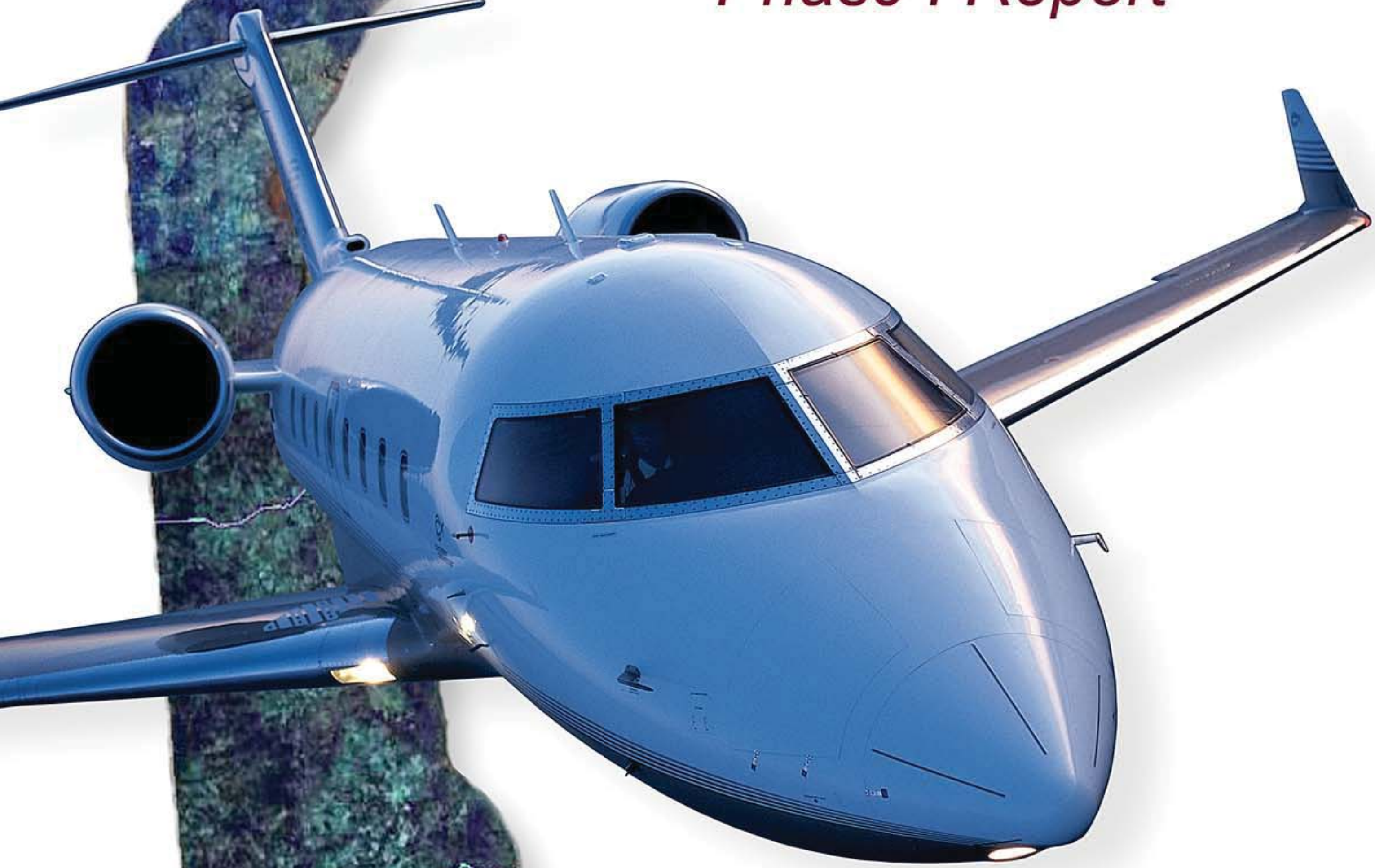
Delaware Aviation System Plan Update

Phase I Report



Prepared for:

STATE OF DELAWARE
Department of Transportation

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Chapter 1:
Issues, Goals, and Objectives

Chapter 1
ISSUES, GOALS, AND OBJECTIVES

THE PREVIOUS DELAWARE STATE AVIATION SYSTEM PLAN Update was completed in 2007, with much of the activity data coming from 2005. Since that time the aviation industry in Delaware has undergone significant changes. In particular, the recession of 2007-2009, soaring avgas and jet fuel prices, the scarcity of funding for operations and capital improvements, and the increasing development of land near airports and throughout the State for residential housing. Of significant concern in this study effort is the economic sustainability of the aviation system over the long term. This study will focus on strategies that are aimed at providing revenue enhancement, cost reductions, and managerial efficiencies. The Delaware State Aviation System Plan Update (SASPU) affords all interested parties in the State an opportunity to discuss these and other aviation challenges and to constructively plan for the future of aviation.

The Delaware Department of Transportation, Office of Aeronautics has initiated a two- phase aviation system planning program. This planning effort will be reviewed for content by DelDOT and the Delaware Aviation Advisory Council. Phase I of the program will quantify the existing and forecast aviation needs for the State, compare the future facility needs to the existing capacity and identify bottlenecks and potential problem areas. Phase II will translate those needs into potential solutions, facilities, services, and financial support for a twenty year planning timeframe. This planning effort will incorporate current planning studies being conducted at Sussex County Airport, Delaware Airpark, and New Castle Airport, along with the results of an assessment of the impacts of green technologies and energy savings for airports in the State.

It is anticipated that all nine public-use airports, one public-use heliport, and the Civil Air Terminal will be included in the SASPU. The study is anticipated to take between eighteen and twenty-four months to complete. This document is the first chapter prepared for inclusion in the Phase I report. Organization of the remainder of this chapter is as follows:

- State Aviation Issues
- State Aviation Goals & Objectives
- Summary

The listing and discussion of these topics does not imply that a final listing of State aviation goals, objectives, and issues has been determined. Rather, these lists can be expanded or contracted throughout the study process as new information becomes available or as a result of Delaware Aviation Advisory Council review.

1. STATE AVIATION ISSUES

Before the inception of the Delaware State Aviation System Plan Update, a number of issues relating to aviation were known to exist in the State. Some of these issues can readily be resolved in the system planning process. Others are outside the scope of the system planning process and may not be resolved in the context of this study. However, this study can be used to bring awareness of the needs and effects of those issues upon the State's aviation system. An initial list of issues identified for study (in no particular order) include the following:

- Future Airport Funding Shortfalls
  - FAA, State, Local
  - Need for Strategic Plan of Economic Sustainability
- Civil Air Terminal Development
  - Air Cargo
  - Schedule Airline Service
- Airport Security Programs
- Delaware Airpark Expansion
- Summit Airport Expansion
- Mitigation or Removal of Airport Airspace Obstructions
- Economic Impacts of Aviation in Delaware
  - Airport Community Value Applied to Recommended Plan
  - Recommendations Prioritized by Economic Sustainability
- Protection/Development of Non-NPIAS Airports
- Airport/Community Land Use Compatibility
- Coordination of SASPU with Other Transportation Planning & the Public
- Future of Military Aviation in Delaware
- Reliable Airport Operations Counts
- Green Technology Impacts

1.1 Future Airport Funding Shortfalls

A significant issue at all Delaware Airports involves the prospect of future funding shortfalls for both operations and capital development. In this regard, the lack of the permanent funding program for FAA has created some uncertainty as to the level of future funding and the need for local matching funds. FAA has informed a number of airports that they do not have the money to implement the larger planned projects that require discretionary funding. These funding issues do not reside solely at the federal level. Both State and local funding shortfalls, caused by the decrease in tax revenues during the recent recession, have had an impact on spending at airports in Delaware. As such, there is a perceived need for a comprehensive strategic plan of economic sustainability for airports in the State.

1.2 Civil Air Terminal Development

Opportunities to develop the Civil Air Terminal for air cargo and airline service have been missed in the past, as inquiries from both air cargo carriers and passenger airlines continue to be made. The process of developing additional ramp for the CAT had progressed to the point of agreement between DelDOT and Kent County, who is the owner of part of the property needed for the ramp expansion. However, that development stalled early in 2011. Similarly, calls from Allegiant Airlines for possible start-up service at the CAT have been met with local enthusiasm but no actual funding for needed improvements. Because the opportunities at the CAT represent potential economic development and job creation, there is some need to find ways of funding the infrastructure required by the carriers requesting its use.

1.3 Airport Security Programs

Because of the proximity of Delaware to Washington, D.C. and other large population centers, potential aviation-borne threats to the Capitol and other large cities are taken seriously. The Department of Homeland Security has had significant interest in making general aviation airports more secure. Guidelines have been published by the Transportation Security Administration for enhancing security at general aviation airports.[1] At the State level, the constant upgrading of security programs are working to reduce the probability of attack or likelihood of terrorist success. The SASPU will incorporate previous statewide general aviation security program work which included vulnerability assessments for each system airport. DelDOT, through its Transportation Management Center, monitors incidents, accidents, events, and potential threats at airports and on highways, coordinating responses through appropriate emergency agencies.

1.4 Expansion of Delaware Airpark

The Delaware Airpark Master Plan recommended the expansion of the airport to incorporate a replacement runway that is longer and wider than the current one. The implementation of this plan was delayed by environmental work, funding shortfalls, and the purchase of needed property around the airport. In fact, the land cost exceeded estimates by a factor of more than three, due to changes in the land's proposed use from agricultural farmland to residential housing. However, it is anticipated that in 2013 the construction of the new runway will be completed. This improvement to the airport should serve to attract more business aviation and based aircraft.

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[1] Security Guidelines for General Aviation Airports, Transportation Security Administration, Information Publication A-001, May 2004.

1.5 Expansion of Summit Airport

Summit Airport was sold to Greenwich AeroGroup in June of 2008. Since that time, Greenwich has taken an aggressive market position, expanding the facilities and work force at Summit Airport. In 2011, new hangars, a paint facility, and roughly 12,000 square feet of office area were under development. Summit has proposed to expand their runway length from the existing 4,488 feet to about 5,300 feet. This increased length would permit Summit to accommodate a number of business jet aircraft types that are currently unable to land at the facility. In addition, Greenwich AeroGroup intends to grow the business at Summit which could mean hundreds of additional jobs at the airport.

1.6 Mitigation or Removal of Potential Airspace Obstructions

The Delaware Code has empowered the Department of Transportation to protect airports and their neighboring areas from potential hazardous operating conditions. This involves the removal or mitigation of existing and potential airspace obstructions to air navigation. In particular, objects that penetrate imaginary approach surfaces to airports can be hazardous to lives and property. Alternatively, obstructions can decrease the capability of the airport by increasing weather minimums. Existing regulations permit the removal of existing obstructions and empower the Office of Aeronautics with review and approval responsibilities for new building permit applications near Delaware airports. Thus far, these obstructions have been identified and the cost of their removal has been estimated. The next step is to prioritize the funding of their removal. The current weakness in the system is the lack of funding needed to remove existing obstructions at privately owned, public-use airports.

1.7 Economic Impacts of Aviation

Accurate estimates of the economic impacts of aviation are significant to the assessment of resource allocation by local and state decision makers. When municipal projects must compete for shrinking amounts of funding, comparative estimates of the return on capital investment between projects can be important. Often the return is measured by the number of jobs, income, and total output created by the undertaking. The current economic impact assessment for Delaware airports is five years old and lacks relevancy for the post-2009 recession period. As such, there is a need to update these numbers and combine them with the recent work on Airport Community Value. Other studies have demonstrated how Airport Community Value can be used to prioritize system plan recommendations to reflect economic sustainability. This is in contrast to the FAA's priority rating system that prioritizes funding based on safety and security at eligible airports.

1.8 Protection/Development of Private Airports and the CAT

Airports are a vanishing resource, not just in Delaware, but across the nation. NASA's Small Aircraft Transportation System (SATS) research has pointed to the increased use of small airports by a greater portion of the general public. Over 98 percent of the nation's population lives within 30 minutes of a small airport. This statistic holds true in Delaware. To make such a system work, small airports and landing sites must be preserved until technology enables their efficient use. While publicly owned airports in Delaware are not under threat of closure, numerous privately owned airports face financial pressures that favor more profitable uses of the land. For example, although Summit Airport is privately owned and included in the NPIAS, its sponsor has not accepted funding from FAA for ten years and as such, is not subject to grant assurances that require the airport to remain open as an airport. Recently, privately owned airports such as Summit Airport and Chorman have invested heavily in their respective facilities. Since 2008, Greenwich AeroGroup has invested more than $12 million in Summit Airport. The owners of Chorman Airport have recently invested in the development of new hangars and taxiway access. The Civil Air Terminal, which is publicly owned, is not a NPIAS airport and thus must rely upon local funding for development. Given that these airports do not enjoy federal funding, the system plan should examine creative ways of supporting their protection and development.

1.9 Airport/Community Land Use Compatibility

An issue that goes hand-in-hand with airport or heliport preservation involves compatible land uses of adjacent properties. In this regard, the land use controls, zoning, and existing land uses of areas surrounding public-use airports and/or heliports will be noted in the inventory effort. Recommendations that could potentially impact surrounding land uses in a negative manner will be avoided if possible. Also, development plans for surrounding land which could adversely affect airports and/or heliports will be addressed. The upshot of this issue may be the recommendation of legislative actions that would protect both airports and their surrounding land uses from incompatible development or use.

1.10 Coordination of SASPU with Other Transportation Planning & the Public

In order to have maximum effectiveness, the State Aviation System Plan Update should be coordinated with other transportation planning in the State and the general public. Recent emphasis upon intermodal transportation, the reduction in carbon footprints, and air/ground linkages for economic development point to the need for a well defined and coordinated plan. In this regard, the SASPU provides a forum for the aviation community and general public to be included in the overall aviation transportation planning in the State. This process is needed in order to better define priorities in funding, project development, and policy consensus. To address this important issue, goals and objectives of the SASPU are directed toward the coordination of the plan with other ongoing transportation planning and the public. In particular, the work of the Delaware Valley Regional Planning Commission, Wilmington Area Planning Council, other State agencies in Delaware, and any other relevant sources will be included in the SASPU.

1.11 Geographic Information System for Delaware Airports

DelDOT has a significant investment in Geographic Information System (GIS) technology. In the past, those resources have not focused on aviation infrastructure in any great detail. Because the need for GIS is increasing in every planning discipline, the aviation system in Delaware should be fully incorporated into the State's GIS. The SASPU will permit the State to develop detailed GIS data for their use. Information including facilities, leases, utilities, property lines, easements, and any other relevant data can be included in the GIS database. Administration of the aviation system can be facilitated by the use of current data that is assembled in one place.

1.12 Future of Military Aviation in Delaware

Military aviation, both at New Castle Airport and Dover Air Force Base, is the single greatest economic impact of aviation in Delaware. Military aviation contributes over $500 million to the State's economy each year and supports thousands of military and civilian jobs. Preservation of the military mission in Delaware should be a top priority to State governmental leaders and should be addressed in the SASPU. Coordination of military aviation planning with civilian aviation planning could be enhanced through this process. For example, development or expansion of the Civil Air Terminal will rely on significant coordination with the military.

1.13 Reliable Airport Operations Counts

Reliable airport operations counts have been difficult to obtain at non-towered airports in Delaware without some type of aircraft counting devices that could be used to sample operational activity. In the past, FAA 5010 forms have been used in estimating annual aircraft operations. These numbers are actually estimates of airport managers and owners and have shown wide variations in the aircraft utilization rates at individual airports. Accurate operations counts are needed in developing forecasts, noise studies, compatible land use plans, and financial plans. Without accurate operations counts, the impacts of an airport may be misrepresented to the local community. For several years, DelDOT's Office of Aeronautics has been collecting data through its noise-activated counters. This program needs to be re-energized and more formalized in order to record any uptick in operational activity that may be occurring since the economic recovery began in 2009. That program and methods for accurately estimating operational activity can be incorporated into the inventory database as a part of the SASPU.

1.14 Green Technology and Energy Savings

In keeping with the economic sustainability strategy for Delaware airports, advances in green technology and energy savings need to be applied to facilities and operational practices. Typically, there can be improvements at airports to reduce energy usage and utility costs by employing green technology and conservation methods. Buildings' visible envelope, heating, electrical lighting, and utility infrastructure systems are all subject to review for improvements such as new low-energy lighting, building insulation, alternative energy generation including wind and solar, and environmentally green methods of operating or developing the facility. These methods are becoming standard practices at airports and must be employed in Delaware. The SASPU can suggest ways to improve overall adaptation to green technologies and utility cost reduction.

2. STATE AVIATION GOALS & OBJECTIVES

ONCE THE STUDY'S ISSUES HAVE BEEN IDENTIFIED, the goals and objectives for the state aviation system must be delineated. While the general approach and format of aviation system planning studies are well established, the ultimate success of the resulting plan depends largely on the initial planning goals and objectives. If the plan is responsive to local and regional aviation goals and objectives, its effectiveness is greatly increased. The goals selected for aviation express desired ends which relate in a technical, operational, economic, environmental, or social context to how the aviation system should develop and how it should be operated. For the purposes of this study, goals are defined as conditions to be achieved. They are derived from values and can be stated, but the degree of their achievement may not be definable. Objectives refer to specific, attainable, and measurable actions which lead to the attainment of goals. Study objectives were classified into categories that help define each of the goals.

The overall goal of the Delaware Department of Transportation, Office of Aeronautics with regard to aviation can be stated as follows:

- To enhance Delaware's economic development by fostering and promoting a safe and efficient aviation system for the movement of goods, services, and people and to encourage and promote aviation and aviation safety. Objectives that support this goal include, but are not limited to the following:

  - To facilitate the timely development of airports that will meet the air transportation needs and economic goals of the State.
  - To ensure that a system of airports is developed that provides a high degree of safety to the users, while at the same time provides adequate levels of service and facilities throughout the State.
  - To maximize the economic benefits and sustainability of the aviation system.
  - To minimize the airport system’s environmental impact.
  - Participate in the process of determining the appropriate role for each Delaware airport and in the provision of a portion of the financial assistance for this development.
  - Make available to the flying public current and accurate information regarding Delaware's aviation system.

With these overall goals and objectives as a background, the more specific system plan study goals and objectives can be created. The following goals and objectives represent an initial set of desired conditions to be achieved in the Delaware aviation system. They will be used throughout the study to shape policy, influence technical criteria and standards, and guide the day-to-day work efforts. In addition, these goals and objectives will provide the impetus and means to examine all of the issues identified previously.

2.1 Aviation System Goals & Objectives

Goals for the aviation system would provide for the development of facilities and services in a manner consistent with and complementary to local economic and social development. As such, an initial goal for the system plan update includes the following:

Goal:

- Develop a system of airports that meets acceptable physical development standards issued by Federal, State, and local agencies, as well as aviation industry development standards.

Objectives:

- To collect all relevant data necessary to develop a system of airports and facilities that maximizes their use.
- To forecast aviation demand for the State's airports through the year 2030, adequately assessing airline, general aviation, cargo, military aviation operations, and surface access needs.
- To monitor airport operations at non-towered airports.
- To quantify existing capacity of airport airside and landside facilities for use in Phase II alternative development scenarios.
- To evaluate the role of privately owned or non-NPIAS airports and make recommendations regarding possible preservation or development of these facilities for the long term to satisfy operational demands and service area voids.
- To evaluate the application of multi-modal linkages to system airports.
- To develop a plan with enough flexibility to be implemented even when certain recommendations cannot be executed.
- To adequately assess and plan for airport security for the State's aviation system.
- To develop a GIS database for system airports.

2.2 Economic Sustainability and Development Goals and Objectives

Ideally, the aviation system would strive for economic sustainability for each of its component airports. In addition, the airport system should support local and State economic goals and plans while providing flexibility to accommodate new opportunities and shifts in development patterns. As such, economic sustainability goals and objectives include the following:

Goal:

- Enhance economic sustainability of system airports through the funding methods, economic incentives, and strategic planning recommendations.

Objectives:

- Consider the economic and financial viability of the State's aviation system and plan for potential future shortfalls in capital funding sources.
- Assist in the funding of revenue-producing infrastructure and other infrastructure related to retention of existing clients and economic development.
- Seek a developmental balance of publicly and privately-owned airports in the State, while maintaining the public's access to safe, adequate facilities.
- Disseminate information to airports on green technology improvement recommendations.
- Maximize Federal financial participation in the development of the aviation system.
- Encourage financial self-sufficiency for airports within the aviation system by enacting policies favorable to aviation businesses and aircraft ownership.
- Incorporate Airport Community Value metrics into the priority ranking of recommendations resulting from the SASPU.
- Develop strategic airport business plans as a part of the statewide aviation system planning efforts.

2.3 Environmental Goals and Objectives

Ideally, airport development would occur in harmony with both the natural environment and human-affected environment. As such, goals and objectives pertaining to the environment are as follows:

Goal:

- Develop a system of airports that conforms to environmental precepts contained in the National Environmental Policy Act Implementing Instructions for Airport Projects (FAA Order 5050.4B).

Objectives:

- Minimize potential environmental impacts identified in FAA Order 5050.4B with special attention to minimizing residential dislocation, mitigating noise impacts, minimizing air and water pollution, protecting wildlife, and preserving cultural resources.

- Develop future recommendations that are compatible with existing land use plans and desired land uses and that reduce objectionable effects of aviation facilities on non-compatible areas, to the extent possible.
- Plan for an energy-efficient system of airports that provides ease of air and ground access.
- Promulgate information concerning environmentally "green" methods of undertaking infrastructure development projects.

2.4 Social Goals and Objectives

Appropriate social goals and objectives would provide facilities and services for all citizens in a manner that maximizes safety, efficiency, and opportunity for use. The primary goal then, is as follows:

Goal:

- Respond to the needs and desires of aviation system users and those affected by the aviation system.

Objectives:

- Plan for the orderly and timely development of the aviation system, maximizing services provided to the system users while minimizing community disruption.
- Integrate airport and airport-related developments with other local community, county, and State development plans and policies along with those proposed by individual airport sponsors and other agencies such as the Wilmington Area Planning Council (WILMAPCO) and the Delaware Valley Regional Planning Commission (DVRPC).
- Ensure the safety of each airport as well as the safety of the entire integrated aviation system.
- Work toward the development of an aviation system that benefits the maximum number of air travelers and job holders, while conserving economic and natural resources to the greatest extent practical.

2.5 Internal Study Process Goals and Objectives

From the FAA's standpoint, Advisory Circular 150/5070-7, **The Airport System Planning Process** describes the content and methods and with which airport systems should be developed. As such, the overall goal of any airport system planning process is to ensure that the air transportation needs of a state or metropolitan area are adequately served by its system of airports, both now and in the future. Translated into the overall goal or purpose for Delaware's system planning study:

Goal:

- A primary purpose of this airport system plan is to study the performance and interaction of the State's aviation system to understand the interrelationship of the member airports.

Objectives:

- To determine the type, extent, location, timing, and cost of the airport development needed in Delaware to establish a viable system of airports, both now and in the future.
- The system planning processes should result in products that can be used by the airport sponsors, State, and FAA in determining these future airport development needs.

Study process goals and objectives provide for an open forum on all aspects of aviation planning within Delaware. These goals and objectives include:

Goal:

- Coordinate the aviation planning process through the Delaware Aviation Advisory Council (DAAC) to develop an awareness of the aviation planning process.

Objectives:

- Coordinate the SASPU process through periodic meetings with the DAAC to discuss interim findings and to integrate those with other transportation planning initiatives and applicable economic development actions.
- Provide information to all groups, agencies, and organizations concerned with aviation and the Delaware State Aviation System Plan Update.
- Ensure that Federal, State, and local officials have an opportunity to participate in the decision-making process during the development and implementation of the system plan.

It should be noted that the goals and objectives presented here represent an initial listing and are subject to additions and revisions as other input is obtained. The study process, therefore, will remain flexible and adaptable to the specific needs of the State of Delaware.

4. SUMMARY

THE ISSUES IDENTIFIED EARLIER SERVE AS focus points for the aviation system planning process in Delaware. The issues mainly refer to specific problem areas that were identified early in the study process. These issues must be dealt with in order to establish an effective State Aviation System for Delaware.

Goals and objectives are the essential bridge between study issues (representing the needs and desires of the local aviation interests) and the technical standards and policies set for the SASPU. In addition, goals and objectives serve to describe the aviation needs and requirements of the entire State. Without goals and objectives, the formulation of consistent policy and direction is difficult, if not impossible.

In general, the system plan is programmed to answer the following primary set of questions:

- How many public-use airports and heliports are needed in Delaware?
- Where should they be located?
- What should be each airport's function and how will its service level best respond to local aviation demand?
- How much will it cost to develop the system of airports and aviation facilities?
- How should the SASPU recommendations be phased over the next 20 years to ensure timely development of the aviation system?

Once these basic questions are answered, a corollary set of questions must then be addressed. These include:

- How can the development of the system encourage economic sustainability for all of the component airports?
- Where will the funding required for development of the system be obtained and who should sponsor the development?
- How will the recommendations of the system plan affect the environment?
- What development is needed at non-NPIAS airports in Delaware and how will that be accomplished over the long term?
- What are the impacts of the aviation system on the other transportation systems within Delaware?
- How does the airport system affect the economy of Delaware?
- How should airport security be addressed by aviation stakeholders including State and local units of government as well as airport tenants and businesses.
- What is the future of military aviation in Delaware and how is it integrated into long range aviation system planning?

Other decision making information will be made available to the DAAC and policy makers as a result of the study. It is anticipated that answers to all of the questions will come from a combination of quantitative analyses and public input and participation in the development of the study.

It cannot be overemphasized that the success of the plan hinges upon aviation community participation and acceptance of the entire process. The most highly sophisticated methodologies and quantitative techniques are of little value if the resulting recommendations are never implemented. The opportunity to participate in this process is a major part of the State Aviation System Plan Update and should be used by interested parties in Delaware to their advantage.

Chapter 2:
Analysis of Existing System

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THE STATE AVIATION SYSTEM PLAN UPDATE (SASPU) process for Delaware is being undertaken at a time of transition in the State's approach to transportation and the administration of its transportation responsibilities. This document will amend the previous State Aviation System Plan to reflect current thinking and update all relevant portions as needed.

The previous Delaware Aviation System Plan Inventory of Existing System was completed in 2006 and featured a system of ten public-use airports and one public-use heliport. These facilities included:

- Chandelle Estates
- Chorman Airport
- Civil Air Terminal at Dover AFB
- Delaware Airpark (NPIAS)
- Jenkins Airport
- Laurel Airport
- New Castle Airport (NPIAS)
- Smyrna Airport
- Summit Airport (NPIAS)
- Sussex County Airport (NPIAS)
- DelDOT Helistop

Only four of the State’s airports are included in the National Plan of Integrated Airport Systems (NPIAS) and thus they were the only facilities eligible for federal funding assistance. The SASP concluded that the recommended system would rely primarily on this minimum system, with supplemental demand accommodation from the other public-use facilities. These other public-use airports, while important to the system, could not be relied upon to remain open throughout the planning period. This includes the Civil Air Terminal at Dover AFB which was closed for six months to civilian flights immediately after 9/11/2001. The privately owned, public-use airports are subject to ownership changes, financial failures, land development pressures, and taxation. Recognizing these factors, the SASP recommended that these facilities be encouraged and supported to the extent possible by State policy and decision makers. However, the bulk of capital funding support was to be directed to the NPIAS airports. To adequately address the analysis of existing system effort, this Chapter has been organized to include the following sections:

- Purpose and Need
- Inventory of Existing Airport System
- Airport Activity Levels
- Airspace Obstructions and Navaids
- Surface Access System
- Socioeconomic Base
- Environmental Considerations

1. PURPOSE AND NEED

To understand the purpose and need for a State Aviation System Plan, it is helpful to consult the Federal Aviation Administration's (FAA's) Advisory Circular (AC) 150/5070-7, **The Airport System Planning Process**. That document summarizes the reasons for conducting a SASP. As stated in the AC, the main purpose of the airport system planning process is to determine the type, extent, location, timing, and cost of the airport development needed in a state or metropolitan area to establish a viable system of airports. DelDOT and the FAA should use the findings of the planning process to guide them in making informed decisions regarding which local airport development proposals to consider for future review and support. The airport system planning process also clarifies Federal, state, and local sponsor objectives, and helps make development of airports part of a regional transportation system.

The product of the process is a cost-effective plan of action to develop airports consistent with established goals and objectives. The process also results in the establishment of perspectives on aviation priorities, such as airport roles, funding, policy strategies, and system trends in activity level. The process ensures that aviation plans remain responsive to the overall air transportation needs of the state or metropolitan area, while identifying the roles and characteristics of existing and recommended new airports, and describing the overall development required at each, including timeframes and estimated project costs. More detailed design, and capital and environmental planning are accomplished under an individual airport’s master plan.

In the context of significant State activity, system planning can be used for a number of purposes including:

- Development of goals and objectives pertaining to airport development, economic development, transportation infrastructure, land use, and environmental factors.
- Development of aviation-oriented objectives involving safety, efficiency, level of service, and economic self-sufficiency.
- Provision of realistic resource requirements for State budgetary consideration.
- Provision of policy and technical direction for master planning efforts at local airports.
- Provision of a forum for public coordination and information concerning aviation policy and pertinent aviation issues.
- Development of recommendations for airport inclusion in the FAA's National Plan of Integrated Airport Systems (NPIAS).
- Development of special studies, in various degrees of detail, concerning safety, environmental, funding, or airport development issues.

As directed by the AC, this airport system planning process will result in products that can be used by the planning organization or individual airport owner or the FAA in determining future airport development needs. In this regard, DelDOT has initiated this process committed to the goal of developing useable end products that will result in implementation of an aviation system that effectively meets user and community needs. The process will focus on the development of a thoughtful, well coordinated, and practical plan, including project scheduling, as well as on the interagency and public coordination needed to successfully put the plan into effect. Ultimately, the SASPU will outline the organizational structure, authority, and responsibility for implementation and will provide a realistic assessment of needs and resources. The plan will also provide guidance and input for the preparation of airport master plans and airport capital improvement plans and serve as an important contribution to the National Plan of Integrated Airport Systems.

2. INVENTORY OF EXISTING AIRPORT SYSTEM

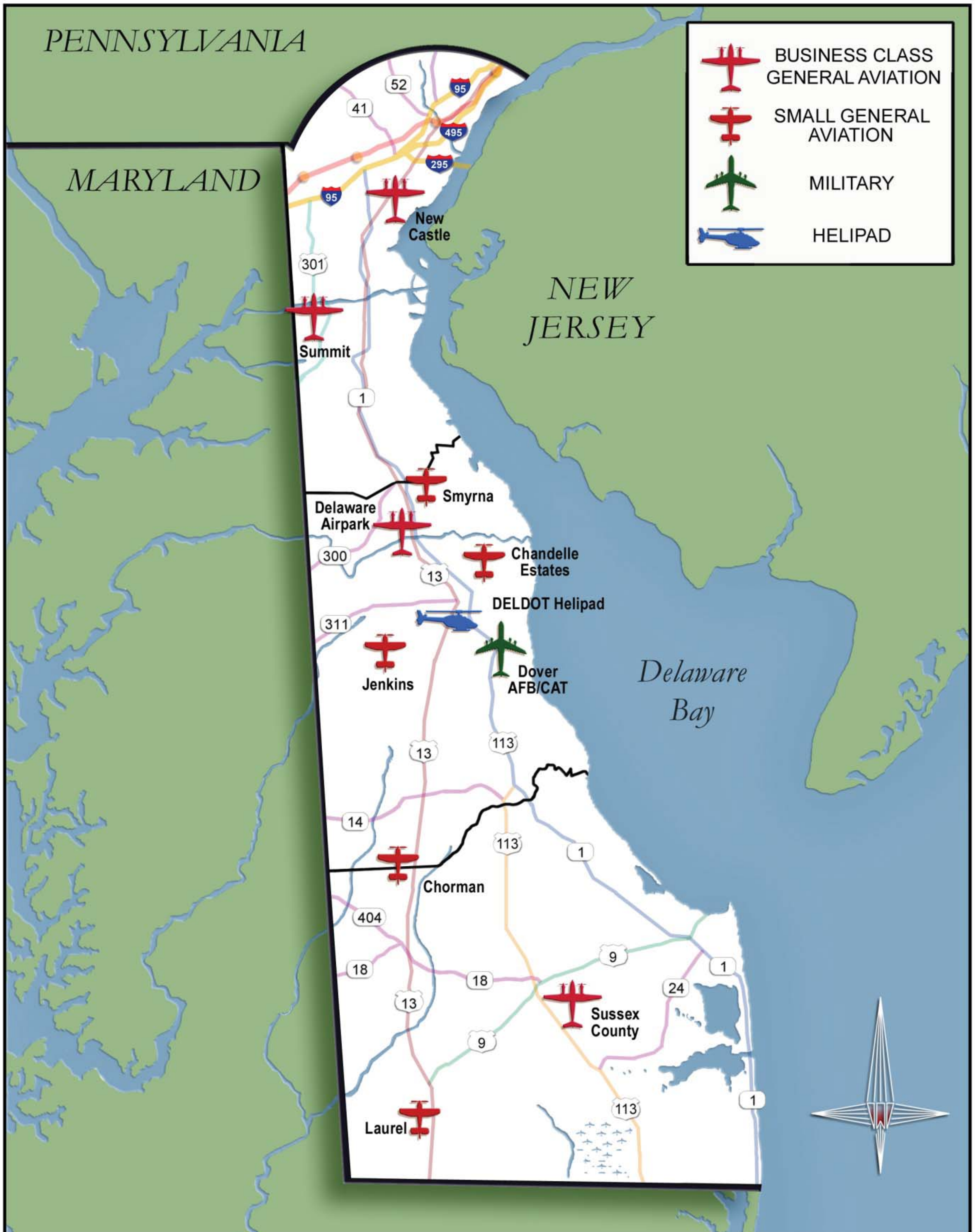
THE FIRST STEP IN DEVELOPING A DATABASE for use in subsequent phases of the study was to analyze the existing aviation system in Delaware. Pertinent data, regarding each airport/heliport and the area it serves was collected or updated from the facilities themselves and appropriate State and local agencies. In addition to the data provided by these sources, Office of Aeronautics staff have collected, tabulated, and reviewed data published by the Federal government and other sources required for comprehensive understanding of the existing aviation system. Maximum use was made of the previous system planning work, various existing airport master plans, and environmental studies that have been completed or that are in process. From these data, the analysis of the existing system was completed.

2.1 Airport and Heliport Facilities

Figure 2-1 presents a map of Delaware showing the locations of each of the existing public-use airports and heliports. The facility inventory records of DelDOT (which are used for the FAA Form 5010), were used as one source of inventory data for airport and heliport facilities. Additional data and information was obtained through review of existing completed airport master plans, and those that are in progress. In addition to the data from published records, on-site inspections of some of the system airports were necessary to inspect runway and taxiway pavement conditions. The inventory effort collected information concerning obstruction data and existing navaids; aircraft operations by type; general condition and type of runways, taxiways, and aprons; size and condition of terminal buildings, and parking facilities. Special attention was given to the physical limitations of each airport for expansion.

Data from the published records, airport master plans, and the on-site inspections provided information for each airport including but not limited to:

- Present classification
- Land area owned or available at the airport
- An inventory of facilities at each airport, such as runways and taxiways, terminal buildings, hangar buildings, and airport lighting systems, aircraft apron, auto parking, cargo facilities, and fueling facilities
- Any limitations on future expansion
- Planned improvements
- Pavement conditions
- Ground access to the airport
- Navigational aids, airspace conditions
- Existing activity levels at system airports



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Delaware State Aviation System Plan Update

DELAWARE PUBLIC-USE AIRPORTS AND HELIPORTS

Figure 2-1

As mentioned above, part of the output from the existing airport facility inventory involved the creation of a computerized database that contains much of the inventory data. In addition to the database, accurate counts of aircraft operations and based aircraft are in the process of being surveyed as a part of the inventory process. For this survey, the State's aircraft operations counting devices are being used by Office of Aeronautics staff to gather accurate operational data.

Airport Classifications

Airport classifications are based on an Airport Reference Code (ARC). The ARC is used to relate airport design criteria to the operational and physical characteristics of the airplanes intended to operate at the airport. The coding system has two components: the aircraft approach category, and the airplane design group. The first component is depicted by a letter (A, B, C, D, or E) and is related to the aircraft approach speed. The second component is depicted by a Roman numeral and is related to the airplane wingspan. The categories of each component are described as follows:

- Aircraft Approach Category is based upon 1.3 times an aircraft's stall speed in their landing configuration at their maximum certificated landing weight:
  - A: Speed less than 91 knots.
  - B: Speed 91 knots or more but less than 121 knots.
  - C: Speed 121 knots or more but less than 141 knots.
  - D: Speed 141 knots or more but less than 166 knots.
  - E: Speed 166 knots or more

- Airplane Design Group is based upon wingspan:
  - I: Up to but not including 49 feet.
  - II: 49 feet up to but not including 79 feet.
  - III: 79 feet up to but not including 118 feet.
  - IV: 118 feet up to but not including 171 feet.
  - V: 171 feet up to but not including 214 feet.
  - VI: 214 feet up to but not including 262 feet.

Under this system, short runway airports and turf airports are classified as A-I and Less than A-I, respectively. Other airports are classified, based upon their design characteristics and critical aircraft type usage. In this regard, each of the State's airports can be classified by ARC as follows:

- A-I or Less:
  - Chandelle Estates Airport
  - Jenkins Airport
  - Laurel Airport

- Smyrna Airport
- B-I, B-II, or B-III
  - Chorman Airport
  - Delaware Airpark
  - Summit Airport
  - Sussex County
- C-I or Higher
  - New Castle Airport
  - Civil Air Terminal at Dover AFB

Description of Facilities

Since the previous aviation system plan, there have been no changes in the number of public-use airports in Delaware. As such, there are currently 9 public-use airports, one joint-use military air base, and one public-use heliport in Delaware. In the following pages, Table 2-1 presents graphic and tabular data that describe each of the existing public-use airports. These airports make up the database of existing facilities from which the recommended aviation system will be developed.

Table 2-1 - Delaware Public-Use Airport Data

CHANDELLE ESTATES

FAA Identifier:	0N4
Location:	3 Miles Northeast of Dover
City:	Dover
County:	Kent
Lat/Long:	N 39-12.14 W 75-29.13
Ownership:	Private
Acreage:	27
Airport role:	Small General Aviation/ Open to the Public
ARC:	Less than A-1
Weather Info:	Not on airport
FSS:	Millville
Based Aircraft:	32
Aircraft Ops:	3,200 100% General Aviation
Airspace:	Class E

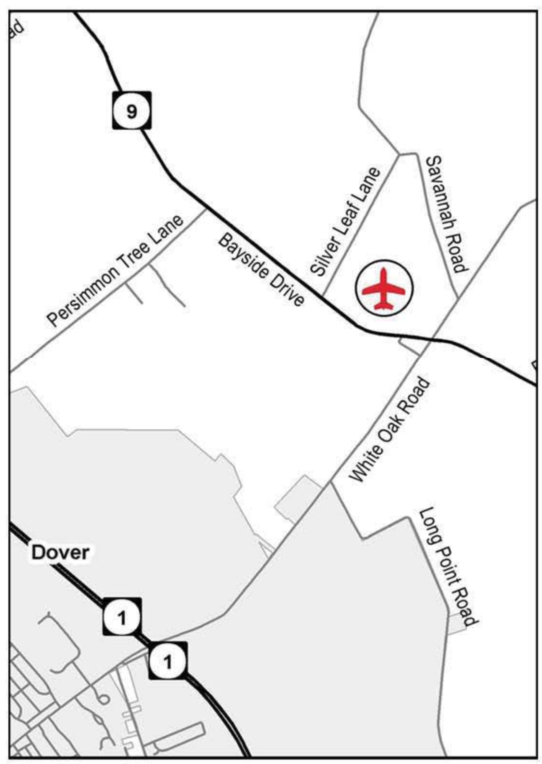


Table 2-1 - Delaware Public-Use Airport Data

CHANDELLE ESTATES

FBO:	RJR Airdome
Services:	
Fuel:	100LL MOGAS
Parking:	Hangars, Tie-downs
Airframe Service:	Major
Powerplant Service:	Major
Bottled Oxygen:	None
Bulk Oxygen:	None
Runway Information:	
Orientation:	4-22
Length:	2,533’
Width:	28’
Strength:	Single-Less than 12,500 lbs.
Surface:	Asphalt
Condition:	Poor
Taxiway:	Turn-Around
Lighting:	LIRL
Visual Landing Aids:	None, None
Navaids:	None

Table 2-1 - Delaware Public-Use Airport Data

CHORMAN AIRPORT

FAA Iden:	D74
Location:	2 Miles Southwest of Farmington
City:	Farmington
County:	Kent
Lat/Long:	N 38-50.58 W 75-36.46
Ownership:	Private
Acreage:	134
Airport role:	Small General Aviation / Open to the Public
ARC:	B-1
Weather Info:	Not on airport
FSS:	Millville
Based Aircraft:	25
Aircraft Ops:	13,200 100% General Aviation
Airspace:	Class E

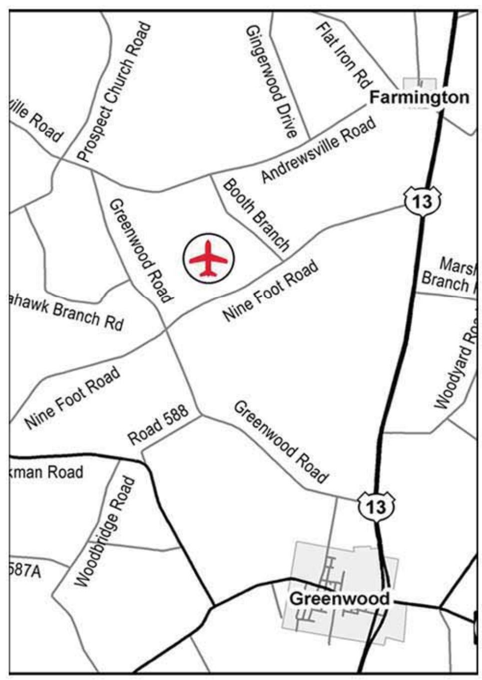


Table 2-1 - Delaware Public-Use Airport Data

CHORMAN AIRPORT

FBO:	Allen Chorman & Son, Inc. Abbott's Aero service Russell Aircraft Refinishing Hangar 6 Aircraft Service
Services:	
Fuel:	None
Parking:	Hangars
Airframe Service:	Major
Powerplant Service:	Major
Bottled Oxygen:	None
Bulk Oxygen:	None
Runway Information:	
Orientation:	16-34
Length:	3,588'
Width:	37'
Strength:	Single-Less than 12,500 lbs.
Surface:	Asphalt
Condition:	Poor
Taxiway:	None
Lighting:	LIRL
Visual Landing Aids:	VASI, VASI
Navaids:	None

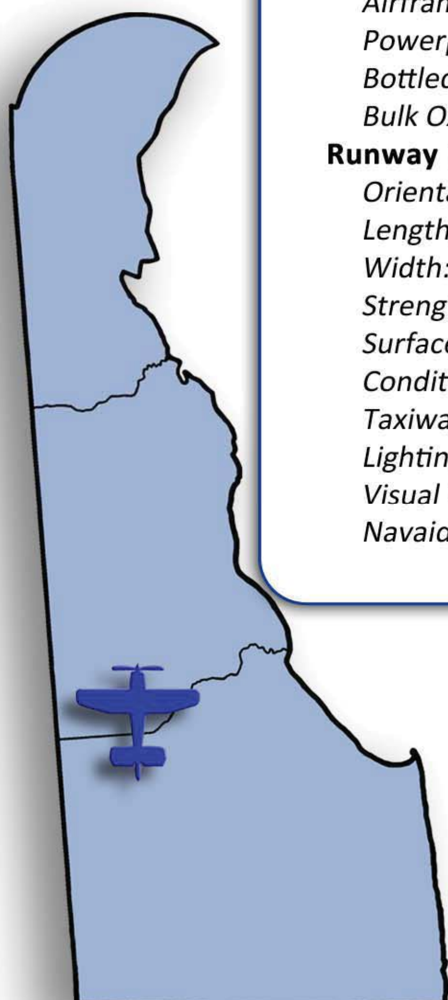


Table 2-1 - Delaware Public-Use Airport Data

CIVIL AIR TERMINAL AT DOVER AFB

FAA Identifier:	DOV
Location:	3 Miles East of Dover
City:	Dover
County:	Kent
Lat/Long:	N 39-07.46 W 75-27.57
Ownership:	State / Military
Acreage:	20
Airport role:	Open to limited General Aviaiton Prior permission only
ARC:	E-VI
Weather Info:	Not on airport
FSS:	Millville
Based Aircraft:	None
Aircraft Ops:	600 General Aviation
Airspace:	Class D

Table 2-1 - Delaware Public-Use Airport Data

CIVIL AIR TERMINAL AT DOVER AFB

FBO:	Delaware River & Bay Authority	
Services:		
Fuel:	Jet A	
Parking:	Hangars	
Airframe Service:	Major	
Powerplant Service:	Major	
Bottled Ox:	None	
Bulk Ox:	None	
Runway Information:		
Orientation:	14-32	1-19
Length:	12,902’	9601‘
Width:	150’	200’
Surface:	Asphalt	Asphalt
Lighting:	HIRL	HIRL
Visual Landing Aids:	None, PAPI	PAPI, PAPI
Navaids:	ILS, LOC, GPS, VOR, TACAN	

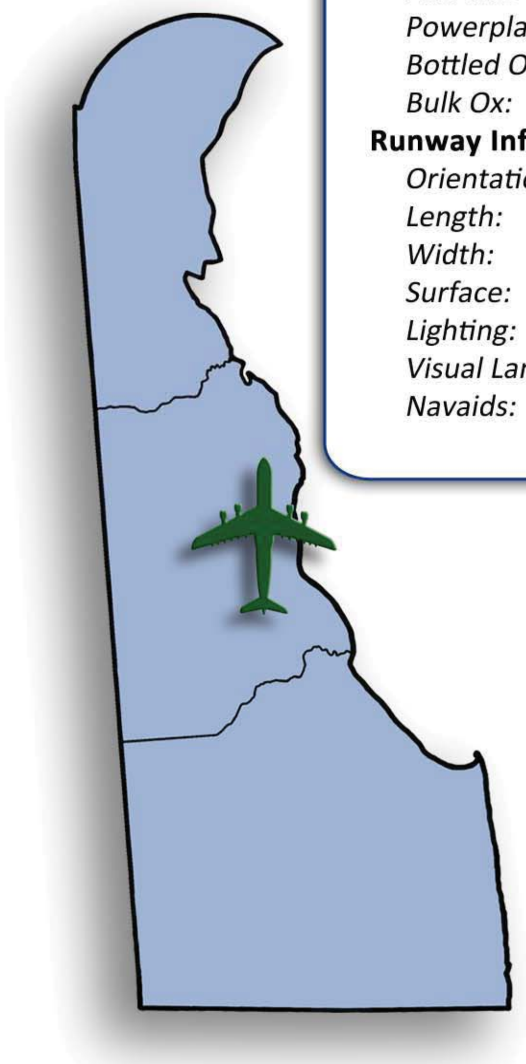


Table 2-1 - Delaware Public-Use Airport Data

DELAWARE AIRPARK

FAA Identifier:	33N
Location:	1 Mile West of Cheswold
City:	Cheswold
County:	Kent
Lat/Long:	N 39-13.06 W 75-35.47
Ownership:	Public
Acreage:	190
Airport role:	Open to the Public
ARC:	B-1
Weather Info:	Not on airport
FSS:	Millville
Based Aircraft:	74
Aircraft Ops:	22,650 100% General Aviation
Airspace:	Class E

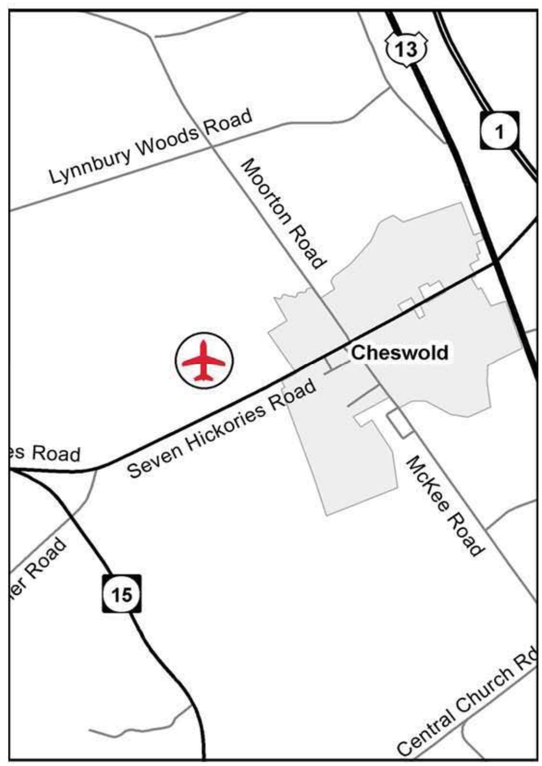


Table 2-1 - Delaware Public-Use Airport Data

DELAWARE AIRPARK

FBO:	Delaware River & Bay Authority
Services:	
Fuel:	100LL
Parking:	Hangars, Tie-downs
Airframe Service:	None
Powerplant Service:	None
Bottled Oxygen:	None
Bulk Oxygen:	None
Runway Information:	
Orientation:	9-27
Length:	3,582’
Width:	60’
Strength:	Single- 13,000 lbs.
	Dual- 18,000 lbs.
Surface:	Asphalt
Condition:	Good
Taxiway:	Full Parallel
Lighting:	MIRL
Visual Landing Aids:	None, None
Navaids:	GPS, VOR

Table 2-1 - Delaware Public-Use Airport Data

JENKINS AIRPORT

FAA Identifier:	15N
Location:	1 Mile West of Wyoming
City:	Wyoming
County:	Kent
Lat/Long:	N 39-07.02 W 75-35.03
Ownership:	Private
Acreage:	60
Airport role:	Open to the Public
ARC:	Less Than A-1
Weather Info:	Not on airport
FSS:	Millville
Based Aircraft:	26
Aircraft Ops:	1,400 100% General Aviation
Airspace:	Class E

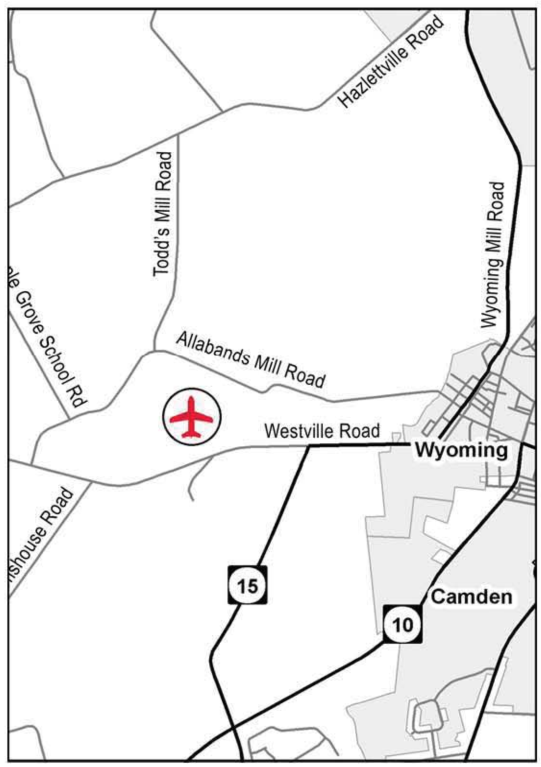


Table 2-1 - Delaware Public-Use Airport Data

JENKINS AIRPORT

FBO:	Joe C. Jenkins	
Services:		
Fuel:	None	
Parking:	Hangars, Tie-downs	
Airframe Service:	Major	
Powerplant Service:	Major	
Bottled Oxygen:	None	
Bulk Oxygen:	None	
Runway Information:		
Orientation:	18-36	12-30
Length:	2,842′	2,035′
Width:	70′	70′
Strength:	NA	NA
Surface:	Turf	Turf
Condition:	Good	Good
Lighting:	LIRL	None
Visual Landing Aids:	VASI, VASI	None, None
Navaids:	None	

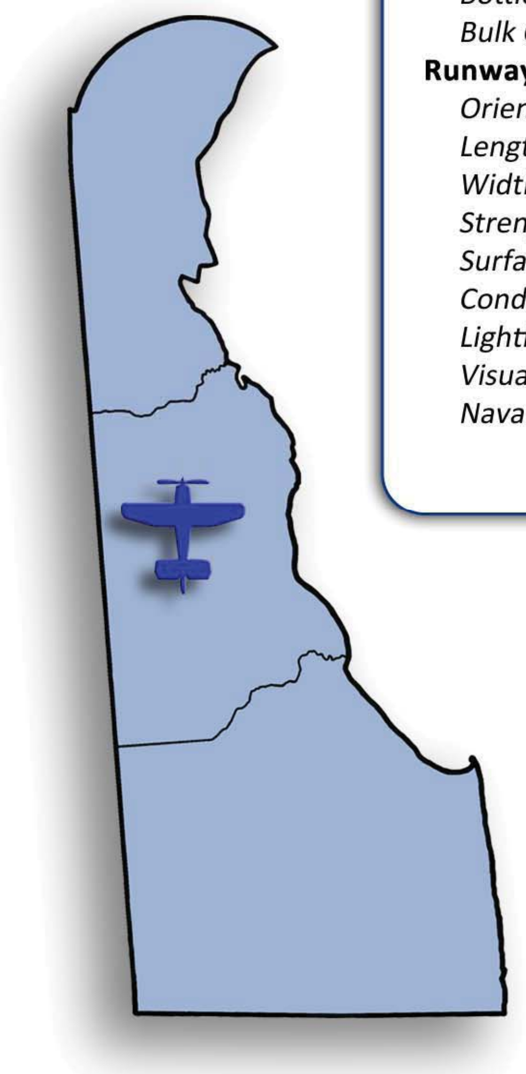


Table 2-1 - Delaware Public-Use Airport Data

LAUREL MUNICIPAL AIRPORT

FAA Identifier:	N06
Location:	1 Mile Southwest of Laurel
City:	Laurel
County:	Sussex
Lat/Long:	N 38-32.31 W 75-35.39
Ownership:	Private
Acreage:	88
Airport role:	Small General Aviation/ Open to the Public
ARC:	Less Than A-I
Weather Info:	Not on Airport
FSS:	Millville
Based Aircraft:	18
Aircraft Ops:	7,750 Annually 100% General Aviation
Airspace:	Class E

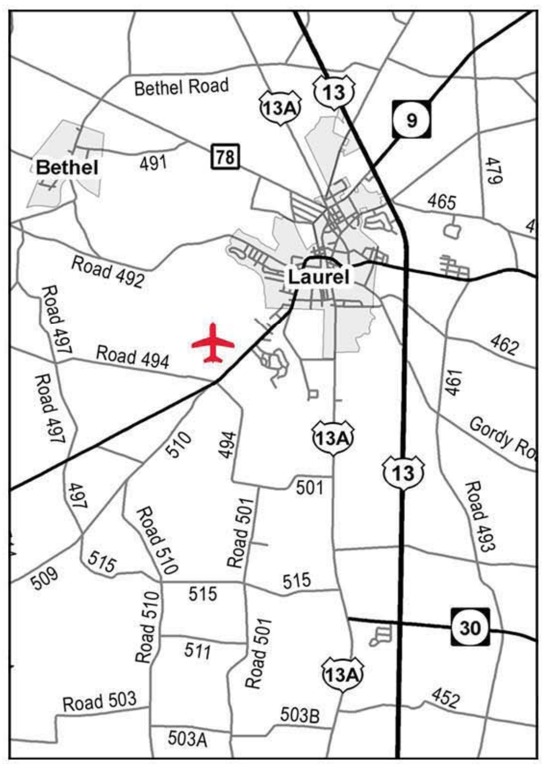


Table 2-1 - Delaware Public-Use Airport Data

LAUREL MUNICIPAL AIRPORT

FBO:	Air Ag, Inc. Sky Dive DelMarVa, Inc. Aircraft Insp. & Maintenance
Services:	
Fuel:	None
Parking:	Hangars, Tiedowns
Airframe Service:	Major
Powerplant Service:	Major
Bottled Oxygen:	None
Bulk Oxygen:	None
Runway Information:	
Orientation:	15-33
Length:	3,175’
Width:	270’
Strength:	NA
Surface:	Turf
Condition:	NA
Taxiway:	None
Lighting:	LIRL
Visual Landing Aids:	VASI, VASI
Navaids:	GPS

Table 2-1 - Delaware Public-Use Airport Data

NEW CASTLE AIRPORT

FAA Identifier:	ILG
Location:	4 Miles South of Wilmington
City:	Wilmington
County:	New Castle
Lat/Long:	N 39-40.43 W 75-36.23
Ownership:	Public
Acreage:	1,250
Airport role:	Commercial Service/ Open to the Public
ARC:	D-III
Weather Info:	ASOS (302) 328-1536
FSS:	Millville
Based Aircraft:	249
Aircraft Ops:	78,840 Annually 69,970 General Aviation 8,870 Military
Airspace:	Class D

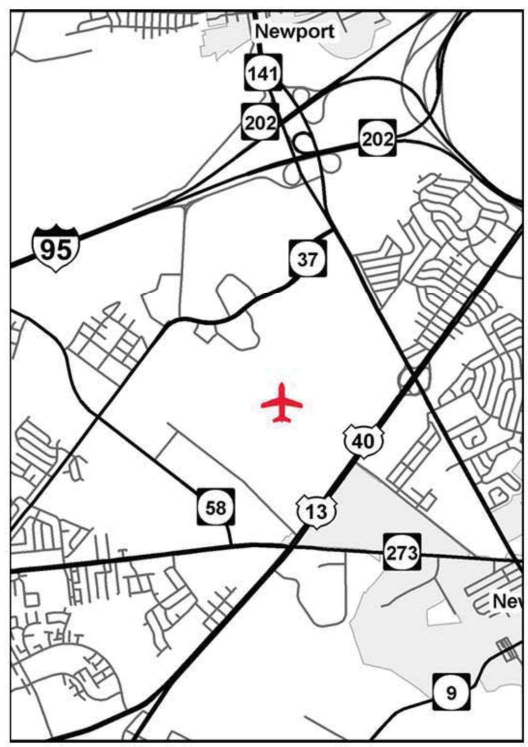


Table 2-1 - Delaware Public-Use Airport Data

NEW CASTLE AIRPORT

FBO:	Aero Taxi, Inc. Dassault Falcon Jet AvCenter-Wilmington		
Services:			
Fuel:	100LL, Jet A		
Parking:	Hangars, Tie-downs		
Airframe Service:	Major		
Powerplant Service:	Major		
Bottled Oxygen:	High/Low		
Bulk Oxygen:	High/low		
Runway Information:			
Orientation:	9-27	1-19	14-32
Length:	7,181'	7,002'	5,004'
Width:	150'	200'	150'
Strength:	Single-90,000 Dual-140,000	Single-90,000 Dual-140,000	Single-50,000 Dual-60,000
Surface:	Asphalt	Asphalt	Asphalt
Condition:	Excellent	Good	Fair
Taxiway:	Full Parallel	Partial Parallel	Full Parallel
Lighting:	HIRL	HIRL	MIRL
Visual Landing Aids:	PAPI, PAPI	MALSR, PAPI	None, VASI
Navaids:	ILS, LOC, GPS, VOR		

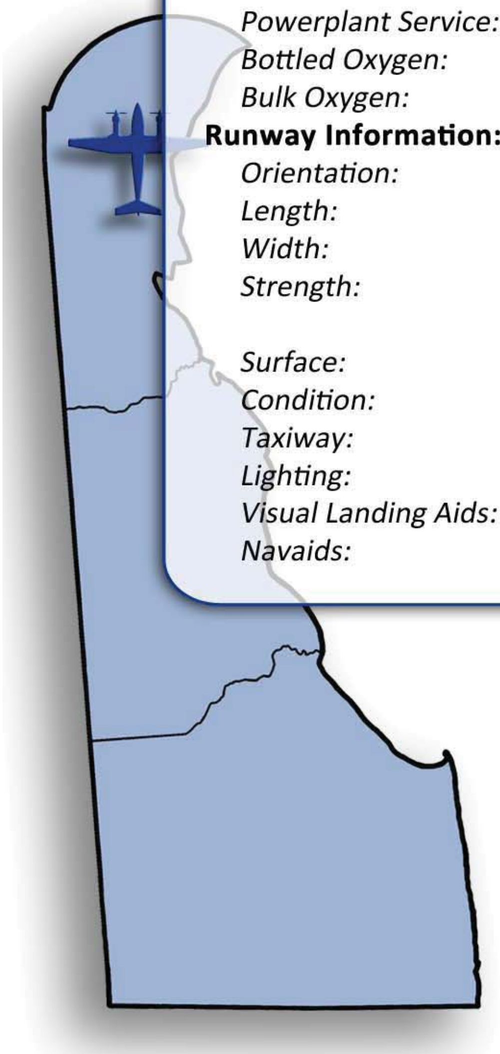


Table 2-1 - Delaware Public-Use Airport Data

SMYRNA AIRPORT

FAA Identifier:	38N
Location:	1 Mile East of Smyrna
City:	Smyrna
County:	Kent
Lat/Long:	N 39-18.13 W 75-35.01
Ownership:	Private
Acreage:	20
Airport role:	Small General Aviation/ Open to the Public
ARC:	Less Than A-1
Weather Info:	Not on airport
FSS:	Millville
Based Aircraft:	13
Aircraft Ops:	2,300 100% General Aviation
Airspace:	Class E

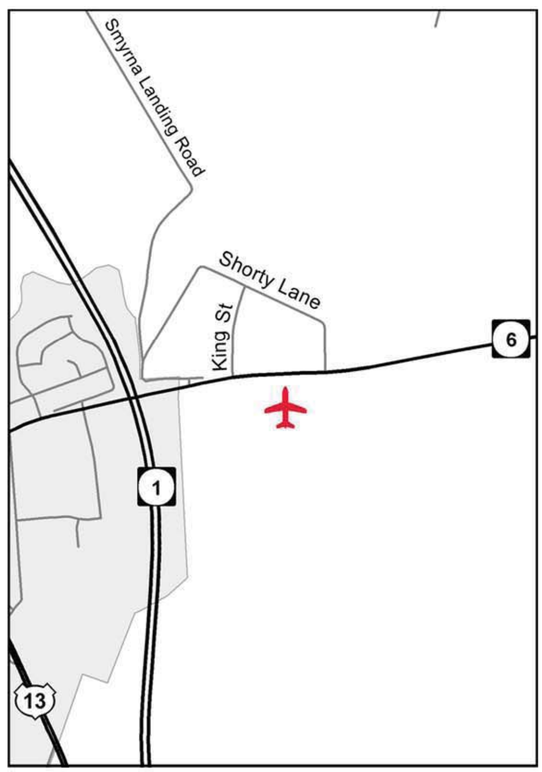


Table 2-1 - Delaware Public-Use Airport Data

SMYRNA AIRPORT

FBO:	Reynolds L. Jones
Services:	
Fuel:	100LL, MOGAS
Parking:	Hangars, Tie-downs
Airframe Service:	None
Powerplant Service:	None
Bottled Oxygen:	None
Bulk Oxygen:	None
Runway Information:	
Orientation:	10-28
Length:	2,600’
Width:	125’
Strength:	NA
Surface:	Turf
Condition:	Good
Lighting:	LIRL
Visual Landing Aids:	VASI, VASI
Navaids:	None

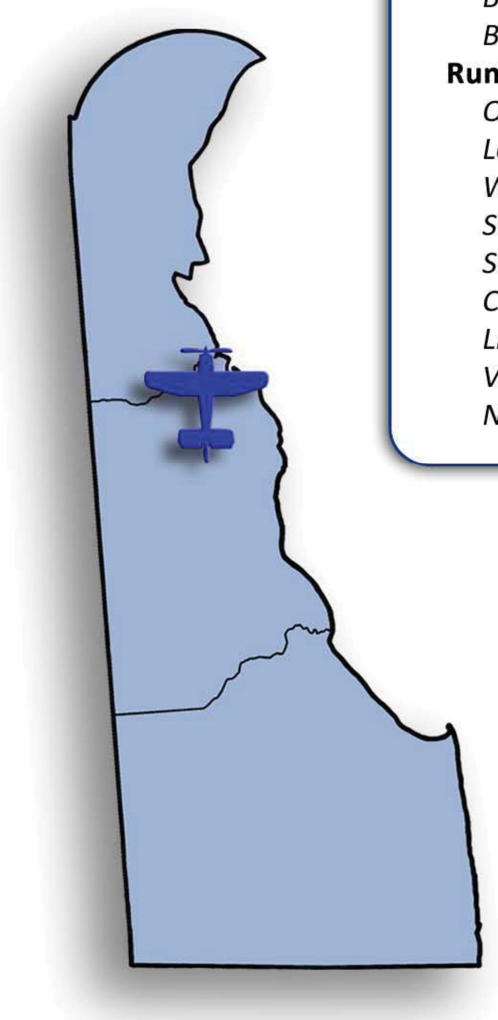


Table 2-1 - Delaware Public-Use Airport Data

SUMMIT AIRPORT

FAA Identifier:	EVY
Location:	5 Miles North of Middletown
City:	Middletown
County:	New Castle
Lat/Long:	N 39-31.15 W 75-43.25
Ownership:	Private
Acreage:	209
Airport role:	General Aviation/ Open to the Public
ARC:	B-II
Weather Info:	AWOS-3 123.325 (302) 378-2063
FSS:	Millville
Based Aircraft:	57
Aircraft Ops:	41,500 Annually 41,400 General Aviation 100 Military 175 Air Taxi
Airspace:	Class E

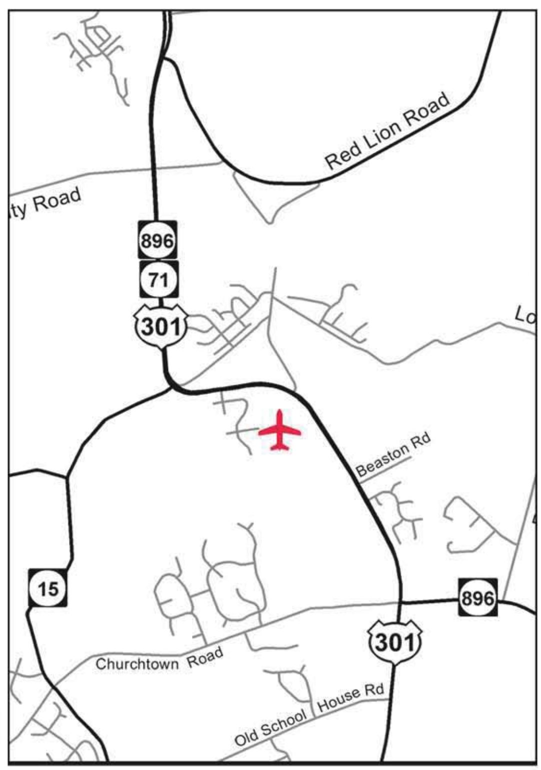


Table 2-1 - Delaware Public-Use Airport Data

SUMMIT AIRPORT

FBO:	Summit Aviation, Inc.	
Services:		
Fuel:	100LL, Jet A	
Parking:	Hangars, Tie-downs	
Airframe Service:	Major	
Powerplant Service:	Major	
Bottled Oxygen:	None	
Bulk Oxygen:	Low	
Runway Information:		
Orientation:	17-35	11-29
Length:	4,487’	3,600‘
Width:	65’	200’
Strength:	Single-18,000 lbs.	NA
Surface:	Asphalt	Turf
Condition:	Good	Good
Lighting:	MIRL	LIRL
Visual Landing Aids:	PAPI, PAPI	REIL, REIL
Navaids:	GPS, NDB	

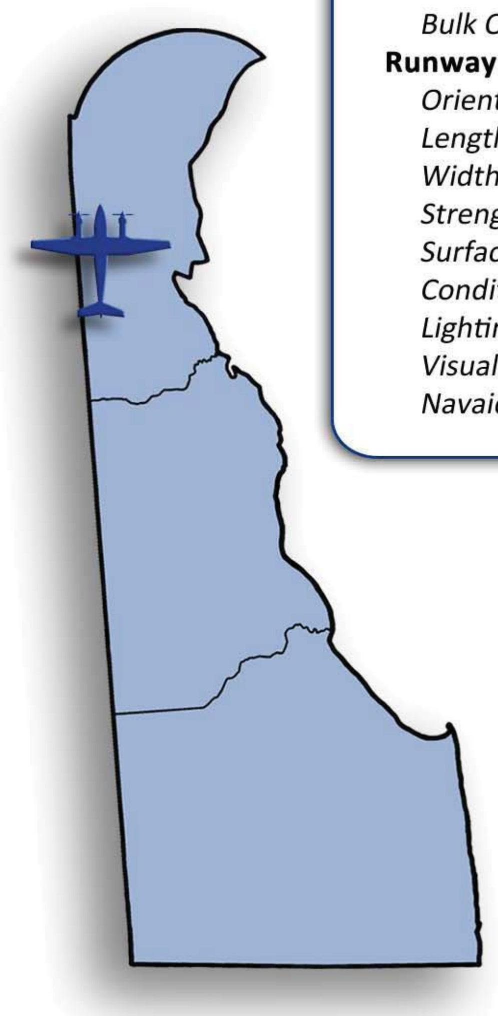


Table 2-1 - Delaware Public-Use Airport Data

SUSSEX COUNTY AIRPORT

FAA Identifier:	GED
Location:	2 Miles Southeast of Georgetown
City:	Georgetown
County:	Sussex
Lat/Long:	N 38-41.16 W 75-21.30
Ownership:	Public
Acreage:	615
Airport role:	General Aviation/ Open to the Public
ARC:	B-III
Weather Info:	ASOS-3 118.375 (302) 856-2927
FSS:	Millville
Based Aircraft:	82
Aircraft Ops:	34,000 Annually 33,900 General Aviation 100 Military
Airspace:	Class E

Table 2-1 - Delaware Public-Use Airport Data

SUSSEX COUNTY AIRPORT

FBO:	Georgetown Air Service	
Services:		
Fuel:	100LL, Jet A	
Parking:	Hangars, Tie-downs	
Airframe Service:	Major	
Powerplant Service:	Major	
Bottled Oxygen:	None	
Bulk Oxygen:	None	
Runway Information:		
Orientation:	4-22	10-28
Length:	5,000’	3,109‘
Width:	150’	75’
Strength:	Dual-70,000 lbs.	Dual-70,000 lbs.
Surface:	Asphalt	Asphalt
Condition:	Good	Excellent
Taxiway:	Full Parallel	None
Lighting:	MIRL	MIRL
Visual Landing Aids:	PAPI, PAPI	PAPI, PAPI
Navaids:	GPS, VOR	

Table 2-1 - Delaware Public-Use Airport Data

DELDOT HELISTOP

FAA Identifier:	0N5
Location:	On the Delaware Department of Transportation campus in Dover
City:	Dover
County:	Kent
Lat/Long:	N 39-08.58 W 75-30.17
Ownership:	Public
Acreage:	1
Airport role:	General Aviation/ Open to the Public
ARC:	None
Weather Info:	Not on Airport
FSS:	Millville
Based Aircraft:	None
Aircraft Ops:	30
Airspace:	Class E

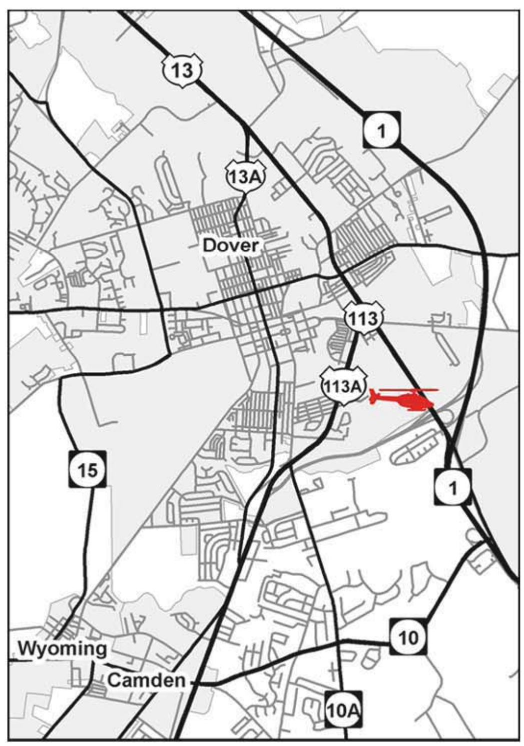


Table 2-1 - Delaware Public-Use Airport Data

DELDOT HELISTOP

FBO:	DelDOT
Services:	
Fuel:	None
Parking:	None
Airframe Service:	None
Powerplant Service:	None
Bottled Oxygen:	None
Bulk Oxygen:	None
Runway Information:	
Orientation:	NA
Length:	60’
Width:	60’
Surface:	Asphalt
Condition:	Good
Taxiway:	NA
Lighting:	Perimeter Lights
Visual Landing Aids:	None
Navaids:	None

3. AIRPORT ACTIVITY LEVELS

THE PAST AND PRESENT AIR TRAFFIC VOLUMES at the existing public-use airports in the State were reviewed to establish a basis for forecasting future aeronautical activity. The categories of air traffic activity collected and studied included:

- General Aviation
  - Registered aircraft
  - Based aircraft
  - Fleet mix
  - Aircraft operations and peaking characteristics
- Military
  - Total aircraft operations at system airports

The primary source for aircraft activity information at the outset of the planning effort was airport management records, Air Traffic Control Tower (ATCT) records, FAA Form 5010 data, and aircraft activity counts from the State's airport operations counting program. Historical information used to develop the registered aircraft forecast was based on data compiled by private vendors (Avantext, Hi-Tech Marketing) for the years 1997-2010.

Data regarding military aviation operations was collected from Dover AFB, New Castle Airport, and Sussex County Airport. Although the Civil Air Terminal is located at Dover Air Force Base, military operations at Dover AFB are not considered to be a part of the CAT's operations. Sussex County Airport and Summit Airport show only a small number of military operations each year. Military activity in the State consists mostly of Dover traffic, with additional weekend training and transport operations conducted by the Air National Guard. The level of military operations is determined by the Department of Defense policy and Congressional funding.

Table 2-2 presents a summary of aircraft activity for all categories. As shown, all general aviation activity for 2010 totaled 129,773 operations. Military operations totaled 132,674, with Dover AFB showing the major share of activity (125,000). The top three airports in the State with regard to based aircraft are: New Castle County (189), Sussex County (62), and Delaware Airpark (56).

Table 2-2 – Airport Activity Summary			
AIRPORT	**ANNUAL OPERATIONS**		**BASED AIRCRAFT**
	General Aviation	Military	
Chandelle Estates	3,200	0	24
Chorman	13,200	0	19
Civil Air Terminal at Dover AFB	600	124,000[1]	0
Delaware Airpark	22,650	0	56
Jenkins Airport	1,400	0	20
Laurel Airport	8,950	0	14
New Castle Airport	69,970	8,870	189
Smyrna Airport	2,300	0	10
Summit Airport	41,400	100	43
Sussex County Airport	33,900	100	62
DELDOT Helistop	0	0	
GRAND TOTALS	197,570	133,070	437

[1] Dover Air Force Base Operations

4. AIRSPACE OBSTRUCTIONS AND NAVAIDS

For this SASPU, the airspace inventory focused on the obstructions and navaids associated with each airport. In the past, emphasis was given to airspace structure and en route facilities which could not be impacted by airport sponsor actions. By turning the focus onto the obstructions and instrument approaches, the SASPU can become more relevant to DelDOT and airport sponsors charged with improving air transportation operations at Delaware airports. As such, this section is organized to address the following topics:

- Airspace Obstructions
- Instrument Approaches and Navaids

4.1 Airspace Obstructions

Airspace obstructions are defined by FAR Part 77 – Objects Affecting Navigable Airspace. In Delaware, many of the public-use airports have obstructions of varying severity. Some are lighted for visual reference and avoidance at night. In other cases, runway thresholds have been displaced to permit obstruction clearance in the approach slope of landing aircraft. Other obstructions simply exist and must be avoided by pilots. To adequately address airspace obstructions in this inventory, the FAR Part 77 definitions are presented, along with recent information on obstruction identification at Delaware airports.

FAR Part 77-Objects Affecting Navigable Airspace

Obstruction clearance requirements on and around the airport are contained in Federal Aviation Regulation Part 77, Objects Affecting Navigable Airspace. Objects which penetrate these imaginary surfaces are considered obstructions and may require removal, lowering or lighting. These surfaces consist of five areas that vary in size and configuration based upon the function of the airport and the type of approach to that airport. The following discusses the location of these five areas:

- ***Primary Surface:*** The primary surface is an imaginary surface longitudinally centered on the runway. The primary surface extends 200 feet beyond each runway end. The elevation of any point on the primary surface is the same as the elevation along the nearest associated point on the runway centerline.

- ***Approach Surface:*** An approach surface is also established for each runway. The approach surface is the same width as the primary surface and begins at the primary surface end. The approach surface will extend upward and outward from the primary surface end and is centered along an extended runway centerline.

- ***Transitional Surface:*** Each runway has a transitional surface that begins at the outside edge of the primary surface at the same elevation as the runway. The transitional surface also connects with the approach surfaces of each runway. The surface rises at a slope of 7:1, up to a height 150 feet above the highest runway elevation. At that point, the transitional surface is replaced by the horizontal surface.

- ***Horizontal Surface:*** The horizontal surface is established at 150 feet above the highest elevation of the runway surface. Having no slope, the horizontal surface connects the transitional and approach surfaces to the conical surface at a distance of 10,000 feet from the end of the primary surfaces of each runway.

- ***Conical Surface:*** The conical surface begins at the outer edge of the horizontal surface. The conical surface then continues for an additional 4,000 feet horizontally at a slope of 20:1. Therefore, at 4,000 feet from the horizontal surface, the elevation of the conical surface is 350 feet above the highest airport elevation.

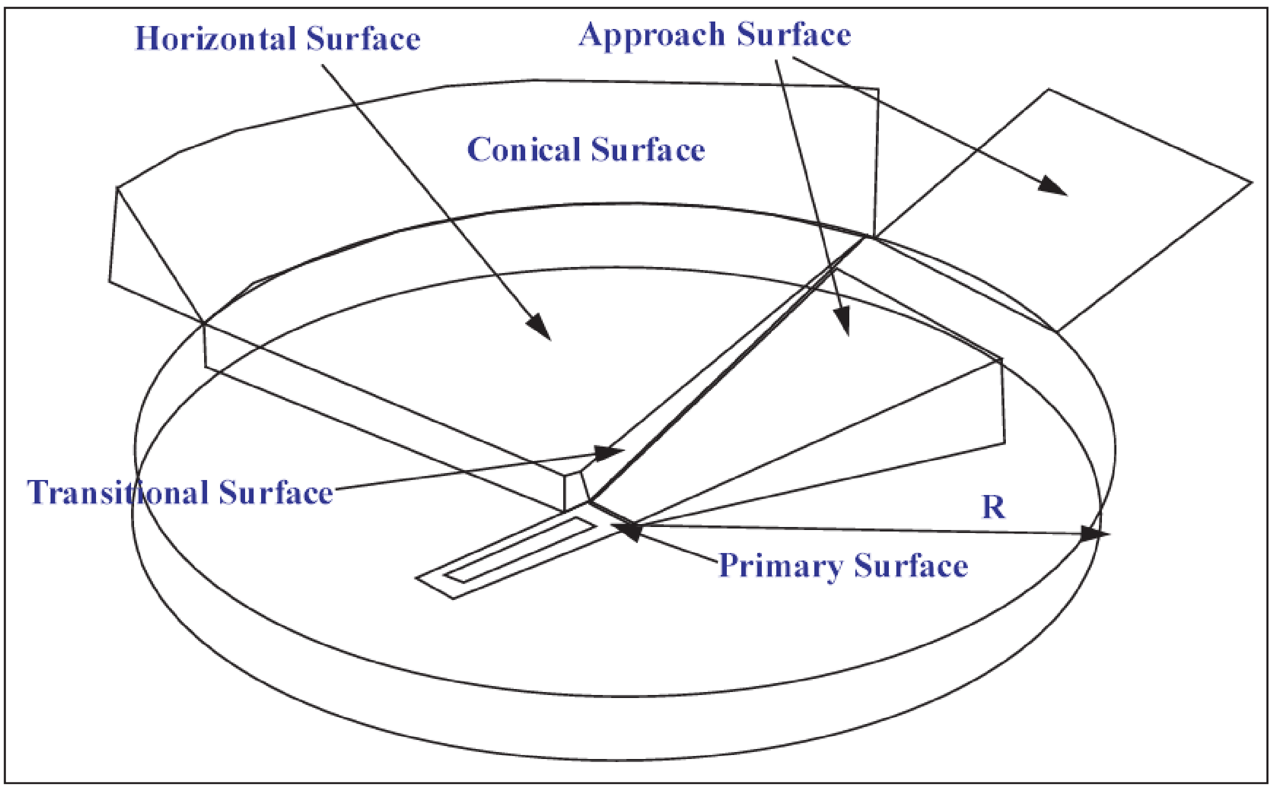


Figure 2-2 – FAR Part 77 Imaginary Surfaces

Inventory of Obstructions

In the subsections that follow, a summary table of height-obstructions is presented for each public-use airport in the State. Because the LiDAR data used in compiling these results is two or three years old, some data may be outdated as of this printing. However, it represents the most comprehensive compilation of data on airport obstructions for public-use airports in the State.

Chandelle Estates

Chandelle Estates Airport (0N6) has one paved runway 2,533 feet in length by 28 feet in width. There are significant displaced thresholds on both runway ends caused by trees. Runway End 4 has a displaced threshold of 539 feet and Runway End 22 has a displaced threshold of 538 feet. The analysis of Chandelle Estates identified 11 main areas of obstructions located on 24.35 acres surrounding the Airport. These obstructions penetrate three of the Airport's surfaces: Primary, Approach, and Transitional. There are an additional 154 single obstructions identified at the Airport. A summary of the existing height obstructions identified using LIDAR and GIS data are presented in Table 2-3.

Table 2-3 - Chandelle Estates Height Obstructions

ID	Type	Max HAS	Average HAS	Acres	Runway Orientation	FAR Part 77 Surface
2	Forested Area	75.23	32.46	4.98	22	Approach
3	Forested Area	70.00	20.84	9.93	22	Transitional
4	Cluster of Trees	-6.64	-8.90	0.63	22	Approach/Transitional
5	Power Lines	42.12	2.95	1.85	22	Approach
6	Forested Area	23.36	0.30	1.37	22	Primary
7	Forested Area	55.36	24.28	1.35	4/22	Primary/Transitional
8	Cluster of Trees	38.94	15.50	0.54	4/22	Primary/Transitional
9	Forested Area	-5.98	-8.75	0.71	4	Transitional
10	Trees & Buildings	5.19	-5.54	1.97	4	Transitional
49	Cluster of Trees	47.25	19.27	.68	22	Primary/Transitional
50	Cluster of Trees	47.77	20.47	.34	22	Primary/Transitional
	12 Obstructions	-	-	-	22	Primary
	4 Obstructions	-	-	-	22	Approach
	30 Obstructions	-	-	-	22	Transitional
	25 Obstructions	-	-	-	4-22	Primary
	49 Obstructions	-	-	-	4-22	Transitional
	10 Obstructions	-	-	-	4	Primary
	12 Obstructions	-	-	-	4	Approach
	12 Obstructions	-	-	-	4	Transitional

Legend – HAS = Height Above Part 77 Surface, FAR = Federal Aviation Regulations

Figure 2-3 - Chandelle Estates Obstruction Areas

Chorman Airport

Chorman Airport (D74) has one paved runway 3,588 feet by 37 feet. The runway does not have a displaced threshold. The analysis of Chorman Airport identified six main areas of obstructions located on 19.88 acres of land. The existing height obstructions identified using LIDAR and GIS data are presented in Table 2-4.

Table 2-4 - Chorman Airport Height Obstructions

ID	Type	Max HAS	Average HAS	Acres	Runway Orientation	FAR Part 77 Surface
12	Forested Area	15.23	-3.47	1.16	16/34	Transitional
13	Forested Area	4.02	-5.97	1.31	16	Transitional
14	Forested Area	-4.08	-8.17	3.09	16	Approach
11	Forested Area	27.04	-1.10	5.15	34	Approach
15	Forested Area	21.50	-1.00	7.60	34	Transitional
16	Forested Area	14.05	-2.75	1.57	34	Transitional

	10 Obstructions	-	-	-	34	Approach
	9 Obstructions	-	-	-	34	Transitional
	1 Obstruction	-	-	-	16	Transitional

Figure 2-4 - Chorman Obstruction Areas

Delaware Airpark

Delaware Airpark (33N) has one paved runway 3,582 feet by 60 feet. Runway End 27 has a displaced threshold of 350 feet. The analysis of Delaware Airpark identified 12 main areas of obstructions located on 69 acres of land. Forty-four individual obstructions were also identified through this process. The existing height obstructions identified using LIDAR and GIS data are presented in Table 2-5.

Table 2-5 - Delaware Airpark Height Obstructions

ID	Type	Max HAS	Average HAS	Area (acres)	Runway Orientation	Part 77 Surface
51	Forested Area	27.49	0.92	6.64	9	Approach
52	Forested Area	26.34	0.39	8.48	9	Transitional
53	Forested Area	12.70	-2.18	2.09	9	Transitional
54	Line of Trees	40.08	14.78	1.27	9	Primary

Table 2-5 - Delaware Airpark Height Obstructions						
ID	**Type**	**Max HAS**	**Average HAS**	**Area (acres)**	**Runway Orientation**	**Part 77 Surface**
55	Forested Area	33.96	6.70	1.74	9	Transitional
56	Forested Area	66.99	14.76	5.15	9 27	Transitional
57	Forested Area	32.47	4.60	1.53	9 27	Transitional
58	Forested Area	82.31	31.08	2.02	9 27	Primary
59	Forested Area	78.96	33.38	3.44	27	Primary
60	Forested Area	69.69	12.22	26.40	27	Transitional
61	Trees and Buildings	41.96	6.89	0.82	27	Transitional
62	Forested Area	13.75	-4.37	9.37	27	Approach
	1 Obstruction	-	-	-	27	Primary
	16 Obstructions	-	-	-	27	Approach
	7 Obstructions	-	-	-	27	Transitional
	2 Obstructions	-	-	-	9	Transitional
	14 Obstructions	-	-	-	9 27	Primary
	4 Obstructions	-	-	-	9 27	Transitional

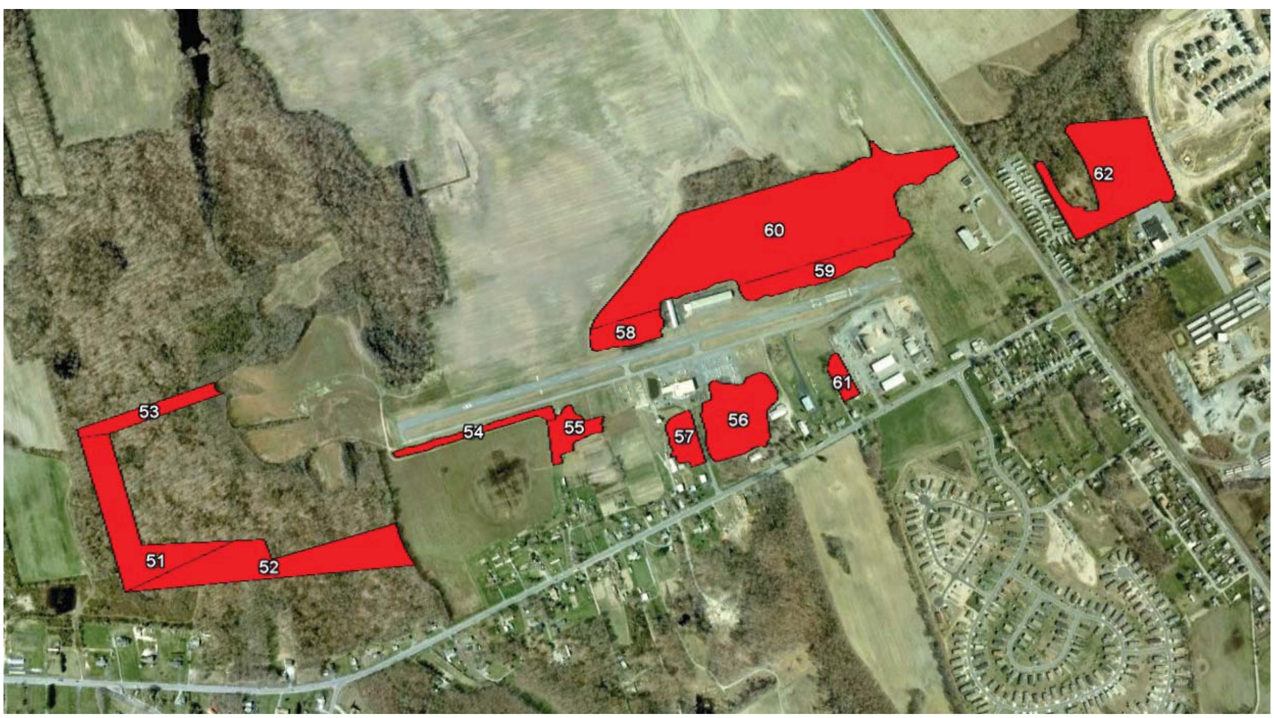


Figure 2-5 - Delaware Airpark Obstruction Areas

Jenkins Airport

Jenkins Airport (15N) has two turf runways. Runway 18-36 is 2,842 feet by 70 feet and Runway 12-30 is a crosswind runway that is 2,035 feet by 70 feet. Runway End 36 has a displaced threshold of 225 feet. The analysis of Jenkins Airport identified 16 main areas of obstructions located on 86.11 acres of land. Seventy-one individual obstructions were also identified through this process. The existing height obstructions identified using LIDAR and GIS data are presented in Table 2-6.

Table 2-6 – Jenkins Airport Height Obstructions

ID	Type	Max HAS	Average HAS	Acres	Runway Orientation	FAR Part 77 Surface
17	Forested Area	89.22	31.52	7.10	18	Approach
18	Forested Area	97.63	12.59	9.90	18	Transitional
19	Forested Area	63.12	15.32	6.49	18	Transitional
20	Forested Area	99.30	39.13	3.79	12 and 18	Primary/approach 12; Transitional 18
21	Forested Area	102.37	44.65	0.56	18	Primary/Approach
22	Forested Area	104.01	28.82	12.95	18 and 12	Approach/Transitional
23	Forested Area	82.75	18.74	18.03	18 and 36	Transitional
24	Forested Area	70.53	25.43	4.93	30	Primary/Approach/Transitional
25	Cluster of Trees	50.87	25.85	0.39	30	Approach/Transitional
26	Cluster of Trees	2.31	-5.59	0.24	30	Approach
27	Cluster of Trees	14.51	-2.18	0.73	30	Primary/Transitional
28	Trees and Buildings	17.16	-3.39	2.36	18 and 30	Transitional
29	Trees and Buildings	61.96	14.00	3.01	30 and 36	Primary/Transitional
30	Aircraft Salvage	65.79	6.44	4.50	30 and 36	Primary/Transitional
31	Forested Area	43.84	2.79	7.72	36	Transitional
32	Trees and Buildings	66.83	22.10	3.41	36 and 30	Approach/Transitional
	3 Obstructions	-	-	-	30	Approach
	8 Obstructions	-	-	-	30	Transitional
	5 Obstructions	-	-	-	36	Primary
	17 Obstructions	-	-	-	36	Approach
	36 Obstructions	-	-	-	36	Transitional
	1 Obstruction	-	-	-	18	Approach
	1 Obstruction	-	-	-	18	Transitional

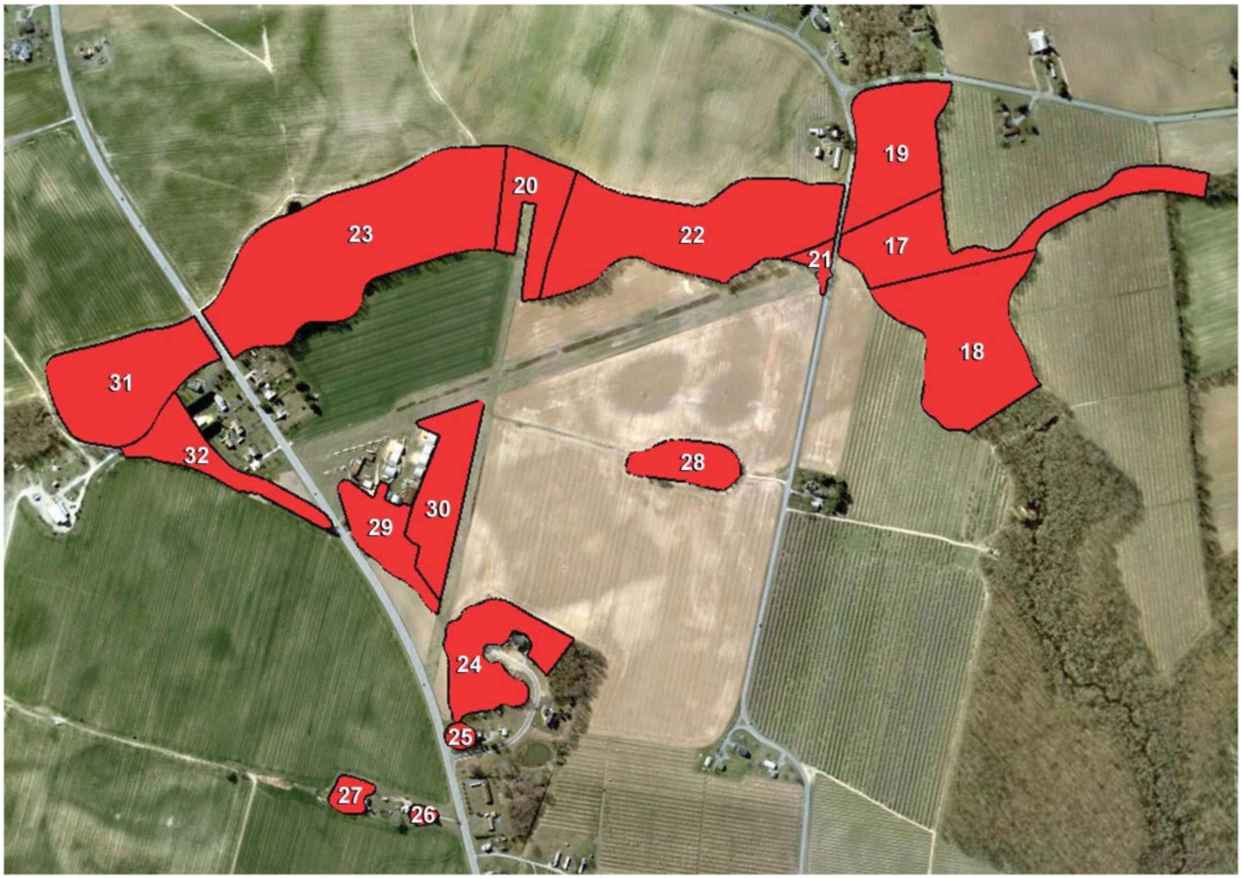


Figure 2-6 - Jenkins Obstruction Areas

Laurel Airport

Laurel Airport (N06) has one turf runway that is 3,175 feet by 270 feet. Runway End 33 has a displaced threshold of 270 feet. The analysis of Laurel Airport identified 5 main areas of obstructions located on 28.53 acres of land. Twenty-five individual obstructions were also identified through this process. The existing height obstructions identified using LIDAR and GIS data are presented in Table 2-7.

Table 2-7 – Laurel Airport Height Obstructions

ID	Type	Max HAS	Average HAS	Acres	Runway Orientation	FAR Part 77 Surface
33	Forested Area	88.13	7.86	9.78	15	Approach
34	Forested Area	54.29	12.88	9.11	15	Transitional
35	Line of Trees	33.44	4.88	0.52	15	Transitional
36	Forested Area	38.72	-1.75	3.01	15	Transitional
37	Forested Area	14.11	-1.73	6.12	16	Approach/Transitional
	2 Obstructions	-	-	-	15	Primary

Table 2-7 – Laurel Airport Height Obstructions						
ID	Type	Max HAS	Average HAS	Acres	Runway Orientation	FAR Part 77 Surface
	1 Obstruction	-	-	-	15	Transitional
	1 Obstruction	-	-	-	33	Primary
	4 Obstructions	-	-	-	33	Approach
	17 Obstructions	-	-	-	33	Transitional

Figure 2-7 - Laurel Obstruction Areas

Smyrna Airport

Smyrna Airport (38N) has one turf runway that is 2,600 feet by 125 feet. The Airport is surrounded by open fields and wetlands. The analysis of Smyrna Airport identified one main area of obstructions located on 3.09 acres of land. Three individual obstructions were also identified through this process. The existing height obstructions identified using LIDAR and GIS data are presented in Table 2-8.

Table 2-8 – Smyrna Airport Height Obstructions						
ID	**Type**	**Max HAS**	**Average HAS**	**Acres**	**Runway Orientation**	**FAR Part 77 Surface**
38	Future Tree Growth	0.74	-6.05	3.09	28	Approach
	Tree	-9.47	-	-	28	Transitional
	Tree	-8.05	-	-	10	Approach
	Tree	-6.68	-	-	10	Transitional

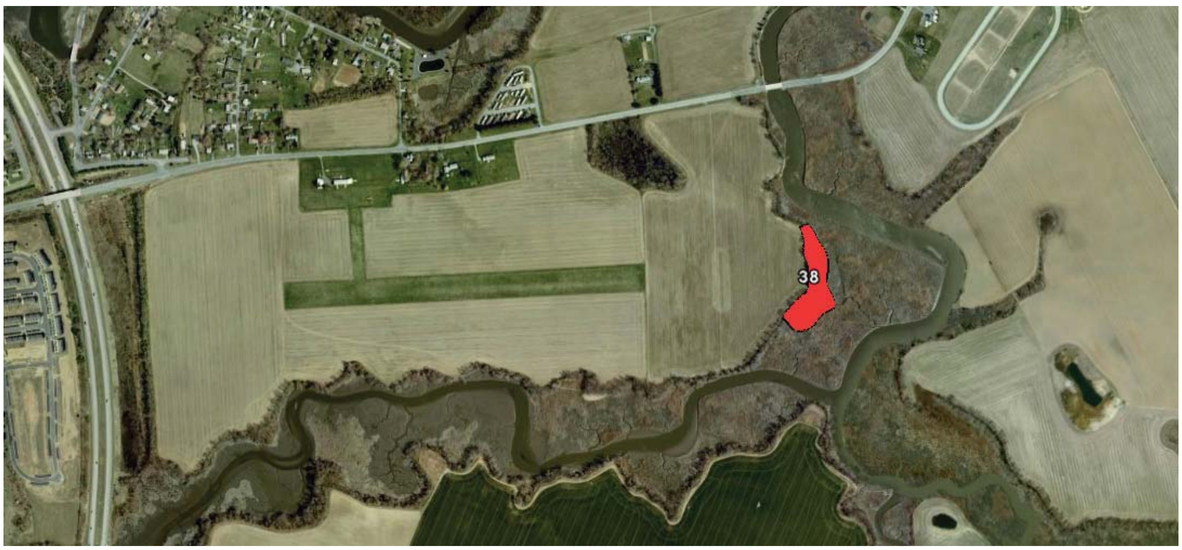


Figure 2-8 - Smyrna Obstruction Area

Summit Airport

Summit Airport (EVY) has one paved runway that is 4,488 feet by 65 feet and one turf runway that is 3,601 feet by 200 feet. The Airport does not have any displaced thresholds. The analysis of Summit Airport identified 10 main areas of obstructions located on 64.64 acres of land. Forty-three individual obstructions were also identified through this process.. The existing height obstructions identified using LIDAR and GIS data are presented in Table 2-9.

Table 2-9 – Summit Airport Height Obstructions						
ID	***Type***	***Max HAS***	***Average HAS***	***Acres***	***Runway Orientation***	***FAR Part 77 Surface***
39	Forested Area	43.18	7.21	13.17	17, 11/29	Transitional
40	Forested Area	48.72	8.16	10.38	17, 11/29	Transitional
41	Forested Area	66.71	11.37	5.39	11/29	Transitional
42	Forested Area	52.98	11.23	13.29	35	Primary/Transitional

Table 2-9 – Summit Airport Height Obstructions						
ID	***Type***	***Max HAS***	***Average HAS***	***Acres***	***Runway Orientation***	***FAR Part 77 Surface***
43	Cluster of Trees	26.59	2.41	3.63	35	Approach/Transitional
44	Cluster of Trees	25.86	0.32	4.18	35	Approach/Transitional
45	Forested Area	49.53	6.05	6.76	11/29	Transitional
46	Forested Area	0.45	23.74	5.29	17	Approach
47	Cluster of Trees	5.13	-4.85	0.36	17	Approach
48	Forested Area	-0.56	-6.73	2.19	17	Approach/Transitional
	2 Obstructions	-	-	-	11	Approach
	11 Obstructions	-	-	-	11	Transitional
	18 Obstructions	-	-	-	17	Approach
	3 Obstructions	-	-	-	17	Transitional
	5 Obstructions	-	-	-	17/35	Transitional
	4 Obstructions	-	-	-	35	Transitional

Figure 2-9 – Summit Airport Obstruction Areas

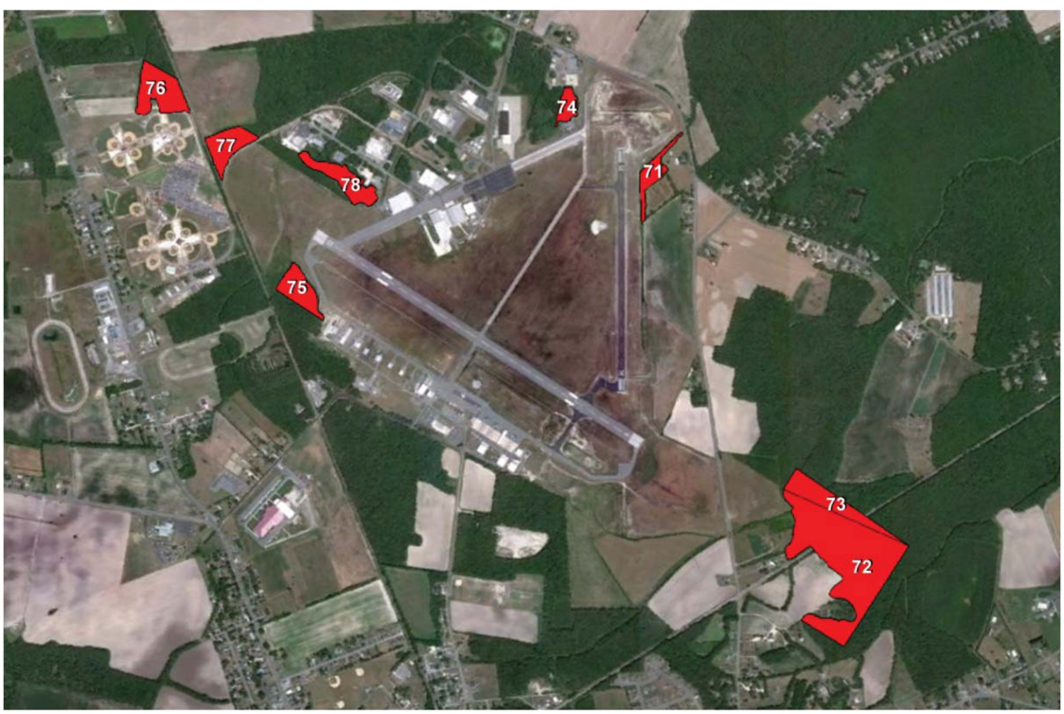
Sussex County Airport

Sussex County Airport (GED) has two paved runways. Runway 4-22 is 5,000 feet by 100 feet and Runway 10-28 is 3,109 feet by 75 feet. The Airport does not have any displaced thresholds. The analysis of Sussex County Airport identified eight main areas of obstructions located on 61 acres of land. Ten individual obstructions were also identified through this process. The existing height obstructions identified using LIDAR and GIS data are shown in Table 2-10.

Table 2-10 – Sussex County Airport Height Obstructions

ID	Type	Max HAS	Average HAS	Acres	Runway Orientation	FAR Part 77 Surface
71	Forested Area	61.98	24.85	2.85	28	Transitional
72	Forested Area	39.63	0.45	29.70	4	Approach
73	Forested Area	35.98	4.05	6.33	4	Transitional
74	Forested Area	15.20	-3.38	1.82	28	Transitional
75	Forested Area	40.05	6.15	4.31	22	Approach/Transitional
76	Forested Area	1.36	-7.07	6.69	22	Approach
77	Forested Area	26.94	2.36	4.52	22	Transitional
78	Forested Area	18.02	-3.08	4.98	22	Transitional
	4 obstructions				4	Transitional
	3 obstructions				28	Transitional
	2 obstructions				22	Approach
	1 obstruction				4 22	Transitional

Figure 2-10 –Sussex County Airport Obstruction Areas



New Castle Airport

New Castle Airport (ILG) has three paved runways. Runway 9-27 is 7,181 feet by 150 feet, Runway 1-19 is 7,002 feet by 200 feet and Runway 14-32 is 5,004 feet by 150 feet. The Airport does not have any displaced thresholds. The analysis New Castle Airport identified eight main areas of obstructions located on 34.7 acres of land. One hundred and six individual obstructions were also identified as a part of this process. The existing height obstructions identified using LIDAR and GIS data are presented in Table 2-11.

Table 2-11 – New Castle Airport Height Obstructions						
ID	**Type**	**Max HAS**	**Average HAS**	**Acres**	**Runway Orientation**	**FAR Part 77 Surface**
63	Forested Area	8.71	-4.51	0.88	19	Approach/Transitional
64	Forested Area	-6.67	-8.78	0.39	19	Approach
65	Forested Area	-4.97	-8.20	0.52	19	Approach
66	Forested Area	5.64	-4.03	0.41	19	Approach/Transitional
67	Forested Area	-5.10	-8.33	1.09	19	Transitional
68	Forested Area	47.61	5.23	16.26	19, 9 27	Transitional
69	Forested Area	17.42	-2.45	14.34	9	Approach
70	Forested Area	2.17	-6.31	0.83	27	Approach/Transitional
	6 Obstructions	-	-	-	1	Approach
	4 Obstruction	-	-	-	1	Transitional
	20 Obstruction	-	-	-	9	Approach
	9 Obstructions	-	-	-	9	Transitional
	1 Obstruction	-	-	-	14	Approach
	1 Obstruction	-	-	-	14	Transitional
	1 Obstruction	-	-	-	19	Approach
	3 Obstructions	-	-	-	19	Transitional
	53 Obstructions	-	-	-	27	Approach
	6 Obstructions	-	-	-	27	Transitional
	1 Obstruction	-	-	-	14 32	Transitional
	1 Obstruction	-	-	-	19, 27	Transitional

Figure 2-11 – New Castle Airport Obstruction Areas

4.2 Instrument Approaches and Navaids

This inventory identifies each of the available types of Instrument Approaches and their possible application in Delaware. All existing electronic navigation aids including Global Positioning System (GPS) approaches, Instrument Landing Systems (ILS), localizers, very high frequency omni-directional range (VOR), and non-directional radio beacons (NDB) at Delaware airports were listed. These instrument approaches are used to improve flight safety and provide improved all-weather capability for airports within the State.

Instrument Approaches

Airports in Delaware have three main types of approaches: visual, nonprecision and precision. A visual approach can be conducted in both instrument flight rules (IFR) and visual flight rules (VFR) conditions. This type of approach authorizes the pilot to proceed visually and clear of clouds to the airport. The pilot must, at all times, have either the airport or the preceding aircraft in sight. This approach must be authorized and under the control of the appropriate air traffic control facility. Reported weather at the airport must be ceiling at or above 1,000 ft and visibility of 3 miles or greater.

Two types of instrument approaches that contribute to all-weather accessibility are nonprecision and precision. Non-precision approaches provide only horizontal or lateral guidance, along with electronic information to aircraft during their approach and landing procedures at an airport. These systems provide support to aircraft approaching an airport during periods of poor visibility and inclement weather when visual approaches are not possible. If these systems are ground-based, they are typically less expensive to install and maintain compared to a precision approach.

Precision approach systems utilize both horizontal and vertical guidance providing better than 1 meter horizontal and 1 meter vertical accuracy. These systems allow aircraft to locate an airport and land on a specific runway during periods of poor visibility and/or inclement weather. Typically, the most demanding general aviation aircraft, such as corporate aircraft, prefer to operate at an airport with all weather instrument coverage. These systems reduce travel delays associated with airport closure due to poor visibility, which would result in rerouting aircraft and an increased ground travel time due to not being able to access the nearest airport to the final destination.

A precision approach procedure requires additional airport infrastructure including a parallel taxiway, 4,200’ runway and improved lighting. The requirements for a nonprecision procedure are less stringent. It is important to note that procedures such as LNAV/VNAV and LPV are categorized as nonprecision, whereas WAAS and LAAS procedures are currently identified as meeting precision criteria.

Navaids

There are numerous types of precision and nonprecision instrument approaches available for use in Delaware including RNAV (GPS), ILS, MLS, LOC, VOR, NDB, SDF, and radar approaches. Each approach has separate and individual design criteria, equipment requirements, and system capabilities. Table 2-12 presents a listing of navigational aids at Delaware airports.

Table 2-12 - Navigational Aids at Delaware Airports

Airport	Runway Orientation	Runway length	Navigational Aids	Tower
Chandelle Estates	4-22	2,533’ X 28’	None	No
Chorman	16-34	3,588’ X 37’	None	No
Civil Air Terminal	14-32 1-19	12,903’ X 150’ 9,602’ X 200’	ILS – 01, 19; RNAV-01, 19, 32; VOR/DME-01, 32; TACAN – 01, 19, 32	Yes (Military)

Table 2-12 - Navigational Aids at Delaware Airports				
Airport	**Runway Orientation**	**Runway length**	**Navigational Aids**	**Tower**
Delaware Airpark	9-27	3,582’ X 60’	VOR – 27; RNAV (GPS)- 09, 27	No
Jenkins	18-36 12-30	2,842’ X 70’ 2,035’ X 70’	None	No
Laurel	15-33	3,175’ X 270’	GPS-A	No
New Castle	9-27 1-19 14-32	7,181’ X 150’ 7,002’ X 200’ 5,004’ X 150’	ILS or LOC- 1; VOR or GPS 1,19; GPS 9,27; VOR 9,27	Yes
Smyrna	10-28	2,600’ X 125’	None	No
Summit	17-35 11-29	4,487’ X 65’ 3,600’ X 200’	RNAV (GPS)- 17,35; NDB-A	No
Sussex County	4-22 13-31	5,000’ X 150’ 2,330’ X 50’	VOR- 4,22; RNAV (GPS)- 4,22	No

5. SURFACE TRANSPORTATION.

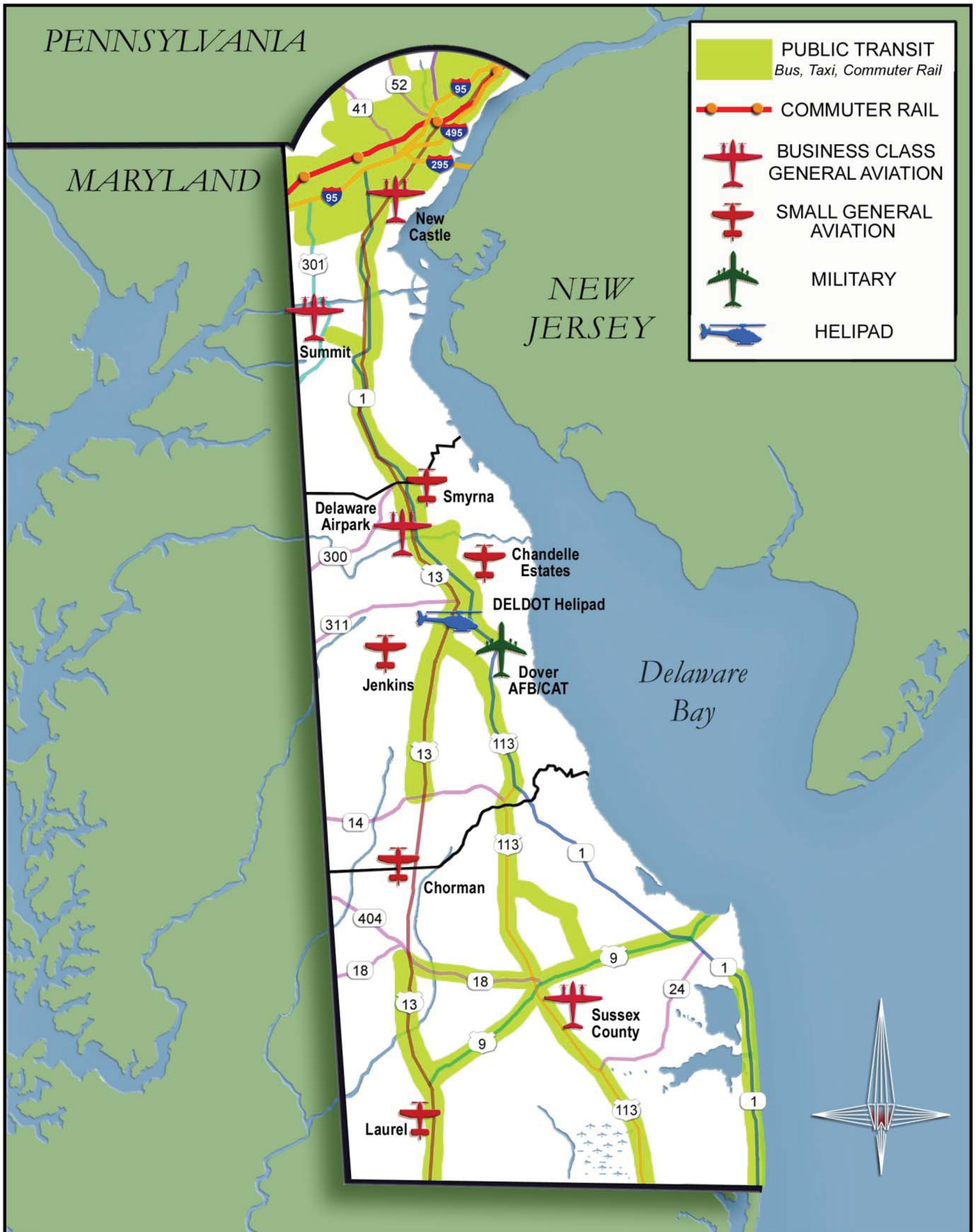
An inventory of the surface transportation network in Delaware provides the capability to examine the interaction of the air and ground transportation systems in the State. The surface transportation system in Delaware is comprised of a network of roadways that provide ground connectivity throughout the State.

Interstate 95 crosses Delaware southwest-to-northeast across New Castle County. In addition to I-95, there are seven principal highways: U.S. Highway 9, U.S. Highway 13, U.S. Highway 40, U.S. Highway 113, U.S. Highway 202, U.S. Route 301, and Delaware Route 1. U.S. 13, U.S. 113, and Delaware Route 1 are primary north-south highways connecting Wilmington and Pennsylvania with Maryland's eastern shore, while U.S. 40, the primary east-west route, connects Maryland with New Jersey. The state also operates two toll highways, the Delaware Turnpike, which is Interstate 95 between Maryland and New Castle and the Korean War Veterans Memorial Highway, which is Delaware Route 1 between Dover and Interstate 95 near Wilmington.

For reference, Figure 2-12 shows transportation infrastructure and the different public transit modes available in the State of Delaware. As shown, the availability of public passenger transit, by both bus and rail, is concentrated in northern New Castle County. Services and service infrastructure in southern New Castle County and south through Kent and Sussex Counties becomes less concentrated and generally follows major north/south highway corridors.

5.1 Airport Specific Demand

On-airport or at-airport access in the state features highways of varying capacities and demand loadings. To support this influx of traffic, airports in the state of Delaware should have adequate parking accommodations. For this reason, the main focus of this section will be Traffic Generated by Airports and the Current Parking Capacities of Airports.



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AVIATION CONSULTANTS

Delaware State Aviation System Plan Update

HIGHWAY TRANSPORTATION NETWORK

Figure 2-12

Traffic Generated by Airports.

Existing traffic generated from airport operations are shown in Table 2-13. As shown, the number of peak hour vehicles generated by each public-use airport varies by airport type and location. New Castle Airport has the highest demand, but there are more than four separate entrance ways to the Airport - spreading peak hour demand.

Table 2-13 – GA Airport Activity Summary

Airport Name	Access Road	2010 Peak Hour Operations[1]	2010 Peak Hour Vehicle Trips[2]
Chandelle Estates	Route 9	3	7
Chorman	Nine Foot Road	8	19
Civil Air Terminal	Horsepond Road	24	56
Delaware Airpark	State Route 42	14	33
Jenkins	Westville Road	2	5
Laurel	State Route 24	7	16
New Castle	US 13, State Routes 273, 58, 202	70	165
Smyrna	State Route 6	2	5
Summit	US 301	25	59
Sussex County	Airport Road, S Railroad Ave	21	49

1 Source: Inventory of aviation activity
2 Vehicle trips estimated from general aviation industry averages of 2.35 times peak hour operations. This number accounts for pilots, passengers, and employees at the airport.

5.2 Public Transportation

The public transportation system, DART First State, has broad coverage within New Castle County with close association to major highways in Kent and Sussex Counties. The system includes bus, passenger rail, subsidized taxi and paratransit modes, the latter consisting of a state-wide door-to-door bus service for the elderly and disabled. Passenger rail service, like interstate highway service, is limited to a single southwest-to-northeast corridor in New Castle County. Ferry service exists between Lewes, Delaware and Cape May, New Jersey, across the mouth of the Delaware Bay.

Bus Service

DART First State provides local fixed route bus service throughout the state operating 68 routes reaching most areas of Delaware. Bus and van services are available within each of the primary service areas in Delaware. In this regard, intra-city bus service is available in Wilmington and Dover. DART First State operated by the Delaware Transit Corporation provides transportation services statewide with over 400 buses and over 60 bus routes including its Sussex County Resort Service and paratransit service. Thus, regional bus service is available in southern Delaware and is not limited to a single city.

Another program of DART is RideShare Delaware, which is a commuter carpool assistance program. The program matches commuters interested in carpooling using a database that synergizes home addresses and work schedules, and is open to anyone who lives and/or works in Delaware, including individuals who commute from surrounding counties in Pennsylvania, New Jersey, and Maryland.

Passenger Rail Service

In terms of rail service, Delaware is served by freight railroad in all three counties, and passenger rail that traverses east-to-west across northern New Castle County (see Figure 2-12). Delaware's only passenger rail service is in Wilmington, Claymont, and Newark. In this regard, Wilmington is located on Amtrak's Northeast Rail corridor which connects Delaware to Baltimore, Philadelphia, New York, Washington and others. Wilmington's train station is the ninth busiest station in Amtrak's Northeast region and is served by over 100 passenger trains per weekday.

The Delaware Transit Corporation (DTC) contracts with the Southeastern Pennsylvania Transportation Authority (SEPTA) to provide commuter rail service between Delaware and Center City Philadelphia. This service provides connections to SEPTA's bus and train systems including the Philadelphia International Airport, PATCO, and New Jersey Transit (NJT).

6. SOCIOECONOMIC BASE

Socioeconomic statistics are generally used to describe the economic and demographic trends expected to occur in a particular area. Socioeconomic factors have been shown in numerous studies sponsored by the FAA to be related to an area's demand for aviation facilities and services. Among the most significant are population, income, and employment. This section identifies each of these factors and presents historical statistics and trends for the years 2000-2010 for all three Delaware counties.

6.1 Recent Recession

The National Bureau of Economic Research pegged the start of the most recent recession to December 2007, lasting until July of 2009 - making it the longest since the Great Depression.[1] By definition, a recession is period of economic decline, typically measured by a decline in Gross Domestic Product (GDP) for two consecutive quarters. The effects of this recession have impacted the State of Delaware, where tax revenues have declined, creating budget deficits at all levels of government for the first time in a number of years. In addition, the real estate boom that was pushing economic development in the housing market in central and southern Delaware has been dampened, resulting in higher unemployment, lower demand for durable goods, and tourism and business slowdowns. There are, of course, exceptions to this rule. But generally, aviation activity and demand has suffered along with the national economic downturn.

To estimate the effects of the recession on general aviation activity, general aviation operations were correlated to unemployment rates. General aviation incorporates all aviation activity except scheduled passenger operations and military operations. For the U.S., the following statistics were available for the 2007-2009 period:

	U.S. GA Operations	U.S. Unemployment Rate
▶ 2007	80,747,523	4.6%
▶ 2008	78,225,420	5.8%
▶ 2009	74,556,114	9.3%

Correlation coefficient (R) between GA Operations and the Unemployment Rate equaled (negative) -0.986. Thus, for the nation, there is a highly correlated inverse relationship between general aviation operations and the unemployment rate. It can be noted that a 4.7 percent rise in unemployment occurred coincident with an 8.3 percent decline in total U.S. general aviation operations. Thus, for every 1.0 percent increase in unemployment, total U.S. general aviation operations declined by 1.77 percent.

1 Source: http://money.cnn.com/2008/12/01/news/economy/recession/index.htm.

On a statewide basis, the relationships between employment and aviation activity indicators will be explored. Much of these statistical relationships will be incorporated into the forecast of aviation demand, presented in the following Chapter.

6.2 Population

Analysis and projection of population are the basis for almost all major planning decisions. In many instances, they determine the level of demand for future facilities and serve as indices of most county and urban characteristics. Further, they have typically served as one of the best indicators of local aviation demand. Historical population, when compared to aviation demand statistics, has shown a high correlation in many areas of the country. Until population growth or decline in the study area is compared to aviation demand statistics in Delaware, it is uncertain whether or not population can be used as a prediction variable in the forecasting process.

Table 2-14 presents the historical population growth for Delaware counties. As shown, Kent County has a slightly higher percentage growth (25.9 percent) than Sussex County (25.1 percent), while Sussex County shows the highest actual population growth (a net gain of 39,556 over the period). For the State, there has been a 13.8 percent growth over the 2000-2010 period, growing from 786,411 to 895,173.

Table 2-14 – Delaware Historical Population Trends[2]

Year	Kent	New Castle	Sussex	State Total
2000	127,109	501,913	157,389	786,411
2001	128,821	505,564	160,235	794,620
2002	131,301	509,113	163,717	804,131
2003	134,222	512,919	167,764	814,905
2004	138,382	516,887	171,370	826,639
2005	143,294	520,918	175,694	839,906
2006	148,041	524,473	180,508	853,022
2007	152,090	527,786	185,020	864,896
2008	155,492	531,057	189,662	876,211
2009	157,741	534,634	192,747	885,122
2010	160,058	538,170	196,945	895,173
% Change	**25.9%**	**7.2%**	**25.1%**	**13.8%**

[2] Source: Regional Economic Information System, Bureau of Economic Analysis (BEA), U.S. Department of Commerce, May 2011. This source is the same used by the University of Delaware, Bureau of Economic Research.

6.3 Income

Similar to population, an area's income and economic activity has been shown to be positively related to the demand for aviation services and facilities in many parts of the country. Further, there is an assumed causal relationship between concentrated economic activity and demand for air transportation.

Income statistics commonly include Total Personal Income (TPI) and Per Capita Personal Income (PCPI). For aviation demand forecasting purposes, PCPI is the preferred statistic since it removes the population growth factor from the income growth factor. Thus, PCPI statistics for Delaware counties were collected for the inventory. Table 2-15 presents the historical growth in PCPI for the three counties.

Table 2-15 – Study Area Historical PCPI[3]

Year	Kent	New Castle	Sussex	State Total
2000	$23,952	$34,752	$24,763	$31,007
2001	$25,126	$36,094	$26,563	$32,394
2002	$26,155	$37,183	$26,534	$33,214
2003	$26,665	$37,822	$27,643	$33,889
2004	$27,898	$39,810	$29,666	$33,713
2005	$28,741	$41,292	$31,013	$37,001
2006	$29,521	$44,056	$32,535	$39,096
2007	$30,743	$44,861	$34,319	$40,123
2008	$31,279	$45,530	$34,652	$40,646
2009	$31,127	$43,957	$34,434	$39,597
2010	$32,195	$45,570	$35,872	$41,045
% Change	**34.4%**	**31.1%**	**44.9%**	**32.4%**

As shown in the table, per capita personal income in Delaware area has grown by 32 percent over the ten year period. This translates into a compound growth of 2.8 percent per year. Sussex County has shown the highest percentage growth (44.9 percent), with Kent and New Castle showing strong growth rates over 30 percent.

6.4 Employment

Employment statistics are another measure of economic activity and thus are related to the demand for air transportation facilities and services. Historical employment statistics for Delaware counties are presented in Table 2-16. As shown, overall employment for Delaware

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3 Source: Regional Economic Information System, Bureau of Economic Analysis (BEA), U.S. Department of Commerce.

grew by 7.8 percent over the period. Sussex County showed the fastest growth with 26.9 percent, while New Castle County had the slowest growth with 1.5 percent. These statistics are consistent with the population trends described earlier. Within the study period, there was only one year where statewide negative growth was observed. Due to the recent global economic recession, the state of Delaware saw a decrease of employment of 3.6 percent, or 19,746 jobs. This negative growth rate measures only slightly higher than the national employment decrease (3.3 percent) for that time period. Even though overall employment grew by 7.8 percent for the entire study period, the 2010 figures show employment has not yet fully recovered to levels prior to the recession.

Table 2-16 – Delaware Historical Employment[4]

Year	Kent	New Castle	Sussex	State Total
2000	71,849	349,291	82,427	503,567
2001	73,704	344,210	82,353	500,267
2002	75,820	340,283	85,119	501,222
2003	77,553	341,571	86,754	505,878
2004	80,521	347,860	91,131	519,512
2005	83,895	351,811	94,505	530,211
2006	85,267	357,047	98,085	540,399
2007	87,297	361,378	100,353	549,028
2008	87,069	362,059	100,414	549,542
2009	84,490	347,119	98,187	529,796
2010	83,677	354,397	104,662	542,736
% Change	**16.5%**	**1.5%**	**26.9%**	**7.8%**

4 Source: Regional Economic Information System, Bureau of Economic Analysis (BEA), U.S. Department of Commerce, May 2011.

7. LAND USE & ENVIRONMENTAL FACTORS

This section summarizes the land use and environmental factors considered in the preparation of this plan. Areas of concern that affect airport development in Delaware include:

- Land Use Impacting Aviation
- Environmental Factors:
  - Aircraft Noise Impacts
  - Wildlife Reservations and Waterfowl Refuges
  - Wetland Areas and Floodplains
  - Public Parks and Recreation Areas
  - Historic and Cultural Resources
  - Prime & Unique Farmland
  - Air Quality
  - Water Quality

7.1 Land Use Impacting Aviation

Compatible land uses around airports follow a reasonable hierarchy of those land uses that are more appropriate than others near an airport environment. Listed from most desirable to least desirable, this hierarchy can be understood as:

1) ***Undeveloped Land:*** Any areas of land yet vacant or undeveloped due to low levels of socioeconomic activity, and/or significant constraints to such activity such as protected scenic and recreational areas, or natural physical constraints that have made economic activity cost-prohibitive.

2) ***Rural/Agricultural Areas:*** Any areas that can be characterized as being sparsely settled with primary activities being related to agricultural use. Potential airport-related noise would have minimal impact on these areas. In addition, the rural nature of these areas poses little threat to life and property damage in the event of an aircraft emergency or incident.

3) ***Industrial Areas:*** Industrial areas are those where some degree of manufacturing, warehousing, distribution, assembly, or production activity occurs. Typically, industrial areas are characterized by private interests and enterprises that have organized for the purpose of making goods and/or services for sale. Industrial areas are more capable of absorbing noise impacts than other high density development. However, industrial areas are less desirable in the vicinity of airports than are agricultural areas due to the higher numbers of people that are attracted to these areas.

4) ***Commercial/Retail Areas:*** Commercial and retail areas are those that can be characterized as having office buildings and commerce parks, restaurants, franchise and specialty goods outlets and the like. These areas are impacted more by airport-related noise than the three previous categories listed above due mostly to the human activities that occur there. Commercial and retail areas represent nodes of economic activity for most cities, towns, and suburbs, that attract larger numbers of people.

5) ***Residential Areas:*** Residential areas are those characterized by the predominance of single and multi-family dwelling units located there, along with the wide variety of public and quasi-public institutions that support these areas. In addition to homes, residential uses include schools, churches, community centers, recreation/sports facilities, daycare centers, nursing and assisted living facilities, and other uses that are generally enjoyed as quality-of-life-enhancing amenities. Residential areas are the least compatible with airport-related noise due to the fact that people live and sleep in these buildings. In addition, safety concerns for both property owners and airport users should limit the amount of residential land use in the near-airport approach areas.

The inventory focused on these criteria as a benchmark for assessing each County's zoning regulations on/around airports. The essential take-away from the research became the answer to a simple question: Does the regulation/code contain some measure of these criteria? The answers for each County are presented in Table 2-17.

Table 2-17 - Performance of County Zoning against Baseline Compatible Land Use Criteria

County	Distinct Airport District	Compatible Uses Defined	Airport Use Dist. Reflects Part 77	Airport Use Dist. Reflects DNL	Disclosure Required
New Castle[1]	No	Minimal	Yes	Yes	Yes
Kent[2]	Yes	No	No	Yes	Yes
Sussex	Yes	No	Yes	No	No

As shown in Table 2-17, each County appears to address airports and land uses surrounding airports in a different manner. New Castle County does not have a distinct airport zoning district, however development around airports is addressed under Special Use regulations,

1 New Castle County Unified Development Code regulates airports as a Special Use, and references FAR Part 77 and DNL contours in the Special Use section that addresses airports.

2 Kent County Code, Airport Environs Zoning Overlay.

where airports themselves are regulated as a land use. Compliance to FAR Part 77 surfaces and current DNL contours are referenced in the New Castle County Unified Development Code. Kent County does have an Airport Environs Overlay District, but does not refer to FAR Part 77 surfaces for height obstructions. Sussex County appears to have the most comprehensive set of land use controls, having adopted the Sussex County Airport Hazard Zoning Ordinance; however, no requirement for disclosure of airport locations or impacts was found in the ordinance. Additionally, the Sussex County Airport Hazard Zoning Ordinance only identifies Sussex County Airport; no reference is made to Laurel Airport.

7.2 Environmental Factors

There are a number of environmental factors that affect aviation and the development or improvement of airports. These factors include weather conditions and a host of environmentally sensitive elements. As defined in this study, environmentally sensitive areas impacted by aviation include all of the environmental factors described in FAA Order 5050.4B (there are 20 categories). Of these, the most significant impacts relative to aviation and airport development in Delaware would include:

- Aircraft Noise Impacts
- Wildlife Reservations and Waterfowl Refuges
- Wetland Areas and Floodplains
- Public Parks and Recreation Areas
- Historic and Cultural Resources
- Prime & Unique Farmland
- Air Quality
- Water Quality

Many of the impacts on these areas for the State's larger airports are covered in Environmental Assessments associated with recent master plans. Brief summaries of these impacts are contained in the following sections.

Aircraft Noise Impacts

Noise generated by aircraft can have a negative impact on the compatibility of land adjacent to airports. Typically churches, hospitals, schools, parks, amphitheaters, and residential districts are considered to be noise-sensitive receptors. Conversely, noise generated by airports is usually compatible with industrial and agricultural activities. It is important to note that at the system planning level of detail, noise studies for individual airports are beyond the work scope. These detailed studies are prepared for airport master plans and environmental assessments using the latest version of the FAA's Integrated Noise Model (INM). This computer model calculates cumulative aircraft noise, expressed in decibels (dB), at ground level using the yearly average day-night sound level (DNL).

For this study, an approximate measure of potential aircraft noise impact can be gained by examining land uses in the immediate vicinity of each system airport. These uses, combined with the activity levels at each airport will yield a ranking of potential impact from aircraft noise. Such a ranking will be helpful in evaluating alternatives in Phase 2 of the system plan. While not as accurate as the INM, this qualitative measure of noise impact provides an intuitively reasonable means of assessing relative impacts among airports.

Wildlife Reservations and Waterfowl Refuges

Delaware has several wildlife reservations and waterfowl refuges located throughout the State. Those reservation and refuges closest to the system airports and their distance and direction from the airports are listed in Table 2-18. Also shown are distances from the wildlife reservations and waterfowl refuges, none of which are adversely impacted by Delaware's public-use airports.

Table 2-18 - Delaware Wildlife Reservation/Waterfowl Refuges

County/Airport	Wildlife Area	Approximate Distance/Direction
KENT		
Chandelle Estates	Little Creek Wildlife Area	1 mile east
Civil Air Terminal	Little Creek Wildlife Area	3 miles east
Chorman	Norman G. Wilder Wildlife Area	12 miles north
Delaware Airpark	Blackiston Wildlife Area	6 miles west
Jenkins	Norman G. Wilder Wildlife Area	3 miles southwest
Smyrna	Woodland Beach Wildlife Area Bombay Hook National Wildlife Area	4 miles east-southeast
NEW CASTLE		
New Castle Airport	Killcohook National Wildlife Refuge (NJ)	4 miles southeast
Summit	Canal Wildlife Area/Lums Pond State Park	1 mile north
SUSSEX		
Laurel	Nanticoke Wildlife Area	4 miles west

Wetland Areas and Floodplains

In Delaware, wetlands are located in every county due to the State's low, flat topography. Wetlands are located on or near every public-use airport. For this inventory, wetland maps provided by the U.S. Department of Interior, Fish and Wildlife Service were collected for each airport facility. These maps will be used later as references for the analysis of alternatives to determine whether any proposed airport expansion will impact nearby wetlands. It is known that wetlands currently impact plans for airport expansion or improvement at Delaware Airpark, Sussex County Airport, and at New Castle Airport.

Floodplains in the vicinity of airports will be examined as a part of the SASPU. In this regard, Federal Emergency Management Agency (FEMA) and state mapping will be used to determine the limits of the base 100-year floodplains and floodways near public-use airports.

Public Parks and Recreation Areas

Delaware has fourteen state parks and recreation areas totaling 20,879 acres. These parks range in size from 150 acres at Alapocas Run to 5,193 acres at Cape Henlopen. Activities at these parks include boating, camping, fishing, game courts, swimming, picnicking, horseback riding, and others. The fifteen state parks, by county of location, and acreage are as follows:

Kent County		
	▶ Killens Pond State Park	1,444
New Castle County		
	▶ Alapocas Run State Park	150
	▶ Bellevue State Park	328
	▶ Fox point State Park	171
	▶ Brandywine Creek State Park	933
	▶ Wilmington State Parks	387
	▶ White Clay Creek State Park	3,384
	▶ Fort Delaware State Park	288
	▶ Fort Dupont State Park	332
	▶ Lums Pond State Park	1,790
Sussex County		
	▶ Cape Henlopen State Park	5,193
	▶ Delaware Seashore State Park	2,825
	▶ Fenwick Island State Park	344
	▶ Holts Landing State Park	204
	▶ Trap Pond State Park	3,106
GRAND TOTAL		20,879

An examination of the distance of airports in the system from these parks and recreational areas indicated that none of the airports are located adjacent to any of the parks or recreational areas. In Kent County, Jenkins Airport is the closest airport to Killens Pond State Park at just under 9 miles. In New Castle County, Summit Airport is within 2 miles of Lums Pond State Park. These proximities will be used during the evaluation of alternatives to determine whether or not state parks and recreational areas could be negatively impacted by changes or improvements to the State's aviation system.

In addition to parks and recreational areas, other attractions within Delaware draw large numbers of people each year. For some of these events, visitors may use air transportation as a means of access:

- ***Air Mobility Command Museum:*** The Air Mobility Command Museum is located at Dover AFB and was founded in 1986. It is dedicated to military airlift and tanker history. The base has long been associated with military airlift which is reflected in the museum's collection of vintage transport aircraft dating back to WWII. The museum has done numerous restoration projects and has planes and exhibits from the Berlin Airlift, the Korean War, and World War II.
- ***Delaware State Fair:*** The Delaware State Fair has an attendance of over 300,000. The 300 acre fairgrounds are home to the annual ten-day Fair in July and encompasses several businesses including The Centre Ice Rink, the Harrington Raceway and Casino.
- ***NASCAR:*** Dover International Speedway seats 135,000 people and hosts NASCAR races two weekends a year.
- ***Horse Racing:*** Delaware has three race tracks: Delaware Park, Dover Downs Harness Racing, and Harrington Raceway. Gaming legislation in Delaware in 1996 allowed the state’s three racetracks to have video lottery machines.
- ***Dover Downs Hotel and Casino:*** Offers over 2,800 slot machines, table games, horse racing November through April and simulcast all year. The four diamond Hotel has 500 luxury guest rooms, and live entertainment all year round.

Historic and Cultural Resources

An action causing an adverse effect on historic or cultural property protected by Section 106 of the National Historic Preservation Act or by provisions of the National Environmental Protection Act (NEPA), must be considered in airport planning or policy making. Eligibility determinations and effects determinations are solely FAA’s responsibilities under Section 106 of the National Historic Preservation Act. In Delaware airport-specific projects involving federal or state funding must be coordinated with the State Historic Preservation Office (SHPO) during the planning stages of any development. Often for these site-specific studies there are requirements to perform archeological site analyses through literature searches, on-site inspections, and various levels of archeological excavation. In addition, architectural studies of historic structures must be made to determine their eligibility for inclusion on the National Register of Historic Places. Impacts to these sites and structures must be evaluated in airport-specific environmental studies funded by the FAA and State.

Prime And Unique Farmland

Delaware's fertile soils grow corn, truck crops, soybeans, and potatoes. These are found throughout the State, but are predominately evident in the southern two thirds of the State.

The variety of crops grown evidences the existence of prime farmlands in the State. The growing season is approximately six months long and extends from mid-March to the end of September.

Under the Farmland Protection Policy Act (FPPA), the U.S. Department of Agriculture has the authority to protect certain types of farmland from being converted to non-agricultural uses. Farmland protected by the FPPA is either prime farmland which is not already committed to urban development or water storage, or unique farmland, or farmland which is of state or local importance as determined by the appropriate state or local government agency with the concurrence of the Secretary of Agriculture. Some actions are exempt from the FPPA and therefore do not need to be coordinated with the U.S. Department of Agriculture (Soil Conservation Service). Prime farmland is defined by the FPPA as land that has the best combination of physical and chemical characteristics for producing food, feed, fiber without intolerable soil erosion as determined by the Secretary of Agriculture. Prime farmland does not include land already in or committed to urban development or water storage. Unique farmland is land other than prime farmland that is used for production of specific high value food and fiber crops, as determined by the Secretary of Agriculture.

Air Quality

Air quality at airports can be affected by the number of aircraft operations, configuration of vehicle access roads and parking, the physical plant, and the types and numbers of ground support equipment. Under the U.S. Environmental Protection Agency (USEPA) conformity regulations, a determination must be made as to whether the project related emission levels exceed established threshold values. Threshold values are outlined in the FAA Air Quality Handbook. If threshold values are not exceeded, the project is assumed to conform to the State Implementation Plan (SIP) goal of eliminating or reducing the severity and number of violations of NAAQS and achieving attainment of those standards and no further analysis is necessary.

The Clean Air Act of 1990 as amended states:

> "No department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license or permit, or approve, any activity which does not conform to a [State Implementation Plan]."

Thus, in order to gain Federal funding for Delaware Airports, it must be determined whether or not airport improvement projects conform to State or Federal air quality plans. Conformity is defined in the Clean Air Act as conformity to the SIP's purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards (NAAQS) and achieving expeditious attainment of such standards, and that such Federal activities will not:

- Cause or contribute to any new violation of any standard in any area.

- Increase the frequency or severity of any existing violation of any standard in any area.
- Delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

Water Quality

Water quality standards apply to certain types of airport development projects. Similar to air quality standards, the emphasis on enforcement deals with new development actions at airports that have received or are eligible for Federal funding. Construction impacts on water quality deal with water supplies, waste treatment capacity, erosion controls to prevent siltation, provisions for containing fuel spills, and location with regard to an aquifer or sensitive ecological area such as a wetland.

Of significance is the Environmental Protection Agency's National Pollution Discharge Elimination System (NPDES) permit application regulations for storm water discharges. The regulations require operators of large municipal separate stormwater systems serving municipalities with populations greater than 250,000, and medium municipalities with population greater than 100,000 but less than 250,000 to submit permit applications for their separate municipal storm sewer system. Covered by the regulations are transportation facilities such as vehicle maintenance, equipment cleaning areas, and airport de-icing areas. As nonpoint source polluters, airports have been required to file for an NPDES permit if they are using their own separate stormwater system, or, if they are using a municipal stormwater system for surfacewater runoff, they are required to certify to the municipality that the surfacewater runoff is in compliance with the municipality's NPDES permit requirements.

New airport development projects are subject to the NPDES regulations. In addition, the system plan has documented airports in Delaware that have complied with the regulations. These include:

- Civil Air Terminal at Dover AFB
- Delaware Airpark
- New Castle Airport
- Summit Airport
- Sussex County Airport

Presently, no other Delaware airports are required to obtain NPDES permits.

Chapter 3:
Forecast of Aviation Demand

Chapter 3
FORECAST OF AVIATION DEMAND

THE FORECAST OF AVIATION DEMAND FOR THE State of Delaware stands as a foundation for subsequent recommendations of the State System Plan Update. In this regard, demand forecasts, are based upon the desires and needs of the service area, and provide a basis for determining the type, size, and timing of aviation facility development. Forecasts must be realistic to provide adequate justification for the airport planning and development being recommended. A forecast that is either too high or too low can jeopardize a project by affecting environmental and funding decisions. Therefore, it was important to quantify the aviation activity indicators that will be used in the development of facility recommendations, airport reference codes, noise analysis inputs, and financial priority rankings. This chapter documents the forecasting effort used to project aviation demand through the year 2030. Major sections of this chapter include:

- Role of the FAA's Terminal Area Forecasts
- Technical Approach
- Projection Methodology
- Forecast of General Aviation Demand
- Aviation Demand Forecast Summary

1. ROLE OF THE FAA'S TERMINAL AREA FORECASTS

THE TERMINAL AREA FORECAST SYSTEM (TAF) IS the official forecast of aviation activity at FAA facilities. These forecasts are prepared annually to meet the budget and planning needs of FAA and provide information for use by state and local authorities, the aviation industry, and the public. The TAF includes forecasts for active airports in the National Plan of Integrated Airport System (NPIAS). In all, there are currently 3,366 airports included in the forecasting database.

Guidance from the FAA indicates that independent forecasts such as those generated by the SASPU must conform to the TAF in order to be approved for FAA funded projects. Locally developed forecasts for operations, based aircraft, and enplanements are considered consistent with the FAA’s Terminal Area Forecasts if the meet the following criteria:

- All NPIAS Airports:
  - The forecast must differ by less than 10 percent in the 5-year forecast period and by 15 percent within the 10-year forecast period.
  - Forecast activity levels do not affect the timing or scale of an airport project.

- Commercial Service Airports other than Large, Medium, and Small Hub facilities, and General Aviation and Reliever Airports:
  - The forecast activity levels do not affect the role of the airport as defined in the NPIAS
- General Aviation and Reliever Airports:
  - Airports with under 100,000 annual operations or with less than 100 based aircraft are exempt from the 10 and 15 percent conformance rules.

Only one Delaware airport is impacted by these guidelines (New Castle Airport), since all others have or are forecast to have less than 100,000 annual operations within the forecast period. With this in mind, forecasts generated by this SASPU have been coordinated with the TAF and are consistent with the guidelines listed above.

2. TECHNICAL APPROACH

AVIATION DEMAND FORECASTS PROCEED THROUGH TWO DISTINCT phases or processes: the analytical, followed by the judgmental. During the analytical process, past aviation activity data are examined for trends in anticipation of future activity levels. Past trends in the various demand elements are extended into the future using a variety of procedures and assumptions, and a series of projections are developed. After preparing a number of such projections, the analyst is able to identify a range of growth within which the true trend will probably fall.

The second phase of demand forecasting requires experienced professional judgment. The analyst examines various growth projections for each demand element, studies the character of the airport and the community and how they will influence the particular element, then the analyst makes a subjective determination of the preferred forecast.

3. PROJECTION METHODOLOGY

THE MOST RELIABLE WAY TO ESTIMATE AVIATION demand is to use more than one analytical technique. The three methods considered in this forecast include regression analysis, market share analysis, and trend analysis.

3.1 Socioeconomic Regression Analysis

The socioeconomic regression projection is based upon an assumed causal relationship between population, income, or employment and the aviation activity in a particular area. This projection of demand is obtained by relating socioeconomic data via regression analysis to aviation activity. The resulting set of regression equations produces a projection of aviation activity when they are coupled with independent projections of future socioeconomic data.

This forecast utilized population, income (in the form of Per Capita Personal Income), and employment statistics as the independent socioeconomic variables. These statistics were obtained from the U.S. Department of Commerce, Bureau of Economic Analysis, and projections of these variables (except for PCPI) were collected from the latest Delaware Population Consortium report.[1] These projections are officially recognized by the Delaware State Planning Office and the U.S. Department of Housing and Urban Development.

3.2 Market Share Projection

Market share projections are developed by calculating historical shares of national or regional activity measures and projecting these respective shares into future time frames. This method of projection reflects demand based upon trends occurring in the entire U.S. It is essentially a "top-down" method of forecasting where other forecasts of activity for larger areas are used as drivers of the local share of that demand. Socioeconomic projections, on the other hand, are considered "bottom-up" methodologies and are based upon local factors. Market share projections reflect historical trends and may include increasing, constant, or decreasing future market shares.

3.3 Trend Analysis

Trend projections use historical data to formulate predictions of future activity. For this study, two trend analysis methods were used to project baseline aviation activity: double exponential smoothing and least squares linear trending.

Double Exponential Smoothing

The double exponential smoothing process produces projections by combining the forecast for the previous period with an adjustment for past errors. It is desirable to correct for past errors when the error has resulted from changes in the trend. In this case, correcting for past errors will put the forecast back on track. The exponential smoothing process can be described mathematically as follows:

$$\bar{x}_t = \alpha x_t + \alpha(1-\alpha)x_{t-1} + (1-\alpha)^2 x_{t-2} + \dots$$

$$\bar{x}_t = \alpha x_t + (1-\alpha)\bar{x}_{t-1}$$

Double exponential smoothing is appropriate when the time series contains a linear trend. It acts by calculating two smoothed series - a single and a double smoothed value. Both will lag

[1] Delaware Population Consortium Annual Population Projections, October 28,2010, Version 2010.0

behind any trend. However, the difference between them indicates the size of the trend. This difference is used to adjust the forecast for the trend.

Time Series Least Squares

The second trend method incorporated is a least squares linear trend. This method uses aviation activity regressed against time to produce a projection. The R^2 statistics are used to gauge the significance of the trend. An R^2 of 0 means there is no statistical relationship between the passage of time and the trend of growth or decline of a forecast variable. R^2 values near 1 indicate a significant relationship and trend. For this study, R^2 values over 0.70 were considered significant.

4. GENERAL AVIATION DEMAND FORECASTS

General aviation activity is defined as civil aviation aircraft takeoffs and landings not classified as commercial or military. Forecasts of aviation demand can be developed for a variety of activity indicators. With the lack of airline service in the State, all demand for airports, airport facilities, and airport services stems from general aviation. Basic activity indicators include the type and number of aircraft operations, along with the number of aircraft based at each airport in the system. Other important elements are derived from these basic indicators. These different elements include:

- Registered Aircraft Forecast
- Based Aircraft Forecast
  - Based Aircraft Fleet Mix
- General Aviation Aircraft
  - Annual Operations
  - Local Versus Itinerant
  - Fleet Mix Forecast
  - Peak Period Operations (Monthly, Daily, Hourly)
- General Aviation Enplaned Passengers

4.1 Registered Aircraft Forecast

A registered aircraft is defined as being either fixed or rotary wing, operated in non-airline service with a current registration. Historical information used to develop the registered aircraft forecast is based on data compiled by private vendors (Avantext, Hi-Tech Marketing) for the years 1997-2010. These sources provide aircraft information, by type for the state and county on an annual basis. Figure 1 presents a graphic illustration of the study area's registered aircraft growth trends since 2000. As shown, there has been an overall increase in the number of registered aircraft reported in the study area with a small decline in 2010 from 2009.

Registered aircraft forecasts were developed for the state of Delaware and were then allocated to each of the three counties based upon market share. It should be noted that most of the registered aircraft in Delaware are not based in the state. Corporations located in the state register their aircraft in Delaware because of the tax-sheltering benefits and may base their aircraft elsewhere. In 2010, there were 13,249 registered aircraft in Delaware, with only 437 of those aircraft based in the state.

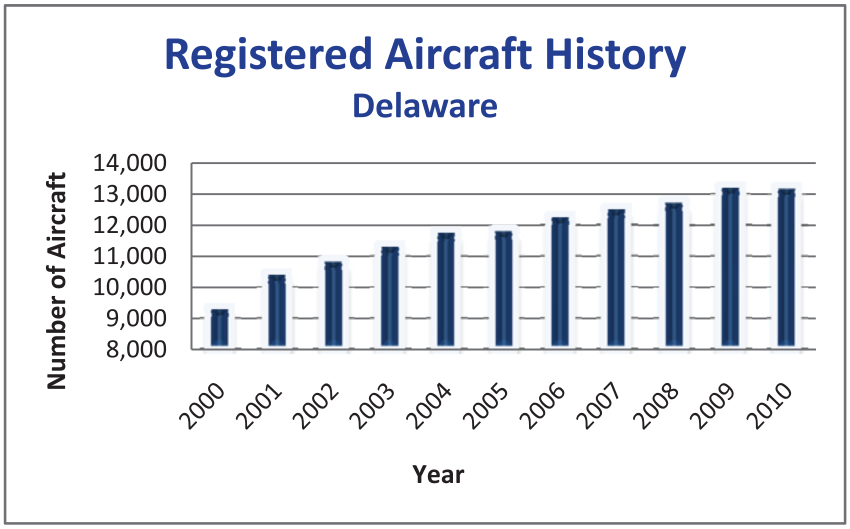


Figure 3-1 – Registered Aircraft History

Table 3-1 presents a summary of the nine projections of registered aircraft demand for Delaware. Also presented are the regression R^2 values for each projection. The Constant Market Share Projection of demand predicts the number of registered aircraft if Delaware keeps pace with the anticipated national growth in registered aircraft. This projection yields a total of 15,783 registered aircraft by the year 2030. The Dynamic Market Share Projection of demand examines historical market shares and develops a linear trend of these market shares to generate the projection of 18,199 registered aircraft by the year 2030.

The Socioeconomic Regression Projections included population, employment, and income statistics from Delaware. These projections resulted from the regression analyses between each indicator and registered aircraft in Delaware from 2001 through 2010. All three of these projections showed positive growth throughout the period.

The Trend Analysis Projection, similar to the Socioeconomic Regression Projections, examined the historical trend of registered aircraft growth using Linear Trend Analysis (least squares) and Double Exponential Smoothing Analysis. Since the historical trend is upward, both the linear trend projection and the exponential smoothing projection show an increase in registered aircraft over the period.

Table 3-1 - Projections of Study Area Registered Aircraft

Projection Type	2010	2015	2020	2030	R^2
Market Share					
Constant	13,249	13,543	14,054	15,783	
Dynamic	13,249	14,033	15,111	18,199	

Table 3-1 - Projections of Study Area Registered Aircraft					
Projection Type	**2010**	**2015**	**2020**	**2030**	**R^2**
Regression					
Population	13,249	14,619	15,734	17,688	0.975
Employment	13,249	14,277	14,535	14,916	0.736
PCPI	13,249	14,124	15,139	17,197	0.915
Trend Analysis					
Exp. Smoothing	13,249	14,738	16,127	18,904	
Linear Trend	13,249	15,024	16,580	19,692	0.978
Derived Projections					
High/Low Average	13,249	14,283	15,317	17,304	
Multi-Average	13,249	14,337	15,326	17,483	
Selected Forecast	**13,249**	**14,337**	**15,326**	**17,483**	

The Derived Projections are simply derivatives of the other existing projections. For example, the High/Low Average is the average of the highest and lowest viable projections. The Multiple Average is the average of all viable projections. As shown, these Derived Projections produce mid-range estimates of demand. Both of these derived projections were above the constant market share projection, (meaning that Delaware is anticipated to grow ahead of the US trend).

The Selected Forecast considered each of the projections as a possible forecast for the registered aircraft within Delaware. Since none could be ruled out on statistical grounds, the Multi-Average projection was selected as the preferred registered aircraft forecast. This forecast represents the mid-range or average of all of the projections. The forecast of registered aircraft shows a growth from 13,249 in the year 2010 to 17,483 by the year 2030 - a 32 percent growth over the period. Figure two shows the registered aircraft forecasts in graphic form.

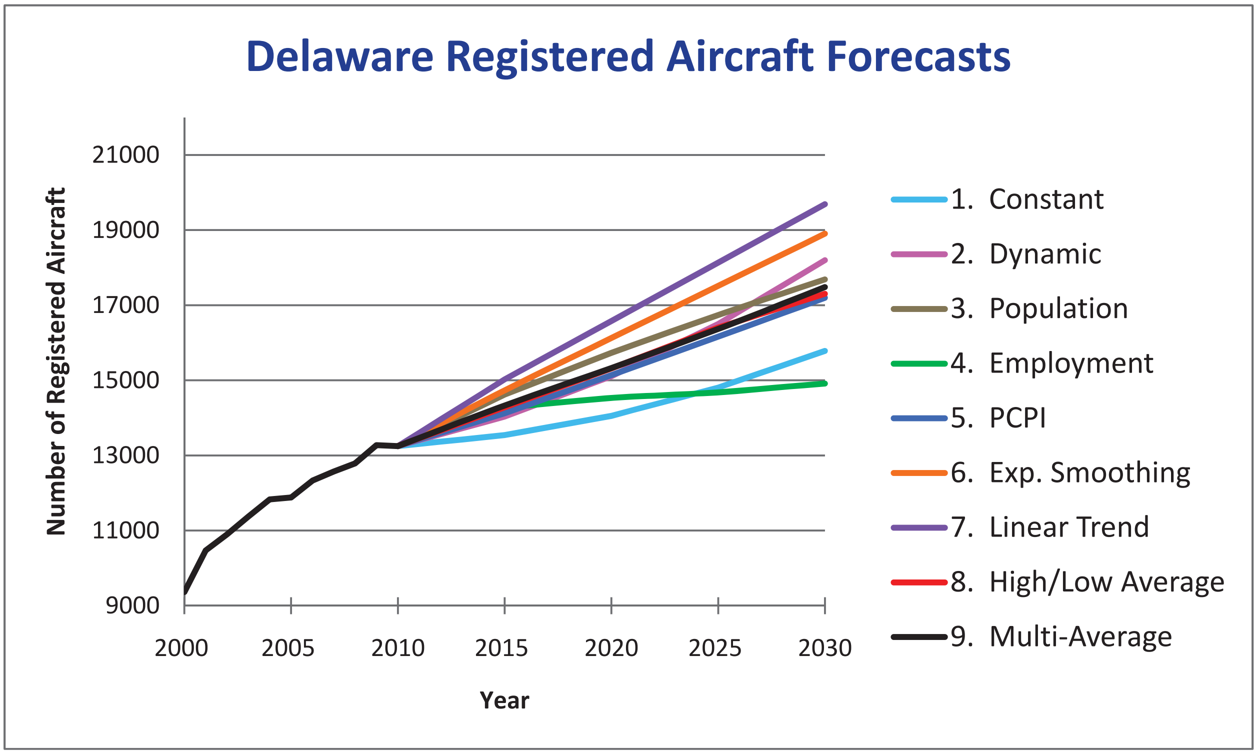


Figure 3-2 – Delaware Registered Aircraft Forecasts

4.2 Based Aircraft Forecast

By definition, a based aircraft is a general aviation aircraft that is stationed at an airport. Forecasting based aircraft at Delaware proceeded through the same process as all other demand elements: an analysis of historical data followed by forecasting into future years. The only difference is that unlike registered aircraft forecasts, which draw from an array of published historical data sources, based aircraft forecasts are hindered by the lack of reliable historical data. For this study, existing and historical based aircraft information was taken from the FAA's Form 5010-1, supplemented by input from the FAA's Terminal Area Forecasts, and airport manager reviews.

The forecast of registered aircraft was used as the "market" and the based aircraft at all public-use airports in Delaware constituted the "share." Table 3-2 presents the forecasts of based aircraft for all public-use airports in Delaware. In addition to the forecasts made for individual airports, based aircraft totals for the State are also presented.

Table 3-2 - Based Aircraft Forecast

Airport	**2010**	**2015**	**2020**	**2030**
Chandelle Estates	24	26	28	32
Chorman	19	21	22	25
Civil Air Terminal	0	0	0	0

Table 3-2 - Based Aircraft Forecast				
Airport	**2010**	**2015**	**2020**	**2030**
Delaware Airpark	56	61	65	74
Jenkins	20	22	23	26
Laurel	14	15	16	18
New Castle	189	205	219	249
Smyrna	10	11	12	13
Summit	43	47	50	57
Sussex County	62	67	72	82
Delaware Total	**437**	**475**	**507**	**576**

As shown, the numbers of based aircraft in the State are forecast to increase from 437 in the first period to 576 by the year 2030 - a 31.8 percent growth over the period. This growth is higher than the national average of 19 percent growth of active aircraft over the same period.

This is still considered reasonable due to the fact that in 2005 there were 506 based aircraft at the public-use airports in Delaware, a number that is forecasted to be reached in 2020.

Based Aircraft Fleet Mix

An aircraft fleet mix refers to the characteristics of a population of aircraft. General aviation aircraft are classified with regard to specific physical traits such as aircraft type (whether fixed wing or rotorcraft), their weight, and number and type of engines. Aircraft having dissimilar physical and operating traits require varying types and amounts of airport facilities. For this reason, it is important to estimate the type of aircraft that will be operating and based at Delaware airports.

In the forecasting process, the based aircraft fleet mix is used as one component to help determine operational fleet mix forecasts. It is also used to determine the future design category each public-use airport. Fleet mix categories included: single engine, multi-engine, turbojet, rotorcraft, and "other." This information was available from the most recent FAA Form 5010-1, Airport Master Record.

Projection of the fleet mix involved the consideration of the effects of the national trends in aircraft manufacturing, and the service area registered aircraft fleet mix. Table 3-3 presents the national forecasts of fleet mix from the most recent FAA forecast publication. Because the total number of based aircraft in Delaware is expected to grow moderately over the forecast period, fleet mix changes will occur as a result of new aircraft being based at system airports. Table 3-4 presents the forecast of based aircraft fleet mix anticipated for each public-use airport in Delaware. As shown, the predominance of single engine aircraft will continue into the future, with gains in multi engine and turbo-jet aircraft.

Table 3-3 – U.S. Fleet Mix Forecast[1]						
Year	**Single Engine**	**Multi Engine**	**Jet**	**Rotorcraft**	**Other**	**Total**
2010	173,711	23,240	11,568	10,165	5,487	224,172
2015	175,025	22,960	14,110	11,570	5,475	229,140
2020	178,786	22,774	17,465	13,320	5,450	237,795
2030	195,510	22,775	26,325	17,035	5,410	267,055

1 Source: FAA Aerospace Forecasts for Fiscal Years 2011-2031

Table 3-4 - Forecast of Based Aircraft Fleet Mix by Airport						
Airport Name	**Single Engine**	**Multi Engine**	**Jet**	**Rotor**	**Other**	**Total**
Chandelle Estates						
2010	22	2	0	0	0	24
2015	24	2	0	0	0	26
2020	26	2	0	0	0	28
2030	30	2	0	0	0	32
Chorman						
2010	17	2	0	0	0	19
2015	19	2	0	0	0	21
2020	20	2	0	0	0	22
2030	22	3	0	0	0	25
Delaware Airpark						
2010	48	7	1	0	0	56
2015	50	9	2	0	0	61
2020	51	11	3	0	0	65
2030	55	12	5	2	0	74
Jenkins						
2010	18	1	0	0	1	20
2015	20	1	0	0	1	22
2020	21	1	0	0	1	23
2030	24	0	0	0	2	26
Laurel						
2010	13	1	0	0	0	14
2015	14	1	0	0	0	15
2020	15	1	0	0	0	16
2030	17	1	0	0	0	18
New Castle						
2010	91	21	53	4	20	189
2015	100	23	56	6	20	205
2020	106	25	60	8	20	219

Table 3-4 - Forecast of Based Aircraft Fleet Mix by Airport

Airport Name	Single Engine	Multi Engine	Jet	Rotor	Other	Total
2030	119	32	70	8	20	249
Smyrna						
2010	8	0	0	0	2	10
2015	9	0	0	0	2	11
2020	10	0	0	0	2	12
2030	11	0	0	0	2	13
Summit						
2010	39	4	0	0	0	43
2015	41	5	0	1	0	47
2020	43	6	0	1	0	50
2030	48	8	0	1	0	57
Sussex County						
2010	44	9	2	6	1	62
2015	46	10	3	7	1	67
2020	47	12	4	8	1	72
2030	50	15	7	9	1	82
STATEWIDE TOTALS						
2010	300	47	56	10	24	437
2015	323	53	61	14	24	475
2020	339	60	67	17	24	507
2030	376	73	82	20	25	576

4.3 General Aircraft Operations Forecast

An aircraft operation is defined as either a takeoff or a landing. A takeoff and landing are considered two operations. General aviation operations forecasts were prepared for each public-use airport in Delaware for a number of activity measures. In this regard, the following operational elements were forecast:

- Total Annual Operations
  - Local versus Itinerant
  - Fleet Mix Forecast
- Peak Period Operations (Monthly, Daily, Hourly)

The general aviation annual operations forecast (Table 3-5) was derived for both local and itinerant operations through the use of an operations-per-based-aircraft (OPBA) ratio. The OPBA's are ratios of total general aviation operations at an airport divided by the corresponding number of based aircraft. These OPBA ratio's were further subdivided into local and itinerant

OPBA ratios. By definition, local operations are performed by aircraft that operate within the local traffic pattern or within site of the airport. They can also be assigned to aircraft arriving or departing from local practice areas within 20 miles of the airport. In essence, local operations are associated with pilot training. Itinerant operations, on the other hand, are all other aircraft operations other than local operations. Table 3-5 presents the forecast of local and itinerant general aviation operations for each Delaware public-use airport.

Table 3-5 – Forecast of General Aviation Operations

Airport	2010			2015			2020			2030		
	Local	Itinerant	Total	Local	Itinerant	Total	Local	Itinerant	Total	Local	Itinerant	Total
Chandelle Estates	2,950	250	3,200	3,200	300	3,500	3,400	300	3,700	3,900	300	4,200
Chorman	1,300	11,900	13,200	1,500	13,100	14,600	1,500	13,800	15,300	1,700	15,600	17,300
Civil Air Terminal	0	600	600	0	800	800	0	1,000	1,000	0	1,400	1,400
Delaware Airpark	18,550	4,100	22,650	20,200	4,400	24,600	21,600	4,700	26,300	24,500	5,400	29,900
Jenkins	850	550	1,400	900	600	1,500	1,000	600	1,600	1,100	700	1,800
Laurel	8,050	900	8,950	8,600	1,000	9,600	9,200	1,000	10,200	10,400	1,200	11,600
New Castle	35,480	34,490	69,970	38,500	37,400	75,900	41,100	40,000	81,100	46,700	45,400	92,100
Smyrna	2,000	300	2,300	2,200	300	2,500	2,400	400	2,800	2,600	400	3,000
Summit	25,000	16,400	41,400	27,300	18,100	45,400	29,000	19,200	48,200	33,100	21,900	55,000
Sussex County	26,200	7,700	33,900	28,300	8,300	36,600	30,400	9,000	39,400	34,600	10,200	44,800
Delaware Total	**120,380**	**77,190**	**197,570**	**130,700**	**84,300**	**215,000**	**139,600**	**90,000**	**229,600**	**158,600**	**102,500**	**261,100**

Operational Fleet Mix Forecast

The operational fleet mix forecast was derived directly from based aircraft fleet mix unless other specific information concerning operational use was available. The process involved multiplying the operations per based aircraft (OPBA) utilization rate times the number of aircraft in each category. Table 3-6 presents the forecast of operational fleet mix for each public-use airport in Delaware.

Table 3-6 – Forecast of Operational Fleet Mix

Airport	Single Engine	Multi Engine	Jet	Rotor	Other	Total
Chandelle Estates						
2010	2,933	267	0	0	0	3,200
2015	3,231	269	0	0	0	3,500
2020	3,436	264	0	0	0	3,700
2030	3,938	263	0	0	0	4,200
Chorman						
2010	11,811	1,389	0	0	0	13,200
2015	13,210	1,390	0	0	0	14,600
2020	13,909	1,391	0	0	0	15,300
2030	15,224	2,076	0	0	0	17,300
Civil Air Terminal						
2010	0	91	429	80	0	600
2015	0	158	536	106	0	800
2020	0	197	670	133	0	1,000
2030	0	276	938	186	0	1,400
Delaware Airpark						
2010	19,414	2,831	404	0	0	22,650
2015	20,164	3,630	807	0	0	24,600
2020	20,635	4,451	1,214	0	0	26,300
2030	22,223	4,849	2,020	808	0	29,900
Jenkins						
2010	1,260	70	0	0	70	1,400
2015	1,364	68	0	0	68	1,500
2020	1,461	70	0	0	70	1,600
2030	1,662	0	0	0	138	1,800
Laurel						
2010	8,311	639	0	0	0	8,950
2015	8,960	640	0	0	0	9,600
2020	9,563	638	0	0	0	10,200

Table 3-6 – Forecast of Operational Fleet Mix						
Airport	**Single Engine**	**Multi Engine**	**Jet**	**Rotor**	**Other**	**Total**
2030	10,956	644	0	0	0	11,600
New Castle						
2010	37,676	8,694	21,943	1,656	0	69,970
2015	41,027	9,436	22,975	2,462	0	75,900
2020	43,199	10,188	24,452	3,260	0	81,100
2030	47,860	12,870	28,153	3,217	0	92,100
Smyrna						
2010	1,840	0	0	0	460	2,300
2015	2,045	0	0	0	455	2,500
2020	2,333	0	0	0	467	2,800
2030	2,538	0	0	0	462	3,000
Summit						
2010	37,549	3,851	0	0	0	41,400
2015	39,604	4,830	0	966	0	45,400
2020	41,452	5,784	0	964	0	48,200
2030	46,316	7,719	0	965	0	55,000
Sussex County						
2010	24,372	4,921	780	3,281	547	33,900
2015	25,597	5,463	1,170	3,824	546	36,600
2020	26,348	6,567	1,560	4,378	547	39,400
2030	28,411	8,195	2,730	4,917	546	44,800
STATEWIDE TOTALS						
2010	**145,165**	**22,755**	**23,556**	**5,017**	**1,077**	**197,570**
2015	**155,202**	**25,884**	**25,487**	**7,358**	**1,069**	**215,000**
2020	**162,336**	**29,549**	**27,896**	**8,735**	**1,083**	**229,600**
2030	**179,127**	**36,892**	**33,841**	**10,094**	**1,146**	**261,100**

Peak Period Operations

Since many general aviation landside and airfield facility needs are related to the levels of activity during peak periods, forecasts were developed for peak month, design day, and peak hour general aviation operations at Delaware public-use airports. Typically, non-towered general aviation airports do not keep accurate records of peak period activity. Thus, an industry-accepted method of estimation was used to predict peak period activity that does not require a census of hourly operations totals. The approach used in developing the peak period operations forecasts is outlined as follows:

- ***Peak Month GA Operations:*** This level of activity is defined as the calendar month when peak aircraft operations occur. Peak Month percentages at Delaware Airports were estimated using the assumption that peak month operations are 10 percent greater than average month operations. The only exception to this rule was for New Castle Airport, where actual FAA Air Traffic Control Tower statistics were used to establish general aviation peak month operations.

- ***Design Day Operations:*** This level of operations is defined as the average day within the peak month. This indicator can be developed by dividing peak month operations by 30 or 31. For conservative forecasting purposes, a 30-day month was selected rather than a 31-day month.

- ***Peak Hour Operations:*** This level of operations is defined as the peak hour within the design day. For airports with between 50 and 300 design day operations, general aviation peak hour operations tend to be 20 percent of those design day operations. As the design day operations decrease, the peak hour percentage increases and vice versa.

Table 3-7 – Forecast of Peak Operations

Airport	GA Operations	Peak Month	Design Day	Peak Hour
Chandelle Estates				
2010	3,200	293	10	3
2015	3,500	321	11	3
2020	3,700	339	11	3
2030	4,200	385	13	4
Chorman				
2010	13,200	1,210	40	8
2015	14,600	1,338	45	9
2020	15,300	1,403	47	9
2030	17,300	1,586	53	11
Civil Air Terminal				
2010	600	300	120	24
2015	800	400	160	32
2020	1,000	500	200	40
2030	1,400	700	280	56
Delaware Airpark				
2010	22,650	2,076	69	14
2015	24,600	2,255	75	15
2020	26,300	2,411	80	16
2030	29,900	2,741	91	18

Table 3-7 – Forecast of Peak Operations				
Airport	**GA Operations**	**Peak Month**	**Design Day**	**Peak Hour**
Jenkins				
2010	1,400	128	4	2
2015	1,500	138	5	2
2020	1,600	147	5	2
2030	1,800	165	6	2
Laurel				
2010	8,950	820	27	7
2015	9,600	880	29	7
2020	10,200	935	31	8
2030	11,600	1,063	35	9
New Castle				
2010	69,970	7,375	414	70
2015	75,900	8,030	451	77
2020	81,100	8,580	482	82
2030	92,100	9,744	547	88
Smyrna				
2010	2,300	211	7	2
2015	2,500	229	8	2
2020	2,800	257	9	3
2030	3,000	275	9	3
Summit				
2010	41,400	3,795	127	25
2015	45,400	4,162	139	28
2020	48,200	4,418	147	29
2030	55,000	5,042	168	34
Sussex County				
2010	33,900	3,108	104	21
2015	36,600	3,355	112	22
2020	39,400	3,612	120	24
2030	44,800	4,107	137	27

4.4 General Aviation Enplanements

Forecasts of annual general aviation enplaned passengers play an important role in determining such landside facilities as access roads, the general aviation terminal building sizes, and the amount of automobile parking areas. This activity indicator is often ignored due to the lack of historical data.

To forecast general aviation enplaned passengers, an aircraft occupancy rate was multiplied by the number of itinerant general aviation departures from the Airport. In 2008, the Aircraft Owners and Pilots Association (AOPA) estimated that an average of 2.5 passengers per general aviation itinerant departure was a reasonable estimate of aircraft occupancy. For this study, this factor was applied to all forecast itinerant departures and 10 percent of local departures (except for the Civil Air Terminal which used a much higher ratio because of the high number of passengers per aircraft using the facility during NASCAR races). Local departures are considered training operations and do not add to the landside facility use. Therefore, only a fraction of those operations were counted as contributing passengers to the landside facility use.

Table 3-8- Forecast of Aviation Enplanements

Airport	**2010**	**2015**	**2020**	**2030**
Chandelle Estates	700	800	800	900
Chorman	15,000	16,600	17,400	19,700
Civil Air Terminal	5,000	5,500	6,000	7,000
Delaware Airpark	7,400	8,000	8,600	9,800
Jenkins	800	900	900	1,000
Laurel	2,100	2,300	2,400	2,800
New Castle	47,500	51,600	55,100	62,600
Smyrna	600	700	800	800
Summit	23,600	26,000	27,600	31,500
Sussex County	12,900	13,900	15,100	17,100
Delaware Total	**115,600**	**126,300**	**134,700**	**153,200**

It can be argued that this methodology ignores 90 percent of the local operations component, which is true. However, local operations are primarily training and are typically made up of repeated takeoffs and landings. Pilots in training do not add significantly to the passenger through-put of the airport facilities and thus their total inclusion would unduly raise the projected demand levels, which in turn, would suggest unnecessary facilities.

4.5 Military Forecasts

Military activity shows little or no correlation to community socioeconomic data or other recognized air traffic indicators. The level of military operations is a function of Department of Defense Policy and Congressional funding. Therefore, it is difficult to accurately predict the level of activity for Delaware airports. Table 3-9 presents the existing and forecast military activity for each Delaware public-use airport with existing military operations. To develop a forecast, the most recent historical level of activity was simply held constant throughout the planning period. In addition to the annual operations forecast, a projection of peak hour operations was included in Table 3-9. The New Castle Airport peak hour military operations were taken from FAA Control Tower records.

Table 3-9 - Forecast of Military Operations

Airport	2010	2015	2020	2030
New Castle	8,870	8,900	8,900	8,900
Peak Hour	30	30	30	30
Summit	100	100	100	100
Peak Hour	4	4	4	4
Sussex County	100	100	100	100
Peak Hour	4	4	4	4

5. SUMMARY OF AVIATION DEMAND FORECASTS

Table 3-10 presents a summary of the aviation demand forecasts for each system airport. Included in summary are airport-specific based aircraft and operations numbers, along with enplanement and peak period statistics. It should be noted that peak hour components were added to project the highest potential peak period operations for each airport. While rare, all of the types of activity could potentially occur during the same hour.

Table 3-10 - Summary of Aviation Demand Forecasts

Airport/Forecast Component	2010	2015	2020	2030
Chandelle Estates				
Based Aircraft	24	26	28	32
Operations	3,200	3,500	3,700	4,200
Peak Hour Operations	3	3	3	4
Enplanements - GA	700	800	800	900
Chorman				
Based Aircraft	19	21	22	25
Operations	13,200	14,600	15,300	17,300
Peak Hour Operations	8	9	9	11
Enplanements - GA	15,000	16,600	17,400	19,700
Civil Air Terminal				
Based Aircraft	0	0	0	0
Operations	600	800	1,000	1,400
Peak Hour Operations	24	32	40	56
Enplanements - GA	5,000	5,500	6,000	7,000
Delaware Airpark				
Based Aircraft	56	61	65	74

Table 3-10 - Summary of Aviation Demand Forecasts				
Airport/Forecast Component	**2010**	**2015**	**2020**	**2030**
Operations	22,650	24,600	26,300	29,900
Peak Hour Operations	14	15	16	18
Enplanements - GA	7,400	8,000	8,600	9,800
Jenkins				
Based Aircraft	20	22	23	26
Operations	1,400	1,500	1,600	1,800
Peak Hour Operations	2	2	2	2
Enplanements - GA	800	900	900	1,000
Laurel				
Based Aircraft	14	15	16	18
Operations	8,950	9,600	10,200	11,600
Peak Hour Operations	7	7	8	9
Enplanements - GA	2,100	2,300	2,400	2,800
New Castle Airport				
Based Aircraft	189	205	219	249
Operations- Total	78,840	84,800	90,000	101,000
General Aviation	69,970	75,900	81,100	92,100
Military	8,870	8,900	8,900	8,900
Peak Hour Operations- Total	100	107	112	118
General Aviation	70	77	82	88
Military	30	30	30	30
Enplanements - GA	47,500	51,600	55,100	62,600
Smyrna				
Based Aircraft	10	11	12	13
Operations	2,300	2,500	2,800	3,000
Peak Hour Operations	2	2	3	3
Enplanements - GA	600	700	800	800
Summit				
Based Aircraft	43	47	50	57
Operations- Total	41,500	45,500	48,300	55,100
General Aviation	41,400	45,400	48,200	55,000
Military	100	100	100	100
Peak Hour Operations- Total	29	32	33	38
General Aviation	25	28	29	34
Military	4	4	4	4
Enplanements - GA	23,600	26,000	27,600	31,500
Sussex County				

Table 3-10 - Summary of Aviation Demand Forecasts				
Airport/Forecast Component	**2010**	**2015**	**2020**	**2030**
Based Aircraft	62	67	72	82
Operations- Total	34,000	36,700	39,500	44,900
General Aviation	33,900	36,600	39,400	44,800
Military	100	100	100	100
Peak Hour Operations- Total	25	26	28	31
General Aviation	21	22	24	27
Military	4	4	4	4
Enplanements - GA	12,900	13,900	15,100	17,100
DELAWARE TOTALS				
Based Aircraft	**437**	**475**	**507**	**576**
Operations- Total	**206,640**	**224,100**	**238,700**	**270,200**
General Aviation	**197,570**	**215,000**	**229,600**	**261,100**
Military	**9,070**	**9,100**	**9,100**	**9,100**
Peak Hour Operations- Total	**214**	**235**	**255**	**289**
Enplanements - GA	**115,600**	**126,300**	**134,700**	**153,200**

Chapter 4:
Demand/Capacity & System Requirements

Chapter 4
DEMAND/CAPACITY & AVIATION SYSTEM NEEDS

FOR AN AVIATION SYSTEM TO PROPERLY SERVICE existing and forecast levels of activity, it must have the ability to efficiently process the demand of its users. This chapter reviews the ability of the existing airport facilities in Delaware to accommodate the number of projected aircraft operations during the planning period by gathering estimates of operational capacity. By definition, operational capacity is determined by the amount of average delay incurred. Therefore, the determination of capacity is a measure of acceptable levels of delay. As demand approaches 100 percent of estimated capacity, the delay incurred by an aircraft increases and the quality of service deteriorates.

To understand the ability of the Delaware system of airports to process demand, available data pertaining to airport capacity were compared to forecast levels of demand. Results of this comparison, or demand/capacity analysis, offered insight into the locations and types of airport facilities needed to adequately serve the State of Delaware over the long term future. Areas where capacity deficiencies are expected can be given special attention in the identification of appropriate alternatives that will deal with the specific problems. This chapter is divided into three major sections:

- Demand/Capacity Analysis
- Facility Needs Analysis
- Summary of Findings

1. DEMAND/CAPACITY ANALYSIS

USING EXISTING AIRPORT MASTER PLANS, THE PRIOR aviation system plan, and Federal Aviation Administration (FAA) Advisory Circular 150/5060-5 **Airport Capacity and Delay,** airport airfield capacities for public-use system airports were determined. It should be noted that the forecast capacity availability at Delaware's public use airports differs significantly from the previous SASPU. This is due to the change in demand caused by the negative effects of the Recession of 2007-2009 and higher avgas and jet fuel prices. With overall aviation demand levels lower throughout the State, the available airfield capacity throughout the system has increased.

This section briefly outlines the process by which airfield capacity was obtained or calculated and presents the results of the analysis. The discussion is organized as follows:

- Definition of Airfield Capacity
- Methodology Used
- Hourly Capacity and Annual Service Volume
- Annual Aircraft Delay

1.1 Definition of Airfield Capacity

Airfield capacity, as it applies to the Delaware Aviation System Plan Update is a measure of terminal area airspace and airfield saturation. It is defined as the maximum rate at which aircraft can arrive and depart an airfield with an acceptable level of delay. Measures of capacity in this chapter include the following:

- ***Hourly Capacity of Runways:*** The maximum number of aircraft operations that can take place on an airport runway system in one hour.
- ***Annual Service Volume:*** The annual capacity or a maximum level of annual aircraft operations that can be accommodated on an airport runway system with an acceptable level of delay.
- ***Annual Delay:*** The total amount of time per year that aircraft are delayed due to a constrained operating environment at an airport.

1.2 Methodology Used

A variety of techniques have been developed for the analysis of airfield capacity. The current technique accepted by the Federal Aviation Administration and employed in this study is described in the FAA Advisory Circular 150/5060-5, **Airport Capacity and Delay**. The Airport Capacity and Delay Model (ACDM) from that Advisory Circular uses the following inputs to derive an estimated airport capacity:

- Meteorological Conditions
- Airfield Layout and Configuration
- Navigational Aids
- Aircraft Operational Fleet Mix
- Touch-and-Go Operations

These inputs were used in the calculation of airfield capacity at public-use airports in Delaware.

Meteorological Conditions

Wind conditions are of prime importance in determining runway use and orientation. The most desirable runway orientation based on wind is the one which has the largest wind coverage and minimum crosswind components. Wind coverage is that percentage of time crosswind components are below an acceptable velocity. In this regard, the FAA recommends that a runway system provide 95 percent wind coverage.

In addition to wind coverage, meteorological conditions involve visibility and cloud ceiling conditions. Visual Meteorological Conditions (VMC) are those weather conditions that permit aircraft to operate and maintain safe separations by visual means (generally a minimum of a 1,000 foot cloud ceiling with 3 miles horizontal visibility). Aircraft that operate under these conditions generally use Visual Flight Rules (VFR). Instrument Meteorological Conditions (IMC) exist when the height of the dominant cloud base falls below that prescribed under VMC, and the range of horizontal visibility is constrained below VMC limits. During these weather conditions, aircraft must operate under Instrument Flight Rules (IFR), which tends to constrain capacity because of the greater aircraft separations needed for safety. Other factors not associated with weather can also influence the use of VFR and IFR operations such as airline operations and instrument flight training.

Airfield Layout and Configuration

Airfield layout and configuration affects the ability of the airport to efficiently accommodate aircraft operations. There are several airport geometrical designs which improve operational capacity. For example, runways with full-length parallel taxiways are more efficient than runways with partial length or no parallel taxiways because departing aircraft can taxi to the threshold with another aircraft on a final approach. Full-length taxiways permit a more rapid exit of aircraft from the runway, reducing the amount of time pilots must spend "back-taxiing" on the runway to the threshold for departure or to an exit taxiway. The number of taxiway exits on the runway and their width also affects operational capacity.

The spacing between the primary runway and its parallel taxiway are important considerations in the airfield capacity calculation. Additionally, airports with intersecting runways may have a lower annual operational capacity than airports with nonintersecting runways, as intersecting runways require more separation to be provided between aircraft using both runways at the same time. Airports with appropriately spaced, parallel runways are the most efficient since they may allow aircraft to land and take-off simultaneously. Also, it should be noted that for capacity calculation purposes, multiple runway airports are treated as single runway airports if there is no Air Traffic Control Tower (ATCT) available at the facility.

Navigational Aids

The availability of navigational aids permits airports to remain open for greater portions of the year than non-instrument capable airports. For example, airports without navigational aids cannot be used during Instrument Flight Rule (IFR) conditions. Thus, airports that do not have IFR capacity will have a lower overall capacity than airports with such capability. The influence of Air Traffic Control facilities available at an airport is also important. If an Approach Control facility with radar can directly vector an aircraft to a position from which an instrument landing can occur, the separation between arriving aircraft can be shortened. This separation must necessarily increase for safety purposes if no radar or Approach Control facility is available. Thus, the capacity of an instrument-equipped airport will differ, based upon the complexity of facilities available.

Aircraft Operational Fleet Mix

The aircraft fleet mix is an important factor in determining an airport's operational capacity. The FAA's Airport Capacity and Delay Model identifies an airport's aircraft fleet mix in terms of four classifications ranging from A (small, single engine with gross weight 12,500 lbs. or less) to D (large aircraft with gross weights over 300,000 lbs.). These classifications and examples of each are identified in Table 4-1.

The capacity model requires that total annual operations be converted to operations by specific aircraft classification category. In particular, the “C” plus “D” percentage (if greater than zero) significantly impacts the capacity calculation. Since requirements for aircraft are based on their approach speed and size, capacity decreases as the number and diversity of approach speeds increases. The greater the difference in size and speed of the aircraft in the fleet, the greater the space required between aircraft and, therefore, the lower the operational capacity

Table 4-1 - Aircraft Classification System Used In Capacity Model

CLASS A	Small single-engine, gross weight 12,500 pounds or less		
	Examples:	Cessna 172/182	Cirrus SR20/22
		Beech Bonanza	Piper Cherokee/Warrior
CLASS B	Twin-engine, gross weight 12,500 pounds or less		
	Examples:	Beech Baron	Piper Navajo
		Cessna 402	Beech 99
		Mitsubishi Mu-2	Rockwell Turbo

Table 4-1 - Aircraft Classification System Used In Capacity Model			
			Commander
CLASS C	Large aircraft, gross weight 12,500 pounds to 300,000 pounds		
	Examples	Boeing 737/757	Gulfstream G-II/III/IV/V
		Lear 35/55	Airbus 319/320/321
		McDonnell Douglas MD 80/88	Challenger 600/601
CLASS D	Large aircraft, gross weight more than 300,000 pounds		
	Examples	Boeing 747/767/777	Airbus A-300/310/380

Touch-And-Go Operations

A touch-and-go operation occurs when an aircraft lands and then makes and immediate takeoff without coming to a full stop. Touch-and-go operations increase the number of operations that a runway system can process due to the low occupancy time associated with each operation. The primary purpose of touch-and-go operations is for the training of student pilots. In Delaware, Chandelle Estates and Jenkins Airport are two privately owned airports that do not permit touch-and-go operations. Delaware Airpark has a significant number of touch-and-go operations as a result of the Delaware State University flight training program.

1.3 Hourly Capacity and Annual Service Volume

It is important to note that it is possible for airports to operate at operational levels in excess of their Airport Service Volume (ASV). However, ASV is widely used as a reference point for the general planning of capacity-related improvements. Detailed airfield capacity analysis, which is often part of an airport master plan, should be conducted for airports where operations are approaching their estimated ASVs.

For each system airport, the FAA's *Airport Capacity and Delay Model* combined information concerning runway configuration, runway usage, meteorology, operational fleet mix, and touch-and-go operations to produce the ASV and adjusted hourly capacity for each VFR and IFR operational runway use configuration. Table 4-2 shows the hourly capacity and ASV for each of the public-use airports in Delaware.

Table 4-2 - Airport Airfield Capacity Adjustment Inputs and Results										
Facility Name	Wind Coverage	% TNG	Taxiway	ATCT	Lighting	IAP	Mix Index C +3D	Adjusted Hourly		Adjusted
								VFR	IFR	ASV
Chandelle	91.6%	0.0%	No	No	LI	No	0	22	0	46,400
Chorman	95.7%	10%	No	No	LI	No	0	23	0	53,100
Delaware Airpark	95.4%	40%	Full	No	MI	Yes	0	87	20	171,300

Table 4-2 - Airport Airfield Capacity Adjustment Inputs and Results										
Facility Name	**Wind Coverage**	**% TNG**	**Taxiway**	**ATCT**	**Lighting**	**IAP**	**Mix Index C +3D**	**Adjusted Hourly**		**Adjusted**
								VFR	**IFR**	**ASV**
Jenkins	98.6%	0.0%	No	No	LI	No	0	22	0	24,800
Laurel	93.6%	30%	No	No	LI	Yes	0	27	20	32,200
New Castle	99.5%	20%	Full	Yes	HI	Yes	28%	73	44	194,000
Summit	95.9%	20%	Full	No	MI	Yes	0	73	20	170,800
Smyrna	91.8%	30%	No	No	LI	No	0	27	0	30,000
Sussex	99.1%	20%	Full	No	MI	Yes	1.8%	73	20	174,500

The FAA recommends that individual airports should begin planning for additional airfield capacity when actual annual operations reach 60 percent of ASV. Additionally, FAA recommends that capacity-enhancing improvements should be designed and constructed when actual annual operations reach 80 percent of ASV. Projections of total annual operations at each system airport were compared to published airfield operational capacity figures to identify facilities projected to exceed 60 percent of airfield capacity during the twenty year planning period. Table 4-3 presents a summary of airfield demand/capacity comparisons for each system airport.

Table 4-3 - Airfield Demand/Capacity Comparisons				
Airport	Annual Service Volume	Year 2030 Operations	Percent of Capacity	Annual Delay (Hours)
Chandelle Estates	46,400	4,200	9%	0
Chorman	53,100	17,300	33%	66
Delaware Airpark	171,300	29,900	17%	35
Jenkins	24,800	1,800	7%	0
Laurel	32,200	11,600	36%	50
New Castle	194,000	101,000	52%	707
Summit	170,800	55,100	32%	202
Smyrna	30,000	3,000	10%	0
Sussex County	174,500	44,900	26%	120
STATE TOTAL	897,100	268,800	30%	1,180

As shown in Table 4-3, none of the public use airports are projected to reach 60 percent of their capacity by 2030. Only 30 percent of the airfield capacity available at the State's public use airports will be used by the year 2030.

1.4 Annual Aircraft Delay

Annual aircraft delay is an important measure of how well the airfield services demand. It can also be used to estimate economic costs of experiencing delay and thus provide a feasibility measure for airport improvement projects. Delay statistics can be expressed either in total number of annual hours or as an average in minutes per aircraft operation. Table 4-4, derived from FAA data, shows the typical relationship between the ratio of annual demand at an airport to its calculated ASV and the average annual aircraft delay per operation based on the various demand/capacity ratios:

Table 4-4 – Relationship of ASV to Potential Delay

Ratio of Annual Demand to ASV	Average Aircraft Delay (min/op)	Peak Delay Range for Individual Aircraft (min)
0.1	0	0.0 - 0.5
0.2	0.1	0.5 - 1.0
0.3	0.2	1.0 - 2.0
0.4	0.3	1.5 - 3.0
0.5	0.4	2.0 - 4.0
0.6	0.5	2.5 - 5.0
0.7	0.7	3.5 - 7.0
0.8	0.9	4.5 - 9.0
0.9	1.4	7.0 - 14.0
1.0	2.8	13.0 - 26.0
1.1	5.4	27.0 - 54.0

As shown, when annual aircraft operations equal annual service volume (ratio of 1.0), the average annual aircraft delay is 2.8 minutes per aircraft. The actual delay at any given time depends on a number of conditions and can vary by a factor of five or more. Once an airport exceeds 80 percent of its operational capacity (a demand to ASV ratio of 0.8), average delay per operation begins to increase rapidly and resulting peak delays can vary widely.

Average annual delay estimates for each of the Delaware Aviation System Airports were presented earlier in Table 4-3. If no capacity expansion is undertaken for the future, the aviation system is anticipated to experience almost 1,180 hours of aircraft operational delay by the year 2030. Sixty percent of this delay will be attributable to New Castle Airport (707 hours of delay). Summit and Sussex County Airports will experience the next highest amounts of delay (202 annual hours and 120 annual hours respectively). Aircraft operational delays at the remaining public-use airports will be negligible.

On a State-wide basis, the sum of all airport capacities is enough to handle all future traffic in the area. This assumes that if one airport becomes saturated in terms of aircraft operations, the excess demand would be distributed to nearby airports with surplus capacity. The combined airfield capacities of all system airports is about 897,000 operations per year. The total number of operations projected for the year 2030 is roughly 259,700 or about 30 percent of total capacity.

2. AVIATION SYSTEM NEEDS

ONE OF THE ULTIMATE OUTPUTS OF THE system plan is to determine the locations and types of airport facilities needed to adequately serve the State of Delaware. The purpose of generating airport facility needs is to identify potential capacity deficiencies or airport improvement needs. This section builds on the results of the Demand/Capacity Analysis in Section 1 and will ultimately provide a base upon which the analysis of alternatives can be performed. In order to adequately address aviation system requirements this chapter has been organized to include the following sections:

- Airport Systems Concept
- Airport Facility Need Standards
- Airfield Facility Needs
- Landside Facility Needs
- Airspace/Navaid Needs
- Surface Transportation Needs
- Summary of Findings

2.1 Airport Systems Concept

An airport "system" implies a group of interdependent airports regularly interacting toward a unified goal. Each airport in a system, therefore, has a specific function which contributes toward that goal. The Aviation System Needs portion of the analysis applies system parameters to the network of Delaware public-use airports in order to better define the needs of airport users and citizens of the State. In this regard, the goals and objectives of the study provide direction as to what is ultimately desirable in the State's air transportation system. To better define the location and types of facilities needed, the following criteria were developed:

- ***Demand/Capacity Relationships:*** Where capacity deficits appear (either for the airfield or for the landside), additional airport facilities are needed. Facility requirements in this chapter deal only with existing airports and use FAA and aviation industry standards.
- ***Airport Locational Criteria:*** These standards are based upon the stated goals and objectives of the study. As such, the following locational standards apply:
  - Commercial air service should be within 60 minutes driving time for all of the State's citizens.
  - Business jet airports (ARC: C-II or Larger) should be within 30 minutes driving time of all significant population centers of more than 25,000.
  - Utility airports (ARC: B-I and B-II) should be within 30 minutes driving time of all cities with over 2,500 population.
- ***Planned Improvements/Airport Master Planning Recommendations:*** Current planned improvements and recent master plans were examined to determine

their site-specific facility recommendations for Delaware airports. Airport master plans often have examined local issues in far greater detail than is possible in a study of this scope. Thus, the facility recommendations from airport master plan studies along with planned improvements will be examined for use in this system plan.

Using these three input factors, a general idea of the location and types of airports needed in Delaware can be generated.

Airport Demand/Capacity Relationships

From the Demand/Capacity Analysis section, all public use airports were below their estimated airfield and landside capacities during the long-range planning period. New Castle Airport is projected to have the highest percentage of capacity used, with 52 percent used by 2030.

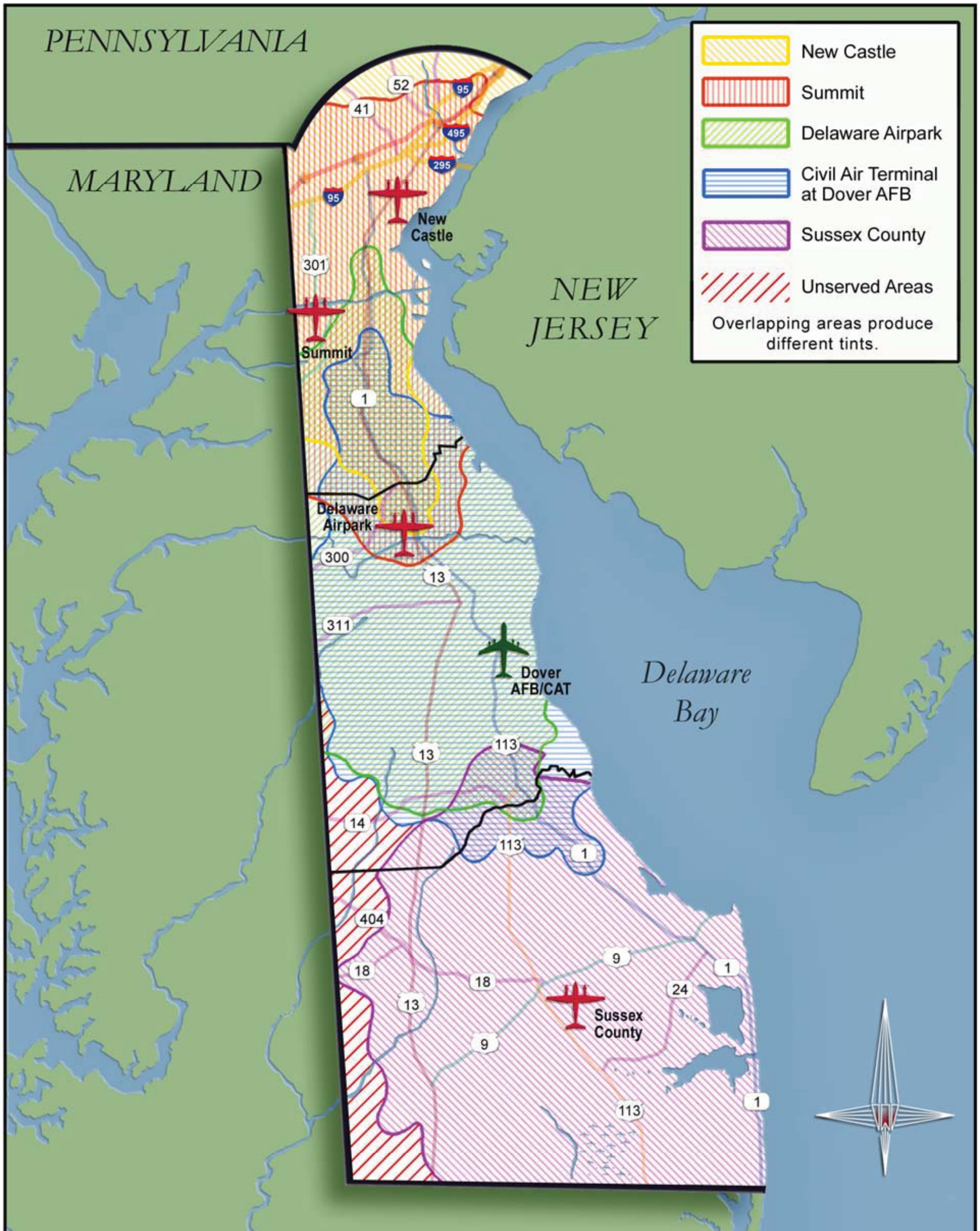
The public use airports in Delaware will not need new facilities from a capacity relief standpoint, but this does not preclude the development of runway and taxiway facilities to accommodate larger or heavier aircraft. For example, some airports may need additional runway length, based upon the type of aircraft forecast to use the facility. In these cases, the airport will have sufficient capacity to accommodate the number of operations forecast, but may not have the length, width, or strength to adequately serve forecast demand.

From the landside perspective, many aircraft owners desire hangar facilities due to inclement winter weather or summer sun/heat exposure in Delaware. As the cost of aircraft continues to rise, the relative value of each aircraft appreciates. Thus, hangars are used both for convenience and to protect valuable investments. Presently, many system airports have waiting lists for hangar space. These examples point to a need for continuous upgrading of facilities. Airfield and landside improvements at system airports are discussed later in this chapter under the topic of airport facility needs standards.

Airport Locational Criteria

Airport locational criteria were developed in response to the goals and objectives of the study pertaining to air transportation accessibility. These goals and objectives translated the need for commercial service and general aviation airport availability into driving times from population centers. Figure 4-1 presents a graphic depiction of 30 minute driving times around B-I or larger airports. For commercial service airports (Philadelphia International, BWI, and Salisbury, MD), Figure 4-2 presents a depiction of 60 minute driving times around each facility, as they impact Delaware.

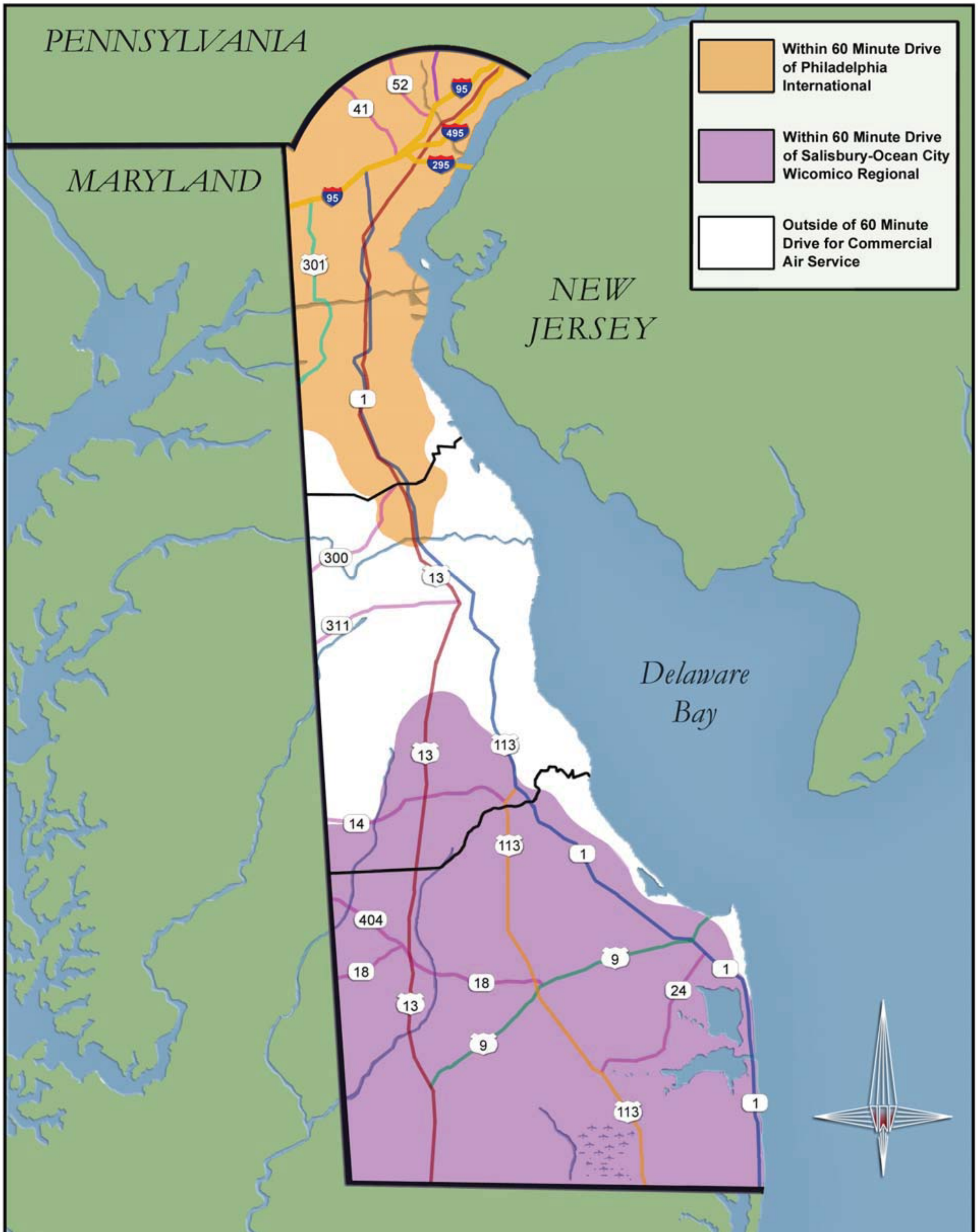
As shown on the maps, there are two areas that are beyond the 30 minute driving time boundary of B-I or larger airports in Delaware. However, no incorporated cities with more than 2,500 population are outside the 30 minute driving time areas. Even so, it can be argued that



Delaware State Aviation System Plan Update

30-MINUTE DRIVETIMES FROM PUBLICLY OWNED AIRPORTS & SUMMIT

Figure 4-1



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Delaware State Aviation System Plan Update

60 MINUTE DRIVETIME FROM NEAREST COMMERCIAL SERVICE AIRPORT

Figure 4-2

the western portions of Kent and Sussex County are "unserved" by a Delaware general aviation airport, since it is over 30 minutes driving time to the Sussex County Airport or Delaware Airpark. However, these areas are served by airports in Maryland including Cambridge-Dorchester and Easton.

The significant population centers of Wilmington, Newark, and Dover are all within 30 minutes driving time of C-II or larger airports. New Castle Airport is classified as a D-III facility while Dover AFB qualifies as a transport airport since it can safely accommodate jets of all sizes and is classified as an E-VI airport. As long as Dover AFB accepts civilian aircraft operations, no new C-II facilities are needed in Delaware according to service area criteria. It should be noted that both Summit Airport and Sussex County Airport are classified as B-II and B-III facilities respectively and both currently accommodate limited business jet activity.

For commercial air service, Philadelphia International Airport provides airline access to northern Delaware residents extending south to the city of Smyrna. From the south, Salisbury, Maryland provides airline service to residents in Sussex County and southern Kent County within an hour’s driving time. As shown in Figure 4-2, the State has inadequate coverage with regard to airline service availability.

Planned Improvements/Airport Master Planning Recommendations

Recommendations from airport master plans along with current planned improvements were used for the four National Plan of Integrated Airport Systems (NPIAS) airports and were carried through this analysis:

- Delaware Airpark
- New Castle Airport
- Summit Airport
- Sussex County Airport

Although not on the list, it should be noted that the Civil Air Terminal is also expected to undergo facility improvement during the planning period. This improvement would require funding from state and local sources, because the facility is not classified as a NPIAS airport.

For the NPIAS airports, the master planning level of detail exceeds that for system planning. Thus, relevant facility recommendations from these plans were used to complement the airport facility requirements standards used in this study. Recommended airfield facility improvements resulting from the application of master planning studies included the following:

- ***Delaware Airpark:*** A new replacement runway for 9-27 that measures 4,200' x 75' with a full parallel taxiway is scheduled to be completed in 2013. The current Airport Reference Code of B-I will change to ARC B-II when the new runway is completed. Other findings indicated a need to develop additional apron area and hangars.

- ***New Castle Airport:*** Airfield improvements have been made and more are to be completed as a result of the ongoing New Castle Airport Master Plan. In addition, landside facilities and a potential new terminal area are recommended for development. Roadway changes including the closure of Old Churchmans Road as a thru street will alter the access to the general aviation hangar area on that side of the airport.
- ***Summit Airport:*** Airport owners plan the expansion of Runway 17-35 to 5,320 feet with a full parallel taxiway.
- ***Sussex County Airport:*** Recommendations include the extension of Runway 4-22 from 5,000 feet to 6,000 feet over the long term, moving the ARC from a B-III to a C-III. However, an intermediate length of 5,500 feet will occur in the near future, as demand and justification for the longer length are then recorded.

2.2 Airport Facility Need Standards

From the criteria applied in the previous section, the airport locations and types needed in Delaware become more well-defined. This section sets forth the facility need standards that will be used on an individual airport basis throughout the remainder of this study. Facility need standards refer to acceptable planning guidelines issued by the State, FAA, or other recognized industry authorities. These guidelines deal with airport improvements and are linked to increased aviation activity as it affects the role and service level of an airport. The general planning standards used in developing facility recommendations in this study are geared toward airports with paved runways. Development standards used in this analysis include the following improvement categories:

- Land
- Runways and Taxiways
- Aircraft Parking Aprons
- Lighting Systems and Approach Aids
- Hangars
- Auto Parking
- Miscellaneous

Land

Airside land requirements include acreage under runway protection zones, the primary runway surface, and the land under transitional slopes extending from the runway centerline out to the building restriction lines. The dimensional standards for airside land requirements can be derived from FAA A/C 150-5300-13 (with Changes), Airport Design. These dimensional criteria were followed as closely as possible in determining minimum land requirements for small general aviation airports and were extrapolated for larger airports. Privately owned airports where no airport upgrades were recommended were not subject to these standards.

Landside areas comprise the land required for fixed base operations, aircraft parking aprons, hangar areas, terminal buildings, auto parking lots, access roads, and utilities. Landside areas are dependent upon runway and taxiway configurations, as well as the airport's ground access system. Since landside acreage requirements will vary according to the airport's configuration and ground access system, minimum acreage will differ among the airports. In general, the minimum land area required by each classification is as follows:

	Minimum Acreage
A-I	Variable
B-I	60
B-II	111
C-II & Larger	225

Runways and Taxiways

Runway and taxiway dimensional requirements are outlined in FAA Advisory Circular: 150/5300-13, Airport Design. Planning guidelines for runway and taxiway development are dependent upon the largest aircraft to regularly use the airport. The requirements outlined in this publication do not deal with turf airports. Runways at turf airports are generally limited by property boundaries and topography. Property boundary limitations frequently prevent adequate clear zones needed to meet minimum federal safety standards. Typical runway lengths for system airports in Delaware would include:

- ***A-I Runways:*** These have a length of approximately 2,500 feet or longer, and a minimum width of 60 feet.
- ***B-I Runways:*** These have a length of 3,000 feet or longer and a minimum width of 60 feet.
- ***B-II Runways:*** These have a length of 3,600 feet or longer and a minimum width of 75 feet. B-II airports that accommodate small planes with 10 or more seats generally do not exceed runway lengths of 5,000 feet and runway strengths of 30,000 pounds.
- ***C-II or Larger Runways:*** In Delaware, these have a minimum length of 5,300 feet and a width of 100 feet. These runways accommodate aircraft weighing more than 12,500 pounds.

Aircraft Parking Aprons

Aircraft parking area requirements were calculated on the assumption that paved apron areas will be provided for all based general aviation aircraft not kept in hangars at B-I or larger airports. This was equivalent to 20 percent of all small single engine aircraft based at these airports. A total of 300-400 square yards of apron per aircraft was used for planning the local apron requirement. In addition, the area of such an apron required to meet itinerant general aviation demand was estimated using an approach suggested by the FAA in Advisory Circular 150/5300-13, Airport Design. This approach indicates that 50 percent of the daily itinerant operations on a busy day (a busy day is 10 percent busier than the average day) will represent aircraft on the ground at any one time. Itinerant apron requirements for general aviation aircraft in Delaware indicate that 400-600 square yards per itinerant aircraft is a reasonable distribution. This will permit the accommodation of aircraft ranging from large multi-engine turboprops to single engine piston aircraft.

Lighting Systems and Approach Aids

Criteria for airport lighting systems and approach aids were developed for the system plan using FAA standards as a basis. Based on these criteria, high intensity runway lighting (HIRL) and medium intensity approach light systems (MALS) were recommended at airports that qualify for a precision instrument approach. All other runways were recommended to have medium intensity runway lighting (MIRL) systems. The taxiway lighting for all taxiways and turnarounds adjoining a lighted runway was medium intensity taxiway lighting (MITL). For turf airports, low intensity runway lights (LIRL) are considered sufficient. Approach aids were recommended at B-I or larger airports as follows:

- ***A Non-Precision Instrument Approach Aid*** was recommended at all C-II and larger airports and other airports with over 20,000 annual operations. In addition, a Global Positioning System (GPS) non-precision instrument approach was recommended for public-use airports with qualifying airfield facilities (proper separation standards for runways and taxiways, lighted obstructions, etc.).

- ***GPS-based Wide Area Augmentation System (WAAS), Vertical Navigation (VNAV), or LPV***[1] approaches were recommended at airports with qualifying forecasts of operations or instrument approaches or where safety concerns or training activity levels dictated a need.

- ***A Medium intensity Approach Light System (MALS)*** was recommended at airports that qualify for precision instrument approaches.

- ***Runway End Identifier Lights (REIL)*** were recommended for all paved and lighted runways except those with MALS, since they are not compatible.

- Visual approach aids such as ***Precision Approach Path Indicators (PAPI) or Visual Approach Slope Indicators (VASI)*** were recommended for all B-I or larger airport runways not already equipped.

[1] The name LPV is used for approaches constructed with WAAS criteria where the value for the vertical alarm limit is more than 12 meters and less than 50 meters.

Buildings

Hangar space requirements at system airports were based upon industry standards and experience with aircraft owner preferences in Delaware. These take into account the relative value of each type of aircraft and thus, the relative importance of protecting that investment. Year 2030 hangar space requirements were calculated for each airport as follows:

Percent of Aircraft Type	Type of Storage
100% of Jet Aircraft	Conventional Hangar
50% of Multi Engine Aircraft	Conventional Hangar
50% of Multi Engine Aircraft	T-Hangar
80% of Single Engine Aircraft	T-Hangar
20% of Single Engine Aircraft	Apron Tie-Down

Conventional hangar space requirements assumed 3,600 square feet per based jet aircraft and 1,600 square feet per multi engine aircraft, while T-hangar units for single engine aircraft were assumed to average 1,200 square feet. General aviation terminal space was recommended for system airports in differing degrees. B-I airports were recommended to have at least 500 square feet for pilot shelter, phone, and restrooms. B-II airports were recommended to have a minimum 800 square feet, while C-II and larger airports were recommended to have a minimum of 1,000 square feet.

Auto Parking

Auto parking areas were recommended for all classifications of airports. Auto parking space requirements are a function of the number of passengers, employees, and pilots expected to use an airport during the daily peak hour. At general aviation airports, planning standards indicate that roughly 1.3 auto parking spaces per total number of peak hour general aviation pilots and passengers is adequate.

Miscellaneous

All public use airports were recommended to have both a rotating beacon and a lighted wind indicator. Table 4-5 presents a summary of facility need standards used for the general aviation airports in the Delaware system.

Table 4-5 - General Aviation Minimum Facility Needs Standards

FACILITIES	B-I Airports[1]	B-II Airports[1]	C-II & Larger Airports[1]
Land			
Airfield	33 Acres	59 Acres	131 Acres
Runway Protection Zones	16 Acres	28 Acres	59 Acres

Table 4-5 - General Aviation Minimum Facility Needs Standards			
FACILITIES	B-I Airports[1]	B-II Airports[1]	C-II & Larger Airports[1]
Landside	8 Acres	24 Acres	24 Acres
TOTALS	57 Acres	111 Acres	214 Acres
Runways			
Length	3,000 Feet[2]	3,600 Feet[3]	5,300 Feet
Width	60 Feet[2]	75 Feet	100/150 Feet
Strength	12,500 Lbs.	12,500 Lbs.[3]	Over 12,500 Lbs.
Taxiways			
Parallel (Width)	25 Feet	35 Feet	35/50/75 Feet
Turn-around (Area)	1,400 s.y.	3,000 s.y.	4,000 s.y.
Aircraft Parking Apron			
Based Aircraft (Area)	300 s.y.	300 s.y.	400 s.y.
Itinerant Tiedown (Area)	400 s.y.	400 s.y.	600 s.y.
Lighting and Approach Aids			
HIRL	No	w/Precision Instrument Approach	w/Precision Instrument Approach
MIRL	Yes	Yes	Yes
MITL	Yes	Yes	Yes
LIRL	Less-than-utility Airport Only		
ILS/GPS[4]	No	Conditional	Conditional
NPIA	Demand Driven	Demand Driven	Yes
Visual Approach Aids	Yes	Yes	Yes
MALS	No	w/Precision Approach	w/Precision Approach
REIL	Yes	Yes (not w/MALS)	Yes (not w/MALS)
Buildings			
GA Terminal (Minimum)[5]	500 s.f.	800 s.f.	1,000 s.f.
Conventional Hangar	As Required	As Required	As Required
T-Hangar[6]	As Required	As Required	As Required
Auto Parking			
Area per Space	35 s.y.	35 s.y.	35 s.y.
Miscellaneous			
Fencing	As Required	As Required	As Required
Rotating Beacon	Yes	Yes	Yes
Wind Indicator	Yes	Yes	Yes
Pavement Overlay[7]	As Required	As Required	As Required

Legend

HIRL:	High Intensity Runway Lights
MIRL:	Medium Intensity Runway Lights
MITL:	Medium Intensity Taxiway Lights
LIRL:	Low Intensity Runway Lights
GPS:	Global Positioning System Approach
ILS:	Instrument Landing System

NPIA: Non-Precision Instrument Approach
MALS: Medium Intensity Approach Light System
REIL: Runway End Identifier Lights

1 U.S. Department of Transportation, Federal Aviation Administration, Airport Design, AC No. 150/5300-13, with Changes.
2 A-I runways have a length of approximately 2,500 feet or longer, and a minimum width of 60 feet. Turf runways are not subject to these standards.
3 B-II airports that accommodate small planes with 10 or more seats can have a runway length of up to 5,000' and runway strengths up to 30,000 pounds.
4 FAA Order 7031.2C, November 1994, Airway Planning Standard Number One - Terminal Air Navigation Facilities and Air Traffic Control Services, FAA Order 8260.3B, United State Standard for Terminal Instrument Procedures (TERPS) with Changes.
5 Delaware recommended standard.
6 Hangar space dictated by fleet mix: Jets - 100% stored in conventional hangars; Multi Engine - 50% stored in conventional hangars, 50% stored in T-hangars; Single Engine - 80% stored in T-hangars.
7 Maximum pavement life assumed to be 20 years.

2.3 Airfield Facility Needs

Having stated the dimensional requirements of the airfield facilities, the next step was to apply these standards to the airports in Delaware. The runway extensions indicated by the master plan input, the locational standards, or the fleet mix forecast are included as "needed" facilities. It should be understood that the designation of an upgrade or improvement for an airport indicates a future aviation need for the general area and does not represent a decision to upgrade that particular airport. Such a decision must be made by the airport Sponsor, using the results of master planning and appropriate environmental studies as a basis. Table 4-6 presents the airfield improvements suggested by the analysis.

Table 4-6 - Suggested Airfield Improvements to System Airports: Year 2030

Airport Name	Existing Primary Runway Dimensions	Future Primary Runway Dimensions	Dimensional Upgrade
Chandelle Estates	2,533' x 28'	2,533' x 60'	32' in width
Chorman	3,588' x 40'	3,600' x 60'	12' in length 20' in width
Delaware Airpark[1]	3,582' x 60'	4,200' x 75'	New Runway and Full Parallel Taxiway
Dover AFB[2]	12,902' x 150'	N/A	N/A
Jenkins	2,842' x 70'	2,842' x 70'	None
Laurel	3,175' x 270'	3,175' x 270'	None
New Castle	7,012' x 150'	7,012' x 150'	None
Summit[1]	4,488' x 65'	5,320' x 75'	833' in length and 10' in width
Smyrna	2,600' x 125'	2,600' x 125'	None
Sussex County[1]	5,000' x 150'	6,000' x 150'	1,000' in length

[1] Recommendations from airport master plans and current ALPs.
[2] Recommendations for military runway lengths are made solely by the military.

2.4 Landside Facility Needs

The landside facility needs for Delaware airports were developed on a generalized basis using the demand/capacity relationships developed earlier in this Chapter. For the purposes of this analysis, landside facility requirements refer to the aircraft or passenger processing capability of an airport. As such, landside facility needs were identified for the hangar and apron areas of the general aviation areas of all airports. It should be remembered that facility needs outlined in this section are simply suggestions and cannot be implemented at any of the system airports without airport owner/sponsor support (particularly the privately owned airports). Table 4-7 presents a summary of additional terminal, hangar, or apron facility needs.

In addition, it should be noted that this analysis is meant to identify potential capacity constraints within the system regarding landside passenger handling and aircraft processing capability. That is why the focus of the analysis is on terminal, hangar, and apron area facilities. In Phase 2 of the System Plan, the entire range of airport facilities including land acquisition, pavement overlays, airfield lighting, and miscellaneous items will be considered using the facility requirements standards outlined in this chapter.

Table 4-7 - Suggested Additional Landside Facility Needs (Year 2030)

Airport Name	Terminal Building Improvements	Additional Apron Area (s.y.)	Additional C-Hangar Space (s.f.)	Additional T-hangar Units[1]
Chandelle Estates	None	1,900 s.y.	None	8 Units
Chorman	500 s.f.	3,700 s.y.	None	None
Delaware Airpark	None	None	28,900 s.f.	29 Units
Dover AFB/Civil Air Terminal[2]	4,000 s.f.	50,000 s.y.	N/A	N/A
Jenkins	500 s.f.	None	None	None
Laurel	None	None	None	None
New Castle	None	9,900 s.y.	None	None
Summit	None	None	None	9 Units
Smyrna	None	None	None	4 Units
Sussex County	None	None	None	None
TOTAL ADDITIONAL FACILITIES	5,000 s.f.	65,500 s.y.	28,900 s.f.	50 Units

[1] Aircraft that require T-hangars were assumed to move to any unused conventional hangar space before additional T-hangar units would be built.
2 The Civil Air Terminal work would be undertaken with State and local funding, and reflects economic development activities to increase usage by NASCAR race teams and air cargo carriers.

2.5 Airspace Obstructions/Navaid Needs

The inventory chapter focused on the airspace obstructions and navaid needs at system airports. The purpose of this section is to examine the future airspace use patterns for each airport and to identify airspace obstruction removal needs along with future IFR demands that will require improved navaid facilities.

The facility needs portion of this analysis specified recommendations for the removal of airspace obstructions, based upon the inventory of those presented in Chapter 2. Airspace obstructions that penetrate FAR Part 77 imaginary surfaces include the following:

- Chandelle Estates: 24.35Acres + 154 Obstructions
- Chorman: 19.88 Acres + 20 Obstructions
- Delaware Airpark: 69.00 Acres + 44 Obstructions
- Jenkins: 86.11 Acres + 71 Obstructions
- Laurel: 28.53 Acres + 25 Obstructions
- New Castle Airport: 34.70 Acres + 106 Obstructions
- Smyrna: 3.09 Acres + 3 Obstructions
- Summit 64.64 Acres + 43 Obstructions
- Sussex County 61.00 Acres + 10 Obstructions

Rather than remove all of these, many non-critical obstructions can be lighted or marked, resulting in a much lower cost of remediation.

From navaid need perspective, there are visual navaids such as Visual Approach Slope Indicators (VASIs) or Precision Approach Path Indicators (PAPIs) lacking on some runway ends at system airports. For the NPIAS airports, runway ends at Delaware Airpark (both Runway end 9 and Runway end 27) need some type of visual landing aids.

From an IFR perspective, it should be noted that the FAA has primary responsibility for the development and management of the airways system. Thus, it is beyond the scope of this study to detail requirements pertaining to Air Traffic Control facilities or equipment. Rather, the focus of this analysis is directed toward specific airport instrumentation that can serve to increase the level of safety at system airports. In this regard, it was recommended that a nonprecision Global Positioning System (GPS) instrument approach be available at public use airports in Delaware that had qualifying facilities (proper separation standards for runways and taxiways, lighted obstructions, etc.) Currently, six airports (New Castle County, Summit Airport, Sussex County Airport, Delaware Airpark, Laurel Airport, and Dover AFB) are already equipped with a minimum of one or more nonprecision instrument approaches. Of these airports, New Castle Airport and Dover AFB have precision instrument approaches. Sussex County Airport is working to upgrade their nonprecision approach to a precision approach in the near future.

Of the remaining airports, Chorman would have the activity needed to justify an instrument approach in the future. However, current runway safety areas would not permit an instrument approach due to the lack of separation between the runway and the various hangar facilities along the flight line. Thus, Chorman would only be eligible if either the runway were relocated or the terminal buildings were relocated. At some point in the future, it is anticipated that the GPS system (WAAS, LPV, VNAV) will permit the addition of precision instrument approach at Summit Airport. The major concern is not whether the technology exists to establish such an approach. Rather, future un-obstructed approach surfaces supporting a 50:1 slope are the main concern for establishing a precision approach at Summit Airport. Increasing development to the north and south of the airport may rule out the possible development of a precision approach at that facility.

2.6 Surface Transportation Needs

Appendix 4-A presents the analysis of Surface Access to Airports in Delaware. Because there are a number of planned developments at system airports, the needs for surface access differ by facility. From a demand/capacity standpoint, there are only two anticipated shortfalls or constraints. These deal with on-airport access or parking issues. In addition to these, there are a number of improvements that are planned, particularly where new airport development must be integrated into the surface transportation system. When improvements are undertaken, they will be for improved convenience or operational efficiency rather than for capacity reasons. Findings from the analysis are described as follows:

- ***Civil Air Terminal:*** If there is no further development of the Civil Air Terminal, its existing roadway system will be adequate for the long term future. However, if the facility is developed either for airline service or air cargo aircraft accommodation, significant changes will be needed in the future:
  - If airline service is initiated, a potential of 300 peak hour vehicles are possible for Horsepond Road. This will hasten the need for capacity-relief improvements including turn lanes, road widening, and increased parking area at the CAT. A minimum of 150 new auto parking spaces will be needed if airline service materializes.
  - If domestic air cargo service is initiated, the roadway system connecting the CAT to State Route 1 will need to be improved for truck traffic. This would include possible widening and strengthening of the roadways connecting to Route 1 (Horsepond Road and Lafferty Lane).

- ***Delaware Airpark:*** No significant changes to the surface access are anticipated or required for this airport.

- The current Annual Average Daily Traffic (AADT) for State Route is 5,262, with a projected total of 7,700 AADT by 2040. This increase is still well below the roadway capacity.
- On-airport traffic levels are only anticipated to grow to 43 peak hour vehicles by 2030, which is roughly 22 percent of the entrance roadway capacity.
- At least 20 more airport auto parking spaces will be needed by 2030.

- ***New Castle Airport:*** At some point in the future, airline service is likely to be initiated at New Castle Airport due to overcrowding at Philadelphia International. If this occurs prior to 2030, new surface access improvements will be needed at the airport:
  - Redevelopment of Old Churchmans Road: Should an airline terminal be located off Old Churchmans Road, the roadway will be closed as a through street and access to the new terminal will only be available via Churchmans Road.
  - Auto parking for a major airline service is not adequate at the airport. With only 1,000 parking spaces in the current terminal area, an additional 2,300 would be needed adjacent to the new terminal area (shuttling parking traffic to the existing parking areas at this scale is not cost-effective).
  - The existing turn signal on U.S. 40/DuPont Highway at the terminal entrance is adequate to accommodate traffic accessing the general aviation functions in the terminal area.
  - Current infrastructure (terminal and hangar buildings) will limit the growth of on-airport traffic in the existing terminal area. As such, the current configurations of traffic in that area (Flight Safety, FAA Tower, general aviation terminal, and Dassault) will not significantly degrade over the planning period.
  - Rail access to the airport is considered impractical at this time. The current locations of rail lines to the north of the airport cannot be connected to the existing or future terminal areas without significant capital expenditures.
  - Public transportation in the form of bus service will continue to connect the airport to downtown Wilmington.

- ***Summit Airport:*** Summit Airport will continue to grow its maintenance, avionics, and aircraft retrofitting businesses, along with its government contracts. As such, the airport is anticipated to increase its employment base over the planning period. Airport management has estimated that this growth may create up to 600 new jobs. Given the new employment numbers, surface access to the airport may need improvement:

- A traffic light may be needed at the main airport entrance in the intermediate planning timeframe to accommodate peak period traffic that would occur during the start and end of work shifts at the airport.
- Additional on-airport parking spaces will be needed. It is anticipated that at least 500 more spaces would be required as the number of employees and visitors to the airport increase. These spaces may be developed in association with new hangars that are planned for the south end of Runway 17-35, with a connecting roadway inside the airport that leads to the main entranceway.

- ***Sussex County Airport:*** Sussex County Airport has two primary surface access needs:
  - Sussex County Airport's runway expansion program will require the relocation of a portion of U.S. 9T (Park Avenue), changing the intersection location of S. Bedford Street and Park Avenue. That relocation will require at least $9 million and a purpose and need generated by the runway expansion project. Prior to that project, the FAA must sign-off on the extension of Runway 4-22 to 6,000 feet. This sign-off is based on demand for large aircraft reaching 500 annual itinerant operations for these large critical aircraft types.
  - With only 40 parking spaces at the terminal building, airport parking is constrained and use of overflow parking at the Sussex County Emergency Operations Center has been one option. There are 60 auto parking spaces at the EOC. However, should a real emergency occur, these parking spaces may be needed for law enforcement and other emergency personnel. Planning for additional airport parking should be undertaken.
  - Highway access from S. Railroad Street and from U.S. Route 9 via Airport Road is adequate to serve the airport through the long term future.

- ***Other Public-Use System Airports:*** Chandelle Estates, Chorman Airport, Jenkins, Laurel, and Smyrna Airport are not anticipated to create significant surface access demand throughout the period. Only one airport has significant expansion plans – Chorman Airport. That facility has received approval from Kent County for the development of up to 136 T-hangar units. If developed, the additional hangar units will attract pilots and passengers to the airport, but not at levels that would require any surface access improvements or changes.

Airport-generated surface vehicle traffic was projected to the year 2030 to determine whether or not hourly roadway capacities at each facility would be exceeded. These peak hour vehicle trips were estimated using a general aviation industry standard of 2.35 times the number of peak hour aircraft operations.[1] This number accounts for employees, passengers, and pilots using the airport.

In addition to airport-generated trips, an existing hourly roadway capacity was estimated for each airport. From a systems planning level of detail, the estimation process used the minimum hourly roadway capacity of 200 vehicles for turn lanes into and out of system airports. As shown in Table 4-8, projected peak hour vehicle trips will not exceed minimum levels of highway capacity during the period. Except for the Civil Air Terminal, none of the airports exceed 22 percent of their on-airport hourly capacity. The Civil Air Terminal is projected to reach 66 percent of its capacity, primarily due to the peak hour activity associated with the NASCAR race weekends.

Table 4-8 - Forecast Surface Access Demand

Airport Name	Access Road	2030 Peak Hour Vehicle Trips*	Existing Hourly Roadway Capacity*	2030 Surplus or (Deficit)
Chandelle Estates	Route 9	10	200	190
Chorman	Nine Foot Road	25	200	175
Civil Air Terminal at Dover AFB	Horsepond Road	132	200	68
Delaware Airpark	State Route 42	43	200	157
Jenkins	Westville Road	7	200	195
Laurel	State Route 24	22	200	178
New Castle Airport	US 13 and 40, State Routes 273, 58, 141	206	1,200	994
Smyrna	State Route 6	7	200	193
Summit	US 301	79	400	321
Sussex County	Airport Road, S Railroad Ave	65	400	335

* Vehicle trips estimated from general aviation industry averages of 2.35 times peak hour operations. This number accounts for pilots, passengers, and employees at the airport.

** Estimated minimum capacity of 200 hourly vehicles for airport ingress and egress turn lanes

[1] Source: Originally published in **Aviation Demand and Airport Facility Requirement Forecasts for Medium Air Transportation Hubs Through 1980**. This standard is still applicable at GA airports.

3. SUMMARY OF FINDINGS

IT IS IMPORTANT AT THIS POINT IN the study to assess the findings that have resulted from the analysis. Further, these findings will have implications on the direction and focus of the alternatives analysis. This chapter has centered around the needs of the aviation system based on the goals and objectives of the plan. As such there were three main criteria used to assess the "system" needs of Delaware airports.

- Demand/Capacity Relationships
- Airport Locational Standards
- Airport Master Planning Recommendations

Airport upgrades and facility needs based on these criteria affect 9 of the 10 public-use airports carried through this analysis. Of these airports, 5 have runway or taxiway upgrades listed as needed, while 9 airports have landside improvement needs listed. For airfield improvements, suggested runway extensions or upgrades were made for the following Delaware airports:

- Chandelle Estates
- Chorman Airport
- Delaware Airpark
- Summit Airport
- Sussex County

Landside improvements focused mostly upon aircraft storage hangar and apron area improvements at various system airports. In this regard, a total 31,000 square feet of terminal space, 30,600 square feet of conventional hangar space, 178 T-hangar units, and almost 12,600 square yards of apron area are needed at system airports within the planning horizon.

From the overall analysis, it was shown that no airfield demand/capacity shortfalls are expected to develop over the planning period. Only New Castle Airport came within 52 percent of its estimated airfield capacity. The aviation system requirements estimated for each airport represent normal improvements to provide safety and meet demand increases over the planning period. The focus of the landside analysis was upon the passenger and aircraft processing capabilities of the individual airports. The alternatives analysis in Phase 2 of the system plan (Chapter 6) will consider the entire range of facility requirements and associated costs including land acquisition, pavement overlays, airfield lighting, and miscellaneous items.

Appendix 4-A:
Airport Surface Access

Appendix 4-A - Surface Access to Airports in Delaware

In planning future aviation facilities in Delaware, it is important to know the impact of the current surface access network on the demand for air transportation services. This is becoming increasingly clear, as air service options are tried in Wilmington, and possibly in Dover. In addition, the general aviation service levels may be increased by improving the surface access network to Delaware's airport system.

For example, unlike other metro areas or small cities lacking air service, the level and scope of Wilmington's corridor rail service is a significant alternative to air service. In fact, one could argue that rather than lacking air service, the market response for most regional business travel originating in Delaware has been Amtrak's service. In addition, Continental Airlines some years ago established a "code share" arrangement with Amtrak for travel originating in both Wilmington and Philadelphia which can be booked either through the Amtrak or Continental websites. This makes Allegiant's case for air service from Dover that much stronger. By virtue of its isolation, Dover customers have fewer attractive options than northern residents.

On the general aviation side, the surface access network has some issues with ingress and egress from airports. Traffic levels along Route 13 at New Castle Airport create queuing delays and cross traffic turning delays. However, other airports experience fewer traffic problems, but they do have on-airport access issues that should be addressed – particularly with regard to flow and parking access.

To assess the surface access network, this appendix has been organized to include the following sections:

- Surface Access Issues
- Existing Traffic Demand at System Airports
- Future Traffic Projections
- Findings and Conclusions

1. SURFACE ACCESS ISSUES

There are a number of issues facing transportation planners in Delaware. In a meeting at the Wilmington Area Planning Council (WILMAPCO) in June, some of these issues were discussed in the context of developing long-term solutions. In other analysis, surface access issues involving downstate airports were also identified:

- ***Protecting Future Airline Terminal Options at New Castle Airport:*** A potential future airline terminal area on the south side of the airport (Figure A-1) will benefit from the protection of surface access options. The development of property adjacent to the airport for a shopping center limits the landside options for the airport and may limit ground access options as well. Several terminal area options have been suggested, all of which show the closure of Old Churchmans Road as a thru-road. The new access to the terminal area would be via Churchmans Road, which would serve both the shopping center and the proposed passenger terminal. Other issues associated with this development involve the potential public transportation connection with DART (Delaware Authority for Regional Transit), and the bundling of parking area and rental car parking facilities at the new facility, including the possibility of a shared parking structure for the airport and shopping center.

  Currently the intersection of State Route 273 and U.S. Highway 40 (N. DuPont Highway) is one of the most dangerous pedestrian crossing areas in the State. Location of a new shopping area and airline terminal in that area may need to examine pedestrian access as well. Previously, a pedestrian walkway under U.S. 40 was rejected because of safety concerns at night. A pedestrian bridge at that location was estimated to cost over $3 million because of the need to include ramps for Americans with Disabilities Act (ADA) accessibility. Also of concern are the FAR Part 77 imaginary surfaces associated with the approach to Runway 1 that may limit the height of a pedestrian bridge over U.S. 40, thereby making it impractical to construct.

- ***On-Airport Access Capacity of Roadways and Parking at New Castle Airport:*** A number of internal roadways at New Castle Airport converge on the terminal side into two potential outlet roads that pass in front of the terminal building. The demand on these roadways during peak hours has not been measured. However, examination of the parking capacity at tenant businesses that use the roadways (Flight Safety International, Dassault Falcon, corporate hangars, the FAA Tower, and the terminal building parking area itself) indicate that total peak loading could range from 400 to 500 vehicles.

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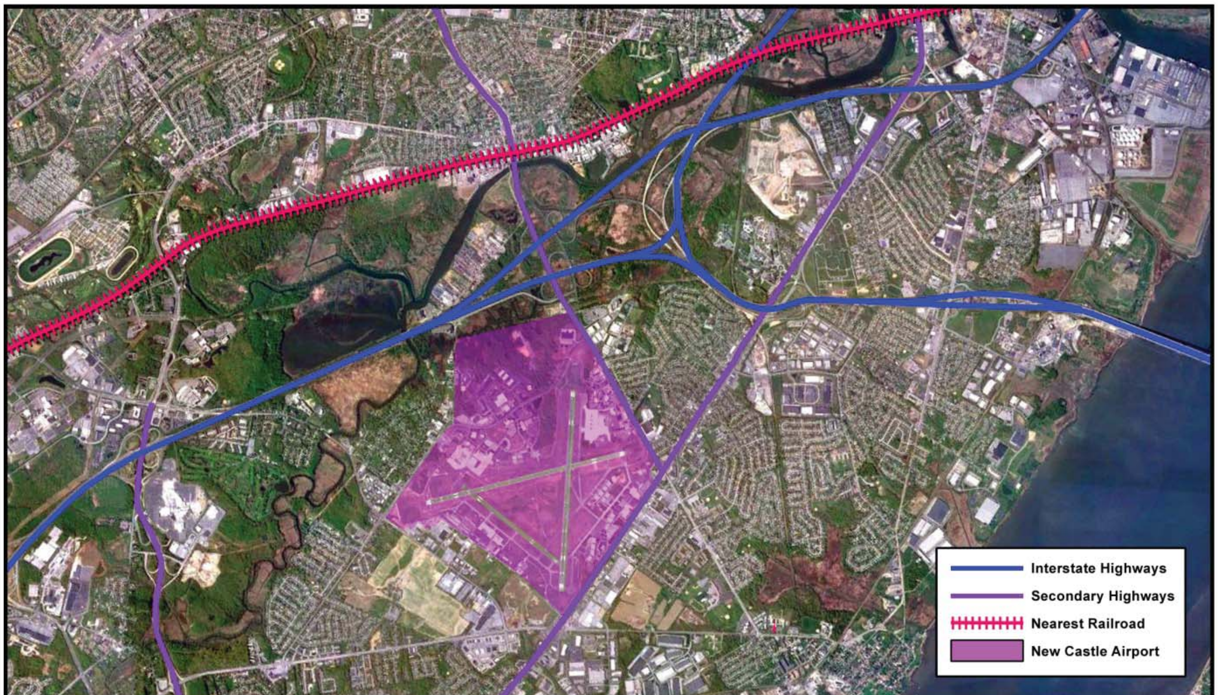
FUTURE ILG TERMINAL AREA ACCESS — **Figure A-1**

The terminal area at New Castle Airport has roughly 1,000 parking spaces, which include those at the FAA tower, Dassault Falcon, Flight Safety, and Terminal parking lot with overflow. In addition to the 1,000 parking spaces, there are a significant number of general aviation and military auto parking spaces associated with access points off Churchmans Road or Airport Road. These spaces are adequate for their respective functions. Of concern in this analysis are the numbers of public auto parking spaces available or developable should airline service be offered at New Castle Airport.

- ***Potential Rail Access to New Castle Airport:*** Discussions with WILMAPCO and DRBA indicate that there is little chance that a light-rail line can be constructed to connect New Castle Airport to downtown Wilmington. Numerous physical constraints limit these possibilities. As such, the airport's surface access system will likely have to depend upon automobile and bus transportation exclusively. The closest commuter rail line is located north of Interstate Highway 95 and would require new right-of-way to reach the airport (Figure A-2).

- ***On-Airport Parking Capacity at Summit:*** In recent months, the 127-space parking area at the terminal building has not been large enough to hold all the employee and visitor parking needs during certain peak periods (Figure A-3). When overflow parking is needed, cars are escorted through the gate onto the



Delaware State Aviation System Plan Update

POTENTIAL RAIL ACCESS TO NEW CASTLE AIRPORT

Figure **A-2**

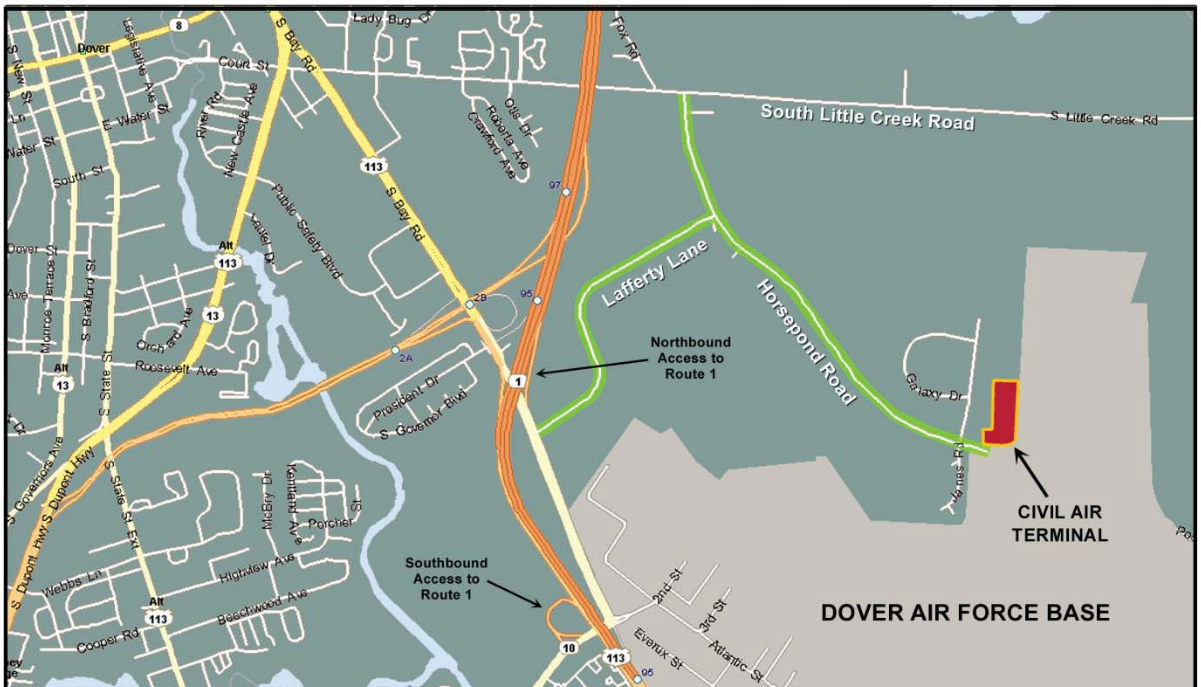
Delaware State Aviation System Plan Update

ON-AIRPORT PARKING CAPACITY AT SUMMIT

Figure **A-3**

airfield area and parked remotely. With an increase in the number of employees anticipated at Summit Airport over the next five years, there should be plans to expand auto parking capacity as well.

- ***Surface Access for a Potential Air Cargo Operation at the Civil Air Terminal (CAT) at Dover AFB:*** A potential air cargo operation at the CAT could bring domestic air cargo distribution to central Delaware (Figure A-4). Evergreen International Airlines has expressed interest in possibly using the CAT as an alternative to a small portion of air cargo traffic that currently is handled at their JFK International hub. This usage would trigger the need for adequate surface access connections to Route 1 and other major highways in Dover.



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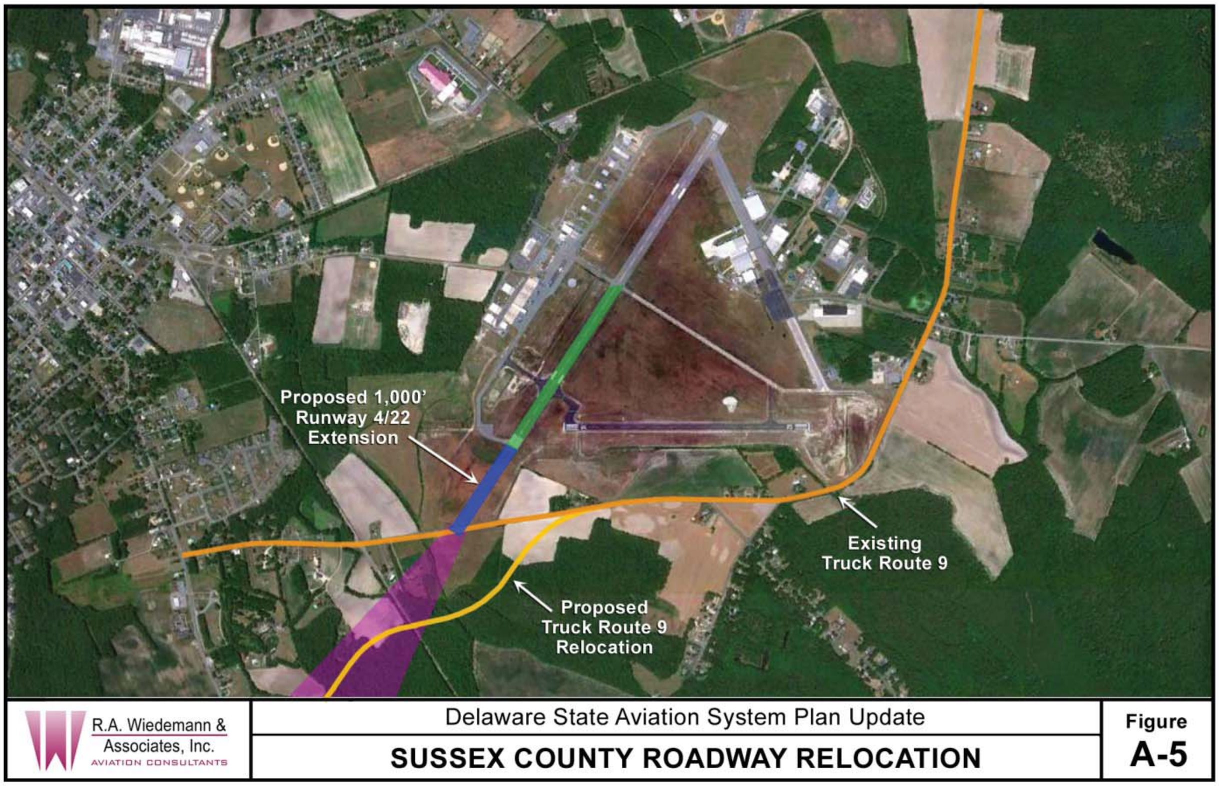
IMPROVED CARGO ACCESS FOR CIVIL AIR TERMINAL

Figure **A-4**

- ***Highway Issues Surrounding Expansion of Sussex County Airport:*** The potential expansion by 1,000 feet of Runway 4-22 (to a total usable length of 6,000 feet) at Sussex County Airport could require the relocation of Route 9 near the airport (see Figure A-5). In the near term, a proposal to expand the runway by 500 feet is being studied. If the runway is only expanded by 500 feet, no

  relocation is needed. However, the long term plan calls for the full 1,000 foot expansion. Thus, at some point the relocation issue must be addressed. A significant impediment to this process is the cost of the proposed roadway

  relocation, which could run as high as $9 million. Another factor that delayed the funding of the project involved the reduction in the number of critical



aircraft operations that justify the expansion. In the early 2000's, jet traffic was growing at the airport and the need for a runway expansion to 6,000 feet seemed assured. However, the recession of 2008-2009 decreased the critical jet aircraft demand and reduced the justifiable increase in runway length to 500 feet (5,500 feet in total usable runway length).

In two of the above cases, on-airport surface access or auto parking capacity constraints are involved. In addition to these, there are a number of improvements that are planned, particularly where new airport development must be integrated into the surface transportation system. The following section documents the highway traffic counts on roadways that serve system airports. This information will help assess the need for improvements to the surface access system serving airports over the long term future.

2. EXISTING TRAFFIC DEMAND AT SYSTEM AIRPORTS

In order to determine the demand levels on roadways that serve system airports, traffic count data collected by DelDOT was used, in conjunction with airport-generated traffic demand. Automatic Traffic Recorder (ATR) stations are traffic volume counter stations permanently installed throughout the road network covering all functional classifications of highways in Delaware except on local streets. Equipped with loop detectors, these ATR stations count the number of all vehicles passing through each location, continuously throughout the year, and transmit the recorded data to the traffic monitoring computers at the Office of Information Technology (OIT) headquarters at DelDOT for electronic data processing. AADT is the Annual Average Daily Traffic for all 365 days of the year.

Key traffic counts for this analysis involved roadways that serve the entrances to system airports in Delaware. For New Castle Airport and Sussex County Airport, there are multiple entranceways to the facilities. Listed below are the system airports, the associated roadways serving them, along with their annual average daily traffic:

- Chandelle Estates
  - Silver Leaf Lane – 168 AADT
  - State Route 9 – 1,289 AADT
- Chorman
  - Nine Foot Road – 793 AADT
  - U.S. Route 13 – 23,901 AADT
- Civil Air Terminal at Dover AFB
  - Horsepond Road – 1,898 AADT
- Delaware Airpark
  - State Route 42 – 5,262 AADT
- Jenkins
  - Westville Road – 2,735 AADT
- Laurel
  - Sharptown Road – 1,610 AADT
- New Castle Airport
  - U.S. 40/DuPont Highway – 77,366 AADT
  - U.S. 202/E. Basin Road (State Route 141) – 41,783 AADT
  - Commons Boulevard/State Route 37 – 18,645 AADT
  - Airport Road – 9,320 AADT
  - Churchmans Road/State Route 58 – 10,267 AADT
  - Old Churchmans Road – 712 AADT
- Smyrna
  - Commerce Street/State Route 6 – 1,807 AADT
- Summit

    - U.S. 301 – 21,798 AADT
- Sussex County
    - Road 319 – 941 AADT
    - U.S. Route 9 – 13,139 AADT
    - U.S. Route 9T – 4,995 AADT

The demand loadings of surface access routes to system airports are instructive. New Castle Airport, for example, has the highest annual average daily traffic of all Delaware airports. Chandelle Estates has the least traffic using the roadway for its direct entrance. Highlights of the data for NPIAS airports are presented in the following paragraphs.

2.1 Civil Air Terminal at Dover AFB

Although not a NPIAS airport at this time, the potential initiation of airline service may change the status of the Civil Air Terminal in the future to NPIAS designation. Currently, the only access to the Civil Air Terminal is via Horsepond Road. This roadway also serves the Kent County Aero Park, which is not operating at its existing capacity (at least one large facility is vacant). The AADT of 1,898 indicates that peak period demand levels of under 300 vehicles per hour are likely. This level of demand includes the use of the Civil Air Terminal, Kent County Aero Park, and the small residential area off County Road 347.

For the future, there are a number of access issues that involve the potential development of the CAT, including potential civilian cargo distribution, potential airline service, and continued accommodation of NASCAR racing teams' aircraft. If civilian air cargo distribution is initiated by one of the supplemental military air cargo carriers (such as Evergreen International), increased truck traffic will be experienced on Horsepond Road and access to Route 1 may need to be improved. If airline service is initiated by Allegiant, the auto parking area will need to be expanded from its current level of 50 spaces to at least 200 spaces. These developments would directly benefit the accommodation of NASCAR racing team aircraft via the expansion of the terminal building and auto parking areas.

2.2 Delaware Airpark

Access to Delaware Airpark's terminal area is only available from State Route 42. This highway had an AADT of 5,262 in 2010. Peak period traffic is less than 800 vehicles per hour. Most vehicles accessing the airport come from the direction of Route 13 and thus, can turn right onto the airport. Users approaching from the west must make a left turn across on-coming traffic. However, since traffic from that direction is very low, there are few times that left turns onto the airport are needed. Given all of these factors, access to the airport is not constrained.

There are only 37 parking spaces at the terminal building at Delaware Airpark. At times, every space is taken, with no nearby overflow parking. For the future, this may become a capacity issue, if continued pilot training for Delaware State University occurs at the facility (both ground school in the terminal building and flight training on the airfield).

2.3 New Castle Airport

Peak hour traffic on U.S. 40/DuPont Highway can exceed 12,000 vehicles. Traffic accessing the airport heading southbound on U.S. 40 can turn directly onto airport property through one of two main access roads. However, northbound traffic must turn across southbound lanes at the stoplight at the terminal entrance. The left-turn light can sequence on a minimum of 140 seconds. The light responds to traffic queues, allowing a minimum five seconds for one car, and up to 25 seconds for multiple cars. Cars exiting the terminal and desiring to travel northbound on U.S. 40 (left turn out of the terminal) are subject to the same 140-second traffic light sequence. This can create some backups during peak periods, but generally all are cleared within a one-light sequence.

It is interesting to note that an average 712 vehicles use Old Churchmans Road each day – most of which is for airport access only. The National Guard and businesses along Airport Road have a significant daily use of 18,645 vehicles – many of which must access U.S. 202.

Although the internal daily vehicle traffic counts for New Castle Airport are not available, aerial photos reveal auto parking demand in the terminal area of about 50 percent of capacity. Because not all users or employees of the airport park at the facility, there may be other vehicles using the access during peak periods. Thus, a worst case scenario daily loading could approach 500 vehicles or more.

The terminal area at New Castle Airport has roughly 1,000 parking spaces, which include those at the FAA tower, Dassault Falcon, Flight Safety, and Terminal parking lot with overflow. An overflow parking lot with 100 spaces has been established on a portion of the terminal apron for airport employees. This lot can be converted to public parking if an airline begins service to the airport. If only the terminal building parking is considered, there are only about 460 spaces available. Of these, roughly 160 are taken by employees, rental cars, and visitors. Thus, only 300 spaces may be available at any one period to serve as airline passenger auto parking. This number of spaces is adequate for airline passenger levels below 150,000.

2.4 Summit Airport

Peak hour traffic on U.S. Highway 301 can exceed 3,500 vehicles. This is significant because vehicles accessing the airport from the south must cross south-bound traffic in a left-turn configuration. There is no traffic signal at the airport, so drivers must judge the oncoming speed of vehicles in making their turning decisions. In departing the airport, vehicles must turn right and cannot access the northbound lanes until the first turning opportunity at the traffic light at Victoria Drive (0.25 miles south of the airport entrance).

Another issue for Summit Airport involves the on-airport parking capacity. In this regard, the current airport parking lot has a capacity of 137 vehicles. When these are filled, cars must park on the airport either near the terminal or to the south at the entrance to the hangar area. In previous periods where overflow parking was needed, cars were escorted through the security gate at the north end of the terminal building and parked in a remote area adjacent to the T-hangars. It is assumed that as more employees are hired, additional auto parking at the new hangar areas to the south of the terminal building will be constructed.

2.5 Sussex County Airport

Access to Sussex County Airport is via Airport Road and S. Railroad Avenue (Road 319). The highest traffic demand for this looping road is from the S. Railroad segment, with 941 AADT. This translates into an approximate peak hour of about 140 vehicles, which is below its capacity.

Other surface access issues at Sussex County Airport involve the need for more terminal area auto parking and the eventual relocation of U.S. Highway 9T to accommodate the extension of Runway 4-22. With only 40 parking spaces, auto parking is currently constrained at the terminal building. At times, the overflow reaches the County Emergency Operations Center (EOC) across the street. There are 60 auto parking spaces at the EOC.

The relocation of U.S. Highway 9T (Figure x), is required if Runway 4-22 is to be extended to 6,000 feet. That highway had an AADT of 4,995 in 2010. The runway can be extended to 5,500 feet without a relocation of the roadway, and that project is currently scheduled to occur over the next two years. However, beyond that period, the roadway will need to be relocated to permit the attainment of safety areas on the future runway extension.

3. FUTURE TRAFFIC PROJECTIONS

THERE ARE TWO COMPONENTS TO FUTURE TRAFFIC projections considered in this analysis. The first involves projections of AADT on highways surrounding Delaware system airports. This can be considered the "ambient" traffic into which the airport and aviation-related traffic must flow. The second component is the airport-generated traffic that results from activity at each airport within the system.

3.1 Projected AADT for Highways Near System Airports

Future traffic counts were provided by DelDOT for the roadways involved in direct surface access to Delaware's system airports. These projections tend to change often due to forecast model improvements and updated assumptions regarding land use and system capacity. However, this section presents the best available projections to the year 2040 at this time. While it is understood that the system plan's planning horizon is 2030, we are using the only projections available that are broken down by street segment. These projections can be considered a worst case loading for the system plan. For comparison purposes the 2010 AADT is also shown along with the percentage growth over the period:

- Chandelle Estates
  - Silver Leaf Lane – 168 AADT **(240 Projected, +42.9%)**
  - State Route 9 – 1,289 AADT **(1,750 Projected, +35.8%)**
- Chorman
  - Nine Foot Road – 793 AADT **(1,030 Projected, +29.9%)**
  - U.S. Route 13 – 23,901 AADT **(35,900 Projected, +50.2%)**
- Civil Air Terminal at Dover AFB
  - Horsepond Road – 1,898 AADT **(2,100 Projected, +10.6%)**
- Delaware Airpark
  - State Route 42 – 5,262 AADT **(7,700 Projected, +46.3%)**
- Jenkins
  - Westville Road – 2,735 AADT **(4,000 Projected, +46.3%)**
- Laurel
  - Sharptown Road – 1,610 AADT **(2,300 Projected, +42.9%)**
- New Castle Airport
  - U.S. 40/DuPont Highway – 77,366 AADT **(95,000 Projected, +22.8%)**
  - U.S. 202/E. Basin Road (State Route 141) – 41,783 AADT **(63,000 Projected, +50.8%)**
  - Commons Boulevard/State Route 37 – 18,645 AADT **(25,500 Projected, +36.8)**
  - Airport Road – 9,320 AADT **(14,000 Projected, +50.2%)**

- Churchmans Road/State Route 58 – 10,267 AADT **(15,000 Projected, +46.1%)**
- Old Churchmans Road – 712 AADT **(800 Projected, +12.4%)**
- Smyrna
  - Commerce Street/State Route 6 – 1,807 AADT **(2,000 Projected, +10.7%)**
- Summit
  - U.S. 301 – 21,798 AADT **(28,000 Projected, +28.5%)**
- Sussex County
  - Road 319 – 941 AADT **(1,050 Projected, +11.6%)**
  - U.S. Route 9 – 13,139 AADT **(17,500 Projected, +33.2%)**
  - U.S. Route 9T – 4,995 AADT **(7,500 Projected, +50.2%)**

As shown, New Castle Airport has the highest traffic volumes in surrounding roadways both now and in the future. U.S. 202/State Route 141 has the highest absolute growth (measured in number of vehicles) of any of the roadways listed – 21,217 additional AADT. This is followed closely by U.S. 40/DuPont Highway which is projected with a growth of 17,634 additional AADT.

In cases where a roadway leads directly to an airport entrance (Old Churchmans at New Castle Airport, Horsepond Road at the Civil Air Terminal, and Road 319 at Sussex County Airport) all have growth rates under 13 percent. These projections may not incorporate future plans of the airport into the modeling. For example, a new terminal area off Old Churchmans Road would significantly increase that level of traffic. Similarly, a new air cargo operation or new airline service at the Civil Air Terminal would significantly impact those projected surface access numbers.

Airports posting the highest growth in AADT on surrounding roadways include:

- Silver Leaf Lane – Chandelle: 42.9%
- State Route 42 – Delaware Airpark: 46.3%
- Westville Road – Jenkins: 46.3%
- Sharptown Road – Laurel: 42.9%
- New Castle Airport:
  - U.S. 202/State Route 141: 50.8%
  - Airport Road: 50.2%
  - Churchmans Road/State Route 58: 46.1%
- U.S. Route 9T – Sussex County Airport: 50.2%

Except for New Castle Airport, many of the high growth rates involve relatively low activity roadways. For example, Silver Leaf Lane is growing from an AADT of 168 to 240 – only 72 vehicles per day. At Delaware Airpark, State Route 42 is projected to grow by 2,438 AADT. But this is significantly less than the large numbers surrounding New Castle Airport, described previously. U.S. 301, which provides access to Summit Airport, is anticipated to grow from 21,798 to 28,000 over the period. This growth will increase the difficulty of turning left into the airport without a stop light to assist traffic across the southbound lanes.

3.2 Forecast of Airport-Generated Surface Vehicle Traffic

Airport-generated surface vehicle traffic was projected to the year 2030 to determine whether or not hourly roadway capacities at each facility would be exceeded. These peak hour vehicle trips were estimated using a general aviation industry standard of 2.35 times the number of peak hour aircraft operations.[1] This number accounts for employees, passengers, and pilots using the airport.

In addition to airport-generated trips, an existing hourly roadway capacity was estimated for each airport. From a systems planning level of detail, the estimation process used the minimum hourly roadway capacity of 200 vehicles for turn lanes into and out of system airports. As shown in Table A-1, projected peak hour vehicle trips will not exceed minimum levels of highway capacity during the period. Except for the Civil Air Terminal, none of the airports exceed 22 percent of their on-airport hourly capacity. The Civil Air Terminal is projected to reach 66 percent of its capacity, primarily due to the peak hour activity associated with the NASCAR race weekends.

Table A-1 - Forecast Surface Access Demand

Airport Name	Access Road	2030 Peak Hour Vehicle Trips*	Existing Hourly Roadway Capacity*	2030 Surplus or (Deficit)
Chandelle Estates	Route 9	10	200	190
Chorman	Nine Foot Road	25	200	175
Civil Air Terminal at Dover AFB	Horsepond Road	132	200	68
Delaware Airpark	State Route 42	43	200	157
Jenkins	Westville Road	7	200	195
Laurel	State Route 24	22	200	178
New Castle Airport	US 13 and 40, State Routes 273, 58, 141	206	1,200	994
Smyrna	State Route 6	7	200	193

[1] Source: Originally published in **Aviation Demand and Airport Facility Requirement Forecasts for Medium Air Transportation Hubs Through 1980**. This standard is still applicable at GA airports.

Table A-1 - Forecast Surface Access Demand				
Airport Name	Access Road	2030 Peak Hour Vehicle Trips*	Existing Hourly Roadway Capacity*	2030 Surplus or (Deficit)
Summit	US 301	79	400	321
Sussex County	Airport Road, S Railroad Ave	65	400	335

* Vehicle trips estimated from general aviation industry averages of 2.35 times peak hour operations. This number accounts for pilots, passengers, and employees at the airport.

** Estimated minimum capacity of 200 hourly vehicles for airport ingress and egress turn lanes

3.3 Impact of New Development Options

From Table A-1 it can be concluded that roadway capacity will not be a problem during the planning period, unless new developments take place that are not a part of the status quo forecast. In this regard, potential development of the Civil Air Terminal into an airline and cargo-capable handling facility, the potential development of airline service at New Castle Airport, and plans for expansion of Summit Airport's workforce could increase local traffic significantly to these facilities. These potential developments will be analyzed in Phase II of the system plan. For this analysis, a brief discussion of the potential impacts is outlined as follows:

- ***Civil Air Terminal Developments:*** The development of the apron and taxiway at the CAT has the potential to attract air cargo activity and freight handling facilities at Kent County Aeropark. In this regard, it has been suggested that a freight-forwarding operation could employ as many as 200. These new employees would be using Horsepond Road on a daily basis. In addition to these employees, truck traffic used to load and unload the air cargo aircraft would be using the road. One B-747 aircraft can fill five or more semi-tractor trailers. Similarly, the addition of proposed Allegiant Airline service could add up to 300 vehicles during arriving and departing flights. Under the highest vehicle-use scenario, all 150 passengers arriving would deplane to their individual vehicles, to be replaced by incoming passengers in an equal number of vehicles. In a worst case scenario, Horsepond Road could be faced with a demand of over 500 vehicles in its peak hour. The actual use would likely be less, but it could still exceed the current minimum roadway capacity of 200 vehicles per hour.

- ***Potential Airline Service at New Castle Airport:*** If airline service is developed at New Castle Airport, the surface access system would have to be upgraded and expanded to meet increased demand levels. A 2009 statewide air service study estimated that the size of potential airline passenger demand capture at New Castle Airport was about 640,000. This demand would require a significant access system and internal parking capacity above current levels. Using the guidance from FAA Advisory Circular 150/5360-13 (with Changes), *Planning and Design Guidance For Airport Terminal Facilities*, a total of approximately 2,300 parking spaces would be needed to accommodate annual passenger enplanement levels of 640,000. This parking is in addition to the existing airport parking needs. Should airline service begin at New Castle Airport, the DRBA will develop a terminal area on the south side, off Old Churchmans Road. A new access configuration will be developed off Churchmans Road to service the new facility and the parking needs. There have been discussions that if a parking structure were developed for the new shopping area in that location, a potential sharing of parking space may be arranged. Figure A-6 presents one option under consideration in the form of a schematic drawing of the new airline terminal area.

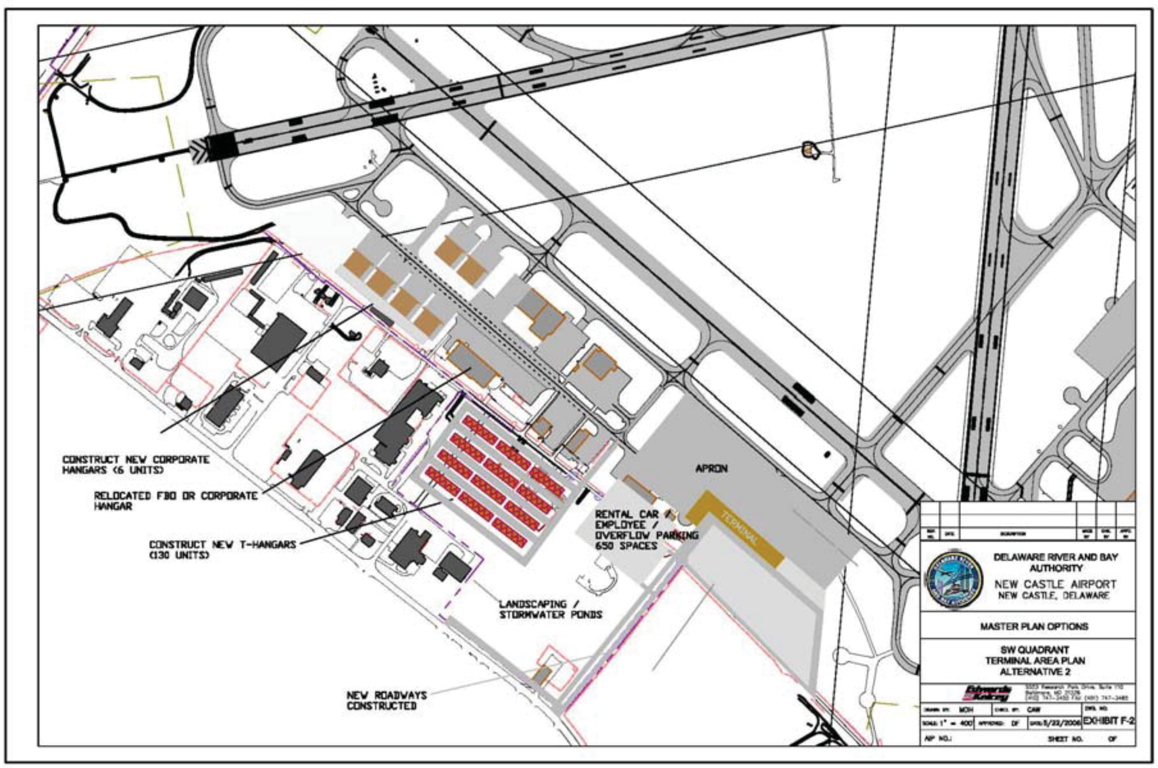


Figure A-6 – Airline Terminal and Access Option

- ***Expansion of Summit Airport's Workforce:*** The potential expansion of Summit Airport's workforce could mean a significant increase in traffic entering and exiting the airport. Potential growth from 100 to 600 employees with a decade has been mentioned as possible. This new traffic would require either an additional set of entranceways on the southern portion of the terminal area or an internal access road to a central entrance/exit. If a central entranceway were developed, it is likely that a stoplight would be needed in order to facilitate left turns on U.S. 301. The U.S. Department of Transportation Manual of Uniform Traffic Control Devices specifies criteria (call warrants) to help ensure that traffic lights are only installed where they will do more good than harm. At least two of the nine warrants listed in the Manual may be found to apply to the Summit situation: Peak Hour Volume or Delay, and Crash Experience. The peak hour warrant is only applied in unusual cases such as a shift change at an office park, factory, or a school, where large numbers of vehicles are attracted or discharged in a short period of time. During these times, the side road traffic suffers undue delay when entering or crossing the major street. The other case would be contingent upon the safety record of the airport entrance. If vehicle crashes increase over time at that location, it may justify the location of a traffic light.

4. FINDINGS AND CONCLUSIONS

THE EVALUATION OF SURFACE ACCESS FOR SYSTEM airports in Delaware has yielded results regarding needed actions over the planning period to accommodate increased demand. In addition, possible development of aviation infrastructure to accommodate more aviation activity such as airline passenger traffic, air cargo activity, and increased aircraft maintenance and repair operations is likely to impact the need for additional surface access capacity. These topics have been addressed in this analysis and the following findings and conclusions have been reached:

- ***Civil Air Terminal:*** If there is no further development of the Civil Air Terminal, its existing roadway system will be adequate for the long term future. However, if the facility is developed either for airline service or air cargo aircraft accommodation, significant changes will be needed in the future:
  - If airline service is initiated, a potential of 300 peak hour vehicles are possible for Horsepond Road. This will hasten the need for capacity-relief improvements including turn lanes, road widening, and increased parking area at the CAT. A minimum of 150 new auto parking spaces will be needed if airline service materializes.
  - If domestic air cargo service is initiated, the roadway system connecting the CAT to State Route 1 will need to be improved for truck traffic. This would include possible widening and strengthening of the roadways connecting to Route 1 (Horsepond Road and Lafferty Lane).

- ***Delaware Airpark:*** No significant changes to the surface access are anticipated or required for this airport.
  - The current AADT for State Route is 5,262, with a projected total of 7,700 AADT by 2040. This increase is still well below the roadway capacity.
  - On-airport traffic levels are only anticipated to grow to 43 peak hour vehicles by 2030, which is roughly 22 percent of the entrance roadway capacity.
  - At least 20 more airport auto parking spaces will be needed by 2030.

- ***New Castle Airport:*** At some point in the future, airline service is likely to be initiated at New Castle Airport due to overcrowding at Philadelphia International. If this occurs prior to 2030, new surface access improvements will be needed at the airport:
  - Redevelopment of Old Churchmans Road: Should an airline terminal be located off Old Churchmans Road, the roadway will be closed as a through street and access to the new terminal will only be available via Churchmans Road (see Figure A-6 shown previously).

- Auto parking for a major airline service is not adequate at the airport. With only 1,000 parking spaces in the current terminal area, an additional 2,300 would be needed adjacent to the new terminal area (shuttling parking traffic to the existing parking areas at this scale is not cost-effective).
- The existing turn signal on U.S. 40/DuPont Highway at the terminal entrance is adequate to accommodate traffic accessing the general aviation functions in the terminal area.
- Current infrastructure (terminal and hangar buildings) will limit the growth of on-airport traffic in the existing terminal area. As such, the current configurations of traffic in that area (Flight Safety, FAA Tower, general aviation terminal, and Dassault) will not significantly degrade over the planning period.
- Rail access to the airport is considered impractical at this time. The current locations of rail lines to the north of the airport cannot be connected to the existing or future terminal areas without significant capital expenditures.
- Public transportation in the form of bus service will continue to connect the airport to downtown Wilmington.

- ***Summit Airport:*** Summit Airport will continue to grow its maintenance, avionics, and aircraft retrofitting businesses, along with its government contracts. As such, the airport is anticipated to increase its employment base over the planning period. Airport management has estimated that this growth may create up to 600 new jobs. Given the new employment numbers, surface access to the airport may need improvement:
  - A traffic light may be needed at the main airport entrance in the intermediate planning timeframe to accommodate peak period traffic that would occur during the start and end of work shifts at the airport.
  - Additional on-airport parking spaces will be needed. It is anticipated that at least 500 more spaces would be required as the number of employees and visitors to the airport increase. These spaces may be developed in association with new hangars that are planned for the south end of Runway 17-35, with a connecting roadway inside the airport that leads to the main entranceway.

- ***Sussex County Airport:*** Sussex County Airport has two primary surface access needs:
  - Sussex County Airport's runway expansion program will require the relocation of a portion of U.S. 9T (Park Avenue), changing the intersection location of S. Bedford Street and Park Avenue. That relocation will require at least $9 million and a purpose and need generated by the runway expansion project. Figure A-5 (presented earlier) shows the planned relocation. Prior to that project, the FAA must sign-off on the extension of

Runway 4-22 to 6,000 feet. This sign-off is based on demand for large aircraft reaching 500 annual itinerant operations for these large critical aircraft types.

- With only 40 parking spaces at the terminal building, airport parking is constrained and use of overflow parking at the Sussex County Emergency Operations Center has been one option. There are 60 auto parking spaces at the EOC. However, should a real emergency occur, these parking spaces may be needed for law enforcement and other emergency personnel. Planning for additional airport parking should be undertaken.
- Highway access from S. Railroad Street and from U.S. Route 9 via Airport Road is adequate to serve the airport through the long term future.

- ***Other Public-Use System Airports:*** Chandelle Estates, Chorman Airport, Jenkins, Laurel, and Smyrna Airport are not anticipated to create significant surface access demand throughout the period. Only one airport has significant expansion plans – Chorman Airport. That facility has received approval from Kent County for the development of up to 136 T-hangar units. If developed, the additional hangar units will attract pilots and passengers to the airport, but not at levels that would require any surface access improvements or changes.

Chapter 5:

Identification of Alternatives

IDENTIFICATION OF AVIATION SYSTEM ALTERNATIVES

The State Aviation System Plan Update (Phases I and II) is taking a fresh look at the classifications of airports and heliports and providing guidelines for their orderly development. The study serves as a forum for public input to the State aviation policy decision process. Review and comment from the Aviation Advisory Committee, combined with the input from State and local agencies and interested general public are important factors in deciding the course of aviation priorities and issues. When completed, the system plan will generate valuable management information tools, general aviation airport security plans, and legislative recommendations. In Phase I of the State Aviation System Plan, four work elements were undertaken:

- Element 1: Issues, Goals, and Objectives
- Element 2: Analysis of Existing System
- Element 3: Forecast of Aviation Demand
- Element 4: Demand/Capacity & Aviation System Needs

Phase II of the State System Plan addresses the following questions:

- How has the most recent recession impacted aviation in Delaware?
- Can the long-term system be sustained with fewer FAA dollars?
- What are the implications of full (unrestricted) joint use at Dover Air Force Base and how would that impact the public-use airport system?
- What are the implications of scheduled airline passenger service in central Delaware?
- Is civilian air cargo service possible in Delaware?
- What impact would the implementation of green technology have on system airports?
- What types of aviation subsystems require State regulation, guidance, policy input, or financing?
- What are the financial implications of the recommended plan?
- How is the recommended plan implemented?

Key issues that could change the aviation system in Delaware include the possible unrestricted joint use of Dover AFB, the development of a civilian air cargo hub at the Civil Air Terminal at Dover AFB, the loss of one or more private airports, and the removal of Summit Airport from the FAA funding program. Also, even though Allegiant Airlines has selected Salisbury, MD to initiate service to the Orlando, FL area, Dover is still in the running as another outlet or location for Allegiant service.

To fully examine the aviation alternatives and issues facing Delaware aviation, the Phase II work scope is composed of six primary work elements including:

- Element 5: Identification of Aviation System Alternatives
- Element 6: Evaluation of Aviation System Alternatives
- Element 7: Selection and Description of Recommended System
- Element 8: Financial and Implementation Plan
- Element 9: Special Study Products
- Element 10: Coordination and Documentation

Element 5 - Identification of Aviation System Alternatives is based upon the forecasts of demand and the system requirements established in the preceding work phases. Included among the concepts which are considered as alternatives are:

- The Baseline Alternative (Status Quo)
- A Contracted System of Airports Alternative
- A Contingency Aviation System Alternative

System requirements, based on the demand and capacity analyses, were established for the airports included in the proposed alternative systems prior to subjecting them to evaluation. For each alternative, the number of based aircraft and operations were determined for each airport as a part of the identification process (Table 5-1).

1. BACKGROUND

IN FORMULATING ALTERNATIVES, IT IS IMPORTANT TO review and use the information gathered in the data collection effort. In this regard, the Phase I study performed a detailed analysis of the aviation system that answered the following questions:

- What are the most pressing aviation issues facing decision makers in Delaware?
- What are the State's overall goals with respect to aviation?
- What is the present make-up of the aviation system in Delaware?
- In the future, what will aviation activity be like in the State?
- What are the physical development needs of the system?

Since the previous aviation system plan, several new issues have arisen that will change the focus of the present planning. These are described below.

1.1 Delaware's Most Pressing Aviation Issues:

The most pressing aviation issues identified in Phase I of this study included the following:

- Future Airport Funding Shortfalls
  - FAA, State, Local
  - Need for Strategic Plan of Economic Sustainability
- Civil Air Terminal Development
  - Air Cargo
  - Schedule Airline Service
- Airport Security Programs
- Delaware Airpark Expansion
- Summit Airport Expansion
- Mitigation or Removal of Airport Airspace Obstructions
- Economic Impacts of Aviation in Delaware
  - Airport Community Value Applied to Recommended Plan
  - Recommendations Prioritized by Economic Sustainability
- Protection/Development of Non-NPIAS Airports
- Airport/Community Land Use Compatibility
- Coordination of SASPU with Other Transportation Planning & the Public
- Future of Military Aviation in Delaware
- Reliable Airport Operations Counts
- Green Technology Impacts

- Since the release of the Phase I study, two other important issues have arisen that will impact the aviation system and the development of alternatives for the Phase II study. These issues include the following:
- Potential Loss of Privately Owned Airports to the Public-Use System
- Potential Full (Unrestricted) Joint Use of Dover AFB

1.2 Delaware's Overall Aviation Goal:

- ***Aviation Goal:*** To enhance Delaware's economic development by fostering and promoting a safe and efficient aviation system for the movement of goods, services, and people and to encourage and promote aviation and aviation safety.

1.3 Delaware's Existing Airport System:

- ***Airport Facilities:*** Currently, there are nine (9) public-use airports and one (1) joint military-civilian use airport in the State, along with one (1) public-use helistop. Of these eleven (11) aviation facilities, five (5) are privately owned. Eight (8) have paved surfaces, while the remaining three (3) have turf surfaces.

- ***Aeronautical Activity:*** Historical levels of aviation activity have been stable in Delaware with areas of slow growth. Total existing based aircraft = 437; total annual aircraft operations = 197,600.

- ***Airspace Structure and Navaids:*** Low activity levels indicate that significant airspace capacity is available for the future. New Castle Airport has the greatest airspace challenges due to its proximity to the Class B airspace associated with Philadelphia International. These and other airspace issues will be examined in the Evaluation of Alternatives.

- ***Surface Transportation:*** The present interaction of the highway and airport system is adequate. However, estimates of future aviation related surface traffic will be compared to capacities of airport access points.

- ***Environmental Considerations:*** For airport development to occur, planners need to be aware of the extensive amount of wetlands in and around Delaware airports. Another environmental concern includes the fact that all of Delaware is classified as non-attainment for ozone standards.

1.4 Delaware Aviation Activity in the Future:

- ***Forecast Aviation Activity:*** Total based aircraft are forecast to grow from 437 in 2010 to 576 by the year 2030. Aircraft operations are anticipated to grow from 197,600 to 261,100 during the same period. There are no airfield operational capacity constraints anticipated during the planning period. However, there may be constraints to the size and type of aircraft that desire to use certain airports in Delaware because of limited runway lengths and strengths.

1.5 Physical Development Needs of the System:

Airport upgrades and facility needs based on these criteria affect 9 of the 10 public-use airports carried through this analysis. Of these airports, 5 have runway or taxiway upgrades listed as needed, while 9 airports have landside improvement needs listed. For airfield improvements, suggested runway extensions or upgrades were made for the following Delaware airports:

- Chandelle Estates
- Chorman Airport
- Delaware Airpark
- Summit Airport
- Sussex County

Landside improvements focused mostly upon aircraft storage hangar and apron area improvements at various system airports. In this regard, a total 31,000 square feet of terminal space, 30,600 square feet of conventional hangar space, 178 T-hangar units, and almost 12,600 square yards of apron area are needed at system airports within the planning horizon.

From the overall analysis, it was shown that no airfield demand/capacity shortfalls are expected to develop over the planning period. Only New Castle Airport came within 52 percent of its estimated airfield capacity. The aviation system requirements estimated for each airport represent normal improvements to provide safety and meet demand increases over the planning period. The focus of the landside analysis was upon the passenger and aircraft processing capabilities of the individual airports.

2. IDENTIFICATION OF ALTERNATIVES

BASED UPON THE FORECASTS OF DEMAND AND the system requirements established in the preceding work phases, three alternative systems were identified for further evaluation. Concepts of which were considered for development as alternatives included:

- ***The Baseline Alternative:*** This alternative is based on an analysis of the adequacy of the existing aviation system. It assumes a status quo scenario where no changes other than those already planned are included.

- ***A Contracted System of Airports Alternative:*** This alternative considers potential closures of privately owned airports and associated impacts.

- ***A Contingency Aviation System Alternative:*** This alternative considers the potential impacts of several possible occurrences that could significantly change the aviation system in Delaware. These impacts revolve mostly around potential changes at Dover AFB, but also include changes to public-use status of some privately owned airports.

For each alternative, the number of based aircraft and operations is presented in Table 5-1.

Table 5-1 - Year 2030 Forecast GA Demand for Each Alternative

Aviation Facility	Alternative 1		Alternative 2		Alternative 3	
	Based A/C	Operations	Based A/C	Operations	Based A/C	Operations
Chandelle Estates	32	4,200	0	0	16	2,100
Chorman Airport	25	17,300	0	0	25	17,300
Delaware Airpark	74	29,900	153	44,700	89	30,300
DELDOT Helistop	0	50	0	50	0	50
Dover AFB[1]	0	1,400	0	0	21	5,500
Jenkins Airport	26	1,800	0	0	13	900
Laurel Airport	18	11,600	0	0	18	11,600
New Castle Airport	249	92,100	249	93,150	249	92,100
Smyrna Airport	13	3,000	0	0	6	1,500

[1] Represents general aviation activity only.

Table 5-1 - Year 2030 Forecast GA Demand for Each Alternative						
Aviation Facility	**Alternative 1**		**Alternative 2**		**Alternative 3**	
	Based A/C	Operations	Based A/C	Operations	Based A/C	Operations
Summit Airport	57	55,000	57	55,000	57	55,000
Sussex County Airport	82	44,800	117	68,250	82	44,800
GRAND TOTALS	**576**	**261,150**	**576**	**261,150**	**576**	**261,150**

This distribution of demand is based on the Forecast of Aviation Demand (Chapter 3 of Phase 1). Each alternative system has the same number of based aircraft and the same number of operations. However, the assumptions about the availability of facilities in each option dictated the demand distribution. Each alternative system is described in the following sections.

2.1 *Alternative 1 – No Action (Adequacy of Existing System)*

Alternative 1 is called the "No Action" Alternative because it examines the adequacy of the existing system without changes or improvements (see Figure 5-1). The alternative serves as a baseline comparison to each of the "action" alternatives (2 and 3) and subsystems.

The adequacy of the existing system of airports to meet the State's air transportation demands is determined by relating the findings concerning the needed number, type, and general location of airports to the inventory of existing airports. In this determination, consideration is given to the estimated aircraft processing capacity of the existing airports, the compatibility of the existing airports with the surrounding community in terms of environmental factors, existing and planned land use and development programs, and the adequacy of existing and planned surface access.

It should be noted that Alternative 1 may represent the highest utilization of some privately owned, public-use airports in Delaware. That is, the status quo may actually be optimistic, relative to the preservation of all privately owned, public-use airports in the State. As described below, Alternative 2 presents a contracted option, while Alternative 3 shows in the impact of a number of possible future scenarios.

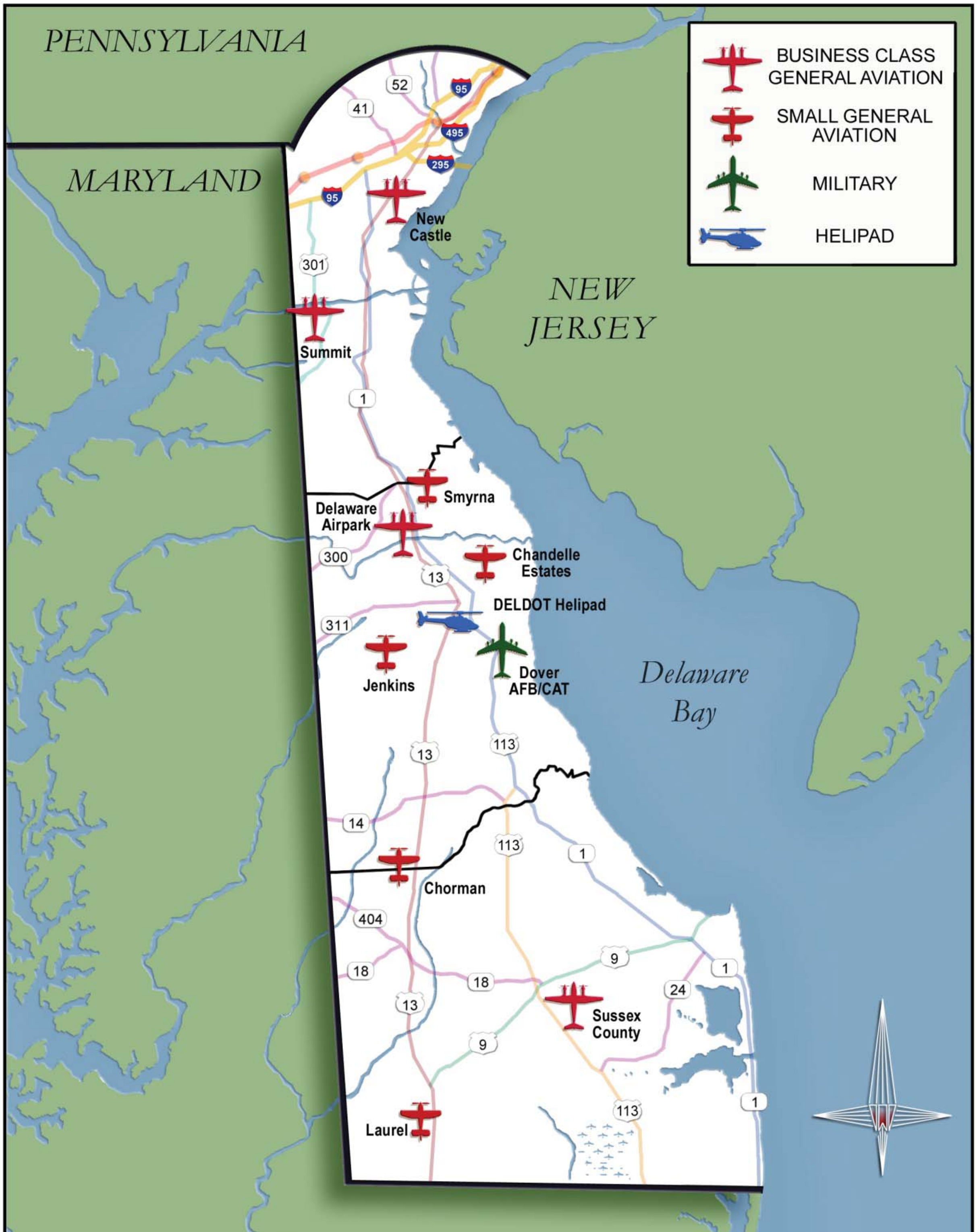
2.2 Alternative 2 – Contracted System of Airports

Alternative 2 is called the "Contracted System of Airports" because it examines the impacts created with the loss of certain privately owned airports in the State. Under this alternative, 5 of the 10 existing system airports were assumed to close by the year 2030 for various reasons. In addition, it was assumed that no joint use of Dover AFB would be permitted due to security or other concerns. Alternative 3 focuses on a core system of airports needed to accommodate aviation demand in the State. This alternative is also considered a "worst case" scenario since it assesses the capability of a contracted system of airports to meet the long-term Delaware aviation needs.

Economic and land development pressures have served to close many privately owned airports across the nation. Delaware is not immune from that process. This alternative examines the potential impacts of losing privately owned airports in Delaware including: Chandelle Estates, Chorman, Jenkins, Smyrna, and Laurel. It was assumed that privately owned Summit Airport would survive due to its existing business model, funding, and planned facility expansion. Summit Airport is owned by Greenwich AeroGroup, a large aircraft services company with more than 650 employees.

It was assumed that Dover AFB would not be available for civil aviation use under this alternative. As such, many of the business jet operations that would have taken place at the Civil Air Terminal would be transferred to other airports. The closure to civil aviation would not impact the potential air cargo operation at the CAT, but it would impact the two NASCAR weekends each year. In this regard, many of the race teams rely upon air access to Dover Downs via Dover AFB. With increasing competition from other venues, the loss of this convenient access point could trigger a cutback in NASCAR activities. Thus, this alternative will examine the impacts of the potential closure of Dover AFB to civil aviation.

Figure 5-3 presents a graphic depiction of Alternative 3 while Table 5-1 (presented earlier) shows the forecast based aircraft and operations associated with each system airport. As shown, there are a number of transfers of based aircraft from the airports that may close to the remaining airports in the system. Most of these transfers were made based upon geographic proximity of existing airports to future airports.



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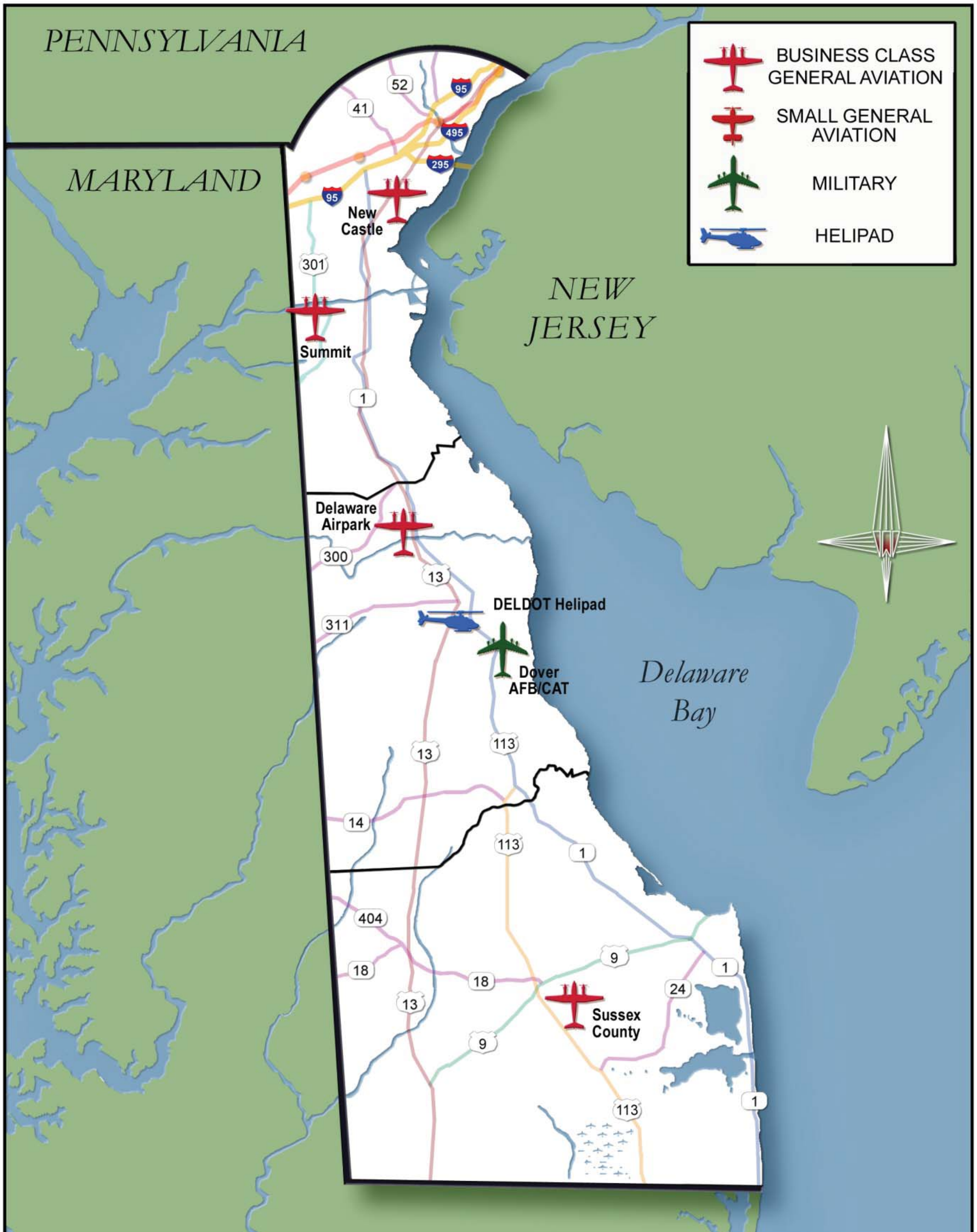
Alternative 1 - No Action

Figure 5-1



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Alternative 2
Contracted Alternative System

Figure 5-2

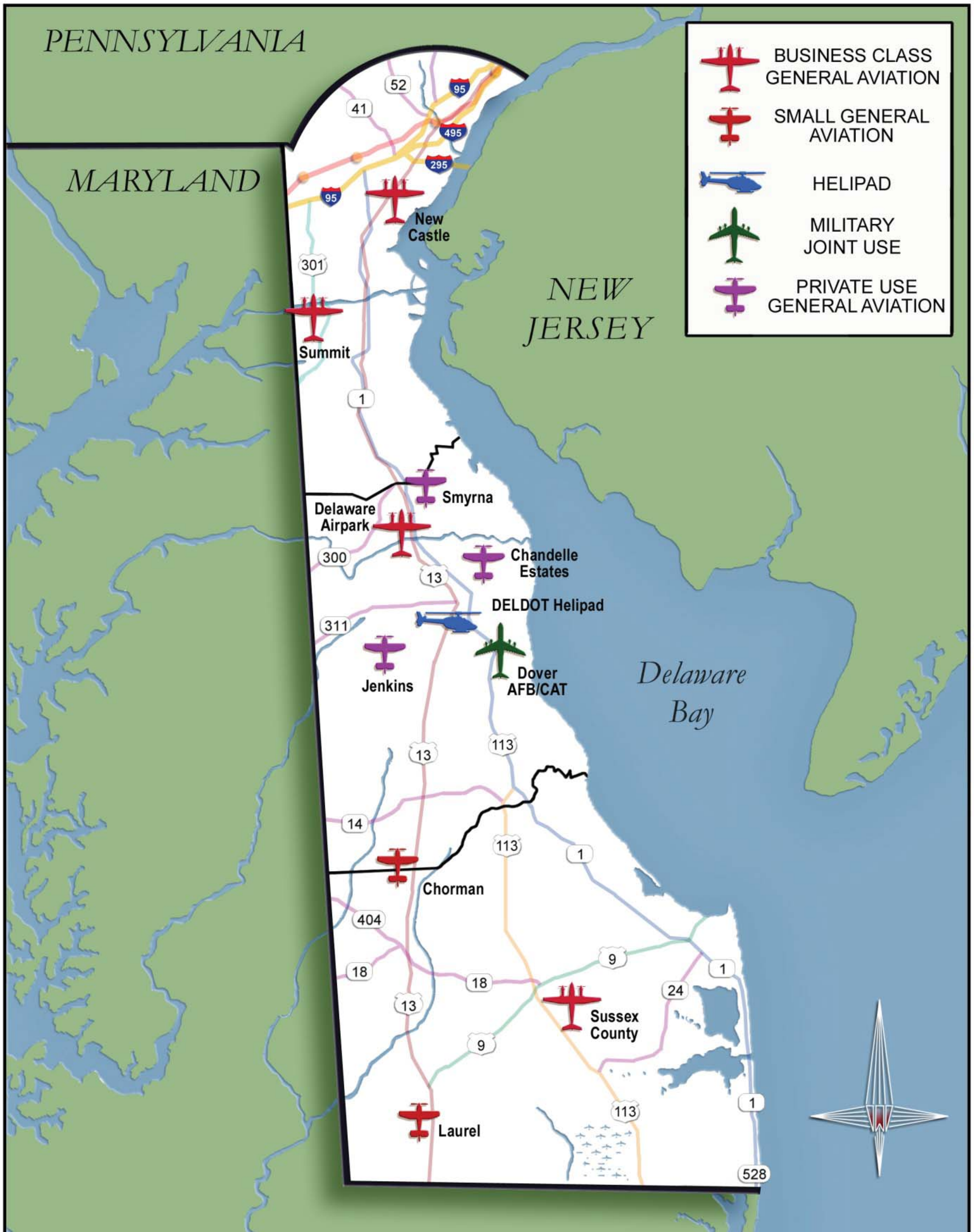
2.3 Alternative 3 – Contingency Aviation System

Alternative 3 is called the "Contingency Aviation System" because it considers the potential impacts of several possible occurrences that could significantly change the aviation system in Delaware. These impacts revolve mostly around potential changes at Dover AFB, but also include changes to public-use status of some privately owned airports. Contingency changes that were factored into the analysis included the following:

- Full Joint Use of Dover AFB: There is some talk about a new round of Base Realignment & Closure (BRAC) for Dover AFB for 2015 or before. These talks center on the possibility of consolidating the role of Dover AFB with that of McGuire AFB in New Jersey. Under the scenario, McGuire would gain the heavy lift cargo mission from Dover, while Dover may keep the mortuary and its mission.
    - There is also the possibility of future full joint use of Dover AFB, without a BRAC. This would permit full civilian use of the facility, while at the same time, keep the heavy lift mission. Such a circumstance would favor the development of the CAT for supplemental air cargo carrier overnight parking.
- Loss of Public-Use status of Chandelle Estates, Jenkins, and Smyrna.
- Loss of NPIAS funding eligibility of Summit Airport.
- Expansion of Sussex County Airport primary runway to 6,000 feet.

Of significance in the potential BRAC of Dover AFB are the civilian options that become available with that occurrence. The potential relocation of the Dover AFB mission could also jeopardize the current attempt to develop the Civil Air Terminal ramp for overnight supplemental cargo carrier aircraft. In this regard, any loss of mission at Dover AFB will have dire impacts on local employment, income, total spending and tax collections in central Delaware. However, one potential benefit to the civilian general aviation system would be the possible full joint use of the Base (no prior permission requirement, no cap on civilian operations). Such a situation would require rethinking of the need for an expanded Delaware Airpark, as all of those operations and more could be accommodated by the Dover AFB runway system.

It is possible that in the future, full joint use of Dover AFB could be achieved (similar to Charleston, SC), without a BRAC. If that were to occur, the benefits of developing the CAT for air cargo carrier overnight parking would still have a demand. It would also permit civilian use of the facility, thereby decreasing the need for expansion of Delaware Airpark. In addition, the loss of public-use status of Chandelle Estates, Jenkins, and Smyrna would likely drive some based aircraft to a newly full-joint use facility such as the CAT at Dover AFB. Other possible uses for the CAT could occur with or without the BRAC, including airline passenger service and civilian air cargo operations. All of these contingencies are examined in the evaluation of aviation system alternatives (Chapter 6).



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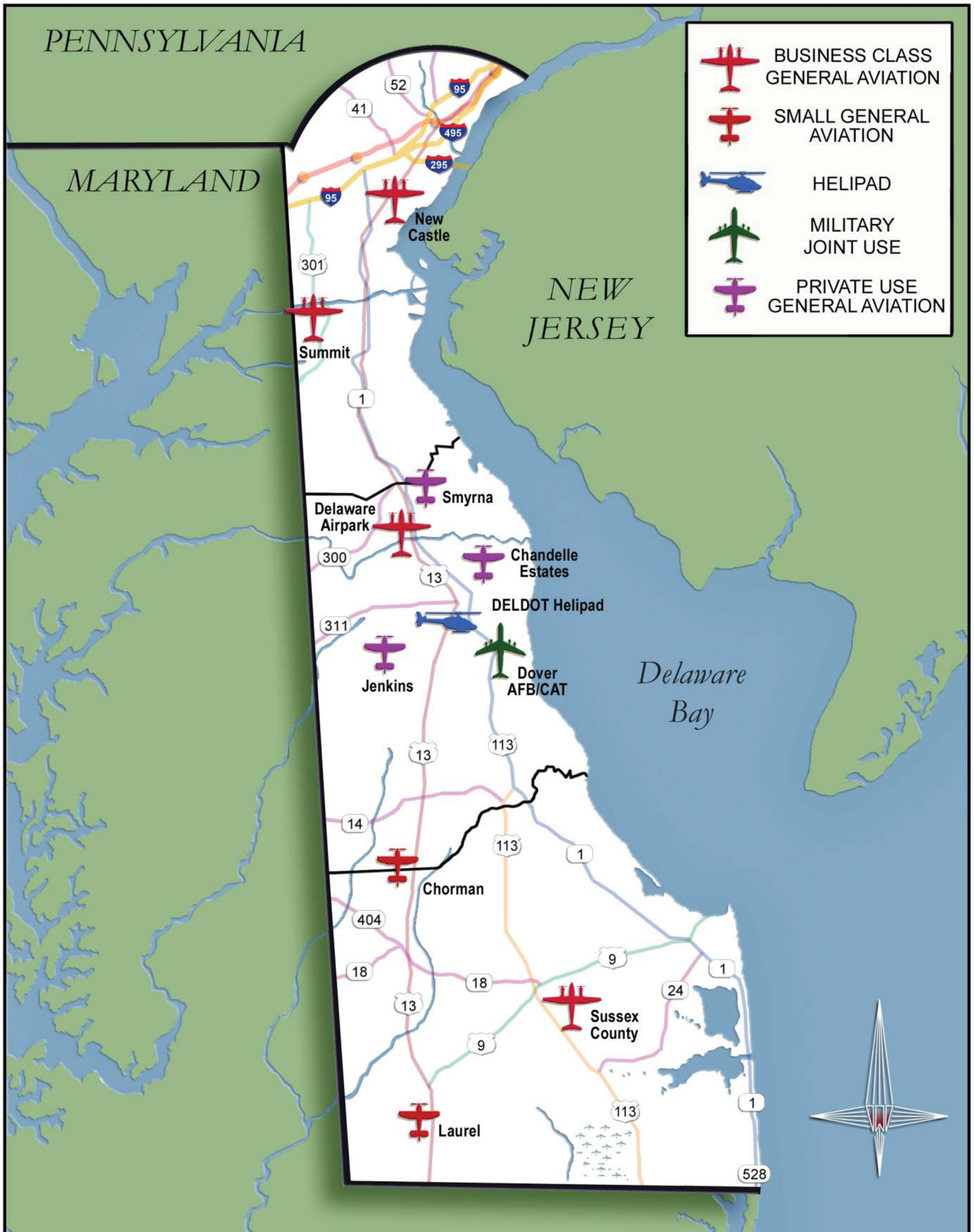
Delaware State Aviation System Plan Update

Alternative 3 - Contingency Aviation System

Figure 5-3



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Delaware State Aviation System Plan Update

Alternative 3 - Contingency Aviation System

Figure 5-3

Chapter 6:
Evaluation of Alternatives

EVALUATION OF ALTERNATIVES

1. INTRODUCTION

IDENTIFYING POTENTIAL ALTERNATIVE SOLUTIONS TO DELAWARE'S LONG term aviation needs was the first step toward developing an updated detailed plan of recommended action. That process, completed in Chapter 5, identified three primary alternatives for further review. The second step is to analyze these alternatives, using a number of criteria and evaluating them relative to each other. This chapter presents a summary of the methods, analysis, and findings of the evaluation process.

As an overview, the evaluation of alternatives used a multiple-criteria process to analyze and evaluate the various alternatives. Each criterion was applied to each alternative and scored in a comparative ranking procedure. This approach permitted a direct comparison of alternatives in each area of evaluation. Criteria used in the evaluation process included the following general factors:

- ***Ability to Serve Forecast Demand:*** How well will each alternative accommodate projected demand? This includes general aviation activity and potential airline and air cargo demand. Alternative 3 will test the limits of this evaluation criterion relative to the need for additional facilities in Central Delaware.

- ***Impact of Airspace Obstructions:*** This criterion was included because the State has an interest in the potential removal of obstructions via State law and regulations that authorize the removal of airspace obstructions from public-use airports in Delaware. The alternatives impact the required funding for obstruction removal by virtue of having different numbers of public-use airports included in each.

- ***Impact on Surface Transportation System:*** The evaluation uses previous work on surface transportation to determine if the new alternatives have any significant impact or deviation from previous analyses.

- ***Environmental & Land Use Compatibility:*** The impact of airport operations on environmental and land use compatibility will be measured indirectly by determining average real estate values in the airport area as compared with other areas of a community that are not impacted by airport noise.

- ***Development Costs:*** The cost of each alternative will be estimated in order to determine which is the most cost-effective. These costs must be weighed against the benefits provided by each alternative.

- ***Impact of Contingencies:*** Because there are a number of contingencies described in Alternative 3, there are several potential impacts to Delaware's aviation system that should be addressed individually. This criterion examines the potential contingencies that could happen at Dover AFB that are not measured against Alternatives 1 or 2.

A composite ranking of the alternatives, based upon all criteria and using a matrix format to array information was prepared. As a result of this approach, the original alternatives were narrowed to those attributes in each alternative that have the most potential for success.

2. EVALUATION OF ABILITY TO SERVE FORECAST DEMAND

EACH OF THE ALTERNATIVES WAS EVALUATED TO determine its ability to meet forecast demand levels within accepted performance standards. These evaluations were performed on a facility-by-facility basis and results were aggregated to permit comparisons at the systems level. Included among the material analyzed in determining this overall ability to meet forecast demand levels were the number, types, and quantities of airport facilities needed to serve aviation demand for each alternative.

One measure of the ability to serve forecast aviation demand is the service capability of each alternative airport system. In this regard, service capability can be identified for two separate components of the airport: airfield and landside.

- ***Airfield Service Capability:*** This is the ability of Delaware airports to accommodate forecast demand operations depicted in each alternative. Deficiencies in airfield capacity would be remedied in each alternative by the conceptual addition of runways or taxiways where needed.

- ***Landside Service Capability:*** This is the ability of Delaware airports to process aircraft and passengers at the hangars and terminal areas of each airport. Deficiencies in landside capacity would be remedied in each alternative by the conceptual addition of apron area, T-hangars, conventional hangars, terminal building space, and automobile parking space.

It should be noted that privately owned, public-use airports were included in the analysis since they are eligible for some State funding (obstruction removal and other project funding).

2.1 Airfield Service Capability

In Chapter 4 of the Phase I study, a demand/capacity analysis and facility needs analysis was performed for the existing system of airports. When loaded with forecast demand, the needed facilities were identified and quantified for each airport. Chapter 5 identified three primary alternatives for further review and analysis. Alternative 1 is called the “Baseline” Alternative because it examines the adequacy of the existing system. It assumes a status quo scenario where no changes other than those already planned are included. This alternative serves as a baseline comparison to each of the “action” alternatives (2 and 3). Alternative 1 has the following assumptions:

- No changes are made to the existing GA system assets in terms of capacity.
- Delaware Airpark will construct a 4,200' X 75' replacement runway with a full parallel taxiway.

- Sussex County Airport will expand its primary runway to 5,500 feet.

Alternative 2 is called the "Contracted System of Airports" because it examines the impacts created with the loss of certain privately owned airports in the State. Alternative 2 focuses on a core system of airports needed to accommodate aviation demand in the State. This alternative is also considered a "worst case" scenario since it assesses the capability of a contracted system of airports to meet the long-term Delaware aviation needs. Assumptions used in Alternative 2 included the following:

- Chandelle Estates, Chorman, Jenkins, Laurel, and Smyrna are assumed to close by 2030 for various reasons.
- Dover AFB (CAT) will no longer be a joint-use facility due to unforeseen security issues or other concerns. The 1,400 GA itinerant operations at the CAT move to (75%) New Castle and (25%) to Sussex County.
- Delaware Airpark will construct a 5,500 X 75' replacement runway with a full parallel taxiway. Delaware Airpark absorbs the demand from Chandelle Estates, Jenkins, Smyrna, and 32 percent of Chorman's aircraft and operations.
- Expansion of Sussex County Airport's primary runway to 6,000 feet. Sussex County absorbs Laurel Airport's demand and 68 percent of aircraft and operations from Chorman.

Alternative 3 is called the "Contingency Aviation System" because it considers the potential impacts of several possible occurrences that could significantly change the aviation system in Delaware. These impacts revolve mostly around potential changes at Dover AFB, but also include changes to public-use status of some privately owned airports.

- Full Joint Use of Dover AFB: A new round of Base Realignment & Closure (BRAC) for Dover AFB for 2015 or before would consolidate the role of Dover AFB with that of McGuire AFB in New Jersey.
- Unrestricted joint use of Dover AFB will change the ASV of the CAT from 13,500 operations to 230,000 operations.
  - There is also the possibility of future full joint use of Dover AFB, without a BRAC. This would permit full civilian use of the facility, while at the same time, keep the heavy lift mission.
- Loss of Public-Use status of Chandelle Estates, Jenkins, and Smyrna. Half of each airport's operations and based aircraft are relocated to nearby airports.
- Expansion of Sussex County Airport primary runway to 6,000 feet.
- Delaware Airpark will construct a 4,200' X 75' replacement runway with a full parallel taxiway.
- Chorman Airport will construct a 3,600' X 60' runway with full parallel taxiway.
- Summit Airport will extend their primary runway to 5,320' but is expected to lose NPIAS funding eligibility prior to developing the extension.

The airfield demand/capacity capabilities for each of the airports by alternative are shown in Table 6-1.

Table 6-1 Airfield Demand/Capacity Comparisons

Alternative/Airport	Annual Service Volume	Year 2030 Demand	Percent of Capacity	Annual Delay (Hours)
Alternative 1				
Chandelle Estates	46,400	4,200	9%	0
Chorman Airport	53,100	17,300	33%	66
Delaware Airpark	171,300	29,900	17%	35
DelDOT Helistop	5,000	50	1%	0
Dover AFB	13,500	1,400	10%	N/A
Jenkins Airport	24,800	1,800	7%	0
Laurel Airport	32,200	11,600	36%	50
New Castle Airport	194,000	101,000	52%	707
Smyrna Airport	30,000	3,000	10%	0
Summit Airport	170,800	55,100	32%	202
Sussex County Airport	174,500	44,900	26%	120
Total For Alt. 1	***915,600***	***270,250***	***30%***	***1,180***
Alternative 2				
Delaware Airpark	171,300	44,400	26%	118
DelDOT Helistop	5,000	50	1%	0
New Castle Airport	194,000	102,050	53%	731
Summit Airport	170,800	55,100	32%	202
Sussex County Airport	174,500	68,650	39%	332
Total For Alt. 2	**715,600**	**270,250**	**38%**	**1,384**
Alternative 3				
Chorman Airport	53,100	17,300	33%	66
Delaware Airpark	171,300	30,395	18%	41
DelDOT Helistop	5,000	50	1%	0
Dover AFB	230,000	5,520[1]	2%	N/A
Laurel Airport	32,200	11,600	36%	50
New Castle Airport	194,000	101,000	52%	707
Summit Airport	170,800	55,100	32%	202
Sussex County Airport	174,500	44,900	26%	120
Total For Alt. 3	***1,030,900***	**265,865**	**28%[2]**	**1,186**

[1]GA operations only

[2]Although future military use is unknown at Dover AFB, this analysis assumes 24,000 military operations in the year 2030 to calculate the percent of capacity used for the entire system in Alternative 3.

As shown none of the public use airports are projected to reach 60 percent of their capacity by 2030. On an airport level, New Castle uses the most of its available capacity throughout all of the Alternatives and has the highest amounts of delay. Summit and Sussex County Airports will experience the next highest amounts of delay depending on Alternative.

The 2030 state-wide demand in Alternative 1 and 2 are the same, while Alternative 3 assumes that Chandelle Estates, Jenkins, and Smyrna are no longer public use facilities and half of each airport's operations and based aircraft relocate to nearby airports. This decreases the demand in Alternative 3 by 4,385 operations and 35 aircraft (Table 6-3).

Table 6-2 - Airfield Demand/Capacity Comparisons, by Alternative

	Alternative 1	Alternative 2	Alternative 3
Based Aircraft	576	576	541
2030 Demand	270,250	270,250	265,865
Annual Service Volume	915,600	715,600	1,030,900
Percent of Capacity	30%	38%	28%[1]
Annual Delay (Hours)	1,180	1,384	1,186
Surplus Capacity	645,350	445,350	789,035
Percent of Available Capacity	70%	62%	72%

[1]Although future military use is unknown at Dover AFB, this analysis assumes 24,000 military operations in the year 2030 to calculate the percent of capacity used for the entire system in Alternative 3

As shown, Alternative 3 has the greatest surplus airfield capacity (789,035 operations), followed by Alternative 1 (645,350 operations), and then by Alternative 2 (445,350 operations).

Alternative 1 has the second largest Annual Service Volume capacity of all the alternatives. Alternative 3 has the most Capacity because it assumes that full joint use of Dover AFB is achieved which changes the Annual Service Volume of Dover AFB in Alternative 1 from 13,500 operations to 230,000 operations.

Alternative 2 shows the largest percent of capacity used and the largest annual delay due to the assumptions that 5 of the 10 system airports close due to various reasons by 2030 and that Dover AFB will no longer allow public operations. Because of this, demand at each of the closed airports was reallocated to other airports which increases their capacity use and in turn increases their delay. Table 6-3 shows the proposed runway improvements to system airports by the year 2030, while Table 6-4 shows the proposed additional airside facilities for the same time period.

Table 6-3 - Runway Improvements to System Airports: Year 2030			
Airport Name	**Existing Primary Runway Dimensions**	**Future Primary Runway Dimensions**	**Dimensional Upgrade**
Alternative 1			
Chandelle Estates	2,533' x 28'	2,533' x 28'	None
Chorman Airport	3,588' x 40'	3,588' x 40'	None
Delaware Airpark	3,582' x 60'	4,200' x 75'	New Runway and Full Parallel Taxiway
Dover AFB	9,602' x 200'	9,602' x 200'	None
Jenkins Airport[1]	2,842' x 70'	2,842' x 70'	None
Laurel Airport[1]	3,175' x 270'	3,175' x 270'	None
New Castle Airport	7,012' x 150'	7,012' x 150'	None
Smyrna Airport[1]	2,600' x 125'	2,600' x 125'	None
Summit Airport	4,488' x 65'	4,488' x 65'	None
Sussex County Airport	5,000' x 150'	5,500' x 150'	500' in length
Turf Subtotal	*153,466 S.Y.*	*153,466 S.Y.*	*0*
Pavement Subtotal	*493,698 S.Y.*	*502,031 S.Y.*	*58,070 S.Y.*[2]
Total For Alt. 1	**647,164 S.Y.**	**655,497 S.Y.**	**58,070 S.Y.**[2]
Alternative 2			
Delaware Airpark	3,582' x 60'	5,500' x 75'	New Runway & Full Parallel Taxiway
New Castle Airport	7,012' x 150'	7,012' x 150'	None
Summit Airport	4,488' x 65'	4,488' x 65'	None
Sussex County Airport	5,000' x 150'	6,000' x 150'	1,000' in Length & Full Parallel Taxiway
Total For Alt. 2	**256,493 S.Y.**	**295,113 S.Y.**	**85,069 S.Y.**[2]
Alternative 3			
Chorman Airport	3,588' x 40'	3,600' x 60'	New Runway & Parallel Taxiway
Delaware Airpark	3,582' x 60'	4,200' x 75'	New Runway & Full Parallel Taxiway
Dover AFB	9,602' x 200'	9,602' x 200'	None
Laurel Airport1[1]	3,175' x 270'	3,175' x 270'	None
New Castle Airport	7,012' x 150'	7,012' x 150'	None
Summit Airport	4,488' x 65'	5,320' x 65'	832' in Length & Full Parallel Taxiway
Sussex County Airport	5,000' x 150'	6,000' x 150'	1,000' in Length & Full Parallel Taxiway
Turf Subtotal	**95,250 S.Y.**	**95,250 S.Y.**	**0**

Table 6-3 - Runway Improvements to System Airports: Year 2030			
Airport Name	**Existing Primary Runway Dimensions**	**Future Primary Runway Dimensions**	**Dimensional Upgrade**
Pavement Subtotal	**485,818 S.Y.**	**527,667 S.Y.**	**108,524 S.Y.[2]**
Total For Alt. 3	**581,068 S.Y.**	**622,917 S.Y.**	**108,524 S.Y.[2]**

[1] Turf runway. [2] Includes additional runway and taxiway extensions.

Table 6-4 - Additional Airside Facilities, by Alternative*					
Alternative/Airport	**Runway Lighting**	**VASI/PAPI**	**REIL**	**Runway (S.Y.)**	**Taxiway (S.Y.)**
Alternative 1					
Chandelle Estates			2 REIL		
Chorman Airport	MIRL	1 VASI			
Delaware Airpark		2 VASI	2 REIL	35,000	8,626
Jenkins Airport			2 REIL		
Laurel Airport			1 REIL		
Sussex County Airport				8,333	6,111
Total For Alt. 1	**1**	**3**	**7**	**43,333**	**14,737**
Alternative 2					
Delaware Airpark	MIRL	2 VASI	2 REIL	45,833	13,681
Sussex County Airport	MIRL			16,666	8,889
Total For Alt. 2	**0**	**2**	**2**	**62,499**	**22,570**
Alternative 3					
Chorman Airport	MIRL	1 VASI		24,000	6,000
Delaware Airpark	MIRL	2 VASI	2 REIL	35,000	8,626
Summit Airport	MIRL			6,010	3,333
Laurel Airport			1 REIL		
Sussex County Airport	MIRL			16,666	8,889
Total For Alt 3.	**1**	**3**	**3**	**81,676**	**26,848**

* Only airports that have airside needs are shown for each alternative.

Table 6-5 presents a summary of airside alternative differences for the various facilities. Not shown, but also included in the costs will be the overlay of all pavements with 20-year life spans.

Table 6-5 – Summary of Incremental Airside Alternative Differences			
Airside Facilities	**Alternative 1**	**Alternative 2**	**Alternative 3**
Runway (paving) SY	43,333	62,499	81,676
Taxiway (paving) SY	14,737	22,570	26,848
Runway Lighting (LF)	8,288	6,000	9,632
VASI/PAPI	3	2	3
REIL	7	2	3

LF = Linear Foot

2.3 Landside Service Capability

The landside service capability refers to the ability of Delaware airports to process aircraft and passengers at the hangars and terminal areas of each airport. Deficiencies in landside capacity would be remedied in each alternative by the conceptual addition of apron area, T-hangars, conventional hangars, terminal building space, and automobile parking space. Table 6-6 presents the additional landside facilities needed for each alternative.

Table 6-6 - Additional Landside Facilities

Alternative/Airport	Apron Area (SY)	T-Hangars (Units)	Conventional Hangar Space (SF)	Terminal Building Space (SF)	Auto Parking (SY)
Alternative 1					
Chandelle Estates	1,900	8	0	0	0
Chorman Airport	3,700	0	0	500	700
Delaware Airpark	0	29	28,900	0	1,050
DelDOT Helistop	0	0	0	0	0
Dover AFB CAT	63,700	0	0	4,000	3,500
Jenkins Airport	0	0	0	500	0
Laurel Airport	0	0	0	0	0
New Castle Airport	9,900	0	0	0	0
Smyrna Airport	0	4	0	0	0
Summit Airport	0	9	0	0	7,000
Sussex County Airport	0	10	0	0	0
Total For Alt. 1	**79,200**	**60**	**28,900**	**5,000**	**12,250**
Alternative 2					
Delaware Airpark	4,678	70	30,500	0	1,050
DelDOT Helistop	0	0	0	0	0
New Castle Airport	9,900	0	0	0	0
Summit Airport	0	9	0	0	7,000
Sussex County Airport	0	35	0	0	0
Total For Alt. 2	**14,578**	**114**	**30,500**	**0**	**8,050**
Alternative 3					
Chorman Airport	3,700	0	0	500	700
Delaware Airpark	0	44	10,900	0	1,050
DelDOT Helistop	0	0	0	0	0
Dover AFB CAT	63,700	11	19,600	4,000	3,500
Laurel Airport	0	0	0	0	0
New Castle Airport	9,900	0	0	0	0
Summit Airport	0	9	0	0	7,000
Sussex County Airport	0	10	0	0	0
Total For Alt 3.	**77,300**	**74**	**30,500**	**4,500**	**12,250**

By way of explanation, in Alternative 3 Chandelle Estates, Jenkins, Smyrna Airport will no longer be public-use airports. A full BRAC of Dover AFB is not the option considered in Alternative 3 facility needs. Rather, the conservative option of full joint military/civilian use is analyzed. Thus, the CAT would need its planned 63,700 square yards of apron to accommodate civilian air cargo carrier parking. Table 6-7 presents a summary of the additional landside facilities needed, by alternative.

Table 6-7 – Summary of Additional Landside Facilities, by Alternative

	Alternative 1	Alternative 2	Alternative 3
Apron Area (SY)	79,200	14,578	77,300
T-Hangar (Units)	60	114	74
Conventional Hangar Space (SF)	28,900	30,500	30,500
Terminal Building Space (SF)	5,000	0	4,500
Auto Parking (SY)	12,250	8,050	12,250

3. EVALUATION OF AIRSPACE OBSTRUCTIONS

THE STATE HAS AN INTEREST IN THE potential removal of obstructions via State law and regulations that authorize the removal of airspace obstructions from public-use airports in Delaware. Therefore, this section describes the results of the evaluation of airspace obstructions for each of the alternatives and is organized to include the following major topics:

- Existing Airspace Obstructions
- Incremental Changes by Alternative
- Summary and Ranking of Airspace Factors

The product of this evaluation was a set of scores for the airports in each alternative which could be compared via cost analysis. The alternatives could be ranked according to costs and potential public sector funding of obstruction removal.

3.1 Existing Airspace Obstructions and Navaids

The object of this analysis is to learn the differences between the impacts of airspace obstructions and navaids on the aviation system in each alternative. As mentioned in Phase 1 of this study, airspace obstructions are defined by FAR Part 77 – Objects Affecting Navigable Airspace. In Delaware, many of the public-use airports have obstructions of varying severity. Some are lighted for visual reference and avoidance at night. In other cases, runway thresholds have been displaced to permit obstruction clearance in the approach slope of landing aircraft. Other obstructions simply exist and must be avoided by pilots.

Chapter 2, Section 4 of this report contains an inventory of airspace obstructions for each public-use airport in Delaware. Rather than repeat those obstructions here, they are incorporated into this analysis by reference.

Perhaps the easiest method of summarizing the impacts of the need for obstruction removal at existing public-use airports is to present the costs of their removal. This provides a universal comparison factor that is applicable between alternatives, without having to compare the individual obstructions to one another. In previous system planning work, costs were assigned to the removal of obstructions at existing public-use airports. Unit costs for obstruction removal were developed as shown in Table 6-8.

Table 6-8 - Estimated Removal Costs

Work Description	Cost
Lighting Obstruction	$1,700
Power Lines	Case by Case Basis
Clearing/Grubbing/Removal	$14,000/ Acre

Table 6-8 - Estimated Removal Costs	
Off Airport Property	
Cost of Easement Per Acre	$17,000
Removal of Tree in Field	$2,000
Removal of Tree in Yard	$10,000
On Airport Property	
Removal of Tree	$500

Based on these cost assumptions, the following obstruction removal and lighting estimates have been developed for the existing public-use airports in Delaware (Table 6-9). As shown, the cost to remove or light obstructions at these airports has been estimated at more than $11.5 million.

Table 6-9 – Alternative 1 (Existing System) Obstruction Removal Estimates

Airport	Removal/Lighting Estimate
Chandelle Estates	$1,200,000
Chorman	$612,000
Delaware Airpark	$1,726,000
Jenkins	$2,574,000
Laurel	$727,000
New Castle	$1,451,000
Smyrna	$45,000
Summit	$1,292,000
Sussex County	$1,897,000
Total	$11,524,000

3.2 Incremental Changes by Alternative

Depending upon the number of types of airports included in each alternative, the requirements for obstruction removal will differ. In this regard, Alternative 2 - Contracted Alternative – has fewer airports than the existing system, and thus, a lower obstruction removal cost. Similarly, Alternative 3 – Contingency Aviation System – has fewer public-use airports than the existing system, and thus also lowers overall costs.

Table 6-10 presents the costs of obstruction removal for Alternative 2. As shown, these costs are more than $5 million less than Alternative 1 and represent the reduction in airport facilities requiring obstruction removal. Total cost for Alternative 2 is approximately $6.4 million. With only the publicly owned airports and Summit included in this alternative, most of the significant obstructions have already been removed or lighted. However, according to the LiDAR analysis, the obstructions for which costs were generated still exist and should be removed or lighted.

Table 6-10 – Alternative 2 Obstruction Removal Estimates	
Airport	Removal/Lighting Estimate
Delaware Airpark	$1,726,000
New Castle	$1,451,000
Summit	$1,292,000
Sussex County	$1,897,000
Total	$6,366,000

Table 6-11 presents the obstruction removal costs for the public-use airports included in Alternative 3. This alternative is also less costly than Alternative 1, but because of the inclusion of several privately owned airports, it is more expensive than Alternative 2. Total removal and lighting costs for Alternative 3 are $7.7 million.

Table 6-11 – Alternative 3 Obstruction Removal Estimates	
Airport	Removal/Lighting Estimate
Chorman	$612,000
Delaware Airpark	$1,726,000
Laurel	$727,000
New Castle	$1,451,000
Summit	$1,292,000
Sussex County	$1,897,000
Total	$7,705,000

3.3 Summary and Ranking of Airspace Compatibility Factors

From an evaluation standpoint, the differences between alternatives involved the potential funding needs for the removal of airspace obstructions. In this regard, the overall ranking of alternatives was as follows:

- Alternative 2 First: $6,366,000
- Alternative 3 Second: $7,705,000
- Alternative 1 Third: $11,524,000

These scores indicate that Alternative 2 creates the least impact in obstruction removal requirements, because that alternative has the fewest number of airports. Alternative 1 has the greatest number of public-use airports and thus would require the highest level of obstruction removal. Because the State is considering undertaking some of these removal costs, Alternative 2 clearly has the least impact on funding requirements.

4. IMPACT ON SURFACE TRANSPORTATION

From the Phase 1 study, a forecast of airport-generated surface vehicle traffic was projected to the year 2030 to determine whether or not hourly roadway capacities at each facility would be exceeded. This forecast was for the existing system – essentially Alternative 1. In addition to airport-generated trips, an existing hourly roadway capacity was estimated for each airport. As shown in Table 6-12, projected peak hour vehicle trips will not exceed minimum levels of highway capacity during the planning period for Alternative 1.

Table 6-12 – Alternative 1 Forecast Surface Access Demand

Airport Name	Access Road	2030 Peak Hour Vehicle Trips*	Existing Hourly Roadway Capacity*	2030 Surplus or (Deficit)
Chandelle Estates	Route 9	10	200	190
Chorman	Nine Foot Road	25	200	175
Civil Air Terminal at Dover AFB	Horsepond Road	132	200	68
Delaware Airpark	State Route 42	43	200	157
Jenkins	Westville Road	7	200	195
Laurel	State Route 24	22	200	178
New Castle Airport	US 13 and 40, State Routes 273, 58, 141	206	1,200	994
Smyrna	State Route 6	7	200	193
Summit	US 301	79	400	321
Sussex County	Airport Road, S Railroad Ave	65	400	335

* Vehicle trips estimated from general aviation industry averages of 2.35 times peak hour operations. This number accounts for pilots, passengers, and employees at the airport.

** Estimated minimum capacity of 200 hourly vehicles for airport ingress and egress turn lanes

4.1 Aviation Demand Generated Vehicle Trips

Table 6-13 presents the forecast vehicle trips for Alternatives 1, 2, and 3, given the different forecast aviation demand projected for each scenario. As shown, there are minimal differences in overall peak hour vehicle trips for most alternatives. Notably, there are a number of airports missing from Alternative 2, by definition. However, of the airports with the least surplus capacity, the Civil Air Terminal at Dover AFB shows the use of 66 percent of its capacity in Alternatives 1 and 2. In Alternative 3, that increases to a potential range of 70-155 percent of capacity, depending upon whether or not airline service is attracted to the CAT. While there are other airports that have significant roadway capacity available for aviation-related demand, it should be noted that non-aviation demand will increase on these highways in the future as well. In fact, the non-aviation demand is much higher in most cases than the aviation-generated demand.

Table 6-13 – 2030 Aviation-Related Peak Hour Vehicle Trips by Alternative

Airport Name	Alternative 1	Alternative 2	Alternative 3
Chandelle Estates	10	0	5
Chorman	25	0	25
Civil Air Terminal at Dover AFB	132	0	141-310*
Delaware Airpark	43	61	45
Jenkins	7	0	7
Laurel	22	0	22
New Castle	206	206	206
Smyrna	7	0	7
Summit	79	79	79
Sussex County	73	94	73

* Upper range would include potential airline service and air cargo operations at the CAT.

4.2 Total Traffic Counts

As described in Phase 1 of the System Plan, future traffic counts were provided by DelDOT for the roadways involved in direct surface access to Delaware's system airports. These projections can be considered a worst case loading for the system plan. For comparison purposes the 2010 Annual Average Daily Traffic is also shown along with the percentage growth over the period:

- Chandelle Estates
  - Silver Leaf Lane – 168 AADT **(240 Projected, +42.9%)**
  - State Route 9 – 1,289 AADT **(1,750 Projected, +35.8%)**
- Chorman
  - Nine Foot Road – 793 AADT (1,030 Projected, +29.9%)
  - U.S. Route 13 – 23,901 AADT (35,900 Projected, +50.2%)
- Civil Air Terminal at Dover AFB
  - Horsepond Road – 1,898 AADT **(2,100 Projected, +10.6%)**
- Delaware Airpark
  - State Route 42 – 5,262 AADT **(7,700 Projected, +46.3%)**
- Jenkins
  - Westville Road – 2,735 AADT **(4,000 Projected, +46.3%)**
- Laurel
  - Sharptown Road – 1,610 AADT **(2,300 Projected, +42.9%)**

- New Castle Airport
  - U.S. 40/DuPont Highway – 77,366 AADT **(95,000 Projected, +22.8%)**
  - U.S. 202/E. Basin Road (State Route 141) – 41,783 AADT **(63,000 Projected, +50.8%)**
  - Commons Boulevard/State Route 37 – 18,645 AADT **(25,500 Projected, +36.8)**
  - Airport Road – 9,320 AADT **(14,000 Projected, +50.2%)**
  - Churchmans Road/State Route 58 – 10,267 AADT **(15,000 Projected, +46.1%)**
  - Old Churchmans Road – 712 AADT **(800 Projected, +12.4%)**
- Smyrna
  - Commerce Street/State Route 6 – 1,807 AADT **(2,000 Projected, +10.7%)**
- Summit
  - U.S. 301 – 21,798 AADT **(28,000 Projected, +28.5%)**
- Sussex County
  - Road 319 – 941 AADT **(1,050 Projected, +11.6%)**
  - U.S. Route 9 – 13,139 AADT **(17,500 Projected, +33.2%)**
  - U.S. Route 9T – 4,995 AADT **(7,500 Projected, +50.2%)**

Except for New Castle Airport, many of the high growth rates involve relatively low activity roadways. For example, Silver Leaf Lane is growing from an AADT of 168 to 240 – only 72 vehicles per day. At Delaware Airpark, State Route 42 is projected to grow by 2,438 AADT. But this is significantly less than the large numbers surrounding New Castle Airport, described previously. U.S. 301, which provides access to Summit Airport, is anticipated to grow from 21,798 to 28,000 over the period. This growth will increase the difficulty of turning left into the airport without a stop light to assist traffic across the southbound lanes.

In cases where a roadway leads directly to an airport entrance (Old Churchmans at New Castle Airport, Horsepond Road at the Civil Air Terminal, and Road 319 at Sussex County Airport) all have growth rates under 13 percent. These projections can be associated with Alternative 1 of the System Plan. Increases in airport activity in either Alternative 2 or 3 may increase these numbers and percentages. For example, a new terminal area off Old Churchmans Road would significantly increase that level of traffic. Similarly, a new air cargo operation or new airline service at the Civil Air Terminal would significantly impact those projected surface access numbers.

4.3 Surface Access Evaluation Findings

For this analysis, the findings for surface access needs and potential improvements were limited to the immediate access of each airport within the various alternatives and did not cover the general needs of highways leading to the system airports. Rather, the findings and recommendations focused on the impacts of each alternative on the surface accessibility of system airports. From the evaluation, the following key findings were made:

- Civil Air Terminal
  - Under Alternative 1, the Civil Air Terminal existing roadway system will be adequate for the long term future.
  - Under Alternative 2, it is assumed that the Civil Air Terminal is closed to public use due to security or other reasons. As such, no surface access aviation-related demand is generated.
  - Under Alternative 3, if airline service is initiated, a potential of 300 peak hour vehicles are possible for Horsepond Road. This will hasten the need for capacity-relief improvements including turn lanes, road widening, and increased parking area at the CAT. A minimum of 150 new auto parking spaces will be needed if airline service materializes. Also for Alternative 3, full joint use of Dover AFB is assumed. Therefore, up to five business jets and 31 propeller aircraft are forecast for the facility, increasing the total number of potential peak hour vehicle trips by 9. Finally, if domestic air cargo service is initiated, the roadway system connecting the CAT to State Route 1 will need to be improved for truck traffic. This would include possible widening and strengthening of the roadways connecting to Route 1 (Horsepond Road and Lafferty Lane).

- Delaware Airpark
  - No significant changes to the surface access are anticipated or required for this airport under any of the three alternatives. On-airport traffic levels are only anticipated to grow to 61 peak hour vehicles by 2030 for Alternative 2, which is the highest level of demand of any of the options. This level of demand is only 30 percent of the entrance roadway capacity.
  - At least 20 more airport auto parking spaces will be needed by 2030.

- New Castle Airport
  - There are no significant changes between alternatives for this airport, as all have the same forecast demand. Thus, whatever happens at this facility can be assumed to occur within each of the alternatives.
  - At some point in the future, airline service is likely to be initiated at New Castle Airport due to overcrowding at Philadelphia International. If this occurs prior to 2030, new surface access improvements will be needed at the airport, including access to the new terminal area and significant expansion of auto parking.

- Summit Airport
  - There are no significant changes between alternatives for this airport, as all have the same forecast demand. Thus, whatever happens at this facility can be assumed to occur within each of the alternatives.
  - Summit Airport will continue to grow its maintenance, avionics, and aircraft retrofitting businesses, along with its government contracts. As such, the airport is anticipated to increase its employment base over the planning period. Airport

management has estimated that this growth may create up to 600 new jobs. Given the new employment numbers, surface access to the airport may need improvement, including a traffic light at the main airport entrance in the intermediate planning timeframe to accommodate peak period traffic that would occur during the start and end of work shifts at the airport. In addition, it is anticipated that at least 500 more auto parking spaces would be required as the number of employees and visitors to the airport increase.

- Sussex County Airport
  - Under all alternatives there are no new surface access needs that would be triggered by vehicle trips to the airport. The highest level of access road peak hour capacity used is 47 percent under Alternative 2.
  - Under Alternative 3, it is assumed that the primary runway will be extended to 6,000 feet. This will trigger the need to relocate a portion of U.S. 9T (Park Avenue), changing the intersection location of S. Bedford Street and Park Avenue. This change will not impact highway capacities, but will permit the runway extension to occur.

- Other Public-Use System Airports: Chandelle Estates, Chorman Airport, Jenkins, Laurel, and Smyrna Airport are not anticipated to create significant surface access demand throughout the period under any of the Alternatives.

5. ENVIRONMENTAL & LAND USE COMPATIBILITY

FOR THIS EVALUATION CRITERION, LAND USE COMPATIBILITY is sometimes measured by the real estate value established in the near-airport environs. Noise impact, in particular, is blamed by many to cause a devaluation of real estate. Thus, the impact of airport operations on environmental and land use compatibility can be measured indirectly by determining average real estate values in the airport area as compared with other areas of a community that are not impacted by airport noise. If the conventional wisdom holds, the property in the near-airport areas should average significantly less in value from similar land uses that are not impacted by airports.

In Delaware, an analysis was completed that examined the data concerning the value of different types of real estate located near airports and similar properties located away from the influence of airport-related noise. The purpose was to learn which alternatives have the greatest impact on land use compatibility. This impact will be measured by the potential differences in airport area land values between alternatives.

5.1 Evaluation Concepts

The impacts of aviation on real estate values are active on a large scale. Airports that attract businesses to an area stimulate commercial real estate and create jobs. Increased employment in turn, causes growth in retail, industrial, office, and residential real estate. Thus, aviation is one industry that supplements economic growth and the demand for real estate. The question posed by this analysis involves whether or not airports help or hurt real estate values in their immediate vicinity. If noise really is the environmental influence that aviation opponents claim, then *residential* property values should suffer as the size and activity of an airport increases. On the other hand, *commercial* property may not be subject to this hypothesis.

Concepts that are evaluated in this analysis include the impact of airport operations on both commercial and residential real estate values. The results are presented in the following sections.

5.2 Commercial Property Values

Delaware's four NPIAS airports proved to be the most viable for this type of study, as other privately owned airports did not have enough commercial properties located adjacent to airport property to draw meaningful conclusions. Therefore, the in-depth examination of commercial real estate values focused on the following Airports:

- New Castle Airport
- Sussex County Airport

- Summit Airport
- Delaware Airpark

Commercial properties within a five mile radius of each airport were evaluated, based on their proximity to the airports' runway areas. This study area was then divided into sections from closest to farthest away from the airport. Figure 6-1 depicts these sections divided into rings.

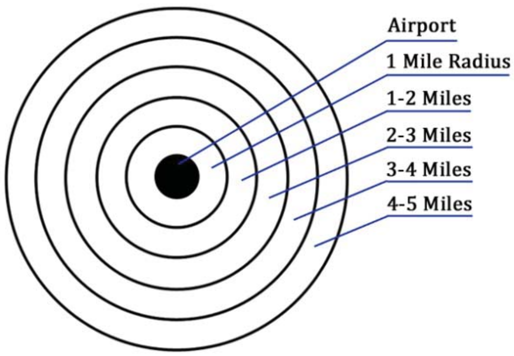


Figure 6-1 – Airport Real Estate Analysis Area

With sections divided in this manner, conclusions can be drawn about property values - specifically with relation to the distance from airports. The end goal is to identify a trend in the difference in property values within the divided sections. For example, if property values are consistently higher in the inner sections close to an airport, and lower in the outer sections away from the airport, one could make the determination that the airport is a positive influence on property values in that area. Of course, if property values were consistently lower in the inner rings and higher in the outer rings, the reverse would be true. One question for this analysis is whether or not there is any difference between commercial property values near an airport and residential property values.

For this report, commercial real estate values were collected from the CoStar.com real estate database. This resource allows for the collection of commercial real estate data by geographical location, and is able to separate findings by the categories of Industrial, Office, and Retail space. For this study, average sale price per square foot was the metric used to evaluate value.

To conduct the analysis, all commercial property data within a five-mile radius of an airport was collected and divided into sections based on proximity to the airport. The properties were analyzed by category to provide an understanding of an airport's influence on commercial property values. It is important to note that within this report, all commercial real estate values were current as of April 2012.

New Castle Airport

Figure 6-2 presents a geographical summary of average property values surrounding New Castle Airport. As shown in Figure 6-2 and Table 6-14, commercial real estate within a five mile radius of New Castle International Airport is priced at a higher value closer to the airport. The highest value commercial real estate is within the segment one mile around the airport, priced at an average of $150 per square foot. The segment with the lowest real estate value is within the 4-5 mile segment, averaging $80 per square foot. This represents an 85.7 percent increase from the outermost segment to the innermost.

Figure 6-2 - Commercial Real Estate Surrounding New Castle Airport

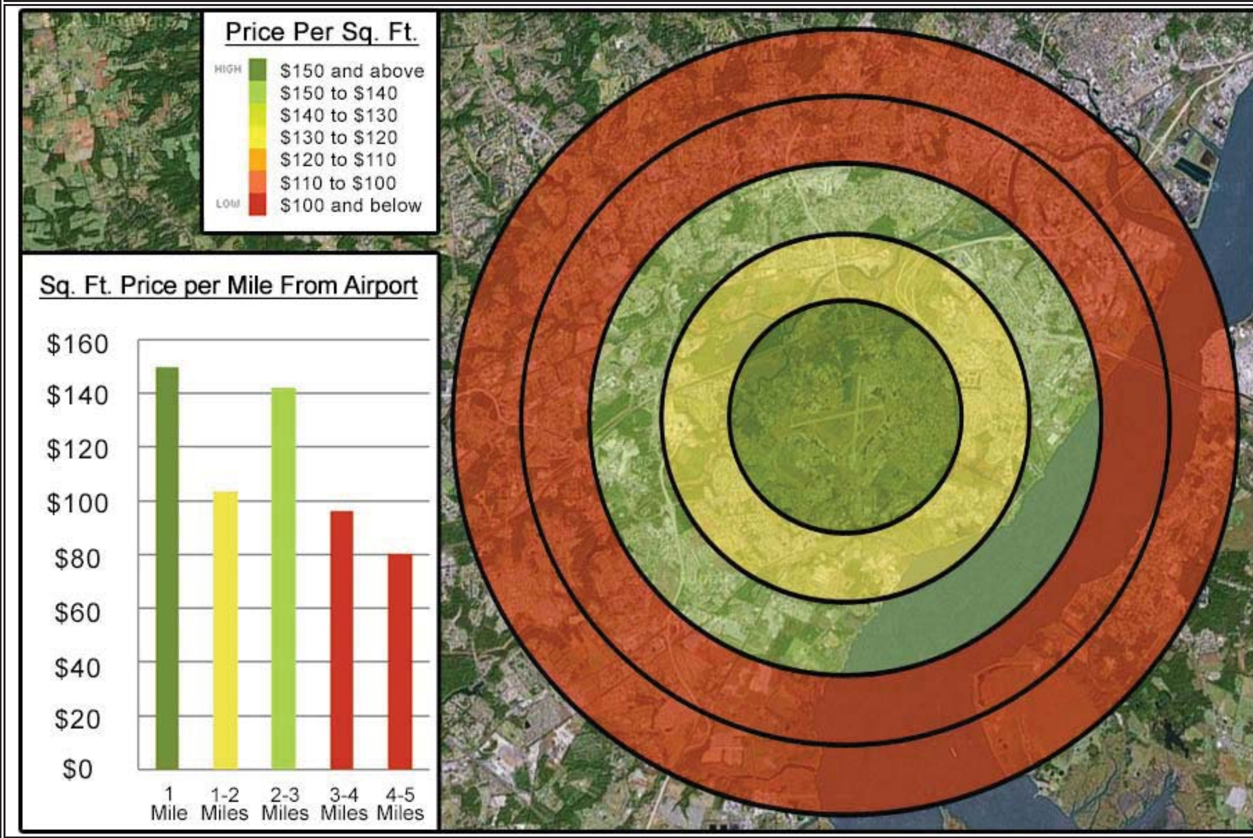


Table 6-14 - Commercial Real Estate Surrounding New Castle Airport					
	1 Mile	1-2 Miles	2-3 Miles	3-4 Miles	4-5 Miles
Properties by Segment					
Industrial (682)	141	149	97	193	102
Office (601)	54	46	80	148	273
Retail (1,052)	132	117	129	306	368
Total (2,335)	***327***	***312***	***306***	***647***	***743***
Average Price Per Sq. Ft.					
Industrial	$58	$49	$64	$57	$41
Office	$142	$166	$214	$106	$85
Retail	$251	$148	$156	$116	$88
Total Weighted Average	***$150***	***$103***	***$142***	***$96***	***$80***

The 3-4 and 4-5 mile segments contained the highest number of commercial properties, with 647 and 743 properties respectively. This outcome is to be expected as these segments cover a much greater surface area than the segments directly adjacent to the airport. Retail spaces occupy the majority of commercial real estate within a five mile radius of the airport with

1,052 properties. Office and Industrial spaces were fairly even in numbers with 601 and 682 properties respectively. With a total of 2,335 commercial properties, the New Castle Airport study area provides an excellent sample size that definitively portrays commercial real estate trends. Conclusively this represents that the airport and its noise do not negatively impact the values of commercial real estate. While residential real estate values may have a different result, it can be concluded that commercial real estate is compatible with airport operations, from an economic standpoint. In fact, the data shows that New Castle Airport provides a very healthy environment for businesses to thrive, particularly those closer to the airport.

Sussex County Airport

Figure 6-3 presents a geographical summary of average commercial property values surrounding Sussex County Airport. As shown, there is a lack of commercial real estate data for at least one geographic segment in the airport area. Though one industrial property was examined in the 3-4 mile segment, no pricing information was available for that property. Therefore, it was not taken into consideration in calculating the total weighed average price per square foot. This same issue was recognized for industrial properties in the 1-2 mile and 4-5 mile segments.

Table 6-15 shows the breakdown of properties and costs by geographic location. Commercial property values closest to the airport showed the least expensive pricing in the study area, averaging $121 per square foot. The highest commercial property pricing was in the 2-3 mile segment, averaging $318 per square foot. This represents commercial values that are over twice as expensive as properties adjacent to the airport. However, many of these properties are located in the downtown area of Georgetown and as such, are not entirely indicative of the airport's actual influence. Specifically, the 2-3 mile segment was only made up of 11 properties, four of which were valued at an average $499 per square foot. This number is extraordinarily high, and does not necessarily represent normal pricing within the 2-3 mile segment.

It is important to note that the area within one mile of the airport contained a greater number of commercial properties than any other segment with 57 properties. This represents only 10 fewer properties than all other segments in the study area combined. The low sample sizes from other segments does not allow for conclusively regarding price per square foot, as they may not accurately represent the actual norms in those areas. However, the relative high density of commercial properties near the airport indicates that relatively speaking, the land surrounding the airport is attracting more businesses than other segments in the study area.

Figure 6-3 - Commercial Real Estate Surrounding Sussex County Airport

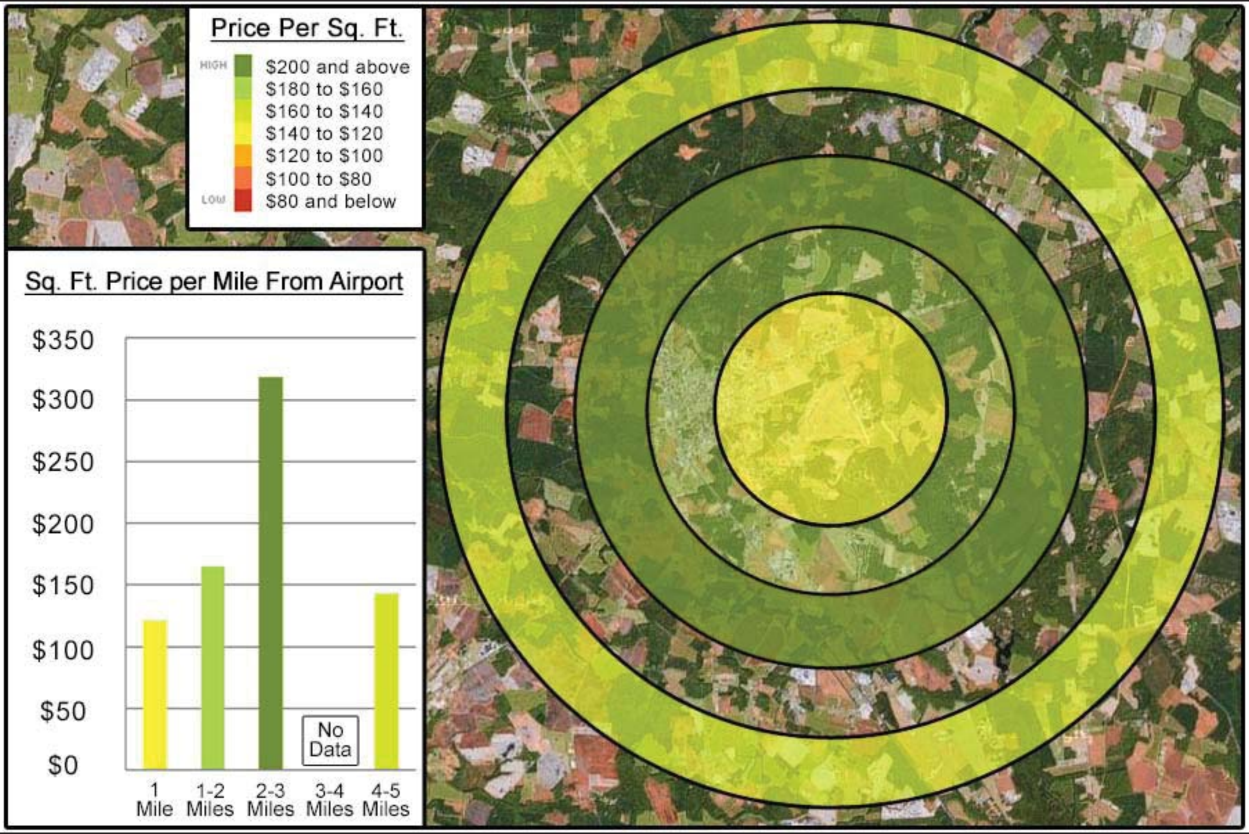


Table 6-15 - Commercial Real Estate Surrounding Sussex County Airport					
	1 Mile	**1-2 Miles**	**2-3 Miles**	**3-4 Miles**	**4-5 Miles**
Properties by Segment					
Industrial (31)	20	4	2	1	4
Office (57)	22	23	4	0	8
Retail (36)	15	13	5	0	3
Total (124)	***57***	***40***	***11***	***1***	***15***
Average Price Per Sq. Ft.					
Industrial	$100	NA	$130	NA	NA
Office	$122	$137	$499	NA	$125
Retail	$149	$215	$249	NA	$194
Total Weighted Average	***$121***	***$165***	***$318***	***NA***	***$143***

Summit Airport

Due to lack of information, little can be concluded about the commercial property surrounding Summit Airport. While research findings indicate that there are retail properties adjacent to the airport, there was no pricing information readily available. Most of the properties in the study area were located in the 4-5 mile segment, which passed directly through the business center of Middletown. Because of the airport's location and lack of sufficient data, no conclusions could be made about the direct effect of Summit Airport on nearby commercial real estate. Figure 6-4 presents a geographical summary of average property values surrounding Summit Airport, while Table 6-16 shows the breakdown of properties and costs by geographic location.

Figure 6-4 - Commercial Real Estate Surrounding Summit Airport

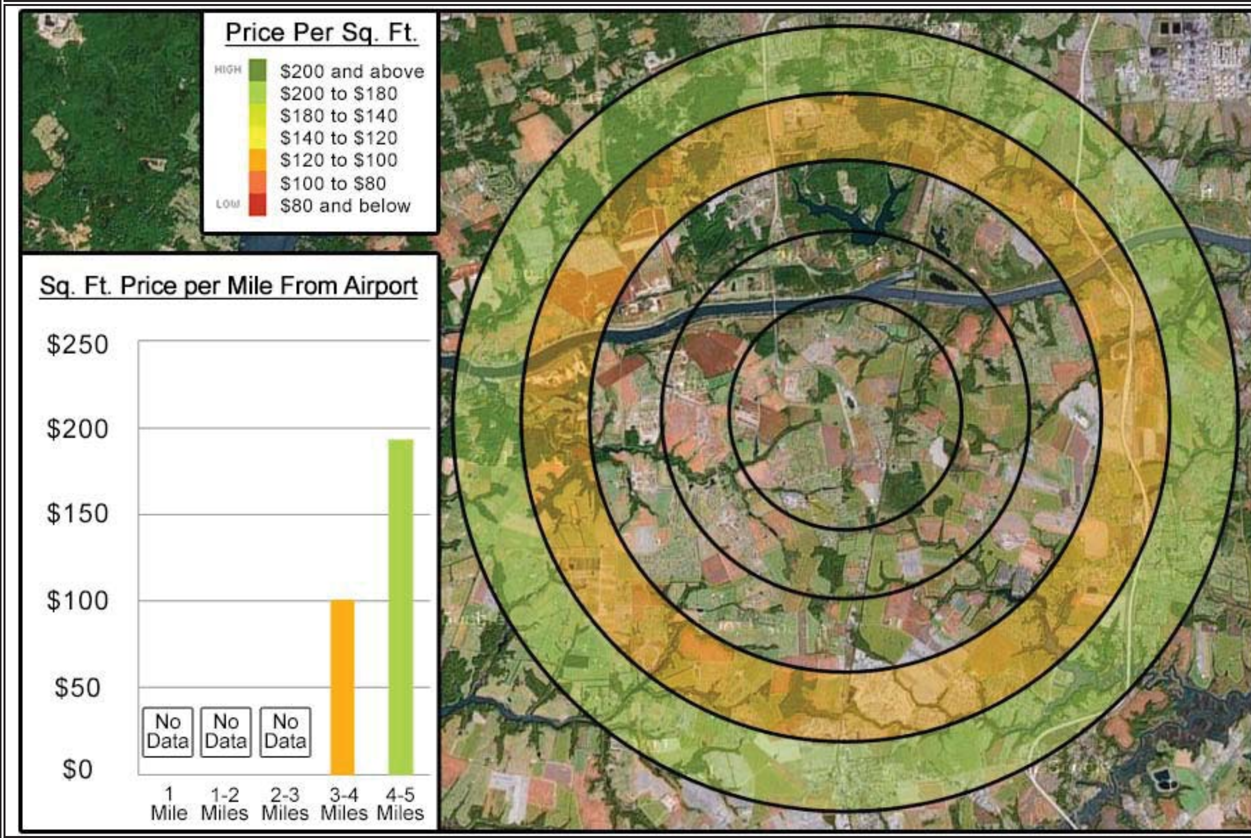


Table 6-16 - Commercial Real Estate Surrounding Summit Airport

	1 Mile	1-2 Miles	2-3 Miles	3-4 Miles	4-5 Miles
Properties by Segment					
Industrial (7)	0	0	0	2	5
Office (63)	0	0	16	13	34
Retail (89)	6	1	4	8	70
Total (159)	***6***	***1***	***20***	***21***	***104***
Average Price Per Sq. Ft.					
Industrial	NA	NA	NA	NA	NA
Office	NA	NA	NA	$111	$206
Retail	NA	NA	NA	$83	$160
Total Weighted Average	***NA***	***NA***	***NA***	***$100***	***$175***

Delaware Airpark

Figure 6-5 presents a geographical summary of average property values surrounding Delaware Airpark, while Table 6-17 shows the breakdown of properties and costs by geographic location.

Figure 6-5 - Commercial Real Estate Surrounding Delaware Airpark

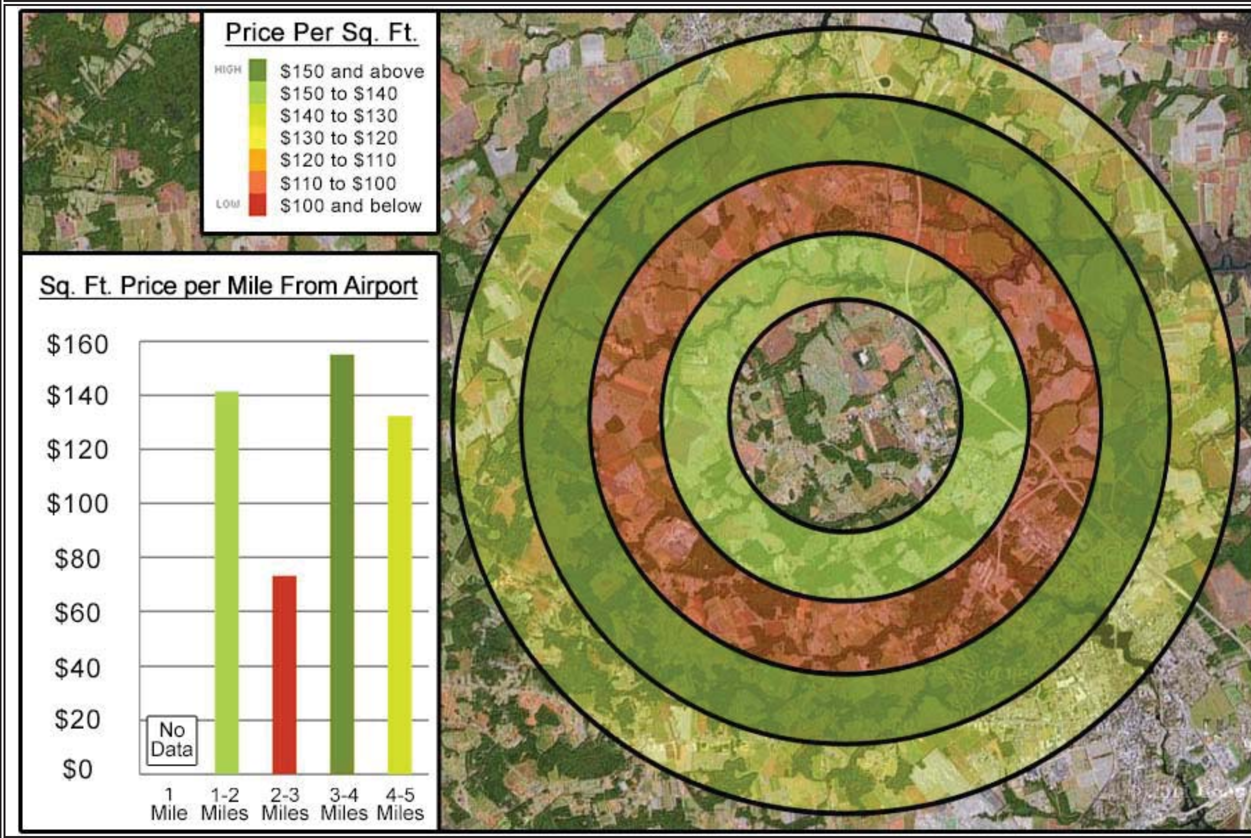


Table 6-17 - Commercial Real Estate Surrounding Delaware Airpark					
	1 Mile	1-2 Miles	2-3 Miles	3-4 Miles	4-5 Miles
Properties by Segment					
Industrial (46)	4	14	8	5	15
Office (106)	0	10	9	8	79
Retail (210)	4	38	25	30	113
Total (362)	***8***	***62***	***42***	***43***	***207***
Average Price Per Sq. Ft.					
Industrial	NA	$161	$45	$86	$122
Office	NA	NA	$171	NA	$89
Retail	NA	$134	$46	$167	$163
Total Weighted Average	***NA***	***$141***	***$73***	***$155***	***$132***

The one mile adjacent to the airport showed the lowest amount of commercial real estate with only eight properties. With this small sample size, no pricing information was available.

However, the 1-2 mile segment showed a significant number of industrial and retail establishments. The highest concentration of commercial real estate was within the 4-5 mile segment, with 207 properties. This result is primarily made up by properties in downtown Dover, and some within the town of Smyrna. It is difficult to compare these properties to commercial real estate nearby the airport, given its location in the town of Cheswold.

It is also important to note the proximity of Dover Air Force Base to the study area surrounding Delaware Airpark. Normally, commercial properties on the outermost segments of a study area represent properties not affected by airport noise. Unfortunately, the outermost segments in this case clearly overlap into geographical areas directly affected by Dover AFB. As a result, the study area encompassed properties from different towns near different airports. While 362 properties made up a useable sample size, the apples-to-oranges comparison was difficult to decipher with regard to airport-impacted land values.

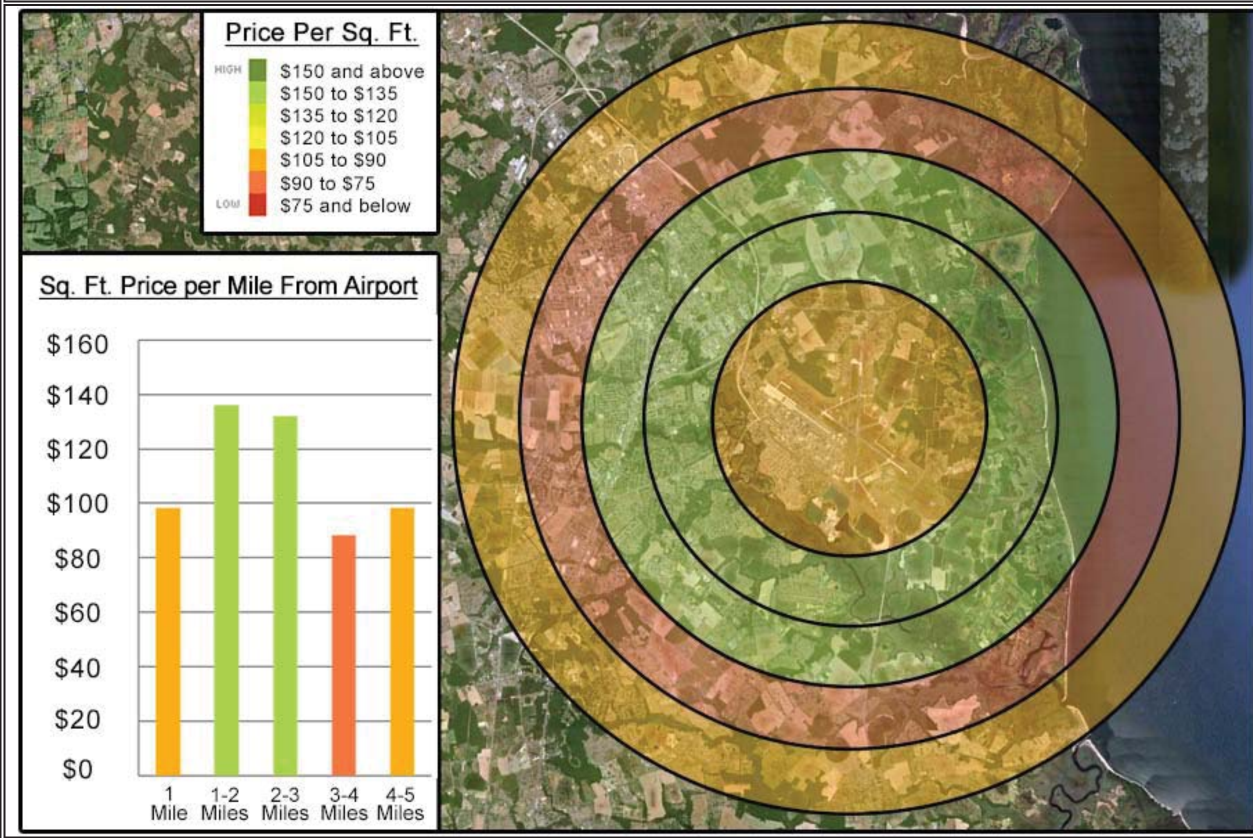
Civil Air Terminal at Dover Air Force Base

Figure 6-6 presents the graphic display of real estate values surrounding the Civil Air Terminal, while Table 6-18 lists the data used in developing the Figure. As previously mentioned, the study area for the Civil Air Terminal at Dover AFB overlaps with the study area surrounding Delaware Airpark. Not surprisingly, the commercial real estate data results varied across each study area segment. The highest values per square foot were found within the 1-2 mile and 2-3 mile segments, which covered the area through downtown Dover. In addition to this, these segments had the fewest amount of low value industrial properties, which considerably affected the averages of the other segments. The 2-3 mile segment showed the highest density of commercial properties, far outnumbering all other segments combined with 338 properties. These properties were primarily composed of office and retail spaces.

Table 6-18 - Commercial Real Estate Surrounding CAT

	1 Mile	1-2 Miles	2-3 Miles	3-4 Miles	4-5 Miles
Properties by Segment					
Industrial (65)	12	5	9	25	14
Office (309)	2	39	165	86	17
Retail (395)	20	69	164	110	32
Total (769)	***34***	***52***	***338***	***35***	***63***
Average Price Per Sq. Ft.					
Industrial	$45	NA	$63	$44	$64
Office	NA	$155	$129	$101	$121
Retail	$129	$126	$139	$88	$100
Total Weighted Average	***$98***	***$136***	***$132***	***$88***	***$98***

Figure 6-6 - Commercial Real Estate Surrounding the Civil Air Terminal



Summary and Findings for Commercial Real Estate

Though a lack of sufficient data was apparent at some airports, useful conclusions may be drawn from this analysis. The results from the New Castle Airport study area proved to have the clearest findings. From this data a great deal can be concluded about the airport's effect on commercial real estate. Significantly higher commercial property values closer to the airport indicate that in Wilmington, New Castle Airport has had a positive influence on commercial land prices.

Sussex County, with the lowest sample size of 124 properties, showed a much higher density of commercial real estate within one mile of the airport than all other segments in its study area. Delaware Airpark, with no pricing information within one mile of the airport had the second highest commercial real estate value in its study area within the 1-2 mile segment. While a lack of pricing information was available for commercial properties near Summit Airport, there is a thriving, high-end residential community surrounding the airport that warrants further study.

While there are many factors that contribute to commercial real estate prices, there does appear to be an overall positive trend with commercial real estate value and proximity to an airport. Some factors not considered in the above analysis included the number of operations at each airport, the size of each airport, and the actual level of noise generated by aviation activity. It is possible that airports with higher operational counts could have a greater positive influence on commercial real estate values. While these results concerning commercial real estate can be considered positive, additional research is needed to assess the effect of airports on surrounding residential properties.

5.3 Residential Property Values

In addition to commercial property values, it was determined that an examination of residential property values was needed. Thus, the residential property values surrounding the following ten aviation facilities were examined:

- New Castle Airport
- Sussex County Airport
- Summit Airport
- Delaware Airpark
- Civil Air Terminal at Dover AFB
- Chorman Airport
- Laurel Airport
- Chandelle Estates
- Smyrna Airport
- Jenkins Airport

Like commercial real estate, data was collected on property values directly surrounding the airport. Because of limitations regarding the collection of this data, a sampling method had to be utilized. A control group of properties similar in size and surroundings were examined within the 4-5 mile segment surrounding the airport.

As an illustration, determining the effect of an airport on properties adjacent to an airport would involve studying those same houses in a similar neighborhood without the airport present. To best replicate this process, the study compared the difference in price per square foot between properties adjacent to the airport and similar properties farther away. It was assumed that the variable of airport activity would be removed from the sample group farther away, and the difference (if any) in price per square foot would represent the effect of airport activity on property value.

Because the control group of houses should simulate the conditions next to the airport, it is of vital importance that samples be chosen carefully. For an airport surrounded by dense housing, it would be unreasonable for the control group to be made up of agricultural dwellings and vice versa. Rather, the sampling of real estate properties was made to select residential homes that had very similar characteristics at both the airport and control group locations. Land within a 4-5 mile radius from each airport was determined to be the boundary for the selection of control group properties. These properties are close enough to be within the same community without being directly affected by aircraft noise.

To research property values by geographical distance to Airports, the database at www.homes.com was used. The home valuation process for this resource combines tax assessment values with recent home sales data to produce market value estimates used for property evaluation. From this, an average price per square foot was determined for each set of selected properties. In total, 6,208 properties were examined for the residential analysis of Delaware public-use airports, with sample sizes varying by airport. New Castle had the largest sample size with 1,878 properties, and Chorman Airport had the smallest sample size with 110 properties. For each airport, two percent of the properties examined (representing the highest and lowest values) were removed when calculating final averages to exclude statistical outliers. It is also important to note that property values for apartments and condominiums were not taken into account for this study.

New Castle Airport

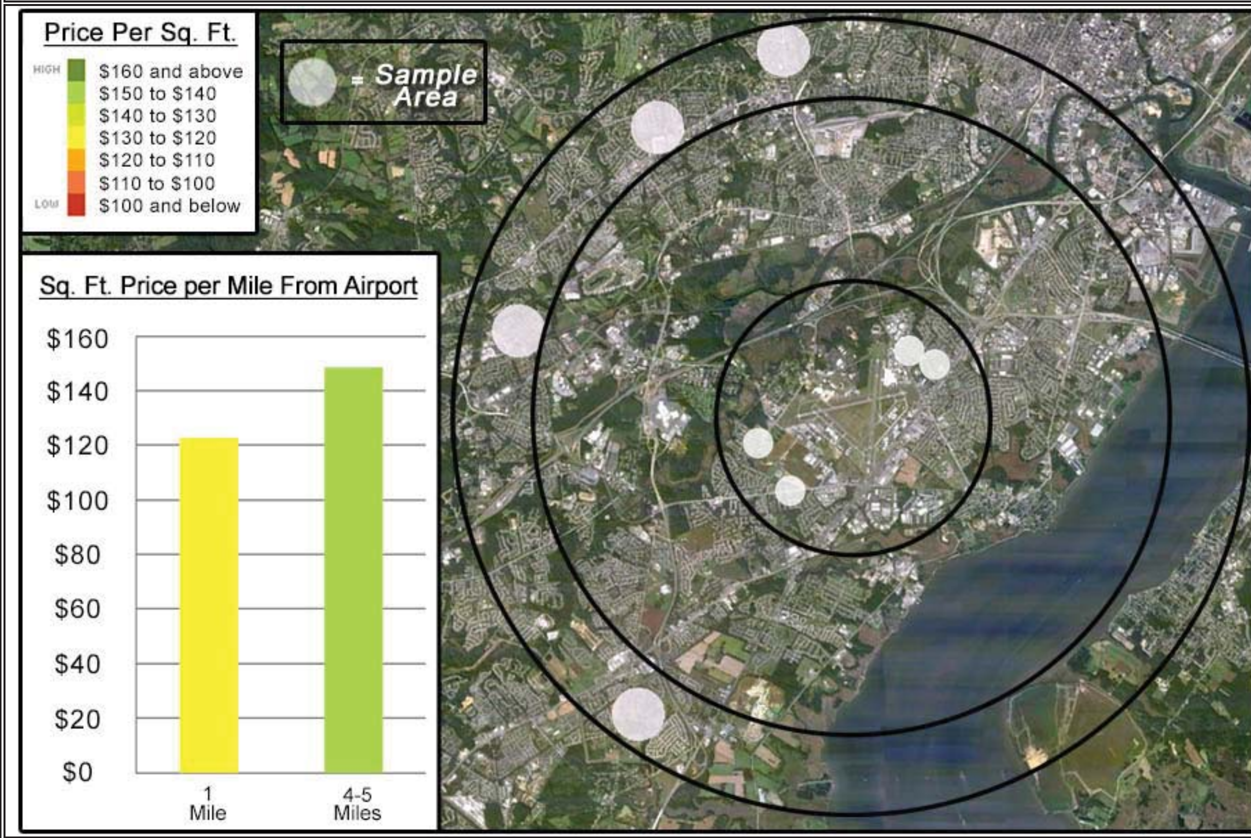
Figure 6-7 displays the sampling areas utilized for New Castle Airport. Because of the high density of residential properties within the study area, sample areas were selected to best represent average property values near the airport. In the 4-5 mile segment, properties were sampled that were similar in size and surroundings to those found within one mile of the airport to allow for property value comparison.

Table 6-19 shows the study results for New Castle Airport, with property values adjacent to the airport averaging 18 percent lower value per square foot than properties sampled within the 4-5 mile range. New Castle Airport contained the largest sample size of any other airport in this study, with 990 properties averaging $122 per square foot within one mile of the airport and 888 properties averaging $148 per square foot within 4-5 miles of the airport.

Table 6-19 - Residential Real Estate Surrounding New Castle Airport

	1 Mile Properties	4-5 Mile Properties	Price Difference (%)
Properties by Segment	990	888	
Average Price Per Sq. Ft.	**$122**	**$148**	**-18%**
Average Property Size	1,244 Sq. Ft.	1,396 Sq. Ft.	

Figure 6-7 - Residential Real Estate Surrounding New Castle Airport



Sussex County Airport

For Sussex County Airport, all residential properties within one mile were able to be examined due to the smaller amount of properties available. Figure 6-8 shows the sample areas utilized within the 4-5 mile segment that closely resemble residential properties adjacent to the airport.

As shown in Table 6-20, very little difference in property values were recorded between properties near the airport and those farther away. Within one mile of the airport, property values only averaged one percent lower than those within the 4-5 mile segment. This defies the conventional wisdom that all airports negatively affect residential real estate value. The sample size for Sussex County Airport analysis consisted of 278 properties. Within one mile of the airport the average price per square foot was $121, while similar properties not affected by the airport averaged $122 per square foot.

Figure 6-8 - Residential Real Estate Surrounding Sussex County Airport

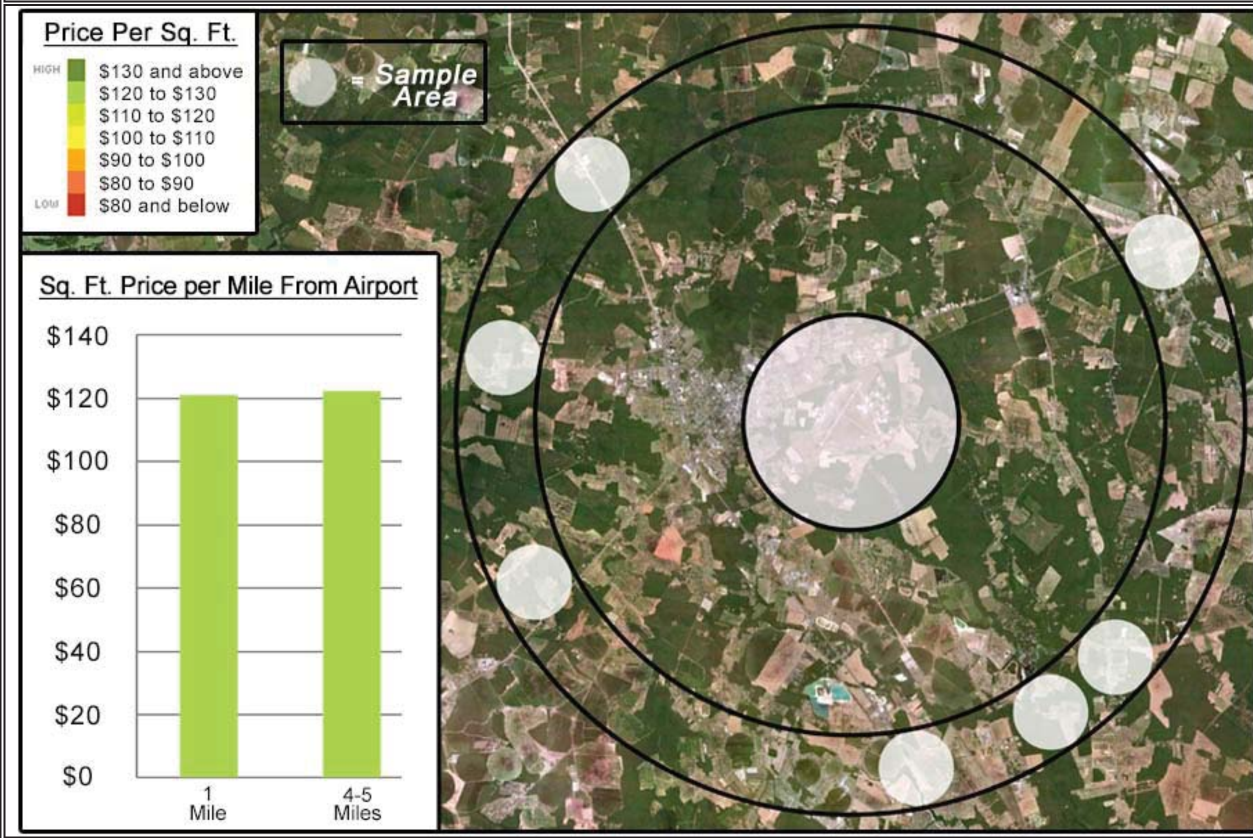
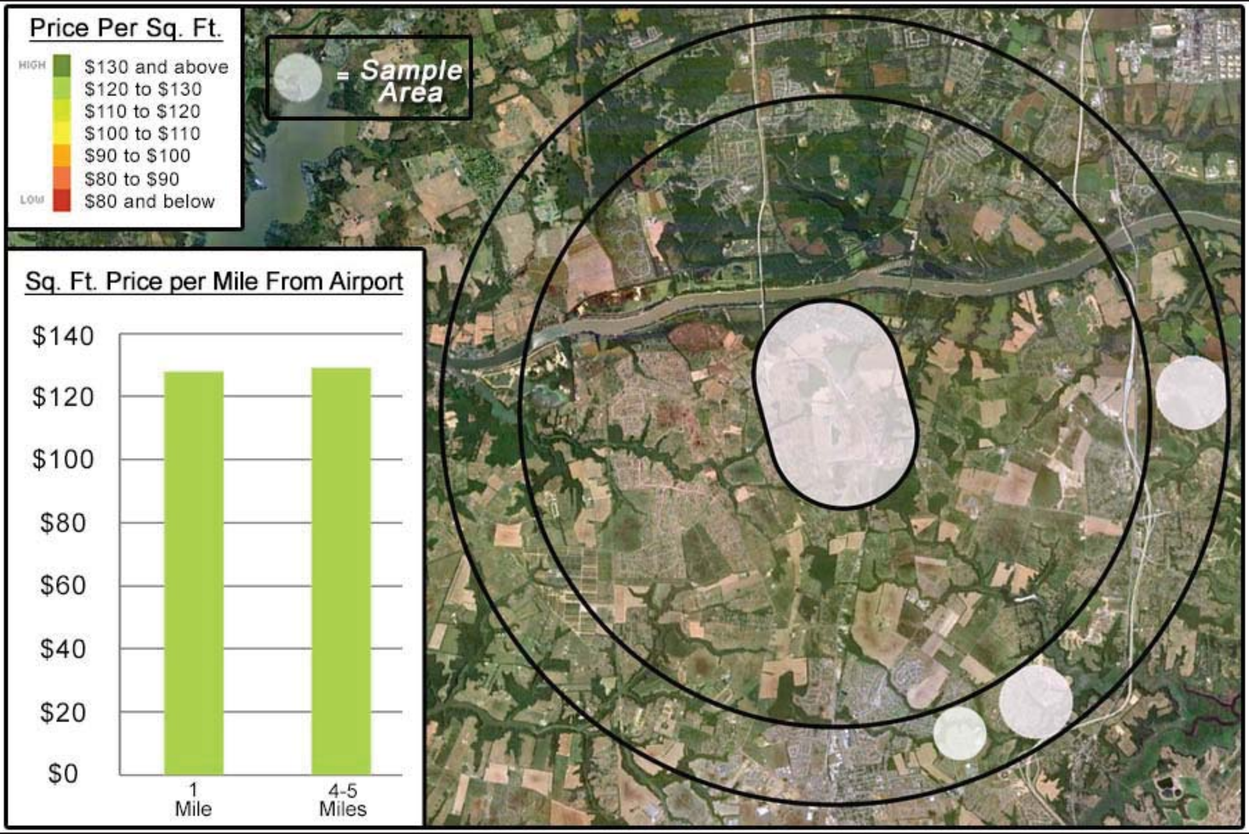


Table 6-20 - Residential Real Estate Surrounding Sussex County			
	1 Mile Properties	**4-5 Mile Properties**	**Price Difference (%)**
Properties by Segment	174	104	
Average Price Per Sq. Ft.	**$121**	**$122**	**-1%**
Average Property Size	1,841 Sq. Ft.	1,872 Sq. Ft.	

Summit Airport

Because the study area is defined as properties within one mile of airport runways and Summit Airport consists of only one main runway, the shape of the study area adjacent to the airport differs from other airports examined. While not perfectly circular, the study area accurately covers all properties within one mile of Summit's main runway. Figure 6-9 shows this study area, as well as the sample areas within the 4-5 mile segment that replicate the housing environment adjacent to the airport.

Figure 6-9 - Residential Real Estate Surrounding Summit Airport



The residences immediately surrounding Summit Airport were the largest of any airport in the study, averaging 2,547 square feet within one mile of the airport. These high end residential properties were compared to other large residences outside of direct airport influence. As shown, the overall price difference of one dollar per square foot does not indicate that Summit Airport is negatively affecting properties near the airport.

Table 6-21 - Residential Real Estate Surrounding Summit Airport

	1 Mile Properties	4-5 Mile Properties	Price Difference (%)
Properties by Segment	372	421	
Average Price Per Sq. Ft.	**$128**	**$129**	**-1%**
Average Property Size	2,547 Sq. Ft.	2,490 Sq. Ft.	

Delaware Airpark

Figure 6-10 shows the sample areas used to represent the average residential property values surrounding Delaware Airpark. The data collected show little difference between properties within a one mile radius of the airport and similar samples outside away from any airport influence; averaging $109 per square foot within one mile of the airport, and $110 per square foot within 4-5 miles of the airport.

Figure 6-10 - Residential Real Estate Surrounding Delaware Airpark

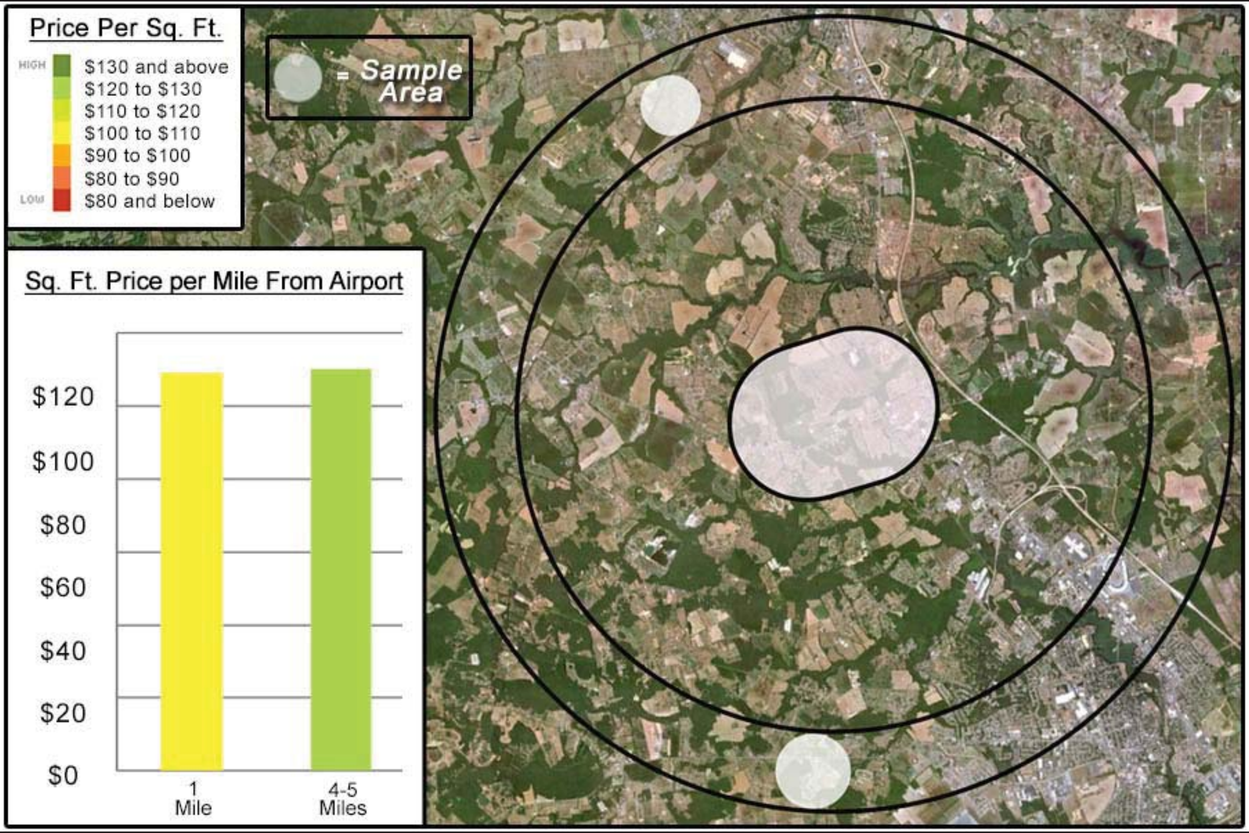
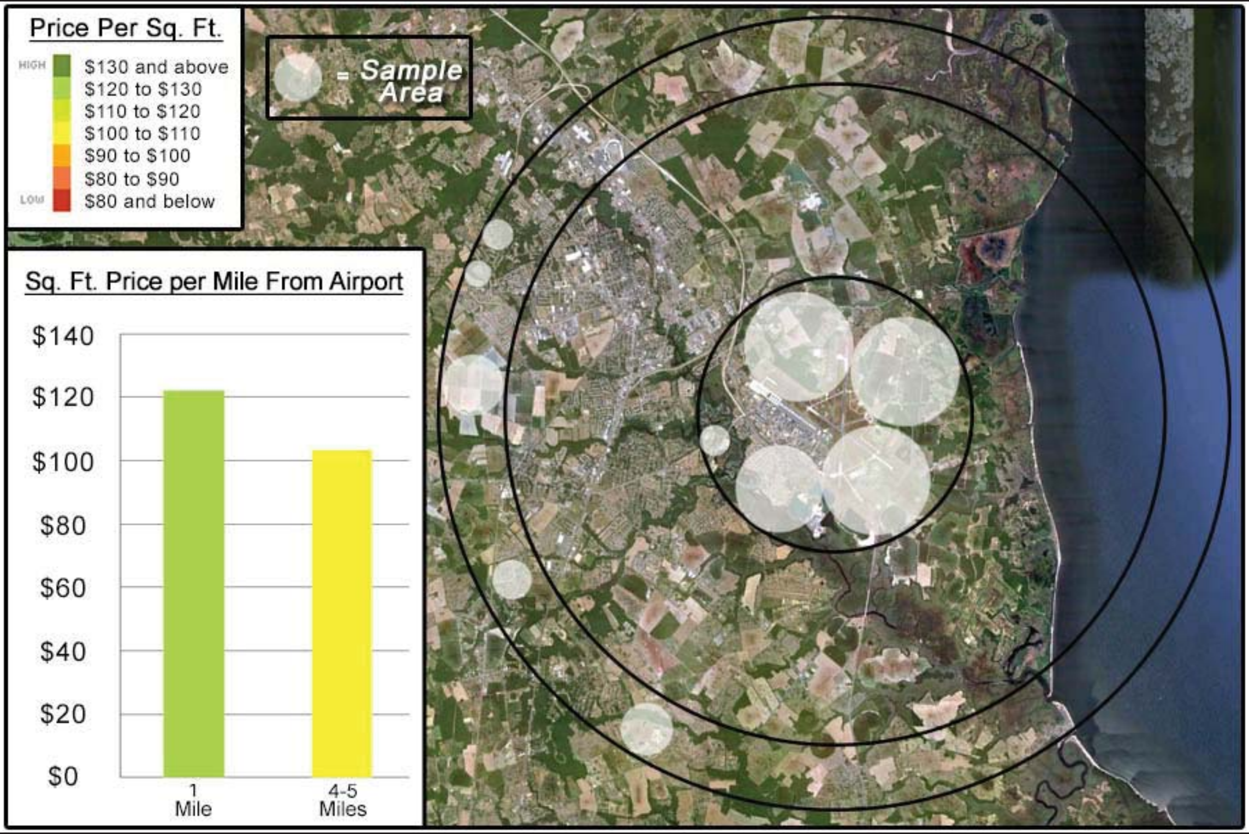


Table 6-22 - Residential Real Estate Surrounding Delaware Airpark			
	1 Mile Properties	**4-5 Mile Properties**	**Price Difference (%)**
Properties by Segment	297	320	
Average Price Per Sq. Ft.	**$109**	**$110**	**-1%**
Average Property Size	1,983 Sq. Ft.	1,954 Sq. Ft.	

Civil Air Terminal at Dover Air Force Base

Data collected surrounding the Civil Air Terminal at Dover Air Force Base was the most surprising of any airport in this study, with residential property values averaging 19 percent higher within one mile of the airport compared to samples taken within a 4-5 mile radius of the airport.

Figure 6-11 - Residential Real Estate Surrounding CAT



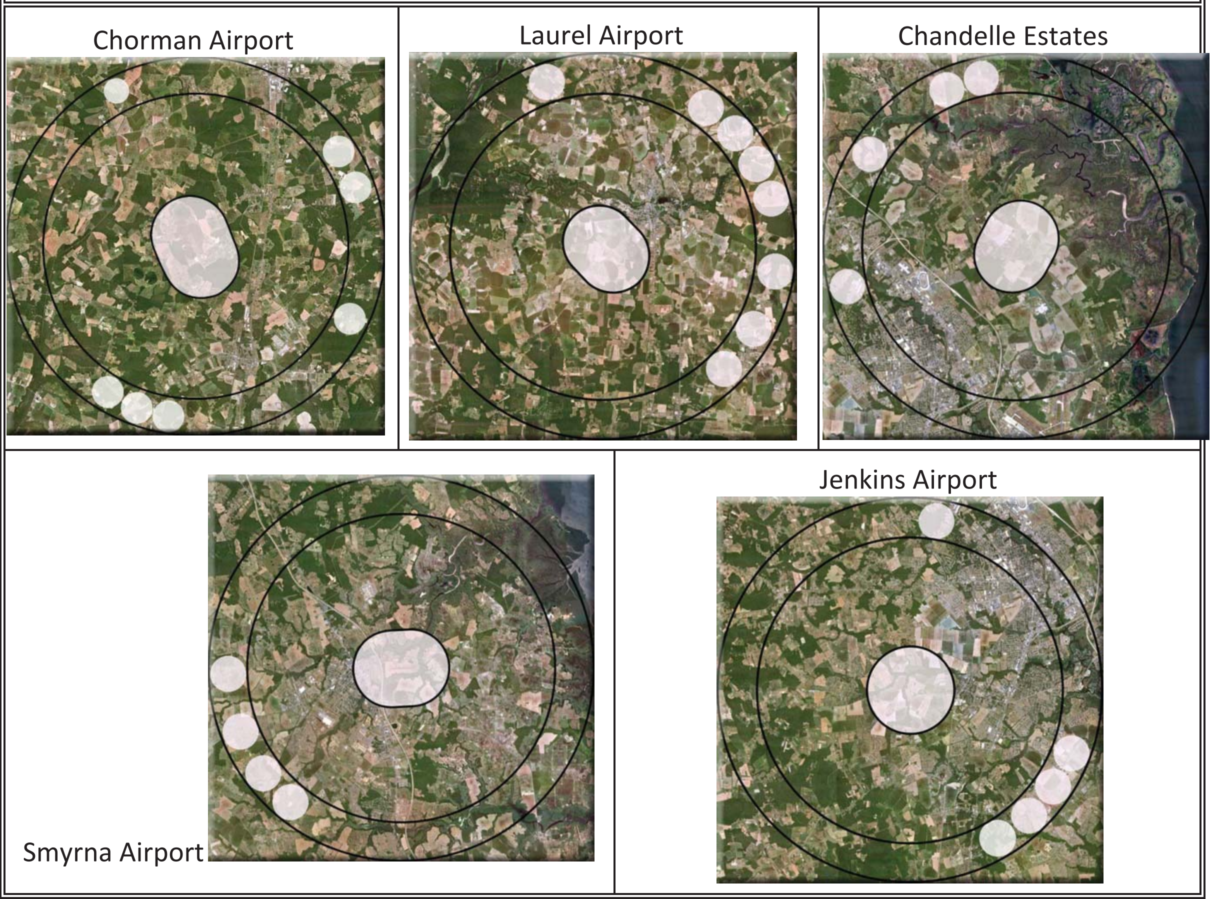
As shown in Table 6-23, the average price per square foot within one mile of the Civil Air Terminal was $122. This was $19 more per square foot than similar properties within a 4-5 mile radius of the airport which had an average value of $103 per square foot. With a total of 810 properties examined, CAT had the second largest sample size of any airport in the study.

Table 6-23 - Residential Real Estate Surrounding CAT			
	1 Mile Properties	4-5 Mile Properties	Price Difference (%)
Properties by Segment	211	599	
Average Price Per Sq. Ft.	**$122**	**$103**	**19%**
Average Property Size	1,999 Sq. Ft.	2,056 Sq. Ft.	

Other Public Use Airports

For this study, other public use airports included in the residential analysis included Chorman, Laurel, Chandelle Estates, Smyrna, and Jenkins Airport. These airports were not included in the commercial real estate portion of this report based upon the absence of commercial real estate near the airports due to location outside major commercial centers. Figure 6-12 displays the sample areas utilized in the data collection for these airports, and Table 6-24 lists the numbered results.

Figure 6-12 - Other Public Use Airport Residential Property Sample Areas



Of the airports examined, Chorman Airport displayed the highest positive effect on residential real estate, with properties within one mile of the airport displaying 10 percent higher value per square foot than similar properties examined 4-5 miles from the airport. The other airport's displayed little to no effect on property values, with Chandelle Estates recording the second highest positive influence at six percent higher value, and Jenkins Airport recording the only negative effect of -1 percent value. These findings are not unexpected, as low operation counts on these airports provide low noise impacts on surrounding properties compared to the NPIAS airports in this study.

Table 6-24 - Residential Real Estate Surrounding Other Public Use Airports

	1 Mile Properties	4-5 Mile Properties	Price Difference (%)
Chorman Airport			
Sample Size	47	63	
Average Price Per Sq. Ft.	**$122**	**$111**	**10%**
Average Property Size	1,913 Sq. Ft.	1,954 Sq. Ft.	
Laurel Airport			

Table 6-24 - Residential Real Estate Surrounding Other Public Use Airports			
	1 Mile Properties	4-5 Mile Properties	Price Difference (%)
Sample Size	45	155	
Average Price Per Sq. Ft.	**$108**	**$106**	**1%**
Average Property Size	2,061 Sq. Ft.	1,903 Sq. Ft.	
Chandelle Estates			
Sample Size	120	192	
Average Price Per Sq. Ft.	**$103**	**$97**	**6%**
Average Property Size	1,632 Sq. Ft.	1,841 Sq. Ft.	
Smyrna Airport			
Sample Size	244	318	
Average Price Per Sq. Ft.	**$116**	**$115**	**1%**
Average Property Size	1,331 Sq. Ft.	2,101 Sq. Ft.	
Jenkins Airport			
Sample Size	198	450	
Average Price Per Sq. Ft.	**$105**	**$107**	**-1%**
Average Property Size	1,765 Sq. Ft.	1,908 Sq. Ft.	

Summary and Findings for Residential Real Estate

While some airports demonstrated negative effecting residential real estate, it can be concluded that this is not a blanket rule that can be applied to any airport. In fact, only one airport demonstrated negatively affecting adjacent residential property values while seven airports displayed no tangible effect, and two airports demonstrated positively affecting property values. However, to understand the full story, both residential and commercial property values must be examined. For example, New Castle Airport showed a negative impact on residential property values, but a very high positive impact on commercial property values. The alternative ranking process attempts to combine the scores of these various land uses to determine which option is best.

5.4 Alternative Ranking Process

In order to rank alternatives with respect to the environmental and land use compatibility factors described in this analysis, a method was developed that gave higher rankings to the alternative that resulted in the highest overall land values. Because both commercial and residential land values near airports were examined, there were some mixed results at specific airports. For example, New Castle Airport showed average commercial property values that were almost 88 percent higher near the airport than similar properties between four and five miles away. Conversely, residential property values were 18 percent higher away from the airport relative to those nearby.

Key factors in ranking the alternatives involved the number of airports in each alternative and the cumulative effect of aircraft activity on land values. In this regard, Alternative 2 –

Contracted System of Airports, has the fewest airports, but the greatest concentration of aircraft activity at each of those airports. Alternative 1 – Baseline Alternative has the greatest number of airports, but the widest dispersion of aircraft operations. Thus, the ranking of alternatives had to consider these factors, along with the actual impact of each airport on its immediate area land values. Table 6-25 presents a summary of the ranking process.

Table 6-25 – Ranking of Alternatives

Airport	**Alt 1**		**Alt. 2**		**Alt. 3**	
	Commercial	Residential	Commercial	Residential	Commercial	Residential
Chandelle Estates	N/A	0.06	--	--	--	--
Chorman	N/A	0.1	--	--	N/A	0.1
Delaware Airpark	0.06	-0.01	0.06	-0.01	0.06	-0.01
Dover CAT	0	0.19	--	--	0	0.19
Jenkins	N/A	-0.01	--	--	--	--
Laurel	N/A	0.01	--	--	N/A	0.01
New Castle Airport	0.87	-0.18	0.87	-0.18	0.87	-0.18
Smyrna	N/A	0.01	--	--	--	--
Summit	N/A	-0.01	N/A	-0.01	N/A	-0.01
Sussex County	-0.18	-0.01	-0.18	-0.01	-0.18	-0.01
Totals	0.75	0.15	0.75	-0.21	0.75	0.09
Average	**0.90**		**0.54**		**0.84**	

As shown, the percentage difference between airport-impacted and non-airport-impacted property values was included for both types of land use. From this table, it can be shown that the existing system averages slightly better than Alternative 3, primarily because of the good influence of the smaller privately owned airports on property values. Alternative 2 is a distant third. Ranking from highest to lowest with regard to environmental and land use considerations would include the following:

- Alternative 1 – First
- Alternative 3 – Second
- Alternative 2 – Third (distant)

This scoring will be taken into account in selecting the preferred alternative in Chapter 7 of this report.

6. DEVELOPMENT COSTS FOR ALTERNATIVES

The evaluation of alternatives includes an examination of system wide costs in order to compare the resources needed to fund each concept. Once these differences are estimated, a comparison or ranking of alternatives with respect to cost can be made. All public-use airports (both publicly owned and privately owned) were included in the cost totals, since the costs are representative of the deficiencies as they currently exist and the funding required to correct those deficiencies.

The process used to estimate system costs involved two steps. First, a determination of applicable unit costs was made; then these costs were applied to the development proposed in each alternative system. Comparative cost estimates were prepared using the requirements for each airport in each alternative. A detailed description of unit costs is presented in Table 6-8. All unit cost estimates are in constant 2012 dollars. It should be noted that these costs estimates are averages and that specific costs will differ by airport. However, since each alternative uses that same unit cost estimates, total costs for each alternative will be comparative.

Table 6-8 - Unit Cost Estimates

ITEM	Unit	Price/Unit
Runway Paving – Asphalt (includes site prep)	Square Yard	$40-$117
Runway Paving – Concrete (includes site prep)	Square Yard	$135
Taxiway Paving – Asphalt	Square Yard	$40-$117
Runway & Taxiway Paving Overlay	Square Yard	$30-$35
Apron Paving – Asphalt	Square Yard	$135
Automotive Parking Space	Square Yard	$50
Terminal Building	Square Foot	$230
Conventional Hangar	Square Foot	$150
T-Hangars	Unit	$75,000
High-Intensity Runway Lighting	Linear Foot	$40
Medium-Intensity Runway Lighting	Linear Foot	$40
Low-Intensity Runway Lighting	Linear Foot	$40
Medium-Intensity Taxiway Lighting	Linear Foot	$40
PAPI	Each	$75,000
VASI	Each	$75,000
REILS	Each	$75,000
MALSR	Each	$1,000,000
Localizer	Each	$500,000
Glide Slope	Each	$1,500,000

Table 6-8 - Unit Cost Estimates		
ITEM	**Unit**	**Price/Unit**
Airport Rotating Beacon	Each	$15,000
Segmented Circle & Wind Sock	Each	$40,000
Wind Indicator	Each	$12,000
Weather Station	Each	$125,000

To estimate total costs, these unit costs were applied to the required number of units for each planning period. Table 6-9 presents a summary of costs by airport and alternative. Not included in these costs are the obstruction removal costs that were estimated as a part of Section 3 of this evaluation. Those costs are included in Table 6-10 in the totals comparison.

The comparison of airport development costs in each alternative shows that Alternative 2 is the least expensive and Alternative 3 is most expensive. However, this ranking accounts for spending at both public and privately owned airports. When the costs are broken down in a later chapter, the private sector funding will be separated from the total funding requirements. At that time, it will be shown that Alternative 2 is actually the most expensive option, relative to public funding.

Table 6-10 presents a summary of the total costs for each alternative, broken down by cost component. This table includes the airfield overlay costs and obstruction removal costs for each alternative. As such, this Table presents a full picture of the impacts of various development decisions at Delaware airports. The overall cost for these alternatives includes the following, by rank:

- Alternative 2 $89,389,600
- Alternative 1 $90,085,900
- Alternative 3 $96,556,400

From a cost perspective, the alternative rankings show that the addition of the obstruction costs to the other development costs brought Alternatives 1 and 3 closer together in total costs.

Table 6-9 - Development Costs by Alterinative

Airport	Alternative 1			Alternative 2			Alternative 3		
	Landside Costs	Airside Costs	**Total Costs**	Landside Costs	Airside Costs	**Total Costs**	Landside Costs	Airside Costs	**Total Costs**
Chandelle Estates	$856,500	$425,800	$1,282,300	-	-	-	-	-	-
Chorman Airport	$649,500	$776,700	$1,426,200	-	-	-	$649,500	$3,729,000	$4,378,500
Delaware Airpark	$6,562,500	$19,782,000	$26,344,500	$10,509,000	$25,643,800	$36,152,800	$4,987,500	$19,782,000	$24,769,500
DelDOT Helistop	$0	$0	$0	$0	$0	$0	$0	$0	$0
Dover AFB CAT	$9,694,000	$0	$9,694,000	-	-	-	$13,459,500	$0	$13,459,500
Jenkins Airport	$115,000	$150,000	$265,000	-	-	-	-	-	-
Laurel Airport	$0	$75,000	$75,000	-	-	-	$0	$75,000	$75,000
New Castle Airport	$1,336,500	$23,360,900	$24,697,400	$1,336,500	$23,360,900	$24,697,400	$1,336,500	23,360,900	$24,697,400
Smyrna Airport	$300,000	$0	$300,000	-	-	-	-	-	-
Summit Airport	$1,025,000	$1,625,200	$2,650,200	$1,025,000	$1,625,200	$2,650,200	$1,025,000	$2,798,300	$3,823,300
Sussex County Airport	$750,000	$11,388,800	$12,138,800	$2,625,000	$16,898,200	$19,673,200	$750,000	$16,898,200	$17,648,200
Total	$21,289,000	$57,272,400	**$78,873,400**	$15,495,500	$67,528,100	**$83,023,600**	$22,208,000	$66,643,400	**$88,851,400**

Table 6-10 - Total Costs By Alternative

Development Item	Alternative 1	Alternative 2	Alternative 3
Landside	$21,289,500	$15,495,500	$22,208,000
Airside	$57,272,400	$67,528,100	$66,643,400
Obstructions	$11,524,000	$6,366,000	$7,705,000
Total Costs	**$90,085,900**	**$89,389,600**	**$96,556,400**

7. IMPACT OF CONTINGENCIES

ALTERNATIVE 3 PRESENTS A NUMBER OF CONTINGENCIES that will have significant impacts on the Delaware Aviation System if they come to pass. Two of the contingencies mentioned will likely happen in each/all of the Alternatives. These involve the runway expansion at Sussex County and the loss of NPIAS funding at Summit. Other contingencies that are not likely to have a significant impact on the system involve the loss of some public-use airports to private use only. These airports are likely to be in Kent County and would include Chandelle Estates, Jenkins, and Smyrna. The other privately-owned, public-use airports are considered active enough and financially strong enough to continue as public-use facilities. Two of those airports are anticipated to develop runway improvements at some point within the planning horizon – Chorman Airport and Summit Airport.

Perhaps the greatest impact on the system is the possible Base Realignment And Closure (BRAC) process for Dover AFB. If the heavy lift mission of the Base is transferred to McGuire AFB in New Jersey, it will mean a significant loss of personnel, aircraft activity, and local economic impact. This loss would mean that only the mortuary and perhaps the hospital would remain active on the Base. Such a loss might mean a reduction of as much as 7,000 direct jobs, leaving about 800 base personnel and contractor jobs. Such a move would reduce the economic impact on the community from $528.2 million to roughly $60 million. In addition, the loss of indirect jobs (jobs created in Dover, Kent County, and Delaware because of the spending of Base employees) totaling almost 3,500.

In addition to the negative impact, there are several potential positive impacts associated with the BRAC of Dover AFB. The first would be the availability of the Base for full joint use by civilian aircraft. This possibility provides a number of cost offsets for future plans at Delaware Airpark, as well as the accommodation of airline service, air cargo service, and private aircraft storage at the Base. For this analysis, the following benefits of full joint use/civilian ownership of the Base were examined:

- Decreased need for expansion of Delaware Airpark (remains at 4,200 feet)
- Possible use of Base passenger terminal for potential airline service
- Use of the Base for civilian air cargo
  - Decreased need to restructure roadway access system to reach CAT with heavy trucks (can use main roads through Base)
- Use of the Base for Maintenance/Repair/Overhaul (MRO) of large aircraft
  - Decreased need to develop large hangar on CAT property for aircraft maintenance
- Redevelopment of some Base facilities
- Potential relocation of small GA aircraft from private-use airports to the Base

Each of these potential benefits is discussed below.

7.1 Decreased Need to Expand Delaware Airpark

If Dover AFB is opened to full, unrestricted joint use by general aviation aircraft, there is an impact on the need to further expand Delaware Airpark in the future. Assumptions in this scenario include the following:

- Any BRAC process or other means of taking Dover AFB to full, unrestricted joint use would not occur until 2015.
- Current expansion plans to take Delaware Airpark to 4,200 feet of runway length will remain intact and be implemented prior to 2015.
- Costs to be incurred for the expansion of Delaware Airpark that include the new 4,200-foot runway and associated property acquisition will not likely be avoided due to the timing of potential actions at Dover AFB. Because it is not likely that the joint-use status of Dover AFB will change before 2015, current plans in place for Delaware Airpark will, in all probability, move forward. Planned expenditures for the improvement at Delaware Airpark include approximately $17 million for the following:
    - Site Preparation
    - New Runway and Taxiway Development
    - New Access Road
    - Other Items: Obstruction Removal, Mitigation Construction, Perimeter Road

- While these costs can be considered "sunk" costs for purposes of this analysis, the potential full joint use of Dover AFB would eliminate the need to further expand Delaware Airpark. For example, in Alternative 2, the assumption of lack of joint use of Dover AFB would result in the need to provide business aviation access to Kent County, DE. Such access would involve the expansion of Delaware Airpark's future 4,200-foot runway to 5,500 feet. Additional land acquisition, runway extension construction costs, and other costs are estimated to total $7.5 million. This capital investment could be saved or even reinvested into general aviation facilities at Dover AFB if that facility were to gain full, unrestricted joint use.

7.2 Possible Airline Service

Dover AFB serves as an embarkation point for military service men and women traveling to and from theaters of U.S. operations. The current terminal building (436th Aerial Port Squadron Passenger Terminal) is capable of processing more than 100,000 passengers per year. Should the Base mission change through a BRAC process, the terminal building should be available for local airline service.

For several years, potential airline service has been courted in Dover. The most recent interest has been shown from Allegiant Airlines, which selected Dover as one of eight future expansion points in its route structure. By using the military terminal rather than developing a new terminal building at the Civil Air Terminal, additional capital investment dollars could be saved. As an initial temporary provision, the existing terminal building at the CAT was to be expanded via manufactured modules. Rental rates for these modular units were expected to cost $30,000 annually. Assuming successful airline service, a replacement terminal building would be constructed at some point in the future. Costs for such a building could run $2 million or more. Thus, long-term savings by using the 436th APS Passenger Terminal for civilian airline service could exceed $2 million.

Figure 6-23 - 436th APS Passenger Terminal at Dover AFB

7.3 Civilian Air Cargo

A third potential use for the full and unrestricted joint use of Dover AFB would be the development of a civilian air cargo hub. Discussions with current civilian cargo airlines that provide supplemental cargo air lift for the military indicated that some would be interested in using the CAT. Currently, more than 10 percent of all domestic air freight travels through JFK International. For companies such as Evergreen Airlines International, much of their civilian freight travels through New York or Miami. An air cargo hub or freight forwarding location in the mid-Atlantic region would aid in faster distribution to the geographic center of the East Coast via trucking versus trucking from JFK or Miami International.

If the existing Dover AFB air cargo infrastructure was available for civilian use, no new facilities would be needed at the CAT to support freight forwarding activities. This could save millions of dollars in the development of ramp space and freight transloading facilities. In addition, the main roadways into and out of the Base could be used for truck traffic rather than Horsepond Road. Together, savings on the upgrading of Horsepond Road access and development of a civilian air cargo facility could total over $25 million, depending upon when a potential BRAC was announced. That is, if the BRAC is announced before development of reinforced ramp space at the CAT, a total of up to $17 million could be saved on pavement reconstruction costs. If the announcement comes after the potential improvement of the CAT, that capital investment would be considered sunk costs.

If there was not a BRAC of the Base mission, then the civilian air cargo operation could still occur, but it would be limited to the expanded CAT property. Under these circumstances, the improvement in roadway access (Horsepond Road), the strengthening of the CAT ramp, and the development of an air cargo facility on non-Base property would be necessary. Thus, without a BRAC there would be no civilian savings for the potential air cargo activity.

7.4 MRO Facilities

A fourth potential benefit resulting from a BRAC of the Dover AFB heavy lift mission would be the potential development of Maintenance/Repair/Overhaul facilities for large aircraft. One or more of the large military hangars would be ideal for maintenance and refurbishment activities. In fact, PATS in Georgetown, DE once considered the development of MRO facilities at the CAT. While there were numerous reasons why that never occurred, the fact that a significant operator considered the location gives rise to a belief that other operators may desire such a location – particularly if facilities were already in place. Of significance is the fact that the Base has 12,900 feet of runway – enough for the largest aircraft in the world's fleet. All apron areas are capable of the load bearing requirements for B-747 and larger aircraft. Thus, operationally and logistically the Base can accommodate very large aircraft for MRO activities. While there are no current plans to develop civilian MRO facilities at the CAT, the air cargo airlines have indicated that they would like a large hangar to perform maintenance work on their aircraft while at the CAT. Such a facility was previously estimated to cost about $8 million. If available for use at the Base, this facility would provide an opportunity for the air cargo airlines or any private MRO operator to perform heavy maintenance.

7.5 Redevelopment of Base Facilities

In every BRAC, there are redevelopment activities where the local community strives to integrate the former military facilities into civilian use. Sometimes this results in the expansion of the inventory of community housing facilities, new industrial locations, additional warehousing space, and aviation-related development. For Dover AFB, all of these options are available if there is a significant BRAC. With any BRAC, there is funding available for redevelopment from the military, which would include the establishment of a temporary redevelopment organization. This entity would work with local economic development organizations to infill Base infrastructure with tenants.

In Kent County, the Kent Economic Partnership is a not-for-profit economic development organization that oversees the Kent County Aero Park. In addition, the Partnership is involved in economic development activities within the County such as recruitment of industrial and commercial companies to the area. This organization, along with the Delaware Economic Development Office (DEDO), DelDOT, DRBA, the City of Dover, and other key stakeholders would be involved in any redevelopment efforts.

7.6 Attraction of GA Based Aircraft

Under full and unrestricted joint use, general aviation based aircraft would be permitted at the Base. This condition would not require a BRAC, but would require a revised joint-use agreement. Based aircraft could locate at the CAT, or in the case of a BRAC, they could locate on the Base. It is a little known fact that general aviation aircraft are currently based at Dover AFB. These belong to a flying club of military pilots. At one point there were more than 20 of these aircraft located on the Base. Currently, there are only about 10 such based aircraft. Without the military mission and its pilots, it is likely that these aircraft would not remain at the Base after a BRAC.

The aviation system planning analysis estimated that the Base would attract 21 general aviation based aircraft from surrounding airports. This estimate was coupled with the assumptions that Chandelle Estates would revert to private use and that five previously forecast business jets at Delaware Airpark would actually locate at Dover AFB if it were available for unrestricted joint use. It should be remembered that Delaware Airpark will not expand to accommodate larger business jet aircraft if Dover AFB is available for full joint use.

7.7 Summary

In summary, it can be concluded that there are significant economic implications to either full joint use of Dover AFB or a BRAC of the facility. These implications are slightly different for each option. Under unrestricted joint use, it is assumed that the Air Force continues to operate the Base and that civilian aircraft cannot be housed on AFB property. In this regard, it is assumed that all general aviation based aircraft, airline operations, air cargo operations, etc., must occur on the CAT if there is no BRAC. If a BRAC creates the unrestricted joint use condition, then many of the former military facilities would be available for redevelopment and reuse.

The economic differences associated with unrestricted joint use of Dover AFB are summarized as follows:

Joint Use – No BRAC	**Savings**
▶ No Expansion of Delaware Airpark Beyond 4,200 Feet:	$7,500,000
▶ Airline Terminal at CAT:	($2,140,000)
▶ Civilian Air Cargo at CAT:	($25,000,000)
▶ MRO Facilities at CAT:	($8,000,000)
▶ Redevelopment of Base Facilities:	N/A
▶ Attraction of GA Based Aircraft:	N/A
▶ TOTAL	($27,640,000)

Joint Use – BRAC	**Savings**
▶ No Expansion of Delaware Airpark Beyond 4,200 Feet:	$7,500,000
▶ Airline Terminal at CAT:	$2,140,000
▶ Civilian Air Cargo at CAT:	$25,000,000
▶ MRO Facilities at CAT:	$8,000,000
▶ Redevelopment of Base Facilities:	N/A
▶ Attraction of GA Based Aircraft:	N/A
▶ TOTAL	$42,640,000

The above comparison indicates that if there is full joint use of Dover AFB without a BRAC, then only minor savings can occur – this involves an estimated $7.5 million in future expansion costs for Delaware Airpark. "Non-savings" of $35.14 million would be incurred through the development of the CAT to meet potential airline, air cargo, and MRO functions.

On the other hand, if a BRAC occurs at Dover AFB which provides civilian use of Base facilities a total of $42.64 million in savings could occur by using these facilities rather than constructing them either at Delaware Airpark or the CAT. It should be noted, that only $9.64 million in savings would be available to the public sector, since the civilian air cargo and MRO facilities ($33 million in costs) would be developed using private funding. Thus, from a public funding standpoint, there is only $2.14 million in potential savings between the full joint use without a BRAC and full joint use with a BRAC.

Not included in this analysis is the potential revenue and economic activity that may occur through the redevelopment of Base facilities. In many communities where a military base has undergone a BRAC, this redevelopment activity and associated economic returns are significant. Also not included in the comparison was the potential loss of economic impact from the Base that can amount to hundreds of millions of dollars. Thus, the above comparison is simply a simple analysis of how to make the best of a bad situation. Under all scenarios, the BRAC of the Base would result in negative economic consequences for an extended period of time.

Chapter 7:
Recommended Aviation System Plan

Recommended Aviation System Plan

THE RECOMMENDED AVIATION SYSTEM WAS FORMALIZED BY describing each airport's location, physical facilities, role, timing of development, and cost. This chapter is organized to include the following sections:

- Selection of Preferred Alternative
- Description of Recommended Aviation System
- Summary

The process of selecting the recommended system along with the system's attributes are described below.

1. SELECTION OF PREFERRED ALTERNATIVE

The selection of a preferred alternative aviation system had to consider the original goals and objectives of the system plan, the inherent scoring of each alternative against each other alternative, and a number of judgmental factors.

1.1 Study Objectives

From the Phase 1 portion of the analysis, the overall goal of the Delaware Department of Transportation, Office of Aeronautics with regard to aviation can be stated as follows:

- *To enhance Delaware's economic development by fostering and promoting a safe and efficient aviation system for the movement of goods, services, and people and to encourage and promote aviation and aviation safety. Objectives that support this goal include, but are not limited to the following:*
  - *To facilitate the timely development of airports that will meet the air transportation needs and economic goals of the State.*
  - *To ensure that a system of airports is developed that provides a high degree of safety to the users, while at the same time provides adequate levels of service and facilities throughout the State.*
  - *To maximize the economic benefits and sustainability of the aviation system.*
  - *To minimize the airport system's environmental impact.*
  - *Participate in the process of determining the appropriate role for each Delaware airport and in the provision of a portion of the financial assistance for this development.*

- *Make available to the flying public current and accurate information regarding Delaware's aviation system.*

In order to select the recommended plan, the objectives from the various system planning goals were consulted. Table 7-1 presents a summary of the objectives within each system planning goal. Two columns on the right side of the table indicate whether or not the objective was completed as a part of the system planning effort and whether or not the objective was used as a decision factor in selecting the recommended plan.

Table 7-1 – Role of System Plan Objectives in Selection Process

System Plan Goals/Individual Objectives	Completed?	Decision Factor
Aviation System		
1. To collect all relevant data necessary to develop a system of airports and facilities that maximizes their use.	Yes	No
2. To forecast aviation demand for the State's airports through the year 2030, adequately assessing airline, general aviation, cargo, military aviation operations, and surface access needs.	Yes	Yes
3. To monitor airport operations at non-towered airports.	Yes	No
4. To quantify existing capacity of airport airside and landside facilities for use in Phase II alternative development scenarios.	Yes	Yes
5. To evaluate the role of privately owned or non-NPIAS airports and make recommendations regarding possible preservation or development of these facilities for the long term to satisfy operational demands and service area voids.	Yes	Yes
6. To evaluate the application of multi-modal linkages to system airports.	Yes	Yes
7. To develop a plan with enough flexibility to be implemented even when certain recommendations cannot be executed.	Yes	Yes
8. To adequately assess and plan for airport security for the State's aviation system.	Yes	No
Economic Sustainability and Development		
1. Consider the economic and financial viability of the State's aviation system and plan for potential future shortfalls in capital funding sources.	No*	No
2. Assist in the funding of revenue-producing infrastructure and other infrastructure related to retention of existing clients and economic development.	No*	No
3. Seek a developmental balance of publicly and privately-owned airports in the State, while maintaining the public's access to safe, adequate facilities.	Yes	Yes
4. Disseminate information to airports on green technology improvement recommendations.	No*	Yes
5. Maximize Federal financial participation in the development of the aviation system.	No*	Yes
6. Encourage financial self-sufficiency for airports within the aviation system by enacting policies favorable to aviation businesses and aircraft ownership.	No*	No
7. Incorporate Airport Community Value metrics into the priority ranking of recommendations resulting from the SASPU.	No*	No
8. Assist airport sponsors in developing strategic airport business plans as a part of the statewide aviation system planning efforts.	No**	No

Table 7-1 – Role of System Plan Objectives in Selection Process		
System Plan Goals/Individual Objectives	**Completed?**	**Decision Factor**
Environmental		
1. Minimize potential environmental impacts identified in FAA Order 5050.4B with special attention to minimizing residential dislocation, mitigating noise impacts, minimizing air and water pollution, protecting wildlife, and preserving cultural resources.	Yes/Partial	Yes
2. Develop future recommendations that are compatible with existing land use plans and desired land uses and that reduce objectionable effects of aviation facilities on non-compatible areas, to the extent possible.	Yes	Yes
3. Plan for an energy-efficient system of airports that provides ease of air and ground access.	No*	Yes
4. Promulgate information concerning environmentally "green" methods of undertaking infrastructure development projects.	No*	No
Social		
1. Plan for the orderly and timely development of the aviation system, maximizing services provided to the system users while minimizing community disruption.	Yes	Yes
2. Integrate airport and airport-related developments with other local community, county, and State development plans and policies along with those proposed by individual airport sponsors and other agencies such as the Wilmington Area Planning Council (WILMAPCO) and the Delaware Valley Regional Planning Commission (DVRPC).	Yes	Yes
3. Ensure the safety of each airport as well as the safety of the entire integrated aviation system.	No**	No
4. Work toward the development of an aviation system that benefits the maximum number of air travelers and job holders, while conserving economic and natural resources to the greatest extent practical.	Yes	Yes

* To be completed in Financial & Implementation Plan
** Not included in work scope

1.2 Alternative Evaluation Scoring

The scoring for each alternative was based, in part, on the list of objectives shown above. In each case where a decision factor is marked "Yes," that factor was considered in the evaluation process. In some cases, the impact of the objective is indirect, such as the objective to forecast aviation demand through the year 2030. The forecast was used in allocating demand to each alternative and was important in assessing future impacts. However, that was an indirect input to the decision process.

From Chapter 6, there were six evaluation criteria, including:

- Ability to Serve Forecast Demand
- Impact of Airspace Obstructions
- Impact on Surface Transportation System
- Environmental & Land Use Compatibility

- Development Costs
- Impact of Contingencies

In this section, a summary of the scoring is presented in matrix format. It should be noted that for some of the Contingencies, the matrix format could not display the entire decision process. For those items, the evaluation process and its resulting conclusions are described. Table 7-2 presents a summary of the scoring process.

Table 7-2 – Alternative Scoring Process

Criteria	Alternative 1	Alternative 2	Alternative 3	Preferred Alternative
Serve Forecast Demand				
Airside Facilities	1	3	2	Alt. 1
Landside Facilities	2	3	1	Alt. 3
Airspace Obstructions				
Removal Needs	3	1	2	Alt. 2
Surface Transportation				
Infrastructure Improvements	2	3	1	Alt. 3
Environmental & Land Use				
Least Impact to Land Values	1	3	2	Alt. 1
Development Costs				
Least Cost	2	1	3	Alt. 2
Impact of Contingencies				
High/Medium/Low	3	2	1	Alt. 3
Sum of Scores	**14**	**16**	**12**	**Alt. 3**
Average Score	**2.00**	**2.29**	**1.71**	**Alt. 3**

As shown, rankings were made on the basis of first, second, and third. The higher the ranking is the lower the score is. Thus, Alternative 3 scored the lowest on average (1.71), which meant that it had the highest overall ranking. Alternative 1 scored second, with Alternative 2 ranked third. A description of the rationale behind the scoring process is presented below.

Ability to Serve Forecast Demand

In ranking the alternatives with respect to their ability to serve demand, two items were considered (airside and landside facilities), along with a notion of geographic coverage for users. For the airside facilities, Alternative 1 was ranked first, since it provided the most number of runways available to the flying public. At the same time, it required the least amount of new runway paving. Alternative 3 was ranked second since it had the second-most number of runways. Although it showed the greatest amount of new runway paving, one of the included projects involved a new runway for Chorman Airport.

Landside facility rankings were based on the alternative with the least required facilities. That alternative had, by default, the greatest amount of facilities on hand to serve future forecast demand. In this regard, Alternative 3 ranked first, followed by Alternative 2 and then Alternative 1. One significant factor in this ranking is the assumption that Alternative 3 will have some type of full civilian joint use at Dover AFB.

A judgmental consideration in the ability of an alternative to serve demand was the geographic coverage offered by each option. This was in keeping with the economic objective: "Seek a developmental balance of publicly and privately-owned airports in the State, while maintaining the public's access to safe, adequate facilities." In this regard, Alternative 1 has the greatest geographic coverage in Delaware regarding public-use airport locations. However, Alternative 3 assumes the same number of airports, but several of them are assumed to no longer be public-use facilities (Chandelle Estates, Smyrna, and Jenkins). Alternative 2 has the least number of facilities and service area coverage.

Impact of Airspace Obstructions

The requirement to remove airspace obstructions is governed to some extent by the number and type of airport facilities included in the recommended plan. Airspace obstruction removal was included in the evaluation of alternatives to comply with the social objective: "Ensure the safety of each airport as well as the safety of the entire integrated aviation system." For alternatives with more airports, there are more costs for obstruction removal – particularly if many of those airports are privately owned and have no jurisdiction for removing obstructions on adjacent property that they do not own. This ranking process is borne out by the costs associated with obstruction removal for each alternative. As expected, Alternative 1 had the highest cost, followed by Alternative 3. Alternative 2 had the lowest cost because it had the fewest airport obstructions and runways. Because the State has enabling legislation for obstruction removal, the plan with the lowest required cost ranked highest. It should be noted that in no instance is safety compromised in this ranking process. That is, all airports within each alternative are assumed to have their required airspace obstructions removed.

Impact on Surface Transportation System

Many surface transportation infrastructure improvements will have to be made regardless of the alternative aviation system involved. However, of all the options, Alternative 3 has the greatest surface access improvement needs. Evaluation criteria were guided by a combination of objectives which were described earlier. The first was an environmental objective: "Plan for an energy-efficient system of airports that provides ease of air and ground access." At the same time, the Aviation System objective: "To evaluate the application of multi-modal linkages to system airports" had to be considered in the development of surface access infrastructure for any air cargo hub that may be developed at the Civil Air Terminal. Finally, in the preservation and creation of jobs, an Economic objective had to be considered: "Assist in the funding of revenue-producing infrastructure and other infrastructure related to retention of existing clients and economic development." The additional highway infrastructure improvements at Sussex County Airport will help retain the jobs at PATS for the County. Thus, this improvement along with the improvements to Horsepond Road under Alternative 3 will serve to either retain or create jobs.

Because of the high secondary impacts (jobs) of creating additional highway infrastructure over and above the other Alternatives, the scoring system used for this criterion favors the additional development. This method is consistent with the study objectives, which weigh the development of infrastructure against the retention or creation of new jobs. Simply stated, new jobs are worth the development of roadway improvements.

Given these parameters, Alternative 3 was ranked highest, followed by Alternative 1. With the least number of facilities and job creation capabilities, Alternative 2 ranked third.

Environmental and Land Use Compatibility

The ranking process used for the Environmental and Land Use Compatibility evaluation criteria focused on the value of property near airports in Delaware. These property values were used as surrogates to measure the impact of airport noise on surrounding land uses. Noise impact, in particular is blamed by many to cause a devaluation of real estate. If the conventional wisdom holds, the property in the near-airport areas should average significantly less in value from similar land uses that are not impacted by airports.

The analysis for Delaware airports yielded mixed results. That is, the conventional wisdom that airport operations impact land values immediately adjacent to airports was not borne out uniformly among all airports. For example, New Castle Airport showed average commercial property values that were almost 88 percent higher near the airport than similar properties between four and five miles away. Conversely, residential property values were 18 percent higher away from the airport relative to those nearby.

Key factors in ranking the alternatives involved the number of airports in each alternative and the cumulative effect of aircraft activity on land values. In this regard, Alternative 2 – Contracted System of Airports, had the fewest airports, but the greatest concentration of aircraft activity at each of those airports. Alternative 1 – Baseline Alternative had the greatest number of airports, but the widest dispersion of aircraft operations. Thus, the ranking of alternatives had to consider these factors, along with the actual impact of each airport on its immediate area land values.

Development Costs

The comparison of airport development costs in each alternative shows that Alternative 2 is the least expensive and Alternative 3 is most expensive. The reason that Alternative 1 costs are less than the other alternatives can be attributed to the fact that fewer airports are included and thus, the costs of obstruction removal are lower. In addition, the assumption that Sussex County Airport would only expand its primary runway to 5,500 feet versus 6,000 feet (as shown in Alternatives 2 and 3) and that Delaware Airpark would only expand its runway to 4,200 feet versus 5,500 feet (as shown in Alternative 2) impact the costs. The overall cost for these alternatives includes the following, by rank:

- Alternative 2 $89,389,600
- Alternative 1 $90,085,900
- Alternative 3 $96,556,400

From a cost perspective, the alternative rankings show that the addition of the obstruction costs to the other development costs brought Alternatives 1 and 3 closer together in total costs. Because of the numeric nature of the evaluation, the ranking is very straightforward with Alternative 2 ranked first, Alternative 1 ranked second, and Alternative 3 ranked third.

Impact of Contingencies

An analysis of the potential impacts of various contingencies was undertaken as a part of the Evaluation of Alternatives. Contingency actions identified in the analysis included the following major possible occurrences:

- Expansion of Sussex County Airport Primary Runway
- Loss of Three Privately Owned, Public-Use Airports to Private Use Only
- Runway Expansion/Improvements at Two Privately Owned Airports
- Potential Full Joint Use of Dover AFB Either Through Negotiation or BRAC

For purposes of this analysis, all of the Alternatives are likely to experience the first two contingency bullet points in some form. That is, the Sussex County Airport primary runway will be expanded, either to 5,500 feet or to 6,000 feet within the planning period. It is also likely that the public-use aspect of some privately owned airports in Kent County will be lost during the period, even if those airports remain open. The difference between Alternatives 1 and Alternatives 3 and 2, however, is the expansion of Sussex County to the full 6,000 foot runway length rather than 5,500 feet. This expansion will preserve a number of jobs at the Airport and therefore is ranked higher in Alternatives 3 and 2 than in Alternative 1 with respect to this criterion.

For the Alternatives Analysis, runway improvements at Chorman (3,600-foot replacement runway) and Summit (832-foot runway extension) were reserved for Alternative 3. These are contingencies that may or may not occur. In addition, any improvements at Summit would be privately funded, which will not constrain the public funding of other eligible Delaware airports. The replacement runway at Chorman would likely require some State funding assistance.

However, the most significant contingency of the three involves the future of Dover AFB and the associated development at the Civil Air Terminal. This contingency involves the full civilian joint use of Dover AFB, either through agreement or through the BRAC realignment of one or more military functions at facility. It is already likely that the Civil Air Terminal will be developed so that supplemental air cargo carriers can use it for overnight parking and light maintenance, at a minimum. So the main impact of this contingency would be the ability to have unrestricted civilian use of the airfield at the Base. If the facility is realigned via a BRAC process, it is possible that following benefits of full joint use/civilian ownership of the Base could occur:

- Decreased need for expansion of Delaware Airpark (remains at 4,200 feet)
- Possible use of Base passenger terminal for potential airline service
- Use of the Base for civilian air cargo
  - Decreased need to restructure roadway access system to reach CAT with heavy trucks (can use main roads through Base)
- Use of the Base for Maintenance/Repair/Overhaul (MRO) of large aircraft
  - Decreased need to develop large hangar on CAT property for aircraft maintenance
- Redevelopment of some Base facilities
- Potential relocation of small GA aircraft from private-use airports to the Base

Of significance, the immediate savings to the future Delaware aviation system of having Dover AFB available for civilian use via the BRAC process was more than $42 million, not including the potential redevelopment of Base facilities to other civilian uses. However, because such an occurrence is considered extremely remote, it was not used in the evaluation scoring. Rather, a more realistic option – full civilian joint use simultaneous with ongoing military operations – was used as the most likely future occurrence for Dover AFB. For purposes of this analysis, full joint use without BRAC was assumed and ranked accordingly.

Impacts of the various contingencies described in Alternative 3 are considerable and will likely have a significant impact on the system. Each alternative was ranked in a simple scoring system equating to high, medium, and low positive impact. The alternative with the highest positive impact was ranked first, followed by the lower positive impacts. As such, the rankings showed Alternative 3 first, Alternative 2 second, and Alternative 1 third with respect to the impact of contingencies.

2. DESCRIPTION OF RECOMMENDED AVIATION SYSTEM

THE RECOMMENDED AVIATION SYSTEM WAS SELECTED in the previous section from the preferred alternative scoring. From that analysis, Alternative 3 emerged as the preferred alternative. As the recommended plan, it can be described in terms of the following:

- Recommended Aviation System
- Airport Roles
- Airport Facilities
- Capital Cost Estimates

Other recommendations pertaining to the recommended system are presented in Chapter 8, Financial and Implementation Plan.

2.1 Recommended Aviation System

To say that Alternative 3 is the Recommended Aviation System leaves a number of specific questions unanswered. In particular, which set of contingencies are most likely to occur and which are proverbial “long shots?” In this section, an outline of the most likely or reasonable future aviation system is projected. Much of the projections are based upon current developments throughout the State and an historical knowledge of aviation in Delaware.

Recommendations for the shape and character of the future aviation system can be briefly identified as follows:

- Seven public-use airports (including Dover AFB) and three private-use airports (see Figure 7-1) are included in the Recommended Aviation System. This is the same number of facilities and classifications as Alternative 3.
  - The three private-use airports include Chandelle Estates, Jenkins, and Smyrna.
- Dover AFB is assumed to have full joint-use capability and be available to the public for operations. It is assumed that the military will continue its heavy-lift air transport mission from the Base.
  - Delaware Airpark is assumed to remain at 4,200 feet of runway length (not expanded further because of the full joint use of Dover AFB).
  - It is possible and likely that the Civil Air Terminal will have some type of scheduled airline service.
- Sussex County Airport is assumed to develop 6,000 feet of useable runway length.
- Summit Airport will extend their primary runway to 5,320’ but is expected to lose NPIAS funding eligibility prior to developing the extension.
- Chorman Airport will likely construct a replacement 3,600' X 60' runway with full parallel taxiway.

- While it is possible that New Castle Airport gain some type of airline service, it may not be likely during the planning period.

With this future aviation system in mind, the following sections describe the individual airport roles, facilities, and costs associated with the Recommended Aviation System.

2.2 Airport Roles

An airport system is a group of interdependent airports, which work together toward the shared purpose of providing aviation services to operators and access to users of the system. Often, this system is not defined until a state or regional planning effort analyzes the inter-workings of airports and identifies the system functionality. Throughout the State of Delaware each airport plays a role which contributes toward that central purpose. The Recommended Aviation System, therefore, includes the future roles for each airport, based upon the projected levels of demand along with input from current local airport planning work. These roles group airports into categories that relate to the air transportation service that each offers. For example, airports with only turf runways cater to a particular clientele that includes training and recreational flyers. Similarly, full service paved runway airports can service corporate and business interests that require all-weather airport operations and use.

Airport Reference Codes (ARC) are used by the FAA to classify airports to denote both the Aircraft Approach Category and the Airplane Design Group capable of using the airport. This classification system fits well in describing the role of the airport as it relates to the rest of the aviation system. In the Phase I study, definitions of the ARC categories were given. Each category has two components: the aircraft approach category, and the airplane design group. The first component is depicted by a letter (A, B, C, D, or E) and is related to the aircraft approach speed. The second component is depicted by a Roman numeral and is related to the airplane wingspan. The categories of each component are described as follows:

- Aircraft Approach Category is based upon 1.3 times an aircraft's stall speed in their landing configuration at their maximum certificated landing weight:
  - A: Speed less than 91 knots.
  - B: Speed 91 knots or more but less than 121 knots.
  - C: Speed 121 knots or more but less than 141 knots.
  - D: Speed 141 knots or more but less than 166 knots.
  - E: Speed 166 knots or more

- Airplane Design Group is based upon wingspan:
  - I: Up to but not including 49 feet.
  - II: 49 feet up to but not including 79 feet.
  - III: 79 feet up to but not including 118 feet.

- IV: 118 feet up to but not including 171 feet.
- V: 171 feet up to but not including 214 feet.
- VI: 214 feet up to but not including 262 feet.

Listed below are the roles for Delaware airports included in the Recommended Aviation System.

A-I and Less-than-A-I Category Airports

For airports in Delaware, an A-I ARC implies an airport with a paved runway that is at least 2,400 feet in length by 60 feet in width. Airports with shorter recommended runway lengths or widths or turf airports are classified as Less-than-A-I category airports. There is only one airport with these characteristics included in the Recommended Plan: Laurel Airport. While Chandelle Estates, Jenkins Airport, and Smyrna Airport meet this classification, their collective transition to private use status removes them from the public system.

The role of Laurel Airport includes recreational flying, aerial application/spray business flying, parachute training, and pilot training. Laurel serves this demand and also fills a geographic "hole" in the State's aviation service area in eastern Sussex County.

From an aviation demand standpoint, Laurel is anticipated to accommodate 18 based aircraft and 11,600 operations by the year 2030. While this is not a large number, the airport does fill important aviation and economic roles such as parachute training and crop spraying. It should be noted that the three private-use airports in this category are anticipated to accommodate a combined total of 35 based aircraft and 4,500 aircraft operations.

There is one heliport in the Recommended Aviation System – the DelDOT helistop. This facility is rarely used and serves as a convenience to the Department of Transportation. As a public-use facility, pilots desiring to use it typically check with DelDOT first. No improvements to this facility are planned over the period.

B-I and B-II Category Airports

B-I and B-II category airports included in the Recommended Aviation System have minimum runway dimensions of 3,000 feet by 60 feet. Delaware airports in this group are:

- Chorman Airport
- Delaware Airpark
- Summit Airport

The role of B-I and B-II airports is to accommodate a greater mix of business and transient aircraft than A-I or smaller facilities, in addition to recreational and flight training operations.

The Recommended System Plan includes recommended airfield improvements, such as primary runway lengthening and/or widening projects, to provide for added safety. For Chorman, it is anticipated that a new 3,600-foot runway will be developed. Delaware Airpark will receive a new 4,200-foot runway, while Summit is likely to develop an 832-foot runway extension to their existing 4,488-foot primary runway. The Recommended System Plan also estimates a combined need for 53 T-hangar storage units, and roughly 11,000 square feet of conventional hangar storage space at these three airports. All of these recommended airside and landside improvements are responsive to forecast levels of demand, including the need to accommodate over 39 percent of total annual operations in the State.

B-III and Larger Category Airports

B-III and larger category airports included in the Recommended Aviation System feature the following three facilities:

- Civil Air Terminal/Dover AFB
- New Castle Airport
- Sussex County Airport

The role of this group of airports is to provide full-service, all-weather air transportation facilities for all types of aircraft from small, single engine aircraft to large corporate and business jet aircraft. These facilities also offer opportunities for aviation-related businesses to be located on and/or adjacent to the airport. Such facilities are an integral part of local and regional economies, providing access to the national air transportation system for a wide range of business needs.

Civil Air Terminal/Dover AFB

While the Civil Air Terminal is not technically an airport, it is adjacent to Dover AFB - the largest airport in Delaware. The Civil Air Terminal shares the runway system with Dover AFB for currently qualified civil aircraft operations. For the future, there are a number of possible scenarios that are likely to change the use and character of the CAT. The Recommended Aviation System projects the following roles for the CAT:

- ***Potential Full Civilian/Military Joint Use:*** If this joint use involves a Base Realignment, it will impact the actual development at the CAT. For example, if the Base is available for civilian aviation via Air Force mission realignment, many of the expansion plans for the CAT would not be required. However, the Recommended Plan assumes full joint use without military mission realignment. Thus, the CAT would be subject to capital improvement plans for its expansion.
- ***Potential Airline Service:*** Ongoing air service improvement efforts have identified an airline that desires to initiate service to Dover. Should this occur, the CAT terminal

building and parking area would be improved to accommodate this new passenger demand.

- ***Wide-body Jet Air Cargo Overnight Parking:*** There are plans underway to expand the CAT ramp to permit overnight parking by B-747 or similar aircraft used by supplemental carriers in the Civil Reserve Aircraft Fleet military airlift program.
- ***NASCAR Race Aircraft Parking:*** The CAT will continue to serve as the location for NASCAR aircraft drop off and pick up during race weekends.

Total civilian operations at the CAT, not including the air cargo carrier overnight parking, is anticipated to be 5,500 by the year 2030.

New Castle Airport

New Castle Airport is poised to become a corporate airport of choice within the south Philadelphia/northern Delaware Metroplex. However, there have been repeated suggestions that airline service be incorporated into the airport's mission. In the past New Castle Airport has had scheduled airline service and has produced a number of passengers. However, its proximity to Philadelphia International Airport (PHL) and the decision of some low cost carriers to enter the PHL market have made it very difficult to sustain conventional airline service at New Castle Airport.

For the Recommended Aviation System, New Castle Airport stands as the busiest general aviation airport in Delaware. It is anticipated to accommodate 249 based aircraft and more than 92,000 aircraft operations. Should airline service eventually be located at the airport, it will likely increase the operational totals and will require terminal area improvements. However, if these changes occur, they will not significantly impact any other airports within the Recommended Aviation System.

Sussex County Airport

Current plans for Sussex County Airport are to extend their current runway to 6,000 feet of useable length. This will require the relocation of US-9T in order to achieve the needed runway length. It is anticipated that this runway extension will permit the aircraft modification and refurbishment company (PATS) to accommodate larger aircraft. Ultimately, it is believed that this action will save the PATS jobs at Sussex County Airport. In addition, the runway extension will serve to make Sussex County Airport more competitive in the future with other jet-capable airports in the region. The Recommended Aviation System projects that Sussex County Airport will accommodate 82 based aircraft and 44,800 aircraft operations by the year 2030.

2.3 Airport Facilities

Tables 7-3 through 7-9 present summaries of individual airport facility recommendations. The descriptions and recommendations for many of these facilities reflect input from coordination meetings, master plans, and other fine-tuning adjustments not previously shown. It should be noted that the facility recommendations in this plan are considered "minimum" requirements in order to support an airport system to meet future needs. Development above these levels should be undertaken if aviation activity forecasts are exceeded, or local airport activity indicates a specific need. Such activity includes local economic growth such as corporate expansions or relocations, which could increase operations, need for additional aircraft storage, or air charter activity.

Table 7-3 - Chorman Airport

ITEM	Existing	2015	2020	2030	Incremental
Facility Characteristics					
Ownership	Private	Private	Private	Private	
ARC Classification	Less than B-I	Less than B-I	Less than B-I	B-I	
Instrumentation	None	None	None	Non-Precision	
Runway Configuration	Single	Single	Single	Single	
Primary Runway Dimensions	3,588' x 37'	3,588' x 37'	3,588' x 37'	3,600' x 60'	
Runway Surface	Asphalt	Asphalt	Asphalt	Asphalt	
Taxiway Type	Turn-around	Turn-around	Turn-around	Parallel	
Demand/Capacity					
Based Aircraft	19	21	22	25	
Annual Operations	13,200	14,600	15,300	17,300	
Annual Service Volume	53,100	53,100	53,100	53,100	
Facility Needs	**Existing**	**Additional Phase 1**	**Additional Phase 2**	**Additional Phase 3**	**Incremental Totals**
PAVING	(s.y.)	(s.y.)	(s.y.)	(s.y.)	(s.y.)
Runway Paving	14,750	-	-	24,000	24,000
Runway Overlay	-	-	-	-	-
Taxiway Paving	-	-	-	6,000	6,000
Taxiway Overlay	-	-	-	-	-
Apron Paving	2,900	-	-	3,700	3,700
Auto Parking	350	-	-	700	700
BUILDINGS	(s.f./Units)	(s.f./Units)	(s.f./Units)	(s.f./Units)	(s.f./Units)
Terminal	-	-	-	500	500
Conventional Hangars	48,760	-	-	-	-
T-Hangars	8	-	-	-	-
LIGHTING/NAVAIDS	(linear ft./	(linear ft./	(linear ft./	(linear ft./	(linear ft./

Table 7-3 - Chorman Airport					
ITEM	**Existing**	**2015**	**2020**	**2030**	**Incremental**
	Units)	Units)	Units)	Units)	Units)
Runway Lighting	3,588' LIRL	3,588' LIRL	3,588' LIRL	3,600' MIRL	3,600' MIRL
VAGL	2	-	-	-	-
REIL	-	-	-	2	2

Legend: LIRL=Low Intensity Runway Lights; MIRL=Medium Intensity Runway Lights; VAGL=Visual Approach Guidance Lights; REIL=Runway End Identifier Lights

Table 7-4 - Delaware Airpark					
ITEM	**Existing**	**2015**	**2020**	**2030**	**Incremental**
Facility Characteristics					
Ownership	Public	Public	Public	Public	
Classification	B-I	B-II	B-II	B-II	
Instrumentation	Non-Precision	Non-Precision	Non-Precision	Non-Precision	
Runway Configuration	Single	Single	Single	Single	
Primary Runway Dimensions	3,582' x 60'	4,200' x 75'	4,200' x 75'	4,200' x 75'	
Runway Surface	Asphalt	Asphalt	Asphalt	Asphalt	
Taxiway Type	Parallel	Parallel	Parallel	Parallel	
Demand/Capacity					
Based Aircraft	56	61	65	74	
Annual Operations	22,650	24,600	26,300	29,900	
Annual Service Volume	171,300	171,300	171,300	171,300	
Facility Needs	**Existing**	**Additional Phase 1**	**Additional Phase 2**	**Additional Phase 3**	**Incremental Totals**
PAVING	(s.y.)	(s.y.)	(s.y.)	(s.y.)	(s.y.)
Runway Paving	23,880	35,000	-	-	35,000
Runway Overlay	-	-	-	-	-
Taxiway Paving	10,728	8,626	-	-	8,626
Taxiway Overlay	-	-	-	23,880	23,880
Apron Paving	11,222	-	-	-	-
Auto Parking	1,470	350	350	350	1,050
BUILDINGS	(s.f./Units)	(s.f./Units)	(s.f./Units)	(s.f./Units)	(s.f./Units)
Terminal	3,400	-	-	-	-
Conventional Hangars	6,800	-	10,900	-	10,900
T-Hangars	18	12	14	18	44
LIGHTING/NAVAIDS	(linear ft./ Units)	(linear ft./ Units)	(linear ft./ Units)	(linear ft./ Units)	(linear ft./ Units)
Runway Lighting	3,582	4,200	-	-	4,200
VAGL	-	2	-	-	2

Table 7-4 - Delaware Airpark					
ITEM	**Existing**	**2015**	**2020**	**2030**	**Incremental**
REIL	-	2	-	-	2

Legend: VAGL=Visual Approach Guidance Lights; REIL=Runway End Identifier Lights

Table 7-5 - Civil Air Terminal/Dover AFB (Full Joint Use)					
ITEM	**Existing**	**2015**	**2020**	**2030**	**Incremental**
Facility Characteristics					
Ownership	Public/Military	Public/Military	Public/Military	Public/Military	
Classification	E-VI	E-VI	E-VI	E-VI	
Instrumentation	Precision	Precision	Precision	Precision	
Runway Configuration	Intersecting	Intersecting	Intersecting	Intersecting	
Primary Runway Dimensions	9,602' x 200'	9,602' x 200'	9,602' x 200'	9,602' x 200'	
Runway Surface	Asphalt	Asphalt	Asphalt	Asphalt	
Taxiway Type	Parallel	Parallel	Parallel	Parallel	
Demand/Capacity					
Based Aircraft	-	-	-	21	
Annual Operations	600	800	1,000	5,500	
Annual Service Volume	13,700	13,700	13,700	230,000	
Facility Needs	**Existing**	**Additional Phase 1**	**Additional Phase 2**	**Additional Phase 3**	**Incremental Totals**
PAVING	(s.y.)	(s.y.)	(s.y.)	(s.y.)	(s.y.)
Runway Paving	428,430	-	-	-	-
Runway Overlay	-	-	-	-	-
Taxiway Paving	327,800	-	-	-	-
Taxiway Overlay	-	-	-	-	-
Apron Paving (CAT)	31,415	63,700	-	-	63,700
Auto Parking	2,100	3,500	-	-	3,500
BUILDINGS (CAT)	(s.f./Units)	(s.f./Units)	(s.f./Units)	(s.f./Units)	(s.f./Units)
Terminal	1,980	-	-	4,000	4,000
Conventional Hangars	-	-	-	19,600	19,600
T-Hangars	-	-	-	11	11
LIGHTING/NAVAIDS	(linear ft./ Units)	(linear ft./ Units)	(linear ft./ Units)	(linear ft./ Units)	(linear ft./ Units)
Runway Lighting	22,505	-	-	-	-
VAGL	4	-	-	-	-
REIL	4	-	-	-	-

Legend: VAGL=Visual Approach Guidance Lights; REIL=Runway End Identifier Lights

Table 7-6 - Laurel Airport					
ITEM	**Existing**	**2015**	**2020**	**2030**	**Incremental**
Facility Characteristics					
Ownership	Private	Private	Private	Private	
Classification	Less than A-I	Less than A-I	Less than A-I	Less than A-I	
Instrumentation	Non-Precision	Non-Precision	Non-Precision	Non-Precision	
Runway Configuration	Single	Single	Single	Single	
Primary Runway Dimensions	3,175' x 230'	3,175' x 230'	3,175' x 230'	3,175' x 230'	
Runway Surface	Turf	Turf	Turf	Turf	
Taxiway Type	Turf	Turf	Turf	Turf	
Demand/Capacity					
Based Aircraft	14	15	16	18	
Annual Operations	8,950	9,600	10,200	11,600	
Annual Service Volume	32,200	32,200	32,200	32,200	
Facility Needs	**Existing**	**Additional Phase 1**	**Additional Phase 2**	**Additional Phase 3**	**Incremental Totals**
PAVING	(s.y.)	(s.y.)	(s.y.)	(s.y.)	(s.y.)
Runway Paving	None	-	-	-	-
Runway Overlay	None	-	-	-	-
Taxiway Paving	None	-	-	-	-
Taxiway Overlay	None	-	-	-	-
Apron Paving	None	-	-	-	-
Auto Parking	None	-	-	-	-
BUILDINGS	(s.f./Units)	(s.f./Units)	(s.f./Units)	(s.f./Units)	(s.f./Units)
Terminal	290	-	-	-	-
Conventional Hangars	6,900	-	-	-	-
T-Hangars	20	-	-	-	-
LIGHTING/NAVAIDS	(linear ft./ Units)	(linear ft./ Units)	(linear ft./ Units)	(linear ft./ Units)	(linear ft./ Units)
Runway Lighting	None	-	-	-	-
VAGL	None	-	-	-	-
REIL	1	1	-	-	1

Legend: VAGL=Visual Approach Guidance Lights; REIL=Runway End Identifier Lights

Table 7-7 - New Castle Airport					
ITEM	**Existing**	**2015**	**2020**	**2030**	**Incremental**
Facility Characteristics					
Ownership	Public	Public	Public	Public	
Classification	D-III	D-III	D-III	D-III	
Instrumentation	Precision	Precision	Precision	Precision	

Table 7-7 - New Castle Airport					
ITEM	**Existing**	**2015**	**2020**	**2030**	**Incremental**
Runway Configuration	Intersecting	Intersecting	Intersecting	Intersecting	
Primary Runway Dimensions	7,012' x 150'	7,012' x 150'	7,012' x 150'	7,012' x 150'	
Runway Surface	Asphalt	Asphalt	Asphalt	Asphalt	
Taxiway Type	Parallel	Parallel	Parallel	Parallel	
Demand/Capacity					
Based Aircraft	189	205	219	249	
Annual Operations	78,840	84,800	90,000	101,000	
Annual Service Volume	194,000	194,000	194,000	194,000	
Facility Needs	**Existing**	**Additional Phase 1**	**Additional Phase 2**	**Additional Phase 3**	**Incremental Totals**
PAVING	(s.y.)	(s.y.)	(s.y.)	(s.y.)	(s.y.)
Runway Paving	314,817	-	-	-	-
Runway Overlay	-	-	-	314,817	314,817
Taxiway Paving	352,636	-	-	-	-
Taxiway Overlay	-	-	-	352,636	352,636
Apron Paving	74,102	-	-	9,900	9,900
Auto Parking	16,590	-	-	-	-
BUILDINGS	(s.f./Units)	(s.f./Units)	(s.f./Units)	(s.f./Units)	(s.f./Units)
Terminal	27,200	-	-	-	-
Conventional Hangars	570,000	-	-	-	-
T-Hangars	72	-	-	-	-
LIGHTING/NAVAIDS	(linear ft./ Units)	(linear ft./ Units)	(linear ft./ Units)	(linear ft./ Units)	(linear ft./ Units)
Runway Lighting	18,889	-	-	-	-
VAGL	4	-	-	-	-
REIL	3	-	-	-	-

Legend: VAGL=Visual Approach Guidance Lights; REIL=Runway End Identifier Lights

Table 7-8 - Summit Airport					
ITEM	**Existing**	**2015**	**2020**	**2030**	**Incremental**
Facility Characteristics					
Ownership	Private	Private	Private	Private	
Classification	B-II	B-II	B-II	B-II	
Instrumentation	Non-Precision	Non-Precision	Non-Precision	Non-Precision	
Runway Configuration	Intersecting	Intersecting	Intersecting	Intersecting	
Primary Runway Dimensions	4,488' x 65'	4,488' x 65'	5320' x 65'	5320' x 65'	
Runway Surface	Asphalt	Asphalt	Asphalt	Asphalt	
Taxiway Type	Parallel	Parallel	Parallel	Parallel	

Table 7-8 - Summit Airport					
ITEM	**Existing**	**2015**	**2020**	**2030**	**Incremental**
Demand/Capacity					
Based Aircraft	43	47	50	57	
Annual Operations	41,400	45,400	48,200	55,000	
Annual Service Volume	170,800	170,800	170,800	170,800	
Facility Needs	**Existing**	**Additional Phase 1**	**Additional Phase 2**	**Additional Phase 3**	**Incremental Totals**
PAVING	(s.y.)	(s.y.)	(s.y.)	(s.y.)	(s.y.)
Runway Paving	32,413	-	6,010	-	6,010
Runway Overlay	-	-	-	32,413	32,413
Taxiway Paving	14,020		3,333	-	3,333
Taxiway Overlay	-	-	-	14,020	14,020
Apron Paving	48,720	-	-	-	-
Auto Parking	4,375	3,500	-	3,500	7,000
BUILDINGS	(s.f./Units)	(s.f./Units)	(s.f./Units)	(s.f./Units)	(s.f./Units)
Terminal	10,200	-	-	-	-
Conventional Hangars	33,000	-	-	-	-
T-Hangars	31	-	9	-	9
LIGHTING/NAVAIDS	(linear ft./ Units)	(linear ft./ Units)	(linear ft./ Units)	(linear ft./ Units)	(linear ft./ Units)
Runway Lighting	4,488	-	832	-	832
VAGL	2	-	-	-	-
REIL	2	-	-	-	-

Legend: VAGL=Visual Approach Guidance Lights; REIL=Runway End Identifier Lights

Table 7-9 - Sussex County Airport					
ITEM	**Existing**	**2015**	**2020**	**2030**	**Incremental**
Facility Characteristics					
Ownership	Public	Public	Public	Public	
Classification	B-III	B-III	C-III	C-III	
Instrumentation	Non-Precision	Non-Precision	Precision	Precision	
Runway Configuration	Intersecting	Intersecting	Intersecting	Intersecting	
Primary Runway Dimensions	5,000' x 150'	5,000' x 150'	6,000' x 150'	6,000' x 150'	
Runway Surface	Asphalt	Asphalt	Asphalt	Asphalt	
Taxiway Type	Parallel	Parallel	Parallel	Parallel	
Demand/Capacity					
Based Aircraft	62	67	72	82	
Annual Operations	33,900	36,600	39,400	44,800	
Annual Service Volume	174,500	174,500	174,500	174,500	

Table 7-9 - Sussex County Airport					
ITEM	**Existing**	**2015**	**2020**	**2030**	**Incremental**
Facility Needs	**Existing**	**Additional Phase 1**	**Additional Phase 2**	**Additional Phase 3**	**Incremental Totals**
PAVING	(s.y.)	(s.y.)	(s.y.)	(s.y.)	(s.y.)
Runway Paving	109,242	-	16,667	-	16,667
Runway Overlay	-	-	-	109,242	109,242
Taxiway Paving	49,444	-	8,889	-	8,889
Taxiway Overlay	-	-	-	49,444	49,444
Apron Paving	45,628	-	-	-	-
Auto Parking	8,400	-	-	-	-
BUILDINGS	(s.f./Units)	(s.f./Units)	(s.f./Units)	(s.f./Units)	(s.f./Units)
Terminal	6,150	-	-	-	-
Conventional Hangars	213,850	-	-	-	-
T-Hangars	18	-	-	10	10
LIGHTING/NAVAIDS	(linear ft./ Units)	(linear ft./ Units)	(linear ft./ Units)	(linear ft./ Units)	(linear ft./ Units)
Runway Lighting	8,109	-	1,000	-	1,000
VAGL	4	-	-	-	-
REIL	4	-	-	-	-

Legend: VAGL=Visual Approach Guidance Lights; REIL=Runway End Identifier Lights

2.4 Capital Cost Estimates

Capital development costs for the Recommended Aviation System were estimated to total $96,556,400. These cost estimates correspond to the recommended facility development schedules shown previously in this System Plan, but do not include engineering and/or contingency fees. In this analysis, both publicly and privately owned airports were shown as requiring facility development or capital maintenance. Several sources were used in developing cost estimates to assure that relatively accurate costs were derived. These sources included:

- RSMeans construction cost data.[1]
- Cost data from other statewide aviation planning documents.
- Examination of Airport Capital Improvement Plans (ACIPs) filed with the FAA.

Obstruction removal costs, estimated in Chapter 6, were included in each future planning phase to show an approximate need for those funding resources. In this regard, the removal costs were divided equally among the planning periods, reflecting a consistent annual funding effort to improve aviation system safety.

[1] Source: http://rsmeans.reedconstructiondata.com/

Total capital costs have been assigned to short, intermediate, and long term phases, in recognition that some portion of total capital development costs will be expended in sooner than others, depending on demand placed on the airport. Table 7-10 presents these costs which show $29,658,700 for Phase 1, $17,435,800 for Phase 2, and $49,461,900 for the long range period.

Table 7-10 - Airport Costs

Airport	Phase 1	Phase 2	Phase 3	Total
Chorman Airport	$0	$0	$4,378,500	$4,378,500
Delaware Airpark	$19,863,700	$2,702,500	$2,203,300	$24,769,500
DelDOT Helistop	$0	$0	$0	$0
Dover AFB CAT	$8,774,500	$0	$4,685,000	$13,459,500
Laurel Airport	$75,000	$0	$0	$75,000
New Castle Airport	$0	$0	$24,697,400	$24,697,400
Summit Airport	$175,000	$1,848,100	$1,800,200	$3,823,300
Sussex County Airport	$0	$11,344,200	$6,304,000	$17,648,200
Obstruction Removal Costs	**$770,500**	**$1,541,000**	**$5,393,500**	**$7,705,000**
Total	**$29,658,700**	**$17,435,800**	**$49,461,900**	**$96, 556,400**

It should be noted that these costs estimates are just that - estimates. More detailed studies (master planning) must be undertaken to calculate precise cost figures, which can be used to procure bids for design, engineering, and construction.

3. SUMMARY

IN SUMMARY, IT CAN BE STATED THAT there are a number of changes that are anticipated for Delaware's aviation system over the next 20 years. These changes are related to the future impacts of technology, fuel prices, aircraft costs, declining pilot population, and the growing need for business aviation. The Recommended Aviation System Plan for Delaware incorporates the following predictions:

- It is likely that Dover AFB will become a full joint-use facility for civilian and military aircraft operations.
- The Civil Air Terminal is projected to become an air cargo overnight parking facility, with significant infrastructure improvements including more than 60,000 square yards of reinforced pavement capable of accommodating multiple wide-body jet aircraft.
- It is likely that three privately owned, public-use airports will become private-use airports within the planning period:
  - Chandelle Estates
  - Jenkins
  - Smyrna
- Chorman Airport is anticipated to develop a new runway at some point during the planning period.
- Because of the anticipated joint use at Dover AFB, Delaware Airpark is projected to expand to only 4,200 feet of runway length throughout the planning period.
- Laurel Airport is projected to remain within the public-use system because of its important training role for skydivers and its aerial spray operations.
- New Castle Airport is anticipated to continue its focus on corporate aviation. However, there may be some movement toward airline activity accommodation toward the end of the planning period.
- Summit Airport is anticipated to expand its runway by 832 feet for a total of 5,320 feet.
- Sussex County Airport is projected to expand its runway to 6,000 feet of useable length.

The cost of the Recommended Aviation System is estimated at $96.6 million for all three periods. In the next Chapter of this report, a detailed discussion of the funding requirements, by eligible agency will be undertaken. In addition, recommendations for policy issues, implementation process, and contingency planning will be presented.

Chapter 8:
Financial and Implementation Plan

Financial and Implementation Plan

THE PURPOSE OF THIS CHAPTER IS TO describe the financial plan along with the recommended methods, policies, and action steps necessary to implement the Recommended Aviation System. In addition, recommendations for other continuing aviation system planning are made as a part of this report. The chapter is organized to include the following sections:

- Financial Plan
  - Capital Improvement Program
  - Capital Funding Eligibility
- Implementation Plan
  - Implementation Strategy – ACV Input
  - Continuing Planning Process

1. FINANCIAL PLAN

THE PURPOSE OF THE FINANCIAL PLAN IS to determine the costs and appropriate funding sources for the Recommended Aviation System Plan. To do this, information was used concerning the overall capital requirements, the eligibility status of each improvement project for Federal, State, local, and private funding, and the sources and amounts of anticipated funding availability. Discussed below are each of the components of the financial plan for the Recommended Aviation System.

1.1 Capital Improvement Program

The capital improvement program for the Recommended Aviation System has been identified by short (2010-2015), intermediate (2016-2020), and long range (2021-2030) system needs. These costs and improvements were staged with respect to the forecasted levels of system demand and capacity to bring all airports to their desired system standards in the appropriate time frame.

The total cost of developing the recommended system of airports in Delaware has been summarized for each airport by time period and eligible funding source and is presented in Table 8-1. The total cost in 2012 dollars for the 20 year (2010-2030) program is estimated at $96,556,400. As shown in Table 8-1, four sources of funds are expected to finance the development program. Projected financial needs from each of those sources are as follow:

- Federal Funding: $65,497,900
- State Funding: $14,767,400
- Local Funding: $5,659,100
- Private Funding: $10,632,000
- TOTAL $96,556,400

The calculation of these costs estimates relied upon a number of assumptions regarding Federally-eligible projects, and those funded through State, Local/Sponsor, and Private resources.

Table 8-1 - Airport Funding Eligibility

SASP Facility	2015	2025	2030	Total Costs
Chorman Airport	$0	$0	$4,378,500	$4,378,500
Federal	$0	$0	$0	$0
State	$0	$0	$3,356,100	$3,356,100
Local	$0	$0	$522,900	$522,900
Private	$0	$0	$499,500	$499,500
Total	**$0**	**$0**	**$4,378,500**	**$4,378,500**
Civil Air Terminal/Dover AFB	$8,774,500	$0	$4,685,000	$13,459,500
Federal	$7,739,600	$0	$0	$7,739,600
State	$430,000	$0	$0	$430,000
Local	$605,000	$0	$920,000	$1,525,000
Private	$0	$0	$3,765,000	$3,765,000
Total	**$8,774,500**	**$0**	**$4,685,000**	**$13,459,500**
Delaware Airpark	$19,863,700	$2,702,500	$2,203,300	$24,769,500
Federal	$17,051,600	$0	$752,200	$17,803,800
State	$947,300	$0	$41,800	$989,100
Local	$964,800	$17,500	$59,300	$1,041,600
Private	$900,000	$2,685,000	$1,350,000	$4,935,000
Total	**$19,863,700**	**$2,702,500**	**$2,203,300**	**$24,769,500**
Laurel Airport	$0	$0	$0	$0
Federal	$0	$0	$0	$0
State	$67,500	$0	$0	$67,500
Local	$0	$0	$0	$0
Private	$7,500	$0	$0	$7,500
Total	**$75,000**	**$0**	**$0**	**$75,000**

Table 8-1 - Airport Funding Eligibility

SASP Facility	2015	2025	2030	Total Costs
New Castle Airport	$0	$0	$24,697,400	$24,697,400
Federal	$0	$0	$22,227,600	$22,227,600
State	$0	$0	$1,234,900	$1,234,900
Local	$0	$0	$1,234,900	$1,234,900
Private	$0	$0	$0	$0
Total	**$0**	**$0**	**$24,697,400**	**$24,697,400**
Summit Airport	$175,000	$1,848,100	$1,800,200	$3,823,300
Federal	$0	$1,055,800	$1,462,600	$2,518,500
State	$0	$58,700	$81,300	$139,900
Local	$175,000	$58,700	$256,300	$489,900
Private	$0	$675,000	$0	$675,000
Total	**$175,000**	**$1,848,100**	**$1,800,200**	**$3,823,300**
Sussex County Airport	$0	$11,344,200	$6,304,000	$17,648,200
Federal	$0	$10,209,800	$4,998,600	$15,208,400
State	$0	$567,200	$277,700	$844,900
Local	$0	$567,200	$277,700	$844,900
Private	$0	$0	$750,000	$750,000
Total	**$0**	**$11,344,200**	**$6,304,000**	**$17,648,200**
Obstruction Removal				
State	**$770,500**	**$1,541,000**	**$5,393,500**	**$7,705,000**
Total SASP Funding Sources				
Federal	**$24,791,200**	**$11,265,600**	**$29,441,000**	**$65,497,900**
State	**$2,215,300**	**$2,166,900**	**$10,385,300**	**$14,767,400**
Local	**$1,744,800**	**$643,400**	**$3,271,100**	**$5,659,200**
Private	**$907,500**	**$3,360,000**	**$6,364,500**	**$10,632,000**
Total	**$29,658,800**	**$17,435,900**	**$49,461,900**	**$96,556,500**

1.2 Capital Funding Eligibility

Capital funding eligibility is based upon a number of factors including the type of project, the type of sponsorship at the airport in question, and its eligibility and priority for FAA Airport Improvement Program (AIP) funding. Funding descriptions for each of the categories described above are presented in the following paragraphs.

Federal Funding

The largest single source for airport development funds is the Federal government. Most airport development items such as land, runways, taxiways, and apron areas are eligible for 90 percent Federal participation at publicly owned airports and some grandfathered reliever airports (regardless of ownership). At New Castle, Delaware Airpark, and Sussex County airports, eligible projects include the planning, design, and construction of projects associated with public use non-revenue generating facilities and equipment of the Airport. Typical AIP-eligible projects include: airport master plans and airport layout plans; land acquisition and site preparation, airfield pavements, e.g. runways, taxiways, and transient aprons; lighting and navigational aids; safety, security, and snow removal equipment; selected passenger terminal facilities; and obstruction identification and removal. Highest funding priority according to FAA's rating procedure is generally given those projects that are safety related such as obstruction removal, runway safety area improvements and facility improvements to meet current FAA Airport Design Standards.

The most recent legislation enacted to authorize funding for FAA projects is the FAA Modernization and Reform Act of 2012. The law is designed to provide the FAA with $63.6 billion between 2012 and 2015. It is important to note, that this Reauthorization Act includes funding eligibility for some revenue producing facilities such as fuel farms and hangars at nonprimary airports. These items can be supported by the eligible airport's nonprimary entitlement funding if the airport sponsor has made adequate provision for financing airside needs of the airport.

Of the capital improvements needed for the Recommended Aviation System Plan by the year 2030, nearly $65.5 million are eligible for Federal funding. Over the 20-year planning period, the total requirement averages almost $3.3 million annually. Based on the historical record of AIP apportionment funding for Delaware airports, it is clear that this total is significantly larger than historical contributions of FAA to the State's airports. For example, FY 2012 Apportionment funding for Delaware is roughly $402,000 – significantly below the average $3.3 million needed. Therefore, Delaware will need a considerable amount of FAA discretionary funding to achieve capital development funding for the Recommended Aviation System.

State Funding

An amendment to the Aeronautics Code in 1996 changed the scope of State funding to include privately owned public-use airports. In this regard, the State is empowered to fund any public-use airport - whether privately owned or publicly owned - in the acquisition, development, operation, or maintenance of the facility. Sources of funds for these projects can be generated through fees, taxes, and other sources applicable to aeronautics and administered by DelDOT and its Office of Aeronautics. This considerably broader scope of funding capability has positively impacted the continuing viability of the privately owned airports in Delaware. However, it has increased the need for State aviation funding.

The estimate of State funding needed for airport improvements listed in the Recommended Aviation System Plan is approximately $7 million through the year 2030. However, additional funding of $7.7 million is necessary for airport obstruction removal. Together, these system improvements increase the level of State funding required to $14.77 million through 2030.

Legislative proposals have been made that will broaden the revenue collection base for the State by imposing registration fees for aircraft registered in Delaware and the imposition of a new tax on Jet A fuel amounting to $0.05 per gallon. For both of these new fees, a dedicated fund for aviation would be created, assuring aviation users that their funds are being recycled into the aviation system.

Local Share Funding

Local airport sponsors such as counties, municipalities, other political subdivisions, or private owners are responsible for costs associated with airport development projects that remain after Federal and State shares have been applied. The cost of projects not eligible for Federal or State funds is paid through local or private funds and is wholly the responsibility of the local sponsor. For publicly owned airports, this sponsor share of the eligible project cost is as follows:

- 5 percent for Federally eligible projects
- Variable percentage for non-FAA eligible projects where State funds are used.[1]
- 100 percent for non-Federal and non-State eligible projects.

For privately owned airports, the private owner share is 100 percent for the non-State eligible projects (no private airports in Delaware are now eligible for Federal funding).

Local sponsors of publicly owned Delaware SASP airports have been identified as the source for almost $5.7 million in capital development projects enumerated in this plan. Just as with the State estimate, this does not include numerous discretionary projects, maintenance programs, or equipment purchases that public use airports may require during the planning period. Local airport sponsors must rely upon funding from four primary sources:

- Airport-Generated Revenues
- Loans Based on Anticipated Revenues
- General Fund Revenues (for publicly owned airports)
- Bond Issues

[1] State funding procedures in this area are not precise.

Airport-generated revenues are available to both public and private airport sponsors. General fund revenues and bond issues are typically only available to public airport sponsors that have taxing authority.

Airport-Generated Revenues

Owners and operators of profitable airports use operating revenues to fund the sponsor share of development funds. In Delaware, the privately owned airports must be profitable or at least break even over the long term in order to survive. Whether there is money available for capital development after operating expenses have been paid will differ by airport. In the past, New Castle Airport has been the only publicly owned airport in the State to have been financially self-sufficient except for certain large capital improvement projects. Sussex County Airport and Delaware Airpark have required operating subsidies. However, with the decrease in projected capital funding by FAA there is an increasing emphasis on airport self-funding for both operating costs and capital projects. With this in mind, typical revenue sources at general aviation airports include:

- Fuel Flowage Fees
- Aircraft Storage Fees and Tie Down Fees
- Rents and Leases
- Sales and Service
- Other Miscellaneous Fees

Experience has shown that only large general aviation airports in busy metropolitan areas can successfully charge landing fees. Landing fees at other less congested general aviation airports tends to drive users away to the non-landing fee facilities.

General Fund Revenues

General fund revenues refer to tax-supported financing of airport operations and capital development programs. General funds are derived from tax revenues that have not been directed toward a specific area or project as a prerequisite to their collection. The amount of general fund support for airport improvement projects is based upon the local tax base, priority of the development project, historical funding trends and, of course, local attitudes concerning the importance of aviation.

Bond Issues

Bond issues that fund the local share of airport development projects must compete with bond issues for other types of community improvements, schools, highways, and sewer systems. In addition, limitations on municipal debt are imposed for all counties in Delaware.

Most general aviation airports do not qualify for revenue bond issues because they do not earn surplus revenues capable of paying off such bonds. Rather, general obligation bonds would be used if debt financing was required for an airport project. General obligation bonds are based on the full faith and credit of the issuer and do not depend upon revenue from the specific project. Like the general fund apportionment, bond issues supporting airport development depend greatly on the priority assigned to such projects by the local community.

Private Funding

Privately-owned, public-use facilities are not eligible for Federal funding for capital improvement projects. Therefore, improvements must be funded by the airport owner, and/or other sources that can be identified. In the Recommended Aviation System Plan, improvements at Chorman Airport were assumed to be funded by State grants. Laurel Airport has only one significant capital cost identified during the planning period – a visual approach slope indicator. The other privately owned airports, Chandelle Estates, Jenkins, and Smyrna Airport were assumed to become private-use facilities and thus, not be counted as a part of the public-use system in the long term.

Private enterprise funding of capital development is defined as the funding needed to support all non-governmentally eligible projects. The system plan calls for some State funding at two private airports (Chorman and Laurel) for which, private enterprise funding will be needed for the local share match. Private funding for the Recommended Aviation System Plan is needed for the development of conventional hangars and T-hangars, and for matching funds for runway/taxiway development at Chorman and for visual approach slope aids at Laurel. A total of over $10.6 million of investment is needed from private sources through the year 2030.

Due to the nature of private enterprise and free market economics, there is no way to forecast levels of private capital that may be available. Market forces of supply and demand will determine prices and decisions to invest will likely be based on risk, general economic health, and the outlook of the aviation industry. Therefore, it can only be assumed that private investment will occur if sufficient profit is available for the project. If private investment is slow to materialize, it is assumed that non-operational, revenue producing projects will be postponed into the future.

2. IMPLEMENTATION PLAN

The Implementation Plan describes specific methods for accomplishing the recommendations in the Delaware State Aviation System Plan Update. These methods were developed to ensure the practicality and flexibility of the plan. To adequately address the implementation strategies, this section is organized to include the following:

- Implementation Strategy – ACV Input
- Continuing Planning Process

2.1 Implementation Strategy – ACV Input

For this system plan update, one strategy that was developed for Plan implementation involved the use of the Airport/Community Value (ACV) scores from recent work that could be updated and modified to provide benchmarks for capital spending, similar to other modes of transportation. These benchmarks or "report cards" on DelDOT spending will help the Department spend its resources in accordance with the system plan. In addition, it is important to show when the Office of Aeronautics invests in the system, they are actually moving the system forward/improving its performance.

ACV Description

ACV metrics employed in this plan are both the estimate of economic impact (total output) combined with estimates of the existing value of an airport. This method is analogous to examining both an income statement and a balance sheet when looking at the financial health of a business. These baseline values can then be subjected to a number of sustainability assessment factors called Economic Sustainability Factors (ESF) in reaching a future estimate of an overall Airport Community Value.

Both traditional and new methods of economic impact analysis are used in this process. The "Airport Community Value" method incorporates familiar measures of job, income, and total output figures along with new metrics for estimating the value of an airport to a community. The process adds the existing value components and establishes a base year ESF score for each airport. For the future, the operational economic activity plus any capital investment is multiplied by the change in future ESF to yield the actual value of the future airport investments. This total is then added to the future (depreciated or appreciated) value of the airport to arrive at a future ACV. Thus, there are "before" and "after" ACV sets showing existing and future projected values. It is the future projected values that will have the greatest impact on system planning funding recommendations and priorities in this analysis. The measures include the following factors:

Existing Value Components

- Economic Impacts From Activity
- Airport Property and Facility Value
    - Replacement Value
    - Current Costs of Facilities Based on Useful Life Estimates

Economic Sustainability Factors (Sustainability Assessment)

- Regional Airport Resource Factor
    - Geographic Coverage
- Airport Protection Factor
    - Land Use and Zoning Controls around Airport
- Location/Access
- Business Use Index
    - Multi-engine Propeller
    - Business Jet
- Expandability Factor
    - Airside, Landside
- Community Commitment Factor
    - Plans on File
    - Community Use of Airport

Future Value Additions

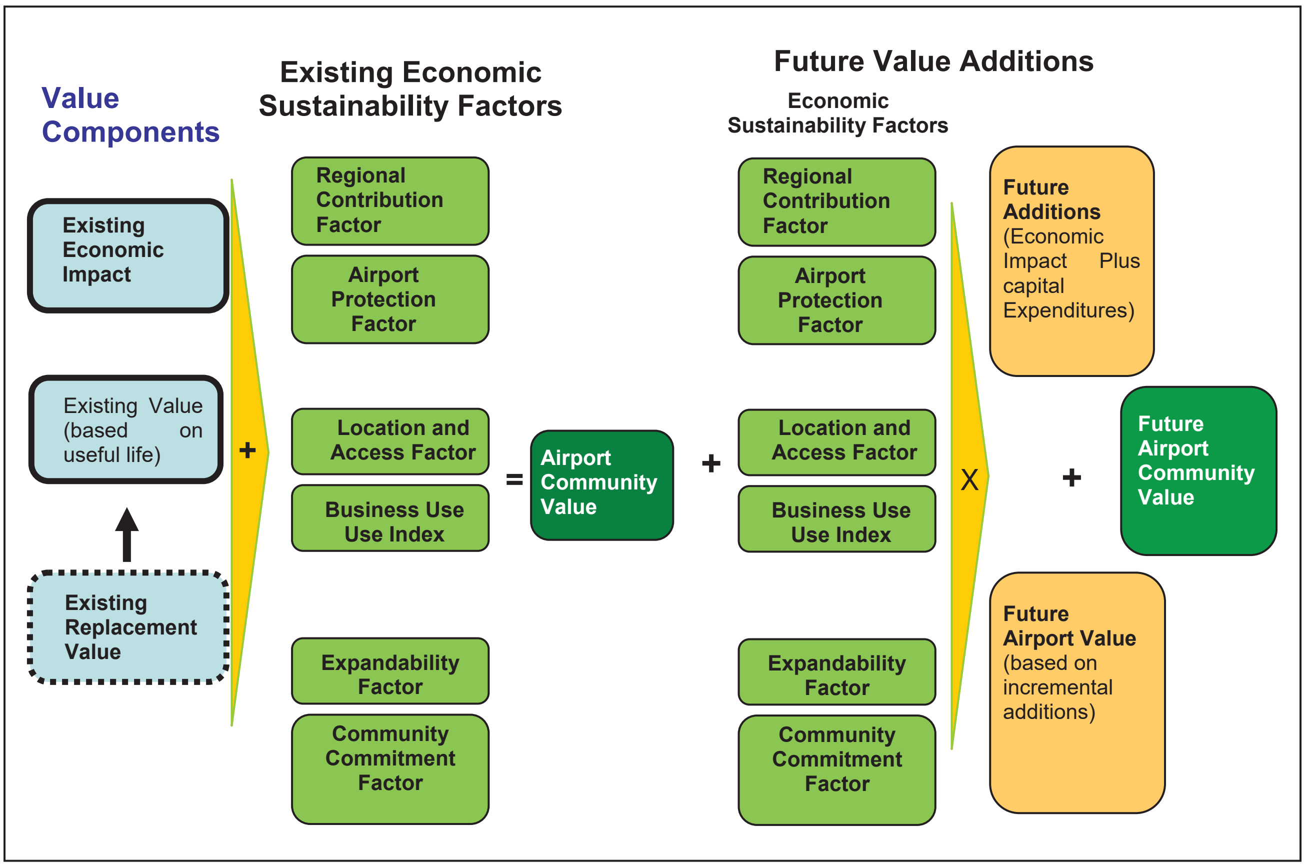
- Economic Impacts From Future Activity
    - Recommended Plan Impacts Included
- Airport Replacement Value
    - Recommended Plan Capital Spending Included
- Economic Sustainability Factors
    - Proactive Measures That Can Increase or Decrease Airport Investment Value

A community can, at any time change its future ACV by undertaking actions impacting the Economic Sustainability Factors (ESF). For example, by lengthening a runway, an airport may increase its accommodation of business aviation, raising its Business Use Index (BUI). If the community is willing to commit dollars to capital improvements, this can increase the Community Commitment Factor (CCF) and so on. Taken together, these proactive measures can increase the value of an airport to a community. Local and regional planners as well as decision-makers can use this tool to measure their airports' ACV and to estimate return on investment from their future capital contributions. Figure 8-1 presents a graphic illustration of the ACV estimation process. Methods for collecting or developing these measures are described in the following subsections.

Existing Value Components

Existing value components were estimated through the system planning process using existing economic impact assessment numbers. This includes the number of existing jobs, the amount of income produced, and the total output for each system airport. In addition to the economic impact, an estimate of the current value of the system airport were developed, using a replacement cost basis or replacement value minus useful life estimates of existing facilities. These numbers will be updated in 2013, but they are not the specific components that determine future airport investment value. Rather, the ESF changes are used in that determination.

Figure 8-1 – Airport Community Value Modeling Process



Source: R.A. Wiedemann & Associates, Inc.

Economic Sustainability Factors (Sustainability Assessment)

The existing values for economic impact and airport replacement costs offer a baseline estimate of overall economic value. However, this value is a static snapshot of a constantly moving economic flow. The six primary factors that modify these values are discussed below.

Regional Airport Resource Factors

Airports are regional resources that serve areas beyond their immediate sponsors' political boundaries. As entry points to the nation's airspace system, airports can be considered "on-ramps" to the national air transportation system. A loss of such a facility reduces the overall service level of the national and regional system to some degree. The regional system plan should place a value on the on-going operations or expansion of each airport as a resource worthy of protection. Although it can be argued that all airports contribute to their local communities, this value differs on a case-by-case basis. This value can be estimated on a systems level using geographic coverage as one parameter. Using normal system planning guidelines of geographic coverage, a rating system should include:

- The classification of airport type (jet-capable, single-engine, etc.), which indicates the service level available at that location.
- The population served by the airport as measured within 30 minutes of driving.

Loss of an airport in any category would be scored negatively using a point system defined later in this section.

Airport Protection Factor

Communities that take measures to protect their airports are increasing the value of their investment. Protection of airport facilities includes any action that increases land use and zoning controls to ensure compatible land uses near the site. This also includes appropriate height hazard zoning. Scoring this factor involves the following primary components:

- Control of Runway Protection Zone
- Runway Safety Areas in Place
- Land Use Compatibility
- Height Hazard Zoning for Airport
- Other Protective Zoning for the Airport

Location/Access Factor

When speaking of location or access, the factor being measured is convenience. The primary reason for using air transportation is to save travel time. In this regard, access to an airport by ground is critical. The relative ease by which an airport can be accessed increases its value to the local community and to the regional system of airports. Similarly, the location of the airport relative to the community it serves is a factor that increases convenience for users. Scoring for this factor includes the following two primary criteria:

- Surface access within three miles of the airport on interstate, regional arterial, local arterial, freight or passenger rail
- Location of the airport in relation to economic activity centers, major employers, central business districts, et cetera

Business Use Index

Similar to geographic coverage, airports should be scored relative to their accommodation of business aviation. As described in this system plan, business aviation has a much brighter future than most other general aviation use. Therefore, if an airport is able to accommodate business jets, it should receive a higher score in this category than airports with short, low-load limit pavements. In addition, the number of jets or multi-engine propeller aircraft based at the airport should be used as a factor in the rating process. Scoring includes the following primary criteria:

- The ability to accommodate business aviation as measured by airport classification
- The number of business type aircraft (jet, multi-engine propeller) already based at the airport as well as the number of itinerant operations

Expandability Factor

The ability of an airport to expand is a significant factor in its future value to the community it serves. If an airport cannot expand, there is limited return on additional capital investment in the facility, since the population of aircraft it serves will not be significantly altered. For this factor, two primary criteria are used as a gauge. The first involves the ability to expand within existing airport property. Both airside and landside are included in this scoring. The second gauge is the potential ability of the airport to expand outside of its existing property boundaries. This measure should be qualitatively assessed, though non-park or wetland open space can exist outside airport boundaries, primarily off existing runway ends. Scoring items include the following:

- On-airport expandability, airside and landside
- Off-airport expandability, primarily off existing runway ends

Community Commitment Factor

The level of community commitment to a local airport is an important factor in assessing its existing and future value. Communities that have developed current master plans and that have airport capital improvement programs on file with funding agencies can be considered proactive in this area. In addition, examining the operations of the airport compared its service area population is a good measure of community support. Airports that show a low utilization ratio when weighed against their service air population are not considered supported by their aviation user groups. Criteria used in ranking community commitment include the following:

- Current plans on file with funding agencies such as airport master plans, airport capital improvement programs, airport zoning plans, FAR Part 150 studies, and airport business plans
- Total aircraft operations at the airport divided by service area population

Method for Evaluation of ACV Scoring

This section presents the method for evaluation of ACV scoring for airports included in the system plan modeling process. All of the ESF are assigned evaluation values, based upon the criteria described above. All of the factors except the Business Use Index (BUI) have the potential of scoring between zero and four points in the matrix. Because of its overall importance in aviation's future, the BUI scoring ranges from one to eight, essentially giving it double the weight of other evaluation factors.

No airport is confined to its current ACV score. By implementing any of the actions listed as factors in the process, the ACV can be altered. With changing economic conditions, the ACV is a fluid number, moving with supply and demand, investment capital, and policy changes designed to protect local airports. Because of this ability to alter an ACV, a methodology to estimate future ACV is included in this section. This future add-on value is estimated from the increases in projected aviation activity and capital investment at each airport. The ACV methodology permits decision-makers to estimate a return on investment, which can be incrementally impacted by proactive measures described in the ESF section.

Matrix Scoring System

The matrix scoring system used to estimate existing Airport Community Values for each system airport was developed in a previous working paper. The scores include measures of the various inputs described in the preceding sections of this report. The subtotal of the existing ACV is simply the existing total economic output combined with the existing airport value with useful life reductions. This dollar amount is accompanied by an ESF.

ESFs are useful for all future actions and investments in the airport. Each ESF with the exception of the BUI has a maximum point total of four. The BUI has a maximum point total of eight. The maximum point total for an airport under the ESF rating system is 28. The ranking of airports with regard to their existing ESF score does not imply a best-to-worst rank order. Instead, the ranking shows the leeway for each airport to adjust its future ACV. Those with lower ESF scores have more potential to improve their future ACV than those at the very top. This improvement potential implies that future investments in the airport can have a high rate of return if the future ESF is increased.

Airport Replacement Value and Existing Value Estimation

Key indicators of value involve the physical assets associated with airports and their infrastructure. By including the airport replacement value and the existing value estimation, a larger picture concerning the actual worth of the airport to the community is presented. Also, by introducing asset valuation, a mechanism for better measuring return on investment can be developed. Inputs needed for Airport Replacement Value estimates include the following:

- Total airport acreage and the most recent estimate of price per acre.
- Runway and taxiway area in square feet (length times width) and cost per square foot.
- Apron Area (in square feet) requires estimates either from airport management or from aerial photography, along with cost per square foot.
- Conventional hangar square footage.
- Number of T-hangar units.
- The fuel system replacement value is based on the size of the facility.
- The instrument approach capability places a value on those facilities or services, with non-precision valued at $500,000 and precision valued at $1,500,000.
- An air traffic control tower is valued at $2 million.
- Non-hangar buildings on the airport are valued at $230 per square foot.

Existing Airport Value with Useful Life Reductions are estimated for each airport using the replacement value estimates combined with knowledge of the age of the various facilities.

- Pavements are assumed to have a 20-year life.
- For hangars and non-hangar buildings, a 40-year life is assumed
- Other facilities were not reduced in value, since their replacement costs are assumed to increase at the same rate as their depreciation.

Future Value Additions

One of the purposes of the ACV modeling system is to provide good information concerning investment decisions in public infrastructure such as the local airport. Key to estimating return on investment is information about the assets involved, their potential for increasing the return, or the risks associated with negative community actions that may threaten the viability of the airport. The ESF provides analysts with this information and capability. The inputs for the future ESFs follow the same method as for the existing ESF scoring with the exception that any known changes in these values should be recorded. This may include proactive measures by a community to protect their airport through zoning or planned runway expansions and greater business use. Changes to the future ESF are compared to the existing ESF and the percentage change is multiplied by the future funding/output additions and added to the future facility value. Essentially, the increase or decrease in value from the actual future funding or output additions is due to the change in ESF. Proactive measures that impact the ESF are the leverage that can be used by a community to increase its airport's value and the return on investment. Conversely, if negative actions occur such as residential encroachment, funding lapses, or loss of business aviation activity, the airport can show a value that is less than future amounts invested in its infrastructure.

Future ACV is based on the future capital investments multiplied by the ESF percentage change plus the future facility value. If the value of the future additions is desired, then the future facility value can be subtracted from the future ACV total. Depending upon the change in ESF, the value of future additions can be more or less than the actual amount invested in the airport.

ACV Scoring

The ACV metric described in the preceding sections was calculated for seven airports included in the Recommended Plan. The product of the exercise is an estimate of the following three values for each airport and for the system as a whole: the economic impact value; the existing (depreciated) airport asset value; and, the airport facility replacement value. To complete the ACV metric and to estimate the value of each airport to its community and the airport system in total, more than 20 discrete data values for each airport were researched and assembled into a database. This data correspond to those described in preceding sections.

Existing Value Components

Existing value components include the existing economic impact assessment data, the current value of the airport, and the replacement value of the airport. Existing value components were compiled or estimated for use in calculating each system airport as follows.

- ***Economic Impacts:*** Economic impacts include the number of existing jobs, the amount of income produced, the total output for each system airport, and the contributions in tax revenues to local and state jurisdictions. The data was taken from the most recent state wide Economic Impact Assessment[2] and was available through DelDOT.

[2] Source: Delaware Airports & Aviation Economic Impact Assessment, 2006

- ***Airport Property and Facility Value:*** Two estimates of existing airport values were used:
  - ***Replacement Value:*** The estimate of replacement values was calculated by multiplying unit costs of construction by the existing quantities of facilities to derive an approximate infrastructure investment need. Not included are the potential unknown costs or time delays related to environmental and land use constraints.
  - ***Existing/Depreciated Value:*** Estimates of an existing/depreciated facility value employed "useful life" estimates of facilities at system airports on a systematic basis across the State of Delaware. For instance, pavement life was reasonably assumed to be 20 years, and the useful life of buildings was assumed to be 40 years. Some estimates were made of the age of facilities if that data was not available for this study. These useful life estimates were then multiplied by the replacement value costs.

Economic Sustainability Factors

The existing values for economic impact and airport replacement costs discussed above offer a baseline estimate of facility values. However, these values are a snapshot of a constantly moving economic target. The ESFs discussed in this report address the market impacts of these values and offer insight into certain strategies that individual airport sponsors might consider to improve their airport values and economic impacts.

ACV Metric Results

Table 8-2 presents the results of the ACV input and scoring for all seven airports included in this study. Existing and replacement values were calculated by the ACV matrix.

Table 8-2 – Existing and Replacement Values

Airport Name	Total ACV	ESF Score	Total Output	Existing Value	Replacement Value
New Castle	$563,849,410	**23.92**	$272,111,000	$291,738,410	$337,207,584
Sussex County	$237,695,669	**15.44**	$151,048,700	$86,646,969	$120,823,600
Summit	$53,612,060	**15.14**	$27,997,100	$25,614,960	$49,462,904
Delaware Airpark	$21,807,838	**17.03**	$3,610,600	$18,197,238	$24,277,660
Civil Air Terminal*	N/A	**16.27**	N/A	$12,415,250	$14,479,400
Chorman	$13,485,246	**10.61**	$2,515,000	$10,970,246	$15,667,744
Laurel	$8,822,777	**7.58**	$3,121,900	$5,700,877	$7,326,900

* Civilian operations only

Total ACV represents the added value of the economic activity at an airport plus the existing asset value of that facility. As mentioned earlier, this snapshot of the overall value of an airport includes both the "income statement" and the "balance sheet" components of economic value. In one sense, the loss of the airport would eliminate both the economic activity and the asset value for the airport function. In addition to the Total ACV, the existing ESF scores are shown in Table 8-2.

Interpreting the results in the Table, New Castle Airport has the highest ACV of any airport in the region. Given the size and economic importance of ILG to the region, this result was expected. In terms of total airport community value, the four NPIAS airports (New Castle, Sussex County, Summit, and Delaware Airpark) round out the top four of the airports included in this analysis.

Economic Sustainability Factors scores range from 7.58 at Laurel Airport to 23.92 at New Castle Airport. These scores can be interpreted to mean that the sponsors of Laurel Airport have a significant opportunity to improve their facility and increase the future value of their investments by protecting the airport from incompatible development and attracting more business aviation. New Castle, on the other hand, is somewhat land-locked and would have difficulty expanding. New Castle's high ESF indicates that it is already highly economically sustainable. Because it is near the top of the scoring, there are fewer investment leveraging options available to the airport's sponsors because of the dense development around the airport.

ESF and Priority Ranking of Future Recommended Plan Projects

When future Economic Sustainability Factors are estimated for the Recommended Aviation System Plan airports, the numbers can be compared with existing ESF ratings to determine whether or not a net gain or loss occurs. For airports with a higher future ESF, the value of the recommendations can be said to increase above and beyond the actual dollar investments. In short, those airports with future ESF ratios that are greater than 1.0 have a net gain in Airport Community Value over airports with lower future ESF ratios.

Table 8-3 presents a comparison of existing and future ESF scores, along with the resulting ratios.

Table 8-3 – Existing and Future ESF Scores

Airport Name	Existing ESF Score	Future ESF Score	Future ESF Ratio
New Castle	23.92	23.92	1.000
Sussex County	15.44	17.62	1.141
Summit	15.14	16.05	1.060
Delaware Airpark	17.03	18.32	1.076

Table 8-3 – Existing and Future ESF Scores			
Airport Name	**Existing ESF Score**	**Future ESF Score**	**Future ESF Ratio**
Civil Air Terminal*	16.27	17.95	1.103
Chorman	10.61	11.28	1.063
Laurel	7.58	7.68	1.013

* Civilian operations only

When the future ESF ratio is applied to the capital spending at each system airport, it shows the additional value gained by the investments. For example, Sussex County Airport with a 1.141 future ESF ration is shown to receive the highest value from its capital investment program, followed by the Civil Air Terminal with a 1.103 ratio, and so on. It should be noted that many capital investments such as pavement overlays and other capital maintenance must be undertaken to keep the airport open. As such, investments at airports with low future ESF ratios cannot only be judged using this overall ratio. Also, the higher ESF scores can be used to set priorities for individual projects because the evaluation criteria consider the importance of each airport to the system.

When applying the ESF gains to the capital investment totals for each airport, there is some idea of the impact of the improvements on the overall value of each airport. The values added by the types of investments themselves, over and above the amount of actual spending, are shown in Table 8-4. The Table simply converts the percentage gains into dollars so that a comparison can be made. As shown, Sussex County has the highest percentage gain and highest absolute gain on future capital spending values of any of the system airports. Conversely, Laurel has the lowest percentage gain and the lowest absolute gain on future capital spending values. Because New Castle Airport's ESF ratio is 1.0, there is no additional future value gained beyond the Airport's capital investments themselves.

Table 8-4 – Impact of ESF on Future Capital Spending Values			
Airport Name	**Future ESF Ratio**	**Future Capital Spending**	**Added Future Value**
New Castle	1.000	$24,697,400	$0
Sussex County	1.141	$17,648,200	$2,488,400
Summit	1.060	$3,823,300	$229,400
Delaware Airpark	1.076	$24,769,500	$1,882,500
Civil Air Terminal*	1.103	$13,459,500	$1,386,300
Chorman	1.063	$4,378,500	$275,800
Laurel	1.013	$75,000	$1,000

* Civilian operations only

The following section examines individual project priorities and how they are ranked.

Individual Project Priorities

In addition to learning how to measure the greatest "bang for the buck" for future capital investment, there is a need to how individual project priorities rank among themselves. In this regard, a process was developed that helps to measure the relative value of various projects in protecting the airport investment to the community. From an economic standpoint, projects that will bring additional revenue or permit additional revenue to take place will strengthen the self-sufficiency of an airport. With a stronger revenue base, the airport has a greater chance for long-term economic survival. Thus, these projects have the potential to improve the airport's economic future and as such, the overall value of the airport to the community.

Table 8-5 presents a listing of airport projects and their rank order with regard to economic sustainability. The weighting factors for each project type are meant to show relative importance rather than absolute mathematical ranking. Thus, there is room for some debate over the scores. However, when examined on the basis of each project contributing to the business use of the airport, these fractional multipliers serve as rating factors for the project's contributing value.

Table 8-5 – Economic Sustainability Ranking of Capital Projects

Rating Factor	Capital Project
1.00	Primary Runway Length
0.95	Landside
0.92	Instrument Approach
0.90	Runway Pavement Overlay
0.88	Conventional Hangar Space
0.85	Itinerant Apron
0.85	Visual Approach Aids
0.80	Load Bearing Capacity
0.75	Jet Fuel
0.72	Taxiway Paving
0.70	Primary Runway Width
0.70	Taxiway Overlay
0.68	T-Hangar Space
0.65	Avgas
0.55	Based Aircraft Apron
0.50	Terminal Building
0.45	Apron Pavement Overlay
0.35	Auto Parking

In the overall ranking process, all of the proposed future projects are included. These projects are ranked by multiplying the rating factor for each project times the future ESF of the airport at which the project is undertaken. Appendix 8-A presents a listing of the results of this process. As shown, there are priorities for certain groups of projects that occur in a highest-to-lowest order ranking. It should be noted that these rankings are only suggestions, but they do reflect the economic sustainability priorities for the State system.

2.2 Legislation and Regulations

In 2007, the SASPU proposed a number of recommendations for legislative changes for State laws. These included changes to the Aeronautics Code to bring various regulations in line with current practices and federal standards. In addition, proposed legislation for increasing revenue to the State to be used for the aviation system was discussed. Those recommendations have not yet been implemented. Thus, they are repeated here so as to be included in the latest State Aviation System Plan Update.

Recommendations for Changes to Existing Legislation

Many of these recommendations were made to update the law to reflect the current administrative structure and response to various responsibilities. The relevant sections include:

- § 133. Reports to federal agencies; preservation of aircraft involved in accidents.
- § 170. Operation of airport, landing area, etc. without license; approval of site required before acquisition.
- § 173. Exceptions from approval and licensing requirements.
- § 602. Erection or maintenance of obstructions; prohibitions.

Changes to Section 602 will bring Delaware into conformance with federal standards for airspace obstruction definitions contained in Federal Aviation Regulations Part 77.

Recommendations for New Legislation

Recommendations for new legislation were brought forward by the Delaware Aviation Advisory Council in accordance with their constituents' desires. In summary, these recommended changes involve the imposition of fees for aircraft registrations in Delaware and the institution of a Jet-A fuel tax of $0.05 per gallon. These new fees would generate almost $1.5 million in new revenues each year that could be applied to Delaware aviation capital needs.

2.3 Continuing Planning Process

The continuing planning process provides a means for timely updating of the Delaware Aviation System Plan. In the continuing airport system planning process, activities that the

Delaware DOT Office of Aeronautics would undertake can be grouped into five general categories:

- ***Monitoring:*** System airports should be surveyed on an annual basis (as is presently the case for licensing purposes) to determine how well they are accommodating aviation demand, the condition of runway surfaces and visual ranges, the status of obstruction removal programs, general aviation security program implementation, and the status of development activity. This is necessary not only to fulfill State aviation regulations, but also to compare the actual conditions at each airport with the forecast needs to determine if the assumptions made during the planning process are holding over time.

- ***Operations Counting Program:*** In 2012, the State purchased two acoustical aircraft counting devices to continue the airport traffic counting program which verifies activity levels at non-towered airports in Delaware. For one year, these counters will be moved from airport to airport at two week intervals. This program should be updated in the future to see if the level of forecast operations are tracking with actual operations.

- ***Delaware Aviation Advisory Council:*** This Council was created by State legislation and has reviewed the aviation system plan and will continue to serve at the Secretary's discretion. The DAAC has been involved in other aviation issues such as the Delaware Aviation Summit, the Statewide General Aviation Security Plan, and the review of safety initiatives as private-use airports. Other aviation issues can be vetted through this committee as they arise.

- ***Special Studies:*** These studies include business plans, economic impact studies, and other items of interest that may require special study. In general, the application of these studies is on a statewide basis. Thus, airport business plans are developed for all eligible airports. The economic impact study is also statewide.

- ***Implementation "Trigger Points":*** Aviation demand trigger points or milestones can be defined as those aviation activity levels that, upon being reached at an airport, will require an implementation action by airport sponsors or State or local officials.

Airport expansion that is tied closely to aviation activity must be tracked closely. In these cases, when aviation demand falls behind predicted levels or if it is improbable that forecasts will be met, further development activity at that airport should be postponed until those activity levels are reached. Conversely, if airport activity exceeds forecast demand levels, their development activities should be implemented on an accelerated schedule. In this manner it is possible that Phase I development activities would be postponed until Phase II. Guidelines for the identification of implementation trigger points in Delaware are presented in Table 8-6. It should be noted that these trigger points are not intended to constrain or prevent airport development desired by airport sponsors. Rather, they are meant as general planning guidelines in a rule-of-thumb context.

Table 8-6 - SASP Implementation Trigger Points

Implementation Action	Criteria
Purchase land for airport expansion	Based upon Master Plan or Airport Layout Plan recommendations and sponsor approval.
Improve runway system capacity	When airfield activity exceeds 80 percent of capacity. (No Delaware airports are forecast to exceed 80% of their runway capacity by the year 2030.)
Extend, widen, or strengthen airport runway	Based upon airport sponsor support and existing demand or immediate forecast demand of 500 annual itinerant operations by an aircraft or aircraft type needing the upgraded condition.
Initiate general aviation apron/ramp expansion	When tie-down space exceeds 80 percent occupancy.
Initiate aircraft hangar expansion	Based upon aircraft owner waiting lists.
Expand airport terminal building	When terminal building utilization exceeds 6.0 enplaned passengers per square foot annually.
Develop Civil Air Terminal for overnight air cargo airline parking	Once funding and environmental approvals are obtained.
Extend Sussex County runway to 6,000 feet of usable runway length	Once funding is obtained.

A vital part of successful implementation of the plan is establishing and maintaining a dialogue among the aviation community and the general public as well as the various agencies involved in the study. Implementation of the plan, however, must begin with the local sponsors initiating and partially financing the system improvements. The system plan will succeed only if these local sponsors know, in advance of their own planning, where they fit in the overall system and the reasoning and assumptions on which the recommendations for their airports were made in the recommended aviation system. If the system plan is viewed by all concerned as a flexible working tool to guide and direct their efforts, aviation users and facility sponsors in Delaware can work toward the airport system they need.

Appendix 8-A:
ACV Project Priorities

Appendix 8-A

Table 8-A-1 – Economic Sustainability Ranking of Capital Projects	
Rating Factor	**Capital Project**
1.00	Primary Runway Length
0.95	Landside
0.92	Instrument Approach
0.90	Runway Pavement Overlay
0.88	Conventional Hangar Space
0.85	Itinerant Apron
0.85	Visual Approach Aids
0.80	Load Bearing Capacity
0.75	Jet Fuel
0.72	Taxiway Paving
0.70	Taxiway Overlay
0.70	Primary Runway Width
0.68	T-Hangar Space
0.65	Avgas
0.55	Based Aircraft Apron
0.50	Terminal Building
0.45	Apron Pavement Overlay
0.35	Auto Parking

Table 8-A-2 - Phase I Project Ranking			
Ranking	**Project (Airport)**	**Airport Future ESF**	**Project Rating Factor**
17.030	Runway Paving (DE Airpark)	17.03	1.00
14.476	Runway Lighting (DE Airpark)	17.03	0.85
14.476	VAGL (DE Airpark)	17.03	0.85
14.476	REIL (DE Airpark)	17.03	0.85
13.830	Apron Paving (CAT)	16.27	0.85
12.262	Taxiway Paving (DE Airpark)	17.03	0.72
11.580	T-Hangars (DE Airpark)	17.03	0.68
6.443	Approach Light Aid (Laurel)	7.58	0.85
5.961	Auto Parking (DE Airpark)	17.03	0.35
5.695	Auto Parking (CAT)	16.27	0.35
5.299	Auto Parking (Summit)	15.14	0.35

Table 8-A-3 - Phase II Project Ranking			
Ranking	**Project (Airport)**	**Airport Future ESF**	**Project Rating Factor**
15.440	Runway Paving (Sussex)	15.44	1.00
15.140	Runway Paving (Summit)	15.14	1.00
14.986	Conventional Hangars (DE Airpark)	17.03	0.88
13.124	Runway Lighting (Sussex)	15.44	0.85
12.869	Runway Lighting (Summit)	15.14	0.85
11.580	T-Hangars (DE Airpark)	17.03	0.68
11.117	Taxiway Paving (Sussex)	15.44	0.72
10.901	Taxiway Paving (Summit)	15.14	0.72
10.295	T-Hangars (Summit)	15.14	0.68
5.961	Auto Parking (DE Airpark)	17.03	0.35

Table 8-A-4 - Phase III Project Ranking			
Ranking	**Project (Airport)**	**Airport Future ESF**	**Project Rating Factor**
21.528	Runway Overlay (New Castle)	23.92	0.90
20.332	Apron Paving (New Castle)	23.92	0.85
16.744	Taxiway Overlay (New Castle)	23.92	0.70
14.318	Conventional Hangars (CAT)	16.27	0.88
13.896	Runway Overlay (Sussex)	15.44	0.90
13.626	Runway Overlay (Summit)	15.14	0.90
11.921	Taxiway Overlay (DE Airpark)	17.03	0.70
11.580	T-Hangars (DE Airpark)	17.03	0.68
11.064	T-Hangars (CAT)	16.27	0.68
10.808	Taxiway Overlay (Sussex)	15.44	0.70
10.610	Runway Paving (Chorman)	10.61	1.00
10.598	Taxiway Overlay (Summit)	15.14	0.70
10.499	T-Hangars (Sussex)	15.44	0.68
9.019	Apron Paving (Chorman)	10.61	0.85
9.019	REIL (Chorman)	10.61	0.85
9.019	Runway Lighting (Chorman)	10.61	0.85
8.135	Terminal (CAT)	16.27	0.50
7.639	Taxiway Paving (Chorman)	10.61	0.72

Table 8-A-4 - Phase III Project Ranking			
Ranking	**Project (Airport)**	**Airport Future ESF**	**Project Rating Factor**
5.961	Auto Parking (DE Airpark)	17.03	0.35
5.305	Terminal (Chorman)	10.61	0.50
5.299	Auto Parking (Summit)	15.14	0.35
3.714	Auto Parking (Chorman)	10.61	0.35