Volume II (Update 2016)

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CHAPTER 6 INVENTORY AND AIRPORT CLASSIFICATION UPDATE

1. Summary of Changes

Since the suspension of the 2012 PA SASP study, there have been a few changes to the existing inventory. These include closed facilities, new airport names, and major modifications of physical facilities at PA SASP airports. Airport classifications, however, as determined by PennDOT, remained the same. The last noted changes to classifications date back to the 2007 PA SASP update, in which various airports witnessed both upgrades and downgrades to their respective classifications.

In 2014, two general aviation (GA) airports have closed in Pennsylvania. These are Hanover Airport (6W6) in Adams County and McGinness Field (8N7) in Lancaster County, both privately-owned, public-use facilities. In 2017, a third privately-owned, public-use GA airport suspended its services, Shippensburg Airport (N42) in Cumberland County. The closure of these three airports brings the total number of airports in the PA SASP down from 131 to 128 compared to the 2012 suspended plan.

Additionally, three airports changed their official name, although their original identifier remained unmodified. Hazleton Municipal Airport (HZL) in Luzerne County is now Hazleton Regional Airport, Rock Airport of Pittsburgh (9G1) in Allegheny County changes to Pittsburgh Northeast Airport, and Butler County Airport (BTP) is now known as Pittsburgh-Butler Regional Airport.

In terms of facility changes, major improvements took place at McVille Airport (6P7)in Armstrong County. These involved the construction of a new paved runway (14-32) completed in 2014, which replaced the old turf runway 3-21. In addition, the airport's identifier changed from P37 to 6P7; however, its PA SASP classification remains the same, Limited.

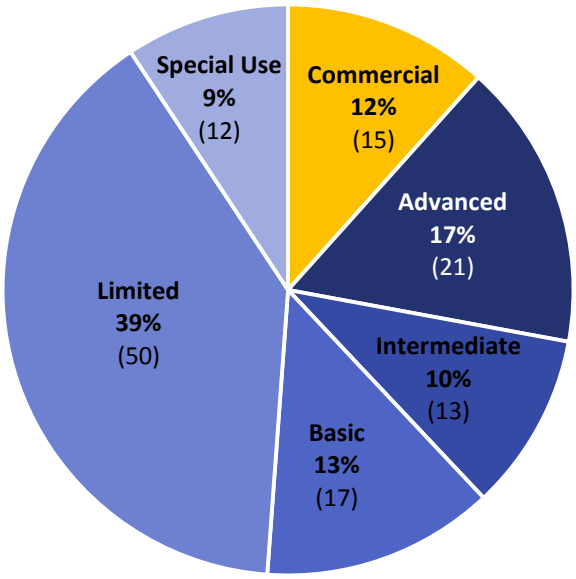
There are other inventory changes noted at various airports. These target different components including runway length, width and strength, taxiways, approach instruments and lights, and ground services and facilities, among others. Updated inventory tables can be found in **Appendix E**.

2. Final Inventory and Airport Classification

With the closure of Hanover Airport, McGinness Field, and Shippensburg Airport, the number of airports in the PA SASP will change from 131 to 128. [1]

In order to classify the various airports of the system, the BOA has developed a set of classification criteria which are detailed in **Table 6-1**. The 2016 classification is shown in **Figure 6-1**.[2] The number of Commercial airports in the state still holds at 15, with the remaining 113 serving as GA facilities. Of those, 21 are classified as Advanced, 13 as intermediate, 17 as Basic, 50 as Limited, and 12 as Special Use.

Figure 6-1: 2016 PA SASP Airport Classification Breakdown



Source: "2012 PA SASP", PennDOT

With the various changes taken into account, an updated classification table is displayed in **Table 6-2**, which also includes the changes in classification between 2002/2007 and 2016. By comparison, the 2007 breakdown was comprised of 131 airports, 116 of which were GA facilities, including 15 Advanced, 21 Intermediate, 25 Basic, 43 Limited, and 12 Special Use.

[1] Airports refer to public-use airports, heliports, and other Special Use aviation facilities.
[2] Unless facility and/or service improvements were made, airports reclassified in 2007 Update were not reclassified a second time in the suspended 2012 PA SASP.

Table 6-1: 2016 Airport Classifications Criteria

Commercial Service	
Class Criteria (Facility Objectives)	
Runway Length	5,000 feet and CFR Part 139 Cert (I, II, or III)
Published Approach	Instrument Landing System (ILS)
Runway Lights	High Intensity Runway Lights (HIRL)
Performance Criteria (Service Objectives)	
Runway Width	100 feet
Runway Strength	60,000 lbs.
Parallel Taxiway	Full Length
Approach NAVAIDS	Rotating Beacon, Lighted Wind Indicator, Segmented Circle, Runway End Identifier Lights (REILs), Precision Approach Path Indicator (PAPI), Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR)
Weather Equipment	Automated Surface Observing System (ASOS); Automated Weather Observing System (AWOS)
Services	Phone, Restroom, Fixed-Base Operator (FBO), Maintenance, Jet Fuel, Ground Transportation
Facilities	Local and Itinerant Aircraft Parking Apron, Storage, Terminal, Auto Parking
Advanced	
Class Criteria (Facility Objectives)	
Runway Length	4,500 feet
Published Approach	Vertically Guided Approach (VGA)
Runway Lights	Medium Intensity Runway Lights (MIRL)
Performance Criteria (Service Objectives)	
Runway Width	75 feet
Runway Strength	30,000 lbs.
Parallel Taxiway	Full Length
Approach NAVAIDS	Rotating Beacon, Lighted Wind Indicator, Segmented Circle, REILs, PAPI, Approach Lights System (ALS)
Weather Equipment	ASOS; AWOS
Services	Phone, Restroom, FBO, Maintenance, Jet Fuel, Ground Transportation
Facilities	Local and Itinerant Aircraft Parking Apron, Storage, Terminal, Auto Parking

Table 6-1: 2016 Airport Classifications Criteria (Continued)

Intermediate	
Class Criteria (Facility Objectives)	
Runway Length	3,800 feet
Published Approach	Non-Precision (NP)
Runway Lights	MIRL
Performance Criteria (Service Objectives)	
Runway Width	75 feet
Runway Strength	12,500 lbs.
Parallel Taxiway	Full Length
Approach NAVAIDS	Rotating Beacon, Lighted Wind Indicator, Segmented Circle, REILs, Visual Glide Slope Indicator (VGSI)
Weather Equipment	ASOS; AWOS
Services	Phone, Restroom, FBO, Maintenance, Jet Fuel, Ground Transportation
Facilities	Local and Itinerant Aircraft Parking Apron, Storage, Terminal, Auto Parking
Basic	
Class Criteria (Facility Objectives)	
Runway Length	3,200 feet
Published Approach	Circling Approach (CA)
Runway Lights	MIRL
Performance Criteria (Service Objectives)	
Runway Width	60 feet
Runway Strength	12,500 lbs. (Paved)
Parallel Taxiway	Partial Length
Approach NAVAIDS	Rotating Beacon, Lighted Wind Indicator, Segmented Circle, VGSI
Weather Equipment	None
Services	Phone, Restroom, Fuel (AvGas)
Facilities	Aircraft Parking Apron, Storage, Auto Parking

Table 6-1: 2016 Airport Classifications Criteria (Continued)

Limited	
Class Criteria (Facility Objectives)	
Runway Length	2,200 feet
Published Approach	None
Runway Lights	None
Performance Criteria (Service Objectives)	
Runway Width	60 feet
Runway Strength	12,500 lbs.
Parallel Taxiway	None
Approach	Wind Indicator
Weather Equipment	None
Services	Phone, Restroom
Facilities	Aircraft Parking, Auto Parking

Class Criteria - Airports need to meet the runway length and at least one of the remaining Facility Objectives, AND pass the Sensitivity Test below to be considered for inclusion in a particular class.

Plus Sensitivity Test:
1) National Plan of Integrated Airport Systems (NPIAS) Designation
2) Steady or Increasing Instrument Flight Rules (IFR) Activity from 2007 to 2012

Approach Types: VGA – ILS, Localizer Performance with Vertical Guidance (LPV), Lateral Navigation (LNAV)/ Vertical Navigation (VNAV); NP- Global Positioning System (GPS), Very High Frequency Omni Directional Radio Range (VOR); CA – Circling Approach

Table 6-2: 2016 PA SASP Airport Classifications Summary

Airport ID/Name		2002/2007 Classification	2016 Classification	FAA ASSET Classification[3]
Commercial Airports				
AOO	Altoona-Blair County Airport	Commercial Service	Commercial Service	Regional
LBE	Arnold Palmer Regional Airport			Regional
BFD	Bradford Regional Airport			Regional
DUJ	Dubois Regional Airport			Local
ERI	Erie International/Tom Ridge Field			Commercial Non-Hub
MDT	Harrisburg International Airport			Commercial Small-Hub
JST	John Murtha Johnstown-Cambria County Airport			Regional
LNS	Lancaster Airport			Regional
ABE	Lehigh Valley International Airport			Commercial Small-Hub
PHL	Philadelphia International Airport			Commercial Large-Hub
PIT	Pittsburgh International Airport			Commercial Medium-Hub
UNV	University Park Airport			Commercial Non-Hub
FKL	Venango Regional Airport			Regional
AVP	Wilkes-Barre/Scranton International Airport			Commercial Non-Hub
IPT	Williamsport Regional Airport			Commercial Non-Hub
General Aviation Airports				
AGC	Allegheny County Airport	Advanced	Advanced	National
BVI	Beaver County Airport	Advanced		Regional
HMZ	Bedford County Airport	Advanced		Local
CXY	Capital City Airport	Advanced		Regional
MQS	Chester County Airport	Advanced		National
AXQ	Clarion County Airport	Basic		Local
HZL	Hazleton Regional Airport	Advanced		Local
IDI	Indiana Co/Jimmy Stewart Airport	Intermediate		Local
RVL	Mifflin County Airport	Advanced		Local

[3] The Federal Aviation Administration (FAA) ASSET document is an 18-month study of nearly 3,000 GA airports, heliports, and seaplane bases identified in the administration's National Plan of Integrated Airport Systems (NPIAS). For more information, visit: https://www.faa.gov/airports/planning_capacity/ga_study/. Also, please see Page 262 in Volume I for an extensive discussion on and detailed comparison of PA SASP/ASSET classification criteria.

Table 6-2: 2016 PA SASP Airport Classifications Summary (Continued)

Airport ID/Name		2002/2007 Classification	2016 Classification	FAA ASSET Classification
PNE	Northeast Philadelphia Airport	Advanced	Advanced	National
SEG	Penn Valley Airport	Advanced		Regional
BTP	Pittsburgh-Butler Regional Airport	Advanced		Regional
MPO	Pocono Mountains Municipal Airport	Intermediate		Local
GKJ	Port Meadville Airport	Advanced		Regional
RDG	Reading Regional Airport	Advanced		National
ZER	Schuylkill County Airport	Advanced		Local
2G9	Somerset County Airport	Basic		Local
6G1	Titusville Airport	Basic		Basic
AFJ	Washington County Airportc	Advanced		Regional
THV	York Airport	Advanced		N/A
PJC	Zelienople Municipal Airport	Intermediate		Local
N27	Bradford County Airport	Intermediate	Intermediate	Local
FIG	Clearfield-Lawrence Airport	Intermediate		Local
8G2	Corry-Lawrence Airport	Basic		Basic
DYL	Doylestown Airport	Intermediate		Regional
29D	Grove City Regional Airport	Basic		Local
PTW	Heritage Field Airport	Intermediate		Regional
VVS	Joseph A. Hardy Connellsville Airport	Intermediate		Local
UCP	New Castle Municipal Airport	Intermediate		Local
CKZ	Pennridge Airport	Basic		N/A
XLL	Queen City Municipal Airport	Intermediate		Regional
FWQ	Rostraver Airport	Intermediate		Regional
OYM	St. Marys Municipal Airport	Basic		Local
LOM	Wings Field	Intermediate		Regional
N96	Bellefonte Airport	Limited Use	Basic	N/A
N13	Bloomsburg Municipal Airport	Basic		Local
OQN	Brandywine Airport	Intermediate		Regional
N94	Carlisle Airport	Intermediate		N/A
9D4	Deck Airport	Basic		N/A

Table 6-2: 2016 PA SASP Airport Classifications Summary (Continued)

Airport ID/Name		2002/2007 Classification	2016 Classification	FAA ASSET Classification
N71	Donegal Springs Airpark	Intermediate	Basic	N/A
9G8	Ebensburg Airport	Basic		Basic
N68	Franklin County Regional Airport	Basic		Local
WAY	Greene County Airport	Basic		N/A
PSB	Mid-State Airport	Basic		Unclassified
N57	New Garden Flying Field	Intermediate		Local
N79	Northumberland County Airport	Intermediate		Local
9G1	Pittsburgh Northeast Airport	Intermediate		N/A
UKT	Quakertown Airport	Intermediate		Local
N38	Wellsboro-Johnston Airport	Basic		Basic
WBW	Wilkes-Barre/Wyoming Valley Airport	Basic		Local
LHV	William T. Piper Memorial Airport	Basic		Local
1N3	Albert Airport	Limited Use	Limited	N/A
22D	Bandel Airport	Limited Use		N/A
9W8	Baublitz Commercial Airport	Limited Use		N/A
14N	Beltzville Airport	Limited Use		N/A
74N	Bendigo Airport	Limited Use		N/A
07N	Bermudian Valley Airpark	Limited Use		N/A
7G4	Blue Knob Valley Airport	Limited Use		N/A
N43	Braden Airpark	Basic		N/A
P15	Brokenstraw Airport	Limited Use		N/A
3G9	Butler Farm Show Airport	Limited Use		N/A
7N8	Butter Valley Golf Port	Limited Use		N/A
N16	Centre Airpark	Limited Use		N/A
N30	Cherry Ridge Airport	Limited Use		N/A
6G6	Cove Valley Airport	Limited Use		N/A
8N8	Danville Airport	Basic		N/A
9N7	Farmers Pride Airport	Basic		N/A
G05	Finleyville Airpark	Basic		N/A
8N4	Flying Dollar Airport	Limited Use		N/A
P91	Flying M Aerodrome	Limited Use		N/A

Table 6-2: 2016 PA SASP Airport Classifications Summary (Continued)

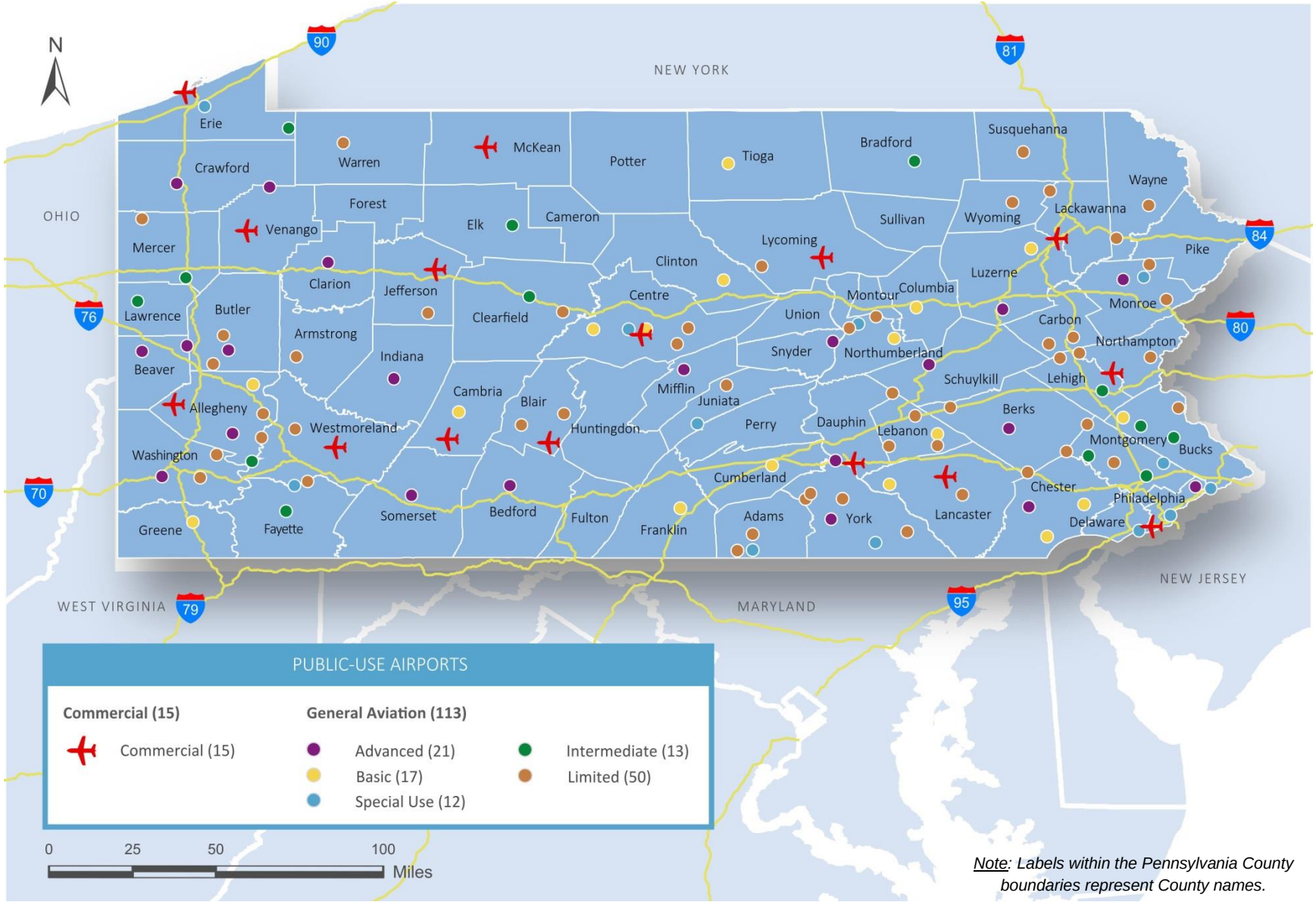
Airport ID/Name		2002/2007 Classification	2016 Classification	FAA ASSET Classification
W05	Gettysburg Regional Airport	Basic		Basic
5G8	Greensburg-Jeannette Regional Airport	Limited Use		N/A
4G1	Greenville Municipal Airport	Limited Use		Local
8N1	Grimes Airport	Limited Use		N/A
P32	Husky Haven Airport	Limited Use		N/A
31D	Inter County Airport	Limited Use		N/A
22N	Jake Arner Memorial Airport	Basic		Local
P96	Jersey Shore Airport	Limited Use		N/A
2N5	Kampel Airport	Limited Use		N/A
08N	Keller Brothers Airport	Limited Use		N/A
P09	Lakehill Airport	Limited Use		N/A
0P8	Lazy B Ranch	Limited Use		N/A
6P7	McVille Airport	Limited Use		N/A
W73	Mid-Atlantic Soaring Center	Limited Use		N/A
P34	Mifflintown Airport	Limited Use		N/A
O03	Morgantown Airport	Limited Use	Limited	N/A
P45	Mount Pleasant/Scottdale Airport	Limited Use		N/A
N74	Penns Cave Airport	Limited Use		N/A
N10	Perkiomen Valley Airport	Intermediate		N/A
4G0	Pittsburgh-Monroeville Airport	Limited Use		N/A
N47	Pottstown Municipal Airport	Intermediate		Local
N35	Punxsutawney Municipal Airport	Limited Use		Unclassified
58N	Reigle Field	Basic		N/A
9N3	Seamans Airport	Limited Use		N/A
76N	Sky Haven Airport	Limited Use		N/A
69N	Slatington Airport	Limited Use		N/A
S37	Smoketown Airport	Basic		N/A
70N	Spring Hill Airport	Limited Use		N/A
N53	Stroudsburg-Pocono Airport	Basic		N/A
71N	Sunbury Airport	Limited Use		N/A
9N1	Van Sant Airport	Limited Use		N/A

Table 6-2: 2016 PA SASP Airport Classifications Summary (Continued)

Airport ID/Name		2002/2007 Classification	2016 Classification	FAA ASSET Classification
N48	Horsham Valley Airways Heliport	Special Use	Special Use	N/A
P72	Penns-Landing- Pier 36 Heliport			N/A
9N2	Philadelphia Seaplane Base			N/A
79N	Ridge Soaring Gliderport			N/A
48P	Rocky Hill Ultralight Flight Park			N/A
0P2	Shoestring Aviation Airfield			N/A
P98	Southern Adams County Heliport			N/A
02P	Stottle Memorial Heliport			N/A
H11	Sunbury Seaplane Base			N/A
PA20	Thermal G Glider Port			N/A
00A	Total RF Heliport			N/A
P99	W.P.H.S. Heliport			N/A

The various types of airports based on the 2016 PA SASP classifications are geographically illustrated in **Figure 6-2**.

Figure 6-2: 2016 PA SASP Airports & Classifications



Note: Labels within the Pennsylvania County boundaries represent County names.

CHAPTER 7 SYSTEM REQUIREMENTS

Chapter Overview

The System Requirements chapter identifies the airport system needs that will help accommodate the state's aviation demands. It intends to establish system adequacy based on airport role, access and specific performance measures for all system airports in Pennsylvania.

The analysis is broken down into three parts. First, each public airport is evaluated using a variety of performance measures which were established during work completed before the suspension of the 2012 Statewide Aviation System Plan (SASP). These are the minimum criteria the SASP uses to categorize airports based on their role or level of significance. The ability of these airports to continue meeting their classification is determined, and ultimately deficiencies and needs are identified for each airport.

To complement the needs assessment, a separate drive time analysis section measures accessibility levels of Pennsylvania's population by car to all airports. Drive time isochrones of 30, 45, and 60 minutes are developed, and assist in determining population coverage ratios, as well as the proximity of economic centers to airports. In addition, gaps within the system are assessed and discussed in detail.

The last component of this chapter evaluates the ability of airports to accommodate the various needs previously identified. A matrix is developed for the most critically constrained airports in the system. These are the facilities that do not meet the most crucial performance objectives, and are singled out using a weighting system developed for this analysis. The end result is a discussion of how the Pennsylvania airport system can best be expanded, supplemented or maintained.

It shall be mentioned here that the findings in this chapter for all public-use airports and any facilities, services, or equipment need, would require a local or bottom up justification from an airport master plan, ALP, or documented operational need. For example, runway length, width, and strength justifications are dependent on the critical design aircraft (or group of aircraft) expected to use the runway. Approach lighting systems are dependent on results of a benefit-cost analysis and a minimum amount of annual instrument approaches performed.

1. Current Airport System Performance

This section focuses on measuring the adequacy of the current airport system. It aims to identify facilities, services, and equipment that enable each airport to meet its system classification. For the purpose of this analysis, inventory data from the suspended 2012 SASP is used. The inventory was completed in 2011, and has been updated by the Bureau of Aviation (BOA) in 2017.

After matching each airport group with its classification objective, and crosschecking these with the existing inventory, an overall performance score is attributed to each airport. Measured on a percentage scale, the score is calculated using varying weights associated with each classification objective. This methodology is detailed further in the following paragraphs.

1.1. Airport Classification Objectives

Classification objectives vary by airport categories and criteria. There are five airport categories defined in the SASP. They include Commercial Service, Advanced, Intermediate, Basic, and Limited airports. Additionally, a Special Use category was established to include all remaining system airports not categorized within one of the five airport roles. Minimum objectives are tailored to each of the five airport categories and help quantify their airport service performance. Special Use airports were exempt from this analysis.

In order to maintain their classification in the future, it is expected that all SASP airports will meet the following requirements:

- Maintain clear approach and departure surfaces to the extent practicable
- Maintain airfield pavements in good to fair condition
- Address all 14 CFR Part 77 obstructions to navigable airspace by removal, marking/lighting or favorable FAA aeronautical study results
- Meet all applicable Pennsylvania airport criteria per Chapter 471, regulations pertaining to airport rating and licensing
- Be compliant with all applicable federal and state grant assurances.

Continued failure to meet these requirements could lead to future SASP classification downgrade.

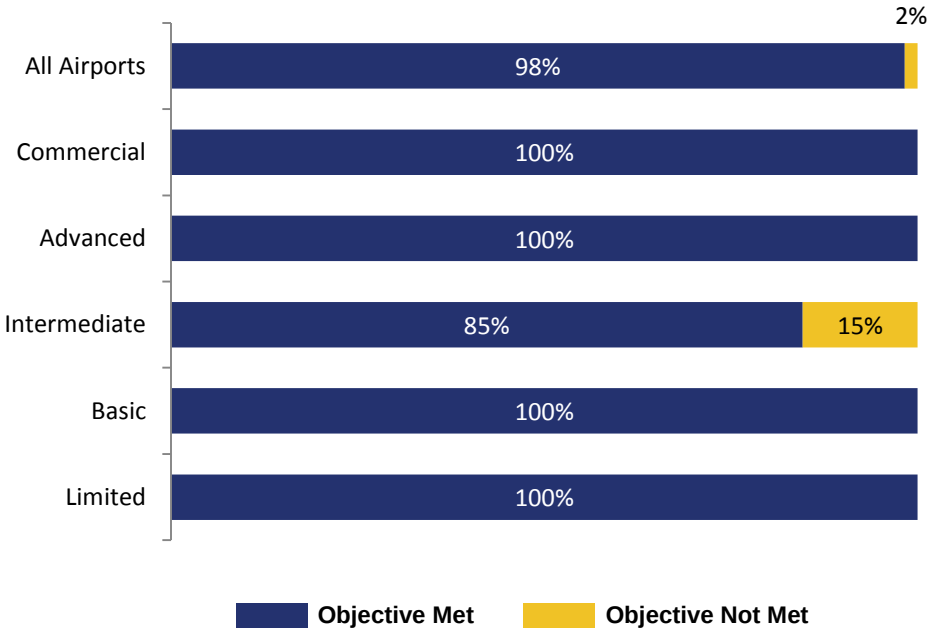
1.2. Runway Length

Adequate runway conditions are essential to airports and airport systems. The objectives for runway length are established as follows:

- Commercial: 5,000 feet
- Advanced: 4,500 feet
- Intermediate: 3,800 feet
- Basic: 3,200 feet
- Limited: 2,200 feet

Overall, as shown in **Figure 7-1**, 98 percent of all system airports meet their runway length objectives. As a rule of thumb, airports falling short 300 feet or less of the set minimum measure are considered adequate. Runway length objectives are 100 percent met by all airport categories except for Intermediate, which has two underperforming airports. They are Doylestown Airport (DYL), which falls short by 796 feet, and Heritage Field Airport (PTW), at 429 feet. These airports maintained their Intermediate classification because airports that were reclassified in the 2007 PA SASP Update were not reclassified again in the suspended 2012 PA SASP Update unless the facility made improvements that meet its new classification.

Figure 7-1: Percent of Airports by Category that Meet Runway Length Objectives



Airports Not Meeting Runway Length Objectives

Intermediate

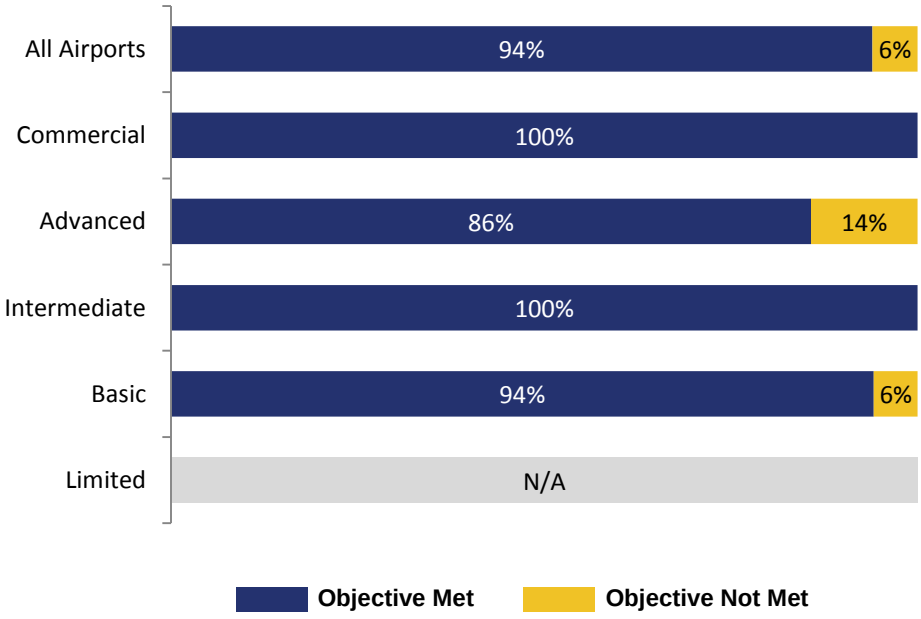
- Doylestown Airport
- Heritage Field

1.3. Published Approach

To fully meet facility objectives, Commercial airports should have an Instrument Landing System (ILS) for ground-based approaches. Advanced airports should provide as a minimum a Vertically Guided Approach (VGA), which means they must possess a Localizer Performance with Vertical guidance (LPV). Intermediate airports, which are required to support Non-Precision (NP) approaches at a minimum, should operate one of the following: a Distance Measuring Equipment (DME), a Very high frequency Omni-Directional Range (VOR), a Non-Directional Beacon (NDB), and/or a Global Positioning System (GPS). Minimum objectives for Basic airports include Circling approaches (CA). There are no approach requirements set for Limited airports.

As shown in **Figure 7-2**, 94 percent of airports currently meet their published approach objective. Four airports fail to meet their objectives.

Figure 7-2: Percent of Airports by Category that Meet Published Approach Objectives



Airports Not Meeting Published Approach Objectives

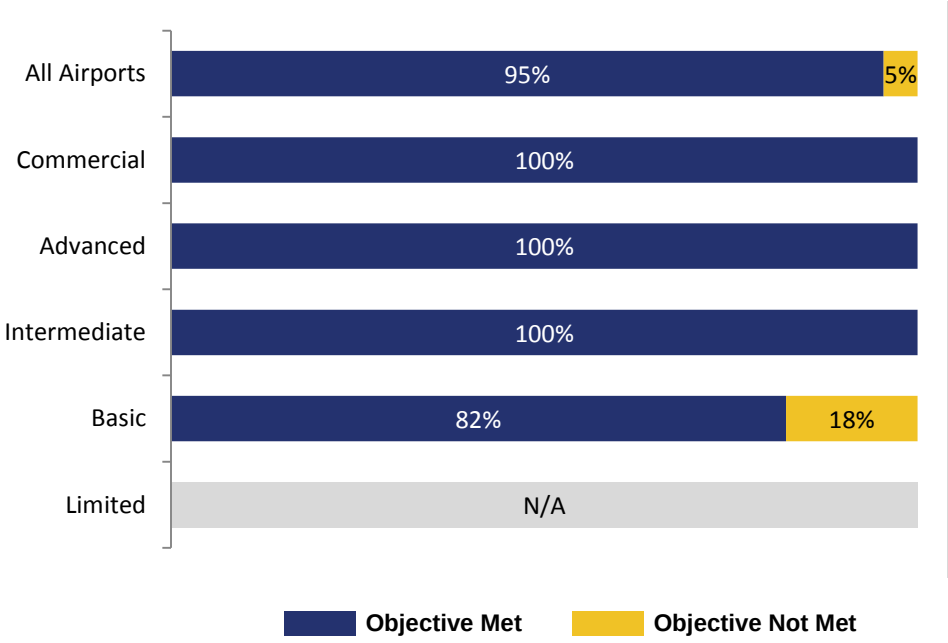
Advanced	Basic
- Penn Valley Airport	- Pittsburgh Northeast Airport
- York Airport	
- Zelienople Muni. Airport	

1.4. Runway Lights

Runway lights are significant contributors to safety at airports. As such, Pennsylvania's Commercial airports should maintain High Intensity Runway Lights (HIRL), while Advanced, Intermediate, and Basic airports should provide at least Medium Intensity Runway Lights (MIRL). Limited airports are exempted from this objective.

In **Figure 7-3**, 95 percent of all airports fulfill their runway lighting objective.

Figure 7-3: Percent of Airports by Category that Meet Runway Lights Objectives



Airports Not Meeting Runway Lights Objectives

Basic

- Bellefonte Airport
- Brandywine Airport
- Carlisle Airport

1.5. Runway Width

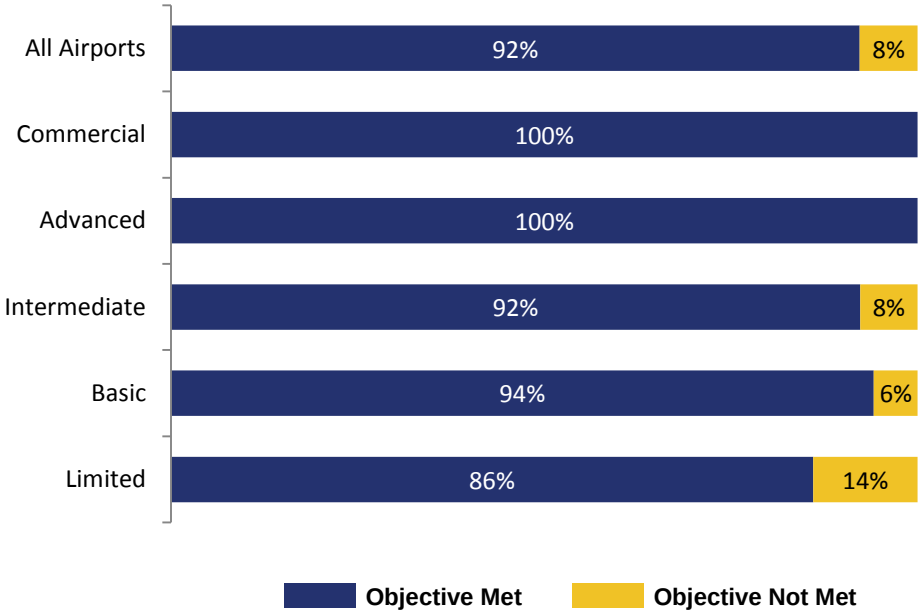
Runway width objectives are broken down as follows:

- Commercial: 100 feet
- Advanced: 75 feet
- Intermediate: 75 feet
- Basic: 60 feet (50 feet for non-NPIAS)
- Limited: 60 feet (50 feet for non-NPIAS)

Non-NPIAS Basic and Limited airports are subject to PennDOT service objectives and given a 10-foot acceptance margin, meaning facilities falling 10 feet short are considered meeting their runway width objective. This rule is not applied to Basic and Limited NPIAS airports, which are required to comply with FAA standards of a 60-foot runway width.

Overall, 92 percent of airports possess adequate standards for runway width as can be seen in **Figure 7-4**, which equates to a total of 107 airports. There are 9 airports that fall short, most of which are Limited facilities.

Figure 7-4: Percent of Airports by Category that Meet Runway Width Objectives



Airports Not Meeting Runway Width Objectives

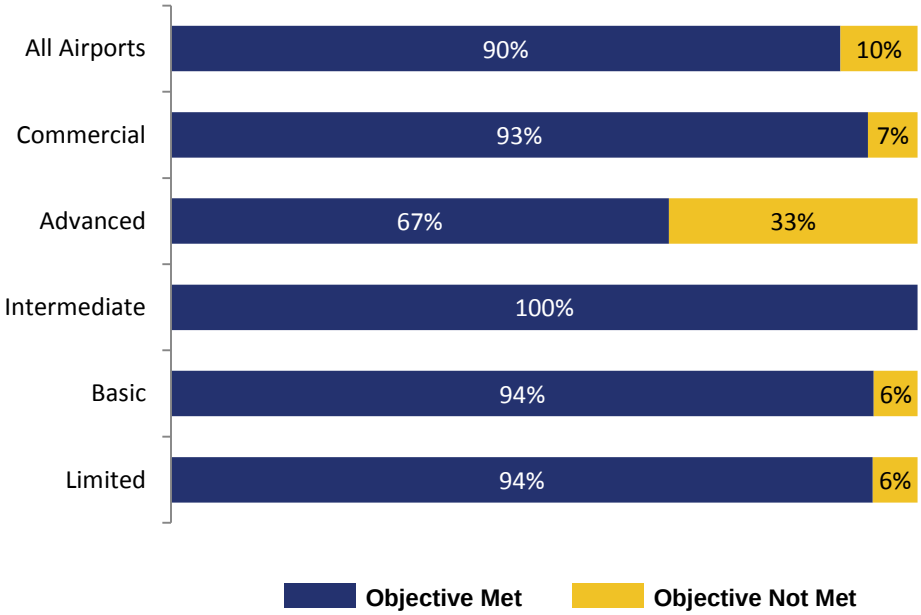
Intermediate	Basic	Limited
- Doylestown Airport	- Brandywine Airport	- Butler Farm Show Airport
		- Penns Cave Airport
		- Perkiomen Valley Airport
		- Pittsburgh-Monroeville Airport
		- Reigle Field
		- Spring Hill Airport
		- Stroudsburg-Pocono Airport

1.6. Runway Strength

The pavement strength of any runway determines the maximum weight of aircraft that can operate at the facility. Since Commercial airports typically handle larger aircraft, their runway strength objectives are the highest, at 60,000 pounds, followed by Advanced airports at 30,000 pounds. Intermediate, Basic, and Limited, airports are all set at 12,500 pounds.

Figure 7-5 shows that 90 percent of airports meet their runway strength objective. Advanced airports score the lowest, with only 67 percent of such facilities fulfilling their objective. Airports that have pavement strengths at 1,000 pounds or less below the minimum objective for their corresponding airport role are counted as having satisfied the strength objective.

Figure 7-5: Percent of Airports by Category that Meet Runway Strength Objectives



Airports Not Meeting Runway Strength Objectives

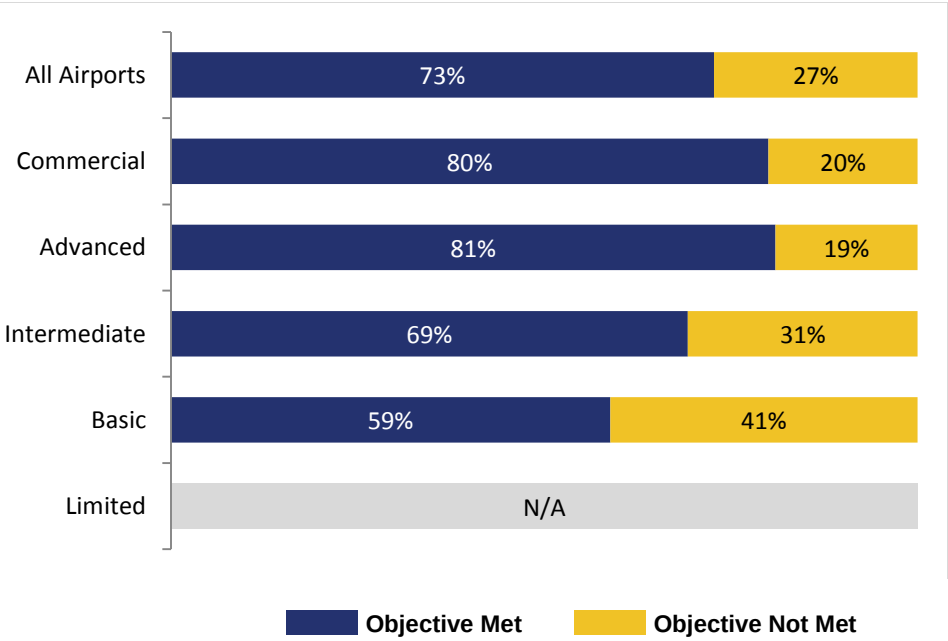
Commercial	Advanced	Basic	Limited
- Altoona-Blair County Airport	- Clarion County Airport	- Brandywine Airport	- Butler Farm Show Airport
	- Penn Valley Airport		- Cherry Ridge Airport
	- Schuylkill County Airport		- Spring Hill Airport
	- Somerset County Airport		
	- Titusville Airport		
	- York Airport		
	- Zelienople Municipal Airport		

1.7. Parallel Taxiway

The presence of parallel taxiways enhances safety and efficiency at airports as far as aircraft circulation is concerned, while simultaneously increasing operational capacity. In order to continue meeting Pennsylvania's aviation demands, full parallel taxiways should be in place for runways at Commercial, Advanced, and Intermediate airports. Basic airports should have at least a partial parallel taxiway for their runways, while Limited airports are exempt from this objective. It is important to note that parallel taxiway development at all PA SASP airport runways requires justification through master planning or documented operational need.

As depicted in **Figure 7-6**, 73 percent of airports fulfill the parallel taxiway objective. Among Commercial airports, over a quarter indicate a deficiency. The largest deficiency is identified for 41 percent of Basic facilities with no partial taxiway, as required to meet their objective.

Figure 7-6: Percent of Airports by Category that Meet Parallel Taxiway Objectives



Airports Not Meeting Parallel Taxiway Objectives

Commercial	Advanced	Intermediate	Basic
- Bradford Regional Airport	- Hazleton Regional Airport	- Bradford County Airport	- Bellefonte Airport
- Wilkes-Barre/Scranton International Airport	- Northeast Philadelphia Airport	- Grove City Regional Airport	- Carlisle Airport
- Williamsport Regional Airport	- Pocono Mountains Municipal Airport	- Joseph A. Hardy Connellsville Airport	- Deck Airport
	- Titusville Airport	- St. Marys Municipal Airport	- Donegal Springs Airpark
			- Mid-State Airport
			- Pittsburgh Northeast Airport
			- Wilkes-Barre/Wyoming Valley Airport

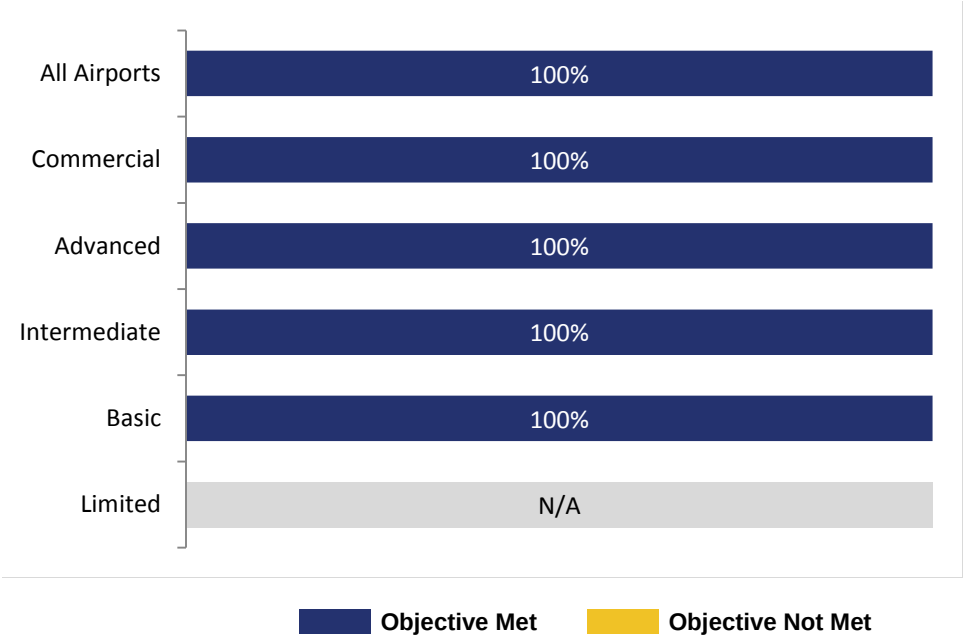
1.8. Approach NAVAIDS

In addition to the published approach objectives listed in Section 1.3, visual aids are jointly relied upon by pilots during landings and takeoffs. These include rotating beacons, lighted wind indicators, segmented circles, Runway End Identifier Lights (REILs), Precision Approach Path Indicators (PAPIs), and various other types of approach lights.

1.8.1. Rotating Beacon

Figure 7-7 shows the share of airports equipped with a rotating beacon. In this case, all airports comply with this objective. Limited facilities are exempt.

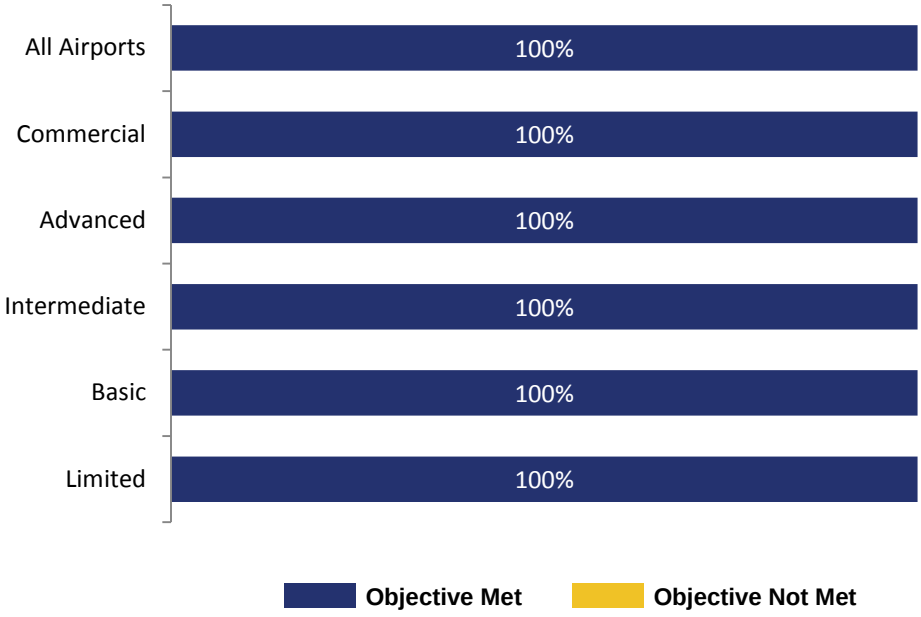
Figure 7-7: Percent of Airports by Category with a Rotating Beacon



1.8.2. Lighted Wind Indicator

All airports meet their lighted wind indicator objective, as displayed in **Figure 7-8**. All Limited airports have at least an unlighted wind indicator.

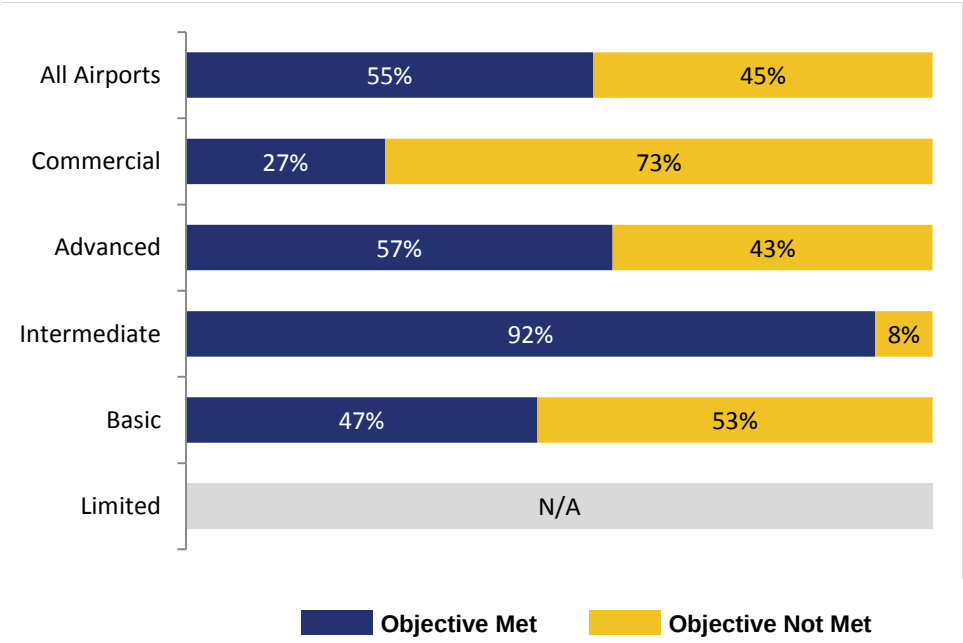
Figure 7-8: Percent of Airports by Category with a Lighted Wind Indicator



1.8.3. Segmented Circle

Figure 7-9 highlights certain gaps in the system, as far as segmented circles are concerned. Only 55 percent of airports are equipped with such visual NAVAIDS. This may be due to the impracticability of having this objective (i.e. parallel runways at Philadelphia and Greater Pittsburgh International Airports). A segmented circle could be supplemented by a lighted wind indicator at the end of the runway or at other viable locations. Therefore, some of these airports could technically meet this objective.

Figure 7-9: Percent of Airports by Category with a Segmented Circle



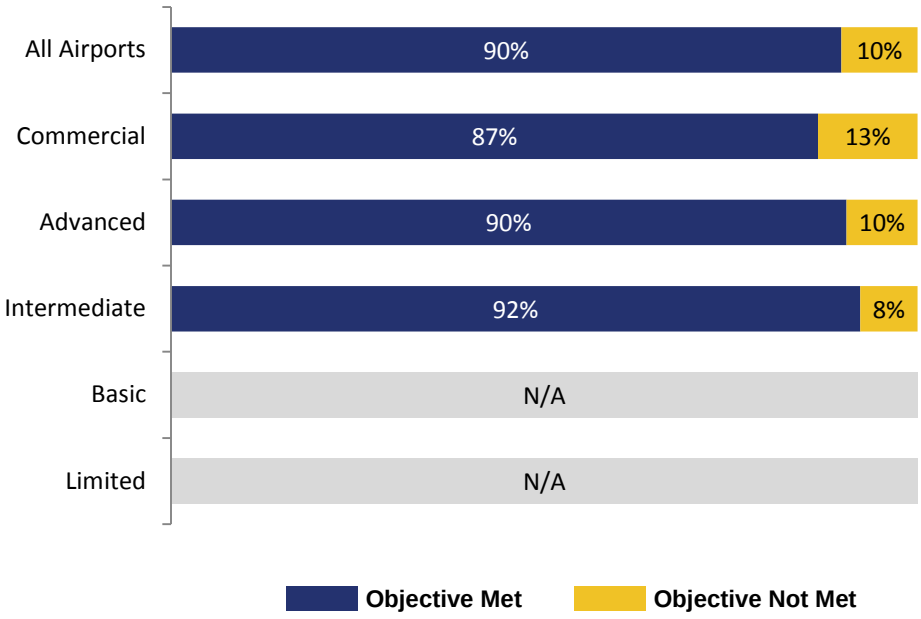
Airports Not Meeting Segmented Circle Objectives

Commercial	Advanced	Intermediate	Basic
- Arnold Palmer Regional Airport	- Allegheny County Airport	- Pennridge Airport	- Bellefonte Airport
- Bradford Regional Airport	- Beaver County Airport		- Bloomsburg Municipal Airport
- Dubois Regional Airport	- Clarion County Airport		- Brandywine Airport
- Harrisburg International Airport	- Northeast Philadelphia Airport		- Deck Airport
- John Murtha Johnstown-Cambria County Airport	- Port Meadville Airport		- Donegal Springs Airpark
- Lancaster Airport	- Schuylkill Co./Joe Zerbey Airport		- New Garden Flying Field
- Lehigh Valley International Airport	- Titusville Airport		- Pittsburgh Northeast Airport
- Philadelphia International Airport	- York Airport		- Quakertown Airport
- Pittsburgh International Airport	- Zelienople Municipal Airport		- Wellsboro-Johnston Airport
- Venango Regional Airport			
- Wilkes-Barre/Scranton International Airport			

1.8.4. REILs

Figure 7-10 displays airports that operate REILs. Overall, 90 percent of Pennsylvania's system airports meet this objective. Basic and Limited facilities have no objective set for their respective categories.

Figure 7-10: Percent of Airports by Category with REILs



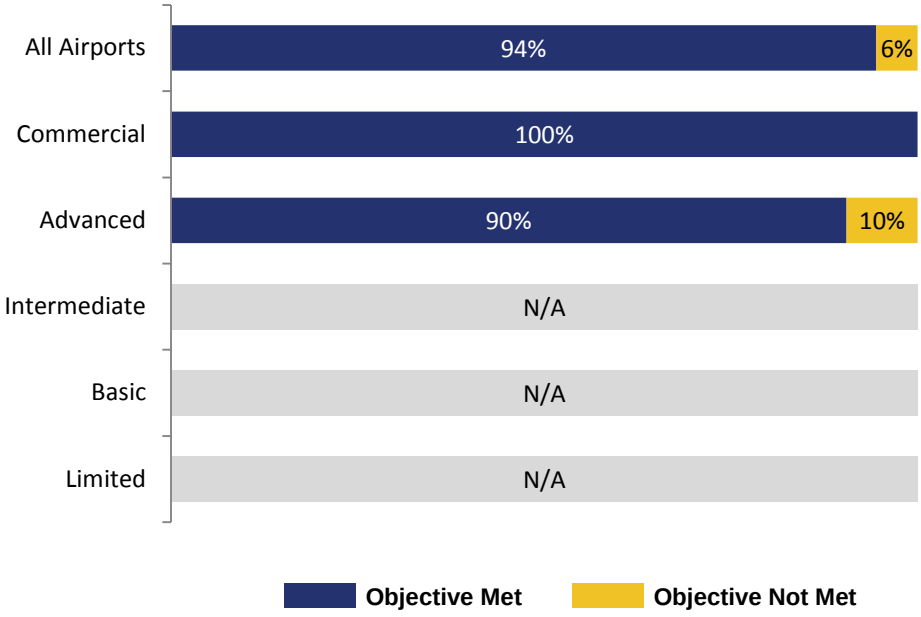
Airports Not Meeting REILs Objectives

Commercial	Advanced	Intermediate
- John Murtha Johnstown-Cambria County Airport	- Port Meadville Airport	-Pennridge Airport
- Williamsport Regional Airport	- Reading Regional/Carl A Spaatz Field	

1.8.5. PAPIs

Similarly, in **Figure 7-11**, 94 percent of airports meet the PAPI (or VASI) objective. In this case, Intermediate, Basic, and Limited facilities have no objective set for their respective categories.

Figure 7-11: Percent of Airports by Category with PAPIs



Airports Not Meeting PAPI Objectives

Advanced

- Mifflin County Airport
- Titusville Airport

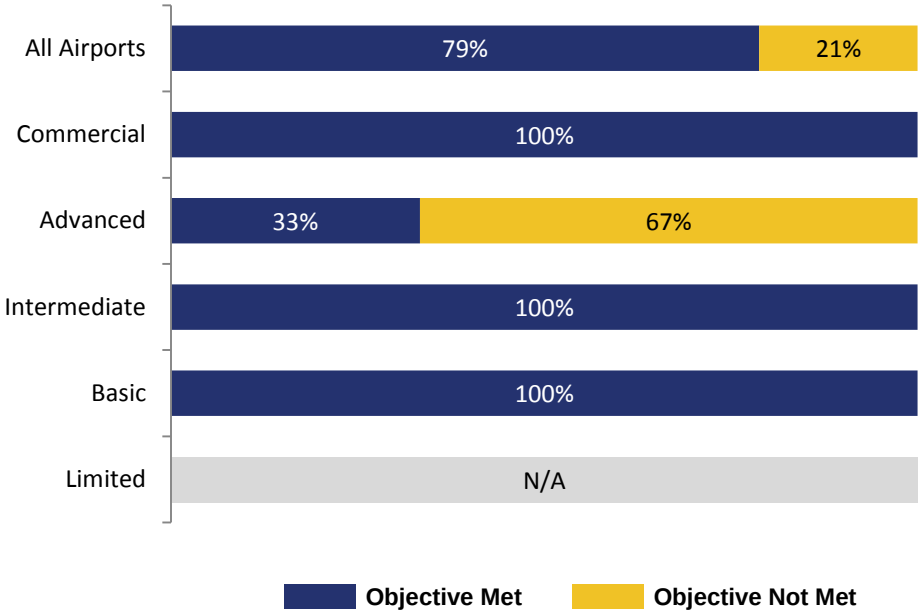
1.8.6. Approach Lights

Approach lights are crucial complements to instrument approach systems. They provide a visual safety buffer, especially at times of low visibility. The approach lights objectives are as follows:

- Commercial: Medium-Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR)
- Advanced: any Approach Lighting System (ALS)
- Intermediate: Visual Glide Slope Indicator (VGSI)
- Basic: Visual Glide Slope Indicator (VGSI)
- Limited: None

Figure 7-12 shows that 79 percent of airports meet their approach lights objective that apply to Commercial service (MALSR or greater), Advanced (any type of approach lighting system), and Intermediate and Basic airports (VGSI at least). Significant deficiencies exist within the Advanced Airport category. This may be due to the physical constraints preventing the installation of a system due to terrain or the inability of improving instrument approach visibility minimums.

Figure 7-12: Percent of Airports by Category that Meet Approach Lighting Objectives



Airports Not Meeting Approach Lighting Objectives

Advanced

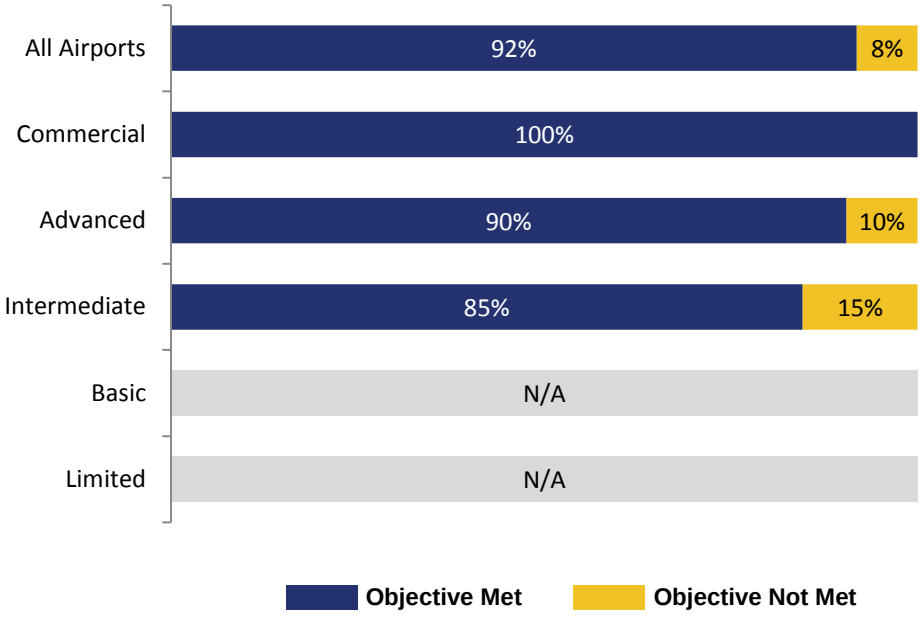
- Beaver County Airport
- Bedford County Airport
- Chester County/G.O. Carlson Airport
- Clarion County Airport
- Indiana Co./Jimmy Stewart Airport
- Mifflin County Airport
- Penn Valley Airport
- Pocono Mountains Municipal Airport
- Schuylkill Co./Joe Zerbey Airport
- Somerset County Airport
- Titusville Airport
- Washington County Airport
- York Airport
- Zelienople Municipal Airport

1.9. Weather Equipment

Airports capable of providing on-site weather updates offer an additional safety buffer to aircraft using their facilities, especially during periods of inclement weather. For this objective, Commercial, Advanced, and Intermediate airports should have either an ASOS or an AWOS. Basic and Limited facilities are excluded from this objective.

In total, 92 percent of airports have installed a weather reporting equipment to meet this objective, as shown in **Figure 7-13**. Four airports, two Advanced and two Intermediate, do not meet this criterion.

Figure 7-13: Percent of Airports by Category that Meet Weather Equipment Objectives



Airports Not Meeting Weather Equipment Objectives

Advanced	Intermediate
- Beaver County Airport	- Corry-Lawrence Airport
- Titusville Airport	- Grove City Regional Airport

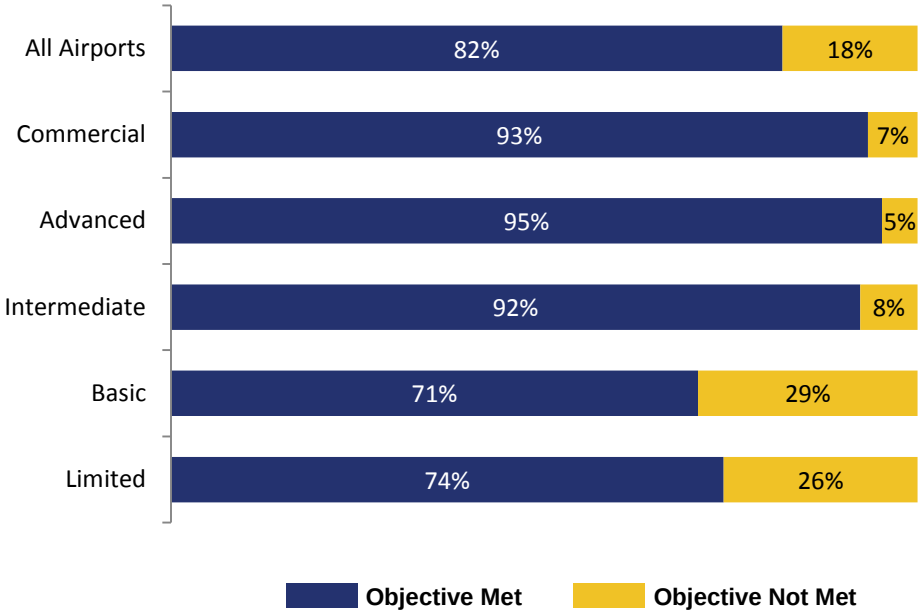
1.10. Services

Airports with a diverse range of services are more likely to continue meeting Pennsylvania's aviation needs, while providing customer satisfaction. The SASP recognizes a total of six core services as part of its performance measures. These include public telephones, public restrooms, FBOs, maintenance facilities, jet fuel, and ground transportation. **Figures 7-14 to 7-19** show the percentages of airports that meet these various objectives.

1.10.1. Public Phone

Although the use of public telephones has been on the decline, mainly due to the rise of cellular service, they remain a back-up option of communication for pilots. However, in the future, this objective could be considered for elimination from the overall performance matrix. In total, 82 percent of system airports offer public telephone service, as displayed in **Figure 7-14**.

Figure 7-14: Percent of Airports by Category with a Public Phone



Airports Not Meeting Public Phone Objectives

Commercial	Advanced	Intermediate	Basic	Limited
- Wilkes-Barre/Scranton International Airport	- Allegheny County Airport	- Pennridge Airport	- Bloomsburg Municipal Airport - Brandywine Airport - Donegal Springs Airpark - Franklin County Regional Airport	- Bendigo Airport - Farmers Pride Airport - Finleyville Airpark - Grimes Airport

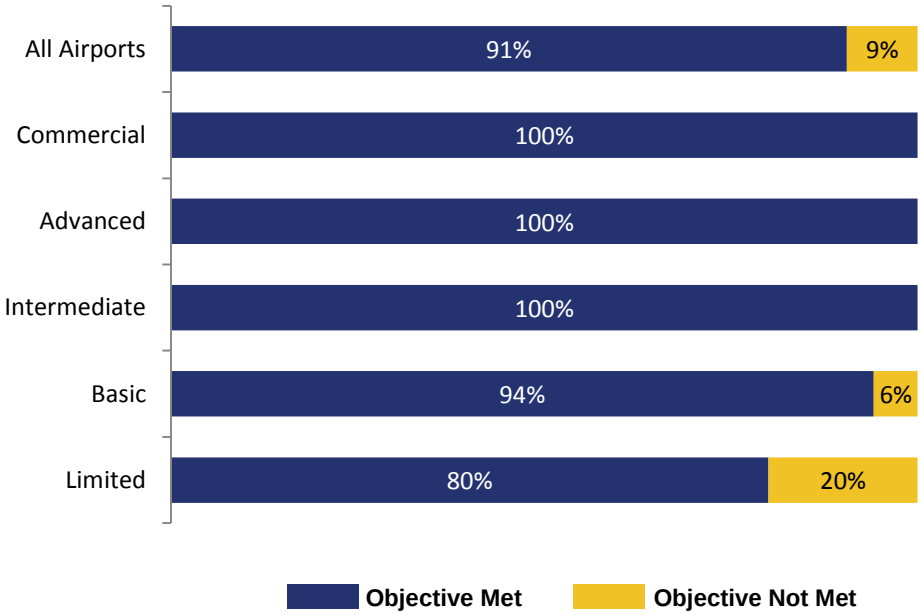
Airports Not Meeting Public Phone Objectives (Continued)

Commercial	Advanced	Intermediate	Basic	Limited
			- Pittsburgh Northeast Airport	- Husky Haven Airport - McVille Airport - Mid-Atlantic Soaring Center - Morgantown Airport - Perkiomen Valley Airport - Reigle Field - Spring Hill Airport - Stroudsburg-Pocono Airport - Sunbury Airport

1.10.2. Public Restroom

Most airports meet their public restroom objective. As shown in **Figure 7-15**, all Commercial, Advanced, and Intermediate airports have accessible restrooms.

Figure 7-15: Percent of Airports by Category with a Public Restroom



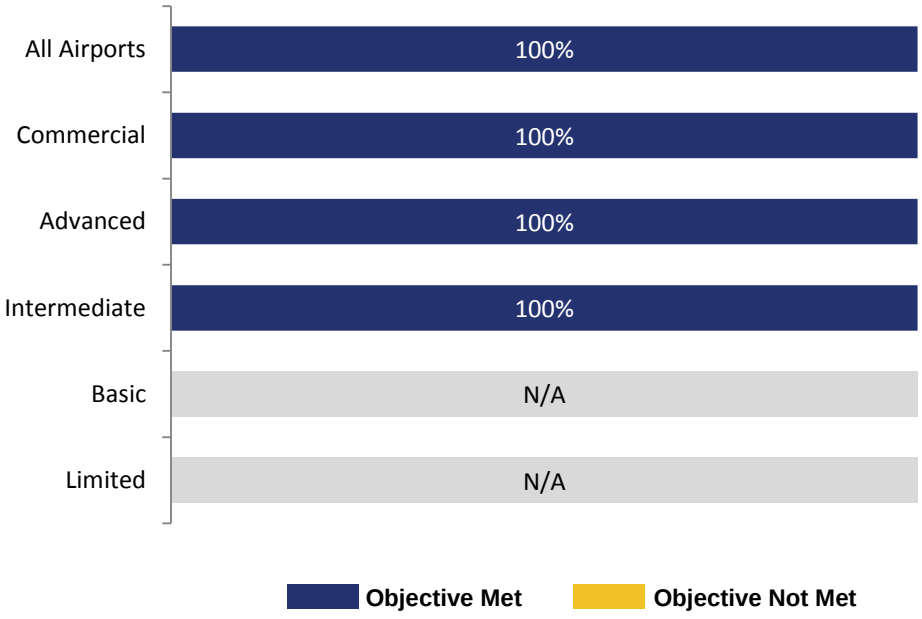
Airports Not Meeting Public Restroom Objectives

Basic	Limited
- Bloomsburg Municipal Airport	- Albert Airport
	- Bandel Airport
	- Butter Valley Golf Port
	- Flying Dollar Airport
	- Kampel Airport
	- Keller Bros. Airport
	- Lakehill Airport
	- Lazy B. Ranch
	- Morgantown Airport
	- Sunbury Airport

1.10.3. Fixed-Base Operators (FBOs)

FBOs are essential facilities for aircraft and pilot services. As such, they are required at Commercial, Advanced, and Intermediate airports, which all currently satisfy this objective, as displayed in **Figure 7-16**.

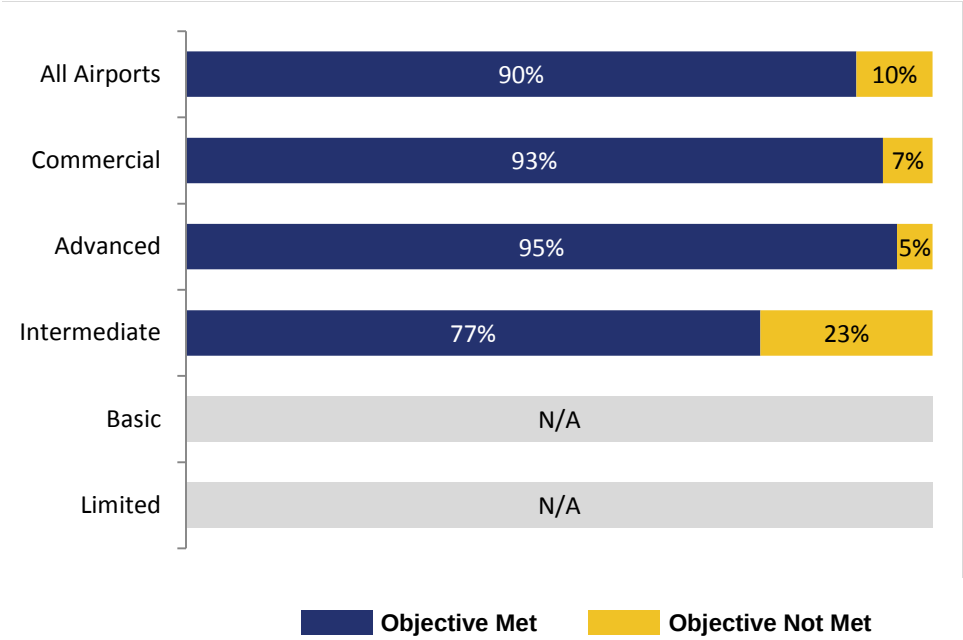
Figure 7-16: Percent of Airports by Category with a FBO



1.10.4. Maintenance Facility

Commercial, Advanced, and Intermediate airports should have a maintenance facility, where aircraft airframe, power plant and/or avionics repairs, inspection and/or new installations could be performed. **Figure 7-17** indicates that 90 percent of these state system airports meet this objective.

Figure 7-17: Percent of Airports by Category with a Maintenance Facility



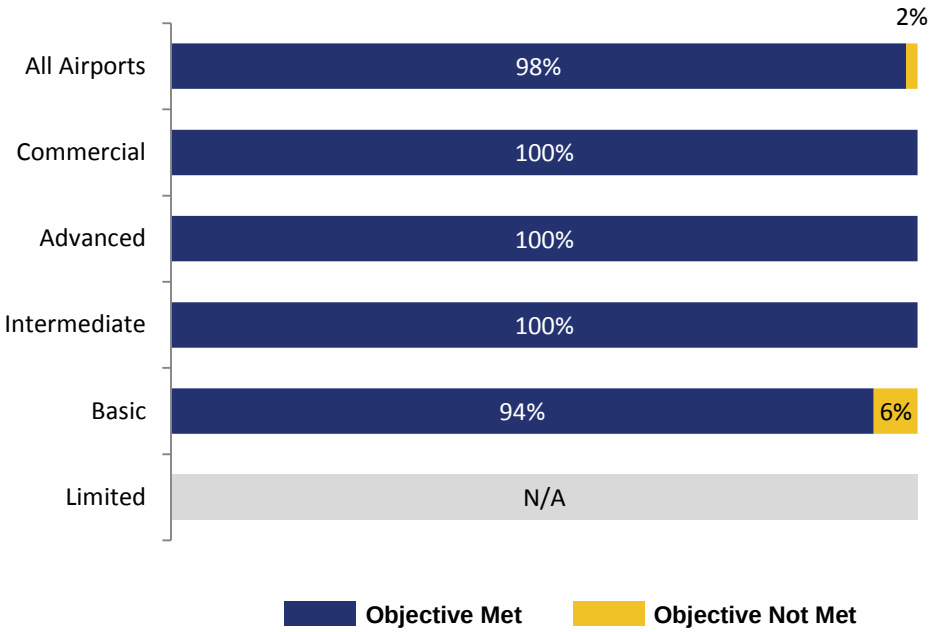
Airports Not Meeting Maintenance Facility Objectives

Commercial	Advanced	Intermediate
- Dubois Regional Airport	- Clarion County Airport	- Clearfield-Lawrence Airport
		- Corry-Lawrence Airport
		- Grove City Regional Airport

1.10.5. Jet Fuel

Airports with adequate jet fuel facilities have a greater capacity to meet the state's aviation demand. Overall, 98 percent of system airports that should possess this service objective offer jet fuel. Only one Basic airport does not, as shown in **Figure 7-18**. Limited airports are exempt from this objective.

Figure 7-18: Percent of Airports by Category with Jet Fuel



Airports Not Meeting Jet Fuels Objectives

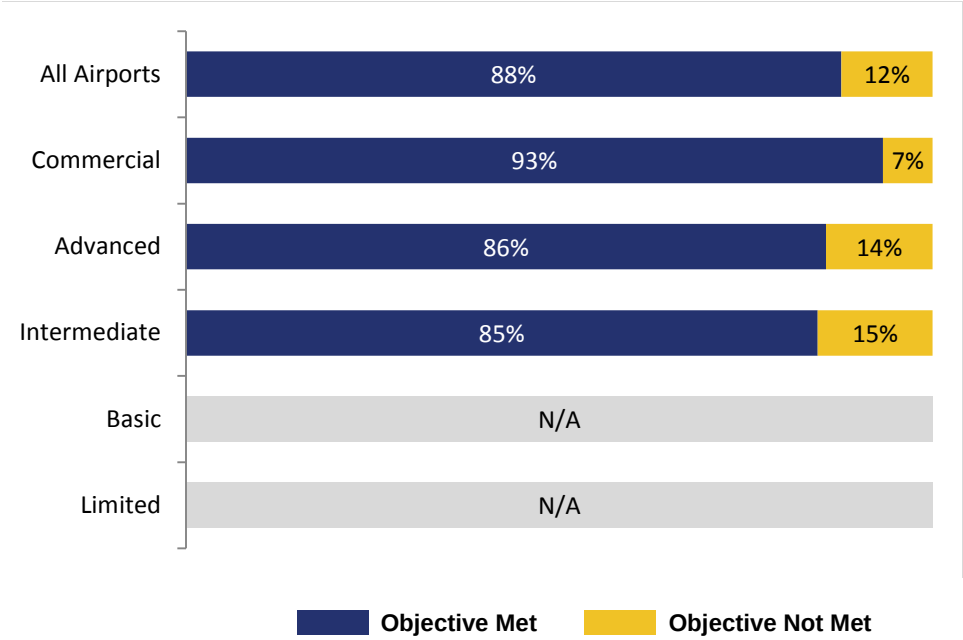
Basic

- Franklin County Regional Airport

1.10.6. Ground Transportation

Ground transportation, including taxicabs, car rentals, and/or scheduled bus service, provides greater accessibility to and from airports. As such, Commercial, Advanced, and Intermediate airports should offer this service. **Figure 7-19** indicates that 88 percent of airports comply with this objective.

Figure 7-19: Percent of Airports by Category with Ground Transportation



Airports Not Meeting Ground Transportation Objectives

Commercial	Advanced	Intermediate
- Dubois Regional Airport	- Hazleton Regional Airport	- Pennridge Airport
	- Schuylkill Co./Joe Zerbey Airport	- Rostraver Airport
	- Somerset County Airport	

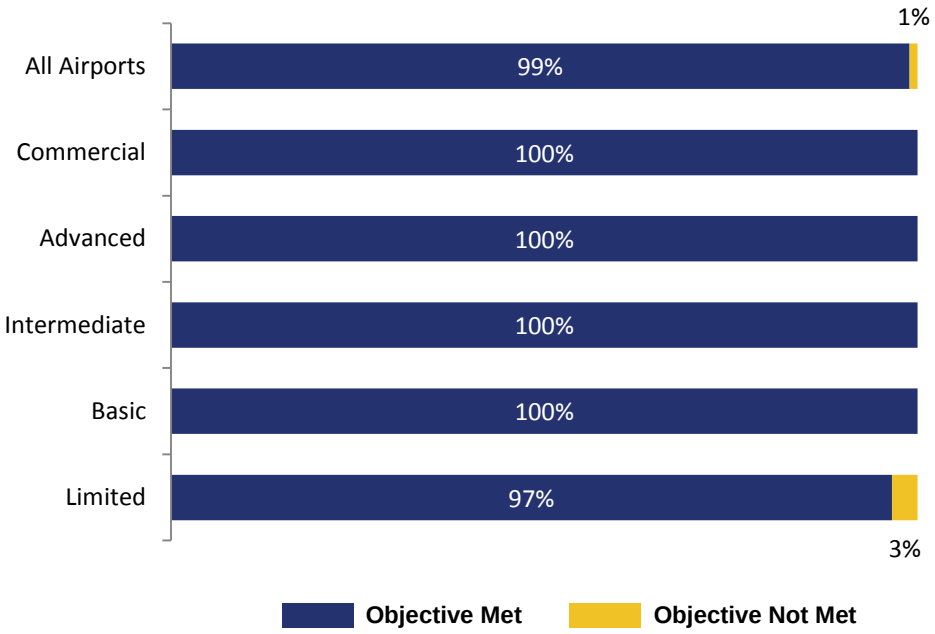
1.11. Facilities

Similar to services, facilities play a key role in supporting aviation and business needs, as well as enhancing overall customer satisfaction. In total, the SASP recognizes four major facilities as being essential to adequate commercial and GA operations. Three of these are on the airside – parking apron, storage, and terminal – and one on the landside – car parking. **Figures 7-20 to 7-23** highlight the airports that fulfill their objectives.

1.11.1. Local and Itinerant Parking Apron

Flexible parking aprons allow for more aircraft capacity. Pennsylvania's system airports score well, with 99 percent of airports fulfilling this objective, as displayed in **Figure 7-20**.

Figure 7-20: Percent of Airports by Category that Meet Local and Itinerant Parking Apron Objectives



Airports Not Meeting Local and Itinerant Parking Apron Objectives

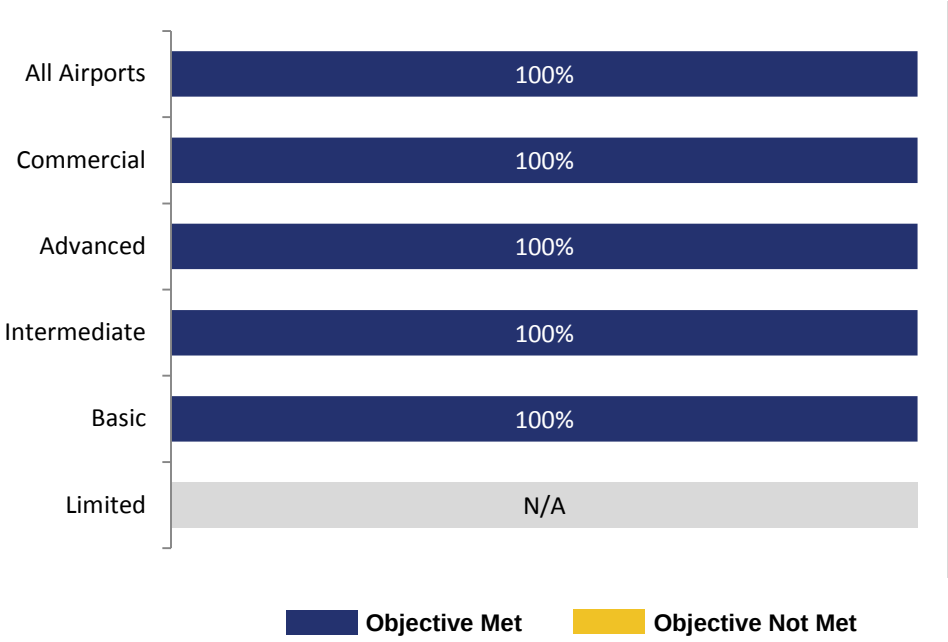
Limited

- Butter Valley Golf Port

1.11.2. Storage

As shown in **Figure 7-21**, 100 percent of airports meet the storage facility objective, including nested t-hangars or community hangars. However, an airport may have a waiting list for new tenants that could justify additional storage facilities.

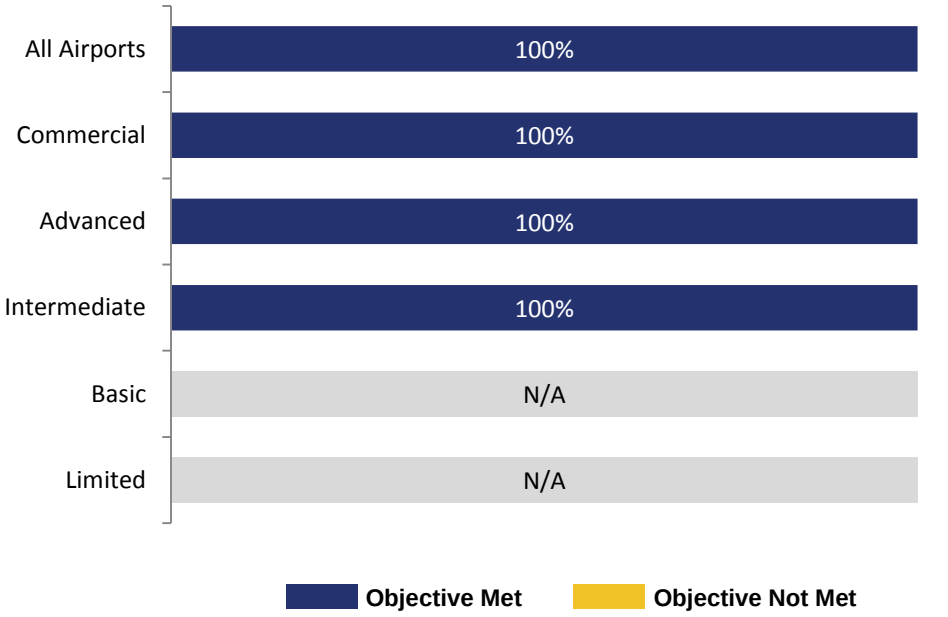
Figure 7-21: Percent of Airports by Category that Meet Storage Objectives



1.11.3. Terminal

Figure 7-22 shows that 100 percent of Commercial, Advanced, and Intermediate airports have some form of terminal facilities. These can be stand-alone buildings or attached to a hangar.

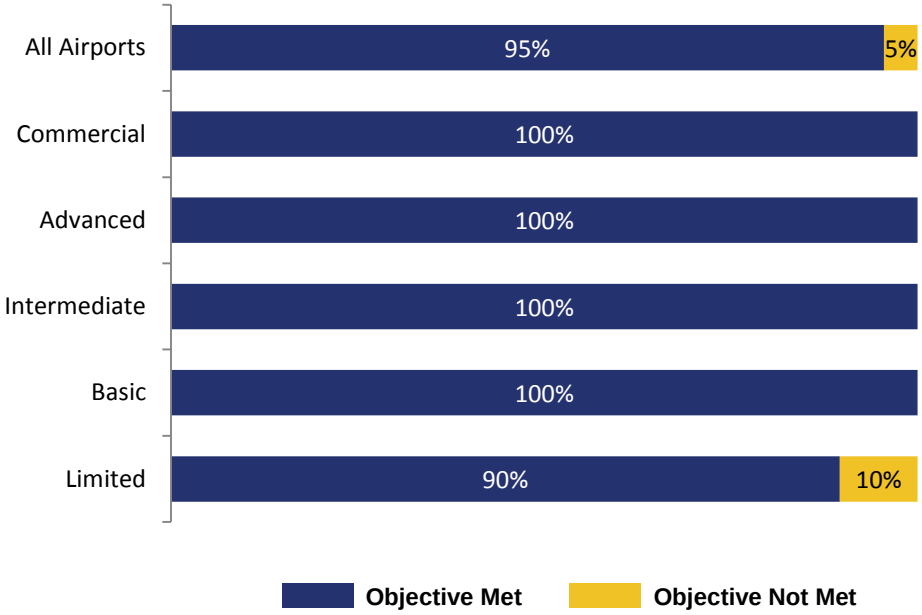
Figure 7-22: Percent of Airports by Category that Meet Terminal Objectives



1.11.4. Car Parking

The availability of close and affordable car parking enhances customer experience at airports. As shown in **Figure 7-23**, Pennsylvania's airports are well served by parking, with 95 percent of them having adequate facilities.

Figure 7-23: Percent of Airports by Category that Meet Car Parking Objectives



Airports Not Meeting Parking Objectives

Limited

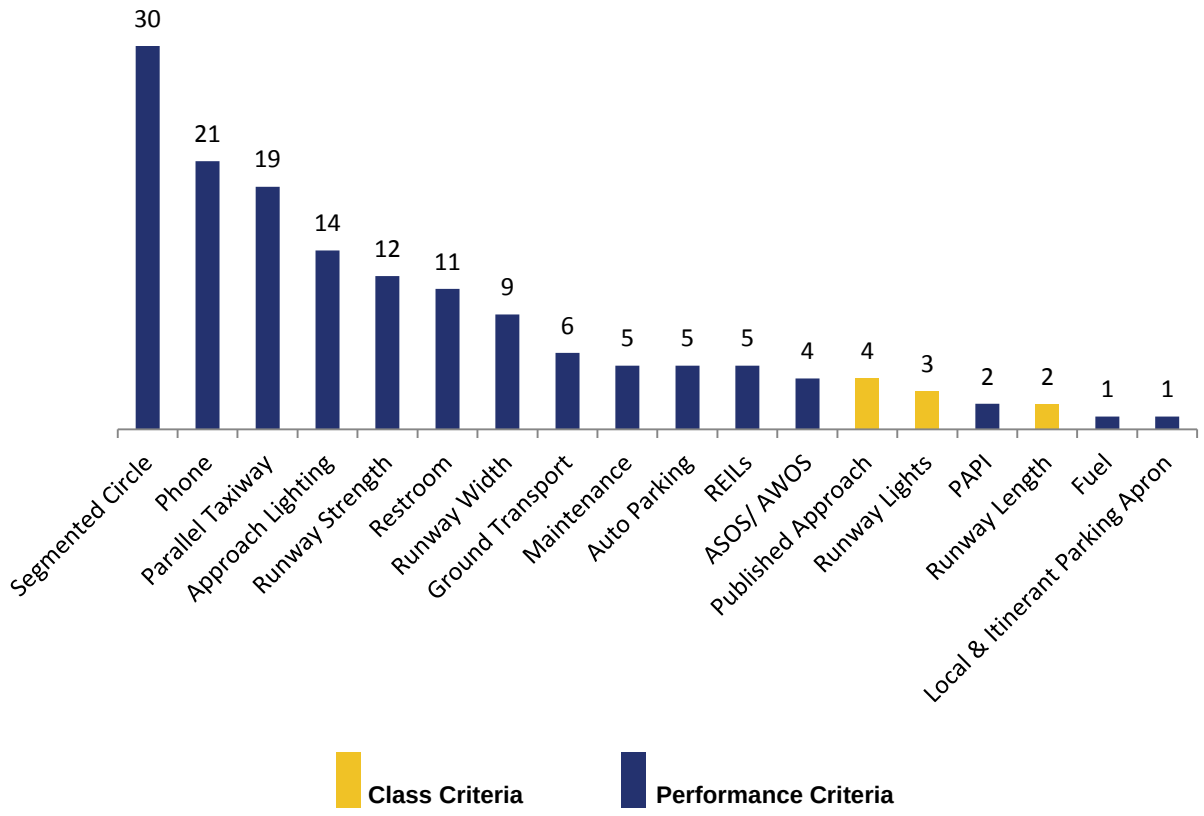
- Bandel Airport
- Cove Valley Airport
- Flying Dollar Airport
- Inter County Airport
- Lakehill Airport

1.12. Most Common Unmet Objectives

Of all 116 airports included in this analysis, 27 meet all their minimum objectives. The vast majority have a number of objectives which remain unfulfilled based on their classification requirements.

All in all, the most common needs identified are those listed under the performance criteria. These include segmented circles, public phones, parallel taxiway, approach lighting, and runway strength requirements. The more essential class criteria, which include runway length, published approach, and runway lights requirements, are generally met by most system airports**. Figure 7-24** shows the number of airports that have not met their airport classification criteria's performance objectives.

Figure 7-24: Number of Airports by Unmet Objectives



2. Airport System Access

Pennsylvania residents and businesses rely on a functioning and accessible system of airports. It is therefore beneficial that they have easy access to any system airport within a reasonable drive time. As part of this section, population coverage within specific drive times is assessed to determine accessibility levels of residents and economic centers to different types of system airports. In addition, potential gaps within the system are identified. Population coverage ratios are calculated for the following drive time scenarios:

- Thirty minutes (for all airports within the system)
- Thirty minutes (for NPIAS airports only)
- Forty-five minutes (for Commercial and Advanced airports)
- Sixty minutes (for Commercial airports only)

The results are displayed in **Table 7-1**:

Table 7-1: Drive Time Population Coverage Ratios

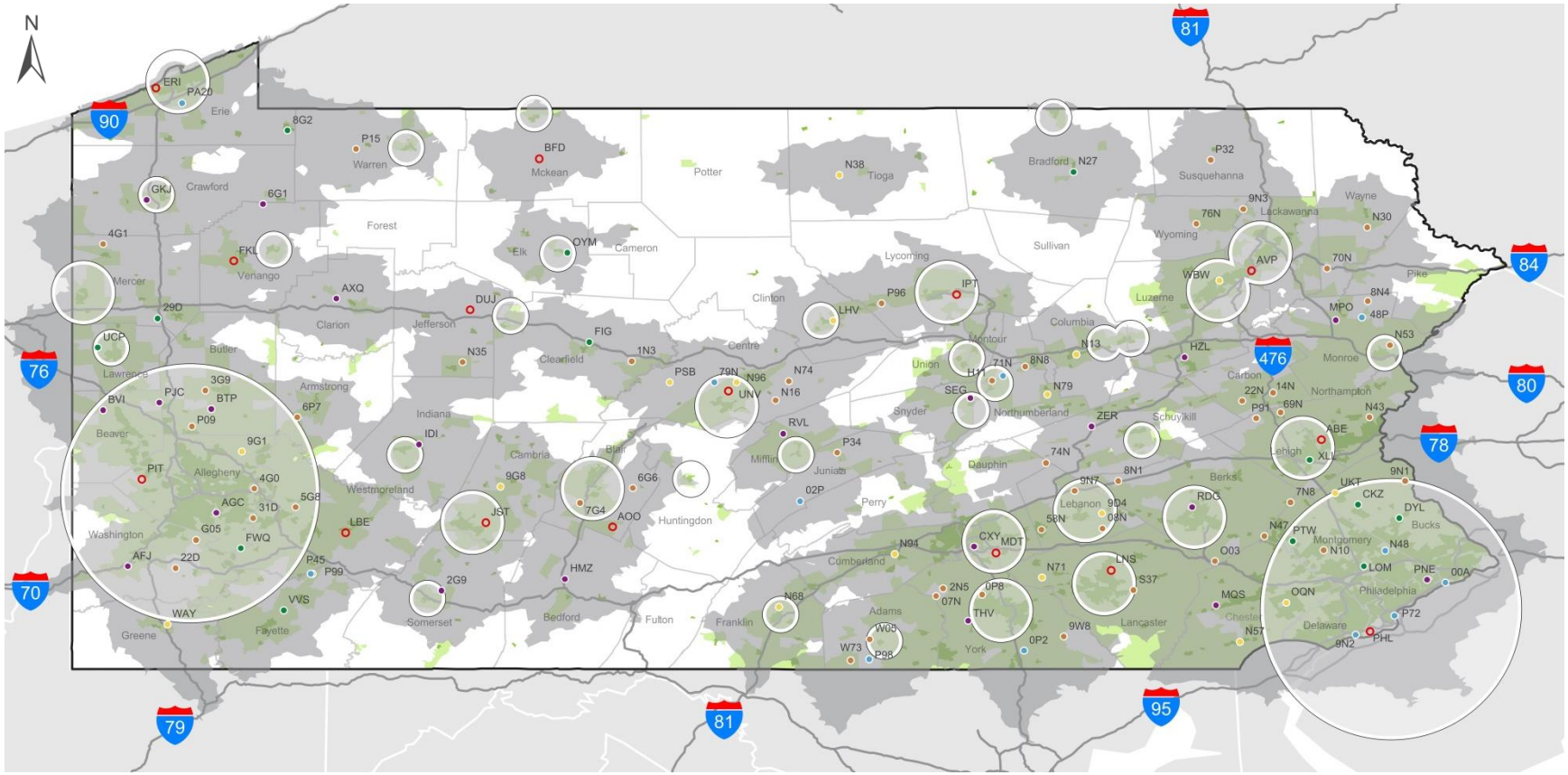
	Population Covered	Coverage Ratio	Population Covered by Out-of-State Airports	Out-of-State Airport Coverage Ratio	Total Airport Coverage Ratio
PA	**12,702,379**	**100%**			
30-minute (All Airports)	12,236,166	96%	-	-	96%
30-minute (NPIAS)	11,391,686	90%	77,093	1%	91%
45-minute (Commercial/Advanced)	11,908,813	94%	339,369	3%	97%
60-minute (Commercial)	12,061,348	95%	304,627	3%	98%

Source: 2010 Census, United States Bureau of the Census

2.1. Access to All System Airports

Figure 7-25 shows 30-minute drive time access to all 128 airports in Pennsylvania's airport system. The analysis further demonstrates that 96 percent of the state's population has access to a system airport within this drive time. This equates to over 12.2 million residents. Additionally, all major population and economic centers are covered by this drive timeframe

Figure 7-25: 30-Minute Drive Time to All System Airports



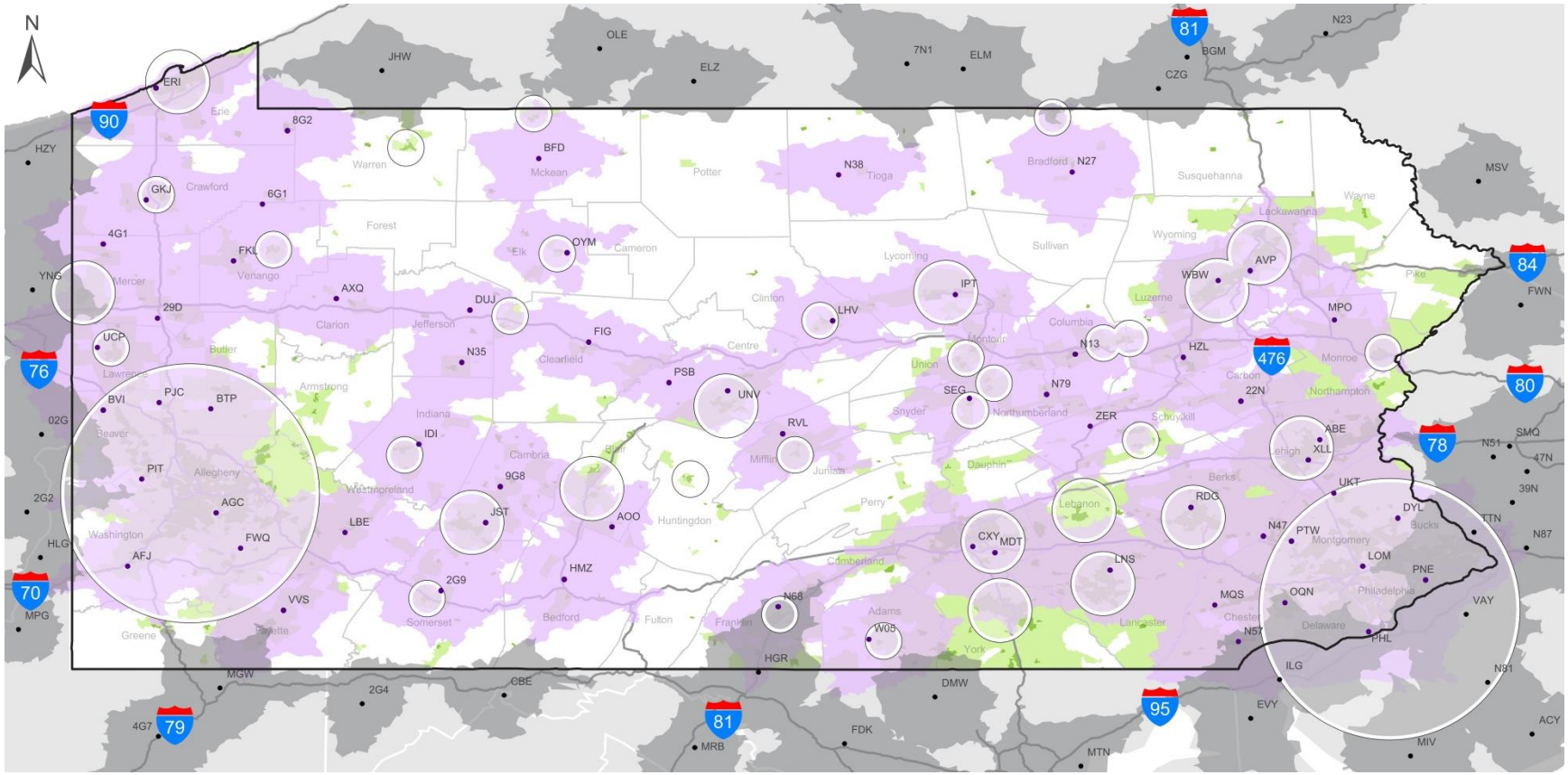
2.2. Access to NPIAS Airports

Pennsylvania currently has 63 airports categorized within the FAA National Plan of Integrated Airport Systems (NPIAS). These facilities are considered of high significance to national air transportation, and could therefore qualify for federal grants under the Airport Improvement Program (AIP) provided that a series of prerequisites, criteria and other steps are met for sponsor/project eligibility.

Figure 7-26 highlights 30-minute drive time coverage to all 63 NPIAS airports in Pennsylvania. In total, 90 percent of the state's population has access to a NPIAS airport in less than a 30-minute drive. This corresponds to roughly 11.3 million individuals.

Additional coverage is provided from out-of-state NPIAS airports, specifically from the states of New York, New Jersey, Delaware, Maryland, West Virginia, and Ohio. In total, 89,000 Pennsylvanians not covered by in-state NPIAS airports fall within a 30-minute drive time to an out-of-state NPIAS airport. This corresponds to one percent of the state's population, bringing total coverage to 91 percent.

Figure 7-26: 30-Minute Drive Time to NPIAS Airports



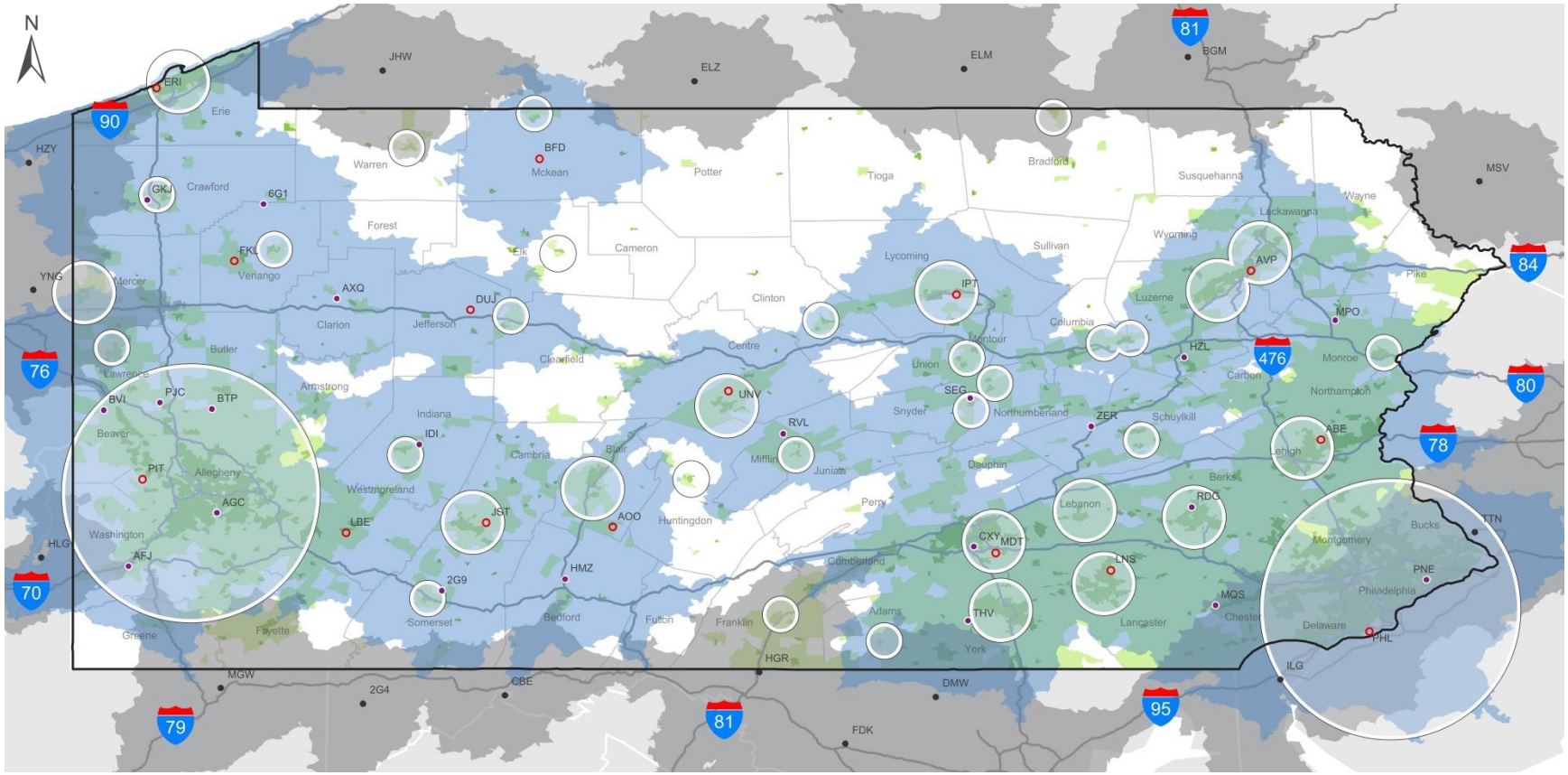
2.3. Access to Commercial and Advanced Airports

A total of 36 airports are classified as either Commercial or Advanced in Pennsylvania. A 45-minute drive time coverage is represented in **Figure 7-27**. In total, 94 percent of the state's population falls within this coverage.

The map also depicts an additional coverage ratio of three percent, which comes from 45-minute drive times to out-of-state airports. The latter include the Pennsylvania equivalent of Advanced and Commercial airports.

When accounting for out-of-state coverage, a total of 97 percent of Pennsylvania's population has access to an Advanced or Commercial airport in less than a 45-minute drive.

Figure 7-27: 45-Minute Drive Time to Commercial and Advanced Airports



LEGEND

- Commercial
- Advanced
- Out-of State

POPULATION DENSITY
(per square mile)

- < 100
- 100 – 1,000
- > 1,000

Economic Center
(Source: Defining a Core PA Transportation System, Pennsylvania State Transportation Advisory Committee, 2006)

45 Minute Drive Time (PA)

45 Minute Drive Time (Out-of State)

94% In-State Coverage + 3% Out-of-State Coverage = 97%

of Pennsylvania's Population Is Covered Within 45 Minutes of PA and Out-of State Airports

0 25 50 100 Miles

2.4. Access to Commercial Airports

Commercial airports are essential facilities for local communities. Not only do they directly support thousands of jobs, they equally connect Pennsylvania residents to the world, and vice-versa. A total of 15 airports are currently in operation, and are dispersed throughout the state.

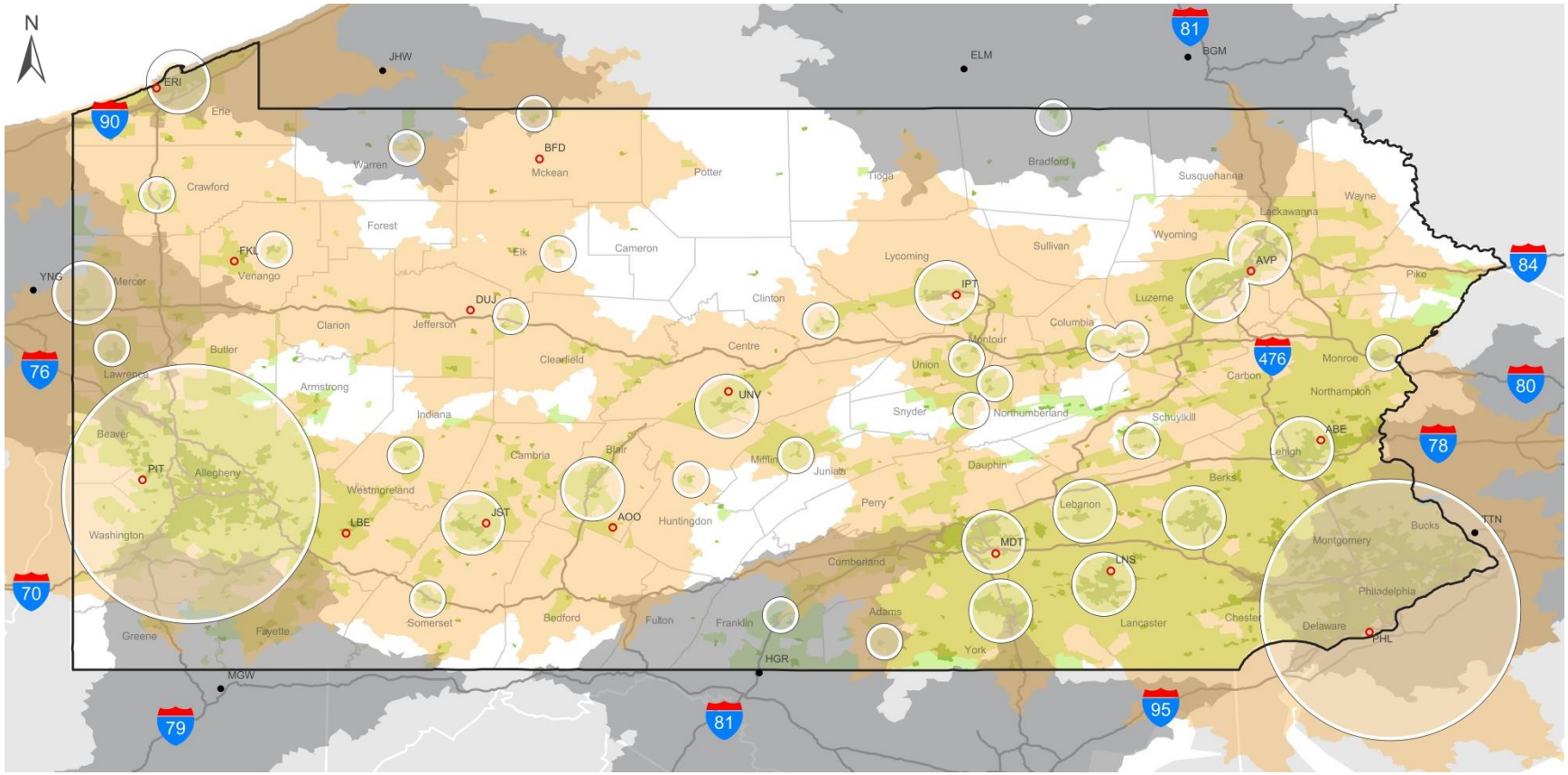
Figure 7-28 depicts 60-minute drive time polygons to all Commercial airports. This timeframe represents the maximum travel time a Pennsylvania resident should have to drive to reach a Commercial airport. In this case, 95 percent of the population can access a state Commercial airport in less than an hour's drive. An additional coverage of three percent comes from out-of-state Commercial airports, bringing the total coverage to 98 percent.

Overall, all major population and commercial centers fall within this drive timeframe.

2.5. Gaps in the System

Overall, the vast majority of Pennsylvania residents have access to a system airport in less than an hour's drive. However, minor gaps do exist in certain parts of the state. The northern areas of Wayne County and Pike County in northeast Pennsylvania could potentially benefit from additional in-state airport coverage, although for the time being, local residents can continue to rely on Sullivan County International Airport in New York for coverage. Other areas requiring enhanced access to airports are the northeastern suburbs of the Pittsburgh metropolitan area, particularly those in north Allegheny County and Armstrong County. Pittsburgh-Northeast Airport, a privately-owned facility in Northeast Allegheny County, or McVille Airport, another privately-owned facility in central Armstrong County, may be considered in the future to potentially qualify as a NPIAS airport if one of them would become publicly-owned and meet a series of prerequisites for inclusion contained in FAA ASSET study criteria and NPIAS Field Formation guidance. Doing so would significantly increase drive time coverage of NPIAS airports as shown in Figure 7-26.

Figure 7-28: 60-Minute Drive Time to Commercial Airports



3. Airport System Deficiencies and Constraints

Not all airports in the Pennsylvania airport system have been able to meet the minimum performance objectives as set in Section 1. As a result, various facilities could face difficulty accommodating future aviation needs and demand. Identifying the most crucial needs and prioritizing them is therefore essential for the improvement and maintenance of the Pennsylvania airport system.

On another level, there are some airports with identified performance needs that are facing specific physical and/or operational constraints preventing them from meeting such needs. Identifying these airports and assessing their constraints is vital, since alternative measures may need to be taken to better preserve and maintain the state's aviation system.

In this section, a methodology to identify the most important system needs by airport is developed. This approach is based on a weighted scoring system that ranks airports on a scale of 0 to 100 percent, and according to their ability to meet criteria objectives set in Section 1. Airports that score less than 75 percent are considered for further analysis and added to the list of most critical facilities. The latter are then evaluated more closely to identify any potential constraints that would prevent them from meeting their objectives in the future.

3.1. Constrained Airports

- ***Methodology for Scoring Airport Performance***

In Section 1, the ability of airports to meet their criteria objectives is assessed. In this analysis, each airport is given a score on a scale of 0 to 100 percent, based on its fulfillment of all 23 criteria objectives. Whenever an objective is met, the facility is given a "1". When an objective is not fulfilled, a "0" is attributed. To give a fairer representation of the level of deficiency, and to properly account for the significance of each performance measure, various weights approved by the Project Oversight Committee are allocated to the different criteria. Class criteria, particularly runway length requirements, are given greater weights, which additionally vary by airport category. **Table 7-2** depicts weight allocation as developed for this study by airport category.

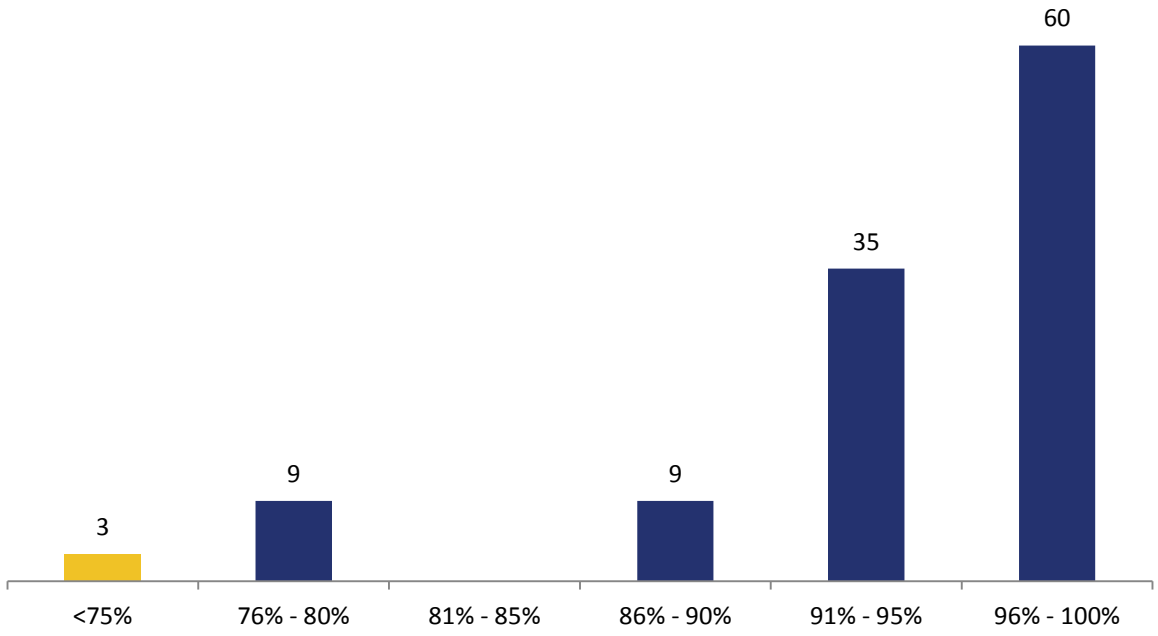
System preservation should be the highest priority for aviation system investment. This includes maintenance of existing airport infrastructure, starting with the runway and its approach and departure surfaces and progressing to landside facilities and ground access. Other important priorities are economic development opportunities that can foster airport sustainability. However, these should only be pursued provided they are financially feasible and locally supported, and there is a justified need and verifiable positive return on investment. Airports seeking federal, state and local investment should use their individual 12 to 20-year capital improvement plans in the process to prioritize projects.

Table 7-2: Scoring Weights by Airport Category (%)

Airport Category	Runway Length	Published Approach	Runway Lights	Runway Width	Runway Strength	Parallel Taxiway	Rotating Beacon	Lighted Wind Indicator	Segmented Circle	REILs	PAPI	Approach Lighting	ASOS/ AWOS	Phone	Restroom	FBO	Maintenance	Fuel	Ground Transport	Local and Itinerant Parking Apron	Storage	Terminal	Auto Parking	TOTAL
Commercial	20	15	15	5	5	5	2	2	1	1	2	3	3	1	1	2	1	2	2	2	2	6	2	100
Advanced	25	15	15	5	5	5	2	2	1	1	2	3	3	1	1	2	1	2	1	2	2	2	2	100
Intermediate	25	15	15	5	5	5	2	2	1	1	0	2	3	1	1	2	1	2	1	3	3	2	3	100
Basic	35	15	15	5	5	5	2	2	1	0	0	2	0	1	1	0	0	2	0	3	3	0	3	100
Limited	65	0	0	10	10	0	0	5	0	0	0	0	0	2	2	0	0	0	0	3	0	0	3	100

Based on the resulting individual scores, **Figure 7-29** shows the total number of airports broken down by scoring group. Overall, 95 airports (82 percent) score above 90 percent, 9 airports (8 percent) between 80 percent and 90 percent, and the remaining 12 airports (10 percent) less than 80 percent.

Figure 7-29: Number of Airports by Scoring Category



- ***Constrained Airports Shortlist***

As a rule, the most constrained airports are defined as those with an overall weighted score of less than 75 percent. In total, there are three airports that fall within this range. They are:

- Intermediate Airports:
  - Doylestown Airport (DYL), Bucks County 70 percent
  - Heritage Field Airport (PTW), Montgomery County 75 percent
- Basic Airports:
  - Brandywine Airport (OQN), Chester County 73 percent

Moving forward, these three facilities are further evaluated to determine the reasons behind their deficiencies, and the constraints they may face with regards to accommodating upgrades.

3.2. Airport System Constraints

Table 7-3 summarizes the various needs and constraints faced by the identified list of critical airports, broken down by objective. In many instances, these facilities have demand that justifies their higher classification, but are unable to expand to meet their required objectives. This is particularly the case for Doylestown and Brandywine airports.

3.2.1. Doylestown Airport

Doylestown Airport, located in Bucks County, is currently classified as an Intermediate facility. However, it fails to meet two major classification objectives, runway length and runway width. Runway 05/23 is 3,004 feet long, falling short of the 3,800 feet requirement. Its width is currently 60 feet, 15 feet below the 75-foot minimum objective set for the Intermediate airport classification standard. In 2005, a $30-million expansion plan was proposed, which included the extension of the runway and the addition of more hangars to increase capacity. However, the project was subsequently abandoned following strong community opposition. To date, this opposition remains a major reason behind the airport's inability to address its constraints, and is the main cause for limited future growth potential.

3.2.2. Heritage Field Airport

Heritage Field Airport in Montgomery County is another Intermediate facility. The sole reason behind its low score is the length of its existing Runway 10/28, which falls 404 feet short of its classification objective. With land available on the departure end of Runway 28, an extension could be further evaluated in the future.

3.2.3. Brandywine Airport

Brandywine Airport is a Basic facility located in Chester County. It currently fails to meet five of its minimum objectives: runway lights, runway width, runway strength, segmented circle, and public phone. The airport has plans to widen Runway 09/27 from 50 to 60 feet, and replace low intensity edge lighting with medium intensity (MIRL). Doing so would significantly enhance its score. There are no major constraints in addressing the remaining unmet objectives. However, the surrounding airport property developments and other constraints significantly limit future expansion. The presence of Route 202 to the west and major commercial establishments to the east of the airport severely impact any potential runway extension.

Table 7-3: Constraints Matrix of Shortlisted Airports

Airport	LOC ID	Score	Objective Need[2]	Objective Weight	Existing Objective	Minimum Objective	Major Constraints	Ability to Address Constraints	Future Expansion Potential
Intermediate									
Doylestown Airport[1]	DYL	70%	Runway Length	25%	3,004’	3,800’	Community opposition and off-airport development	Limited	Low
			Runway Width	5%	60’	75’		Limited	
Heritage Field Airport[1]	PTW	75%	Runway Length	25%	3,371’	3,800’	None	Possible. Potential extension of Runway 10/28 to the West.	Medium - High
Basic									
Brandywine Airport	OQN	73%	Runway Lights	15%	LIRL	MIRL	None	Possible	Constrained
			Runway Width	5%	50’	60’	None	Possible. Current plans to widen runway.	
			Runway Strength	5%	10,000 lbs.	12,500 lbs.	None	Possible. Current plans to repave runway.	
			Segmented Circle	1%	-	Yes	None	Possible	
			Public Phone	1%	-	Yes	None	Possible	

[1] *These airports were reclassified in 2007 and were not reclassified a second time in 2012.*

[2] *Any airport facility, service or equipment need requires a local or bottom-up justification through master planning or document operational need.*

3.3. Accommodating Growth

3.3.1. GA and Commercial Activity

According to the latest forecasts developed by the BOA in 2016, GA and non-commercial aircraft operations are expected to increase from roughly 2.1 million to 2.3 million between 2016 and 2036. This equates to a total growth rate of 10.4 percent, or an average annual growth rate of 0.5 percent. In addition, the number of GA based aircraft is expected to rise from 4,669 to 5,234 over the same twenty-year period. This corresponds to a 12.1 percent growth rate, or 0.6 percent per year on average.

With regards to commercial activity, operations at the 15 Commercial airports are projected to grow from 614,912 to 721,505 between 2016 and 2036, or the equivalent of 0.6 percent per year. Philadelphia International Airport (PHL) and Pittsburgh International Airport (PIT) will generate around 80 percent of total operations. Detailed forecast tables can be found in **Appendix G**.

With these overall growth projections, no major additional strain on the state's airport system can be anticipated. Moreover, given population drive time coverage ratios of around 95 percent, no immediate need for additional airports is identified. The existing infrastructure will continue to support future operational demand, with a few exceptions. With respect to GA service, the three constrained airports identified in Table 7-3 should be upgraded where possible to continue meeting regional demand, especially since aircraft operations in Eastern Pennsylvania are forecasted to grow faster than the state's average. Regarding commercial activity, PHL could face major operational challenges. Despite the recent decline of commercial aircraft operations, due to the introduction of larger aircraft resulting in the consolidation of flight schedules, the airport's airspace remains constrained. It is therefore essential to continue maintaining the existing airport system, and to strengthen the role of reliever GA airports in Southeastern Pennsylvania. Doing so will continue to help reduce congestion in and around the PHL airspace, and minimize delays.

3.3.2. Alternatives and Changes to Classification

As part of the analysis, surrounding airports were evaluated to determine whether they may be upgraded to supplement and/or replace the role of the three critical airports. Thus, Basic NPIAS facilities like Quakertown Airport, and Limited facilities like Pottstown Municipal Airport were closely examined to identify their runway expansion potential, and all proved to be constrained mostly by terrain and surrounding development. Neither of these facilities will be able to complement or replace the roles of Doylestown, Heritage Field, and/or Brandywine airports in the near future. Therefore, no necessary changes to the existing airport classification are recommended for this PA SASP update. Business aviation demand in southeastern Pennsylvania that requires longer runways will continue to rely on Northeast Philadelphia and Chester County airports as well as nearby out-of-state airports, New Castle Airport (DE) and Trenton Mercer County Airport (NJ). Reading Regional Airport and Lehigh Valley International located within 50 miles of Philadelphia and closer to its Northern and Western suburbs will also serve the role.

With uncertainty as to the future of Essential Air Service that subsidize airline service to six Commercial airports, future reclassification from Commercial to Advanced may need to occur in future PA SASP Updates. These six airports also currently meet Advanced airport class criteria facility objectives.

CHAPTER 8 IMPLEMENTATION PLAN

Chapter Overview

The implementation plan chapter summarizes the major Pennsylvania Statewide Airport System Plan (PA SASP) priorities that need to be addressed in the near future, in order to secure a more resilient and modern airport system in the Commonwealth. Findings of Chapter 7 – System Requirements are used in this analysis to supplement the results of this implementation plan.

The first section provides an overview of Core Airports and System Airports. As part of the prioritization, the main focus of this chapter is on the portion of PA SASP facilities identified as Core Airports. These facilities mainly consist of airports in the National Plan of Integrated Airport Systems (NPIAS), Non-NPIAS airports serving a NPIAS role by providing population coverage to areas not covered by a NPIAS airport, and essential public special-use facilities as identified by Pennsylvania's Metropolitan Planning Organizations (MPO), Regional Planning Organizations (RPO), and the Bureau of Aviation (BOA). There are 70 airports identified as Core facilities. The 58 remaining PA SASP airports are referred to as System Airports where the emphasis is on design standards compliance and maintenance. The second part identifies key system priorities for Core Airports, including drive time accessibility, potential facility upgrades, and accommodating future demand.

1. Core and System Airports in the SASP

The implementation plan recognizes a set of airports that will serve as the essential facilities to cover present and future system needs. These facilities are identified as Core Airports. They generally provide higher performance levels than the remaining PA SASP airports, due to their larger size, more advanced facilities, and higher share of state aviation activity. Consisting primarily of airports in the NPIAS, Core Airports are mainly classified in the PA SASP as Commercial, Advanced, or Intermediate including 49 of 70 airports, with the other 21 Core Airports coming from the Basic, Limited and Special-Use classifications. All remaining public-use facilities are referred to as System Airports. While remaining important to the system and eligible for funding, the state's potential future funding focus will concentrate on safety, maintenance and design standard compliance, rather than major expansion projects for the System Airports.

In this report, a total of 70 airports within the state of Pennsylvania are considered to be Core facilities, with the remaining 58 serving as System Airports:

- **Core Airports**
  - Primary airports as defined in the FAA's NPIAS
  - Non-primary airports as defined in the FAA's NPIAS that are also classified in the FAA ASSET
  - Non-NPIAS airports that serve a Core Airport role by providing system coverage to population centers not covered by a NPIAS airport's service area or possess 2016 activity levels equal to or exceeding FAA ASSET National or Regional categories. These airports could potentially meet NPIAS entry criteria if they were publicly-owned
  - Public Special-Use facilities identified as being an essential transportation asset by its MPO, RPO and the BOA

- **System Airports**
  - All other public-use facilities not classified as a Core facility

The BOA utilizes established federal classifications as a basis for differentiating Core and System Airports. The majority of Core Airports are grouped into two major NPIAS categories: Primary and Non-primary. Primary airports are public airports that have more than 10,000 passenger enplanements annually and receive scheduled passenger service. Non-primary airports consist of general aviation, reliever, and Commercial airports that have annual passenger enplanements between 2,500, and 10,000. Pennsylvania has nine Primary and 53 Non-primary airports.

Furthermore, the PA SASP identifies four traditional Non-NPIAS Core Airports. These include Carlisle Airport (N94), Deck Airport (9D4), Pennridge Airport (CKZ), and York Airport (THV). Another Non-NPIAS Core category includes Public Special-Use facilities. Penn's Landing – Pier 36 Heliport is currently the only facility classified as such under this category. Three other Non-NPIAS airports, Cherry Ridge Airport (N30), McVille Airport (6P7) and Pittsburgh Northeast Airport (9G1) are identified as "Candidate" Core Airports. These airports cover gaps in population and business centers, yet need to demonstrate long term sustainability and commitment to the system as the other Non-NPIAS facility traditionally have accomplished through the years. Public-ownership, which could likely result in FAA funding eligibility, is desirable for any non-NPIAS Core facility provided it can meet the NPIAS entry requirements.

Figure 8-1 illustrates a detailed breakdown of Pennsylvania's 128 SASP airports under this airport classification process.

Figure 8-1: PA SASP Airports Categorization Breakdown

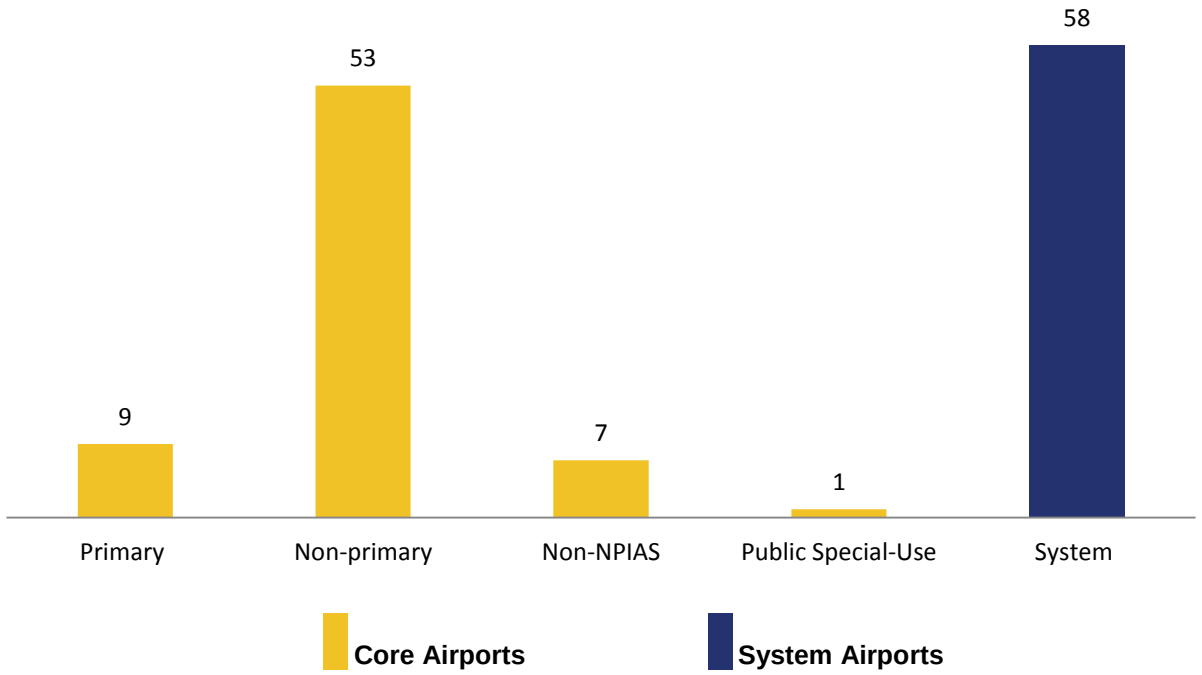


Table 8-1 below shows the list of Core Airports in the state of Pennsylvania classified into one of the four categories as mentioned above.

Table 8-1: List of Core Airports by SASP Classification

Airport	Code	County	Category
Commercial (15)			
Altoona-Blair County Airport	AOO	Blair	**Non-primary**
Arnold Palmer Regional Airport	LBE	Westmoreland	**Primary**
Bradford Regional Airport	BFD	McKean	**Non-primary**
Dubois Regional Airport	DUJ	Jefferson	**Non-primary**
Erie International Airport Tom Ridge Field	ERI	Erie	**Primary**
Harrisburg International Airport	MDT	Dauphin	**Primary**
John Murtha Johnstown-Cambria County Airport	JST	Cambria	**Non-primary**
Lancaster Airport	LNS	Lancaster	**Non-primary**
Lehigh Valley International Airport	ABE	Northampton	**Primary**
Philadelphia International Airport	PHL	Delaware	**Primary**
Pittsburgh International Airport	PIT	Allegheny	**Primary**
University Park Airport	UNV	Centre	**Primary**
Venango Regional Airport	FKL	Venango	**Non-primary**
Wilkes-Barre/Scranton International Airport	AVP	Luzerne	**Primary**
Williamsport Regional Airport	IPT	Lycoming	**Primary**

Table 8-1: List of Core Airports by SASP Classification (Continued)

Airport	Code	County	Category
Advanced (21)			
Allegheny County Airport	AGC	Allegheny	**Non-primary**
Beaver County Airport	BVI	Beaver	**Non-primary**
Bedford County Airport	HMZ	Bedford	**Non-primary**
Capital City Airport	CXY	York	**Non-primary**
Chester County/G.O. Carlson Airport	MQS	Chester	**Non-primary**
Clarion County Airport	AXQ	Clarion	**Non-primary**
Hazleton Regional Airport	HZL	Luzerne	**Non-primary**
Indiana Co./Jimmy Stewart Airport	IDI	Indiana	**Non-primary**
Mifflin County Airport	RVL	Mifflin	**Non-primary**
Northeast Philadelphia Airport	PNE	Philadelphia	**Non-primary**
Penn Valley Airport	SEG	Snyder	**Non-primary**
Pittsburgh-Butler Regional Airport	BTP	Butler	**Non-primary**
Pocono Mountains Municipal Airport	MPO	Monroe	**Non-primary**
Port Meadville Airport	GKJ	Crawford	**Non-primary**
Reading Regional/Carl A Spaatz Field	RDG	Berks	**Non-primary**
Schuylkill Co./Joe Zerbey Airport	ZER	Schuylkill	**Non-primary**
Somerset County Airport	2G9	Somerset	**Non-primary**
Titusville Airport	6G1	Crawford	**Non-primary**
Washington County Airport	AFJ	Washington	**Non-primary**
York Airport	THV	York	**Non-NPIAS**
Zelienople Municipal Airport	PJC	Beaver	**Non-primary**
Intermediate (13)			
Bradford County Airport	N27	Bradford	**Non-primary**
Clearfield-Lawrence Airport	FIG	Clearfield	**Non-primary**
Corry-Lawrence Airport	8G2	Erie	**Non-primary**
Doylestown Airport	DYL	Bucks	**Non-primary**
Grove City Regional Airport	29D	Mercer	**Non-primary**
Heritage Field Airport	PTW	Montgomery	**Non-primary**
Joseph A. Hardy Connellsville Airport	VVS	Fayette	**Non-primary**
New Castle Municipal Airport	UCP	Lawrence	**Non-primary**
Pennridge Airport	CKZ	Bucks	**Non-NPIAS**
Queen City Municipal Airport	XLL	Lehigh	**Non-primary**
Rostraver Airport	FWQ	Westmoreland	**Non-primary**
St. Marys Municipal Airport	OYM	Elk	**Non-primary**
Wings Field	LOM	Montgomery	**Non-primary**

Table 8-1: List of Core Airports by SASP Classification (Continued)

Airport	Code	County	Category
Basic (13)			
Bloomsburg Municipal Airport	N13	Columbia	**Non-primary**
Brandywine Airport	OQN	Chester	**Non-primary**
Carlisle Airport	N94	Cumberland	**Non-NPIAS**
Deck Airport	9D4	Lebanon	**Non-NPIAS**
Ebensburg Airport	9G8	Cambria	**Non-primary**
Franklin County Regional Airport	N68	Franklin	**Non-primary**
New Garden Flying Field	N57	Chester	**Non-primary**
Northumberland County Airport	N79	Northumberland	**Non-primary**
Pittsburgh Northeast Airport (*)	9G1	Allegheny	**Non-NPIAS**
Quakertown Airport	UKT	Bucks	**Non-primary**
Wellsboro-Johnston Airport	N38	Tioga	**Non-primary**
Wilkes-Barre/Wyoming Valley Airport	WBW	Luzerne	**Non-primary**
William T. Piper Memorial Airport	LHV	Clinton	**Non-primary**
Limited (7)			
Cherry Ridge Airport (*)	N30	Wayne	**Non-NPIAS**
Gettysburg Regional Airport	W05	Adams	**Non-primary**
Greenville Municipal Airport	4G1	Mercer	**Non-primary**
Jake Arner Memorial Airport	22N	Carbon	**Non-primary**
McVille Airport (*)	6P7	Armstrong	**Non-NPIAS**
Pottstown Municipal Airport	N47	Montgomery	**Non-primary**
Punxsutawney Municipal Airport	N35	Jefferson	**Non-primary**
Special Use (1)			
Penns Landing-Pier 36 Heliport	P72	Philadelphia	**Public Special-Use**

(*) Candidate Core Airport

2. Airport System Priorities

In order for Core Airports to continue accommodating growth in Pennsylvania, a number of key priorities are recommended to be addressed in the near future. Doing so will also ensure that the airport system meets its minimum performance objectives and maximizes on statewide airport system benefits. The main priorities established for Core Airports consist of the following:

1) Maximizing drive time accessibility of population and economic centers, and reducing identified gaps
2) Implementing, along with system preservation and economic development needs, feasible upgrades and expansions justified through the master planning process or documented operational need
3) Ensuring that operational capacity will accommodate future demand

2.1. Drive Time Accessibility

Access to Core Airports within a reasonable drive time is essential in maintaining efficiency throughout the Pennsylvania airport system as businesses and residents rely on functional and accessible airports. This section illustrates the share of the state's population that falls within a 30-minute drive time to a Core Airport. Coverage of major economic centers is similarly analyzed, and the most significant gaps are adequately identified.

2.1.1. Access to Core Airports

Figure 8-2 highlights 30-minute drive time coverage to all 70 Core Airports in Pennsylvania's airport system. The results summarized in **Table 8-2** indicate that 93 percent of the state's total population has access to a Core Airport within this drive time. Additional population coverage of one percent is provided by out-of-state NPIAS airports. This share corresponds to the percent of Pennsylvanians not covered by in-state Core Airports, but falling within a 30-minute drive time to an out-of-state NPIAS airport. When accounting for out-of-state coverage, a total of 94 percent of Pennsylvania's population has access to a Core Airport within a 30-minute drive.

Table 8-2: Drive Time Population Coverage Ratios

	Population Covered	Coverage Ratio	Out-of-State Pop. Covered	Out-of-State Coverage Ratio	Total Coverage Ratio
PA	**12,702,379**	**100%**			
30-minute (Core Airports)	11,810,364	93%	61,102	1%	94%

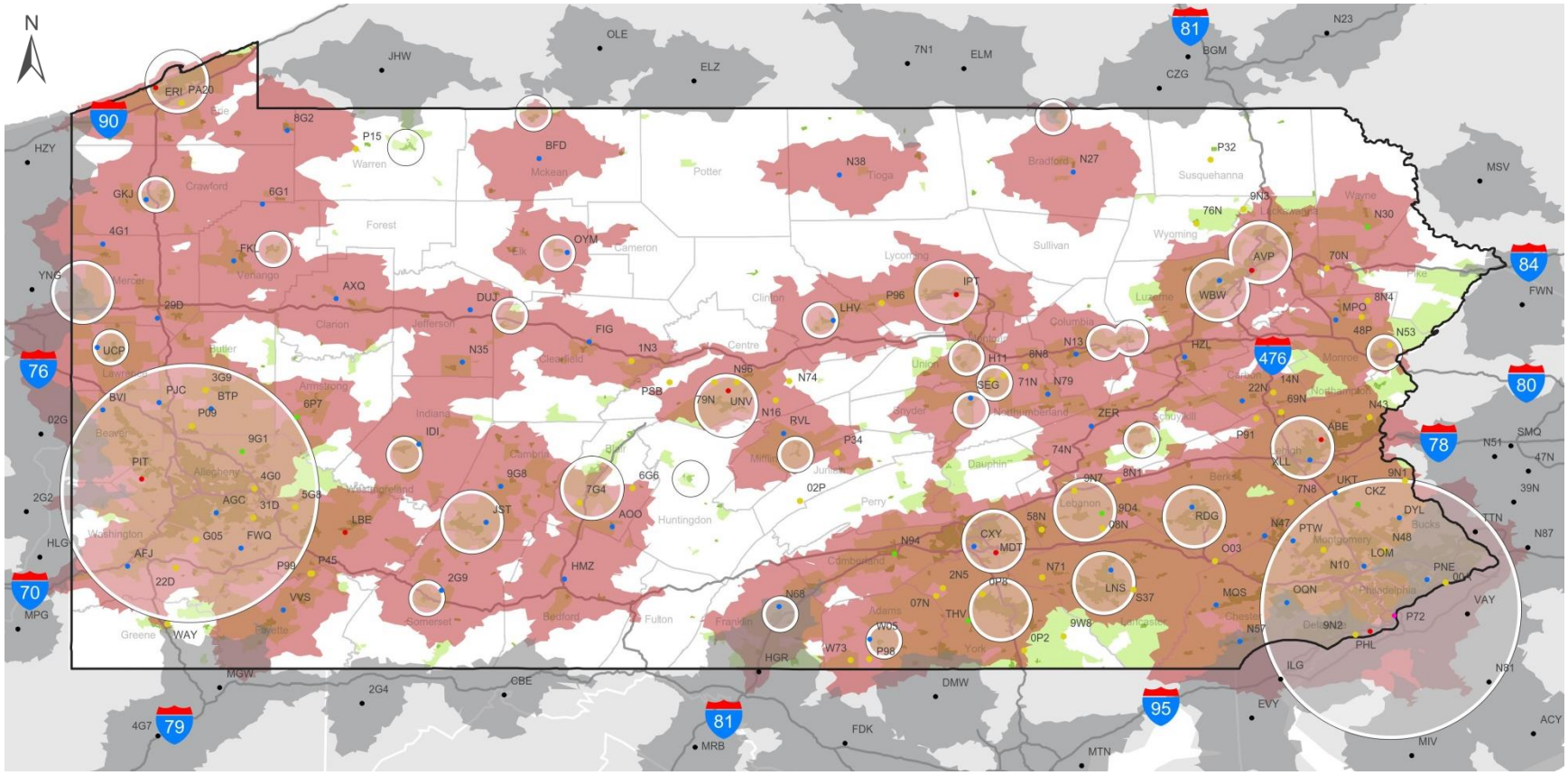
Source: 2010 Census, United States Bureau of the Census

2.1.2. Drive Time Gaps

Overall, the vast majority of Pennsylvania's population is conveniently located within a 30-minute drive to a Core Airport. Most economic centers are also covered within this drive time. However, certain gaps have been identified in this analysis. Such gaps include areas in the northeastern suburbs of Pittsburgh, namely in Armstrong and Westmoreland counties, the southern parts of York and Lancaster counties that only have system airport coverage, and the eastern portion of Pike County. Two secondary economic centers also remain outside the coverage area. These include the towns of Warren and Huntingdon, located in the same named counties in northwestern and south-central PA respectively.

As mentioned previously, Core Airports include all 62 NPIAS airports, in addition to one Special-Use and seven Non-NPIAS facilities. When comparing Figure 8-2 to the 30-minute coverage map of NPIAS airports in Chapter 7 – System Requirements, it can be noted that many of the gaps previously identified are being covered due to the inclusion of four Non-NPIAS airports in the Core Airports drive time map. These facilities include York Airport (THV), Deck Airport (9D4), Cherry Ridge Airport (N30), and McVille Airport (6P7), which provide additional coverage to York, Lebanon, Wayne, and Armstrong counties respectively. In fact, they increase in-state population coverage by an additional three percent compared to the coverage provided by NPIAS airports only, illustrated in Figure 7-26 of the System Requirements chapter.

Figure 8-2: Recommended 30-Minute Drive Time Core Airports Map



2.2. Airport and SASP Optimization and Sustainability

The goals of the SASP defined the importance of supporting a system that is able to meet the demand of its users by optimizing facilities that help foster economic development and promote and preserve a sustainable statewide aviation system. **Table 8-3** lists the types of projects that are considered system preservation or economic development. These types of projects would be designed to foster economic development and/or promote and preserve a sustainable airport and system. They would be available at all System as well as Core Airports and would be equally prioritized based on an airport's classification objective (i.e. Advanced, Limited, etc.).

Table 8-3: Airport System Preservation and Economic Development Project Types

System Preservation Projects	Economic Development Projects
Existing Airfield and Airport Infrastructure Rehabilitation and Repairs	Hangars
Obstruction Removal, Lighting, and/or Marking for Existing Approaches	GA Terminal (typically attached to a hangar at smaller airports)
Airport Equipment	Fuel System Improvements
Other Airfield Safety, Standard and Security Improvements	Fuel Trucks and Other Ground Service Equipment
Enactment of Airport Hazard Zoning	Aviation Business Center Infrastructure

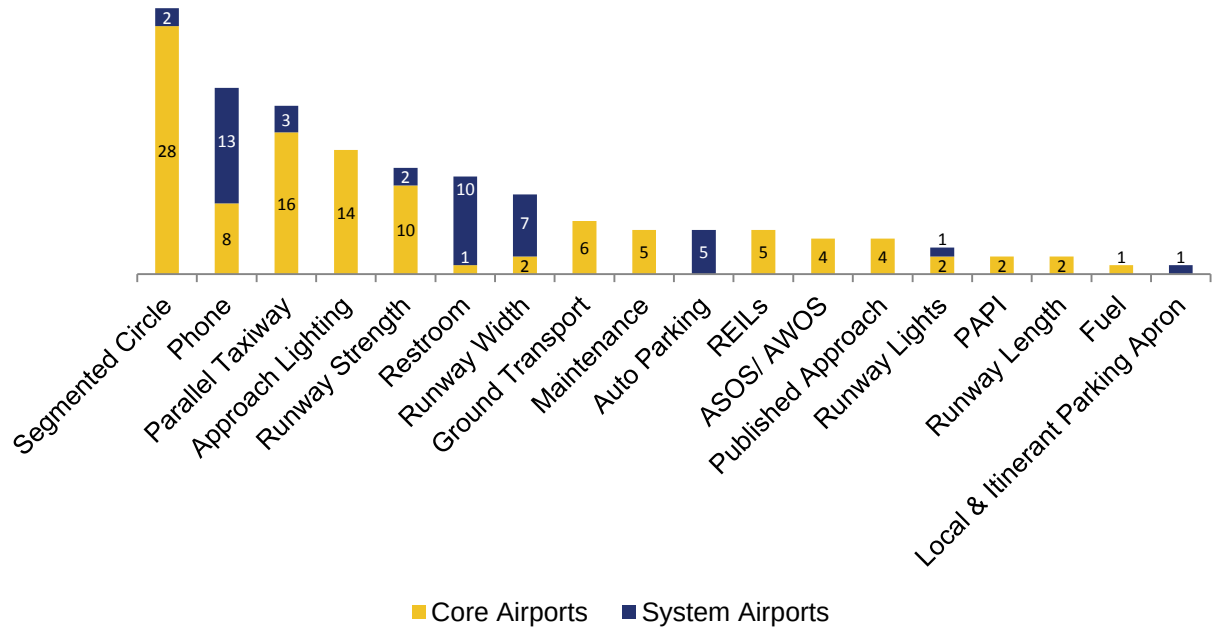
2.3. Facility Upgrades

This section identifies existing unmet performance objectives at Core Airports, which are based on classification criteria previously defined in the PA SASP. It is understood that recommended facility development projects in this PA SASP update need to be validated and verified in subsequent Master Plans and Airport Layout Plans (ALP). As Pennsylvania's system airports seek to serve existing and future demand, it is paramount that they continue maintaining up-to-date facilities and expanding them as needed. Core facilities may have a higher funding priority in the upcoming years and decades to the extent funding levels are available for any locally justified upgrade and/or expansion beyond what is needed for system optimization and sustainability. In addition, crucial improvements to three airports identified with the lowest performance scores are discussed.

2.3.1. Meeting Classification Objectives

In the System Requirements chapter, the ability of each system airport to continue meeting its classification objectives as defined by the PA SASP was evaluated. The results indicate that while most airports fulfill the majority of their objectives, some airports fail to meet one or more major objectives. **Figure 8-3** depicts the total number of airports that do not meet a given objective, broken down further into Core and System Airports. It is pertinent to note that the majority of airports failing to meet certain class or performance objectives are Core facilities.

Figure 8-3: Number of Airports by Unmet Objectives



2.3.2. Upgrades at Constrained Airports

The System Requirements chapter identified three constrained Core Airports that earned a performance score below 75 percent. This score is based on a weighted system evaluation that measures the airports' ability to meet each criteria objective. In these three cases, major objectives under the class criteria, such as runway length and runway lights, are unmet resulting in a low score of 75 percent or below. The three identified airports are Doylestown Airport (DYL), Heritage Field Airport (PTW), and Brandywine Airport (OQN). Thus, upgrading these facilities to meet their class and performance objectives is desirable given their importance in the regions they serve, and the rising demand and congestion they face. However, any airport facility, service or equipment need requires local or bottom up justification through master planning or documented operational need. In addition, these upgrades must be accepted locally by the communities the airports serve.

That said, the airports do list such development projects that would mitigate their unmet class criteria objectives on their current 12 year Capital Improvement Programs (CIPs) and their most current Master Plans or ALPs, although not all have been approved at this stage. Land constraints and community opposition remain major obstacles to these improvements. **Table 8-4** summarizes the various projects planned at the three airports. If implemented, the airports' scores would significantly improve, enabling them to meet almost all classification objectives, greatly enhancing the overall system performance metrics. Until these facilities are able to be improved to meet more than 75% of their PA SASP class and performance criteria objectives, they will be considered as "constrained" facilities.

Table 8-4: Planned Projects at Constrained Airports

Airport	Unmet Objective	Planned Project	Construction Timeline	Cost	Funding Status*
Doylestown Airport (DYL)	Runway Length	Extend Runway 5 and Add Parallel Taxiways, Phases 1-2	2024-2026	$2.4 million	Not Planned
	Runway Width				
Heritage Field Airport (PTW)	Runway Length	Extend Runway 10/28, Phases 1-3	2017-2020	$3.4 million	Not Planned
Brandywine Airport (OQN)	Runway Lights	Rehabilitate Runway Lighting, Phases 1-2	2018-2020	$987,000	Planned
	Runway Width	Widen Runway 9/27	2017-2018	$1.1 million	Planned
	Runway Strength				
	Segmented Circle	Not Planned	-	-	-
	Public Phone	Not Planned	-	-	-

(*) Planned for funding in BOA's 2017-2018 Four-Year Program

2.4. Future Demand

Activity forecasts for operations and based aircraft at Pennsylvania's system airports were completed in the suspended 2012 PA SASP, and have been subsequently updated in 2016. **Table 8-5** shows the latest GA operations and based aircraft forecasts, while **Table 8-6** highlights updated projections for commercial aircraft operations exclusively. As noted, GA operations are expected to increase by approximately 220,000 takeoffs and landings between 2016 and 2036, which corresponds to a total growth rate of about 10 percent, or 0.50 percent per year. Based aircraft are projected to grow from 4,669 to 5,234 aircraft over the same timeframe, or by 12 percent overall or 0.57 percent annually. The aircraft operations number at the 15 Commercial hubs is forecasted to reach 721,505 by 2036, which equates to a total growth rate of 17 percent or 0.80 percent per year.

Table 8-5: GA Operations and Based Aircraft Forecast

	Historical Data		Forecast		
	2012	2016	2021	2026	2036
TOTAL (Operations)	2,455,929	2,113,703	2,173,992	2,225,869	2,334,300
TOTAL (Based Aircraft)	4,866	4,669	4,822	4,955	5,234

Source: BOA

Table 8-6: Commercial Aircraft Operations Forecast

	Historical Data		Forecast		
	2012	2016	2021	2026	2036
TOTAL	688,267	614,912	592,626	626,876	721,505

Source: BOA

Based on the forecasted numbers and using a peak hour factor of 12%, all 128 airports can anticipate around one to two additional operations per peak hour on average, which can easily be accommodated within today's runway capacity of the existing airport infrastructure. Based aircraft are expected to increase by an average of five per airport in the Pennsylvania system over the next twenty years, a number that can once again be easily accommodated. This rationale can be applied to Core Airports as well, since they currently accommodate and are expected to continue to accommodate the majority of the forecasted operations and based aircraft in the state airport system.

3. Conclusion

The Pennsylvania airport system is in a solid shape based on the performance parameters defined in Chapter 7. The average performance score is 94 percent for all PA SASP airports. With a few exceptions, most airports currently meet the vast majority of their performance objectives based on their classification, and will be capable of accommodating future demand. That said, three major priorities are taken into consideration, focusing on the seventy Core Airports, which account for the bulk of aviation activity within the state. These priorities include maximizing airport accessibility, upgrading facilities where needed, and accommodating the projected increase in operations and based aircraft.

With regards to accessibility, Pennsylvania's Core Airports provide 30-minute drive time coverage to 93 percent of Pennsylvania's population, as well as most major economic centers. In fact, this coverage ratio is three percent higher than compared to just NPIAS airports alone, due to the addition of seven Non-NPIAS facilities, which are privately-owned, public-use airports serving the system in a NPIAS role to the Core airport system.

Moving forward, the funding emphasis for Core and System Airports should focus on system preservation (including safety) and economic development, which would foster optimization and/or promote and preserve a sustainable airport system. Then typically Core Airports could be considered for upgrade and expansion projects that are feasible and justifiable through the master planning process or documented operational need.

In addressing its major priorities, the Pennsylvania airport system will maintain standards and efficiencies which are bound to retain and potentially attract more businesses to the state, and ultimately greater resilience in the years and decades to come.

CHAPTER 9 IMPACT OF COMPLETED AIRPORT IMPROVEMENTS ON THE STATE OF THE SYSTEM PERFORMANCE

Chapter Overview

This chapter derives a methodology for quantitatively and qualitatively assessing the benefits of specific airport improvements on the overall performance of the state's airport system. In developing the methodology, five case studies involving recent projects at Pennsylvania Statewide Airport System Plan (PA SASP) airports were undertaken as a means of quantifying project benefits to the system. The case study facilities include Indiana County Airport (IDI), New Garden Flying Field (N57), Pocono Mountains Municipal Airport (MPO), Erie International Airport (ERI), and McVille Airport (6P7).

Each case study includes an overview of the airport, a description of the improvement project, and a before-and-after performance assessment. To best relate the project benefit assessments to the PA SASP objectives, the case studies each involve a major aviation-related improvement project completed in the past seven years. Example types of aviation improvement projects considered valid for assessment purposes include: runway and taxiway extensions, improved navigation aids (NAVAIDS) and approach instruments, or any other aviation related economic development project such as new hangar construction. The assessment compares quantitative changes in airport operations, based aircraft, and on-airport businesses that result from the completed improvement. Qualitative impacts are also evaluated that directly relate the projects to the airport system's performance, such as design standard compliance, changes in the types of aircraft being accommodated, off-airport business development, and aircraft stage length impacts.

To help validate the results of the evaluation, input was received from the five case study airports via a survey questionnaire developed in conjunction with the Bureau of Aviation (BOA) and submitted to the airports for their response. The survey consists of four questions which focus on the completed major improvements at the specific airport, the benefits the airport recognizes from those major improvements and changes to on-airport businesses and employment. The response rate stood at 100 percent. A sample of a blank survey can be found in Appendix H.

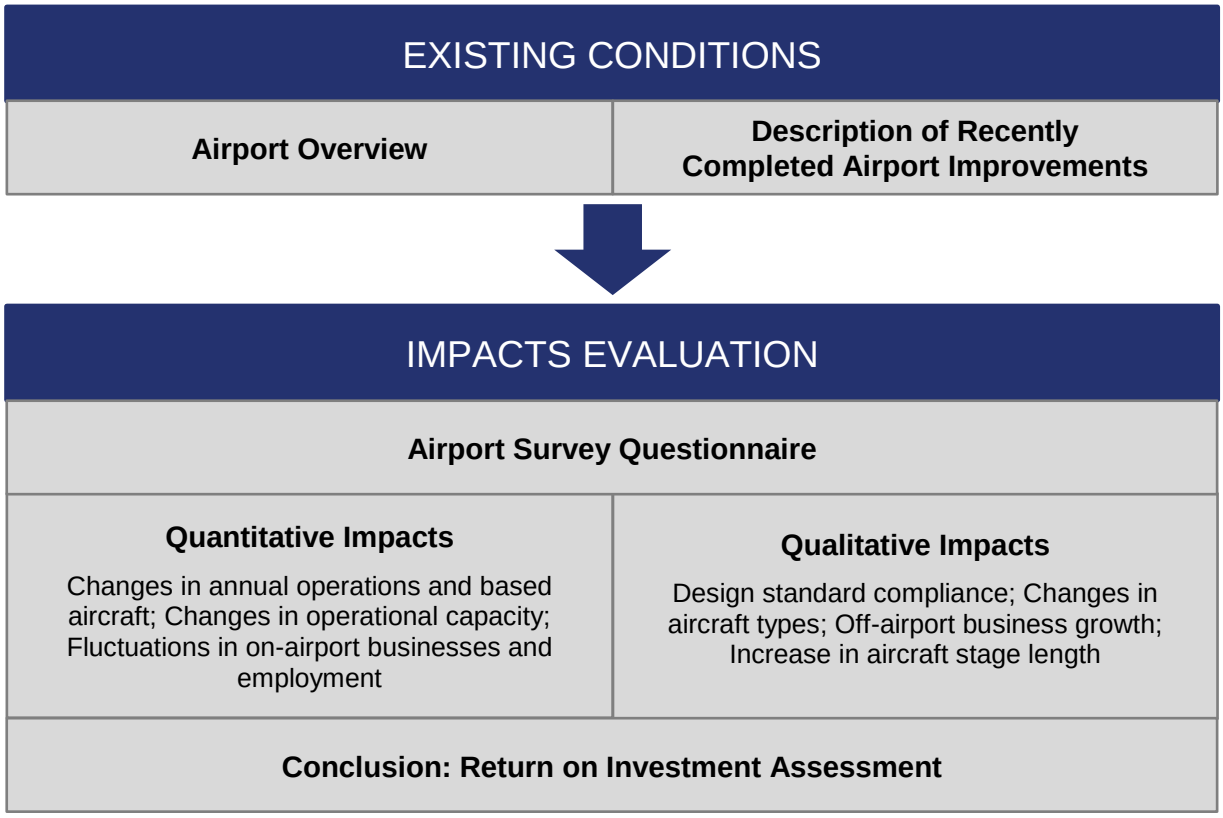
In addition, the Project Contribution Calculator, a simulation tool developed for the BOA during the 2007 PA SASP was utilized to model activity impacts of airport projects, and compared to real time outcomes received from the surveys. For this analysis, the Project Contribution Calculator takes a series of input data, which include details about the completed improvements, and generates forecasted output for annual operations and capacity changes. The Economic Impact Calculator is a similar tool utilized to predict fluctuations in the number of jobs, both temporary during construction and permanent, and in airport revenue generated by the improvement projects. The results are discussed in the following paragraphs.

In the conclusion, a methodology to determine the level of return on investment based on a specific scoring system is presented. The analysis helps in understanding the extent to which the various improvements have benefited the airports and communities they serve, and whether they may be undertaken again in the future.

1. Methodology Overview

The methodology to assess the impacts of selected airport improvements is broken down into two major parts, as depicted in **Figure 9-1** below. The first element provides an overview of the existing conditions at the given airport, and describes the completed improvements, including their nature, overall costs, and funding sources. The second element focuses on the various impacts, both quantitative and qualitative, which resulted from the airport investments. Quantitative impacts include changes in airport activity, as well as on-airport businesses and employment. Qualitative impacts focus on a broad list of elements such as design standard compliance to improved airport safety, changes in aircraft types accommodated post improvements, and aircraft stage length fluctuations, which corresponds to the maximum range of an aircraft between origin and destination based on runway length. A final assessment determines the level of return on investment for each of these airport improvements, based on the identified impacts.

Figure 9-1: Methodology Overview for Assessing the Impacts of Selected Airport Improvements



2. Indiana County Airport Case Study

2.1. Airport Overview

Located east of the borough of Indiana and 65 miles northeast of Pittsburgh, Indiana County Airport (IDI) is a publicly-owned general aviation (GA) facility classified in the PA SASP as Advanced. The airport first opened in 1951, and currently features a paved runway (11/29), a series of parallel taxiways, multiple hangars for based aircraft, a GA terminal building, and other facilities as listed in **Table 9-1**. **Figure 9-2** depicts a recent aerial of Indiana County Airport showing facilities within the airport's perimeter. In 2016, the airport accommodated 22,127 operations and based 49 aircraft.

Table 9-1: Indiana County Airport Existing Facilities Information

LOC ID	IDI
PA SASP Classification	Advanced
NPIAS	Non-primary
Runway	11/29
Runway Length	5,502 feet
Published Approach	VGA
Runway Lights	HIRL
Runway Width	100 feet
Runway Strength	30,000 lbs.
Parallel Taxiway	Full
Approach NAVAIDS	Lighted Wind Indicator, Segmented Circle, REILs, PAPI
Weather Equipment	AWOS
Services	Phone, Restroom, FBO, Aircraft Maintenance, Fuel, Ground Transportation
Facilities	Aircraft Parking Apron, Storage, Terminal Building, Auto Parking

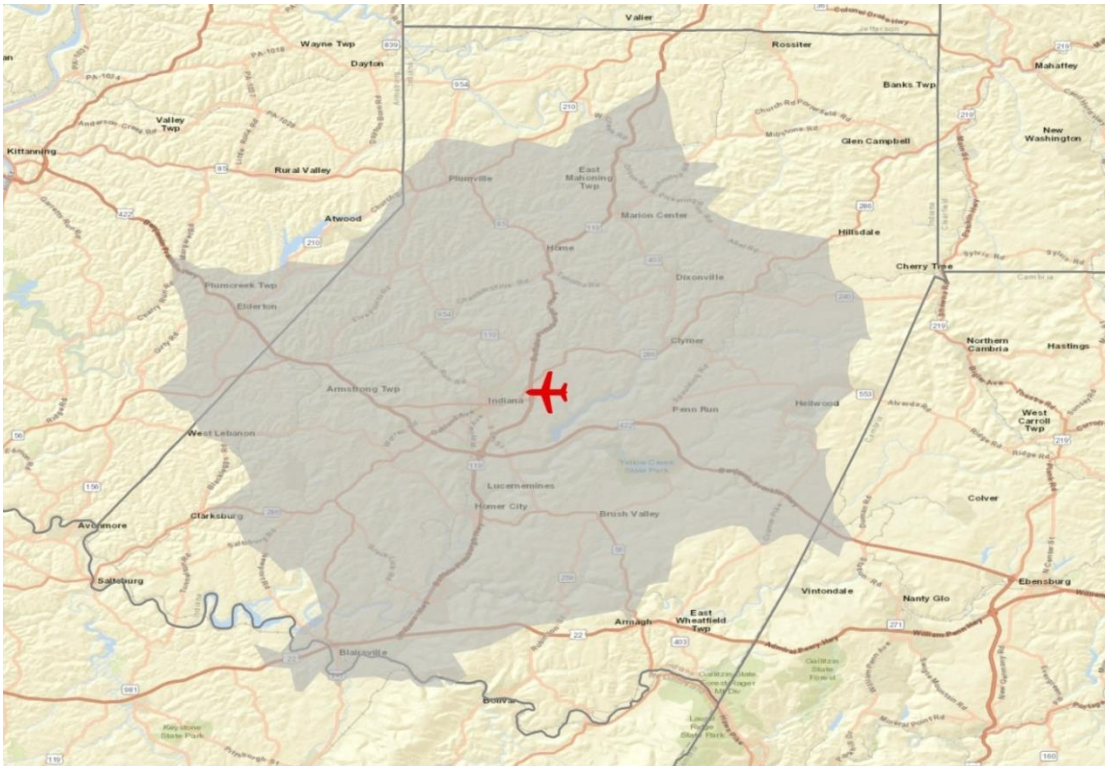
Figure 9-2: Indiana County Airport Aerial

Source: Google Earth (2015)

2.1.1. Drive Time Coverage

Indiana County Airport is an essential facility for the airport system and the only PA SASP airport in Indiana County. As highlighted in **Figure 9-3**, most of the County's area falls within a 30-minute drive time from and to the facility. Major towns and economic centers in the County are also covered within this timeframe, including Indiana, Homer City, and Blairsville. Coverage extends beyond the county's border to nearby Armstrong, Westmoreland, and Cambria counties.

Figure 9-3: 30-Minute Drive Time Coverage From/To Indiana County Airport



Source: AECOM

2.1.2. Recent Airport Improvement

In 2013, Indiana County Airport completed the relocation and extension of Runway 11/29 just south of its previous location, to a total new length of 5,500 feet. The project also included an increase in pavement thickness to accommodate 30,000 lbs. aircraft, up from an 18,000 lbs. weight restriction. The original 4,000-foot runway was re-designated and extended as a full-length parallel taxiway connecting the runway, terminal, hangars, and on-airport businesses. The new runway's location, being further away from trees and non-mitigatable obstructions on the east side, permitted the development of new approach procedures which were established in 2016. The investment project amounted to over $19 million and was funded through Federal, State, and local grants and matches (**Table 9-2**).

Table 9-2: Major Improvement at Indiana County Airport

Improvement	Year Completed	Cost	Funding Source(s)
Reconstruction and Extension of Runway 11/29	2013	$19,489,403	FAA/State/Local

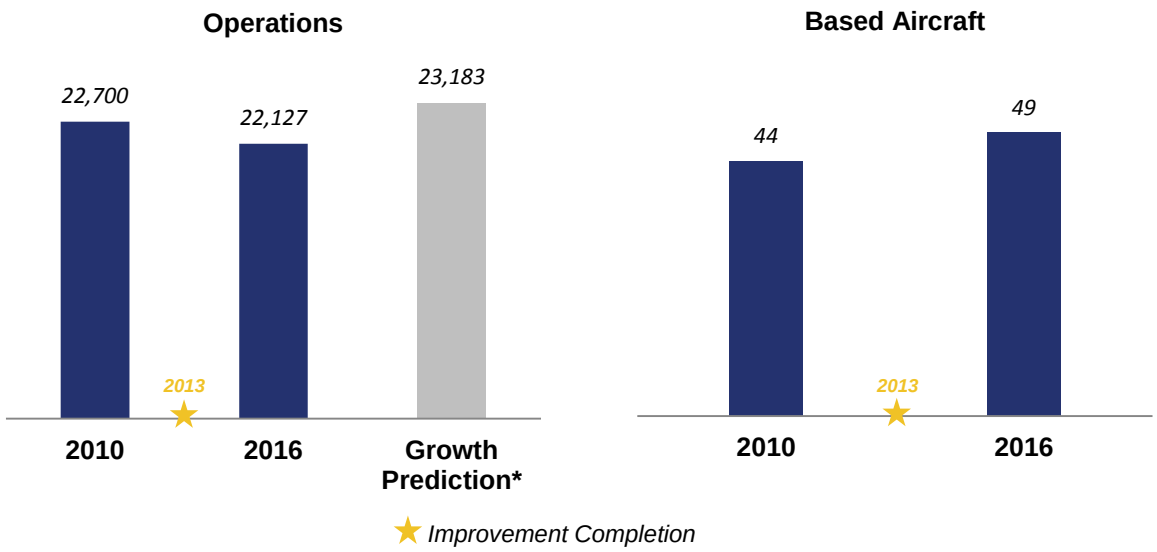
2.2. Impacts of Facility Improvements

2.2.1. Quantitative Impacts

- ***Airport Activity Changes***

The extension of Runway 11/29 had varied impacts on aviation activity at Indiana County Airport. The Project Contribution Calculator predicted an annual capacity increase of 33,325 aircraft operations, a 17 percent growth from its original 190,000 annual operations to 223,325 operations. However, total annual aircraft operations decreased slightly from 22,700 to 22,127 over the 2010-2016 case study timeframe, or by approximately two percent. Based aircraft witnessed a rise in their number from 44 to 49, the equivalent of an 11 percent increase (**Figure 9-4**). At this point, the airport has not reached the anticipated annual operations growth of 483 flights as was simulated by the Project Contribution Calculator.

Figure 9-4: Airport Activity Changes at Indiana County Airport (2010 – 2016)

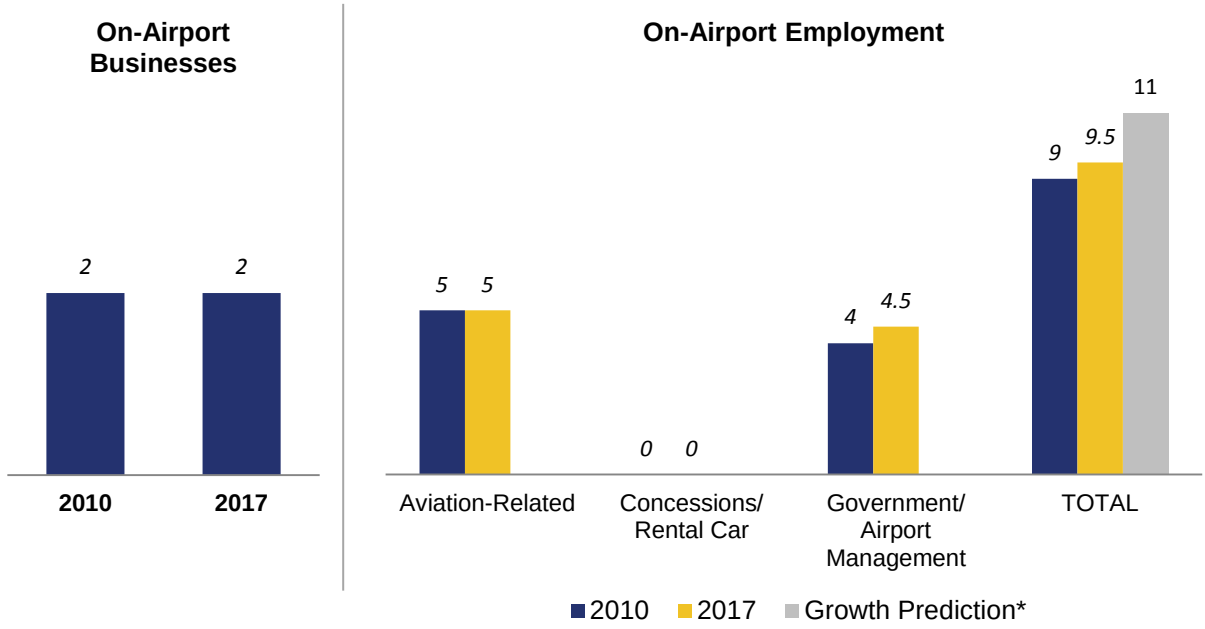


**Estimated result from Project Contribution Calculator using 2010 as base year.*
Source: BOA, FAA Airport Master Record (Form 5010)

- ***On-Airport Business Activity Changes***

Business activity remained more or less stable at Indiana County Airport following the construction of the new runway. The number of on-airport businesses has remained the same at two, although additional interests are expected in the near future. On-airport employment has gained one part-time job in government and airport management services, bringing the total number of on-airport jobs to 9.5, as shown in **Figure 9-5**. This gain is below the expectations simulated by the Economic Impact Calculator, which had forecasted two additional jobs to be created as a result of the airport improvements.

Figure 9-5: Changes in On-Airport Business Activity at Indiana County Airport (2010 – 2017)



** Estimated result from the Economic Contribution Calculator, using 2010 as a base year. This tool predicts total employment gains from both on-airport and off-airport businesses.*

2.2.2. Qualitative Impacts

There have been positive changes at Indiana County Airport following the airport improvements, allowing different types of aircraft to fly into the airport. Corporate/business type aircraft that were previously limited are now able to use the airport in a more consistent way, primarily due to the instrument approaches implemented by the FAA in 2016, but also due to the availability of a longer runway. These are the same aircraft that would previously divert to neighboring airports and drive their executives to Indiana to conduct business. These same aircraft, due to the length of the runway, can carry additional fuel purchased at the airport, increasing the service range of airplane operators. Overall, the airport gained one additional multi-engine aircraft to a total of four, and seven additional single-engine aircraft to a total of 43.

The improvements provide safety upgrades to design standards including wider pavement, as well as wider and longer runway and taxiway safety areas protecting aircraft in the event of an overrun or undershoot. They also enable improved all-weather access which is a particularly important consideration for business operators.

On the local business side, there is potential to begin an air charter service as a privately-owned corporation. Indiana has been negatively impacted by the loss of industry and has identified the airport as an essential link beyond county borders to attract business. The County has made significant headway recently with the development of several new industrial parks, including Windy Ridge Business and Technology Park located approximately six miles southwest of the airport, and the 119 Business Park, located 10 miles south of the airport. It is intended that the airport infrastructure improvements will further enhance these efforts.

2.2.3. Summary of Impacts

Indiana County Airport has witnessed mostly positive growth in airport activity and on-airport business development, as shown in **Table 9-3**. With regards to qualitative project impacts, the airport ranks high in changes to aircraft types, accommodating new general and business jets, in addition to various multi and single-engine aircraft. Its design standard compliance impact is also ranked high, following the widening of its runway and taxiway safety areas. With a longer runway, Indiana County now provides a slightly increased aircraft stage length, and therefore obtains a medium impact score in that category. The same applies to off-airport business development with the opening of two new business parks in the County. Since these parks are still not fully built out, their potential growth has yet to be entirely attributed to improvements at Indiana County Airport. Given that the airport has witnessed no new services after the upgrades, it scores low on the final qualitative impact category, changes to airport services.

Table 9-3: Summary of Impacts at Indiana County Airport

Improvement Type	Cost	Quantitative Impacts				Qualitative Impacts *(As Reported in Surveys)*				
		Operations (% Change)	Based Aircraft (% Change)	On-Airport Businesses (% Change)	On-Airport Employment (% Change)	Aircraft Type Changes	Aircraft Stage Length	Design Standard Compliance Airfield Safety	Off-Airport Business Development	Airport Services Changes
R/W Extension	$19,489,403	2%	11%	0%	6%	High	Medium	High	Medium	Low

3. New Garden Flying Field Case Study

3.1. Airport Overview

New Garden Flying Field (N57) is a public GA airport located in Southern Chester County, in Toughkenamon (**Figure 9-6**). It is currently classified as a Basic facility in the PA SASP, and featured in the NPIAS as a Non-primary airport. New Garden Flying Field caters to recreational and corporate aviators alike. The airport's primary paved Runway 06/24 is capable of accommodating vertically-guided approaches. Other airport services include various types of hangars, a flight school, and maintenance facility. **Table 9-4** provides a list of all major facilities at New Garden. In 2016, the airport handled 33,728 aircraft operations according to the latest DVRPC Aircraft Operations Counting Program data available and housed 104 based aircraft in 2016 as validated by the BOA.

Table 9-4: New Garden Flying Field Existing Facilities Information

LOC ID	N57
PA SASP Classification	Basic
NPIAS	Non-primary
Runway	06/24
Runway Length	3,695 feet
Published Approach	VGA
Runway Lights	MIRL
Runway Width	50 feet
Runway Strength	12,500 lbs.
Parallel Taxiway	Full
Approach NAVAIDS	Lighted Wind Indicator, REILs, PAPI
Weather Equipment	-
Services	Phone, Restroom, FBO, Aircraft Maintenance, Fuel, Ground Transportation
Facilities	Aircraft Parking Apron, Storage, Terminal Building, Auto Parking

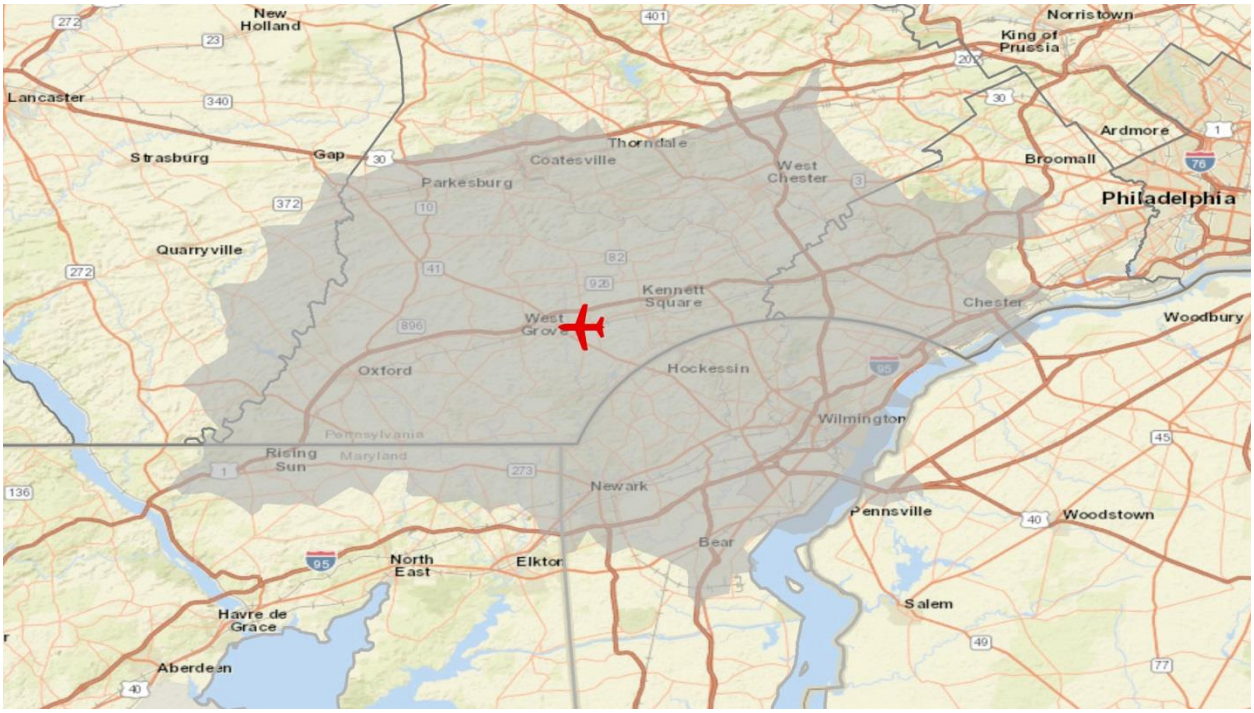
Figure 9-6: New Garden Flying Field Aerial

Source: Google Earth (2016)

3.1.1. Drive Time Coverage

New Garden Flying Field is one of three airports listed in the PA SASP within Chester County. It provides 30-minute drive time coverage to population centers in more than half of Chester County's total area. In addition, the airport's drive time area extends to parts of Delaware and Lancaster counties, and the northern parts of the states of Delaware and Maryland. Larger cities and boroughs within the 30-minute drive time area include Wilmington, Newark, and West Chester, as shown in **Figure 9-7**.

Figure 9-7: 30-Minute Drive Time Coverage From/To New Garden Flying Field



Source: AECOM

3.1.2. Recent Airport Improvement

Over the last decade, New Garden Flying Field engaged in major airport upgrades to bring its various facilities up to FAA and BOA standards. In 2010, the taxiway extension to a full parallel taxiway runway was completed, at a cost of $3 million. In 2016, seven T-hangars and two box hangars were built on the east side of the airport, for a total of $1.4 million on a 10,200 square-feet footprint. Finally, the reconstruction and widening of Runway 06/24 was completed in 2017, for roughly $7.8 million. **Table 9-5** gives a summary of these major improvements and funding sources.

Table 9-5: Major Improvements at New Garden Flying Field

Improvement	Year Completed	Cost	Funding Source(s)
Extension of Parallel Taxiway	2010	$3,053,936	FAA/State/Local
New T & Box Hangars	2016	$1,399,188	State/Local
Reconstruction & Widening of Runway 06/24	2017	$7,802,688	FAA/State/Local

3.2. Impacts of Facility Improvements

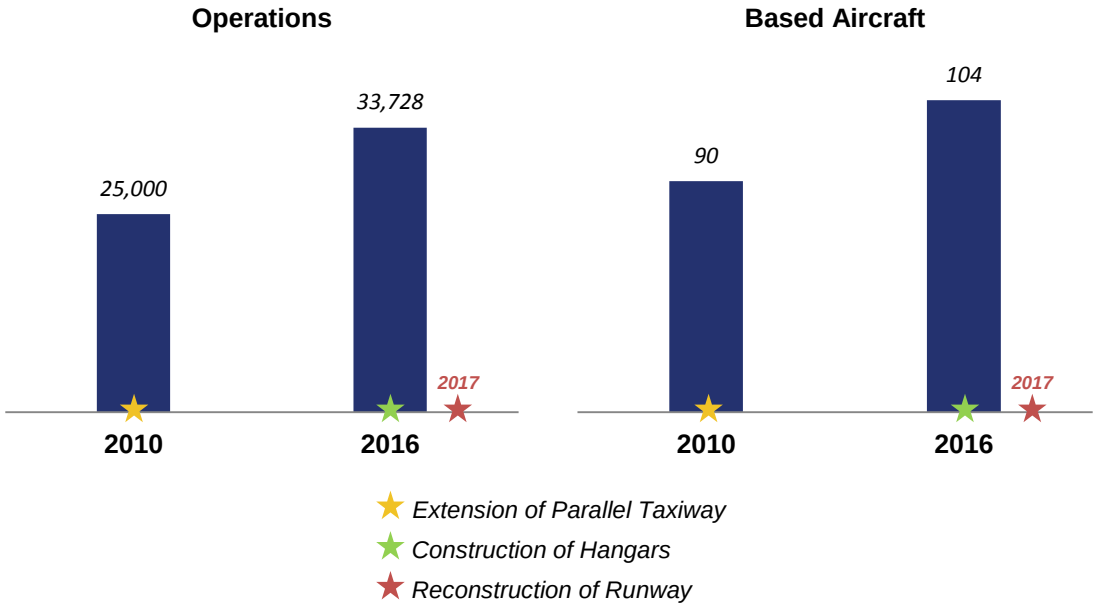
3.2.1. Quantitative Impacts

- ***Airport Activity Changes***

New Garden Flying Field has witnessed a significant increase in activity since the completion of its various improvements. Aircraft operations grew by approximately 35 percent between 2010 and 2016, from 25,000 to 33,728. In addition, the number of based aircraft rose from 90 to 104 over the same timeframe, a 16 percent growth, as shown in **Figure 9-8**. In terms of occupancy, the seven new T-hangar bays are all at capacity now, storing single-engine aircraft, and the recently constructed box hangars accommodate three single-engine aircraft each as well. These numbers add up to the existing 66 T-hangar bays and 10 box hangar spots, which are all currently occupied.

The Project Contribution Calculator results for New Garden Flying Field were not applied due to the fact that only a full runway rehabilitation without any extension was completed. In order to understand what could potentially ocurr at the airport in terms of activity changes in the future, conditions at Wings Field Airport (LOM) and Heritage Field Airport (PTW), which have similar airfield characteristics as New Garden, can be compared. Wings Field currently stores three based jet aircraft, while Heritage Field stores one jet aircraft. According to 2016 FAA Traffic Flow Management System Count data, Wings Field accommodated approximately 400 annual jet operations, and Heritage Field over 50 annual jet operations. Therefore, there is very good potential that New Garden could experience one to two based jets and 100 to 200 annual jet operations, accommodating local/regional demand for smaller jets in the near future.

Figure 9-8: Airport Activity Changes at New Garden Flying Field (2010 – 2016)

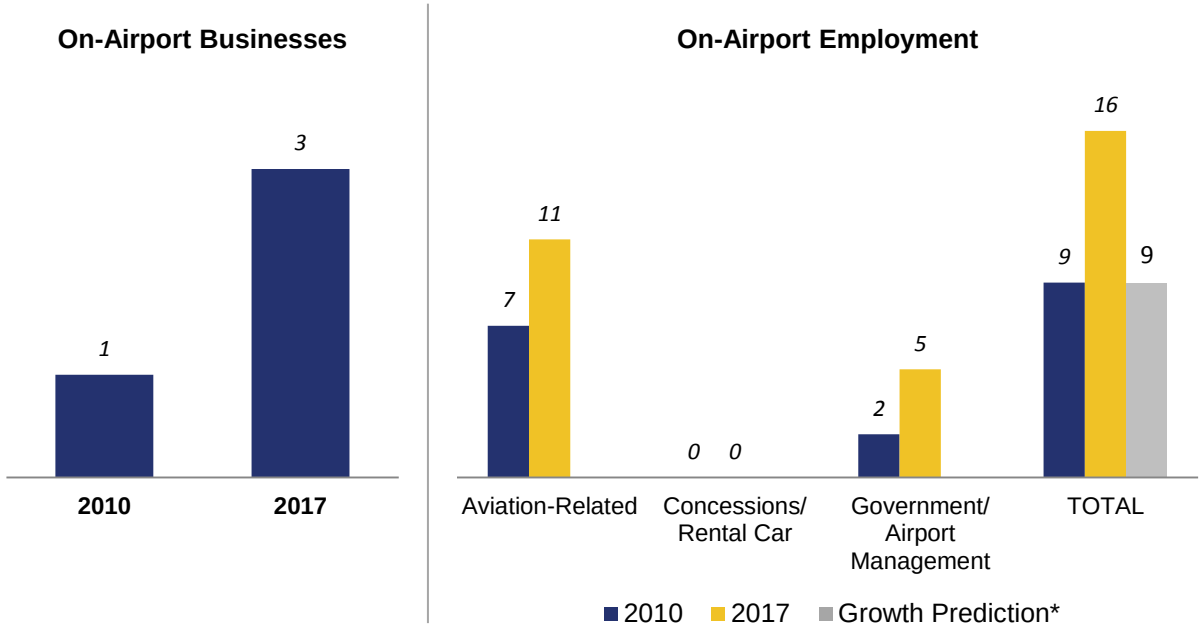


Source: BOA, FAA Airport Master Record (Form 5010)

- ***On-Airport Business Activity Changes***

The reconstruction of Runway 06/24, extension of the parallel taxiway, and new hangars have had noticeable impacts on on-airport businesses and employment. On-airport businesses increased from one to three, while total employment generated by these businesses almost doubled, growing from nine to 16 (**Figure 9-9**). Specifically, aviation-related jobs grew from seven to 11, while government and airport management rose from two to five. No new concession and/or rental car jobs were created. The Economic Contribution Calculator predictions show no changes to employment, which indicates an optimal performance by New Garden as far as job creation is concerned.

Figure 9-9: Changes in On-Airport Business Activity at New Garden Flying Field (2010 – 2017)



** Estimated result from the Economic Contribution Calculator, using 2010 as a base year. This tool predicts total employment gains from both on-airport and off-airport businesses.*

3.2.2. Qualitative Impacts

Overall, the runway and taxiway improvements at New Garden Flying Field preserve existing infrastructure and improve compliance with current design standards, which are primary objectives for both the BOA and FAA. The upgraded runway could now enable future localizer performance with vertical guidance (LPV) approaches, enhancing access during inclement weather, an important factor for business travelers. In the long run, the enhancements demonstrate a commitment by the airport to continue accommodating potential growth in operations and based aircraft, as well as any potential increase in demand for the services it offers. On the safety front, the new parallel taxiway eliminates the need to back taxi on an active runway, thereby reducing the risk of runway incursions while increasing aircraft operations.

3.2.3. Summary of Impacts

As shown in **Table 9-6**, New Garden Flying Field has demonstrated high growth in the quantitative measures used in this analysis. As for the qualitative impacts, the airport scores low in changes to aircraft type, since larger aircraft have yet to fly there. The construction of a parallel taxiway significantly increases airfield safety, and therefore generates a high impact on design standard compliance. Off-airport business development and airport service changes both had low impacts, since the airport improvements have not spurred any surrounding development project or generated further diversification in the services offered by the facility.

Table 9-6: Summary of Impacts at New Garden Flying Field

Improvement Type	Cost	Quantitative Impacts				Qualitative Impacts *(As Reported in Surveys)*				
		Operations (% Change)	Based Aircraft (% Change)	On-Airport Businesses (% Change)	On-Airport Employment (% Change)	Aircraft Type Changes	Aircraft Stage Length	Design Standard Compliance Airfield Safety	Off-Airport Business Development	Airport Services Changes
R/W Reconstruction, Parallel T/W, Hangars	$12,255,812	35%	16%	200%	78%	Low	-	High	Low	Low

4. Pocono Mountains Municipal Airport Case Study

4.1. Airport Overview

Located in northern Monroe County, approximately 24 miles south of Scranton, and within an hour's drive from the western edge of the Greater New York Metropolitan Area, Pocono Mountains Municipal Airport (MPO) is a public GA facility classified in the PA SASP as Advanced. The airfield, pictured in **Figure 9-10**, comprises two intersecting runways, primary runway 13/31 and secondary runway 05/23. In addition, a variety of hangars and several on-airport businesses are located at the airport. **Table 9-7** highlights the major facilities, equipment, and services currently at Pocono Mountains Municipal Airport. In 2016, the airport handled 21,800 flight operations and accommodated 43 based aircraft.

Table 9-7: Pocono Mountains Municipal Airport Facilities Information

LOC ID	MPO
PA SASP Classification	Advanced
NPIAS	Non-primary
Primary Runway	13/31
Primary Runway Length	5,001 feet
Primary Published Approach	VGA
Primary Runway Lights	MIRL
Primary Runway Width	75 feet
Primary Runway Strength	10,000 lbs.
Parallel Taxiway	Partial
Approach NAVAIDS	Lighted Wind Indicator, Segmented Circled, REILs, PAPI
Weather Equipment	-
Services	Phone, Restroom, FBO, Aircraft Maintenance, Fuel, Ground Transportation
Facilities	Aircraft Parking Apron, Storage, Terminal Building, Auto Parking

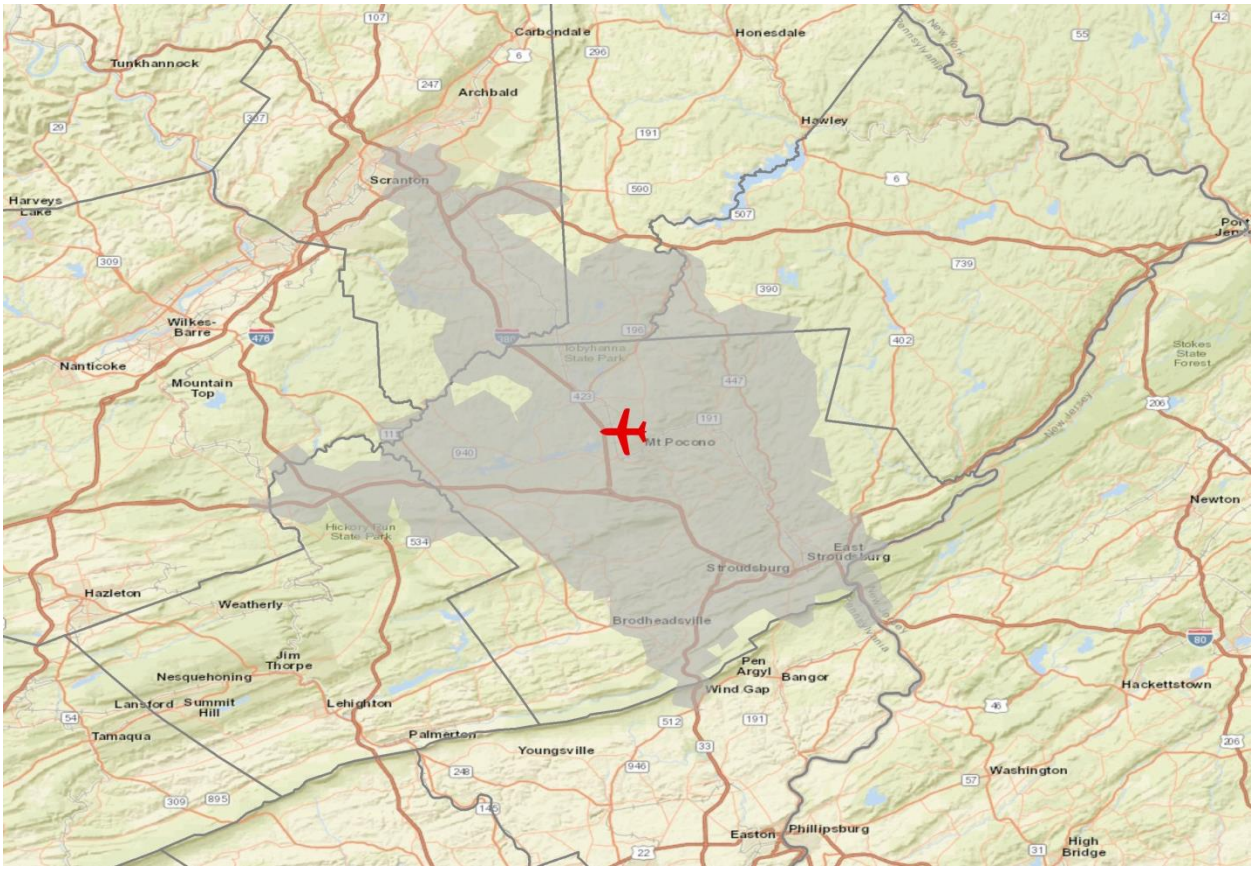
Figure 9-10: Pocono Mountains Municipal Airport Aerial

Source: Google Earth (2017)

4.1.1. Drive Time Coverage

Pocono Mountains Municipal Airport is the only Advanced airport in Monroe County, which is home to two additional Limited facilities. As shown in **Figure 9-11**, the airport primarily serves the Pocono Mountains region, and is accessible in less than a 30-minute drive from the northern parts of Monroe County, and portions of Pike, Wayne, and Lackawanna counties. Major cities and economic hubs are covered by this drive time, including Scranton, Mount Pocono, and Stroudsburg.

Figure 9-11: 30-Minute Drive Time Coverage From/To
Pocono Mountains Municipal Airport



Source: AECOM

4.1.2. Recent Airport Improvement

In 2012, Pocono Mountains Municipal Airport completed a $6 million extension and widening of Runway 13/31. The project increased the runway's length from 3,950 feet to 5,001 feet, and its width from 60 feet to 75 feet, enabling the facility to accommodate larger aircraft. A combination of federal, state, and local funds was used for the investment (**Table 9-8**).

Table 9-8: Major Improvement at Pocono Mountains Municipal Airport

Improvement	Year Completed	Cost	Funding Source(s)
Extension and Widening of Runway 13/31	2012	$6,043,170	FAA/State/Local

4.2. Impacts of Facility Improvements

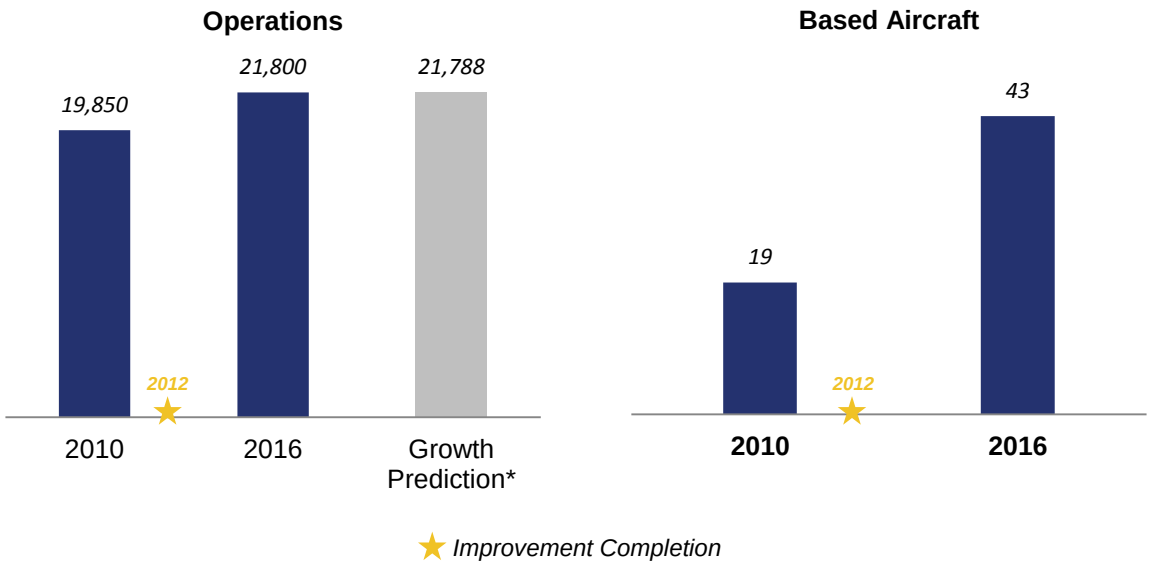
4.2.1. Quantitative Impacts

- ***Airport Activity Changes***

Annual flight operations increased from 19,850 takeoffs and landings to 21,800 between 2010 and 2016, the equivalent of a 10 percent rise, while based aircraft more than doubled, from 19 to 43 aircraft, reflecting a 126 percent growth rate. These changes are illustrated in **Figure 9-12**. Following the extension of Runway 13/31, operational capacity increased by approximately two percent or 3,060 additional flights per year.

Activity impacts are in line with those simulated by the Project Contribution Calculator. The latter estimates a forecasted demand increase in annual operations of 323 which would primarily be performed by business jets. Between 2010 and 2016, operations actually expanded by 325 on average per year.

Figure 9-12: Airport Activity Changes at Pocono Mountains Municipal Airport (2010 – 2016)

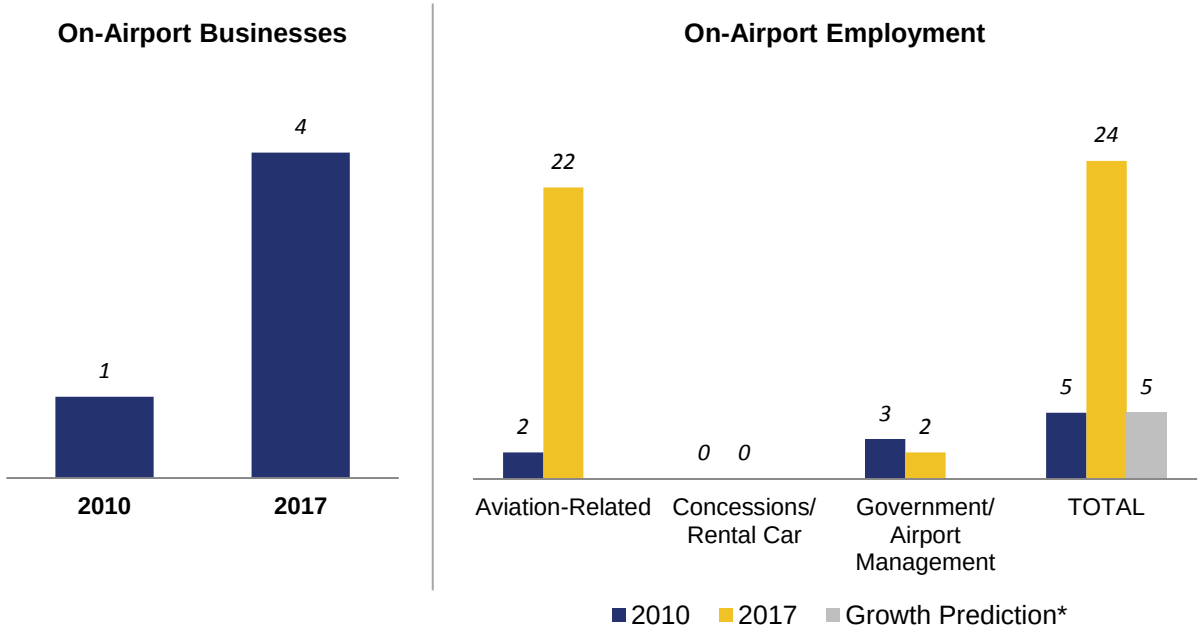


** 2016 Estimated Result from Project Contribution Calculator*
Source: BOA, FAA Airport Master Record (Form 5010)

- ***On-Airport Business Activity Changes***

Similar to aviation activity, on-airport businesses and related employment experienced significant gains following the improvements to Runway 13/31. The number of on-airport businesses quadrupled from one to four, and total employment generated by these businesses increased from five to 24. The vast majority of new jobs were aviation-related, as highlighted in **Figure 9-13**. Some of the new on-airport businesses include a flying club and a professional helicopter training facility. By comparison, the Economic Impact Calculator simulates no additional jobs resulting from the runway improvement, which indicates an above par economic impact.

Figure 9-13: Changes in On-Airport Business Activity at Pocono Mountains Municipal Airport (2010 – 2017)



** Estimated result from the Economic Contribution Calculator, using 2010 as a base year. This tool predicts total employment gains from both on-airport and off-airport businesses.*

4.2.2. Qualitative Impacts

The runway extension at Pocono Mountains Municipal Airport enabled the facility to accommodate larger business jets and chartered aircraft capable of increasing access for visitors to the Poconos, both for business and leisure. Following the completion of the runway extension, the airport added three business-type airplanes (two jet aircraft and one turboprop) to its based aircraft fleet. New aviation services such as on-site aircraft maintenance, air tours, flight instructions, and pilot training opened. These include Moyer Aviation, Hi-Tech Helicopters, and Pocono Mountains Flying Club, which currently serves 29 members with three flight instructors and two aircraft. Airport proximity was a major location factor associated with the recent opening of the Kalahari Resorts and Conventions, the largest indoor water park in the world. According to the airport, an estimated four to six aircraft per month, carrying visitors and executives destined for the Kalahari resort, utilize the facilities at Pocono Mountains. These planes include single-engine and chartered jet aircraft.

4.2.3. Summary of Impacts

Pocono Mountains Municipal Airport has seen significant positive impacts following the extension of its runway. Airport activity and on-airport business development as well as employment have greatly increased, in most cases by more than 100 percent. On the qualitative side, the airport ranks high in changes to aircraft type, with the addition of three business-type aircraft to its based aircraft fleet. Its longer and wider runway enables increased aircraft stage length and helped enhance compliance with the FAA runway width design standards. The opening of a hotel and convention center in the airport's vicinity and its reliance on air services offered at Pocono Mountains demonstrates a positive impact on off-airport business development. Finally, a high impact is noted for changes in airport services, as new on-airport businesses with a diverse range of services have started operations (**Table 9-9**).

Table 9-9: Summary of Impacts at Pocono Mountains Municipal Airport

Improvement Type	Cost	Quantitative Impacts				Qualitative Impacts *(As Reported in Surveys)*				
		Operations (% Change)	Based Aircraft (% Change)	On-Airport Businesses (% Change)	On-Airport Employment (% Change)	Aircraft Type Changes	Aircraft Stage Length	Design Standard Compliance Airfield Safety	Off-Airport Business Development	Airport Services Changes
R/W Extension	$6,043,170	10%	126%	300%	380%	High	Medium	Medium	Medium	High

5. Erie International Airport Case Study

5.1. Airport Overview

Erie International Airport (ERI) is one of 15 Commercial facilities in Pennsylvania, located in the city and county of Erie. Opened in 1938, the airport has two runways, including its primary 8,420-foot long Runway 06/24 and the 3,508-foot long crosswind Runway 02/24 (**Figure 9-14**). In 2016, the airport accommodated 87,647 passenger enplanements, with direct commercial flights to Chicago, Detroit, and Philadelphia. In the same year, 26,982 aircraft operations were recorded, including 6,232 of commercial nature. The airport houses 56 based aircraft, and features numerous facilities and aviation equipment, including a terminal building, multiple hangars, aprons, car parking, and ground transportation, as listed in **Table 9-10**.

Table 9-10: Erie International Airport Facilities Information

LOC ID	ERI
PA SASP Classification	Commercial
NPIAS	Primary
Primary Runway	06/24
Primary Runway Length	8,420 feet
Primary Published Approach	ILS
Primary Runway Lights	HIRL
Primary Runway Width	150 feet
Primary Runway Strength	65,000 lbs.
Parallel Taxiway	Full
Approach NAVAIDS	Lighted Wind Indicator, REILs, PAPI
Weather Equipment	ASOS
Services	Phone, Restroom, FBO, Aircraft Maintenance, Fuel, Ground Transportation
Facilities	Aircraft Parking Apron, Storage, Terminal Building, Auto Parking

Figure 9-14: Erie International Airport Aerial

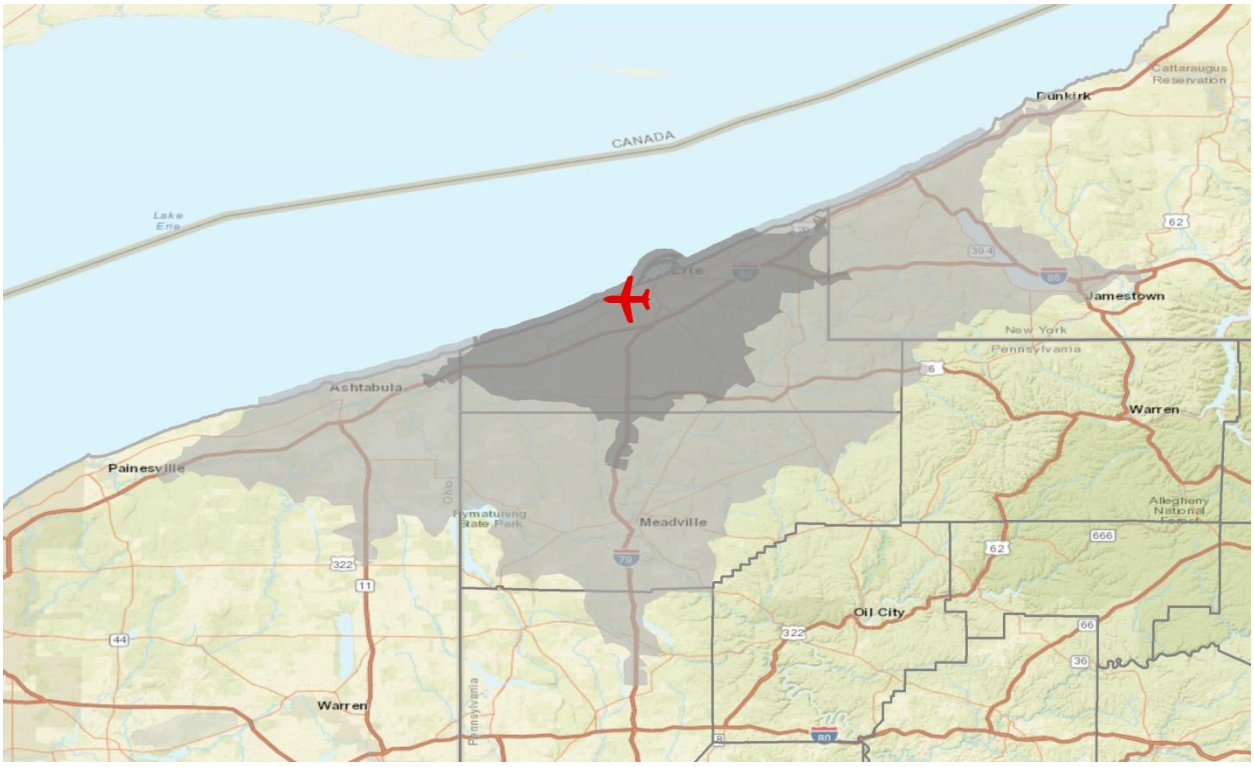
Source: Google Earth (2016)

5.1.1. Drive Time Coverage

Erie International is the only Commercial airport, and one of two system airports in Erie County, the other being Corry-Lawrence Airport (8G2). As displayed in **Figure 9-15**, most of Erie County is covered within a 30-minute drive to and/or from the airport. When a 60-minute drive time interval for Commercial airports is applied, coverage extends beyond the county and state to nearby Crawford County in Pennsylvania, Chautauqua County in New York, and Ashtabula County in Ohio. The following cities fall within this drive time including Erie, Meadville, Dunkirk, Jamestown, and Ashtabula.

Figure 9-15: Drive Time Coverage From/To Erie International Airport

Dark Gray: 30-Minute / Light Gray: 60-minute



Source: AECOM

5.1.2. Recent Airport Improvement

Erie International completed a major extension of Runway 06/24 in 2012, at a total cost of $80 million. The improvement consisted of extending the departure end of Runway 06 by 1,920 feet to a total runway length of 8,420 feet, and included additional land acquisition and wetland mitigation. The parallel Taxiway A was also extended to cover the full length of the runway. Funding was provided by a combination of federal, state, and local grants (**Table 9-11**).

Table 9-11: Major Improvement at Erie International Airport

Improvement	Year Completed	Cost	Funding Source(s)
Extension of Runway 06/24 and Taxiway A	2012	$80,570,950	FAA/State/Local

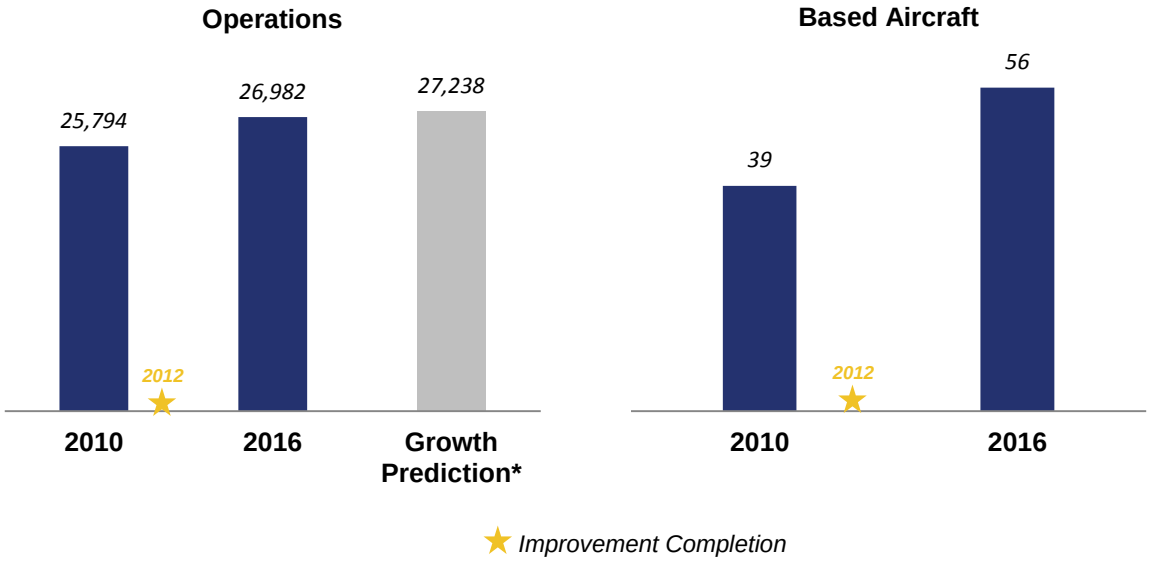
5.2. Impacts of Facility Improvements

5.2.1. Quantitative Impacts

- ***Airport Activity Changes***

Aircraft operations grew five percent between 2010 and 2016, rising from 25,794 takeoffs and landings to 26,982. This outcome, however, falls short of the Project Contribution Calculator's predicted operations increase of 1,444 annual operations. The most significant change targeted based aircraft, which increased from 39 to 56 over the same period, the equivalent of a 44 percent. These various changes are shown in **Figure 9-16**. The extension of Runway 06/24 increased the total annual operational capacity by 3,900 flights from 195,000 to 198,900, a two percent increase.

Figure 9-16: Airport Activity Changes at Erie International Airport (2010 – 2016)

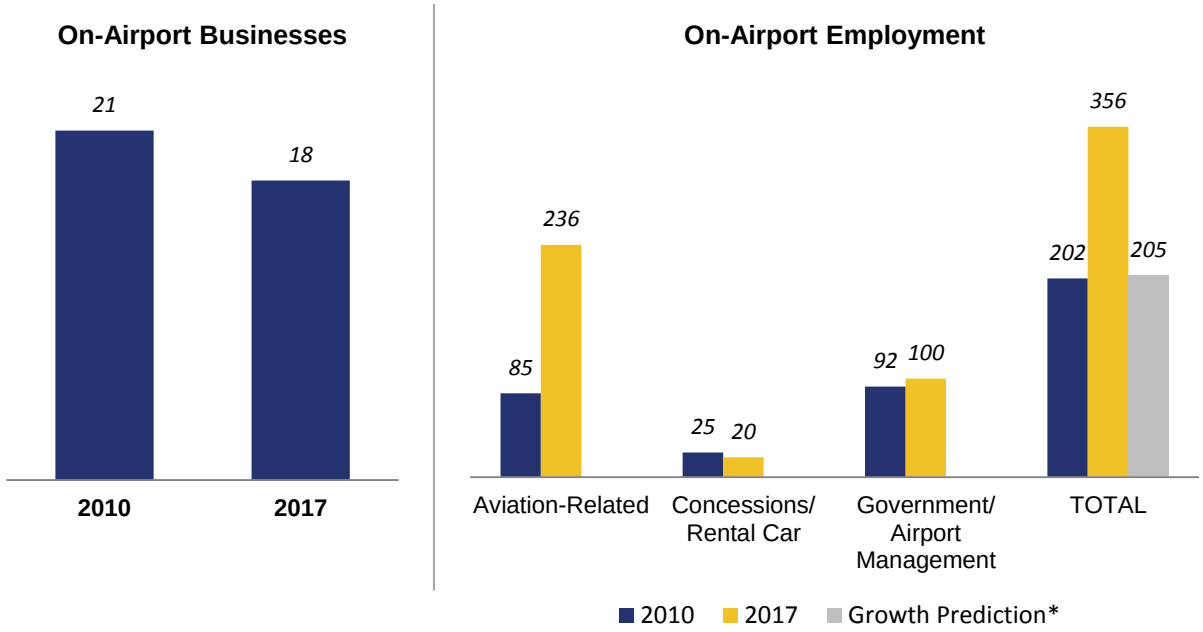


** 2016 Estimated Result from Project Contribution Calculator*
Source: BOA, FAA Airport Master Record (Form 5010)

- ***On-Airport Business Activity Impacts***

Erie International Airport witnessed noticeable impacts to its on-airport business environment following the extension of Runway 06/24. Although the number of on-airport businesses declined slightly from 21 to 18, total employment from these businesses nearly doubled, growing from 202 to 356. The largest job gains occurred in aviation-related businesses, which saw their number grow by 178 percent. Concessions and rental car jobs decreased by five employees or 20 percent, and lastly government and airport management rose from 92 to 100 employees or by approximately nine percent. These fluctuations are illustrated in **Figure 9-17**. The employment results far exceed the projections of the Economic Impact Calculator, which anticipated only three additional jobs resulting from the runway extension.

Figure 9-17: Changes in On-Airport Business Activity at Erie International Airport (2010 – 2017)



** Estimated result from the Economic Contribution Calculator, using 2010 as a base year. This tool predicts total employment gains from both on-airport and off-airport businesses.*

5.2.2. Qualitative Impacts

The extension of Runway 06/24 and other related improvements projects, such as the upgraded instrument approaches and runway obstruction removals, enhanced air safety at Erie International. The airport is now able to accommodate larger aircraft and offer longer stage length, as well as eliminate weight penalties which were based on an inadequate runway length. In addition, this provides airlines with greater operational flexibility.

5.2.3. Summary of Impacts

As highlighted in **Table 9-12**, Erie International Airport witnessed mostly positive impacts following the completion of its runway extension. Operations and based aircraft have both experienced low to medium growth, while on-airport business activity, and employment in particular, has expanded based on the before and after improvement years used in this analysis. Since the fleet mix that currently operates at Erie has not changed, the impact on aircraft type changes remains low. Aircraft stage length impacts are ranked medium, since the extended runway adds to the airport's capacity to service longer routes, although none have materialized to date. The recent land acquisition and wetland mitigation enhance safety at the facility, thus generating a high impact on design standard compliance. Impacts on off-airport business development and airport services changes remain low as no improvements were noted in these areas.

Table 9-12: Summary of Impacts at Erie International Airport

Improvement Type	Cost	Quantitative Impacts				Qualitative Impacts *(As Reported in Surveys)*				
		Operations (% Change)	Based Aircraft (% Change)	On-Airport Businesses (% Change)	On-Airport Employment (% Change)	Aircraft Type Changes	Aircraft Stage Length	Design Standard Compliance Airfield Safety	Off-Airport Business Development	Airport Services Changes
R/W Extension	$80,570,950	5%	44%	-14%	78%	Low	Medium	High	Low	Low

6. McVille Airport Case Study

6.1. Airport Overview

McVille Airport (6P7) is a small privately-owned GA facility, located in the southwest corner of Armstrong County, some 29 miles northeast of Pittsburgh (**Figure 9-18**). Classified as a Limited facility in the PA SASP, McVille currently features a recently-built 2,800-foot paved runway, a terminal building, and hangars, in addition to other facilities and aviation equipment listed in **Table 9-13**. In 2016, it handled 1,700 operations and accommodated 19 based aircraft.

Table 9-13: McVille Airport Facilities Information

LOC ID	6P7
PA SASP Classification	Limited
NPIAS	-
Runway	14/32
Runway Length	2,800 feet
Published Approach	-
Runway Lights	MIRL
Runway Width	60 fee
Runway Strength	12,500 lbs.
Parallel Taxiway	-
Approach NAVAIDS	Lighted Wind Indicator, Segmented Circle, REILs, PAPI
Weather Equipment	-
Services	Phone, Restroom, FBO, Aircraft Maintenance, Fuel, Ground Transportation
Facilities	Aircraft Parking Apron, Storage, Terminal Building, Auto Parking

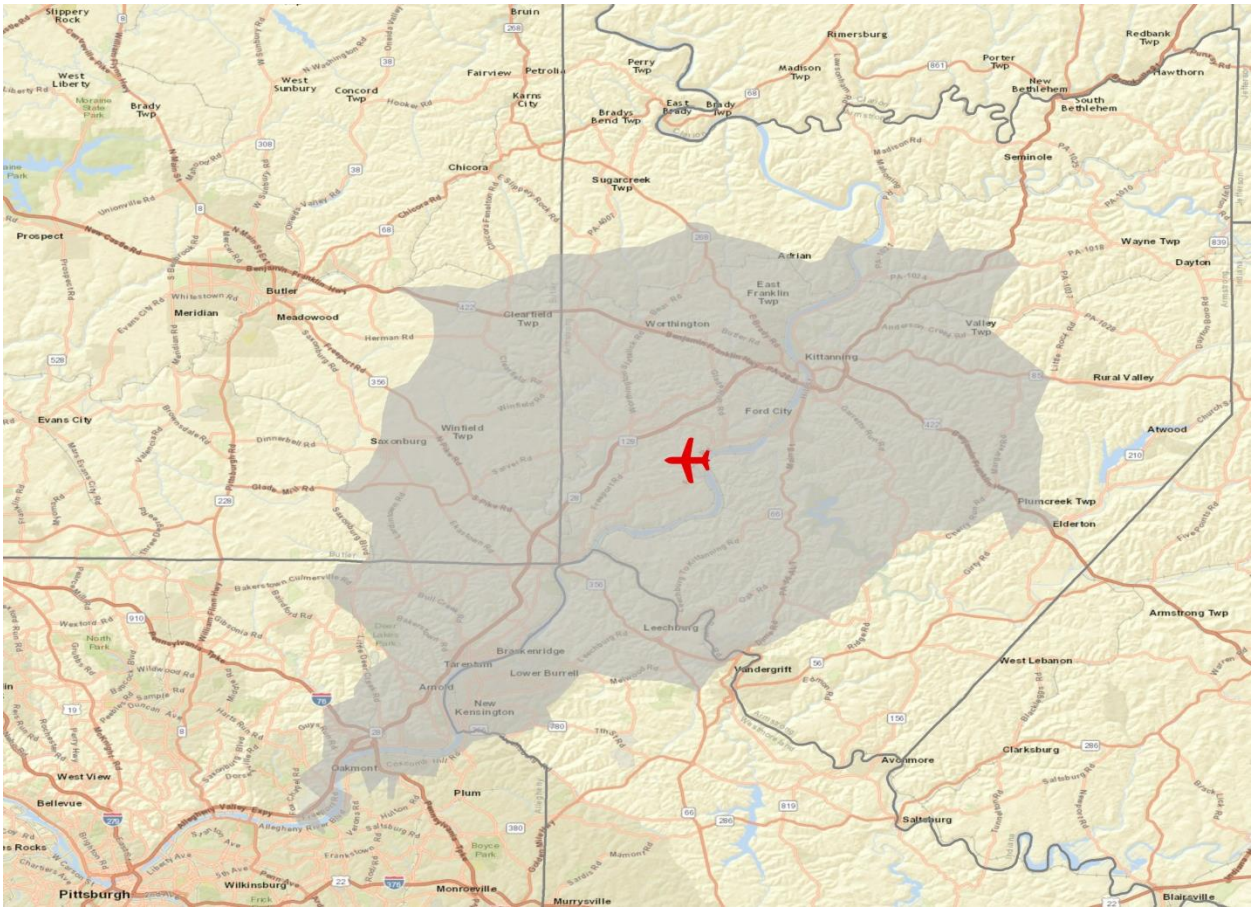
Figure 9-18: McVille Airport Aerial

Source: Google Earth (2016)

6.1.1. Drive Time Coverage

McVille is the only public-use airport in Armstrong County, and is consequently of strategic importance in the area it serves. As shown in **Figure 9-19**, the airport's 30-minute drive time coverage includes almost half of Armstrong County's total area. In addition, coverage extends into Butler and Allegheny counties. Smaller population centers including the towns of Kittanning, Ford City, Leechburg, and New Kensington all fall within this drive time.

Figure 9-19: 30-Minute Drive Time Coverage From/To McVille Airport



Source: AECOM

6.1.2. Recent Airport Improvement

In 2012, McVille Airport concluded the construction of a new paved runway to replace an existing turf strip. With a total length of 2,800 feet, the completed paved Runway 14/32 is 60 feet wide and represents a significant upgrade for the airport, which can now handle larger aircraft. The $1.6 million investment received both state and local funding (**Table 9-14**).

Table 9-14: Major Improvement at McVille Airport

Improvement	Year Completed	Cost	Funding Source(s)
Construction of New Paved Runway 14/32	2012	$1,625,000	State/Local

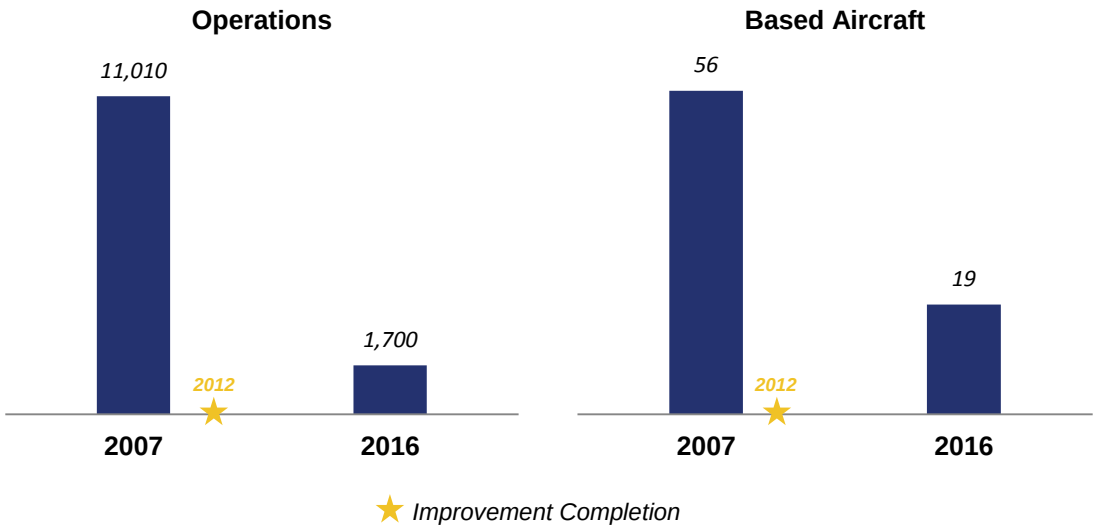
6.2. Impacts of Facility Improvements

6.2.1. Quantitative Impacts

- ***Airport Activity Changes***

The impacts on aircraft operations and based aircraft cannot be accurately measured since the airport suspended all operations between 2008 and 2013 during construction. Both annual operations and based aircraft dropped to zero during that time as airplane operators were forced to relocate, in some instances permanently. The last available data prior to the beginning of construction dates back to 2007, with 11,010 operations. By 2016, the number gradually increased from zero to 1,700 as activity resumed following the airport's reopening. In addition to the airport's closure, other factors such as fewer pilots and adverse economic conditions of owning small aircraft could have led to this slower activity recovery. The number of based aircraft witnessed a similar decrease, from 56 to 19 between 2007 and 2016. This is due to the demolition of multiple hangars to make way for strip mining as well as runway construction (**Figure 9-20**). Operational capacity more than doubled from 50,000 to 120,125 total annual operations due to the runway reconstruction.

Figure 9-20: Airport Activity Changes at McVille Airport (2010 – 2016)

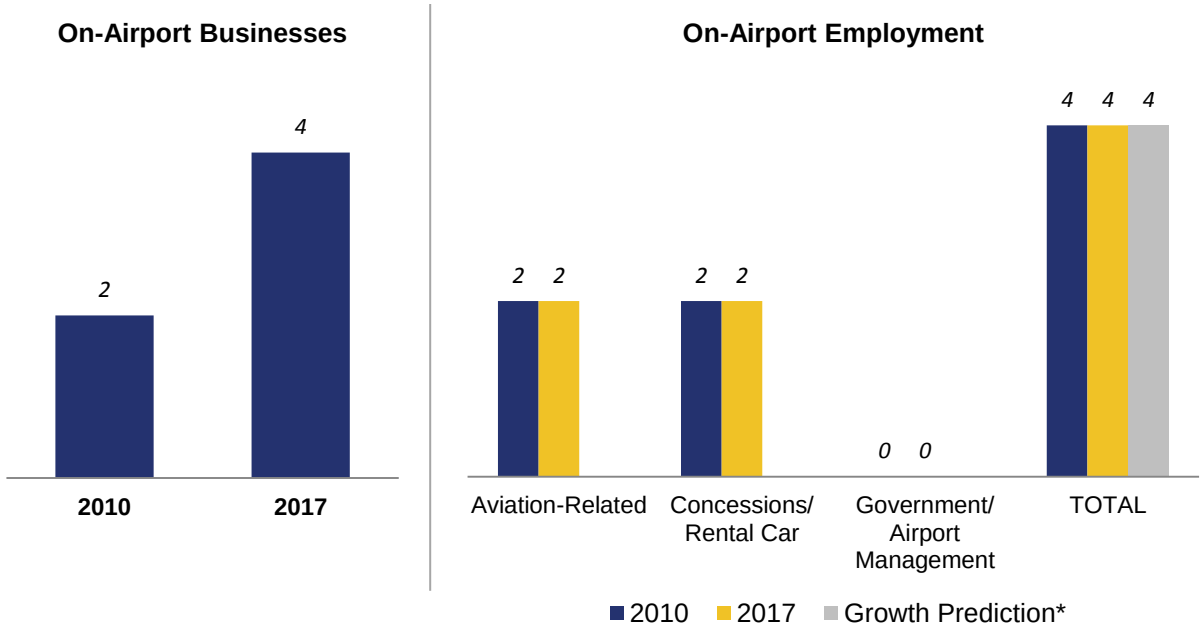


Source: BOA, FAA Airport Master Record (Form 5010)

- ***On-Airport Business Activity Changes***

Since the construction of the new Runway 14/32 in 2012, two new on-airport businesses have opened at McVille Airport, bringing the total number to four. Related employment, however, has remained stable at four as forecasted by the Economic Impact Calculator. Jobs are broken down evenly between aviation-related and concessions/rental car businesses, as seen in **Figure 9-21**.

Figure 9-21: Changes in On-Airport Business Activity at McVille Airport (2010 – 2017)



** Estimated result from the Economic Contribution Calculator, using 2010 as a base year. This tool predicts total employment gains from both on-airport and off-airport businesses.*

6.2.2. Qualitative Impacts

Today, McVille Airport stands as the only public-use airport in Armstrong County and, with a paved runway, now offers year-round accessibility. The facility is bound to provide greater accommodation for general and business aviation customers in the region, including those of Northpointe Industrial Park situated less than 15 minutes away by car.

6.2.3. Summary of Impacts

The overall impacts of the improvements at McVille Airport are not entirely noticeable. Changes to operations and based aircraft cannot be accurately measured given the airport's complete closure during construction. While one additional on-airport business has opened, no new jobs were created. To date, the types of aircraft being accommodated have not changed, hence a low impact score was depicted for this category in **Table 9-15**. As the only airport in Armstrong County, the upgraded and extended runway transformed the airport from a seasonal turf surface facility into a year-round service airport. The newly paved runway allows for a greater aircraft stage length, and significantly improves design standard compliance, which provides a high score for this category. Off-airport business development that could be contributed to the airport improvements could not be detected. With year-round aviation services, McVille has the potential to offer additional airport services and thus creates a medium impact in that category, although no new services have materialized so far.

Table 9-15: Summary of Impacts at McVille Airport

Improvement Type	Cost	Quantitative Impacts				Qualitative Impacts *(As Reported in Surveys)*				
		Operations (% Change)	Based Aircraft (% Change)	On-Airport Businesses (% Change)	On-Airport Employment (% Change)	Aircraft Type Changes	Aircraft Stage Length	Design Standard Compliance Airfield Safety	Off-Airport Business Development	Airport Services Changes
R/W Reconstruction	$1,625,000	-	-	100%	0%	Low	Medium	High	Low	Medium

7. Conclusion: Return on Investment Assessment

Airport improvements and upgrades can have wide benefits and far-reaching impacts not just on the facilities directly, but on the communities they serve as well as the entire statewide aviation system. For the five airport case studies conducted in this chapter, various quantitative and qualitative impacts are identified, resulting from the completion of major improvements at these facilities. The projects include, among others, runway and/or taxiway extensions, runway reconstructions, runway strengthening and/or widening, construction of new hangars, and upgrades to approach instruments and NAVAIDS.

Quantitative impacts identified in this analysis consist of changes in airport activity, including flight operations, based aircraft, and operational capacity. Fluctuations in on-airport business activity are also taken into consideration, and encompass the total number of on-airport businesses and jobs generated.

Qualitative impacts include changes in the types of aircraft now using the facility following an improvement, compliance with design standards, aircraft stage length impacts, and off-airport development potential. In the cases of Indiana County Airport and Pocono Mountains Municipal Airport, larger general and business jets are now able to fly into those facilities thanks to upgraded airfields and instrument approaches. Furthermore, design standard improvements at these facilities permit safer aircraft operations in all-weather conditions. Extended runways also allow greater stage length of flights, which enables a larger number of cities to be within reach and/or increased passengers and cargo capacities. Finally, airport facility improvements may foster regional economic development, by incentivizing more businesses to open in the airport's vicinity and take advantage of its services. At Pocono Mountains Municipal Airport, a facility that serves a region largely dominated by a tourist industry, the extension of its main runway 13/31 spurred the opening of a large Water Park resort, the Kalahari Resort and Conventions. The airport is also within an hour's drive from the western edge of the Greater New York Metropolitan Area.

- ***Return on Investment Results***

The methodology used to evaluate the level of return on investment is based on a scoring system that takes into account changes in the quantitative and qualitative impacts discussed in the previous sections. In this analysis, return on investment is not quantified by a dollar amount, but rather rests on a High/Medium/Low prioritization index. The results are detailed in **Table 9-16**.

In the case of the quantitative factors, the score attributed depends on the growth rate experienced by the airports between 2010 and 2016, or before and after the completion of improvements. When the rate is at zero percent or negative, a score of zero is noted. Low growth greater than zero percent and less than 10 percent receives a score of one, medium growth greater than 10 percent and less than 100 percent a score of two, and high growth 100 percent or higher a score of three.

In the case of qualitative factors, "High", "Medium", and "Low" scores depend on the airport's performance in generating positive change. For instance, airports that have witnessed an increased diversification in the types of aircraft accommodated obtain a "High" score. Conversely, when no off-airport business development has taken place, the airport receives a "Low" score in this category. The reasoning behind the determination of each performance score is explained in detail in the summary sections of the case studies.

The return on investment score is identified based on the average scores of both the quantitative and qualitative impacts. Since quantitative impacts represent empirical evidence of growth or decline at the airports, their performance scores have been attributed a double weight. Overall, Pocono Mountains Municipal Airport and New Garden Flying Field generated the greatest return with “High” scores of 7.9 and 6.0 respectively. They have demonstrated medium to high growth in operations, based aircraft, and number of on-airport businesses and jobs as a result of their respective improvements. In addition, they have shown a medium to high compliance with design standards. Pocono Mountains airport, in particular, has witnessed considerable high changes in the types of aircraft it now accommodates with the arrival of several business jets, as well as a diversified range of new aviation services. The remaining three airports, Erie International Airport, Indiana County Airport, and McVille Airport obtained a “Medium” score. For the most part, they have had low to medium growth in airport and business activity, and a similar low to medium impact on most qualitative measures, with the exception of design standard compliance which ranks high.

Evaluating return on investment brings certain trends into perspective. First, large investments do not necessarily result in the highest returns. As can be noted in Table 9-16, the upgrades at Erie International cost approximately $80 million and generated a “Medium” return, whereas Pocono Mountains Municipal Airport, with its $6 million investment, scored “High” in its return on investment. Second, airport location and proximity to major business and urban centers greatly enhances its growth potential. This was particularly the case for New Garden Flying Field being close to both Philadelphia and Wilmington, and Pocono Mountains situated at an hour’s drive from the Greater New York Metropolitan Area.

Table 9-16: Overall Return on Investment Assessment

Airport ID	Type	Cost	Quantitative Impacts (2010 – 2016)				Qualitative Impacts (As Reported in Surveys)					Overall Return On Investment
			Operations (% Change)	Based Aircraft (% Change)	On-Airport Businesses (% Change)	On-Airport Employment (% Change)	Aircraft Type Changes	Aircraft Stage Length	Design Standard Compliance Airfield Safety	Off-Airport Business Development	Airport Services Changes	
IDI	Runway Extension	$19,489,403	2%	11%	0%	6%	High	Medium	High	Medium	Low	**Medium** (4.2)
N57	Runway Reconstruction, Parallel T/W, Hangars	$12,255,812	35%	16%	200%	78%	Low	N/A	High	Low	Low	**High** (6.0)
MPO	Runway Extension	$6,043,170	10%	126%	300%	380%	High	Medium	Medium	Medium	High	**High** (7.9)
ERI	Runway Extension	$80,570,950	5%	44%	-14%	78%	Low	Medium	High	Low	Low	**Medium** (4.3)
6P7	Runway Reconstruction	$1,625,000	N/A	N/A	100%	0%	Low	Medium	High	Low	Medium	**Medium** (3.3)

LEGEND

Quantitative Impacts (Double Weight)

Score

0	No/Negative Growth (< 0%)
1	Low Growth (0% - 9%)
2	Medium Growth (10% - 99%)
3	High Growth (>100%)

Qualitative Impacts (Single Weight)

Score

1	Low
2	Medium
3	High

Return on Investment

Score

	Low (1.0 – 2.9)
	Medium (3.0 – 5.9)
	High (6.0 – 9.0)

CHAPTER 10 SUMMARY OF FINDINGS

Table 10-1 below presents the key findings of the 2016 PA SASP Update.

Table 10-1: Summary of Findings in the 2016 PA SASP Update

Forecasts (2016 – 2036)
➢ **Passenger enplanements** +33 percent growth
➢ **Commercial aircraft operations**: +17 percent growth
➢ **GA based aircraft**: +12 percent growth
➢ **GA aircraft operations**: +10 percent growth
System Requirements
➢ **Most airports meet their classification criteria** o *95 out of 116 airports have a performance score greater than 90 percent*
➢ **Certain facility upgrades are recommended, if feasible and justifiable, to improve overall system performance**, particularly at facilities with a performance score below 75 percent
➢ **No classification upgrades or downgrades are recommended**
➢ **Pennsylvania's population has sufficient automobile access to system airports**. In total, 96 percent have access to any system airport in less than a 30-minute drive ➢ Minor access gaps do exist in certain counties: o *Northern portions of Wayne and Pike Counties* o *Northeastern suburbs of the Pittsburgh metropolitan area in Allegheny and Armstrong Counties*
Implementation Plan
➢ **Core and System Airports' funding emphasis should focus on system preservation and economic development**
➢ **Core Airports typically then could be prioritized for all essential airfield improvements** and other upgrades that increase capacity where needed, if feasible and justifiable
➢ **Three major priorities** should be addressed in the near future: o *Maximizing drive time accessibility of population and economic centers, and reducing identified gaps* o *Implement, along with system preservation and economic development needs, feasible upgrades and expansions justified through the master planning process or documented operational need* o *Ensuring that operational capacity will accommodate future demand*
➢ Overall, the **PA air transportation system is in a good shape**: o *The average performance score of airports is 94 percent, indicating solid facilities* o *Although forecasts indicate a rise in based aircraft and operations, there is enough capacity to accommodate future growth* o *93 percent of PA's population has access to a Core Airport in less than a 30-minute drive*

Table 10-1: Summary of Findings in the 2016 PA SASP Update (Continued)

Selected Airport Improvements: Return on Investment
➢ **Case study airports generated a medium to high Return on Investment (ROI)**, based on both quantitative and qualitative impacts: ○ ***Indiana County Airport - IDI*** *(Runway Extension): Medium ROI* ○ ***New Garden Flying Field - N57*** *(Runway Reconstruction): High ROI* ○ ***Pocono Mountains Municipal Airport - MPO*** *(Runway Extension): High ROI* ○ ***Erie International Airport - ERI*** *(Runway Extension): Medium ROI* ○ ***McVille Airport - 6P7*** *(Runway Reconstruction): Medium ROI*
➢ **Two major trends identified**: ○ *Large investments do not always result immediately in the highest returns, but have the ability to do so in the future* ○ *Airport location and proximity to large business centers greatly enhance growth potential, and ultimately return on investment*