

SOUTH JERSEY REGIONAL AIRPORT

Master Plan Update



Prepared for
The New Jersey
Department of Transportation

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Executive Summary

AECOM was commissioned by the New Jersey Department of Transportation (NJDOT) in October 2011 to undertake the Airport Master Plan Update for the South Jersey Regional Airport (the Airport or VAY). The study supplements the 1997 Approved Airport Master Plan and Airport Layout Plan (ALP) for VAY, and was completed in accordance with new Federal Aviation Administration (FAA) guidelines, including the AC150/5300-13 Change 18, and AC 150/5300-18B. The ALP for the Airport is being developed and submitted through the FAA's Airports-GIS (AGIS) system as an electronic ALP (e-ALP).

In 2011, NJDOT entered into a long-term agreement with Flight 114, LLC, to operate the South Jersey Regional Airport. Along with the federally mandated requirements outlined in United States Code (USC) 47107(a)(16); requiring the airport sponsor to maintain an ALP that ensures the safety, utility, and efficiency of the airport, NJDOT and Flight 114 wanted to examine the ability to maximize the potential of the airport, while bringing it into compliance with FAA standards.

The Airport Master Plan examined and updated the following elements:

- Forecast airport activity (based aircraft, aircraft operations, etc.) for the current 20-year planning period
- Current and future facility requirements for both demand-driven development and conformance with FAA design standards
- Recommended development plan to coincide with the facility requirements of the airfield, general aviation facilities, and landside facilities
- Environmental Overview of the airfield
- Implementation and phasing plan, in conjunction with an associated financial plan

The Airport Master Plan Update determined the key focus for the Airport entailed improving the safety of the airfield by ensuring compliance with the latest FAA safety design standards. Currently, the Airport is in non-compliance with specific FAA standards that require remedial action. The main elements that are described herein to alleviate the non-compliance issues include but are not limited to:

- Improve runway grade, extend runway to 4,220 feet and widen to 75 feet, and ensure the safety areas are free and clear of obstructions
- Provide a full-length parallel taxiway south of the runway
- Increase runway to taxiway separation to adhere to the FAA design standards
- Enclose airport perimeter security fence

The report also identified other airfield, general aviation, and landside facilities to meet the capacity requirements and to improve the safety and efficiency of the airport.

In February 2013, the FAA completed their review of the Aviation Demand Forecast and Capacity Analysis for the Airport Master Plan Update (see **Appendix B**); approving the airport activity forecast of estimated based aircraft, and estimated aircraft operations through 2031. Based on the FAA's comments regarding the critical aircraft, the Airport Master Plan Update recommended that the proposed airport development be based on a B-II Airport Reference Code (ARC) on the ALP as the NJDOT's ultimate plan for VAY, with the understanding that the development and increase to B-II may happen, if justified beyond the airports current 12 year plan.

Section 1

Airport Inventory



Prepared for
The New Jersey
Department of Transportation

1 Airport Inventory

The initial step in the master planning process was to inventory the physical, operational, and functional characteristics of the Airport and its immediate environs. The inventory information presented in this section provides the basis for evaluating existing facilities at VAY and subsequently determining future facility needs. The information includes the location of the Airport, a brief overview of the history of the Airport, the existing airport facilities, the existing land use data, and the environmental conditions.

1.1 Background

1.1.1 Airport Location

VAY is located in Burlington County, New Jersey, and lies within the jurisdictional border of Lumberton Township. The airport neighbors Hainesport Township to the north, Medford Township to the south, and Mount Laurel Township to the west. It is located 21 miles southeast of the City of Philadelphia and 20 miles northeast of Philadelphia International Airport. The published geodetic location of VAY is 39° 56'34.4"North latitude, 74° 50'44.7" West longitude, at an elevation of 53 feet above mean sea level (MSL). The airport encompasses approximately 658 acres. **Figure 1-11** illustrates the location of VAY.

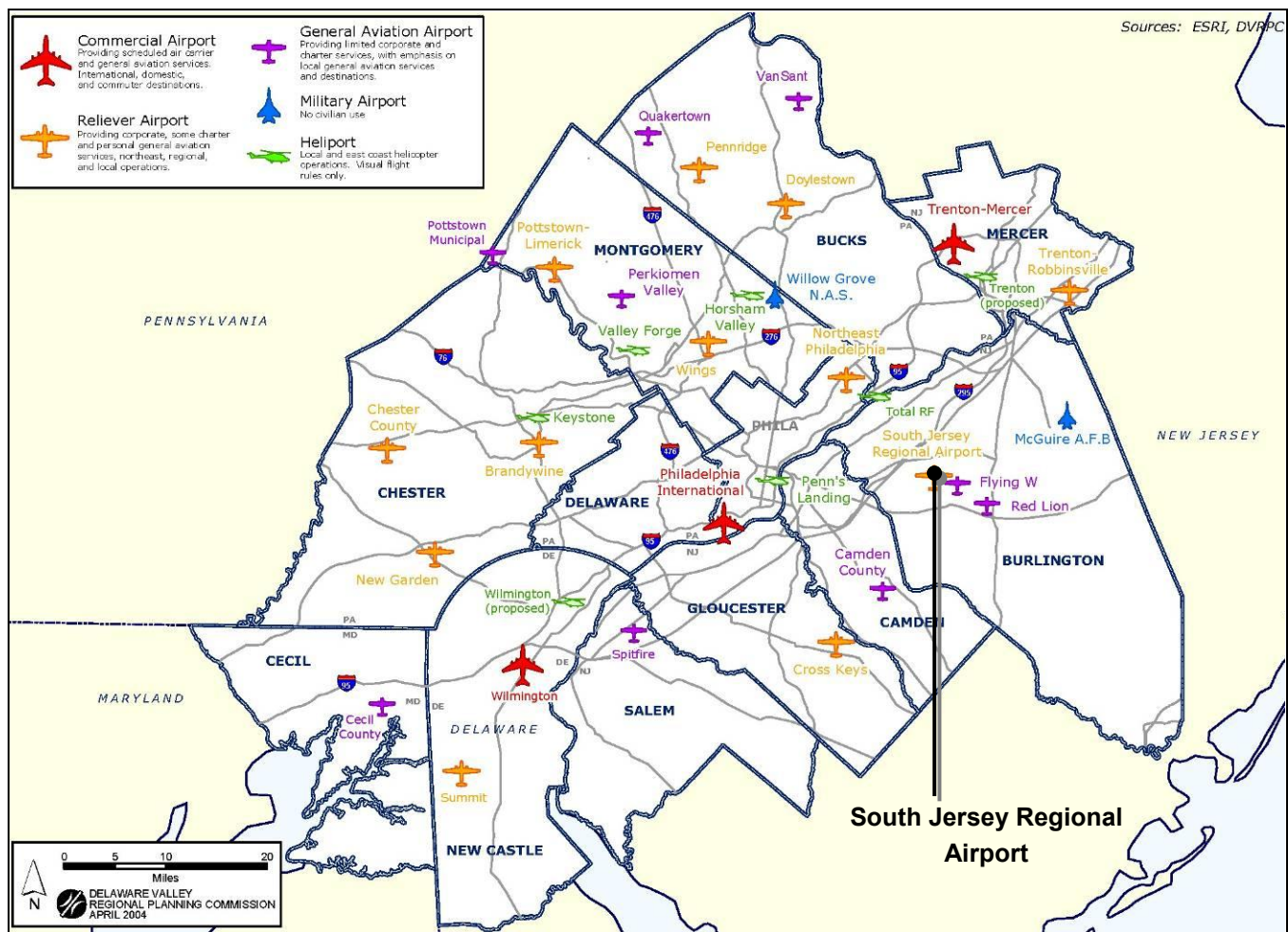


Figure 1-1: Location Map

Source: Delaware Valley Regional Planning Commission (DVRPC), April 2004

1.1.2 Airport History

VAY was originally Cameron Field, and was constructed in 1955 on 120 acres of land, consisting of two grass strips. The original plan was for an executive flying park with private homes built along the taxiways. Soon after it opened, local interest increased and the grass strips were graded to provide a safer operating surface.

In 1960, Philip Cohen bought the field and formed Triangle Airways to operate it. Additional land was purchased and the east-west strip was extended with clear approaches. Cohen's Iron Works constructed a main hangar as well as other buildings, and on October 6, 1960, Triangle Airways officially opened Burlington Airpark. The new facility was completed with a pilot's lounge, operations office, restaurant, aircraft storage, and offices for student instruction and the newly initiated Sky Diving Center. Within a short time, the hangars were filled and industrial tenants were developing along the eastern border. The runway was paved and lighted, a beacon was installed, and the Airpark was proving to be an asset to the community. Triangle Airways continued to operate the Airpark until the early 1980's, at which time there were more than 230 based airplanes and helicopters.

During the mid-1980's, ownership transferred several times. The facilities became neglected and the Airpark suffered a drastic reduction in aircraft activity. In 1988, Burlington Airpark had 35 airplanes and was all but closed when, in September, management and ownership was acquired by the Aviation Industrial Realty Corporation (AIRCORP), who then changed the name of the airfield to South Jersey Regional Airport. Saberflight provided the fixed base operator (FBO) service to the airport operations.

Since the 1988 acquisition, AIRCORP, the FAA, and NJDOT have been committed to a capital improvement program that continues to increase the safety and capacity of VAY. A new terminal was constructed including vehicle parking for pilots, passengers, and employees. A three-phase apron expansion included a paved tie-down ramp and a stormwater detention pond. Additional land was acquired to preserve the open space needed for aviation compatible development and growth. A Master Drainage Plan was prepared to coincide with the improvements to protect and preserve the integrity of natural resources. Aircraft owners continued to return to VAY on nearly a weekly basis, in addition to new tenants being attracted by the refurbished facilities. By 1994 VAY had nearly 200 aircraft and had nearly recaptured the tenant base experienced in the early 1980's.

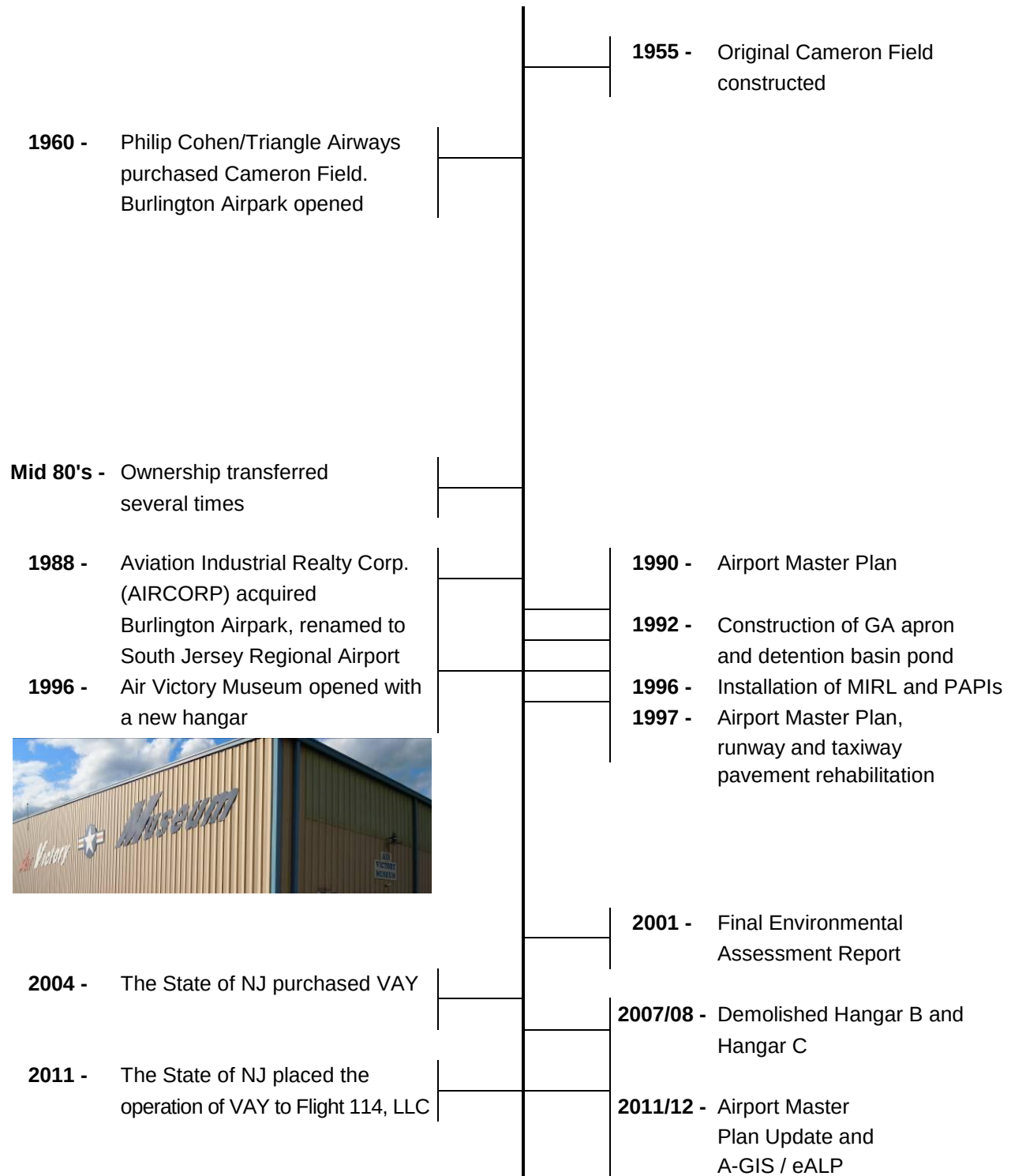
In the late 1990's, the airport owner proposed a runway expansion plan to attract more planes and allow VAY to serve as a reliever airport for Philadelphia International Airport (PHL). The plan drew widespread opposition from residents in Lumberton and other nearby townships who feared that an increasing number of large aircraft would worsen noise pollution and increase the chance for accidents over their neighborhoods.

The NJDOT studied the expansion proposal and formally shelved it in 2002. In March of 2004, the State of New Jersey purchased the airport for \$8.2 million after the owners threatened to close it and sell the land to developers. At the time of the sale, the annual air traffic was about 58,000 operations.

From 2005 to 2010, the Airport was operated and managed by Greenwood Lake Airport Management, LLC, which was doing business as South Jersey Regional Airport, LLC, under a contract with the State of New Jersey. On January 1, 2011, the State of New Jersey awarded a private operator, Flight 114, LLC, to be the Airport Operator for the South Jersey Regional Airport responsible for the operation and management of the Airport for 20 years. The Airport Operator shall receive the revenue generated from the Airport and pay the State a fixed monthly fee plus a percentage of the revenue from Airport operations.

In the last five years, VAY has averaged about 28,100 operations annually. There were 77 based aircraft at the end of 2011.

Figure 1-2 shows the timeline of the major events for VAY.



1.1.3 Airport's Role

VAY is publicly owned by the State of New Jersey, managed by NJDOT Division of Aeronautics, and operated by Flight 114, LLC. It is a public use airport, classified by the FAA as a general utility airport and designated as a reliever airport by the FAA and Delaware Valley Regional Planning Commission (DVRPC). Reliever Airports are those designated by the FAA in the National Plan of Integrated Airport systems (NPIAS) to relieve congestion at Commercial Service airports and to provide improved general aviation access to the overall community. Reliever airports must have at least 100 based aircraft or 25,000 annual itinerant operations according to FAA Order 5090.3C. VAY is mostly serving recreational planes in recent years. It operates from 08:00 to 20:00.

With reference to the New Jersey State Airport System Plan (released in 2008) (SASP), VAY's recommended functional role is Priority General Service. Priority General Service airports should be able to accommodate some of the most demanding corporate aircraft, including jets. All types of multi- and single-engine aircraft operating for business, training, and pleasure can be anticipated at these airports. The Priority General Service airport functional level was developed to identify those airports that contribute significantly to the system and should be upgraded to the Advanced Service functional level. These airports will offer a full complement of aviation related services and should be developed to the fullest extent possible. However, existing constraints at airports in the Priority General Service functional level may make airport expansion extremely unlikely or infeasible.

1.2 Existing Airport Facilities

The following paragraphs describe the existing facilities at VAY. **Figure 1-3** provides an overview of the existing airport facilities.

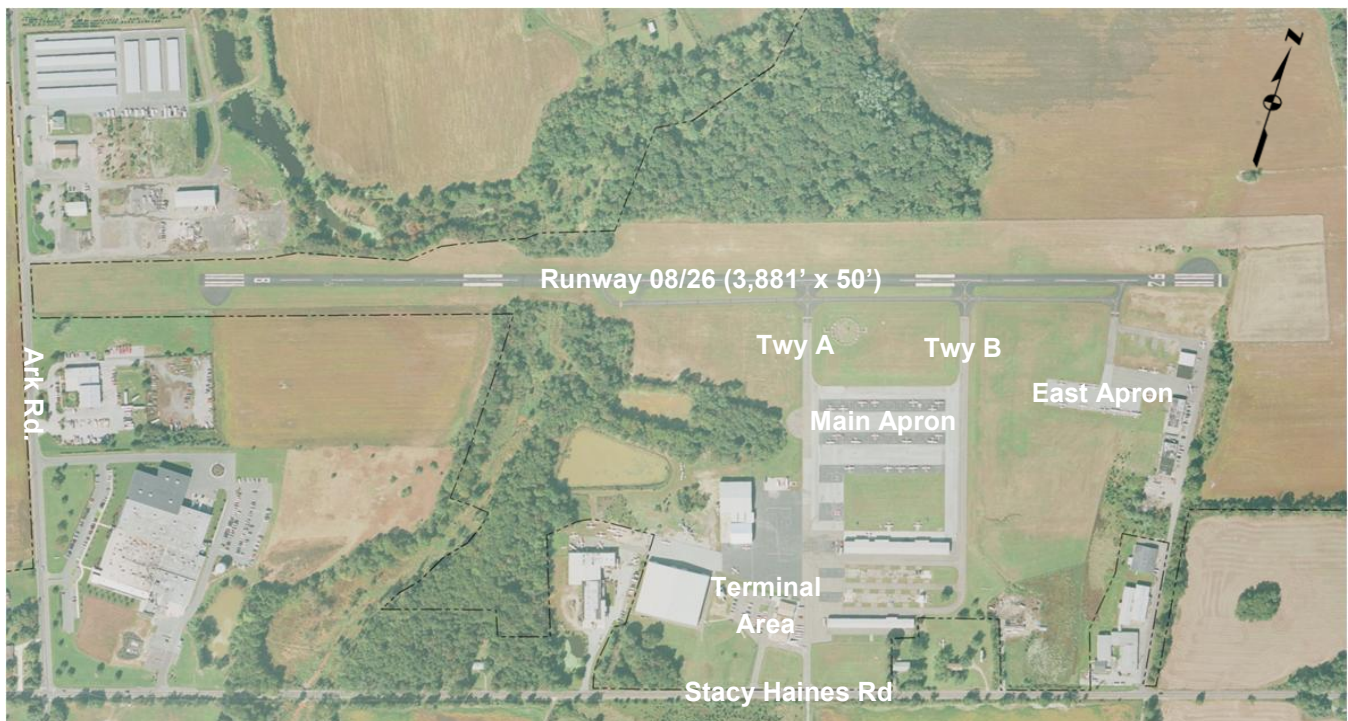


Figure 1-3: Overview of the Airport Facilities

1.2.1 Airfield and Airspace

Runway

VAY has a single east-west Runway 08/26, measuring 3,881 feet in length and 50 feet in width. **Table 1-1** summarizes the airport facilities and runway data.

Runway 08/26 is paved and marked for non-precision approaches with centerline, runway designation, threshold, fixed distance, and holding position markings on intersecting taxiways.

Taxiway

The taxiway system is designated by letters. Taxiway A, measuring 20 feet in width, serves as a partial parallel taxiway for Runway 08/26 with five entrances/exits connecting to the runway. The separation distance between the Taxiway A centerline and the runway centerline is approximately 75 feet. Because the western portion of the runway does not have taxiway access, aircraft departing Runway 08 or landing Runway 26 must back-taxi on the runway for the remaining distance. To facilitate this maneuver, there are turnaround bulbs located at each runway end.

The Airport also has three apron taxiways connecting the aprons to the parallel Taxiway A. Taxiway B and Taxiway C are leading to / from the main aircraft parking apron (the Main Apron). Taxiway D is leading to / from the aircraft parking apron at the east end (the East Apron). All of these three taxiways are 35 feet wide.

Airport Reference Code

The FAA classifies airports for design purposes based on their associated Airport Reference Code (ARC). The ARC consists of two aircraft characteristics that govern the dimensions of airfield facilities and the associated design surfaces. The first component of the ARC is a letter that references the aircraft approach category; which indicates the approach speed of the aircraft that the runway is designed to accommodate. The second component of the ARC is a Roman numeral that references the Airplane Design Group (ADG), which indicates the aircraft wingspan and tail height a runway is designed to accommodate.

Currently, the Airport is classified as a B-II airport. However, the existing runway width (50 feet), parallel taxiway widths (20 feet) and the separation between the runway and taxiway (75 feet) do not meet the FAA design standards. B-II design standards relate to aircraft with an approach speed of 91 knots – 120 knots, and a total wingspan of 79 feet.

With reference to FAA AC 150/5300-13, the minimum runway width for aircraft approach category B runways with not lower than 3/4-statute mile approach visibility minimums is 75 feet with 10-foot stabilized turf shoulders for ADG II. In contrast, Runway 08/26 is 50 feet wide and has turf shoulders. Per the standards, the minimum taxiway width is 35 feet with 10-foot shoulders, and a separation standard for runway centerline to taxiway centerline of 240 feet. As previously stated, the distance between the Runway 08/26 centerline and the Taxiway A centerline is 75 feet.

Runway and Taxiway Pavement

The pavement was severely cracked in several areas along the runway and taxiway back in the 1990's and was reconditioned in 1997 through a grant-in-aid from NJDOT Division of Aeronautics. The present pavement condition of the runway and taxiways are in good condition, with both surfaces being comprised of asphalt.

Table 1-1: Existing Airport Facilities and Runway Data

Description	Airport Data	
Airport Reference Code ⁽¹⁾	B-II ¹	
Airport Reference Point ⁽²⁾		
Airport Latitude	39° 56'34.4" N	
Airport Longitude	74° 50'44.7" W	
Airport Elevation (MSL) ⁽²⁾	53'	
Acreage ⁽²⁾	658	
Airport Navigational Aids ⁽⁴⁾	GPS, VOR, NDB	
Miscellaneous Facilities ⁽²⁾	Rotating Beacon, Wind Indicator (lighted)/ Segmented Circle	
Description	Runway Data	
	Runway 08	Runway 26
Runway Category ⁽¹⁾	B-II ¹	
Runway Length ⁽²⁾	3,881'	
Runway Width ⁽²⁾	50'	
Pavement Type ⁽²⁾	Asphalt	
Weight Bearing Capacity for Single Wheel (lbs) ⁽²⁾	30,000	
Runway Heading ⁽²⁾	082 magnetic, 070 true	262 magnetic, 250 true
Runway End Coordinate ⁽²⁾		
Latitude	39 ° 56'27.7457"N	39 ° 56'40.9835"N
Longitude	74 ° 51'08.0999"W	74 ° 50'21.3329"W
Runway End Elevation (MSL) ⁽²⁾	43.7'	51.7'
Displaced Threshold ⁽²⁾	None	None
Effective Gradient ⁽²⁾	0.3%	0.3%
Approach Visibility Minimums (AGL) ^{(4) (5)}	Ceiling 616' Visibility 1 statute mile	Ceiling 408' Visibility 1 statute mile
Runway Lighting Type ⁽²⁾	MIRL	MIRL
Runway Marking Type ⁽²⁾	Non-precision	Non-precision
14 CFR FAR Part 77 Approach Category ^{(2) (3)}	Non-precision 34:1	Non-precision 34:1
Visual Nav aids ⁽²⁾	PAPI (2 Right) (3.25 degrees glide path) REILS	PAPI (2 Right) (3.00 degrees glide path) REILS

Abbreviations:

- GPS – Global Positioning System
- VOR – Very High Frequency Omni-directional Range Finder
- NDB – Non-Directional Beacon
- MIRL – Medium Intensity Runway Lights
- PAPI – Precision Approach Path Indicator
- REILS – Runway End Identifier Lights

Note: 1. The existing runway, taxiways and separation between runway and taxiway do not meet the ADG I or II standard.

Sources:

- (1) South Jersey Regional Airport, Airport Master Plan 1997
- (2) Airport Master Record, FAA's Aeronautical Information Services, Effective date October 20, 2011
- (3) Code of Federal Regulations, Title 14, Part 77 – Obstructions to Navigation
- (4) Instrument Approach Procedures, FAA, date August 25, 2011
- (5) IFR Low Altitude Enroute Aeronautical Chart, Effective date October 20, 2011

Airspace and Air Traffic Control

The surrounding airspace is generally congested, due to its proximity to other airports in the region and the Alert Area and Military Operations Area (MOA) east of the Airport. The Airport is within 30 nautical miles of the Philadelphia International Airport (PHL); a Class B airspace. **Figure 1-4** shows the VFR Terminal Area Chart for PHL and **Figure 1-5** shows the IFR Low Altitude Enroute Aeronautical Chart for the area surrounding VAY. Both figures depict the airspace and MOA around VAY.

The New York Air Route Traffic Control Center (ARTCC) provides radar services to high altitude aircraft operating on IFR flight plans. The McGuire Approach and Departure Control provides radar sequencing and separation to aircraft landing and/or departing VAY since there is no airport traffic control tower (ATCT) on the field. The Automated Flight Service Station (AFSS) is provided at Millville Airport.

The traffic pattern at VAY is standard (left-hand turns) for Runway 08 and non-standard (right-hand turns) for Runway 26. The traffic pattern altitude is established at 853 feet MSL.

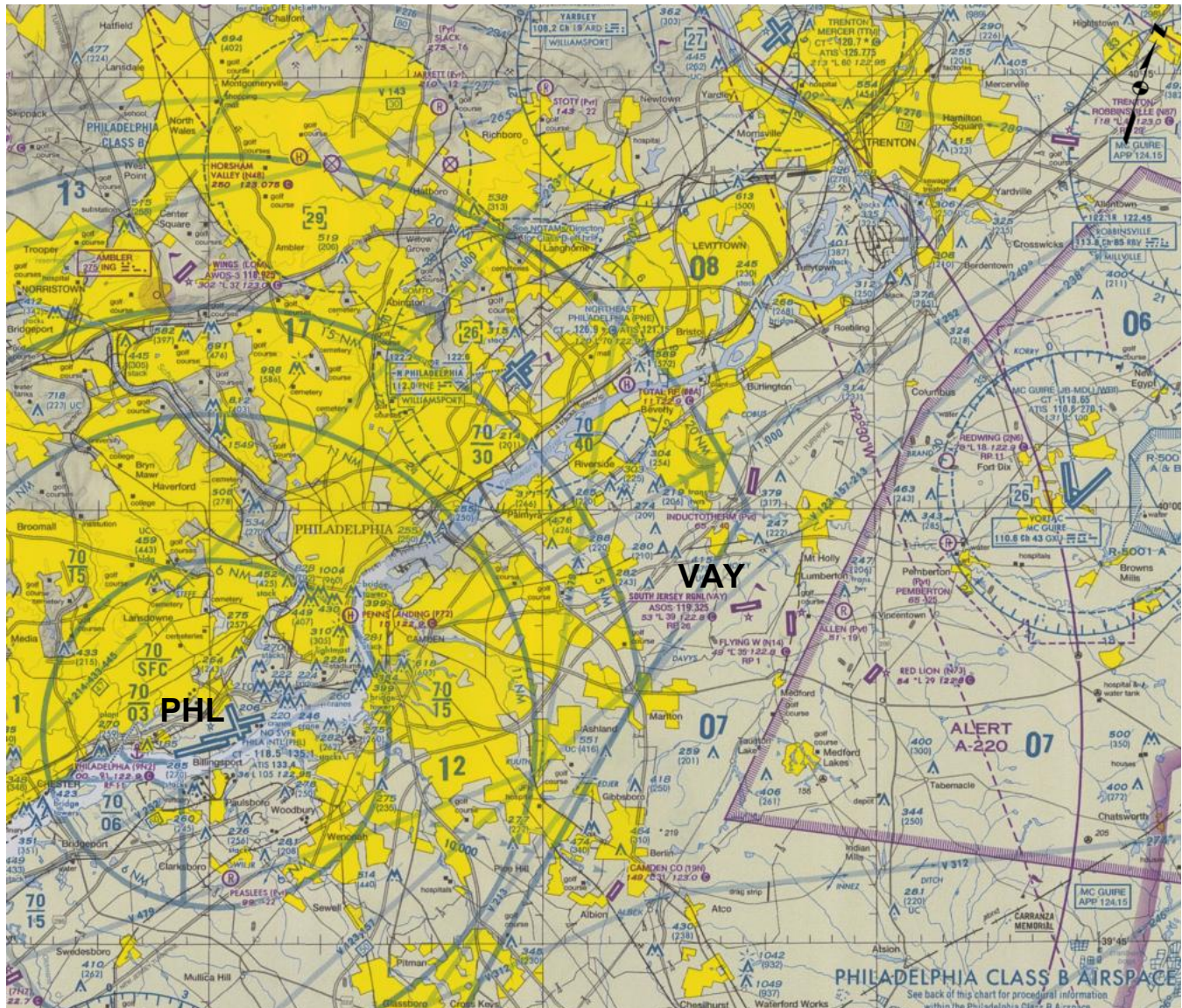
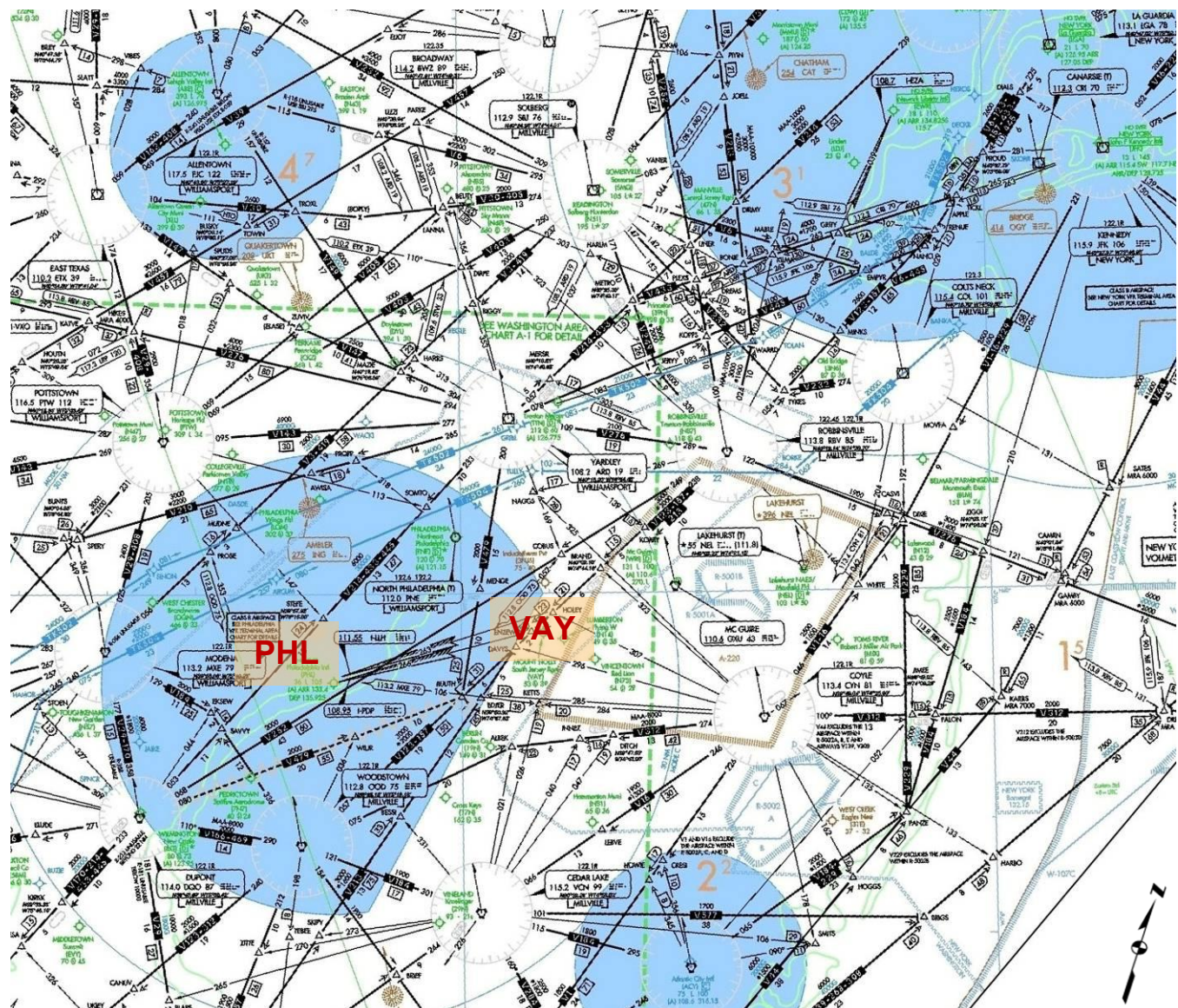


Figure 1-4: Terminal Area Chart for PHL, date July 28, 2011



AIRSPACE INFORMATION

Open area (white) indicates controlled airspace (Class E) unless otherwise indicated

All airspace 14,500' and above is controlled (Class E)

Shaded area (brown) indicates uncontrolled airspace below 14,500' (Class G)



In Canada - Indicates Class B Airspace above 12,500'

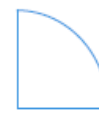
 Oceanic Control Area (CTA)
 Additional Control Area limit



Class B Airspace



Class C Airspace



Mode C Area
See FAR 91.215

SPECIAL USE AIRSPACE



P - Prohibited Area
R - Restricted Area
W - Warning Area
A - Alert Area
MOA - Military Operations Area



In Canada:
CYA - Advisory Area
CYD - Danger Area
CYR - Restricted Area

Line delimits internal separation of same Special Use Area

See Airspace Tabulation for complete information

Figure 1-5: IFR Low Altitude Enroute Aeronautical Chart, date October 20, 2011

Navigational and Lighting Aids

The navigational and lighting aids at VAY are described below and summarized in **Table 1-1**.

Within a 25 nautical mile radius of VAY, there are six very high frequency omni-directional range (VOR) stations, one Terminal Radar Approach Control TACAN (military VOR) and three non-directional beacons (NDB).

A VOR is a navigational aid that transmits radio signals in all directions from a central station. It is the most widely used navigational aid and the primary en route facility on which the airway system is established. **Table 1-2** is a listing of the VORs and their location with respect to VAY.

Table 1-2: VOR Locations within 25 nautical miles of VAY

VOR Identifier	Distance from VAY (nautical miles)	Radial (in degrees)
North Philadelphia	11.2	148
McGuire	12.1	262
Yardley	18.8	181
Coyle	20.5	302
Robbinsville	22.4	236
Cedar Lake	24.9	023

An NDB is a navigational aid that transmits low or medium frequency radio signals whereby the pilot of an aircraft can determine his/her bearing and “home” in on the station. The NDBs in the area within 25 nautical mile radius of VAY are given in **Table 1-3**.

Table 1-3: NDB Locations within 25 nautical miles of VAY

NDB Identifier	Distance from VAY (nautical miles)	Heading (in degrees)
Willow Grove	20.2	149
Ambler	23.0	130
Lakehurst	24.2	268

VAY has three published instrument approach procedures (all non-precision), including an RNAV(GPS) approach to Runway 08, RNAV(GPS) approach to Runway 26, and VOR approach to Runway 26. The RNAV(GPS) approach procedures include both the LP (lateral precision) procedure, which is a Wide Area Augmentation System (WAAS) procedure with accurate lateral guidance but no vertical guidance; and the LNAV (lateral navigation) procedure, which is the basic Global Positioning System (GPS) approach procedure with only lateral guidance. The approach minimums by aircraft category are shown in **Table 1-4**.

Runway 08/26 has medium intensity runway lights (MIRL) and precision approach path indicators (PAPI) as visual aids to guide the pilot's approach. Runway end identifier lights (REILs) have recently been installed (January 2013) for both the Runway 8 and Runway 26 ends.

Table 1-4: Instrument Approach Summary

Type of Instrument Approach and Runway	Approach Category (Mean Sea Level (MSL) – Above Ground Level (AGL) / statute miles			
	A	B	C	D
RNAV (GPS) – Runway 08 LP MDA LNAV MDA Circling	660 ft MSL - 616 ft AGL / 1 mile 660 ft MSL - 616 ft AGL / 1 mile 660 ft MSL - 607 ft AGL / 1 mile		N/A	N/A
RNAV (GPS) – Runway 26 LP MDA LNAV MDA Circling	460 ft MSL - 408 ft AGL / 1 mile 460 ft MSL - 408 ft AGL / 1 mile 520 ft MSL - 467 ft AGL / 1 mile		N/A	N/A
VOR – Runway 26 S-26 Circling	620 ft MSL - 567 ft AGL / 1 mi 620 ft MSL - 567 ft AGL / 1 mi	620 ft MSL - 567 ft AGL / 1 ¹ / ₄ mi 620 ft MSL - 567 ft AGL / 1 ¹ / ₄ mi	N/A	N/A

Abbreviations: RNAV – Area Navigation
LP – Lateral Precision
LNAV – Lateral Navigation
MDA – Minimum Descent Altitude

Source: Instrument Approach Procedures, FAA, date August 25, 2011

Meteorological Conditions

The climatic environment of an airport site influences the operational characteristics of the aircraft as well as airfield facility requirements. For example, cloud ceiling and visibility conditions affect airport capacity because aircraft spacing usually increases as these conditions deteriorate. Annual temperature is useful in recommending runway specifications and associated lengths. Wind persistency (prevailing wind direction vs. wind speed over time) during various weather conditions dictates runway orientation, as well as the location of instrument landing aids.

There have been two meteorological stations for VAY serving different periods since 1995. The details of the meteorological stations are summarized in **Table 1-5**. The meteorological data from the National Climatic Data Center (NCDC) for these two stations include daily data for mean temperature, maximum temperature, minimum temperature, mean visibility and mean wind speed, etc. The latter station installed in 2008 is an automated airport weather station with an Automated Surface Observing System (ASOS) located at the east of the Airport as pictured in **Figure 1-6**.

Based on the analysis for these two meteorological stations at VAY for the period from 2000 to 2011, the mean daily maximum temperature of the hottest month is 87.5°F and the mean daily minimum temperature of the coldest month is 23.2°F. The analysis is summarized in **Table 1-6**.



Figure 1-6: Automated Surface Observing System (ASOS)

Table 1-5: Meteorological Stations at VAY

Station Name	USAF	WBAN	Location	Period of Record
South Jersey Regional	724074	93780	LAT 39.941 ° N LON 74.841 ° W	Nov 24, 2008 to present
South Jersey Regional	724074	99999	LAT 39.950 ° N LON 74.850 ° W	Jan 5, 1995 to Nov 23, 2008

Abbreviations: USAF – US Air Force Datsav3 Station Number
 WBAN – NCDC "Weather Bureau Air Force Navy" Number

Table 1-6: Mean Daily Maximum and Minimum Temperatures

Description	Year											Average
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	
Hottest Month of the Year ¹	Aug	Jul	Jul	Jul	Jul	Jul	Jul	Jul	Aug	Jul	Jul	N/A
Mean Daily Maximum Temperature of the Hottest Month	87.9	88.5	85.8	85.9	87.6	88.0	85.9	87.8	84.5	90.1	90.2	87.5
Coldest Month of the Year ²	Jan	Dec	Jan	Jan	Jan	Feb	Feb	Jan	Jan	Jan	Jan	N/A
Mean Daily Minimum Temperature of the Coldest Month	22.6	24.8	21.1	17.5	24.0	26.8	21.5	28.3	22.4	24.9	20.8	23.2

Note: 1. The hottest month of the year is obtained from the highest monthly average of the daily mean temperature.
 2. The coldest month of the year is obtained from the lowest monthly average of the daily mean temperature.

Source: National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center, Station at VAY for 2001 to 2011

Wind data for VAY from 2000 to 2009 was analyzed, and predominant winds in the area were determined to be from the west, ranging from southwest to northwest. Wind coverage for the present runway orientation is presented in **Table 1-7**.

Table 1-7: Wind Coverage for Runway 08/26

Weather condition	Crosswind Components			
	10.5 Knot	13 Knot	16 Knot	20 Knot
All Weather Wind Coverage	95.95%	98.02%	99.65%	99.95%
VFR Wind Coverage Ceiling ≥ 1,000' Visibility ≥ 3 statute miles	95.82%	97.96%	99.65%	99.95%
IFR Wind Coverage Ceiling <1,000' Visibility < 3 statute miles	97.00%	98.52%	99.65%	99.96%

Source: National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center, Station at VAY for 2000 to 2009

1.2.2 Terminal Area and Aircraft Parking Aprons

Terminal Area

The existing terminal area and related facilities are depicted on **Figure 1-7**.

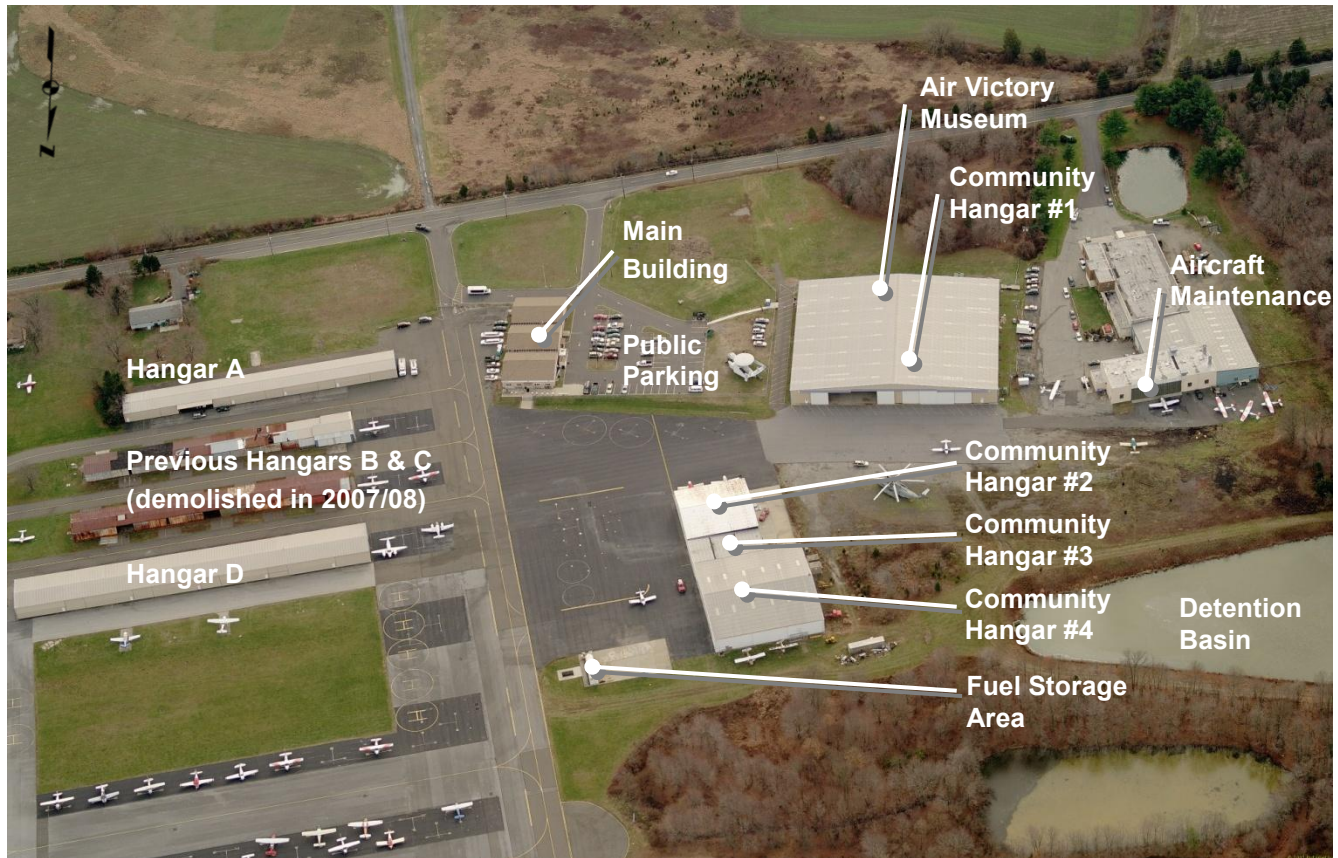


Figure 1-7: Terminal Area

The terminal area is located on the north side of Stacy Haines Road (also known as Burlington County Route 612, Mount Laurel / Eayrestown Road) on the southern edge of the airport. **Figures 1-8 to 1-9** show VAY's single story terminal building (the Main Building) of 9,000 square feet that includes several offices, a lounge for pilots and passengers, a restaurant, a meeting room, hired car (limousines) service and restrooms.

The Airport Operator / fixed base operator (FBO) is operated by Flight 114, LLC. Their office is located at the Main Building.

On the west side of the Main Building is a paved public parking lot with approximately 52 vehicular parking spaces (including three accessible spaces), shown in **Figure 1-10**. Access to the car park is via Stacy Haines Road.

On the east side of the Main Building is the airside restricted area with several parking lots for staff and the hired cars (limousines).



Figure 1-8: Main Building



Figure 1-9: Interior of Main Building (left), Lounge for Pilots and Passengers, Airport Operator's Office (right)

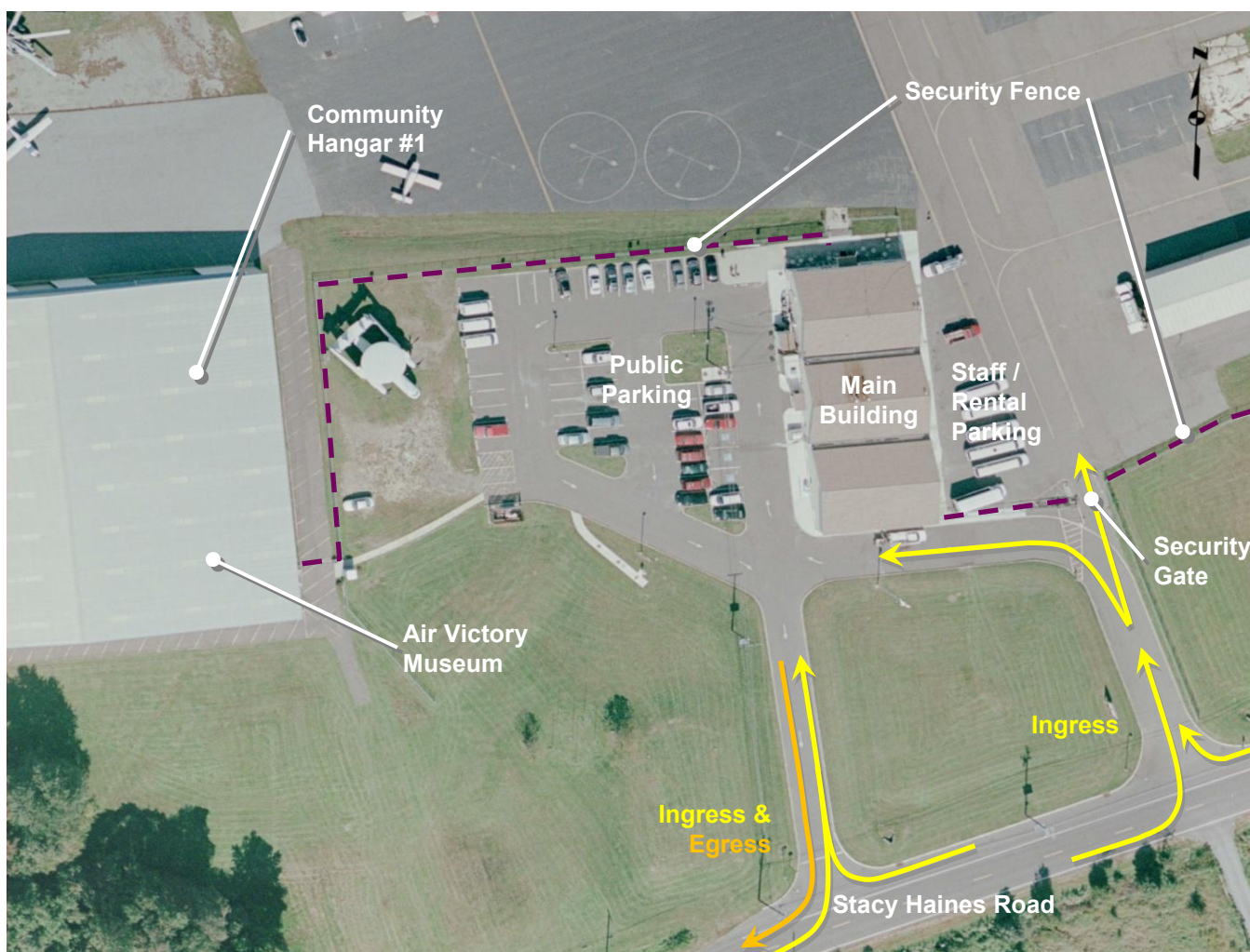


Figure 1-10: Public Parking (Approximately 52 parking spaces, with 3 accessible spaces)

There are approximately 20 T-hangar spaces in two ten-bay rows, located to the east of the Main Building, named Hangar A and Hangar D, and shown in **Figure 1-11**. Hangar A is a 10,560-square foot T-hangar structure built in 1988. The building contains 10 T-shaped units with a 42-foot electrically operated bi-fold doors. Hangar D is an 18,000-square foot T-hangar structure built in 1988. The building contains 10 T-shaped units with a 50-foot electrically operated bi-fold doors. Both buildings are pre-engineered steel frame structures with ribbed metal paneled walls. The interior floors are concrete and a basic electrical package services each individual unit. Hangar B and Hangar C (another 2 x ten-bay) were built in the mid 1960's and were demolished around 2007/08. The T-hangars are rented on a month to month basis. Hangar A was recently repaired in 2011.



Figure 1-11: Hangar A (top) and Hangar D (bottom)

There are four open-bay hangars to the north and west of the Main Building, namely Community Hangars #1 to #4. Community Hangar #1, with an area of 48,000 square feet, was constructed in 1996/1997. The hangar is split 50/50 with the southern part of Community Hangar #1 containing the Air Victory Museum, while the northern part of Community Hangar #1 is occupied by the Division of Aeronautics, NJDOT, to store aeronautical equipment maintained by the Division. A list of the equipment is described in Section 1.2.3. Community Hangars #2 and #3 contain a total of 24,000 square feet and were built between 1980 and 1993, and are pictured in **Figure 1-12** along with Community Hangar #4. Community Hangar #3 (3,700 square feet) was built in 1993 and lies between two previously existing hangars, Community Hangar #2 (6,400 square feet) and Community Hangar #4 (13,900 square feet). Community Hangar #2 is equipped with an electrically operated three part roll-up door system having a clear opening of 80 feet. Community Hangar #3 features an electrically operated bi-fold door which fronts on the eastern side of the adjacent ramp area. Community Hangar #3 was previously used by a helicopter school and is now a storage hangar. Of the Community Hangars, Community Hangar #4 is the largest. It features an electrically operated roll-up door divided into three sections, and it includes a small, 500-square foot interior office area.



Figure 1-12: Community Hangars #1 (top) and #2 to #4 (bottom)

To the west of the Community Hangar #1, there is an aircraft maintenance hangar operated by B P Air, Inc, seen in **Figure 1-13**, which provides aircraft maintenance services. This building is located outside the airport property boundary, and its two tenants share one direct access point for through-the-fence operations with direct apron access. "Through-the-fence" operations are discussed in more detail in Section 1.2.6.



Figure 1-13: Aircraft Maintenance with apron access

Main Apron

The main apron is the ramp area to the north of Hangar D which includes aircraft tie-down spaces on paved area and turf tie-down spaces. The Main Apron covers an area of approximately 40,000 square yards with around 78 parking spaces. Approximately 31,000 square yards are paved area with 54 parking spaces, and 9,000 square yards are turf area with 24 parking spaces.

Figure 1-14 shows how both Taxiway B and Taxiway C connect the Main Apron to the parallel Taxiway A and the runway.

The grass areas to the north of the Main Apron and between the East and Main Aprons, used to be parking areas during the mid 90's when there were over 200 based aircraft. This area is currently not being used for aircraft parking, and is not considered part of the Main Apron.



Figure 1-14: Main Apron and Transient Apron

Transient Apron

To the north of the Main Building and in front of the Community Hangars #2 to #4 is the ramp area for transient aircraft, shown in **Figure 1-14**. It is estimated the Transient Apron has an area of approximately 8,500 square yards which can accommodate approximately 19 transient aircraft.

East Apron

Figure 1-15 shows the East Apron located at the east end of the airport and adjacent to the runway 26 end. It is connected to the parallel Taxiway A and runway through Taxiway D. It covers an area of approximately 8,000 square yards with 23 parking spaces. Parking spaces to the north of the East Apron are within the existing Runway Object Free area (ROFA) (i.e. 250 feet from the runway centerline), and are not included as part of the East Apron.

The area to the north of the East Apron has been re-graded and repaved recently to mitigate localized flooding and for pavement rehabilitation.

In summary, the Main Apron, Transient Apron and East Apron provide approximately 120 parking spaces on 56,500 square yards.

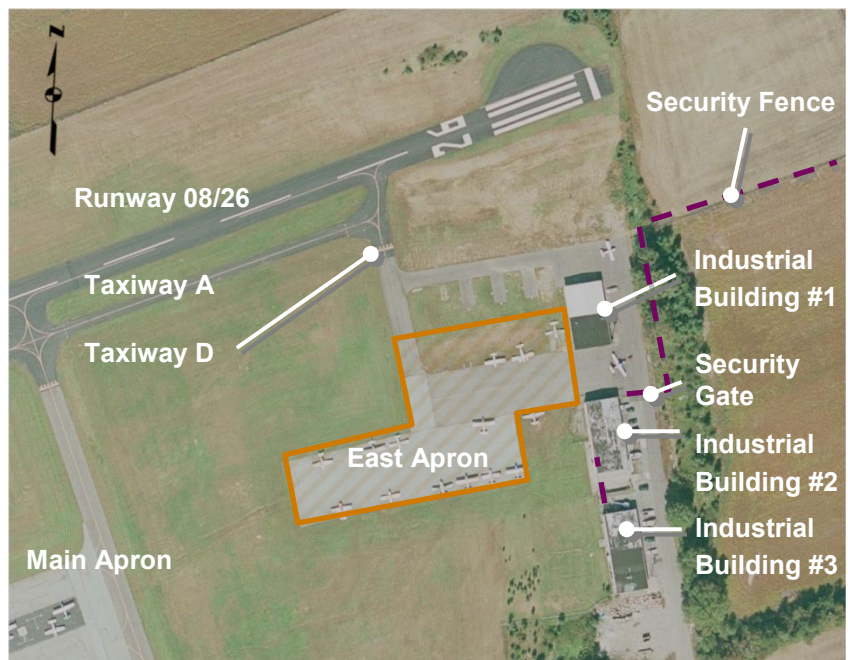


Figure 1-15: East Apron and Adjacent Industrial Buildings

Adjacent to the East Apron are three industrial buildings located at the east of the airport property, as shown in **Figures 1-15 and 1-16**, named Industrial Building #1 to #3. The buildings are one-story wood framed hangar buildings built in the 1960's. Of the three buildings, Industrial Buildings #1 and #2 have airside access. Industrial Building #1 contains approximately 5,000 square feet and the building has two manually operated rolling slack doors. It is leased for private aircraft storage. Industrial Building #2 contains approximately 5,500 square feet and has one, manually operated rolling slack door, and a small office and shop space. It is leased to a privately owned aircraft maintenance shop. Industrial Building #3 contains approximately 6,000 square feet, and the interior of the building is a mixture of open shop area and office area located at the southern most portion of the building. The northern half of the Industrial Building #3 is vacant, but is currently being renovated by Resource Management, while the southern half is the storage for a landscaping company (Grass Masters Inc.) who has an office in the Main Building.



Figure 1-16: Industrial Building #1 / Aircraft Storage (left), Industrial Building #2 / Maintenance Shop (right)

1.2.3 Support Facilities

Fuel Storage Facilities

Fuel service for Jet-A fuel (Jet-A) and 100 low lead aviation gasoline (AVGAS) is operated and managed by the Airport Operator. It is available at VAY seven days a week from 8:00am to 8:00pm. The two fuel trucks currently operating at VAY to dispense the fuel are:

- 1974 Ford Fuel Truck for AVGAS (Condition: runs good, very poor shape)
- 1980 Ford F-700 Fuel Truck for Jet-A (Condition: runs ok, clutch slips, driver door has dent, very hard to open, very poor shape)

The two fuel trucks, shown in **Figure 1-17**, are parked at the west end of Hangar A.

Fuel supply for the Airport used to be provided via tanker trucks only. The Airport Operator added an AVGAS fuel tank (12,000-gallon capacity) which is owned by the Airport Operator in 2011, and can be seen in **Figure 1-17**. The Airport Operator is planning to add another fuel tank (12,000-gallon capacity) for Jet-A. The fuel storage area is located in front of the Community Hangar #4 with an underground oil interceptor in the vicinity.



Figure 1-17: Fuel Trucks (left); Fuel Tanks (right)

Aircraft Rescue and Fire Fighting (ARFF)

The aircraft rescue and fire fighting (ARFF) services are provided by the Lumberton Township Fire Department located approximately three miles from the airport. The current level and type of activity does not warrant on-airport fire services.

Ground Support Equipment and Storage

Below is a list of ground support equipment (GSE) at the Airport. Other than the two fuel trucks mentioned above, which are parked next to Hangar A, and a front end loader, which is parked at the vacant space between Hangar A and Hangar D, most of the remaining equipment is stored in the northern half of Community Hangar #1. These GSEs are property of the State and they are operated and maintained by the Airport Operator.

- 1970 International Dump Truck (Condition: Runs, broken plow harness, window stuck in door, bad shape)
- 1974 Ford F-250 (Condition: Not running, crack in windshield, no dash, very bad shape)
- Deutz Tractor (Condition: No date, very old, not running, needs hydraulic fluid, front end work, in very bad shape)
- Lawn Mower (Condition: 12-foot cut, not running, missing parts, has not run in years, unusable)

- 14-foot Mowing deck for Deutz Tractor (Condition: missing parts, very rusty, needs some new parts, not fixable, unusable)
- 1988 Chevy Blazer Plow Truck (Condition: Rusty, transmission slips, broken driver side window, poor shape)
- 1988 Ford F-350 Plow Truck (Condition: not running, dent in hood, dent in bed, dent in gate, no grill, very bad shape)
- 8 horsepower Air tug (Condition: needs carburetor, good shape)
- 527 Tenant Series Power Scrubber (Condition: not running, needs squeegee, and lifting parts, bad shape)
- 5.5 Horsepower Power Tug (Condition: new motor, new tires, runs good, good shape)
- 1963 Clark 5,420lb tug (Runs, has bad baring in motor, ok shape)
- Hobart Tug (Runs but stalls, needs carburetor, bad shape)
- SPL 32-foot 84-4A Man lift (needs circuit board, tires, muffler, bad shape)
- 1974 Ford Fuel Truck for AVGAS (Condition: runs good, very poor shape)
- 1980 Ford F-700 Fuel Truck for Jet-A (Condition: runs ok, clutch slips, driver door has dent, very hard to open, very poor shape)
- Front end loader, JCB 426 HT with 2yd bucket and 12' snow plow, purchased in 2008, as shown in **Figure 1-18**



Figure 1-18: Front End Loader

1.2.4 Airport Access

Figure 1-19 depicts the access roads to the Airport. Regional access is provided by the New Jersey Turnpike (gold line on the map below), Interstate Route 295 (blue line), and U.S. Route 206 (red line to the east of the Airport), as well as New Jersey State Routes 70, 38 and 73 (amber lines to the south, north and west of the Airport respectively). Direct access to VAY is provided via Stacy Haines Road (County Route 612, magenta) which leads to the entrance of the Airport at the south. Connecting local urban roads include Masonville-Fostertown Road (County Route 636, magenta), Mt. Holly-Medford Road (County Route 541, green), Mt Laurel Road (County Route 674, green), and Ark Road (County Route 635, magenta).

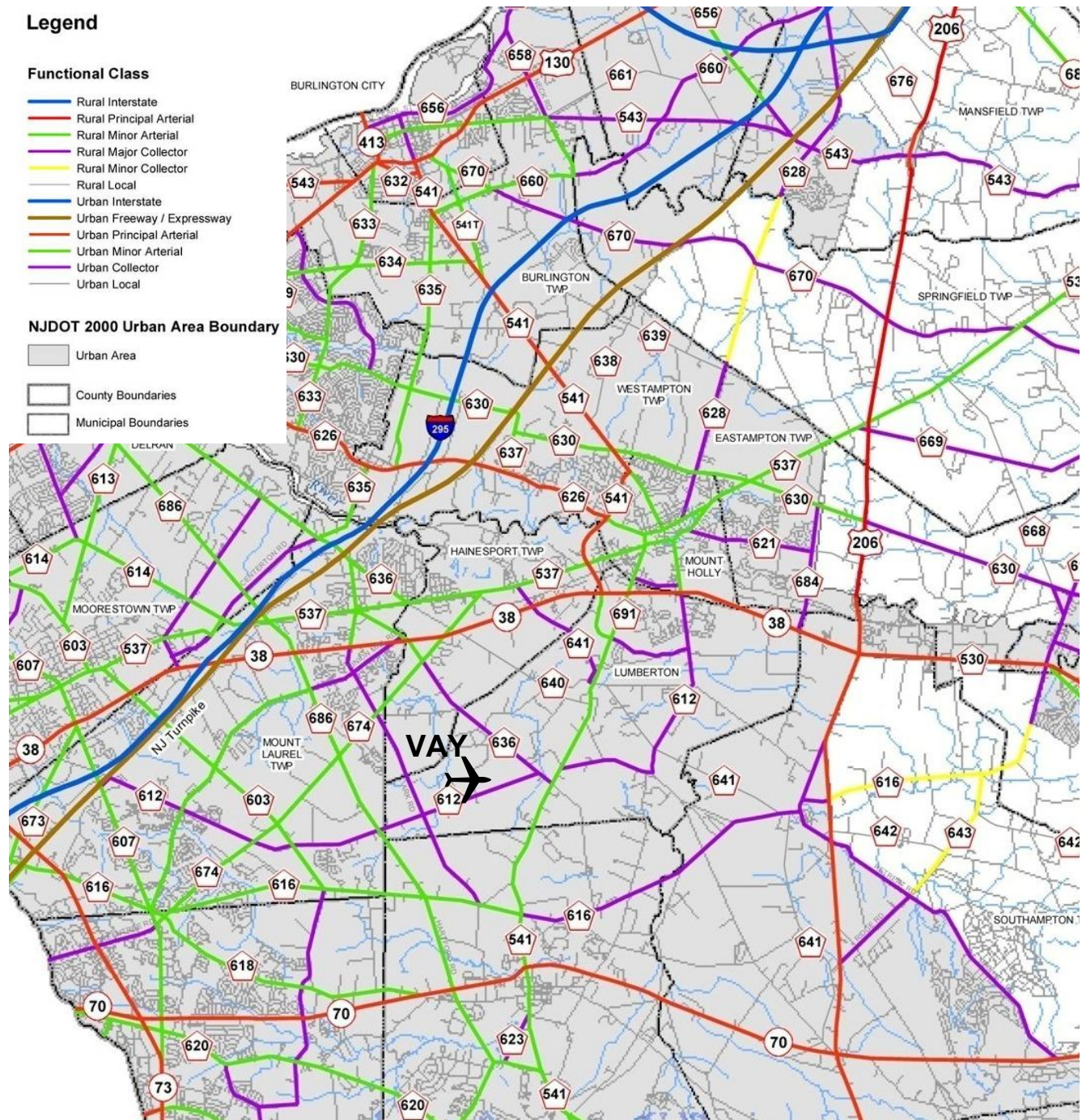


Figure 1-19: Access Roads to VAY

Source: NJDOT 2000 Urban Functional Classification, Burlington County, June 2, 2004

1.2.5 Utilities

The Airport is provided with potable water, a stormwater drainage system, sewer, telephone, internet connection, electricity, and natural gas.

A detention pond with a stormwater drainage system for the Main Apron and Transient Apron areas; including an oil interceptor at the fuel storage area, were constructed in 1992. The outlet of the detention pond is connected to Masons Creek on its western edge. **Figure 1-20** illustrates the existing condition of the detention pond on a day after a heavy rain.

An electric vault for the power supply of the airfield lighting systems is located behind the Community Hangars #2 to #4.



Figure 1-20: Stormwater Detention Pond

1.2.6 Security

The security arrangements for the Airport include a security system consisting of key coded entry to the airfield (i.e. aircraft areas and ramps) and a closed circuit television (CCTV) security system. However, it should be noted that the CCTV cameras, located at the east Hangar D and adjacent to the ASOS, are currently not in operation. Both the Division of Aeronautics Office of the NJDOT, located in Ewing Township, Mercer County, and the Airport Operator's office in the Main Building have access to the CCTV security system through the internet.

The airside of the Airport is generally surrounded by a security fence with security gates for vehicular access. The areas not enclosed by the fence are considered natural barriers to entry. These natural barriers include Masons Creek, both North and South of the runway and the two ponds northwest of Community Hangars #2 to #4. The layouts of the security fence and security gate locations are shown on the Airport Layout Plan set, and in **Figure 1-21**.

There are two separate "through-the-fence" operations that allow direct access to the Airport. These operations occur from adjacent non-airport property that has access to the Airport's runway and taxiway system. The property is not owned by the airport, and therefore does not include a security fence along its boundary. At VAY, one is for privately owned aircraft and the other is for an aviation related business (i.e. the aircraft maintenance hangar operated by B P Air, Inc. as mentioned above).

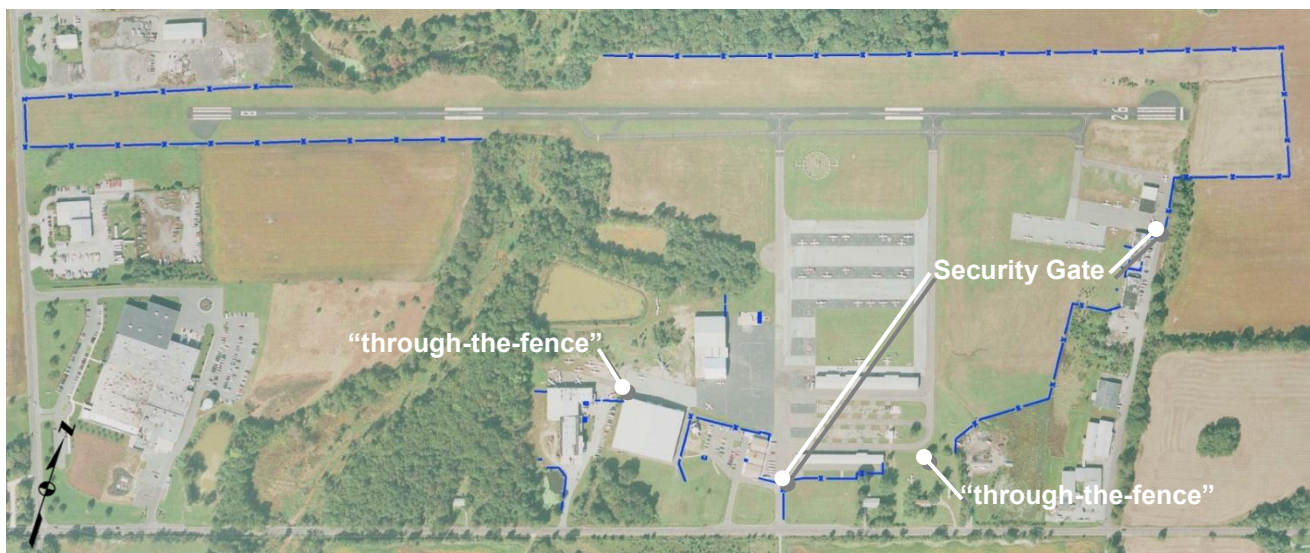


Figure 1-21: Existing Security Fence

1.2.7 Existing On-Airport Land Use

Existing on-Airport land uses are depicted on **Figure 1-22**. The functional designation is defined below and the approximate acreage is summarized in **Table 1-8**.

- **Airfield** – All of the associated aircraft movement areas of the airfield, including the runway, taxiways, Main Apron, East Apron, Transient Apron, and the areas included within the Building Restriction Line (BRL). The BRL encompasses the ROFA and RPZs for both runway ends. However, due to the existing airport property limits adjacent to Runway 8, the full BRL and RPZs are not fully included.
- **Terminal** – Main Terminal Building and other related landside facilities, including the curbside and vehicle public parking.
- **General Aviation** – Corporate use facilities, fixed based operator (FBO) and aircraft services, and private hangar parking where services are provided to general aviation uses; including hangars and associated vehicle parking.
- **Aircraft Maintenance** – Facilities used and dedicated to aircraft maintenance and repair activities; including vehicle parking.
- **Industrial** – Industrial related businesses and their associated facilities.
- **Other / Open Space** – Other general areas, including but not limited to other properties and open space.

Aviation related businesses adjacent to, but not within, the airport property are not included in the on-Airport land use inventory; they are included in the off-Airport land use.

Table 1-8: Existing On-Airport Land Use

Existing Land Use	Area (acres)	Percentage of Total
Airfield	95	14.44%
Terminal	2.5	0.38%
General Aviation	3.5	0.53%
Aircraft Maintenance	0.5	0.08%
Industrial	1.5	0.23%
Other / Open Space	555	84.35%
Total	658	100%

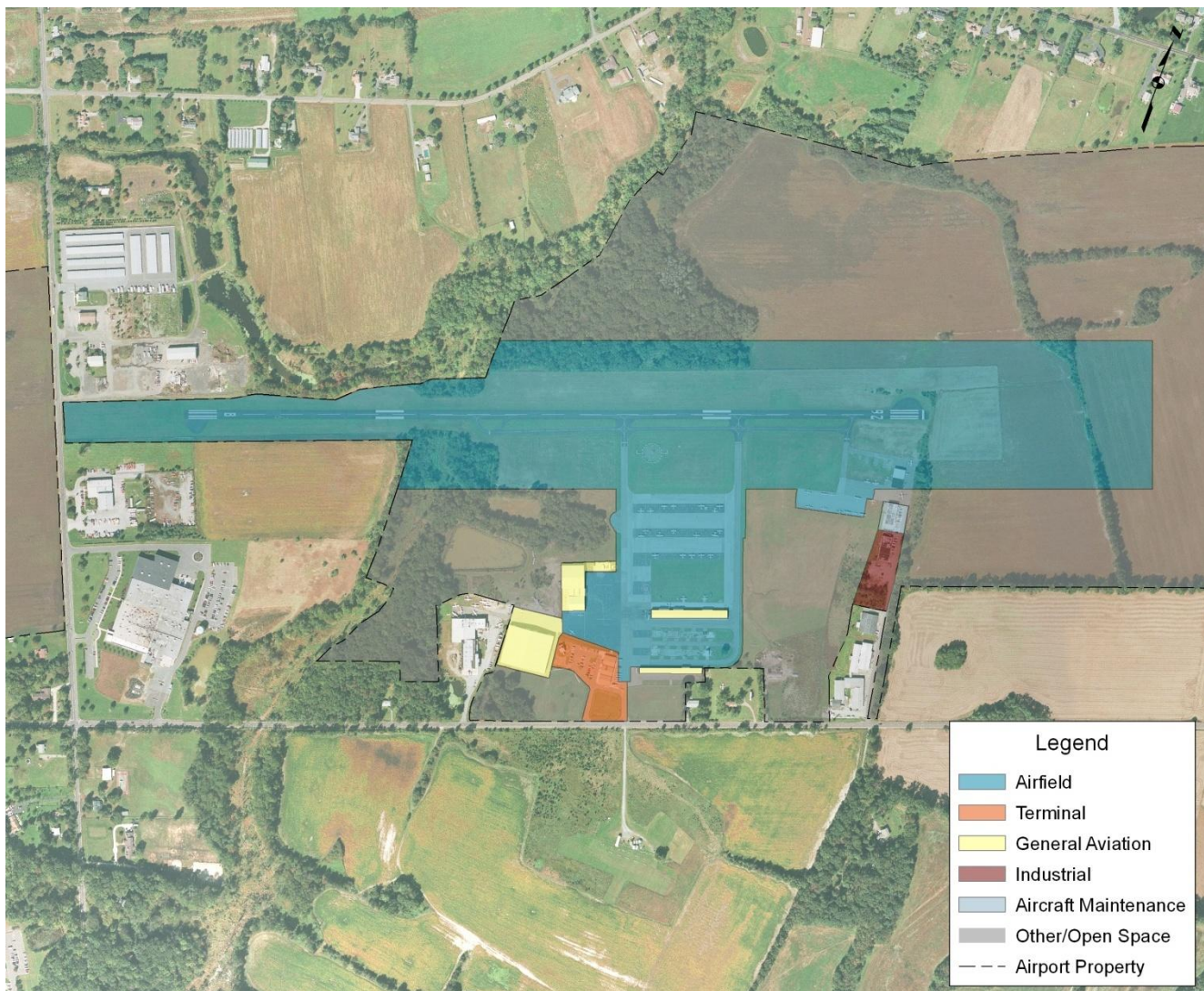


Figure 1-22: On-Airport Land Uses

1.2.8 Existing Off-Airport Land Use

Generalized existing land uses in the Airport environs are depicted on **Figure 1-23**. Existing land use in the vicinity of the Airport includes a mix of agricultural and wooded areas, low-density residential developments, and scattered commercial establishments.

Within Lumberton Township, the majority of the immediate area surrounding the Airport is undeveloped. Most of the residential area is located to the north and east of the Airport property. Along Fenimore Road, the existing homes are located on large lots, several of which are associated with adjacent agricultural activities. To the north of Fenimore Road and to the east of Masonville-Fostertown Road are several relatively new developments that were constructed within the past 35 years. These existing developments, which are within one-mile from the Airport, are located on Marriott Drive, Country Way, Stirling Way, Cameron Lane, Patricia Court, Caitlin Court and Crispin Road.

Within the adjacent Mount Laurel Township, existing residential developments within one-mile from the Airport, are located along Foxcroft Way with access from Hartford Road, and a development of medium-density houses with access from Hainesport-Mount Laurel Road and located along Miniver Court, Kettlebrook Drive, Hollowell Way, Albridge Way, Ramsbury Court, Knighton Lane, Fradswell Court, Tambrook Drive, Forest Lake Drive, Denham Court, Harwood Court, Burryport Way and Claver Hill Way.



Figure 1-23: Off-Airport Land Uses

Source: NJDEP 2007 Land Use/Land Cover Update Watershed 18 and 19, July 19, 2007

Adjacent to the Airport, approximately a dozen existing homes are scattered along the surrounding roadways, including Stacy Haines, Masonville-Fostertown, and Ark Roads.

A couple of commercial establishments are located adjacent to the Airport property along Stacy Haines and Ark Roads. These businesses include:

- Moorhouse Sailmakers, Inc. / 52 Stacy Haines Road
- B P Air, Inc. (Aircraft Maintenance) / 70 Stacy Haines Road
- Peco, Inc. (Printer) / 70 Stacy Haines Road
- Wings Agency Aviation Insurance / 68 Stacy Haines Road
- Crewdawg Aviation, LLC (Flight Training) / 68 Stacy Haines Road
- Grass Masters, Inc. (Landscaping) / 68 Stacy Haines Road
- Landstar (Trucks) / 68 Stacy Haines Road
- Sancoa International Co. (Printer) / 92 Ark Road
- Flanagan's Auto and Truck Repair, Inc. / 98 Ark Road
- S & E Lawn Services, Inc. / 106 Ark Road

- May Richard Tree Services, Inc. / 106 Ark Road
- Ark Road Storage, LLC / 108 Ark Road
- Hainsport Tool & Maintenance, Inc / 1924 Ark Road, Hainesport

The following schools are located within the vicinity of the Airport. However, neither of them is within the existing Airport Safety Zone.

- Springville Elementary School
- Burlington Special Services School, Lumberton Campus

There are no churches, hospitals, shopping centers, or additional places of public assembly (other than the previously mentioned schools) located within a one-mile radius of VAY.

Local Zoning

Lumberton has implemented zoning regulations as documented in the *Chapter 130 – Development Regulations* of the Township Code. The zoning districts of the Airport property include:

General Districts

- Rural Industrial (RI)
- Airport Industrial (I-3)
- Rural Agricultural (RA)
- Transfer of Development Rights (TDR) Sending Area (RA/S), (RA/R-2)
- TDR Transition Area (RA/ST)

A majority of the Airport's eastern property lies within an area zoned as a Transfer of Development Rights (TDR) Sending Area. The TDR program was implemented by Lumberton Township as a pilot program in 1989. This program is a land use tool that allows the township to transfer the development potential from one parcel that should be preserved (referred to as the sending zone), to another parcel within the county deemed appropriate for growth (receiving zone). This market-based system allows for compensation for the loss of development rights, which developers can purchase as credits to be applied to a receiving zone. The TDR parcels that are sold and deemed sending zones are thus restricted to the land use in which they were sold.

In January 1999, the previous airport owner signed an agreement with the Township of Lumberton to enroll Block 33: Lots 7, 8, 12, 13, and 14 (East of Masonville-Fostertown Road) and Block 36: Lots 2, 4, and a portion of 6 (East of Runway 26) in the Township of Lumberton's TDR program. All of these parcels are located within the TDR Sending Area, as zoned through the Township of Lumberton. This *Deed of Easement, Restriction and Enrollment* restricted land use to agricultural uses on the specified blocks and lots, and all existing conditions or land uses to remain as they were at the time the deed was signed and enacted. Through the program, as the development rights to the above parcels were sold, land use to these parcels was restricted to agricultural use and production. The TDR Sending Area zoning limit, along with the surrounding airport zoning classification is depicted in **Figure 1-24**, with the specific locations of the TDR parcel's enrolled in the program to be determined through Lumberton Township coordination prior to any proposed construction.

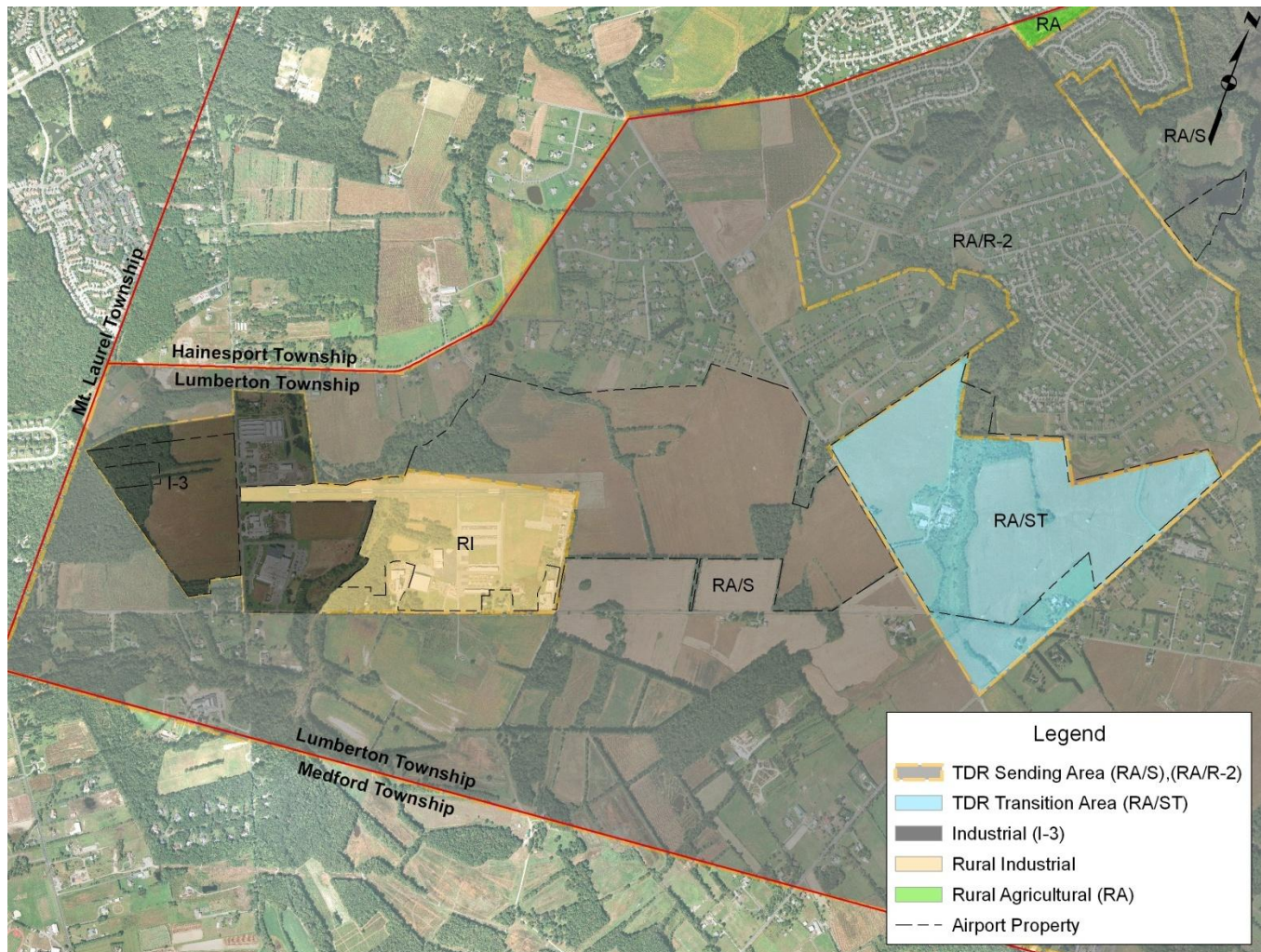


Figure 1-24: Lumberton Township Zoning

Source: Lumberton Township Zoning GIS Files, Received July 25, 2012

1.2.9 Land Use Considerations

Chapter 62 of the New Jersey Administrative Code, *Air Safety and Zoning*, identifies minimum statewide standards for the control of airport and aeronautical hazards and standards for land use adjacent to airports. Municipalities are required to implement and maintain land use ordinance in accordance to the provisions of this chapter. The Airport Safety Zones (ASZ) for the airport are presented on **Figure 1-25**.

The Office of Smart Growth, housed in New Jersey's Department of Community Affairs, is the land use planning office for the State. The goal of the Office of Smart Growth is to ensure State agencies have incorporated smart growth principles in their functional plans, regulations, and programs. In general, smart growth describes the principles of well-planned and well-managed growth that promotes continued community and economic development, while preserving open space and farmland.

The New Jersey State Development and Redevelopment Plan (SDRP), which was adopted by the State Planning Commission in 2001 and is supported by the Office of Smart Growth, is intended to guide planning at the state, regional, and local levels. The primary planning tool in the SDRP is the State Plan Policy Map, which subdivides the State into five planning areas, two sub-areas, and several special planning areas. VAY is contained in the Rural Planning Area (PA4).

According to the SDRP, PA4 should ...*"Maintain the Environs as large contiguous areas of farmland and other lands; revitalize cities and towns; accommodate growth in Centers; promote a viable agriculture industry; protect the character of existing stable communities; and confine programmed sewers and public water services to Centers."*

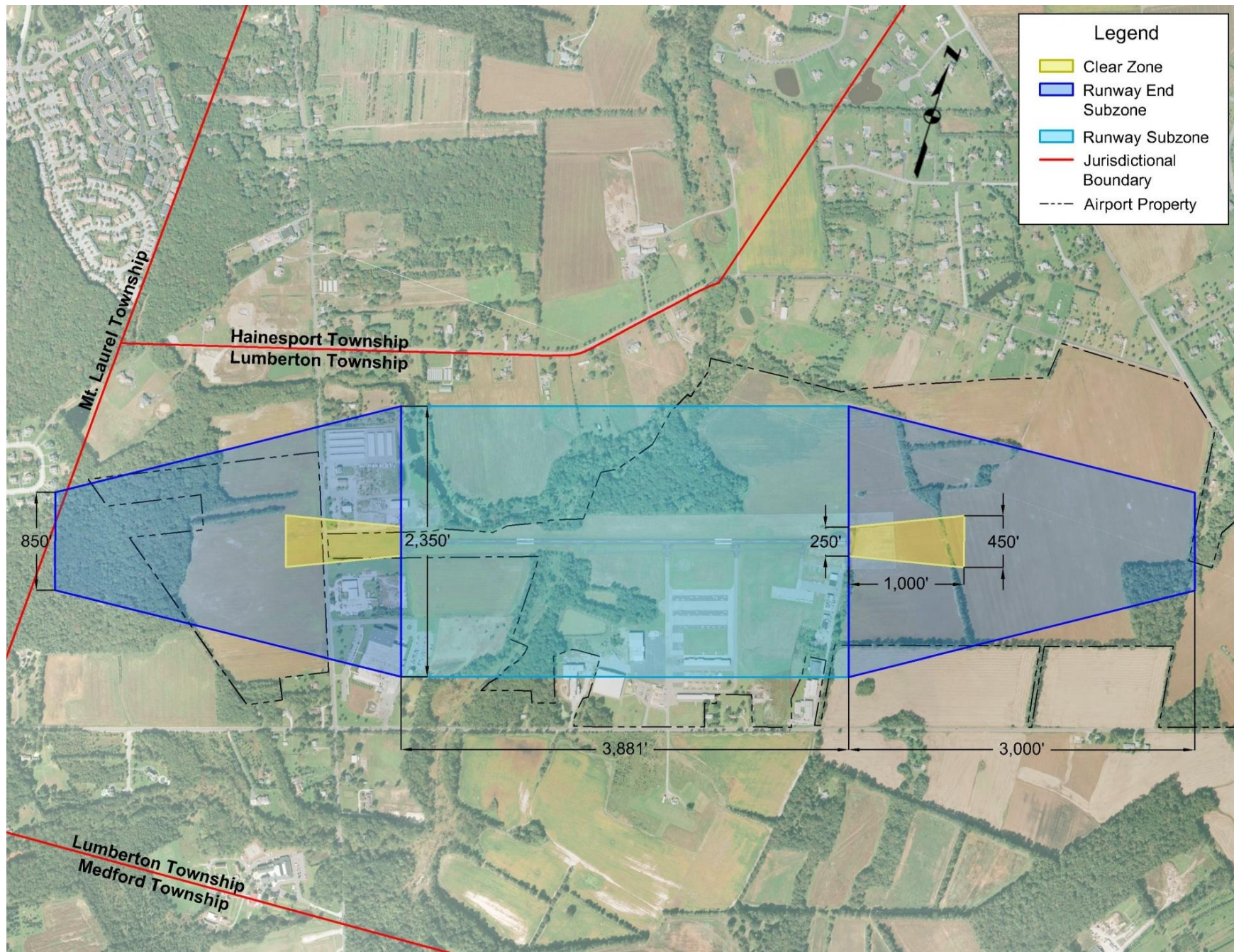


Figure 1-25: Existing Airport Safety Zones based on Chapter 62 of the New Jersey Administrative Code

PA4's stated policy objectives related to airports are to ...*"Support the preservation of general aviation airports as integral parts of the State's transportation system."* VAY is located proximate to and supports Mount Holly, a Village Center proposed by the New Jersey State Planning Commission.

ASZs are the State-Mandated district consisting of an overlay zone that surrounds an airport's runway. The ASZ surrounding VAY includes each of the general districts such as the I-1, I-3, RA, RA/S and RA/ST as mentioned above.

As was illustrated in **Figure 1-24**, the existing Airport facilities are located within the I-3 District, which permits the airfield and airport-related support facilities. The existing I-3 district terminates near the end of the existing runway. Thus, any extension or shift in the runway would extend into I-1, RA and/or RA/S districts. These districts do not permit airport facilities as described in the Township Development Regulations.

Lumberton Township has incorporated the state-mandated ASZ into the Township's regulations. The ASZ delineates an area surrounding public-use runways at airports licensed by NJDOT and overlays the local zoning, as seen in **Figure 1-25**. By definition, airports and airport-related facilities are compatible land uses and permitted activities within an ASZ. Thus, state regulations ensure licensed airports are not considered a non-conforming use, regardless of the location of other zoning districts such as I-1, RA/S, etc. Thus, although the runway may be located in a general zoning district other than I-3, it remains in the ASZ by definition, and is thus a permitted activity by state regulation.

The purpose of the state-mandated ASZ is to encourage airport compatible development, and protect the surrounding airspace from encroachment by residential and other development. The properties within the ASZ contain both lot size and use restrictions as documented in the Township Development Regulations. The primary difference is that properties within the ASZ have a minimum residential lot size of three acres, which is larger than the two-acre minimum requirement in other areas of RA and RA/S districts.

1.3 Existing Environmental Conditions

The existing environmental conditions at the airport and their potential impacts to proposed development are discussed in the following sections. Environmental studies, surveys, and investigations potentially required in order to implement airport improvements and expansions are discussed in Section 5.2.

This Section is intended to provide the New Jersey Department of Transportation (Sponsor), regulatory agencies, involved municipalities, and the general public with an inventory of existing environmental conditions present on the subject site. The area covered in this Chapter (i.e., subject site) includes the core airport property, as well as adjacent properties to the west, across Ark Road, and to the east across, Fostertown Road, identified herein as the western adjacent area, and the eastern adjacent area, respectively, seen in **Figure 1-26**. Collectively, the entire airport property, or subject site, comprises approximately 658 acres all lying within the Township of Lumberton, Burlington County, New Jersey.

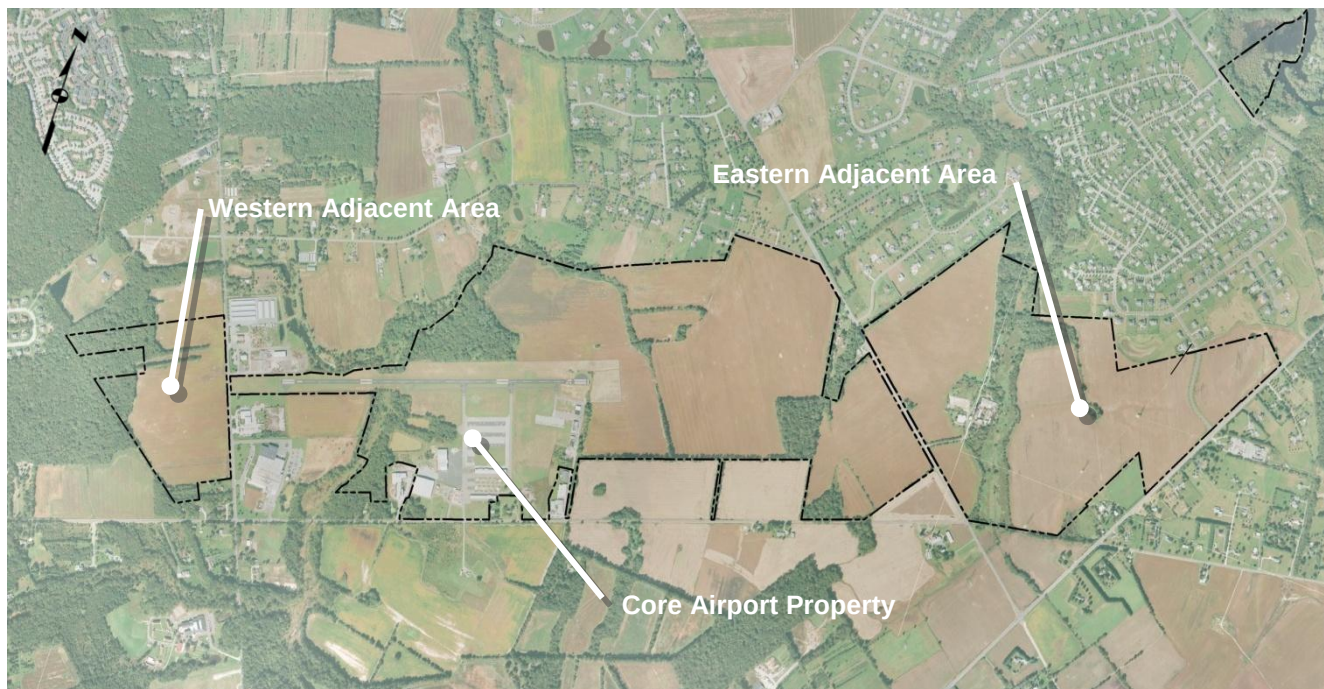


Figure 1-26: Core, Eastern, and Western Airport Properties

The core airport property contains landside and airside facilities; agricultural row-crops; open, maintained fields; freshwater wetlands and open waters. The western adjacent area is completely undeveloped and comprises active corn row-crops and wooded areas. The eastern adjacent area is also undeveloped, although ruins and remnants of pre-existing structures are present. This area also contains active row-crops and naturally vegetated areas.

Existing environmental conditions were inventoried through a review of existing, published information, a review of existing mappings and environmental documents, and a site inspection. Geographic Information System (GIS) information and mapping prepared by the New Jersey Department of Environmental Protection (NJDEP) was reviewed to ascertain certain onsite environmental conditions (<http://www.state.nj.us/dep/gis/>). No detailed surveys, delineations or investigations beyond a one day site visit were performed to document the existing environmental conditions.

The following categories were reviewed:

- Water Quality
- Wetlands
- Floodplains

- Biotic Communities
- Farmland
- Historic & Archeological Sites
- Air Quality
- Compatible Land Use and Noise
- Hazardous Materials and Waste Sites

This Section does not constitute an Environmental Assessment Report (EAR); however, the information presented herein is similarly prepared to facilitate the preparation of such a report, if necessary. Guidelines for preparing an EAR are provided in the FAA Order 5050.4B, Airport Environmental Handbook. Prior to plan implementation, a federal environmental assessment will be conducted for projects having the potential to impact the natural environment on or near the airport. The assessment shall include sufficient avoidance alternatives, design mitigation measures, and construction controls applicable to the proposal to demonstrate the local, state, and federal environmental protection standards can be met.

1.3.1 Water Quality

The NJDEP manages watersheds statewide by dividing the State into twenty, large Watershed Management Areas (WMA). WMAs are comprised of drainage basins and large watersheds that encompass multiple small watersheds.

Multiple watersheds and subwatersheds occur within each WMA. The US Geological Survey (USGS) has mapped and identified watersheds using a hierarchical numbering system. The term "HUC-14" is from the hydrologic unit code system developed by the USGS for delineating and identifying drainage areas. The system starts with the largest possible drainage areas and progressively smaller subdivisions of the drainage area are delineated and numbered in a nested fashion. A drainage area with a hydrologic unit code (HUC) designation with 14 numbers, or HUC-14, is one of several subwatersheds of a larger watershed with 11 numbers, or an HUC-11. There are 921 HUC 14 subwatersheds in New Jersey that range in size from 0.1 to 42 square miles.

It is the policy of the State of New Jersey to restore, maintain, and enhance the chemical, physical, and biological integrity of its waters, to protect the public health, to safeguard aquatic biota, protect scenic and ecological values; and to enhance the domestic, municipal, recreational, industrial, agricultural and other reasonable uses of the State's waters. The New Jersey Surface Water Quality Standards (NJAC 7:9B) establish the water quality goals and policies underlying the management of the State's water quality.

The highest quality surface waters in NJ are referred to as Outstanding Natural Resource Waters. These waters are identified as Freshwater 1 (FW1) or Pinelands (PL) waters. Category One (C-1) waters are protected from any measurable change in water quality because of their exceptional ecological, recreational, water supply significance, or exceptional fisheries resources. All surface waters except those designated as Outstanding Natural Resource Waters or Category One Waters are Category Two Waters (C-2). Category Two Waters are protected from any measurable change in existing water quality; however, some lowering of existing water quality may be allowed by the NJDEP.

The subject property is situated within the Lower Delaware Watershed Management Area (WMA#19), which is within the Rancocas Creek South Branch (below Bobbys Run) Watershed, also known as an HUC-11. The subject site is within two separate subwatersheds, or HUC-14s, meaning the site has a primary drainage divide (**Figure 1-28**). The western adjacent area and a majority of the core airport property are within the Rancocas Creek South Branch (below Rt. 38) subwatershed, while a small eastern portion of core airport property and the entire eastern adjacent area are within the Rancocas Creek South Branch (below Bobbys Run) subwatershed. The western subwatershed is associated with Masons Creek while the eastern subwatershed is associated with an unnamed tributary to the South Branch Rancocas Creek.

Masons Creek, a perennial watercourse, flows through the core airport property from south to north along, and forming a portion of, the western core airport property boundary. Masons Creek flows offsite to the north and empties into the South Branch Rancocas Creek, which flows into Rancocas Creek and then empties into the Delaware River. The unnamed tributary

to the South Branch Rancocas Creek, a perennial watercourse, flows through the eastern adjacent area from south to north. This watercourse also empties into the South Branch Rancocas Creek, which flows into the Rancocas Creek and ultimately into the Delaware River. Both of the site's subwatersheds and two major watercourses are contributory to the South Branch Rancocas Creek, although they discharge into the South Branch Rancocas Creek approximately 16,500 feet from each other. None of these downstream waters are classified by the NJDEP Surface Water Quality Standards (NJAC 7:9B) as Category One (C-1) or trout production (TP) waters.

Three unnamed tributaries to Masons Creek are located within the core airport property which each basically flow west and discharge into Masons Creek. One tributary is located just north of the main office, a second tributary is located north of the existing runway within a forested wetland, and the third tributary is located within an agricultural field north and northeast of the eastern end of the runway. The western adjacent area contains one unnamed tributary to Masons Creek. As per NJAC 7:9B, Masons Creek and its four unnamed tributaries located within the subject site are classified as Category Two, general freshwater 2, non-trout (FW2-NT-C2) waterbodies. Additionally, the unnamed tributary to the South Branch Rancocas Creek located within the eastern adjacent area is also classified as FW2-NT-C2. As a result of the onsite and downstream surface water quality classifications, neither a 300-foot wide riparian zone pursuant to the Flood Hazard Area Control Act Rules (NJAC 7:13), nor a 300-foot wide Special Water Resource Protection Area (SWRPA) pursuant to the Stormwater Management Rules (NJAC 7:8) apply for purposes of project development. Furthermore, jurisdictional wetlands will not be assessed a 150-foot wide transition area due to the wetlands discharging into a trout production water. However, onsite jurisdictional wetlands may be assessed a 150-foot wide transition area due to the presence of threatened or endangered species, which will be covered in subsequent sections of this chapter.

A total of six open waterbodies (i.e., ponds) are present onsite; five of them are mapped by NJDEP as a waterbody. All of the ponds contained water at the time of the field visit completed on May 24, 2012. The core airport property contains four waterbodies; three of them are mapped by NJDEP as a waterbody. The four ponds present on the core airport property are basically located along the eastern side of Masons Creek, and one of the ponds appears to be a man-made retention pond located north of the museum building. Presumably, this is why the NJDEP has not mapped this feature as a water body. These ponds are not specifically classified by NJAC 7:9B, but assume the same classification as the watercourse which they discharge into; therefore, these ponds are considered FW2-NT-C2 waterbodies containing the same regulatory aspects explained above relative to adjacent buffers. The eastern adjacent area contains two open waterbodies, both mapped by NJDEP as waterbodies. One of the ponds is located in the central section just north of an abandoned farm house and the other is located to the east within an active agricultural wheat field.



Figure 1-27: Open Waterbody on Airport Property

The NJDEP GIS mapping does not indicate the presence of any water quality monitoring stations on the subject site; however, two stations are mapped upstream of the site and one station is mapped downstream of the site. One upstream monitoring station is located on an unnamed tributary to Masons Creek at the Ark Road Bridge identified as station AN0172. The station monitors biological resources (i.e., aquatic invertebrates). The other upstream monitoring station is located on Masons Creek at the Ark Road Bridge (01465930) maintained by the NJ USGS. The downstream site on Masons Creek is approximately 8,500 feet from the site as measured along the watercourse under the bridge which carries Hainesport-Mt. Laurel Road over Masons Creek. It is a Tier C long-term trend assessment Volunteer Water Monitoring Station (VWM-919) implemented through the New Jersey Water Ambassador Program coordinated by NJDEP.

Lumberton Township is located within the geographic area under the jurisdiction of the Delaware River Basin Commission (DRBC). This agency should be contacted prior to undertaking a proposed project or development.

In conclusion, onsite waters and their water quality classifications do not impose additional constraints upon the subject site than what is typically required by the NJDEP. The design and implementation of appropriate stormwater management techniques will help protect and maintain the integrity of onsite and downstream water quality.

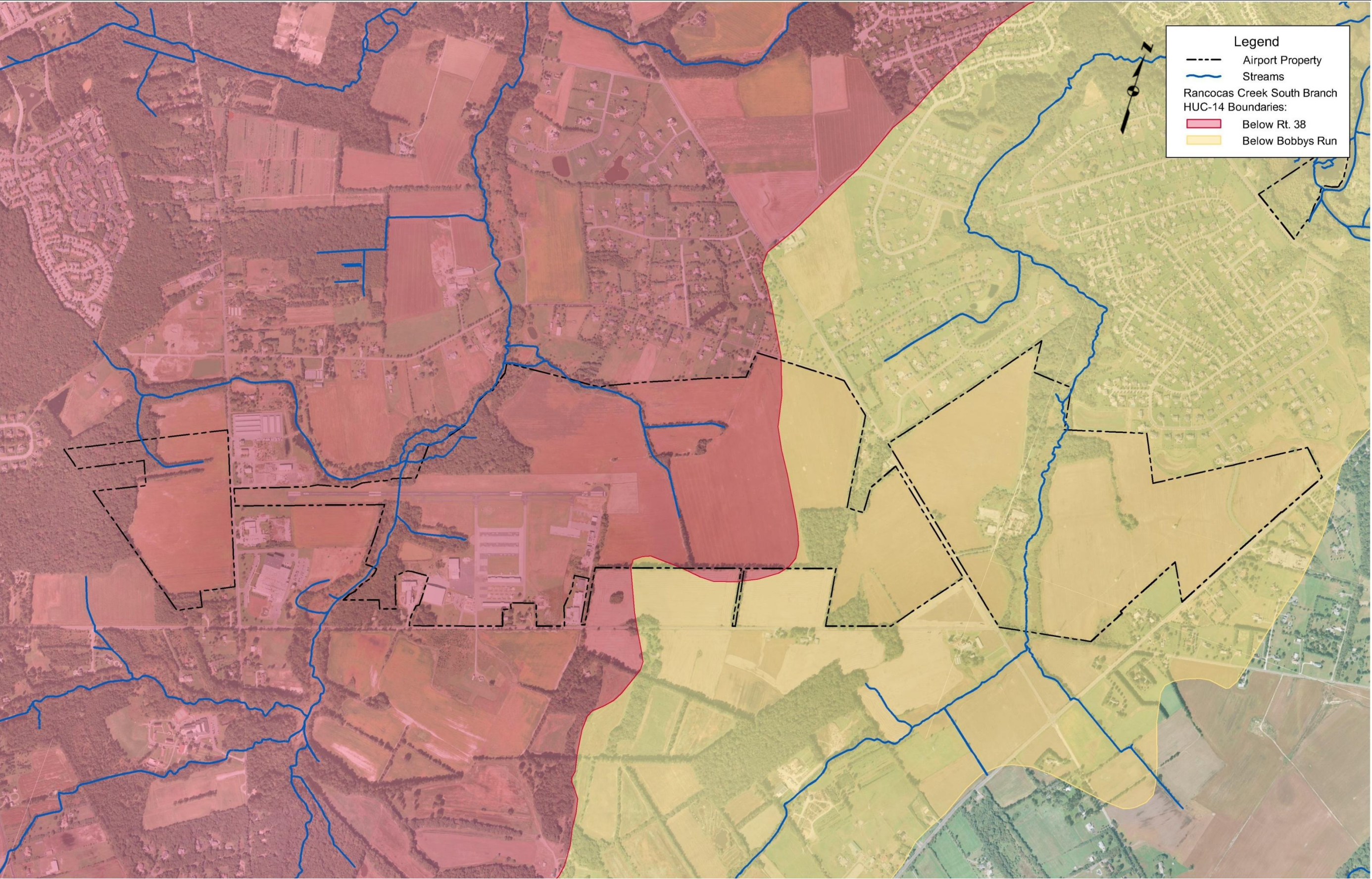


Figure 1-28: Rancocas Creek South Branch (Below Rt.38) and (Below Bobbys Run) HUC-14s

1.3.2 Wetlands

By definition, contained in the Freshwater Wetlands Protection Act Rules at NJAC 7:7A, a wetland is “an area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation” (NJAC 7:7A-1.4). In March 1994, the NJDEP assumed the administration of the Federal Section 404 wetlands program from the US Army Corps of Engineers (Corps) for a majority of freshwater wetlands in the State. The Corps still retains jurisdiction over all tidal wetlands, certain interstate waters and wetlands, and most freshwater wetlands within 1,000 feet of tidal waters (i.e., non-assumable waters). Onsite wetlands and waters are considered assumable and are under the sole jurisdiction of the NJDEP.

Wetlands serve many important functions including but not limited to: minimizing flooding by absorbing water during storm events and releasing it slowly over time; improving water quality by filtering sediments and absorbing nutrients and pollutants; and providing habitat for many species of wildlife including Federal and State-listed endangered, threatened, and rare species.

The general distribution of NJDEP mapped onsite freshwater wetlands is depicted in **Figure 1-29**, and again on the Overall Constraints Map presented in **Figure 5-2**. The mapped wetlands are based on the NJDEP 2007 Land Use Land Cover mapping where interpretations of 2007 color infrared aerial photos were integrated with other sources (i.e., hydric soils, USGS flood prone areas, and 1906 atlas sheet geology) and based on coincident features. The extent of NJDEP mapped wetlands is intended to serve as a general planning tool and should not take the place of site-specific field investigation and verification by NJDEP.

The specific location, extent and resource value classification of wetlands is subject to case-by-case detailed field delineations, surveys, and assessment. In order to accurately identify and delineate wetlands in the field, a methodology was developed by the Federal Interagency Committee for Wetland Delineation (FICWD) and is presented in the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (FICWD, 1989). NJDEP has adopted this manual as the technical basis for identifying and delineating freshwater wetlands in New Jersey. The location and extent of wetlands is established using a three-parameter approach: 1) dominance of hydrophytic vegetation; 2) presence of hydric soils; and, 3) evidence of wetland hydrology.

The presence, absence, extent, and resource value classification of wetlands are subject to verification by the NJDEP Land Use Regulation Program. NJDEP wetland verification is achieved through a Letter of Interpretation (LOI) or specific wetland permitting process. An LOI is a legally binding document issued by the NJDEP that verifies the location, extent, and resource value classification of onsite wetlands. An LOI is valid for five years with a onetime five year extension available, and would enable the NJDOT to understand the development limitations on the property when implementing a development or project associated with the Airport Layout Plan (ALP). Based on a review of past environmental reports prepared for VAY, previous jurisdictional wetland investigations have been completed onsite. Furthermore, the NJDEP may have previously issued wetland permits and/or transition area waivers associated with these former investigations. However, it is unclear as to whether or not an LOI was secured, and if so, if it remains valid to date. As a result, it is highly recommended the NJDOT engage the services of a qualified firm to complete a comprehensive wetland delineation and survey of the subject site, and to request NJDEP verification of the delineation through the issuance of an LOI. The LOI process will be further explained in Section 5 to follow.



Figure 1-29: NJDEP Freshwater and Linear Wetlands

According to 2007 land use/land cover data, mapped wetlands on the site account for approximately 98.83 acres out of 658 acres representing 15% of the total airport property. Mapped wetlands as depicted were visually observed, and their precise extent was not field delineated. During the one day qualitative field observation, it was noted that NJDEP mapped wetlands generally correspond to actual field conditions; however, based on the site visit, the actual amount of wetlands could be off by as much as 20%. Several areas mapped as wetlands by NJDEP were observed not to be wetlands, while several areas not mapped as wetlands by NJDEP were observed to be wetlands, or at least may potentially be wetlands. The largest area of potential misrepresentation was observed to be located within existing grasslands and agricultural fields (i.e., corn and soybeans). Numerous low topographic areas throughout these portions of the site not mapped by NJDEP as wetlands contained saturated soils and hydrophytic vegetation (**Figure 1-30**) such as soft rush (*Juncus effusus*) and slender rush (*Juncus tenuis*). These areas will more than likely be considered jurisdictional wetlands by NJDEP in an LOI if hydric soils are present. Conversely, several areas mapped by NJDEP as modified agricultural wetlands within the corn and soybean fields showed no obvious field indicators that they are in fact jurisdictional wetlands. The presence or absence of hydric soils within these areas will be the determining factor as to their jurisdictional status. Furthermore, some wetland types reported by NJDEP were observed to be inaccurate, such that an area mapped as an emergent wetland was observed to be a forested wetland. Nevertheless, this mapping inaccuracy is not as critical as an omission of a particular wetland, due to the survey requirements.



Figure 1-30: Hydrophytic Vegetation

Therefore, as noted above, mapped wetlands should only be used as a planning tool, and if the NJDOT were to propose any construction, vegetation removal, or ground disturbances, a detailed wetland delineation in accordance with the NJDEP accepted methodology is recommended to be completed and presented to NJDEP for verification. It is possible several areas of the airport property within the grasslands and/or agricultural fields could contain jurisdictional wetlands which are not readily apparent, and, if present, could result in substantial constraints to a project.

Wetland types were derived from NJDEP land use/land cover data which groups the wetlands according to the NJDEP modified Anderson System. However, wetland communities are described herein using USFWS nomenclature and the Cowardin system. The types and approximate percentages of onsite NJDEP mapped wetlands are identified in **Table 1-9**.

Table 1-9: Summary of Existing Wetlands

WETLAND TYPE	WETLAND CODE	ACREAGE (Approx.)
Modified Agricultural Wetlands	MODAg	41.70
Modified Lawn Wetlands	MODL	0.03
Palustrine Forested Broad-leaved Deciduous Wetlands Saturated Water Regime	PFO1B	19.40
Palustrine Forested Broad-leaved Deciduous Wetlands Seasonal Water Regime	PFO1C	1.80
Palustrine Scrub-Shrub Broad-leaved Deciduous Wetlands Saturated Water Regime	PSS1B	5.40
Palustrine Scrub-Shrub Broad-leaved Deciduous Wetlands Seasonal Water Regime	PSS1C	3.10
Palustrine Emergent Wetlands Persistent Vegetation Saturated Water Regime	PEM1B	9.70
Palustrine Emergent Wetlands Persistent Vegetation Seasonal Water Regime	PEM1C	3.70
Riverine Lower Perennial Open Water	R2OW	1.70
Combination of Scrub-Shrub and Forested Wetlands Saturated Water Regime	PSS1B/PFO1B	2.30
Combination of Forested and Scrub-Shrub Wetlands Saturated Water Regime	PFO1/PSS1B	9.00
Combination of Scrub-Shrub and Emergent Wetlands Saturated Water Regime	PSS1B/PEM1B	1.00
TOTAL ACREAGE		98.83

Modified wetlands are wetlands which have been disturbed or altered by human activities. These wetlands, as defined under the Anderson Classification System (Anderson et al., 1976), would be identified as “cemetery on wetland”, “managed wetlands”, “maintained lawn greenspaces”, or “wetlands in rights-of-way”. Utility right-of-way wetlands are the most common urban wetlands. Some modified wetlands may have some components of herbaceous wetlands or may be lawns dominated by maintained cool, season grasses. Close inspection of soils and vegetation of heavily modified wetlands may reveal the presence of historic wetlands including hydric soils and small amounts of hydrophytic vegetation. Such modified wetlands will often revert back to the natural hydrophytic plant community if previously installed drainage features are abandoned. Palustrine wetlands include all non-tidal wetlands dominated by trees forested (FO), shrubs (SS) and persistent emergent (EM) vegetation. These wetlands are usually bordered by uplands, and are shoreward of lakes and river, and stream channels. Palustrine wetlands may include small, shallow intermittent, or permanent ponds, such as vernal pools. Palustrine forested wetlands are the most abundant type of wetlands in New Jersey. Riverine wetlands are linear wetlands or open waters associated with a river.

Onsite wetlands can be grouped into four broad categories based on their location and hydrologic association as follows: 1) western adjacent area wetlands; 2) Masons Creek corridor wetlands; 3) eastern core airport property wetlands; and, 4) South Branch Rancocas Creek tributary corridor wetlands. The western adjacent area wetlands and the Masons Creek wetlands both drain to Masons Creek, while the eastern core airport property wetlands and the South Branch Rancocas Creek tributary wetlands drain to the South Branch Rancocas Creek tributary. Representative vegetation observed during the site visit is noted in the community descriptions below.

Western Adjacent Area Wetlands

The western adjacent area (i.e., airport property west of Ark Road) contains forested (PFO1B) and agricultural wetlands (MODAg) associated with an unnamed tributary to Masons Creek. Forested wetlands are supplied by the hydrology of the tributary and a shallow groundwater table. Representative vegetation species observed includes red maple (*Acer rubrum*), sweet gum (*Liquidambar styraciflua*) and black gum (*Nyssa sylvatica*) trees; spicebush (*Lindera benzoin*), southern arrowwood (*Viburnum dentatum*) and highbush blueberry (*Vaccinium corymbosum*) shrubs; and a ground cover mainly comprising skunk cabbage (*Symplocarpus foetidus*). Portions of this area contain mapped agricultural wetlands comprising corn row-crops. Primary wetland hydrology is a shallow groundwater table. Evidence of subsurface drainage was not noted during the field visit, and it is anticipated the NJDEP will consider agricultural lands and open maintained fields containing hydric soils as jurisdictional wetlands if significant hydrological modifications have not occurred, and drainage structures are not present.

Masons Creek Corridor Wetlands

Masons Creek corridor wetlands are located along the creek and its tributaries just west and north of the airport landside facilities, as well as north, south and northeast of the existing runway. This wetland system contains forested wetlands (PFO1B, PFO1C), emergent wetlands (PEM1B, PEM1C), shrub wetlands (PSS1B), agricultural wetlands (MODAg), and combination forested and shrub wetlands (PFO1B/PSS1B). Wetland hydrology is supplied by Masons Creek (**Figure 1-31**) as well as a shallow groundwater table. Representative vegetation species observed in the forested wetlands include red maple, silver maple (*Acer saccharinum*), and black gum trees; with spicebush, highbush blueberry, southern arrowwood shrubs; and skunk cabbage, reed canarygrass (*Phalaris arundinacea*), Japanese stiltgrass (*Microstegium vimineum*), sensitive fern (*Onoclea sensibilis*) and cinnamon fern (*Osmunda cinnamomea*) comprising the herbaceous layer. Representative vegetation species observed in the shrub wetlands include highbush blueberry, southern arrowwood, multiflora rose (*Rosa multiflora*) and silky dogwood (*Cornus amomum*). Representative vegetation species in the emergent wetlands include reed canarygrass, skunk cabbage, soft rush, fringed sedge (*Carex crinita*) and tussock sedge (*Carex stricta*). Evidence of subsurface drainage was not noted during the field visit, and it is anticipated the NJDEP will consider agricultural lands and open maintained fields containing hydric soils as jurisdictional wetlands if significant hydrological modifications have not occurred, and drainage structures are not present.



Figure 1-31: Masons Creek

Eastern Core Airport Property Wetlands

Wetlands located on the eastern edge of the core airport property comprise modified wetlands (MODAg, MODL) and shrub wetlands (PSS1B). These wetlands are not very extensive and are supplied by a shallow groundwater table, surface water drainage, and runoff from the surrounding farmlands. The shrub wetlands in this location are basically contained within and directly adjacent to a mapped tributary to Masons Creek, which was devoid of any surface water flow at the time of the site visit. Representative vegetation species observed within the shrub wetlands include red maple and silver maple trees and saplings, with silky dogwood and spicebush shrubs, and a ground cover comprising soft rush, sensitive fern, and Japanese honeysuckle (*Lonicera japonica*). Mapped agricultural wetlands comprise active corn and soybean row-crops. Evidence of subsurface drainage was not noted during the field visit, and it is anticipated the NJDEP will consider agricultural lands and open maintained fields containing hydric soils as jurisdictional wetlands if significant hydrological modifications have not occurred, and drainage structures are not present.

South Branch Rancocas Creek Tributary Wetlands

Wetlands associated with the South Branch Rancocas Creek tributary are situated in the eastern adjacent area parcels and comprise modified wetlands (MODAg), shrub wetlands (PSS1C), emergent wetlands (PEM1B, PEM1C), riverine open waters (R2OW), and combination shrub and emergent wetlands (PSS1B/PEM1B). Wetland hydrology is supplied by the South Branch Rancocas Creek tributary, a shallow groundwater table, surface water drainage, and runoff from the adjacent farmlands. Representative vegetation species observed in the shrub wetlands include silky dogwood, southern arrowwood, and highbush blueberry, with reed canarygrass, skunk cabbage, and soft rush in the herbaceous layer. Representative vegetation species observed in the emergent wetlands include reed canarygrass, soft rush, and various sedges (*Carex* spp). Representative vegetation species in the shrub/emergent wetlands include the same typical species. Mapped agricultural wetlands comprise active soybean and wheat row-crops. Evidence of subsurface drainage was not noted during the field visit, and it is anticipated the NJDEP will consider agricultural lands and open maintained fields containing hydric soils as jurisdictional wetlands if significant hydrological modifications have not occurred, and drainage structures are not present.

The *Freshwater Wetlands Protection Act Rules* (NJAC 7:7A) classify wetlands according to resource value. Each wetland resource value classification has a corresponding transition area, or upland buffer, that must be maintained between the wetland and adjacent development to protect the integrity and viability of the wetland ecosystem (NJAC 7:7A-2.5).

Exceptional resource value wetlands are the highest quality wetlands and require a 150-foot wide transition area. Exceptional resource value wetlands are those that drain to Freshwater 1 (FW-1) waters, Freshwater 2 (FW-2) trout production (TP) waters or their tributaries, or are present or documented habitat for wetland dependent threatened or endangered species.

Ordinary resource value wetlands do not require transition areas. Such wetlands do not exhibit the characteristics of exceptional resource value wetlands and include isolated wetlands surrounded by development of more than 50%, and are less than 5,000 square feet in size. These wetlands may also include drainage ditches or detention basins.

Intermediate resource value wetlands include all freshwater wetlands not defined as exceptional or ordinary, and require a 50-foot transition area.

A large majority of the subject site including the western adjacent area and core airport property is mapped by NJDEP Landscape Project as a Rank 4 habitat (State endangered species) for upland sandpiper (*Bartramia longicauda*). Almost all of the eastern adjacent area is mapped by NJDEP Landscape Project as Rank 3 habitat (State threatened species) for American kestrel (*Falco sparverius*). Neither of these bird species is a federally protected species.

The *Federally Listed and Candidate Species Occurrences in New Jersey by County and Municipality* (October 2010) maintained by the U.S. Fish and Wildlife Service (USFWS) lists Lumberton Township as having potential occurrence for the following species:

- Bog turtle (*Clemmys muhlenbergii*) - Federally threatened / State endangered
- Swamp pink (*Helonias bullata*) - Federally threatened / State threatened

The particulars of the mapped habitats and species requirements are outlined in Section 5.1.4 Biotic Communities.

The upland sandpiper and American kestrel are not known wetland dependent species. Bog turtle and swamp pink are both wetland dependent species; therefore, it is possible all or portions of onsite wetlands may be classified as exceptional resource value by the NJDEP requiring a 150-foot wide transition area, depending if suitable habitat is present and/or if there is a documented sighting onsite. The NJDEP, through the issuance of an LOI, is the agency having jurisdiction over assessing the width of the transition area.

The actual, verified extent of onsite wetlands and any resulting transition areas are considered a major issue relative to this Master Plan, and any construction or project, planned or undertaken, in support of the ALP. As noted earlier in this section, if a valid LOI does not exist for the subject site (including the western and eastern adjacent areas), it is highly recommended that a comprehensive wetland delineation and survey be completed and submitted to NJDEP in an application for an LOI. The LOI will officially verify the jurisdictional extent of the wetlands and will remain valid for a period of five years, with the opportunity for one five-year extension as long as an application for extension is made to NJDEP prior to the LOI expiration date. The western and eastern adjacent areas are recommended to be included in the LOI because agricultural wetlands may be suitable for wetland enhancement if compensatory mitigation is ultimately required by NJDEP for activities associated with the ALP.

1.3.3 Floodplains

Federal actions are subject to the requirements of Executive Order 11988, Floodplain Management. Conversely, floodplain is a general term used to describe the flood hazard area as it relates to regulation in the State of New Jersey. Compliance with the New Jersey *Flood Hazard Area Control Act Rules* at NJAC 7:13 will satisfy the Federal requirements under Executive Order 11988, since NJAC 7:13 are more restrictive.

The flood hazard area is the land and the space above that land, which lies below the flood hazard area design flood elevations. The inner portion of the flood hazard area is the floodway, and the outer portion of the flood hazard area is the flood fringe. The NJDEP defines the floodway as “the land, and the space above that land, which lies within the inner portion of the flood hazard area, and which is mathematically determined to be required to carry and discharge floodwaters resulting from the 100-year flood under certain conditions.” The floodway always includes the channel and often includes the land adjacent to the channel. The floodway is normally characterized by faster and deeper flows than the flood fringe, which is the portion of the flood hazard area outside of the floodway.

According to the *Flood Hazard Area Control Act Rules* at NJAC 7:13, both Masons Creek and the South Branch Rancocas Creek tributary are State-studied streams. Additionally, the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map indicates a 100-year floodplain along both of these watercourses as well. Since NJDEP flood hazard area mapping exists for these watercourses, it must be utilized in lieu of the FEMA mapping in determining the regulatory limit of the floodway and flood hazard area and compliance with NJAC 7:13. The floodway limit is shown along the corridor of the watercourses, plus or minus 20 to 30 feet depending on the specific location along the watercourse. This regulated limit of the floodway is the graphic representation on the state mapping and must be digitized on a plan of the property exactly as it is shown on the state mapping. Conversely, the regulated limits of the flood hazard areas correspond to certain elevations which exist on the site in present times. For example, the NJDEP state mapping/profile indicates a certain elevation that must be delineated on the site, which may result in the flood hazard area being located in a slightly different geographic position in reality when compared to the state mapping.

The NJDEP flood hazard elevation for Masons Creek ranges from elevation 39 (NGVD 1929) at its upstream site limit to elevation 32.5 (NGVD 1929) at the downstream site limit. The range in elevation is due to gradient changes, as well as water backing up behind the five existing corrugated metal pipes (CMP) which carry Masons Creek underneath the runway. Presumably, these pipes do not provide the required hydraulic capacity to freely convey the design storm waters. The NJDEP flood hazard elevation for the South Branch Rancocas Creek tributary ranges from elevation 33 (NGVD 1929) at its upstream site limit, to elevation 27.5 (NGVD 1929) at its downstream site limit. The range in elevation is due to gradient changes, as well as water backing up behind a culvert which carries the tributary underneath an old private driveway, presumably resulting in the same hydraulic condition as noted above.

In addition to the State delineated watercourses, all of the tributaries must be analyzed to determine if any or all of them have a contributory drainage area equal to or greater than 50 acres. If so, each tributary with a contributory drainage area equal to or greater than 50 acres will require its own flood hazard area separate from the State delineations described above. Therefore, further engineering analysis is required to determine if any of the tributaries contain a regulated flood hazard area. The recommended studies and investigations relative to determining and verifying flood hazard areas are outlined in Section 5 to follow.

Riparian Zones

Riparian zones include the land and vegetation adjacent to surface waters whereby the removal of vegetation is regulated under NJAC 7:13. Vegetated riparian zones control downstream flooding and improve water quality and biological diversity by filtering out sediments and suspended solids; transforming excess nitrogen and phosphorus; storing nutrients for extended periods; and providing energy to the stream in the form of dissolved carbon compounds and organic detritus. Forested riparian zones provide shade for aquatic habitat which moderates water temperature thereby supporting a healthy assemblage of aquatic flora and fauna. Riparian zones serve as valuable feeding and foraging corridors for wildlife. Deforestation associated with agriculture and development has drastically reduced riparian forest coverage in New Jersey. Under NJAC 7:13, riparian zones are 50, 150 or 300 feet wide along both sides of a stream as measured from the top of bank or edge of water.

- For Category 1 streams and upstream waters within the same HUC-14 subwatershed, the riparian zone is 300 feet.
- A riparian zone of 150 feet is established if the waterbody is trout production or trout maintenance, or within one mile upstream of these waters. Waters containing water-dependent endangered or threatened species habitat, or within one mile upstream from habitat for certain water dependent endangered and threatened species, plus water flowing through areas mapped as containing acid producing soils, are subject to a 150 foot wide riparian zone.
- Any regulated waterbodies that do not meet the above mentioned criteria would have a 50-foot wide regulated riparian zone under NJAC 7:13.

Riparian zones were not mapped specifically for this Master Plan, but would be coincident with some of the stream and open water mapping appearing on the Overall Constraints Map. Riparian zones occur in association with Masons Creek (**Figure 1-32**) and the South Branch Rancocas Creek tributary, as well as any tributary which has a contributory drainage area equal to or greater than 50 acres. Tributaries with a contributory drainage area less than 50 acres may or may not require a riparian zone depending on whether or not they are considered man altered natural watercourses. Strictly man-made watercourses with contributory drainage areas less than 50 acres do not require a riparian zone. A review of the NJDEP historical topographic mapping indicates only one historic watercourse is mapped onsite, and it flows out of the small pond near Stacey Hines Road and eventually discharges into Masons Creek. Therefore, it is possible none of the remaining onsite tributaries would require a riparian zone if the drainage areas do not equal or exceed 50 acres; however, confirmation and verification by NJDEP relative to the applicability of riparian zones is required. The anticipated width of any onsite riparian zone is expected to be a combination of 50 feet and 150 feet. As shown in **Figure 1-33**, the extreme southern limit of the western adjacent area, the southern half of the core airport property and the southern half of the eastern adjacent area contain areas of mapped acid producing soils. Any regulated watercourse flowing through the mapped acid producing soils will require a 150-foot wide riparian zone, unless specific soil tests are run to rebut the presumption of acid producing soils. Portions of regulated watercourses not flowing through these areas are expected to



Figure 1-32: Masons Creek Tributary

require a 50-foot wide riparian zone. However, at the time this report was prepared, the NJDEP is considering removing the acid-producing criteria for imposing a 150-foot wide riparian zone. If this change is included in the rule adoption, the riparian zone is expected to be 50-feet wide across the entire site.

As with wetlands, the actual extent of regulated flood hazard areas and riparian zones are a major issue relative to this Master Plan and any construction or project planned or undertaken in support of the ALP. It is recommended the onsite limits of the flood hazard area and riparian zone be established by acceptable methodologies and verified by NJDEP prior to conducting any construction, vegetation removal or soil disturbances at the airport property. The recommended studies and investigations relative to determining and verifying riparian zones are outlined in Section 5 to follow.

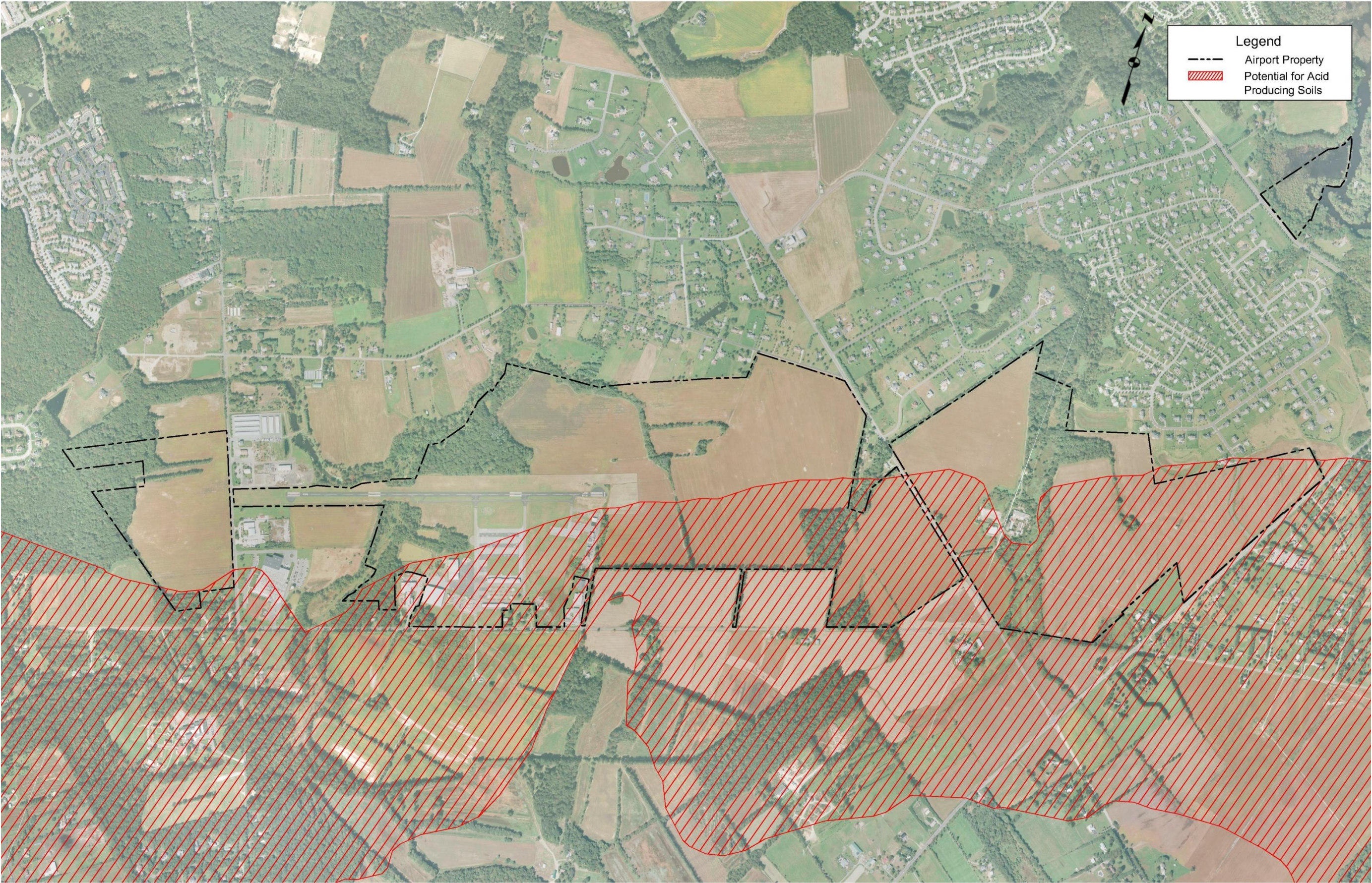


Figure 1-33: Potential for Acid Producing Soils

1.3.4 Biotic Communities

An area is considered a Biotic Community if it supports unique vegetative characteristics, water resources, wildlife/waterfowl habitat, or threatened or endangered species. The data presented in this section was obtained through a review of existing, available information, as well as a one day field visit. The field visit revealed the presence of five general biotic communities on the subject site as follows: agricultural lands, maintained open fields, woodlands (upland and wetland), stream corridors, and open waters. The most unique biological communities are the stream corridors along Masons Creek and South Branch Rancocas Creek tributary, as well as the maintained open fields, and possibly the agricultural lands. Although not considered a biotic community, developed areas comprising buildings, parking lots, runway, taxiways, landscaped areas, maintained lawns/fields and hangars provide habitat for common wildlife species such as woodchucks and European starlings.

The stream corridors are mainly comprised of wetlands as explained earlier in this section of the Master Plan, but also contain lesser areas of upland forestland. These corridors provide habitat for many species of flora and fauna, including the potential for threatened or endangered species. These biotic communities also provide base storage of flood waters during times of heavy precipitation and high stream flow, as well as a collection area for stormwater runoff. The water collected in these corridors is conveyed offsite providing a portion of base flow for the receiving downstream waterbodies, critical to the overall aquatic health of these downstream waterways.

In a letter dated May 31, 2012, the NJDEP's Natural Heritage Program (NHP) indicated searches of the Natural Heritage database and the Landscape Project mapping identified the following species or attributes as occurring within the subject property:

- Great blue heron (*Ardea herodias*) - Special Concern
- Upland sandpiper (*Bartramia longicauda*) - Breeding, State Endangered
- American kestrel (*Falco sparverius*) - Breeding, State Threatened
- Potential vernal pool habitat
- Moth (*Cucullia alfarata*) - Not Listed
- Hand-maid moth (*Datana ranaecephala*) - Not Listed

The NHP did not report the occurrence of rare plants, ecological communities, Natural Heritage Priority sites or streams/mussel habitat on the subject site.

The following protected species or attributes were identified within one mile of the subject site:

- American kestrel (*Falco sparverius*) - Breeding, State Threatened
- American bittern (*Botaurus lentiginosus*) - Breeding, State Endangered
- Bald eagle (*Haliaeetus leucocephalus*) - Foraging, State Endangered
- Great blue heron (*Ardea herodias*) - Foraging and Nesting, Special Concern
- Upland sandpiper (*Bartramia longicauda*) - Breeding, State Endangered
- Potential vernal pool habitat
- Moth (*Cucullia alfarata*) - Not Listed
- Hand-maid Moth (*Datana ranaecephala*) - Not Listed

The NHP did not report the occurrence of rare plants, ecological communities, Natural Heritage Priority sites or streams/mussel habitat within one mile of the subject site.

Regarding onsite species, only the American kestrel and upland sandpiper are species which may result in constraints to a proposed project, as the remaining species are not officially protected by the State of New Jersey or a federal agency. The potential onsite vernal pool habitat is understood to be the pond located northwest of the main office building and directly north of the man-made retention basin. The pond was observed to contain water at the time of the site visit and appeared to contain a permanent level of water, which is not characteristic of a typical vernal pool. Green frogs (*Rana clamitans*), a facultative vernal species, were heard calling from the pond during the site visit. The NJDEP may define the pond as a vernal pool if the presences of two or more facultative vernal species are confirmed, and the pond is found to be free of fish. The designation of the pond as a vernal pool in and of itself will not result in a 150-foot wide wetland transition area unless the vernal species are also protected species (green frog is not protected); however, a vernal pool designation may preclude the use of wetlands general permits to conduct a regulated activity within or adjacent to the vernal pool. Further, detailed surveys are required to determine if the pond, or another waterbody, is a confirmed vernal pool habitat. If a project is proposed within or near any onsite waterbody, it is recommended its potential status as a vernal pool habitat be investigated since target species surveys can only be completed between late March and June of each year. The seasonal survey restrictions may severely impact the schedule of a project or proposed action.

The *Federally Listed and Candidate Species Occurrences in New Jersey by County and Municipality* (October 2010) maintained by the U.S. Fish and Wildlife Service (USFWS) lists Lumberton Township as having a potential occurrence for bog turtle (*Clemmys muhlenbergii*) – Federally threatened/State endangered, and swamp pink (*Helonias bullata*) Federally threatened / State endangered species. As noted earlier in this Master Plan, suitable habitat for these species is present; therefore, the USFWS should be consulted concurrently with the planning and design of a project or development in support of the ALP.



Figure 1-35: Bog Turtle

Based on the site visit, the subject site does contain suitable habitat for bog turtle and swamp pink (Figures 1-34 and 1-35). Suitable habitat for bog turtle includes emergent wetlands with soft, mucky soils and perennial groundwater seeps. These areas were observed along both the Masons Creek and South Branch Rancocas Creek tributary corridors, although other wetlands may include small inclusions of suitable bog turtle habitat. The palustrine forested wetlands within the Masons Creek corridor were observed to contain suitable habitat for swamp pink. Therefore, it is recommended a Phase I bog turtle habitat survey and a swamp pink habitat assessment be completed before vegetation disturbances or development is undertaken. Based on the results of these habitat assessments, further, detailed presence/absence surveys may be required by the NJDEP and/or USFWS. The presence or absence of these species will result in direct consequences to a proposed action, and early coordination with NJDEP and USFWS is critical in determining potential project constraints; if target species surveys are required, they can only be completed during certain times of the year (i.e., between April 15 – June 15 for bog turtle).

Furthermore, if these species are determined to be present, affected wetlands will be assessed a 150-foot wide transition area by NJDEP and the USFWS can impose up to a 300-foot wide buffer adjacent to core bog turtle habitat and a 500-foot wide buffer adjacent to swamp pink habitat. The recommended biotic surveys are discussed in Section 5 to follow.

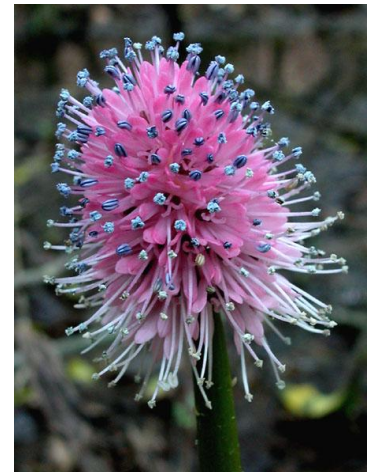


Figure 1-34: Swamp Pink



Figure 1-36: Potential Breeding Habitat

Another unique biotic community includes the maintained open fields, and to a lesser extent, the agricultural lands, which are both indicated by NJDEP as breeding habitat (i.e., sighting) for upland sandpiper and American kestrel. Figure 1-36 shows a potential breeding habitat.

The open maintained fields were observed to contain typical herbaceous species approximately 2 to 8 inches in height including white clover (*Trifolium repens*), red clover (*Trifolium pratense*), hop clover (*Trifolium agrarium*), English plantain (*Plantago lanceolata*), dwarf dandelion (*Krigia virginica*), cat's ear (*Hypochoeris radicata*), and various goldenrods (*Solidago spp.*). These fields appear to be mowed as a maintenance item at some unknown frequency. The existing agricultural lands mapped as habitat for these species contain either row-crops of corn, soybeans, or wheat. The row-crops of corn and soybeans are not optimal habitat for either of these bird species, but are reported to potentially be utilized. The wheat fields located in the eastern adjacent area may be utilized by American kestrel for breeding and foraging. The maintained open fields can also be considered marginal habitat. Nevertheless, these grasslands and agricultural fields are reported by NJDEP as sightings for breeding activities for these species; therefore these species are presumed to be extant unless otherwise rebutted through a detailed targeted survey. The recommended biotic surveys are discussed in Section 5 to follow. As a matter of regulation, American kestrel and upland sandpiper will not result in the assessment of a 150-foot wide wetland transition area pursuant to NJAC 7:7A or a 150-foot wide riparian zone pursuant to NJAC 7:13 since these species are not wetland/water dependent species. However, impacts to these species must be addressed if a Flood Hazard Area Permit is required and/or if an Environmental Assessment is undertaken for a proposed action.

The 1997 Master Plan stipulates that an intensive habitat and grassland bird species survey was performed at the airport for determining the presence or absence of upland sandpiper and grasshopper sparrow. The Master Plan indicates the results of the survey (1990 and 1996) concluded these species were not observed and the airport property does not appear to be crucial for their survival. Due to the significant amount of time that has elapsed since these target surveys were completed, it is recommended new target species surveys be completed before a project, vegetation removal or development is proposed or undertaken in support of the ALP.

In conclusion, it is apparent the airport is currently operating in harmony with any protected species which may or may not be present onsite. Nevertheless, the survey or assessment for the presence or absence of any protected species, in conjunction with early coordination with the State and Federal agencies having jurisdiction, is a crucial early step that is highly recommended during the project planning phase.

1.3.5 Farmland Soils

The National Resource Conservation Service (NRCS) lists soils according to their agricultural significance, or Land Capability Classification. The highest quality soils are termed Prime Farmland Soils, which are followed by Soils of Statewide Importance. Prime Farmlands Soils include all those soils in Land Capability Class I and selected soils from Land Capability Class II. Prime Farmlands Soils are lands that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and are also available for these uses. Prime Farmlands Soils are not excessively erodible or saturated with water for a long period of time, and they do not flood frequently or are protected from flooding. Soils of Statewide Importance include those soils in Land Capability Class II and III that do not meet the criteria as Prime Farmlands Soils, yet support agricultural production, with some limitations. These soils may be suited to certain crops or require special conservation practices to maintain their productivity.

The following onsite soils are classified by NRCS as Prime Farmlands Soils:

- Adelphia fine sandy loam, 2 to 5% slopes (AdmB)
- Freehold fine sandy loam, 0 to 2% slopes (FrmA)
- Freehold fine sandy loam, 2 to 5% slopes (FrmB)
- Holmdel loamy sand, 0 to 5% slopes (HoaB)
- Holmdel fine sandy loam, 0 to 2% slopes (HodA)
- Marlton fine sandy loam, 0 to 2% slopes (MapA)
- Marlton fine sandy loam, 2 to 5% slopes (MapB)

The following onsite soils are classified by NRCS as Soils of Statewide Importance:

- Kresson fine sandy loam, 0 to 2% slopes (KreA)
- Kresson loam, 0 to 2% slopes (KrhA)
- Pemberton sand, 0 to 5% slopes (PefB)
- Shrewsbury (drained) fine sandy loam, 0 to 2% slopes (ShsA)

A total of eighteen different soil types are mapped onsite by NRCS. As seen above, seven are Prime Farmland Soils and four are Soils of Statewide Importance, for a total of eleven out of eighteen soils types having an agricultural significance.

Except for a couple of small areas within the eastern adjacent area, all of the existing agricultural lands occupy mapped Prime Farmland Soils or Soils of Statewide Importance. Existing agricultural lands contain active row-crops of corn, soybeans, and wheat. **Figure 1-37** illustrates the Farmland Soils.



Figure 1-37: Farmland Soils

1.3.6 Historic and Archeological Sites

The National Historic Preservation Act of 1966, as amended in 1980 and 1992, applies to Federal actions effecting properties included on or eligible for inclusion on the National Register of Historic Places (Section 106). The Archeological and Historic Preservation Act of 1974 provides for the survey, recovery, and preservation of significant scientific, prehistoric, archeological, or paleontological data when such data may be destroyed or irreparably lost to a federally funded project. The New Jersey Register of Historic Places Act requires actions by State, county, or local governments, which may impact a property listed in the New Jersey Register of Historic Places, be reviewed and authorized through the State Historic Preservation Office (SHPO). The SHPO also provides advice and comment for a number of permitting programs within the NJDEP, including some permits required under the NJDEP Land Use Regulation Program (i.e., freshwater wetlands program).

A review of existing, available information and NJDEP mapping was completed relative to cultural resources to develop this section of the Master Plan. A detailed cultural resource investigation was not completed as part of this Master Plan. A review of existing environmental documents for the subject site indicates one or more previous cultural resource investigations have been completed.

According to the NJDEP Geoweb GIS mapping tool, a large portion of the subject site is located within ½ mile by ½ mile grids which indicate the presence of archeological sites, detailed in **Figure 1-38**. These grids indicate the presence of archeological sites that: 1) are included in the New Jersey or National Registers of Historic Places; 2) have been determined eligible for inclusion through Federal or State processes as administered by the SHPO; or 3) have been identified through cultural resource survey or other documentation on file at SHPO. Since archeological sites are particularly sensitive to destruction, the ½ mile by ½ mile grid locational system protects the sites by not revealing their exact location. Therefore, it is undetermined if

the subject site actually contains a known archeological site based on the public information, and further investigation is required to make a presence/absence determination.

Approximately 75% of the western adjacent area, the entire developed section of the core airport property, the southeastern tip of the core airport property, and the southern 25% of the eastern adjacent area are mapped within the archeological sites grid. The New Jersey State Museum is the official registrar of archeological sites in New Jersey; therefore, it is recommended these records be reviewed prior to a project or development.

The NJDEP Geoweb GIS mapping tool delineates the extreme eastern section of the core airport property and the entire eastern adjacent area within the Lumberton Rural Agricultural Historic District, shown in **Figure 1-38**. The SHPO prepared an opinion as to this site's historic eligibility on 9/12/01. Furthermore, the NJDEP website indicates an addendum to a previous cultural resource investigation has been completed for an airport expansion project. The NJDEP website does not map any listed or eligible historic properties on or directly adjacent to the subject site. The closest known historic property based on the resources reviewed is the Eayres Plantation and Mill Site located approximately 4,000 feet east of the eastern adjacent area. This site is on the State and National Registers.

It is recommended either existing cultural resource investigations be updated or new investigations be completed by a qualified professional before a project or development is planned and designed in support of the ALP.

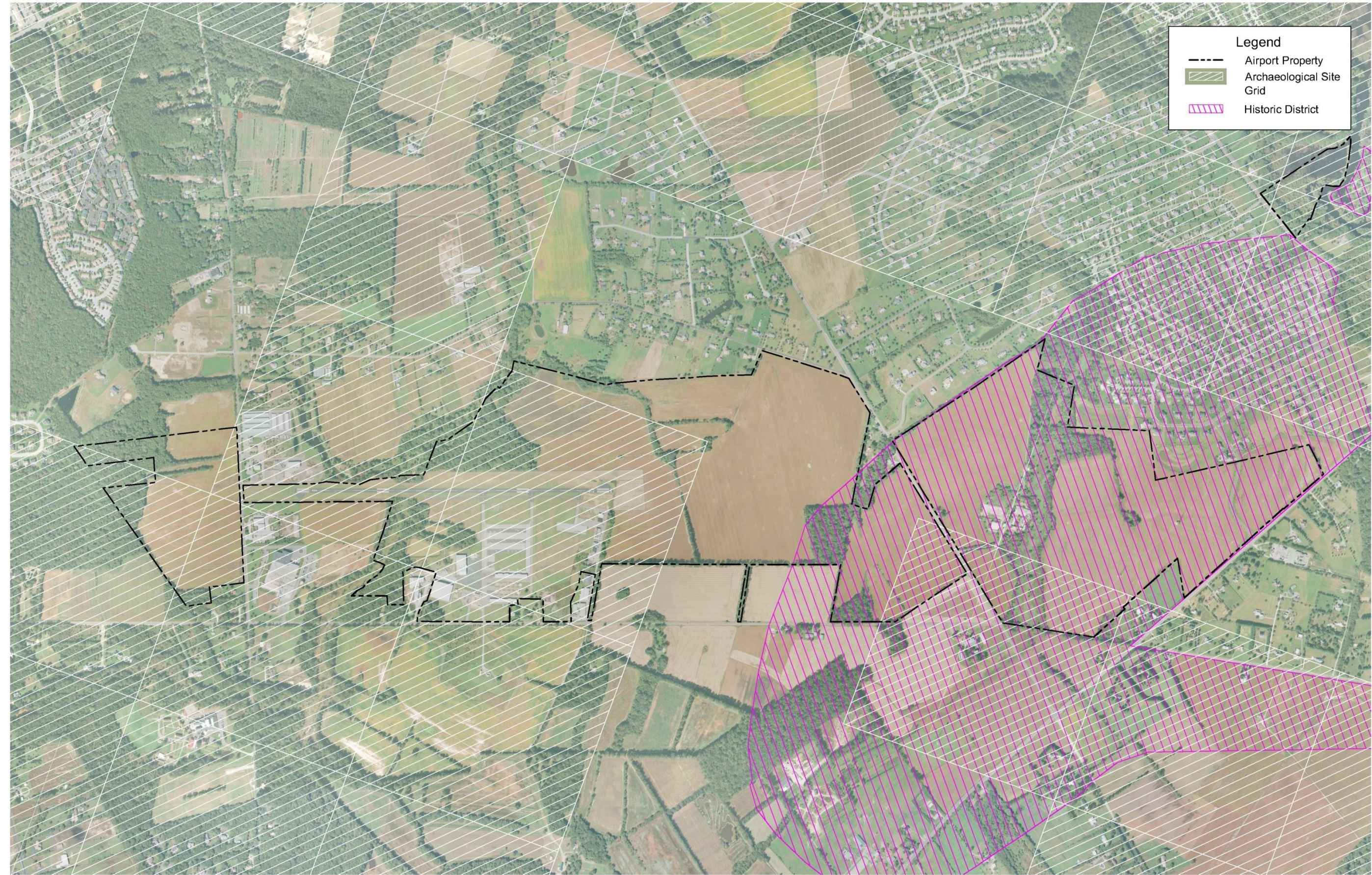


Figure 1-38: Historic and Archaeological Sites

1.3.7 Air Quality

The NJDEP Bureau of Air Quality provides air quality monitoring at various locations across the state for six specific air pollutants (criteria pollutants). These pollutants are used as indicators of air quality and for which National Ambient Air Quality Standards (NAAQS) have been established. These pollutants include carbon monoxide, nitrogen oxides, ozone, sulfur dioxide, smoke shade, and fine particulates. In addition, a manual monitoring network has been established to measure inhalable particulates, ozone precursors, atmospheric deposition, lead, and air toxins. The Bureau divides the state into nine Air Quality Index Regions. The South Jersey Regional Airport falls within Region 5, which is referred to as the Central Delaware Valley Region. This region includes Burlington and Mercer Counties. Air Quality stations within the region include stations in Ewing and Rider University.

Particulate matter (most commonly sulfides and organic carbon), sulfur dioxide, and ozone are monitored at these stations.

The air monitoring data is also used to characterize the general air quality within nine distinct Air Quality Index Reporting Regions covering New Jersey. Descriptor ratings, ranging from "Good" to "Very Unhealthy," have been established to provide a general system of rating the regional air quality. The NAAQS is given a numerical Air Quality Index (AQI) rating. The results of air monitoring for pollutants measured at the stations were compared to the National Ambient Air Quality Standards. An index value was given for the level of Air Quality. The Index Level ranges from 0-500. Zero to 50 is considered good air quality; 51-100 is considered moderate air quality; 101-150 is considered unhealthy for sensitive groups (children, elderly and individuals with health conditions); 151-200 is considered unhealthy; 201-300 is considered very unhealthy and 301 to 500 is considered hazardous. The index value (NAAQS) standard is equal to a value of 100. Any value above 100 is considered to be exceeding the National Air Quality Standard.

The 2010 Air Quality Index Summary indicates the Central Delaware Valley Region was reported to have had 285 days rated as "good;" 65 days rated as "moderate;" and 15 days rated as "unhealthy for sensitive groups". There were no days rated as "unhealthy", "very unhealthy", or "hazardous" in the Central Delaware Valley Region. Among the nine reporting regions, the Central Delaware Valley Region has the sixth fewest days ranked as "good." Throughout the State, ozone was the most common criteria pollutant exceeding standards. In general, the air quality in New Jersey has improved significantly since the passage of the Clean Air Act in 1970. New Jersey is now in compliance with all NAAQS Standards for criteria pollutants, except for ozone.

The full NJDEP Bureau of Air Monitoring 2010 Air Quality Report; real time monitoring station data; multiple studies/reports concerning pollutants and air toxics, can be reviewed at NJDEP Bureau of Air Monitoring website at <http://www.njaqinow.net/Default.ltr.aspx>.

According to the Airport Environmental Handbook, no air quality analysis is required if a general aviation airport has less than 180,000 operations forecasted annually. Since the number of forecasted operations for the year 2013 is less than 180,000, no further air quality analysis is necessary, and it can be stated that significant air quality impacts will not occur as a result of the proposed development plan.

1.3.8 Compatible Land Use and Noise

The subject site is situated within a fairly rural setting with interspersed residential, commercial, and light industrial uses. Large expanses of agricultural lands dominate the existing landscape. According to the NJDEP Geoweb GIS website 2007 Land Use/Land Cover types, the subject site contains current land uses including airport facilities, developed areas, residential uses, crop and pasturelands lands, agricultural wetlands, managed wetlands, forest lands, forested wetlands, artificial lakes, and scrub-shrub wetlands. These designations and their definitions have been derived from the Anderson Classification System (Anderson et al., 1976), a standard land cover classification system, and edited by the NJDEP. The land use cover type map is based on the best available information and appears to be generally consistent with onsite observations; however, land uses have not been completely ground-truthed and some of the cover types may not accurately reflect existing conditions.

Surrounding general land uses include crop and pasturelands, residential, commercial services, industrial uses, and several types of wetlands and waters. No sensitive receptors such as schools, hospitals, or churches are situated adjacent to the subject site. The Special Elementary/Secondary School for Handicapped is located approximately 3,000 feet south of the western property line of the core airport property (i.e., near the end of the runway). A private childcare facility, Kindercare, is located approximately 2,700 feet southeast of the southern property line of the eastern adjacent area. Springville School is

situated approximately 4,000 feet west of the core airport property line while the St. Martin in the Fields Church is located approximately 6,200 feet east of the core airport property line. None of these schools or the church is located within the airport safety zone. Therefore, there are no known or identified incompatible land uses located adjacent or within 2,700 feet of the subject site.

The existing noise contours further validate the compatible land uses adjacent to the existing Runway 08-26. Per FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, no residential properties, schools, or sensitive receptors are to be located in the 65 DNL contour for the Airport. As shown in **Figure 1-39**, the only areas affected by the 65 DNL contour located off Airport property are local businesses and agricultural land. The remaining noise contours are located on airport property and do not pose any noise sensitivity issues.

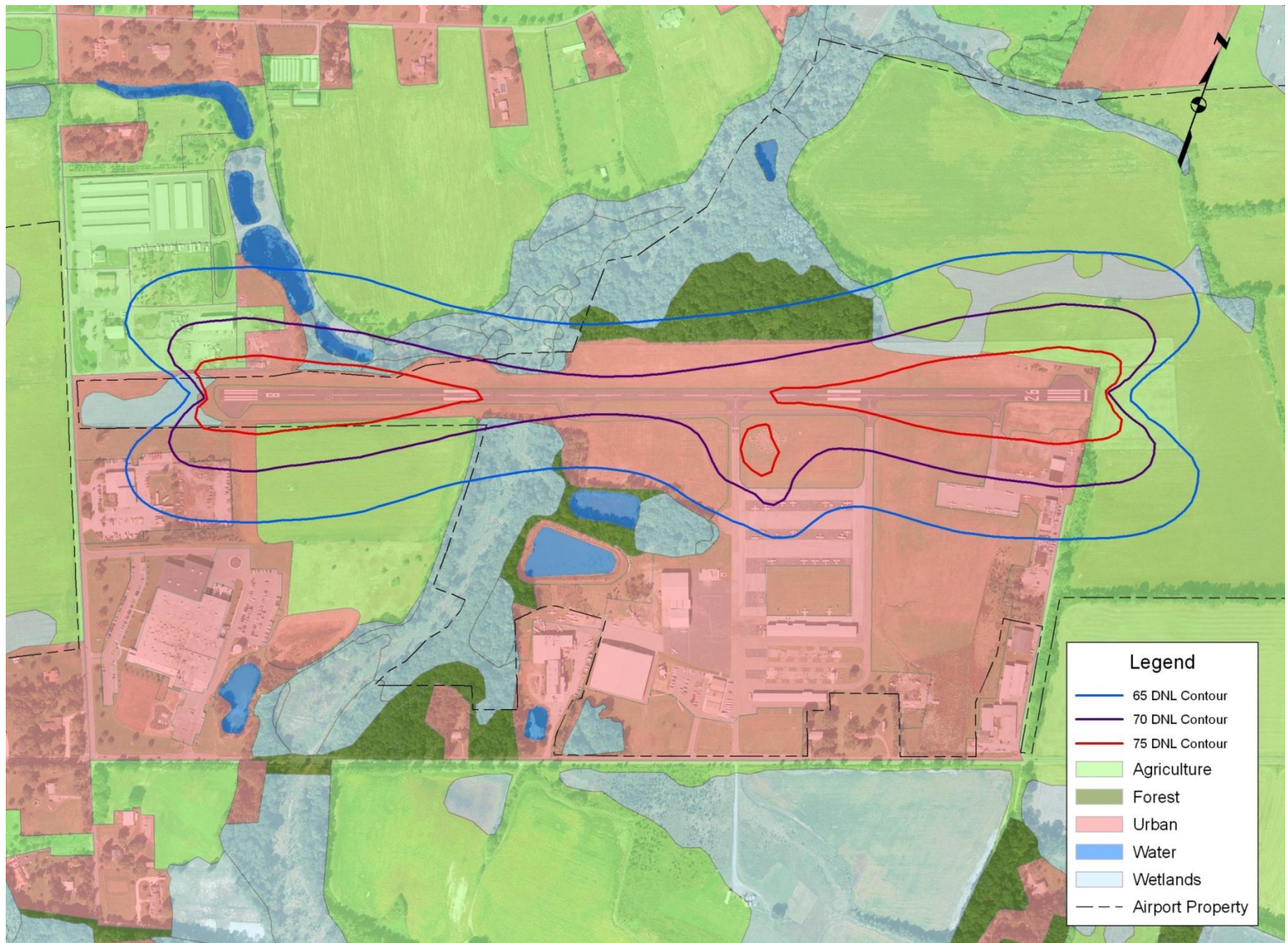


Figure 1-39: Noise Contours

1.3.9 Hazardous Materials and Waste Sites

A review of the NJDEP Geoweb GIS mapping tool revealed the subject site is on the New Jersey Known Contaminated Sites List (KCL) as an active site (Program Interest #331504). According to NJDEP online records, NJDEP oversight commenced in 2007 under the Bureau of Field Operations (BFO070001), and was then transferred to the Licensed Site Remediation Professional (LSRP) Program in 2012 where it remains active (LSR120001). NJDEP records indicate the remedial level as C2 formal design with a known source or release with groundwater contamination. The subject site is not on the Federal National Priority List (NPL-Superfund) maintained by the US Environmental Protection Agency (EPA). A review of previous environmental documentation for the subject sites indicates previous environmental studies/investigations have been completed for the subject site.

Two other known contaminated sites are mapped by NJDEP in the project vicinity identified as Electronic Parts Specialty located approximately 5,700 feet northeast of the eastern adjacent land and a site known as 5151 Church Road located approximately 8,000 feet southwest of the core airport property. Both of these sites are reportedly active.

The subject site is not mapped by NJDEP as containing a groundwater Classification Exception Area/Well Restriction Area (CEA), a Currently Known Extent of groundwater contamination designation (CKE) or a deed notice.

In conclusion, it is recommended the previous environmental investigations be updated or redone as needed prior to the design or planning of a development or project in support of the ALP.

Section 2

Aviation Demand Forecast



Prepared for
The New Jersey
Department of Transportation

2 Aviation Demand Forecast

Forecasting future aviation activity at an airport is essential to assess the need for additional or expanded facilities. This Section presents a summary of historical aviation demand at VAY and a forecast of unconstrained aviation demand for 2012 through 2031 (the forecast period). The analyses required in developing the forecasts are presented below followed by an explanation of the forecast approach and methodology, and a comparison of the Master Plan forecast results to the FAA Terminal Area Forecast (TAF) for the Airport.

2.1 Airport Service Region

When examining eligibility for inclusion in the National Plan of Integrated Airport Systems (NPIAS), the FAA assumes an airport's 30-minute drive time coverage area is comprised of a circle with a 20-mile radius centered on the airport. The underlying assumption in this FAA approach is that a distance of 20 miles would typically take 30 minutes to drive, assuming a reasonable speed and normal driving conditions. In view of the relatively high population density and congested driving conditions in the State of New Jersey and adjacent Philadelphia / Delaware Valley Region, the estimated radius of an airport's service region or coverage area is reduced from 20 miles to approximately 15 miles. This assumption is in-line with the assumption in the New Jersey State Airport System Plan (SASP).

To provide a higher level of detail over using a 15-mile radius centered on VAY, an approximate drive time analysis was performed to determine the airport service region within the 30-minute drive time area.¹ **Figure 2-1** depicts the airport service region that was developed for VAY within the 30-minute drive time.

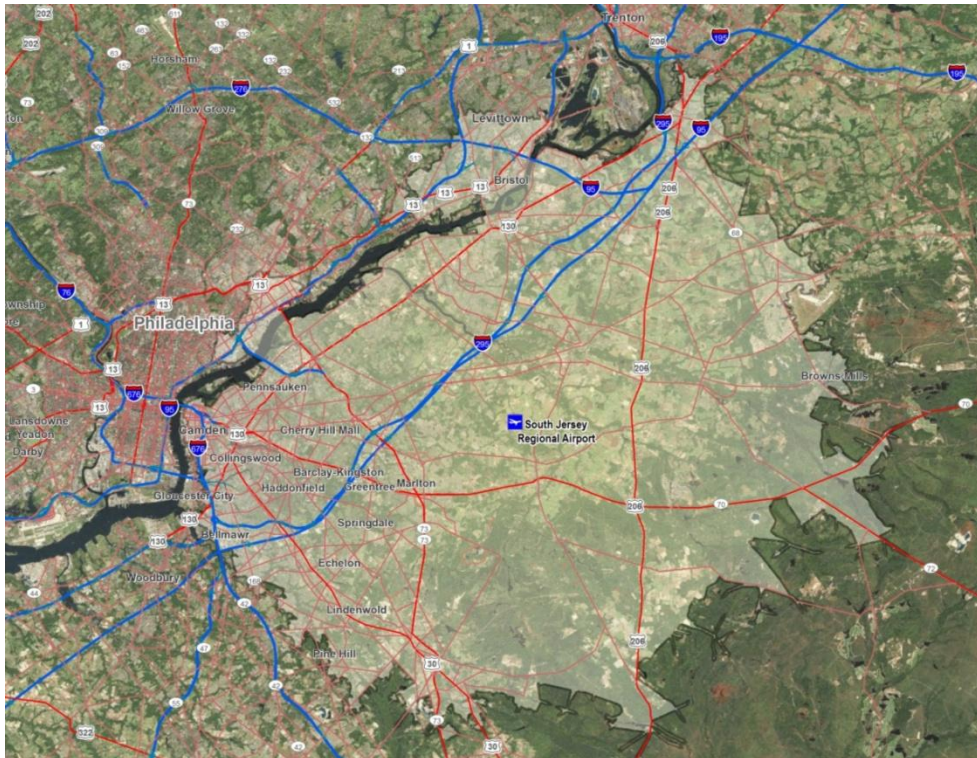


Figure 2-1: Airport Service Region within 30-minute Drive Time

¹ Developed using ESRI Streetmap data (2008). The speed for the analysis based on the following: Interstate: 55 mph, US and State Route: 45 mph, County Road: 35 mph, Local Road: 25 mph. The time to travel each road segment was determined from the following: (Distance x 60)/speed. ESRI Network Analyst was used to calculate the distance that could be traveled in 30 minutes along all routes from the Airport.

Another approach to identify the service region for VAY is by examining the composition of the based aircraft. Based on the available aircraft registration provided by NJDOT in October 2011, a large share (61%) of the based aircraft are registered in Burlington and Camden Counties. The remaining based aircraft are registered in various locations throughout the nation. A summary of the based aircraft registered locations for the based aircraft at VAY is shown in **Figure 2-2**.

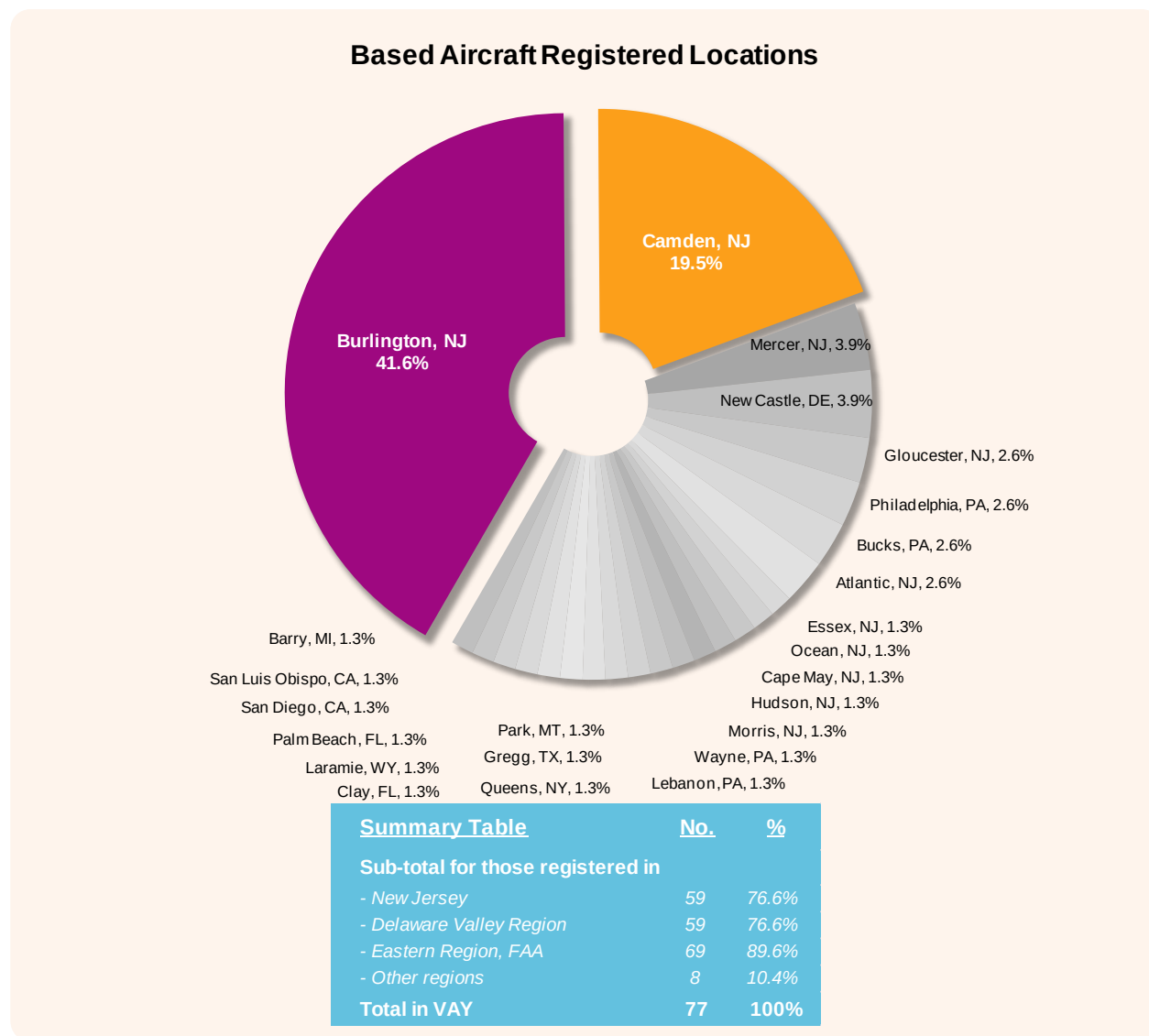


Figure 2-2: Based Aircraft Registered Locations

By examining the share of aircraft registered in Burlington and Camden counties based in VAY, as compared to other counties in the region, it further confirms the contribution of VAY to both Burlington and Camden counties is equally important. **Figure 2-3** summarizes the share of aircraft registered in the region that are based at VAY.

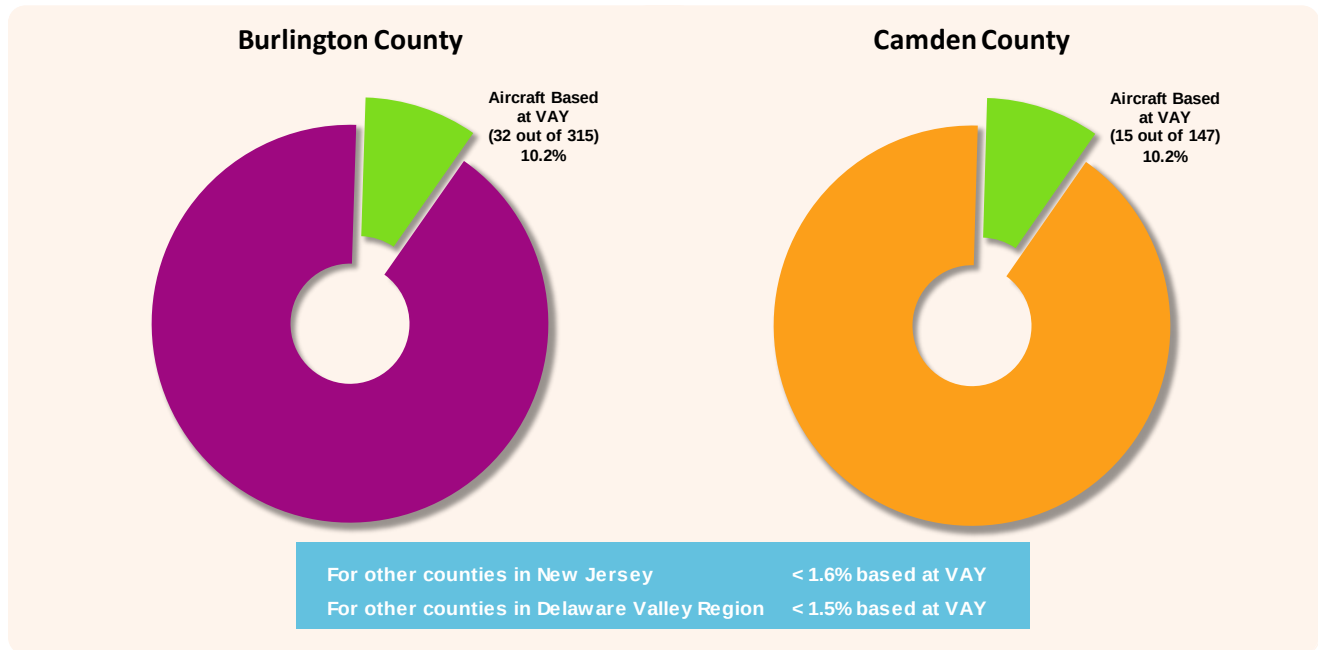


Figure 2-3: VAY's Share of Based Aircraft

In summary, based on the 30-minute drive-time coverage approach and the based aircraft registered locations, VAY primarily serves Burlington and Camden counties. In the analysis of demand forecast in later sections, Burlington and Camden counties are considered together.

The comparisons of forecasts from the regional, statewide, and national levels are considered in this Section along with local forecasts. VAY geographically falls within the following statewide and regional airport systems, which are considered in the demand forecast analysis where appropriate:

- New Jersey State Airport System, SASP released in January 2008
- Delaware Valley Regional Airport System, RASP released in August 2006
- Eastern Region Airport System, FAA TAF accessed January 2012

The latest 2030 Delaware Valley Regional Airport System Plan (RASP) includes airports in 12 counties from four states. The 12-county Delaware Valley Region (the Region) includes Burlington, Camden, Gloucester, Salem and Mercer in New Jersey; Philadelphia, Delaware, Bucks, Montgomery and Chester in Pennsylvania, New Castle in Delaware, and Cecil in Maryland.²

Socioeconomic data for Metropolitan Statistical Areas (MSA) is also available from the U.S. Census Bureau and other U.S. government agencies. The Philadelphia MSA (also known as the Philadelphia-Camden-Wilmington, PA-NJ-DE-MD MSA in full) includes 11 counties, which is very similar to the 12-county Region mentioned above. The main difference is the Philadelphia MSA excludes Mercer County in New Jersey. Since Burlington and Camden counties are also within the Philadelphia MSA, the regional analysis will consider the available data from the MSA where appropriate.

The Eastern Regional Airport System (ERAS) is defined by the FAA, and it covers a much larger area than the Region or MSA. The ERAS includes eight states: New Jersey, Pennsylvania, Delaware, Maryland, New York, Virginia, West Virginia, and the District of Columbia. In the comparison with FAA's Terminal Area Forecast (TAF), the projection for the Eastern Region will be considered for the regional comparison.

² However, some of the socioeconomic data from the Delaware Valley Regional Planning Commission (DVRPC), which will be discussed in the later sections, is based on the major segments in the Region that includes 9 counties from New Jersey and Pennsylvania instead of 12 counties. The 9-county region includes Burlington, Camden, Gloucester, and Mercer in New Jersey; and, Philadelphia, Delaware, Bucks, Montgomery and Chester in Pennsylvania. DVRPC also carried out economic studies in association with other agencies for Greater Philadelphia Region which includes 11 counties. This 11-county region is similar to the 12-county region defined in the RASP except that it excludes the Cecil County in Maryland. Since Burlington and Camden are within all of the 12-county, 11-county and the 9-county region, available data from DVRPC from either of them are used in the analysis and 12-county, 11-county or 9-county within the Region is specified in the data source.

2.2 Economic Basis for Aviation Demand (Socioeconomic Data)

The economy of Burlington and Camden counties, the State of New Jersey, and the Region are determinants of general aviation demand at VAY. The development of the economic base of an airport service region and the surrounding areas is important to future growth. The following sections present a discussion of the economic basis for aviation demand at the Airport.

2.2.1 Historical Population, Employment, and Per Capita Income

Figures 2-4 and 2-5 present comparative trends in population, employment and per capita personal income in Burlington and Camden counties, New Jersey, the 12-county Region, and the United States from 1990 to 2010.

Population

As shown in **Figures 2-4 and 2-5**, the population of Burlington and Camden counties, the State of New Jersey, and the Region increased at a lower than average growth rate than the population growth of the United States throughout the historical period from 1990 to 2010. Populations in Burlington and Camden counties have historically grown at a lower rate than in the State of New Jersey (except between 2001 to 2006; 5 out of 20 years). Populations in Burlington and Camden counties have also historically grown at a lower rate than in the Region (except between 1990 to 1991, 1994 to 1995, and 2000 to 2003; 5 out of 20 years). Population in Burlington and Camden counties increased at an average of 0.34% per year between 1990 and 2000, and 0.33% per year between 2000 and 2010. Both of the Burlington and Camden 10-year average annual growth rates from 1990 to 2000 and 2000 to 2010 are below the State of New Jersey or the Region, and less than half that of the growth rates in the United States (1.23% for 1990 to 2000 and 0.92% for 2000 to 2010).

Employment

From 1990 to 2000, the employment in Burlington and Camden counties, the State of New Jersey, and the Region generally increased at a lower average rate than the employment growth of the United States (except between 1997 to 1998 for Burlington and Camden counties, and between 1999 to 2000 for New Jersey; 1 out of 10 years). These trends are shown in **Figure 2-5**. The 10-year average annual growth rates from 1990 to 2000 for the employment in Burlington and Camden counties, New Jersey, and the Region are 0.82%, 0.91%, and 0.86%, respectively and are only half that of the growth rates in the United States with an average of 1.8%.

However, from 2000 to 2009, the average employment growth (and recovery from negative growth from 2007 to 2009) in Burlington and Camden counties is generally higher than in New Jersey, the Region, and the United States. The 10-year average annual growth rates from 2000 to 2010 for the employment in Burlington and Camden counties is 0.8%, which is higher than the 0.59% in New Jersey, 0.53% in the Region, and 0.51% in the United States.

Nevertheless, the employment growth rate has been decreasing at the local, statewide, and regional level since around 2004. The employment growth rate in Burlington and Camden counties has decreased from the recent high at 2.67% between 2003 and 2004 to the recent negative growth rate of -2.7% between 2008 and 2009.

Per Capita Income

The average per capita personal income in Burlington and Camden counties has historically been higher than that in the United States, but lower than in New Jersey and the Region. In 2009, the most recent year for which per capita income data were available at the time this report was prepared, the average per capita income in Burlington and Camden counties was \$43,899, compared with \$49,980 in New Jersey, \$46,181 in the Region, and \$38,846 in the United States

Similar to the employment growth rate, the growth rate of per capita income has been decreasing in Burlington and Camden counties, New Jersey, and the Region since around 2005. The growth rate of per capita income in Burlington and Camden counties has decreased from the recent high at 6.58% between 2005 to 2006, to the recent negative growth rate of -0.57% between 2008 and 2009.

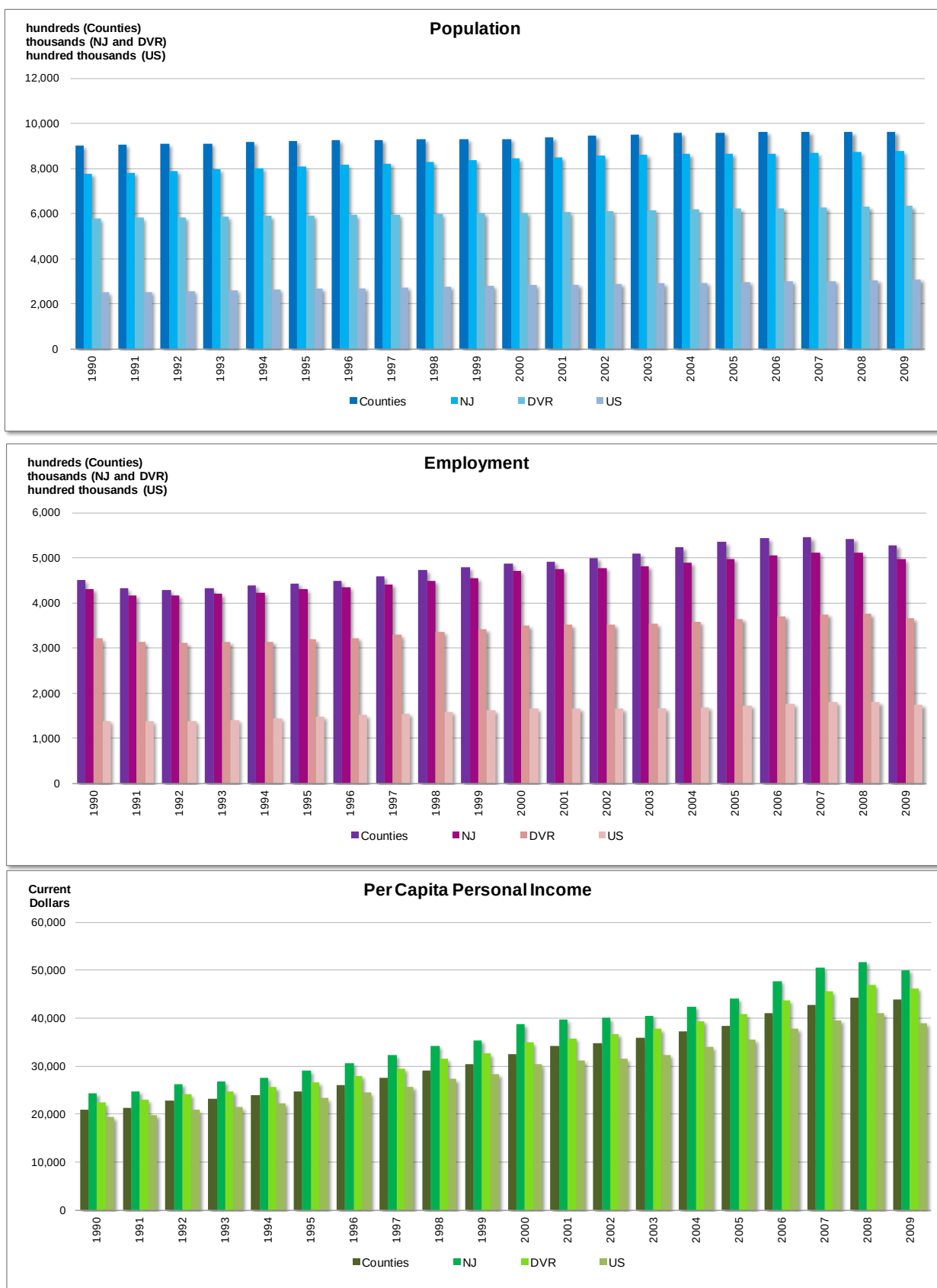


Figure 2-4: Historical Population, Employment and Per Capita Personal Income

Sources of data see Figure 2-5

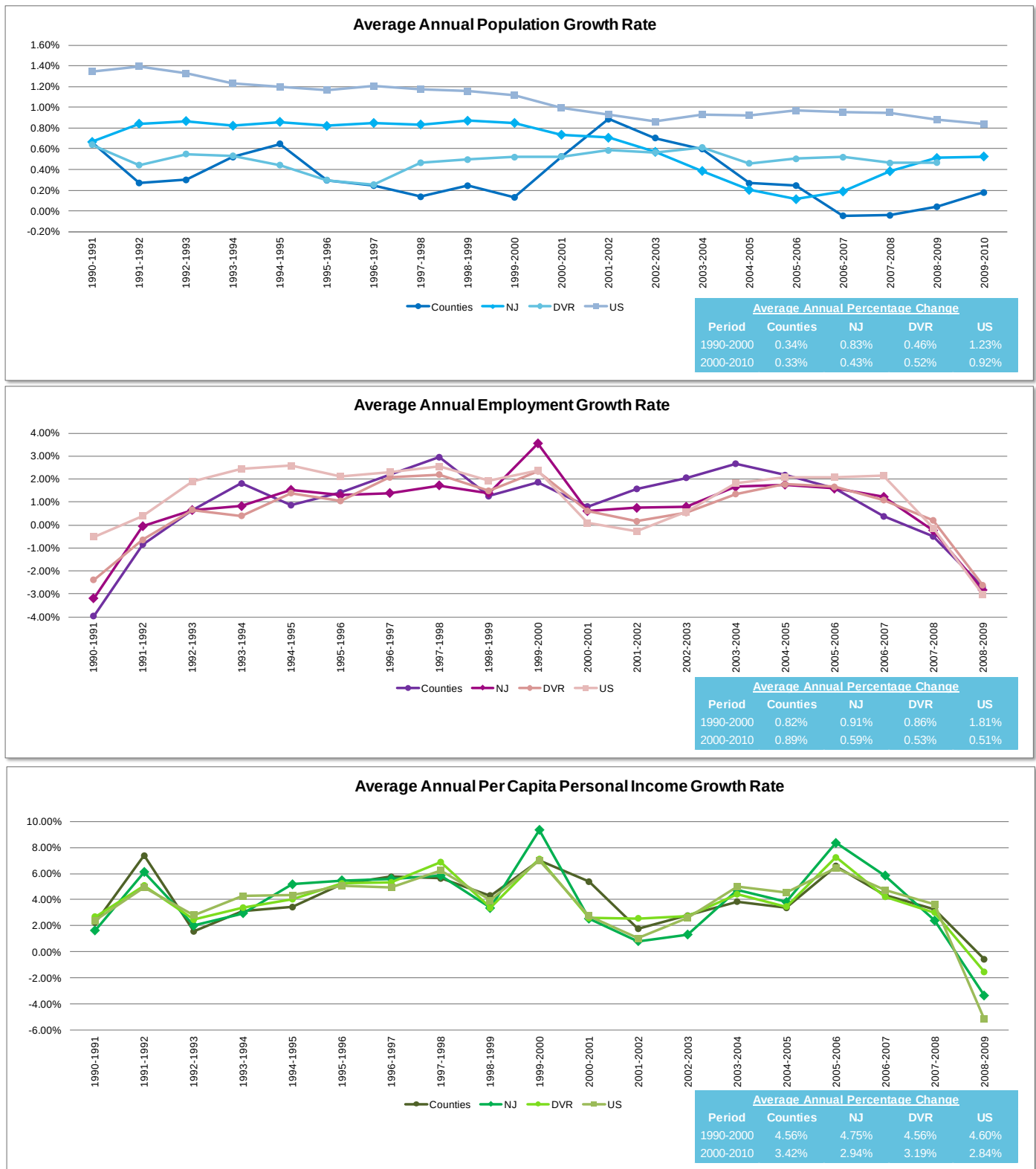


Figure 2-5: Historical Population, Employment and Per Capita Personal Income Growth Rates

Sources:

1. U.S. Census Bureau, Population Division, Intercensal Estimates of the Residential Population for Counties of New Jersey (as of July 1). Population data from 1990 to 1999 is based on the release on April 17, 2002. Population data from 2000 to 2010 is based on the release on September 2011.
2. U.S. Census Bureau, Population Division, Intercensal Estimates of the United States Resident Population by Age and Sex (as of July 1). Population data from 2000 to 2010 is based on the release on September 2011.
3. U.S. Bureau of Economic Analysis. All dollar estimates are in current dollars (not adjusted for inflation). Employment and per capita personal income data for New Jersey, Burlington and Camden is released on April 21, 2011. Employment and per capita personal income data for the United States is released on September 22, 2011. Population, employment and per capita personal income data for the Region is based on the summation of data for 12 counties, release date April 21, 2011.
4. AECOM analysis.

2.2.2 Economic Outlook

Local and regional economic activities are linked to the national economy. The paragraphs below discuss the economy from the national level to the regional and local levels based on available existing studies.

U.S. Economy

With reference to the Budget and Economic Outlook: Fiscal Years 2011 to 2021, dated January 2011, and the Budget and Economic Outlook: An Update, dated August 2011, prepared by the Congress of the United States Congressional Budget Office (CBO), the U.S. economic outlook is summarized below.

The U.S. economy has struggled to recover from the recent recession that, according to the National Bureau of Economic Research, began in December 2007 and ended in June 2009. The pace of growth in the nation's output has been slow compared to the rate of growth in most other recoveries since World War II, and the unemployment rate has remained quite high. The historical national Gross Domestic Product (GDP) and unemployment rates are given in **Figures 2-6** and **2-7** respectively.

The slow pace of the current recovery is broadly consistent with international experience of recoveries following financial crisis. It normally takes time for households to settle their debts and build up their wealth again, for companies to regain their confidence in putting investment in their business, and for financial institutions to recover their capital bases and credit levels after a financial crisis.

Although some of the factors contributing to economic weakness in the first half of 2011 (such as the spike in oil prices) are not expected to persist, the CBO expects the pace of growth to be restrained for several more years by the lingering effects of overbuilding, the financial crisis, and the recession. In addition, federal fiscal policy will provide decreasing support for the economy and thereby restrain economic growth over the next few years.³

Taking those factors into account, the CBO projects GDP will increase at a modest pace. **Figure 2-6** presents the GDP projections by the CBO from 2011 to 2021. The year-to-year percentage changes are also provided. **Figure 2-7** provides the unemployment projections by the CBO.

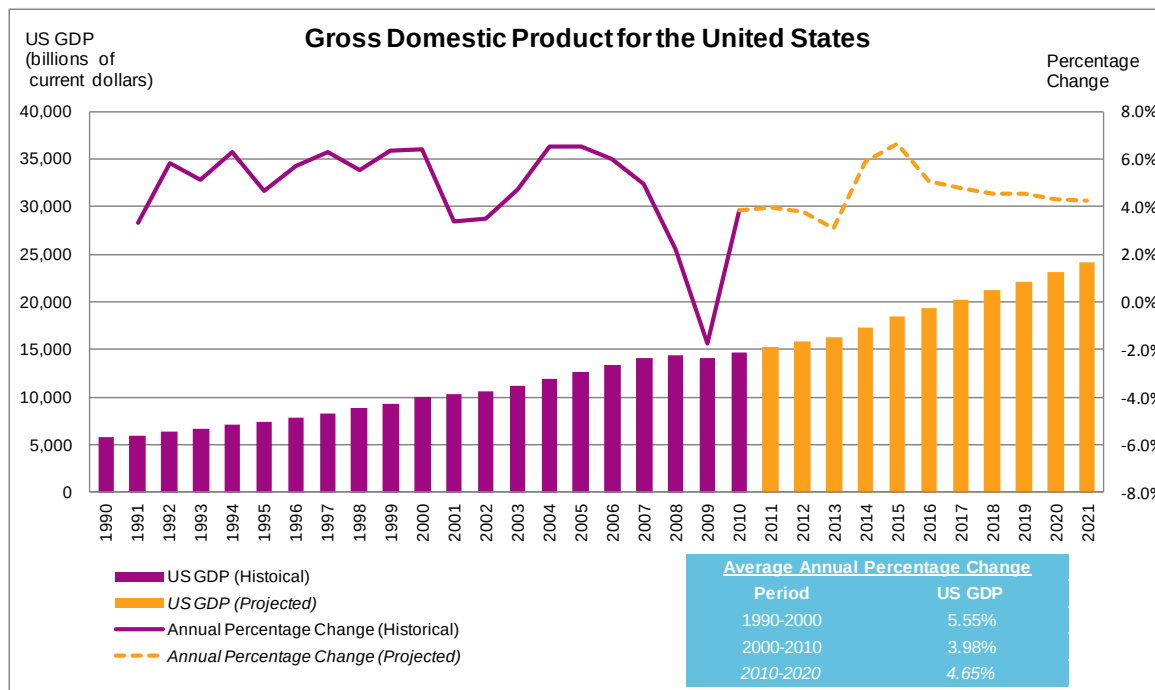


Figure 2-6: Historical Population, Employment and Per Capita Personal Income Growth Rates

Sources:

1. U.S. Congressional Budget Office, Budget and Economic Outlook: An Update, issue August 2011
2. AECOM analysis

³ U.S. Congressional Budget Office, Budget and Economic Outlook: An Update, August 2011

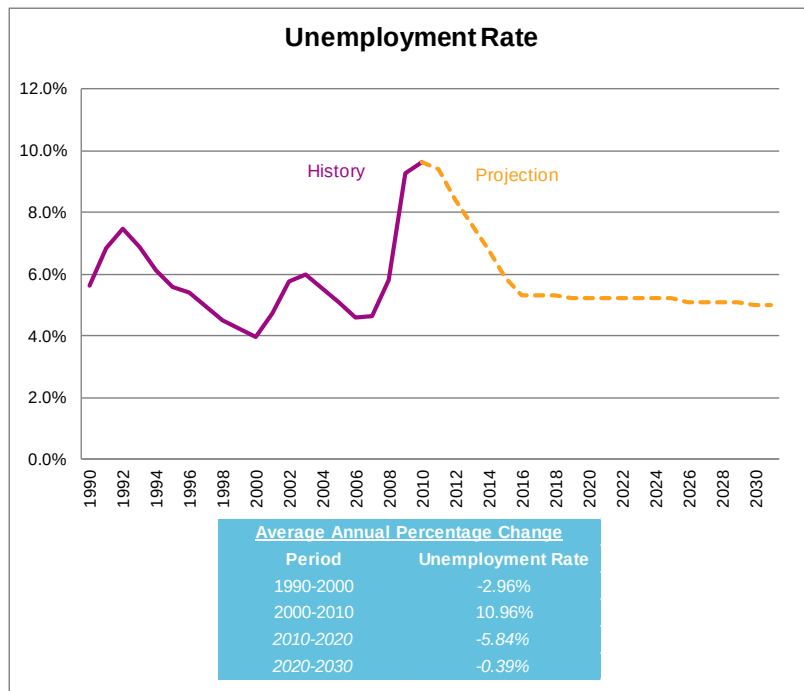


Figure 2-7: Historical and Projected Unemployment Rate

Sources:

1. U.S. Congressional Budget Office, Budget and Economic Outlook: An Update, issue August 2011, for the actual data from 1990 to 2010. CBO's 2011 Long-Term Budget Outlook, issue June 2011, for the projected data from 2011 to 2031.
2. AECOM analysis

New Jersey Economy

With reference to the latest economic outlook from the State Governor's Budget Summary for Fiscal Year 2012 released in February 2011, the general economic condition of New Jersey is summarized below.

New Jersey is beginning to show signs of recovery after being hit hard by the national recession. Unemployment reached its highest level in 33 years, while the housing market collapsed and State revenue declined precipitously. Through difficult decisions and a new focus on discipline and fiscal responsibility, New Jersey is beginning to see signs of progress and recovery, and citizens are showing a renewed optimism about the direction of the State.⁴

Looking ahead to the State's economy, New Jersey should be in a fortunate position as compared to others. Large concentrations of employers in the life sciences, telecommunications, and finance sectors are retained in New Jersey and they are likely to grow at a faster rate as the national economy recovers. These sectors employ highly-skilled, well-educated, and generally highly-paid workers who contribute significant revenue into local economies. New Jersey is one of the national leaders with regards to its high proportion of post-graduates. That concentration of highly-educated population should continue to attract more employers, if other issues such as the burden of taxation are addressed. The logistics sector in New Jersey will benefit if national and international commerce continue to recover. Retail, travel, and entertainment should also be benefited when household incomes start to grow.³

Figure 2-8 presents the historical and projected GDP for New Jersey obtained from Woods and Poole, a recognized firm that specializes in long-term socioeconomic data projections. The year to year percentage changes are also given in the figure.

⁴ State of New Jersey, The Governor's Budget Summary for FY2012, February 2011

As the data in **Figures 2-6** and **2-8** indicates, New Jersey's statewide economy is generally lower than the nation over the period of 1990 to 2000 and from 2000 to 2010 with an average growth rate of 4.68% and 3.16% in New Jersey as compared to 5.55% and 3.98% for the United States, respectively. However, the projected GDP growth rate is generally higher for New Jersey according to Woods and Poole as compared to the outlook by CBO for the coming decade. The economic recovery in New Jersey is likely to be at a faster pace than the nation.

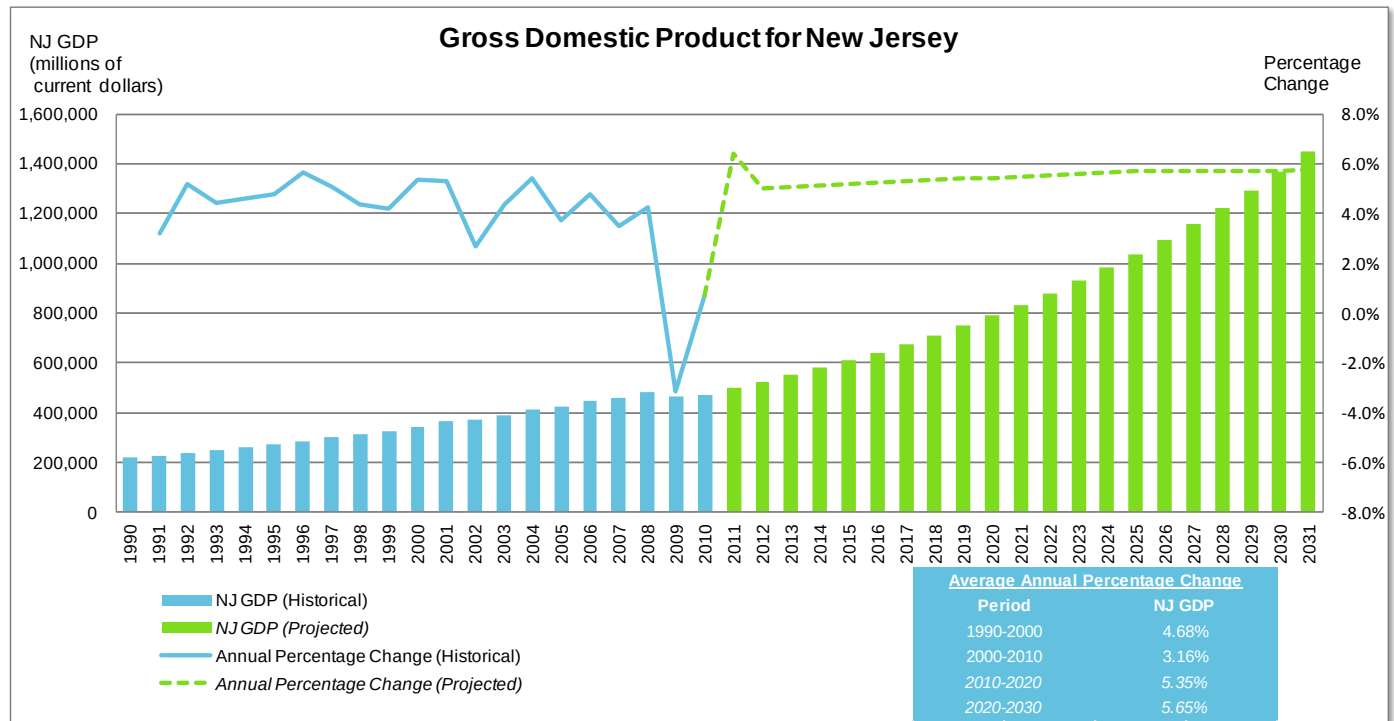


Figure 2-8: Historical and Projected Gross Domestic Product for New Jersey

Sources:

1. Woods and Poole, 2011 Data Pamphlet for New Jersey
2. AECOM analysis

2.2.3 Oil Prices

The price of aviation fuel is an important factor affecting the general aviation industry. Fuel prices are particularly sensitive to worldwide economic uncertainty and political instability. Beginning in 2003, fuel prices increased as a result of the Iraq War, political instability in some oil-producing countries, the rapidly growing economies of China, India, and other developing countries, and other factors influencing the demand for and supply of oil. By mid-2008, the average annual world oil prices were three times higher than they were in 2003. In the second half of 2008, oil prices fell sharply as demand was reduced worldwide, although prices began to pick up again from 2009 to 2011. The historical trend of average annual world oil prices is shown in **Figure 2-9**.

Analysts hold different views regarding how oil and aviation fuel prices may change in the future. Reference forecasts projected oil prices out into the future based on current market conditions, other possible factors which may affect the supply and demand of crude oil, exchange rates, and technology advancement in oil extraction, etc. To consider the uncertainties in the future market, several organizations such as the U.S. Energy Information Administration and the National Energy Board have high and low price forecasts, in addition to their reference cases. For these groups, the reference case is an average of their high and low price forecasts and represents their best estimate of oil prices. The National Resources Canada summarized the reference forecasts from eight different organizations, including the U.S. Energy Information Administration, and provided the average reference case for long-term projections of world oil prices as given in **Figure 2-9**.

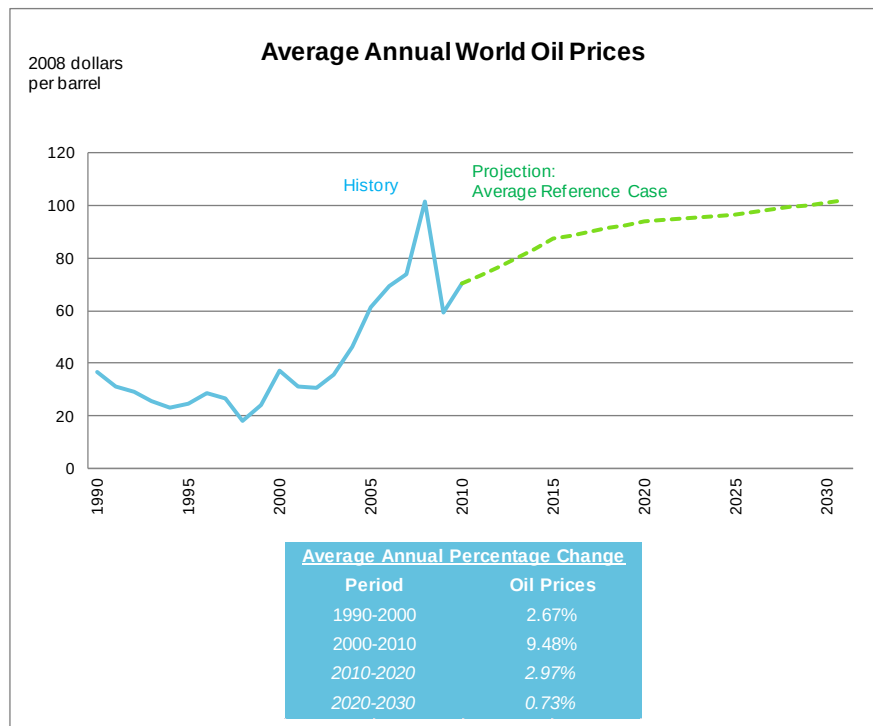


Figure 2-9: Historical and Projected Average Annual World Oil Prices

Sources:

1. U.S. Energy Information Administration, Annual Energy Outlook, Report #:DOE/EIA-0383(2010), release on May 11, 2010, for the historical data from 1990 to 2010. Natural Resources Canada, Long Term Outlook: Crude Oil Prices to 2030, October 2010, for the projected data for 2015, 2020, 2025 and 2030. The projected oil prices between the years are obtained by interpolation.
2. AECOM analysis

2.2.4 Summary

The descriptions of the various economic and demographic indicators discussed above collectively describe the region surrounding VAY in general. In terms of population growth, Burlington and Camden counties are below New Jersey, the Region and the United States. It is also the regional trend that population growth in New Jersey and the Region are both below the nation. On the other hand, the employment and per capita income growth in Burlington and Camden counties has generally outpaced the historical growth in New Jersey, the Region, and the United States in the last decade. It is also the regional trend that the employment and per capital income growth in New Jersey and the Region are both higher than the nation. Although the historical growths in GDP for New Jersey have increased at a lower rate than national GDP for both from 1990 to 2000 and from 2000 to 2010, it is anticipated New Jersey will recover from the recent recession and the projected GDP for New Jersey will increase at a faster pace than the nation in the coming decade.

The economic outlook generally expects short-term slow growth as a result of the national economic recession. Over the longer term, growth in economic and demographic variables is expected to rebound and produce average growth or slightly below their long-term historical averages.

The historical trends and projections for key economic variables discussed above were used as reference for the general development of aviation demand forecasts. The results of these analyses do not necessarily provide a direct one-for-one link between growth of an individual economic variable and the forecast elements. Instead, the trends in economic variables are compared with the trends in aviation demand in an attempt to discover general relationships between the two and identify reasonable indicators of growth in future aviation activity. The primary reason for this comparison is that innumerable outside influences affect the results of the forecasts. Events such as economic recessions, financial crisis, use of new technology, widespread health issues, terrorist attacks, etc., cannot be predicted with certainty and, therefore, the results of the economic analyses are used as a guideline and indicator to project future aviation demand rather than a precise predictor.

2.3 Historical Aviation Demand

2.3.1 Background

The Airport has witnessed a series of dramatic changes since the late 1970's / early 1980's. Early records indicate VAY based approximately 200 aircraft in the late 1970's; around two-thirds of the County registered aircraft. During the 1980's the number of based aircraft declined drastically. The Airport recorded 236 aircraft in 1981, and by 1986, the number of aircraft had fallen to 35, at which time no services were being provided and the airport was nearly closed.

The Airport was then sold, and under the new ownership the airplanes were returning to the Airport since 1988 to the late 1990's. The Airport recorded 190 based aircraft in 1994 and had increased to 207 by 1999. The initial return was due primarily to the acquisition of the airport and the establishment of a responsive fixed-based operator (FBO). The increase was further enhanced by several capital improvement projects, including the construction of additional aircraft parking aprons, taxiways, vehicle parking, hangars, and a runway and taxiway lighting project.

The number of based aircraft has been declining since the late 90's and has decreased from 207 in 1999 to 77 in 2011, around 10% of Burlington County's registered aircraft. The annual operations did not decrease as much as the based aircraft in the late 90's to early 2000's. This was due to the presence of the on base helicopter flight school which increased the helicopter operations at VAY to offset the drop in fixed wing operations. However, since the mid-2000's, the overall flight operations has been declining. The decline in based aircraft and the relocation of several helicopters to Flying W Airport are the main reasons for the drastic reduction of flight operations. In 2004, ownership of the airport transferred to the State of New Jersey, which resulted in the airport experiencing a transition period in management and operations. By 2009/2010, the Airport had reported a decline in flight training operations which had resulted in several leased aircraft being withdrawn and utilized elsewhere. The loss of flight training operations has resulted in a continual decline in annual operations.

2.3.2 Historical Based Aircraft and Annual Operations

Based aircraft are the total number of active general aviation aircraft that are either hangared or tied down at an airport. Based aircraft numbers at airports fluctuate based on a variety of factors, including the availability of the aircraft storage hangar units, time of year, and pilot storage preferences. An operation is defined as a landing or takeoff; both a landing and takeoff, such as a touch-and-go, would count for two operations. **Table 2-1** presents the historical based aircraft and annual operations for VAY for the last two decades. The Airport does not have an airport traffic control tower and the operations are not officially recorded. The based aircraft and annual operations counts reference the previous Airport Master Plan Report for VAY and mostly based on the DVRPC Aircraft Counting Program.

The DVRPC has conducted aircraft operations counts at non-towered airports in the 12-county Region since 1986, including VAY. The counting program employs an acoustical aircraft operation counter that is periodically installed for sampling at various times throughout the year. The recorded activity levels are used to estimate the total annual airport activity for the Airport. The historical counting program at VAY was carried out in 1990, 1995, 1999, 2002/03, 2006/07 and 2009/10. Since 1995, the based aircraft counts were also recorded under the DVRPC Aircraft Counting Program. The counts in between the surveyed years are estimated by interpolation as shown in **Table 2-1**.

Table 2-1: Historical Based Aircraft and Annual Operations at VAY

Period	Based Aircraft	Annual Operations
1990	138	58,159
1991	150	57,164
1992	163	56,186
1993	175	55,225
1994	190	54,280
1995	189	53,351
1996	193	54,818
1997	198	56,326
1998	202	57,874
1999	207	59,466
2000	195	59,186
2001	183	58,907
2002	172	58,630
2003	162	58,354
2004	145	52,345
2005	129	46,955
2006	115	42,119
2007	103	37,782
2008	103	31,005
2009	103	25,443
2010	92	31,234
2011	77	31,234
Average Annual Percentage Change		
1990-2000	3.60%	0.20%
2000-2010	-7.13%	-5.57%

Sources:

1. VAY Airport Master Plan Report, dated May 1997. Data for based aircraft counts from 1990 to 1994 is based on the VAY Airport Master Plan Report.
2. DVRPC Aircraft Counting Program, issue 1990, 1999, 2002/03, 2006/07, and 2009/10. Data for based aircraft from 1995 to 2009 and annual operations from 1990 to 2009 are based on the counting program.
3. FAA Airport Master Record, Form 5010, printed October 2011. Data for the based aircraft and annual operations in 2010 are based on the Airport Master Record published online.
4. The latest based aircraft data is obtained from NJDOT in October 2011.
5. AECOM analysis

The historical trend of the based aircraft and annual operations at VAY is depicted in **Figure 2-10**. As shown in **Table 2-1** and **Figure 2-10**, the based aircraft and annual operations generally increased slowly with an average annual percentage change of 3.6% and 0.2% between 1990 and 2000 respectively. However, both the based aircraft and annual operations decreased significantly with an average annual percentage of -7.13% and -5.57% between 2000 and 2010 respectively.

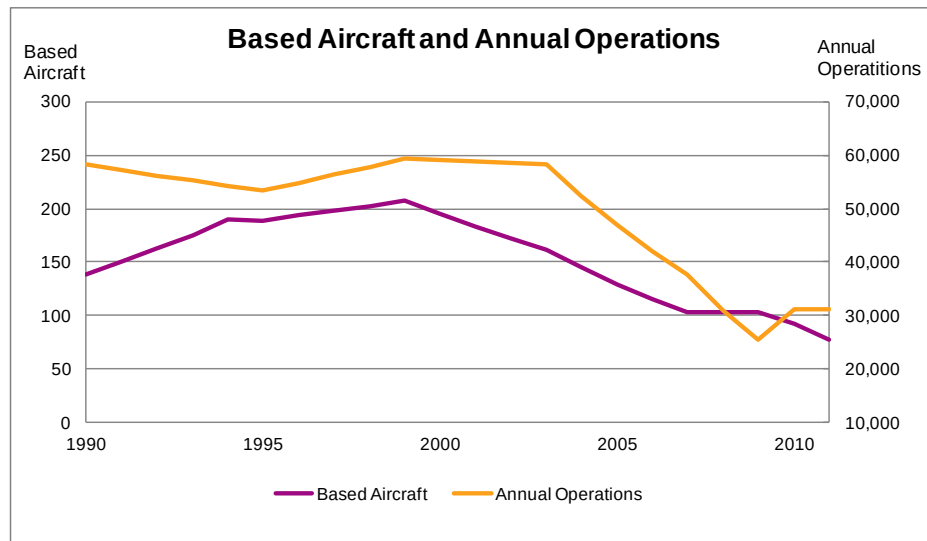


Figure 2-10: Historical Based Aircraft and Annual Operations at VAY

2.3.3 National General Aviation Trends

Specific trends related to general aviation activity during the mid to late 1990's, as given in the Fiscal Year 2000 FAA Aerospace Forecasts developed by the U.S. Department of Transportation, have been identified in the SASP. These trends include continued increases in the number of annual general aviation aircraft shipments, growth in the number of licensed pilots with a relatively strong growth in the number of student pilots, and moderate growth in the active aircraft fleet, and a trend towards the operation of more demanding jet aircraft as opposed to piston or turboprop aircraft.⁵

Moving from the 1990's to the 2000's, the growth in the general aviation industry slows down as compared to the mid to late 1990's. Larger social and macroeconomic factors have influenced the U.S. aviation industry in the last decade, including impacts on general aviation. These events include the recession of 2001 together with the September 11th, 2001 terrorist attacks, and the recession beginning in late 2007 compounded by a 2008 oil price shock.

As pointed out in the FAA Aerospace Forecast Fiscal Years 2011 – 2031, the general aviation industry suffered through a difficult 2010 despite signs of economic recovery as of late. Based on figures released by the General Aviation Manufacturers Association (GAMA), there has been a third consecutive year of decline in shipments from 2008 to 2010.⁶

Student pilots are important to the general aviation industry. Student pilot numbers have been declining for many years in the last decade except 2010. FAA issued a rule in 2010 which increased the duration of validity for student pilot certificates for pilots under the age of 40 from 36 months to 60 months. As a result, according to the statistics compiled by the FAA's Mike Monroney Aeronautical Center, the number of student pilots at the end of 2010 increased by more than 50% as compared to the year end 2009 according to the FAA Aerospace Forecast Fiscal Years 2011-2031. The impact of this new rule on the long-term trends in student pilots has yet to be determined.⁵

In summary, with reference to the FAA TAF historical data, the national trends for general aviation based aircraft and total general aviation annual operations are depicted in **Figure 2-11**. The average annual growth rate for general aviation based aircraft in the United States is 1.07% from 1990 to 2000 and it drops to a negative growth rate of -0.7% from 2000 to 2010. The average annual growth rate for the total operations for general aviation in the United States is 1.23% from 1990 to 2000 and it drops to a negative growth rate of -1.96% from 2000 to 2010.

⁵ New Jersey State Airport System Plan, released in January 2008

⁶ FAA Aerospace Forecast Fiscal Years 2011 – 2031

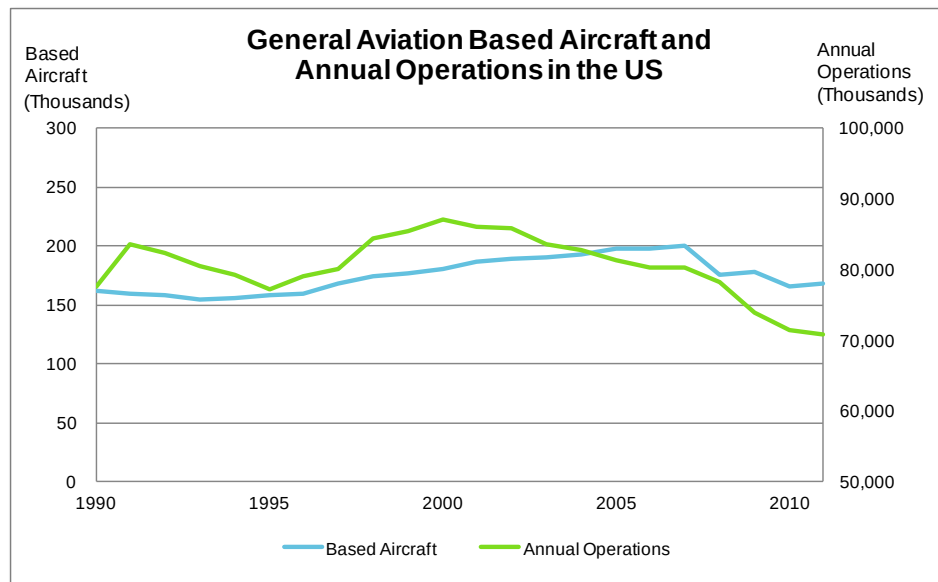


Figure 2-11: Historical General Aviation Based Aircraft and Annual Operations in the US

Sources:

1. FAA Terminal Area Forecast (TAF), accessed January 2012

2.3.4 Regional General Aviation Trends

With reference to the RASP, the Region has experienced continued suburbanization resulting in increasing numbers of population and employment concentrations in the suburbs since 2000. This has increased the pressure to improve airport capacity as opposed to airport expansion, since development is occurring adjacent to airport property. With the increased density of neighbors around airports, it is more difficult to develop general aviation to meet the required suburban capacity.⁷

As identified in the RASP, the general aviation traffic demand trends are suffering, with contributing factors including security concerns after the terrorist attacks in 2001, and high fuel cost. New airspace operating limitations went into effect impacting general aviation traffic, especially in the northeast U.S. More scrutiny at general aviation airports, flight schools, and pilot eligibility has increased costs and reduced the market for non-commercial airports. Fuel costs have increased by more than three times by 2008 as compared to the mid to late 1990's. These impacts on general aviation amount to less overall flying. These macroeconomic factors not only impact the national aviation industry as mentioned in the previous section, but also impact the regional aviation operations.

Based on the data in the SASP, the historical trends of general aviation based aircraft and annual operations at New Jersey's towered airports from 1990 to 1999 are illustrated in **Figure 2-12**. Because of the inconsistency seen in historical operations data and the statewide total over the period examined in the SASP, the annual operations data could not be developed for all the general aviation airports in New Jersey. However, data for general aviation operations at New Jersey's towered airports was collected and it represented an average annual growth rate of approximately 0.4% between 1990 and 1999.

Statewide total based aircraft at general aviation airports in New Jersey increased at an average annual growth rate of approximately 1.08% between 1990 and 1999 as given in the SASP. Because based aircraft numbers at New Jersey's airports fluctuate on a frequent basis, and because historical data is not available for all airports, only the average annual growth rate is extracted from the SASP as presented above to generally indicate the statewide trend in the 1990's.

⁷ Delaware Valley Metro Area 2030 Regional Airport Systems Plan Update, Final Report dated August 2006

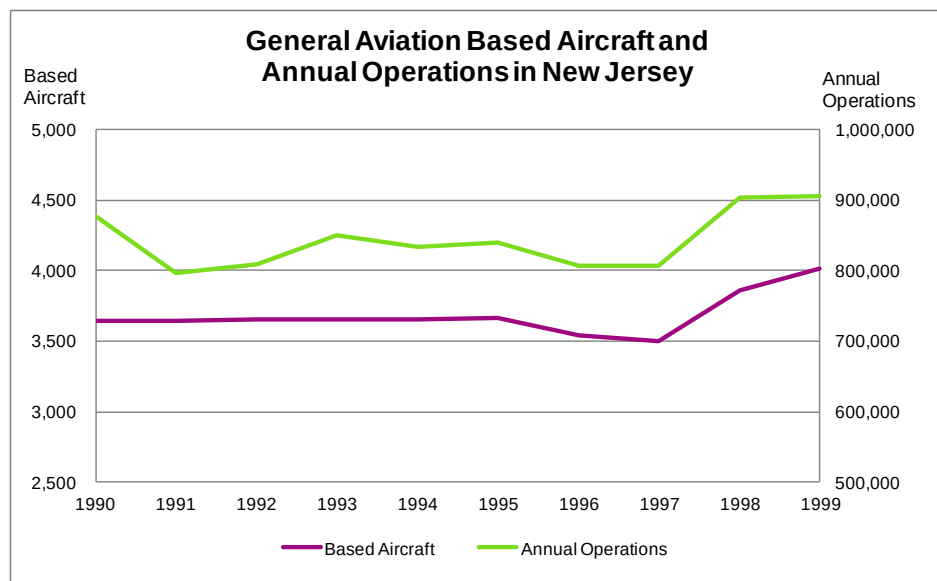


Figure 2-12: Historical Based Aircraft and Annual Operations at Airports in New Jersey

Sources:

1. New Jersey State Airport System Plan (SASP), February 2007

2.3.5 Summary on Historical General Aviation Trends

The average annual growth rates for general aviation based aircraft and annual operations in the U.S., the State of New Jersey, and VAY during the last two decades are summarized in **Table 2-2** for ease of comparison. In summary, there is a decline in the general aviation industry in terms of both the based aircraft and annual operations from the 1990's to the 2000's at the local, regional, and national levels. The impact is more severe locally than at the national level as the Airport has suffered from changes of ownership and management, and a corresponding relocation of based aircraft to nearby airports.

Table 2-2: Comparison of Historical General Aviation Trends at VAY, New Jersey and the United States

Period	Based Aircraft			Annual Operations		
	VAY ¹	New Jersey ²	United States ^{3,4}	VAY ¹	New Jersey ²	United States ^{3,4}
	Average Annual Percentage Change					
1990-2000	3.60%	1.08%	1.07%	0.20%	0.40%	1.23%
2000-2010	-7.13%	N/A	-0.70%	-5.57%	N/A	-1.96%

Sources:

1. Refer to **Table 2-1**
2. New Jersey State Airport System Plan (SASP), February 2007.
3. FAA Terminal Area Forecast (TAF), accessed January 2012.
4. AECOM Analysis

2.4 Existing Aviation Demand Forecasts

This section summarizes the forecasts on based aircraft and annual operations at VAY from the following reports and studies:

- Final Airport Master Plan Report for South Jersey Regional Airport, May 1997
- Delaware Valley Metro Area, 2030 Regional Airport Systems Plan Update (RASP), August 2006
- New Jersey State Airport System Plan (SASP), released January 2008
- FAA Terminal Area Forecast (TAF), accessed January 2012

The national and regional forecasts from the above reports and studies are listed for reference, and the national forecasts from the following report are included:

- FAA Aerospace Forecast Fiscal Years 2011-2031

2.4.1 Previous Airport Master Plan Forecasts

The based aircraft forecasts and annual operations, including the split between the local and itinerant operations, from the previous 1997 Final Airport Master Plan Report for VAY are summarized in **Table 2-3**. It is noted that this 1997 Final Airport Master Plan Report had projected up to 2010 based on the then DVPRC forecasts and adopted the 2020 forecasts from the earlier 1990 Airport Master Plan Report for VAY. In other words, the 2020 forecast was in fact projected in 1990.

Table 2-3: Previous Airport Master Plan Forecasts on VAY

Period	Based Aircraft	Annual Operations		
		Local Operations	Itinerant Operations	Total Operations
Base Year 1996	228	61,700 (59.5%)	42,100 (40.5%)	103,800
Forecast 2000	251	75,300 (60%)	50,200 (40%)	125,500
2005	271	81,300 (60%)	54,200 (40%)	135,500
2010	291	87,300 (60%)	58,200 (40%)	145,500
2020	220	N/A	N/A	145,000
Average Annual Percentage Change				
Forecast 2000-2010	1.49%	1.49%		
2010-2020	-2.76%	-0.03%		

Sources:

1. Final Airport Master Plan Report for VAY, May 1997.

Note:

1. The based aircraft counts by the Airport Management in 1996 as reported in the Final Airport Master Plan Report for VAY were much higher than the counts by the DVPRC Airport Counting Program. As shown in **Table 2-1**, the based aircraft baseline for the current master plan study is based on the counts from the DVPRC instead.

2.4.2 2025 and 2030 RASP Forecasts

DVRPC has included forecasts for individual general aviation (GA) airports in the Region in the 2025 RASP, dated April 2001. However, in the latest 2030 RASP updated August 2006, only the regional forecast for the Region and breakdowns to the airports in New Jersey Suburbs are included, which are summarized in **Table 2-4** below.

Table 2-4: DVRPC's RASP Forecasts on the Region and New Jersey Suburbs GA Airports

Period	Based Aircraft		Annual Operations	
	NJ Suburbs	The Region	NJ Suburbs	The Region
Base Year 2005	632	2,424	330,400	953,150
Forecast 2030	750	2,905	413,000	1,191,440
	Average Annual Percentage Change			
Forecast 2005-2030	0.69%	0.73%	0.90%	0.90%

Sources:

1. Delaware Valley Metro Area 2030 Regional Airport Systems Plan Update (RASP), Final Report, August 2006

2.4.3 New Jersey SASP Forecasts

The forecasts of based aircraft and annual operations for both VAY and the GA airports in New Jersey from the latest SASP are presented in **Table 2-5**. For the operations in VAY, the split of local and itinerant operations are also provided.

Table 2-5: SASP Forecasts on VAY and New Jersey GA Airports

Period	Based Aircraft		Annual Operations			
	VAY	New Jersey	VAY			New Jersey
			Local Operations	Itinerant Operations	Total Operations	
Base Year 2000	176	4,203	37,324 (62.8%)	22,142 (37.2%)	59,466	1,982,250
Forecast 2020	199	4,830	44,563 (62.8%)	26,437 (37.2%)	71,000	2,377,500
	Average Annual Percentage Change					
Forecast 2010-2020	0.62%	0.67%	0.89%			0.91%

Sources:

1. New Jersey State Airport System Plan (SASP), released Jan 2008

2.4.4 FAA Terminal Area Forecasts

The latest FAA TAF for based aircraft and annual operations for VAY, the Eastern Region and the United States are given in **Table 2-6**.

Table 2-6: FAA TAF for VAY, Eastern Region and the United States

Period	Based Aircraft			Annual Operations								
	VAY	Eastern Region	United States	VAY			Eastern Region (thousands)			United States (thousands)		
				Local	Itinerant	Total	Local	Itinerant	Total	Local	Itinerant	Total
Base Year 2010	96	15,589	165,860	20,302 (65%)	10,932 (35%)	31,234	3,993 (55.0%)	3,273 (45.0%)	7,266	37,003 (51.8%)	34,453 (48.2%)	71,456
Forecast 2015	96	16,159	173,444	20,302 (65%)	10,932 (35%)	31,234	3,976 (55.2%)	3,229 (44.8%)	7,205	36,991 (51.8%)	34,394 (48.2%)	71,385
2020	96	16,772	181,035	20,302 (65%)	10,932 (35%)	31,234	4,085 (55.3%)	3,304 (44.7%)	7,389	37,776 (51.8%)	35,114 (48.2%)	72,890
2025	96	17,408	189,188	20,302 (65%)	10,932 (35%)	31,234	4,202 (55.4%)	3,384 (44.6%)	7,586	38,619 (51.8%)	35,886 (48.2%)	74,505
2030	96	18,013	197,357	20,302 (65%)	10,932 (35%)	31,234	4,327 (55.5%)	3,468 (44.5%)	7,795	39,532 (51.8%)	36,721 (48.2%)	76,253
Annual Percentage Change												
Forecast 2010-2020	0.00%	0.73%	0.88%	0.00%	0.00%	0.00%	0.23%	0.10%	0.17%	0.21%	0.19%	0.20%
2020-2030	0.00%	0.72%	0.87%	0.00%	0.00%	0.00%	0.58%	0.49%	0.54%	0.46%	0.45%	0.45%

Sources:

1. FAA TAF, access January 2012

2.4.5 FAA Aerospace Forecasts

The forecasts of active general aviation aircraft in the United States given in the FAA Aerospace Forecast Fiscal Years 2011-2031 are summarized in **Table 2-7**.

Table 2-7: FAA Aerospace Forecasts for Active General Aviation Aircraft in the United States

Period	Active General Aviation Aircraft		
	Piston-powered	Turbine-powered	Total
Base Year 2009/2010	160,623 (Year 2009)	63,215 (Year 2010)	224,172 (Year 2010)
Forecast 2031	168,140	102,780	270,920
Average Annual Percentage Change			
Forecast 2011-2031	0.21%	2.34%	0.91%

Sources:

1. FAA Aerospace Forecast Fiscal Years 2011-2031

2.4.6 Comparison of Existing Aviation Demand Forecasts

The existing aviation demand forecasts from previous reports and studies are extracted and summarized above (**Tables 2-3 to 2-7**). The base year and the forecast periods are rather diverted in different reports and studies. It is not practical to have a direct comparison for the same forecast periods on the based aircraft and annual operations on local, regional, and national levels. The forecasts carried out over a decade ago and those with projections not consistent with more recent forecasts should not be considered.

Generally speaking, DVRPC's forecast average annual percentage growth of based aircraft for the GA airports in the New Jersey Suburbs is similar to the forecast by SASP for GA airports in New Jersey (0.69% and 0.67% respectively) for the coming one to two decades. DVRPC's forecast for average annual percentage growth of based aircraft for the GA airports in the Region is the same as the TAF for the Eastern Region (both 0.7%). However, the forecast by SASP for the average annual percentage growth of based aircraft at VAY is well above the TAF; 0.62% to 0 respectively.

Regarding the forecast of average annual percentage growth on annual operations for general aviation, the projections by DVRPC and SASP are very close for VAY, New Jersey, and the Region. They are all within the range of 0.89% to 0.91% in the next one to two decades. However, the TAF is generally on the low side with no growth in annual operations for VAY, 0.17% to 0.54% for the Eastern Region, and 0.2% to 0.45% for the United States in the following decades, respectively.

As compared to the historical trends as discussed in the previous section, the forecast aviation trends for VAY in terms of average annual growth rate for based aircraft and general aviation annual operations are also below the regional or national level as per SASP and TAF in the next one to two decades.

2.5 Forecast Aviation Demand

To ensure a reasonable preferred forecast, three approaches were used to project both based aircraft and general aviation operations for VAY, with the results compared for a preferred projection. The projections completed for this chapter represent unconstrained forecasts. They do not take individual airport constraints or potential economic constraints into consideration.

2.5.1 Forecast Methodology

The three approaches adopted are described below:

Trend Analysis

Trend analysis typically uses the historical pattern of an activity, and projects this trend into the future. The historical aviation trends and previous airport forecasts have been reviewed as discussed in the previous two sections. Both the historical trends over the last decade and the SASP forecast aviation trends in the coming two decades for VAY are generally below the regional or national levels. The regional trends projected by SASP and the Region are generally consistent with each other and both of them are generally higher than the TAF. The forecast based aircraft and annual operations for this approach adopt the average annual growth rate of 0.62% and 0.89% respectively from SASP and projects to 2031. This approach represents a steady growth scenario.

Regression Analysis

Regression analysis is a statistical technique that ties aviation demand (dependent variables), such as based aircraft and general aviation annual operations, to economic measures (independent variables), such as population, employment, income and GDP. Correlations between historical aviation demand and socioeconomic data are analyzed to find the highest relationship between the dependent and independent variables. The forecast based aircraft and annual operations are then derived from the regression model based on the socioeconomic data up to 2031.

- Multiple regression analyses on historical data from 1990 to 2009 demonstrated there is a strong correlation of the based aircraft and annual operations for VAY with respect to the economic data. This includes the GDP of New Jersey, unemployment rate and oil prices as described in Section 2.2.2. The coefficient of determination (R^2) for the regression analyses on based aircraft and annual operations for VAY are 0.87 and 0.88 respectively, which represent a very high percent of variation in the dependent variables that are explained by the regression equations. The comparison between the historical data by regression analysis and the actual historical based aircraft and annual operations is given in **Appendix A** to illustrate the close correlation.
- Forecast socioeconomic data of New Jersey from Woods & Poole, a recognized firm that specializes in long-term demographic projections, unemployment rate from the CBO and average annual world oil prices from the U.S. Energy Information Administration and Natural Resources Canada are obtained for the forecast of the based aircraft and annual operations for VAY based on the regression equations obtained above. This approach represents the economy driven scenario.

FAA Terminal Area Forecast

The third approach is based on the TAF and the forecast data is given in **Table 2-6**. This approach represents the low growth scenario.

It should be noted that the low growth scenario refers to the annual growth rates and not necessarily reflects that the absolute number of based aircraft or annual operations for the TAF is the lowest amongst the three approaches. For instance, the actual number of based aircraft at VAY is 77 in late 2011, according to the latest information from NJDOT. The trend analysis applies the growth rate of 0.62% and projects the based aircraft to rise from 77 to 87 by 2031. However, the TAF has adopted 96 based aircraft for 2011, and even with the zero annual growth rate of the TAF, the projected based aircraft is 96 by 2031; higher than the trend analysis.

2.5.2 Based Aircraft

The based aircraft projections by the three approaches are presented graphically in **Figure 2-13**.

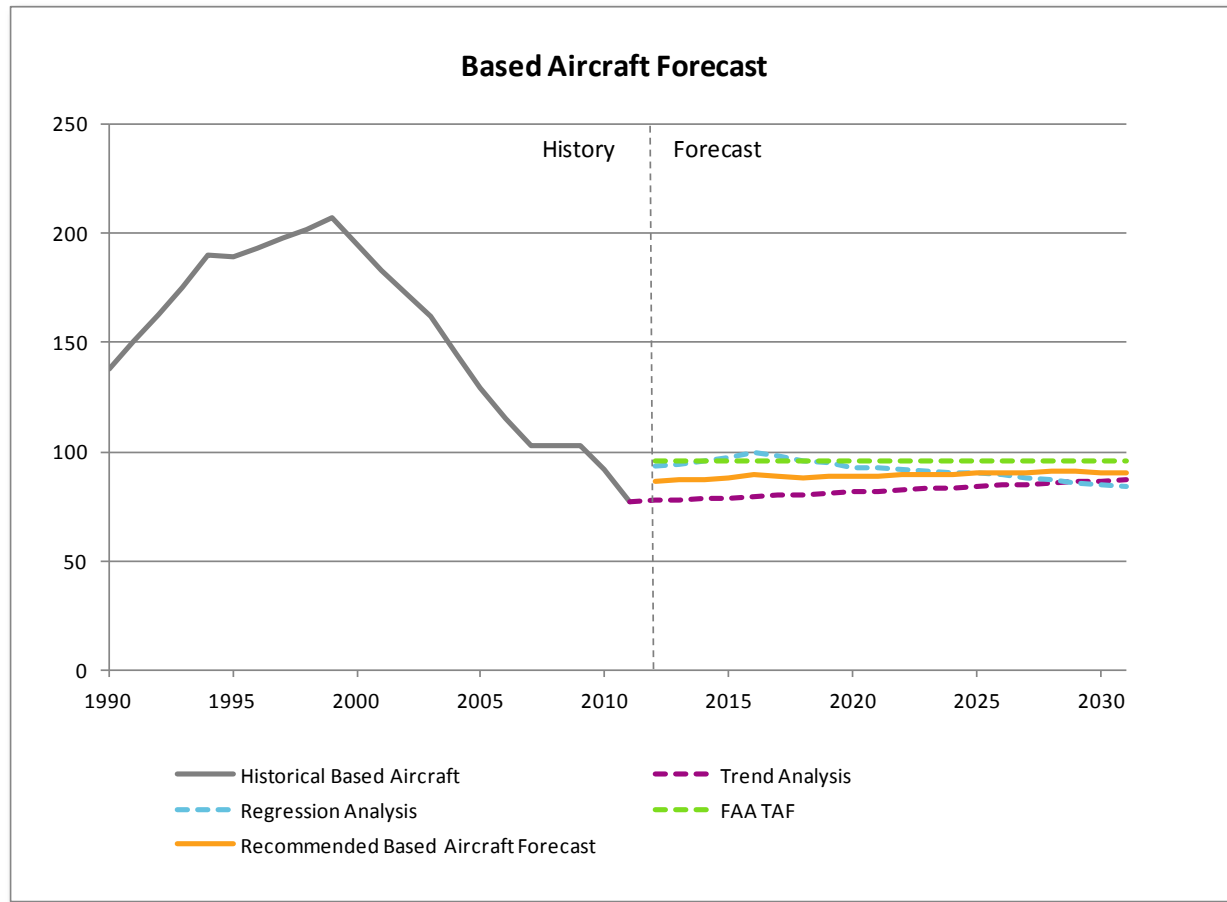


Figure 2-13: Based Aircraft Forecast (2012 to 2031)

Comparing the three approaches, the high and low scenarios are taken as the maximum and minimum of the three approaches respectively and the medium scenario is the mean of the maximum and minimum. It is recommended to take the balance between the three and adopt the medium scenario for the current Airport Master Plan. The 5-year, 10-year and 20-year forecasts and average annual growth rates are summarized in **Table 2-8** for the high, medium and low scenarios.

Table 2-8: Recommended Based Aircraft Forecast

Scenarios	Number of Based Aircraft				Average Annual Growth Rates		
	Estimated 2011	Forecast 2016	Forecast 2021	Forecast 2031	2011-2016 (5-year)	2011-2021 (10-year)	2011-2031 (20-year)
High Scenario	77	99	96	96	5.15%	2.23%	1.11%
Medium Scenario (Recommended)	77	89	89	90	2.94%	1.46%	0.78%
Low Scenario	77	79	82	84	0.51%	0.63%	0.44%

2.5.3 Based Aircraft Fleet Mix

The based aircraft fleet mixes given in the New Jersey SASP at base year 2000 and projected year 2020; and the latest fleet mix based on the list of aircraft registration provided by NJDOT in 2011 are summarized in **Table 2-9**. These are the references for the projected based aircraft fleet mix.

Table 2-9: Present Based Aircraft Fleet Mix and Previous Projection by SASP

Based Aircraft	Number (Percentage)		
	Actual 2000 ¹	Actual 2011 ²	Previous Forecast 2020 ¹
Single Engine	138 (78.4%)	68 (88.3%)	152 (76.4%)
Multi-Engine	26 (14.8%)	7 (9.1%)	30 (15.1%)
Jet	2 (1.1%)	0 (0%)	4 (2.0%)
Helicopter	2 (1.1%)	2 (2.6%)	4 (2.0%)
Other (Gliders, balloons, etc)	8 (4.6%)	0 (0%)	9 (4.5%)
Total	176 (100%)	77 (100%)	199 (100%)

Sources:

1. New Jersey State Airport System Plan (SASP), released Jan 2008
2. List of registered aircraft based at VAY in October 2011, NJDOT

With reference to the present based aircraft fleet mix and the previous projections given in SASP, it is projected the distribution of fleet mix will be as shown in **Table 2-10**. Although there are no jet aircraft based at VAY at present, it is anticipated the percentage will gradually come back in 10 to 20 years and reach 2% by 2031. Similarly, the percentage of multi-engine will increase gradually from the present 9.1% to 15% by 2031. The percentage of helicopters is assumed to stay steady and follow the present percentage of 2.6%.

Table 2-10: Forecast Based Aircraft Fleet Mix

Aircraft Type	Number of Based Aircraft (Percentage)		
	2016	2021	2031
Single Engine	78 (87.4%)	75 (84.4%)	72 (80.4%)
Multi-Engine	9 (10%)	11 (12%)	14 (15%)
Jet	0 (0%)	1 (1%)	2 (2%)
Helicopter	2 (2.6%)	2 (2.6%)	2 (2.6%)
Other (Gliders, balloons, etc)	0 (0%)	0 (0%)	0 (0%)
Total	89	89	90

2.5.4 Aircraft Operations

Annual Operations

The annual operations projections by the three approaches are presented graphically in **Figure 2-14**.

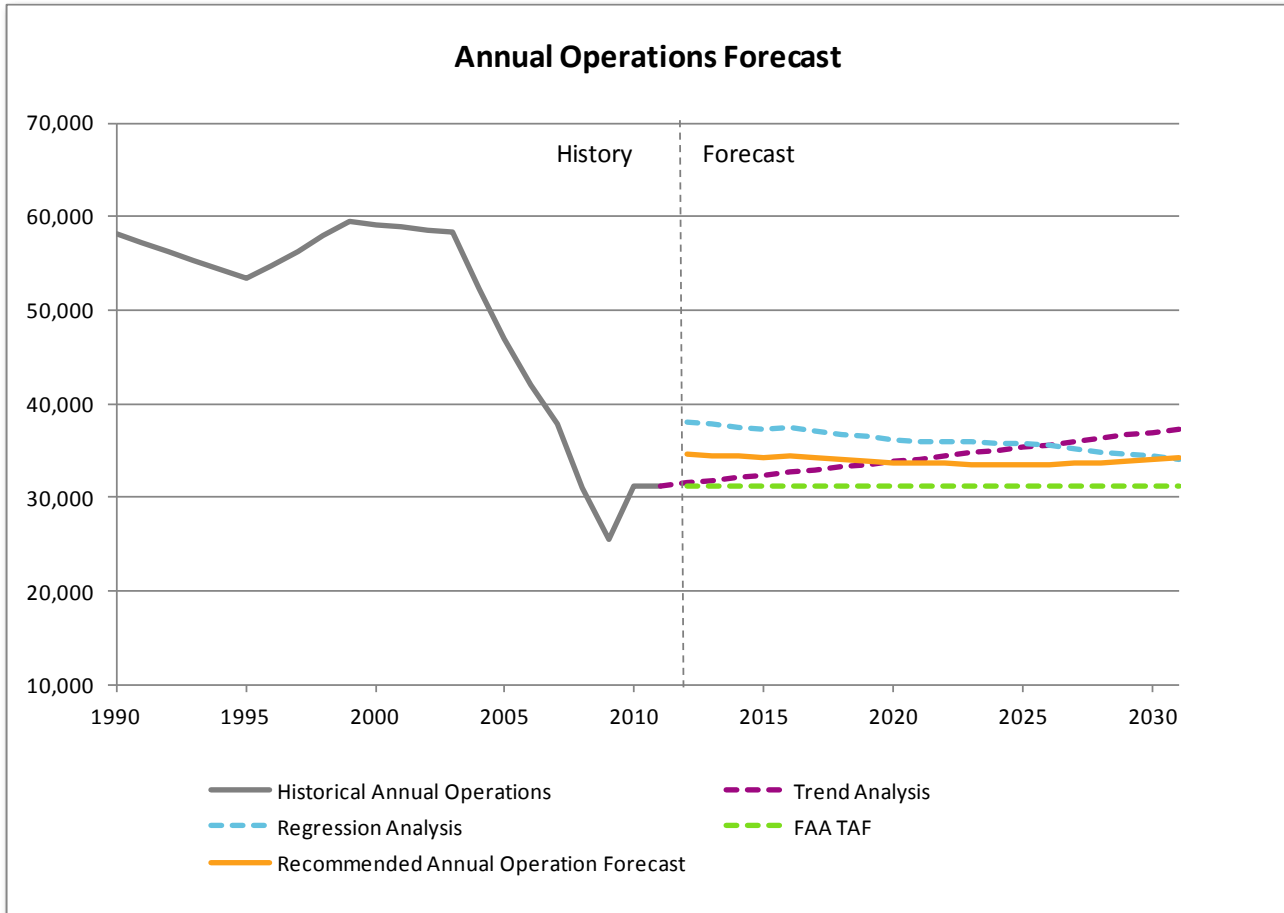


Figure 2-14: Annual Aircraft Operations Forecast (2012 to 2031)

Comparing the three scenarios, it is recommended to take the balance between the three and adopt the medium growth scenario for the current Airport Master Plan. The 0-5 year, 6-10 year and 10-20 year forecasts are summarized in **Table 2-11** for the recommended medium growth scenario.

The previous Airport Master Plan for VAY assumed the split between local and itinerant operations is 60% to 40% (see **Table 2-3**) while New Jersey SASP assumed 62.8% to 37.2% (see **Table 2-5**) and FAA TAF estimated 65% to 35% (see **Table 2-6**). For this Airport Master Plan, it is recommended to take a median between the three approaches and assume a split of 63% to 37% between local and itinerant operations.

Table 2-11: Recommended Annual Operations Forecast

Scenarios	Number of Annual Operations				Average Annual Growth Rates		
	Estimate 2011	Forecast 2016	Forecast 2021	Forecast 2031	2011-2016 (5-year)	2011-2021 (10-year)	2011-2031 (20-year)
High Scenario							
Local	19,677	23,664	22,702	23,493			
Itinerant	11,557	13,898	13,333	13,797	3.76%	1.44%	0.89%
Total	31,234	37,561	36,035	37,290			
Medium Scenario (Recommended)							
Local	19,677	21,671	21,190	21,585			
Itinerant	11,557	12,727	12,445	12,677	1.95%	0.74%	0.46%
Total	31,234	34,398	33,635	34,262			
Low Scenario							
Local	19,677	19,677	19,677	19,677			
Itinerant	11,557	11,557	11,557	11,557	0.00%	0.00%	0.00%
Total	31,234	31,234	31,234	31,234			

Annual Operations by Aircraft Type

Estimating operations directly from based aircraft would overstate the number of multi-engine and jet aircraft operations, as these aircraft are infrequently used for pilot training. The previous Airport Master Plan for VAY identified approximately 30% of all operations are touch-and-go training operations conducted mostly by single-engine aircraft. However, there is no flight school at VAY at present, and there tends to be more touch-and-go operations by helicopters as a result of the helicopter pilot training school at the nearby Flying W Airport. In view of the recent situation, it is estimated that 10% of the total annual operations are touch-and-go operations by the single engine aircraft based at the Airport and another 10% of the total annual operations are touch-and-go operations by helicopters from the nearby training school. Although there are no jet aircraft currently based at VAY, with reference to a flight plan analysis for flights originated or designated at VAY as collected from mid-November to mid-December 2011, it is estimated approximately 4% of the annual itinerant operations are by jet aircraft.

The operational fleet mix at VAY using this methodology is given in **Table 2-12**.

Table 2-12: Forecast Annual Operations by Aircraft Type

Aircraft Type	Annual Operations			
	Estimate 2011	Forecast 2016	Forecast 2021	Forecast 2031
Single Engine	24,779	27,046	25,653	25,056
Multi-Engine	2,232	2,701	3,169	4,035
Jet	462	509	762	1,045
Helicopter	3,761	4,142	4,051	4,126
Other (Gliders, balloons, etc)	0	0	0	0
Total	31,234	34,398	33,635	34,262

Annual Instrument Approaches

VAY has an active, published instrument approach which allows the airport to remain open during inclement weather and periods of low visibility. When these conditions prevail, instrument operations should only be performed by certified pilots with specially equipped aircraft, such as advanced pilot training and business related flying. The forecast approach adopted in the previous Airport Master Plan was based on 15% and 6.5% of the itinerant operations being instrument operations and instrument approaches. This approach was reviewed and adopted in the current master plan and the estimates are given in **Table 2-13**.

Table 2-13: Forecast Instrument Operations

Type of Operations	Annual Operations			
	Estimate 2011	Forecast 2016	Forecast 2021	Forecast 2031
Instrument Operations	1,733	1,909	1,867	1,902
Instrument Approaches	751	827	809	824

Peak Hour Aircraft Operations

Many airport facility needs are related to the levels of activity during peak periods. Peak hour operations are forecast for the average day of the peak month (ADPM) and are developed using a percentage established in the previous Airport Master Plan. Peak month operations were projected as 10% of annual operations. The number of operations for the average day of the peak month is obtained by dividing the peak month activity by 30 days. The peak hour is projected as 10% of the ADPM. Based on these ratios, VAY's peak hour operations are presented in **Table 2-14**.

Table 2-14: Forecast Peak Hour Operations

Type of Operations	Estimate 2011	Forecast 2016	Forecast 2021	Forecast 2031
Peak Month Operations	3,123	3,440	3,363	3,426
Average Day of Peak Month	104	115	112	114
Peak Hour Operations	10	11	11	11

2.5.5 Comparison with FAA Forecasts

A comparison of the recommended forecast for based aircraft and total annual operations with FAA's TAF for VAY is given in **Table 2-15**.

Table 2-15: Comparison with FAA Forecasts

Description	Year	Recommended Airport Forecast	TAF	Percentage Difference
Based Aircraft	2011	77 ¹	96	-
	2016	89	96	-7%
	2021	89	96	-7%
	2031	90	96	-6%
Total Annual Operations	2011	31,234	31,234	0%
	2016	34,398	31,234	10%
	2021	33,635	31,234	8%
	2031	34,262	31,234	10%

Note:

1. Actual based aircraft number as of October 2011.

As shown in **Table 2-15**, despite the discrepancy in the actual 2011 based aircraft numbers, the differences between the forecasts are 7%, 7%, and 6% below the TAF in 5, 10 and 20 years, respectively. This is mainly due to the fact that the current Airport Master Plan has adopted the actual number of based aircraft with reference to the list of registered aircraft at VAY as of October 2011.

The percentage difference between the projected total annual operations at VAY is at or below 10% from the TAF in 5, 10 and 20 years.

With reference to FAA AC 150/5070-6B, when the 5- or 10-year forecast is for less than 100,000 total annual operations or 100 based aircraft, the forecast does not need to be reviewed by the FAA Headquarters. Since this is the case for VAY, the forecast data is provided to the FAA for the annual update of the TAF only.

2.5.6 Forecast Summary

In summary, the recommended aviation demand forecast for VAY is given in **Table 2-16**.

Table 2-16: Forecast Summary

Description	Forecast Levels				Average Annual Growth Rates		
	Base Year 2011	2016	2021	2031	2011-2016 (5-year)	2011-2021 (10-year)	2011-2031 (20-year)
Operations							
<u>Itinerant</u>							
General aviation	11,557	12,727	12,445	12,677	1.95%	0.74%	0.46%
<u>Local</u>							
General aviation	19,677	21,671	21,190	21,585	1.95%	0.74%	0.46%
TOTAL OPERATIONS	31,234	34,398	33,635	34,262	1.95%	0.74%	0.46%
Instrument Operations	1,733	1,909	1,867	1,902	1.95%	0.74%	0.46%
Peak Hour Operations	10	11	11	11	1.92%	0.96%	0.48%
Based Aircraft							
Single Engine (Nonjet)	68	78	75	72	2.78%	0.98%	0.29%
Multi Engine (Nonjet)	7	9	11	14	5.15%	4.62%	3.53%
Jet Engine	0	0	1	2	0.00%	7.18% ¹	5.65% ¹
Helicopter	2	2	2	2	0.00%	0.00%	0.00%
Other	0	0	0	0	0.00%	0.00%	0.00%
TOTAL	77	89	89	90	2.94%	1.46%	0.78%

Note:

1. Average annual compound growth rates from 0 to 1 and 0 to 2 number of jet engine aircraft from 2011 to 2021 and 2031 respectively are estimated as if the increase was from 1 to 2 and 1 to 3 instead.

FAA stated in their letter dated February 6, 2013 that the methods used in the aviation demand forecast were generally acceptable for a Master Plan Forecast. The 2011 Estimated Based Aircraft (77) is comparable to other regional airports with similar activity size and economic impacts. The projected based aircraft over 20 years is acceptable at 89 in 2016, 89 in 2021 and 90 in 2031. The recommended operations forecast is above the TAF but is consistent with average growth rates for the region for future years 2016 to 2031. The projected growth rate for operations over 20 years is accepted by the FAA as 34,398 in 2016, 33,635 in 2021 and 34,262 in 2031. A copy of the letter from the FAA is attached in **Appendix B**.

Section 3

Capacity Analysis and Facility Requirements



Prepared for
The New Jersey
Department of Transportation

3 Capacity Analysis and Facility Requirements

Section 2 produced a forecast of aviation demand expected at VAY during the 20-year forecast period. The next step in the planning process is to determine the type and magnitude of airport facilities that are needed during the 20-year strategic planning period to accommodate future demand.

The process of determining facility requirements involves the application of industry standard airport planning factors to the various forecast components in order to identify improvements that will provide sufficient capacity to handle the expected demand. By comparing the sizes and capacities of the future facility needs with existing facility sizes and capacities, facility deficiencies can be determined and quantified. The deficiencies identified in this section will be incorporated into **Section 4 – Airport Development Alternatives** – to identify sequenced improvements.

Airport facility requirements in this Section are grouped into the four main operating elements: airfield, general aviation, landside, and support facilities.

3.1 Airfield Requirements

The capacity of the airfield was analyzed to determine the ability of VAY's existing airfield facilities to adequately accommodate forecast activity levels throughout the planning period.

Factors affecting airfield facility requirements include:

- The efficiency and safety of existing facilities
- Wind coverage and weather conditions
- The future level of aviation activity, which determines the requirements for runway and taxiways
- The fleet mix projected to operate at the Airport

The wind coverage and weather conditions were discussed in **Section 1**, while forecast of aircraft activity were discussed in **Section 2**. The remaining factors affecting the facility requirements, such as airfield geometry and runway capacity analyses, are discussed in the following pages.

3.1.1 Critical Aircraft and Airport Reference Code

In order to determine the airfield requirements, the critical aircraft and Airport Reference Code (ARC) must be determined to apply the corresponding FAA design criteria.

As discussed in **Section 1**, the ARC is an FAA designation used in assigning standards to the operational and physical characteristics of an airport based on the typical aircraft operating at the airport. **Table 3-1** provides the details on ARC classifications.

Table 3-1: Airport Reference Code Classifications

Aircraft Approach Category		Airplane Design Group		
Category	Approach Speed (knots)	Group	Tail Height (ft)	Wingspan (ft)
A	< 91	I	< 20	< 49
B	91 to < 121	II	20 to < 30	49 to < 79
C	121 to < 141	III	30 to < 45	79 to < 118
D	141 to < 166	IV	45 to < 60	118 to < 171
E	166 or more	V	60 to < 66	171 to < 214
		VI	66 to < 80	214 to < 262

Source:

1. FAA Advisory Circular 150/5300-13, Change 18, Airport Design

Notes:

1. The Airport Reference Code consists of an Aircraft Approach Category and an Airplane Design Group (e.g. B-II).

2. Typical approach speeds are defined as 1.3 times their stall speed in its landing configuration at the certificated maximum flap setting and maximum landing weight at standard atmospheric conditions.

For airport master planning and design purposes, airports are classified based on the aircraft regularly operating at the airport. While there can be a wide variety of aircraft utilizing the airfield at VAY, from small, single-engine (12,500 lbs or less) to larger jet aircraft (greater than 12,500 lbs), the Airport is designed based on the critical aircraft. FAA defines the term critical aircraft as the aircraft that operates at least 500 annual itinerant operations at a particular airport.

Two factors were considered in ascertaining the current critical aircraft. First, the largest based aircraft at the airport was determined. Generally speaking, the largest based aircraft can determine the critical ARC since based aircraft typically account for more than 500 annual operations. The second factor analyzes the operational fleet mix to assess if the critical aircraft is not the largest based aircraft. Airports with a majority of itinerant operations are more likely to serve larger aircraft in general, increasing the importance of the second design group factor. However, only 37% of the annual operations are estimated to be itinerant at VAY as mentioned in **Section 2**. It is anticipated the influence of the largest based aircraft will account for the required 500 annual operations over the largest aircraft in the operational fleet mix for VAY.

A review of the existing based aircraft registration information received from NJDOT in October 2011 indicated the largest aircraft currently based at VAY is a turboprop aircraft; the Piper PA-31T Cheyenne, a B-I aircraft.

An analysis of flight plan data was conducted to determine the operational fleet mix at VAY. Flight plan data from mid November 2011 to mid December 2011 was collected to investigate the common types of aircraft generally using VAY. The data collected included arrival and departure dates and time, origin, destination, type and model of aircraft, and it represents the minimum number of instrument flight rule (IFR) operations at VAY.

The flight plan analysis indicated the majority of the aircraft are small aircraft categorized as either A-I or B-I (93%). Approximately 4% of the operations recorded in the collected flight plans are B-II aircraft; the largest being a Cessna 525B Citation CJ3 (wingspan 53.3 feet & Maximum Takeoff Weight (MTOW) 14,000 lbs). Generally speaking, pilots of larger jet aircraft are more likely to file flight plans for visual flight rules (VFR) operations than the small single-engine aircraft due to safety and insurance policies commonly utilized by corporate aircraft. The estimated 4% of itinerant operations conducted by jet aircraft is considered the best available estimate.

Although a B-II aircraft is currently the largest aircraft with recorded operations at VAY, there is still a possibility that larger C-II aircraft may visit VAY in the future under the unconstrained condition. The challenge is to estimate the proportion of C-II aircraft operations at VAY. For the purposes of determining facility requirements, the main concern is whether the C-II aircraft will have more than 500 annual itinerant operations at VAY, and thus designate it the critical aircraft. A sensitivity test demonstrated that even if half of the jet aircraft operating at VAY are C-II aircraft, annual operations are approximately 254 by 2031. Furthermore, unless over 99% of the jet aircraft operating at VAY are C-II instead of B-II aircraft, the possibility of C-II aircraft becoming the critical aircraft at VAY is highly unlikely.

It is recommended that the proposed airport development for the 20-year planning period be based on a B-II ARC for VAY, with the understanding that the development and increase to B-II may happen, if justified beyond the airports current 12 year plan. This recommendation is accepted by the FAA in their letter dated February 6, 2013; attached in **Appendix B**. This design group is also consistent with the current FAA designation of VAY and allows the airport to continue its operations as a reliever airport for the local metropolitan area. Typical representative aircraft for B-II includes the turboprop Beech Super King Air and jet aircraft Falcon 200, 900, and Cessna Citation II, III, IV, V.

Table 3-2 summarizes the proposed design data of the critical aircraft with B-II.

Table 3-2: Design Data of the Critical Aircraft

Description	Design Data
Critical Aircraft	ARC B-II aircraft
Approach Speed	121 knots
Wingspan	79 feet
Tail Height	30 feet
Maximum Takeoff Weight (MTOW)	30,000 lbs

Notes:

- The design data are taken as the maximum criteria for B-II aircraft with reference to FAA Advisory Circular 150/5300-13, Change 18, Airport Design. The MTOW is based on the existing runway pavement strength and assumes that the existing runway pavement strength will be retained. With reference to Appendix 13 of AC 150/5300-13, a maximum takeoff weight of 30,000 lbs includes most of the ARC B-II aircraft except only Dassault 941, Dassault FAL-200, 50, 900, Fokker F-28 and VFW-Fokker 614 which are not common models operating at VAY according to available historical records.

3.1.2 Airport Service Role

As stated in **Section 1**, VAY is a public use airport, classified by the FAA as a general utility airport and designated as a reliever airport.

General Utility Airport

Utility airports are defined as those which have been designated, constructed and maintained to accommodate approach category A and B aircraft. The specifications for utility airports are grouped into small aircraft, which include those of maximum certified takeoff weights of 12,500 lbs or less, and large aircraft, which include those with maximum takeoff weight in excess of 12,500 lbs. Utility airports for small aircraft are further classified as basic utility stage I (which accommodates about 75% of the single engine and small twin engine aircraft used for personal and business purposes), basic utility stage II (which accommodates all of the airplanes of a basic utility stage I airport plus some small business and air taxi-type airplanes), and general utility stage I (which accommodates all small aircraft). Utility airports for large aircraft are called general utility stage II. Utility airports are further grouped for either visual and non-precision instrument operations or precision instrument operations. The visual and non-precision operations at utility airports are the basic utility stage I, basic utility stage II, or general utility stage I airports. The precision instrument operation utility airport is the general utility stage II airport.⁸

Most of the B-II aircraft are large aircraft (i.e. those with maximum takeoff weight greater than 12,500 lbs). In order to accommodate these large aircraft under ARC B-II, VAY should remain as a general utility airport and provide facilities to meet the general utility stage II airport requirements.

Reliever Airport

Reliever airports are those designated by the FAA in the National Plan of Integrated Airport systems (NPIAS) to relieve congestion at Commercial Service airports and to provide improved general aviation access to the overall community. Reliever airports should have at least 100 based aircraft or 25,000 annual itinerant operations as stated in FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems (NPIAS).

The aviation demand forecast given in **Section 2** projected a total based aircraft of 90 and total annual operations of 34,262, including 12,677 itinerant operations by 2031. Although these values are below the FAA minimum, VAY is located in a metropolitan area which can provide business and recreational or student pilots with alternative landing areas and help reduce congestion at large commercial service airports in the vicinity (i.e. the Philadelphia International Airport) when required. It is recommended the FAA designation for VAY as a reliever airport is maintained.

3.1.3 Weather and Wind Analysis

Aviation weather conditions are primarily determined by cloud ceiling and visibility (or runway visual range). During good visibility conditions, pilots often fly under VFR. These visual meteorological conditions are defined as no cloud ceiling, or a cloud ceiling above 1,000 feet and visibility greater than 3 statute miles. Instrument meteorological conditions for flying under IFR are defined as a cloud ceiling lower than 1,000 feet and/or visibility less than 3 statute miles.

Meteorological data for the VAY area, based on weather observations recorded from 2000 to 2009, were obtained from the National Climatic Data Center, National Oceanic and Atmospheric Administration (NOAA). During this timeframe, approximately 70,200 weather observations were recorded. Based on the data, the VFR weather conditions occur 88.4% of the time while IFR weather conditions occur 11.6% of the time at VAY.

The orientation of an airport's runway system to the prevailing wind direction is critical to the safe operation of aircraft and the maximum use of airport facilities. Crosswinds are winds perpendicular to the runway or path of an aircraft that tend to affect the flight of approaching aircraft. Generally, the lighter the aircraft, the more it is affected by crosswinds. The FAA recommends 95% wind coverage on the basis of the crosswind not exceeding a particular speed for a specified aircraft size. In accordance with FAA AC150/5300-13, Airport Design, the allowable crosswind component for B-II airports is 13 knots.

⁸ Planning & Design of Airports, Fifth Edition, Robert Horonjeff, Francis X. McKelvey, William J. Sproule, Seth B. Young

As given in **Section 1** (see **Table 1-7**), the wind coverage under the all weather, VFR and IFR weather conditions for the existing Runway 08/26 with a crosswind component of 13 knots are 98.02%, 97.96% and 98.52% respectively. The wind rose is illustrated in **Figure 3-1**.

In summary, the existing airfield provides a minimum of 98.02% wind coverage in all weather for a crosswind of 13 knots, thereby exceeding the minimum FAA recommendation of 95% wind coverage.

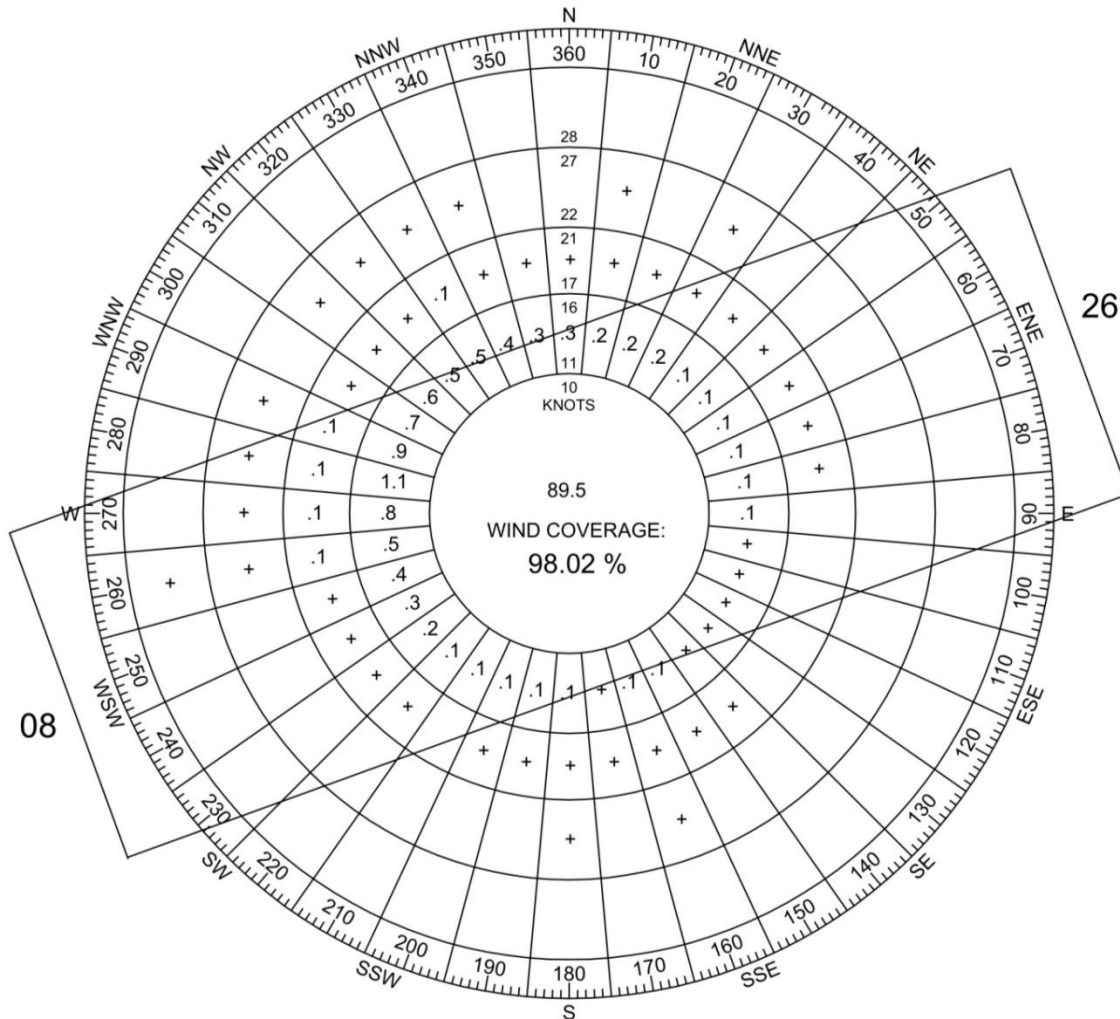


Figure 3-1: All Weather Wind Coverage for Crosswind of 13 knots

3.1.4 Airfield Geometry

FAA airfield geometry criteria provide uniformity among airport facilities and serve as a guide for airport operators when planning future facilities. The design criteria including separation standards, widths, safety areas, obstruction surfaces, and gradients for runways, taxiways, and taxilanes are discussed in this sub-section.

FAA Planning and Design Standards

As shown in **Table 3-3**, the airport planning and design standards for B-II airports fall into two categories based on the approach visibility minimums. For runways with instrument approach procedures with visibility minimums lower than 3/4-statute mile, the design requirements are higher (e.g. greater separation from runway to taxiway and larger runway width) than those which provide for approaches with visibility not lower than 3/4-statute mile. To determine the applicable geometry for B-II airfields, the approach visibility minimums for VAY must be determined. For a cost effective approach, the design standards for visibility minimums not lower than 3/4-statute mile (shown in bold below) are recommended.

Table 3-3: Airport Planning and Design Standards for Airport Reference Code B-II

Description		Existing Conditions	Planning and Design Standard	
Airport Category and Airport Data				
Aircraft Approach Category and Airplane Design Group		B-II	B-II	
Approach visibility minimums		Not lower than 1-statute mile	Lower than 3/4-statute mile	Not lower than 3/4-statute mile (Recommended)
Separation Standards (feet)				
Runway centerline to parallel taxiway/taxilane centerline		75	300	240
Runway centerline to edge of aircraft parking		400	400	250
Taxiway centerline to parallel taxiway/taxilane centerline		N/A	105	
Taxiway centerline to fixed or moveable object		> 65.5	65.5	
Taxilane centerline to parallel taxilane centerline		> 97	97	
Taxilane centerline to fixed or moveable object		35-45	57.5	
Runway Design Standards (feet)				
Runway width		50	100	75
Runway shoulder width		0	10	10
Runway Safety Area (RSA) Length beyond runway Width		See note 1	600 300	300 150
Runway Protection Zone (RPZ) Length Inner width Outer width		See note 1	2,500 1,000 1,750	1,700 1,000 1,510
Runway Object Free Area (ROFA) Length beyond runway Width		See note 1	600 800	300 500
Runway Obstacle Free Zone (ROFZ) Length beyond runway Width		See note 1	200 400	200 400
Precision Obstacle Free Zone (POFZ) Length Width		N/A N/A	200 800	N/A N/A
Taxiway Design Standards (feet)				
Taxiway width		20	35	
Taxiway edge safety margin		0	7.5	
Taxiway shoulder width		0	10	
Taxiway Safety Area (TSA) width		See note 1	79	
Taxiway Object Free Area (TOFA) width		See note 1	131	
Taxilane Object Free Area width		See note 1	115	
Taxiway wingtip clearance		N/A	26 (Design Requirements)	
Taxilane wingtip clearance		N/A	18 (Design Requirements)	

Source:

1. FAA Advisory Circular 150/5300-13, Change 18, Airport Design

Note:

1. Obstruction survey determined existing obstacles are within the concerned areas; to be addressed in **Section 4**.

Approach Visibility Minimums and Approach Requirements

As mentioned in **Section 1**, VAY has three published non-precision instrument approach procedures, including an RNAV(GPS) approach to Runway 08, RNAV(GPS) approach to Runway 26, and VOR approach to Runway 26. The RNAV(GPS) approach procedures include both the LP (lateral precision) procedure, which is a Wide Area Augmentation System (WAAS) procedure with accurate lateral guidance but no vertical guidance; and the LNAV (lateral navigation) procedure, which is the basic Global Positioning System (GPS) approach procedure with only lateral guidance. The existing visibility minimums are 1-statute mile in the published instrument approach procedures (**Table 1-4** in **Section 1**).

WAAS is a navigation service using a combination of GPS satellites and the WAAS geostationary satellites to improve the navigational service provided by GPS. It offers an opportunity for airports to gain Instrument Landing System (ILS) comparable approach capability without the purchase or installation of any ground-based navigation equipment at the airport. WAAS completed full operating capacity in 2008. WAAS improves the navigational system accuracy for en route, terminal, and approach operations, which supports vertically-guided instrument approaches to qualifying runways. Vertically-guided approaches reduce pilot workload and provide safety benefits compared to non-precision approaches. The WAAS-enabled vertically-guided approach procedures are called LPV (localizer performance with vertical guidance).⁹

The advantages of LPV approaches include:

- No requirement for ground-based transmitters at the airport.
- No consideration needs to be given to the placement of navigation facility, maintenance of clear zones around the facility, or access to the facility for maintenance.
- No need for critical area limitations associated with an ILS.
- From a pilot's viewpoint, an LPV approach is similar to an ILS approach but it is more stable than that of an ILS.
- WAAS equipped users can fly area navigation (RNAV) and basic required navigation performance (RNP) procedures, as well as LPV procedures, and the avionics costs are relatively lower considering the total navigation solution.⁹

Each RNAV procedure typically includes three approach types: LPV, LNAV/VNAV, and LNAV. This enables as many GPS-equipped aircraft to use the procedure as possible and provides operational flexibility if WAAS becomes unavailable. Some aircraft may only be equipped with GPS receivers so they can fly to the LNAV decision altitude. Some aircraft equipped with GPS and flight management system (FMS) (with approach-certified barometric vertical navigation or Baro-VNAV) can fly to the LNAV/VNAV decision altitude. An aircraft with WAAS-LPV avionics can fly the LPV approach.

As mentioned above, the existing RNAV procedure for VAY includes only LP and LNAV. FAA publishes LP procedures at runways where LPV procedures may not qualify. The two main reasons are obstructions and/or infrastructure which prevent an LPV procedure. It is recommended to maximize airport operations and to be fully benefitted from the use of WAAS by improving VAY in the most cost effective way to qualify for LPV procedure which is an approach with vertical guidance (APV). APV is an instrument approach procedure providing course and vertical path guidance that does not conform to ILS or MLS (microwave landing system) system performance standards contained in ICAO Annex 10, or a precision approach system that does not meet TERPS (Terminal Instrument Procedures) alignment criteria. APV is one category higher than the non-precision approach but not yet a precision approach. Although both LPV and LNAV/VNAV are APV, LNAV/VNAV is not a WAAS approach. In the past, only aircraft equipped with FMS and certified Baro-VNAV could use the minimums associated with LNAV/VNAV. Now, LNAV/VNAV approaches may also be flown using WAAS equipment.

There are four main groups of approach requirements for different approach procedures based on visibility minimums: greater than 1-statute mile, 1-statute mile, lower than 1-statute mile and lower than 3/4-statute mile. The following percentages were found to demonstrate the amount of time the visibility at VAY was at or below the required minimums: 1-statute mile; 1%, below 1-statute mile; 0.9%, and 3/4-statute mile or less; 0.8%. The existing published instrument approach for Runway 26 has a minimum descent altitude of 460 feet and visibility of 1 statute mile, which covers approximately 99% of all weather observations at VAY.

⁹ Maximizing Airport Operations Using the Wide Area Augmentation System (WAAS), FAA.

Since the visibility minimums for the existing published instrument approach procedures are close to 1-statute mile, a comparison of the approach requirements, as given in **Table 3-4** presents the extra effort required to provide LPV/APV with or without lowering the approach visibility minimum to below 1-statute mile or 3/4-statute mile.

Table 3-4: Comparison of Approach Requirements

Description	LPV / APV Approach Requirements (Tables A16-1A and A16-1B of AC/150/5300-13, Change 18)			Non-Precision Approach Requirements (Table A16-1C) (Existing Conditions)
Visibility Minimums ¹	Lower than 3/4-statute mile	Lower than 1-statute mile	1-statute mile or above	1-statute mile or above
Height Above Threshold (HATH) ²	200 (for LPV) / 250 (for APV)	200 (for LPV) / 300 (for APV)	350 (1-statute mile) 400 (> 1-statute mile)	400 (1-statute mile) 450 (> 1-statute mile)
TERPS Glidepath Qualification Surface (GQS) ³	Dimensional Standards* A = 0, B= 1/2 width runway + 100, C=760, D=10,000, E=0, Slope=30:1 and no obstructions exceed the height of GQS			N/A
TERPS Paragraph 251	34:1 clear	20:1 clear	20:1 clear or penetrations lighted for night minimums (see AC 70/7460-1)	
Precision Obstacle Free Zone (POFZ)	Required	Not required for LPV / Required for APV	Required	N/A
Minimum Runway Length	4,200 ft (paved)	4,200 ft for LPV / 3,200 ft for APV (paved)	3,200 ft	
Runway Markings (see AC 150/5340-1)	Precision	Non-Precision (Precision recommended for APV)	Non-Precision	
Holding Position Signs & Markings (see AC 150/5340- 1 and AC 150/5340-18)	Precision	Non-Precision (Precision recommended for APV)	Non-Precision	
Runway Edge Lights ⁴	HIRL / MIRL		MIRL / LIRL	
Parallel Taxiway ⁵	Required		Recommended	
Approach Lights ⁶	MALSR, SSALR, or ALSF	Recommended	Recommended	
Runway Design Standards (as shown in Table 3-3)	< 3/4-statute mile approach visibility minimums	≥ 3/4-statute mile approach visibility minimums		
Threshold Siting Criteria to be Met	Dimensional Standards* A = 200, B= 400, C=1,900, D=10,000, E=0, Slope=34:1	Dimensional Standards* A = 200, B= 400, C=1,900, D=10,000, E=0, Slope=20:1		
Survey Required for Lowest Minima	Vertically Guided Airport Airspace Analysis Survey		Non-Vertically Guided Airport Airspace Analysis Survey	

* The letters are keyed to those shown in **Figure 3-2**. Dimensions are given in feet.

Abbreviations:

N/A – Not applicable

Source:

1. FAA Advisory Circular 150/5300-13, Change 18, Airport Design

Note:

1. Visibility minimums are subject to the application of FAA Order 8260.3 (TERPS) and associated orders or this table, whichever is higher.

2. The HAT indicated is for planning purposes only. Actual obtainable HAT is determined by TERPS.

3. The GQS is applicable to approach procedures providing vertical path guidance. It limits the magnitude of penetration of the obstruction clearance surfaces overlying the final approach course. The intent is to provide a descent path from DA to landing free of obstructions that could destabilize the established glidepath angle. The GQS is centered on a course from the DA point to the runway threshold. If the GQS is penetrated, vertical guidance instrument approach procedures are not authorized.

4. Runway edge lighting is required for night minimums. High intensity lights are required for RVR-based minimums

5. A parallel taxiway must lead to the threshold and, with airplanes on centerline, keep the airplanes outside the OFZ.

6. To achieve lower visibility minimums based on credit for lighting, a TERPS specified approach light system is required.

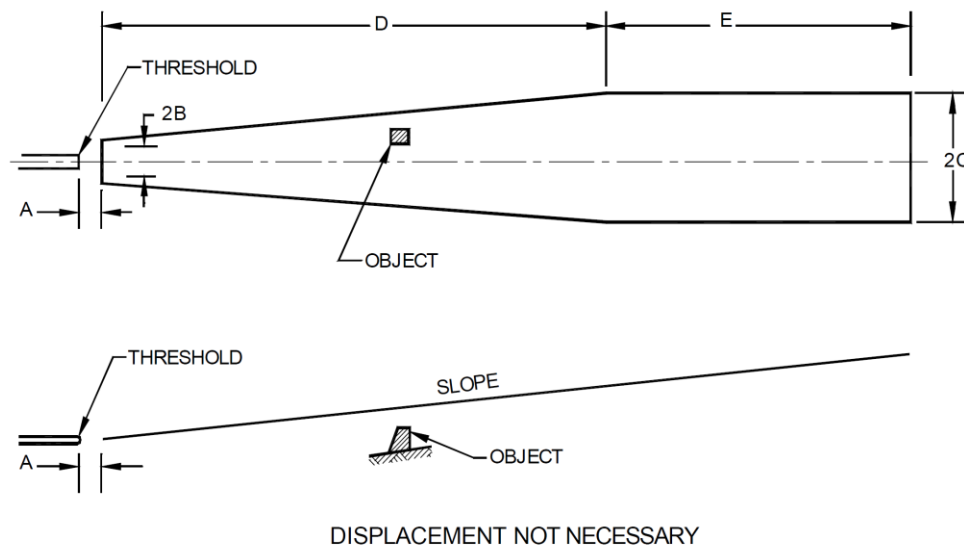


Figure 3-2: Approach Dimensional Standards

Source:

1. FAA Advisory Circular 150/5300-13, Change 18, Airport Design

In accordance with the requirements outlined in **Table 3-4**, a vertically guided airport airspace analysis survey is being performed under the Airports-GIS and Electronic Airport Layout Plan assignment included with the Airport Master Plan update for VAY. Upon completion, if the obstruction survey demonstrates there are no obstructions exceeding the height of the glidepath qualification surface (GQS), and the corresponding threshold siting criteria are met, the existing airport infrastructure (i.e. with more than 3,200 feet of runway length, non-precision markings, and MIRL) generally satisfies the requirement for APV and visibility minimums up to 1-statute mile. The only exception to implementing the APV is the non-compliance in runway width and separation distance from runway to taxiway; these distances will be enhanced regardless of the improvements made to the approach surface. Provided that the obstruction requirements are met, if a parallel taxiway is provided (which is being recommended by this master plan regardless of the improvements on the approach), the airport infrastructure will generally meet the requirement for APV and visibility minimums lower than 1-statute mile but higher than 3/4-statute mile. If the runway length is further increased to 4,200 feet, the airport infrastructure will meet the requirement for LPV with visibility minimums lower than 1-statute mile but higher than 3/4-statute mile. However, lowering the LPV visibility minimums to below 3/4-statute mile will require extensive upgrades of the airport infrastructure; such as precision runway markings, holding position signs and markings, medium intensity approach lighting with runway alignment indicator lights (MALSR), simplified short approach lighting system (SSALR), or an approach lighting system with sequenced flashing lights (ALSF), and higher runway design standards.

For a cost effective approach, it is recommended to provide the airport infrastructure with runway design standards for visibility minimums not lower than 3/4-statute mile as shown in bold in **Table 3-3**. If the obstruction survey demonstrates VAY is in compliance with the APV / LPV approach requirements, it is recommended that each runway end be upgraded to an APV / LPV instrument approach procedure.

Runway Length Requirements

The type of aircraft an airport can accommodate is primarily determined by the length of the airport's runway. The purpose of establishing appropriate runway length requirements is to maximize the operational efficiency and flexibility of the airfield. Aircraft runway length requirements were evaluated in accordance with FAA Advisory Circular (AC) 150/5325-4B, Runway Length Requirements for Airport Design, for both takeoffs and landings. Assumptions and results for the analyses undertaken for VAY are presented in **Table 3-5**.

Table 3-5: Runway Length Requirements for Airport Design

Airport and Runway Data	
Airport elevation	53 ft
Mean daily maximum temperature of the hottest month	87.5 °F
Maximum difference in runway centerline elevation	12 ft
Runway Lengths for Small Airplanes with Maximum Certified Takeoff Weight of 12,500 lbs or less (ft) ¹	
Small airplanes with approach speeds of less than 30 knots	300
Small airplanes with approach speeds of less than 50 knots	800
Small airplanes with less than 10 passenger seats	
95 percent of these small airplanes	3,060
100 percent of these small airplanes	3,620
Small airplanes with 10 or more passenger seats	4,220
Runway Lengths for Airplanes within a Maximum Certified Takeoff Weight of more than 12,500 lbs up to & including 60,000 lbs (ft)	
Large airplanes (>12,500 lbs and < 60,000 lbs)	
75 percent of these large airplanes at 60 percent useful load	5,330
75 percent of these large airplanes at 90 percent useful load	7,000
100 percent of these large airplanes at 60 percent useful load	5,500
100 percent of these large airplanes at 90 percent useful load	8,190

Abbreviations:

MSL – Mean sea level

Source:

1. FAA Advisory Circular (AC) 150/5325-4B, Runway Length Requirements for Airport Design

Notes:

1. With reference to AC 150/5325-4B, Chapter 2, Paragraphs 203 and 204, and Figures 2-1 and 2-2

2. With reference to AC 150/5325-4B, Chapter 3, Figures 3-1 and 3-2, and included runway length adjustments for effective runway gradient and wet and slippery runways

3. Airplanes that make up 75% of the Fleet are given in Table 3-1 of AC 150/5325-4B.

4. Airplanes that make up 100% of the Fleet are given in Table 3-2 of AC 150/5325-4B

The existing runway at VAY is 3,881 feet long which is estimated to satisfy the requirements for 100% of small airplanes with less than 10 passenger seats. It is recommended to increase the runway length to 4,220 feet to accommodate those with 10 or more passenger seats. With the existing runway strength being 30,000 lbs, a runway length of 4,220 feet will accommodate some of the large aircraft with a weight penalty, such as being reduced to approximately 40% of their useful load; in other words, a reduced useful load means fewer passengers, less cargo, and reduced amounts of usable fuel. This can also limit the range for larger aircraft. Cessna Citation 525, 550 series, and the Dassault Falcon 10, 20 series are the common models of these large aircraft with maximum takeoff weight of more than 12,500 lbs and less than 30,000 lbs.

This modest extension to 4,220 feet will also meet the minimum runway length requirement for upgrading to an LPV instrument approach procedure as shown in **Table 3-4**.

Runway Width

The runway width requirement is based on the wingspan and approach speed of aircraft using the runway. The FAA Advisory Circular 150/5300-13 specifies a runway width of 75 feet for B-II airports with visual runways and runways with not lower than 3/4 statute mile approach visibility minimums (**Table 3-3**). The current width of Runway 08/26 (i.e. 50 feet) does not meet the B-II design standards for runways with non-precision approaches. To provide LPV / APV approaches with not lower than 3/4 statute mile approach visibility minimums for Runway 08/26, it is recommended that the proposed runway width be increased to 75 feet.

Runway Shoulders

Runway shoulders provide resistance to blast erosion and accommodate the movement of maintenance and emergency equipment and the occasional passage of an aircraft veering from the runway. As shown in **Table 3-3**, it is recommended that 10-foot shoulders be provided, composed of one of the following: turf, aggregate-turf, soil cement, lime, or bituminous stabilized soil, to meet the B-II design standards.

Runway Safety and Object Free Areas

In addition to the structural pavement and shoulders, the runway system also consists of various aeronautical surfaces designed to enhance safety of aircraft on, approaching, departing, or adjacent to the runway. These design standards were given in **Table 3-3** and discussed below.

Runway Safety Area (RSA)

The RSA is defined as a rectangular area centered about the runway that is cleared, drained, and graded. This area should be capable of accommodating an aircraft in the event it overruns the runway end, as well as being capable of supporting firefighting equipment. The RSA for Runway 08/26 shall be an area 150 feet wide centered on the runway centerline and extending 300 feet beyond each runway end. The existing RSA beyond Runway 26 does not adhere to the FAA mandated slope requirements, with a longitudinal grade of -8% within the first 200 feet of the threshold. The longitudinal grade from the end of the runway shall be from 0% to -3% for the first 200 feet and no more than -5% for the remainder of the RSA. Transverse grades shall be -1.5% to -5% away from the runway shoulder edge.

Runway Object Free Area (ROFA)

The ROFA is a rectangular area surrounding the runway provided to enhance the safety of aircraft operations by ensuring the area is kept free of parked aircraft and other objects, except those objects that need to be located in the ROFA for air navigation or aircraft ground maneuvering purposes. The ROFA for Runway 08/26 shall be 500 feet wide centered on the runway centerline and extending 300 feet beyond the ends of the runway.

Runway Obstacle Free Zone (ROFZ)

The ROFZ is an area of airspace centered about a runway that is required to be clear of all objects, except for frangible navigational aids that need to be located in the OFZ because of their functions. The OFZ provides clearance protection for aircraft landing or taking off from the runway, and for missed approaches. The footprint of the OFZ for Runway 08/26 shall be 400 feet wide centered on the runway centerline and extending 200 feet beyond the ends of the runway. The OFZ is the airspace above the surface with an elevation at any point that is the same as the elevation of the nearest point on the runway centerline, extending from the runway surface to 150 feet above the airport elevation (203 feet MSL).

Runway Protection Zones (RPZs)

RPZs are areas at the ends of runways that provide for the unobstructed passage of aircraft through the airspace above them, and are used to enhance the protection of people and property on the ground in the vicinity of the runway ends. While it is desirable to clear all objects from RPZs, some uses are permitted, provided they do not attract wildlife, are outside the ROFA, and do not interfere with navigational aids. Land uses prohibited in the RPZ are residences and places of public assembly, such as churches, schools, hospitals, office buildings, and shopping centers. The RPZs with inner widths of 1,000 feet, outer widths of 1,510 feet and a lengths of 1,700 feet are recommended for Runway 08/26.

Control over the use of the RPZs through the acquisition of sufficient property interests (such as fee title, lease, or easement) is strongly encouraged by the FAA to prohibit unsafe uses within the RPZs. Portions of the RPZs, at Runway 08 and 26 ends may be beyond the airport property boundaries in the proposed development option which will be discussed in **Section 4**.

Runway Grades

The maximum longitudinal runway grade is 2% and maximum allowable grade change is 2% for aircraft approach category B runways. It is desirable to keep longitudinal grades to a minimum and only apply longitudinal grade changes when absolutely necessary. The existing Runway 08/26 does not meet the design standards in regards to the longitudinal runway grade in the vicinity of Masons Creek, which has settled approximately five feet lower than the surrounding runway. This condition should be alleviated to the extent practicable. A runway should have adequate transverse slopes to prevent accumulation of water on the surface. The FAA recommends a transverse grade of 1% to 2% for aircraft approach category B runways and a grade of 3% to 5% for runway shoulders. The existing runway profile and the proposed runway regrading is depicted and discussed in **Section 6**.

Taxiway System

A taxiway is a defined path on the airfield surface established for taxiing aircraft from the runway to a parking position, or from one part of the airport to another.

The existing Taxiway A, measuring 20 feet in width, serves as a partial parallel taxiway for Runway 08/26 with five entrances/exits connecting to the runway. The separation between Taxiway A and the runway centerline is approximately 75 feet. Neither the existing taxiway width nor the separation between the runway and taxiway meet the FAA design standards.

Currently, the western portion of the runway does not have taxiway access and aircraft departing Runway 08 or landing Runway 26 must back-taxi on the runway. To facilitate this maneuver, there are turnaround bulbs located at each runway end. Although this back-taxiing arrangement is an acceptable procedure at many small general aviation airports, it does present certain capacity and safety considerations as the operations become more frequent. The added time an aircraft is on the runway reduces the hourly capacity by delaying its use by the next aircraft. It is recommended an airport's primary runway be served by a full length parallel taxiway allowing aircraft to enter or exit the runway as expeditiously as possible.

In summary, a full-length parallel taxiway to Runway 08/26 with a runway centerline to parallel taxiway centerline distance of 240 feet is recommended. The width of a parallel taxiway should be 35 feet with 10-foot stabilized shoulders to meet the design standards for ARC B-II. Full parallel taxiways are also recommended for airports with instrument approaches.

Navigational and Landing Aids

Nav aids

As discussed above, it is recommended to include LPV approaches for VAY, which is an instrument approach procedure providing vertical path guidance, i.e., APV. No additional nav aids are required.

Visual Approach Aids

VAY has a rotating beacon and a lighted wind indicator, along with PAPIs for both runway ends to aid pilots in identifying the runway during low visibility or night conditions. In January 2013, Runway 08/26 was outfitted with REILs for each runway end.

Airfield Lighting

The existing Runway 08/26 has been equipped with medium intensity runway lighting (MIRL), and medium intensity taxiway lighting (MITL). No additional airfield lighting is required.

3.1.5 Airfield Demand/Capacity Analysis

Airfield capacity is an important part of the airport planning process. A comparison of operational demand with airfield capacity results in airfield development requirements.

FAA AC 150/5060-5, Airport Capacity and Delay, provides formulae to estimate annual service volume (ASV). As stated in the Advisory Circular, ASV is “a reasonable estimate of an airport’s annual capacity. It accounts for differences in runway use, aircraft mix, weather conditions, fleet mix, etc., that would be encountered over a year’s time.” The capacity and delay calculations for long range planning as given in Chapter 2 of the AC 150/5060-5 were adopted for the airfield demand/capacity analysis for VAY.

The capacity and delay calculations are based on the following assumptions which have been verified with VAY:

- **Runway-Use Configuration:** At least 80% of the time the airport is operated with the runway-use configuration which produces the greatest hourly capacity. Since there is only one runway-use configuration at VAY, i.e., a single-runway configuration, this assumption is applicable.
- **IFR Weather Conditions:** The model assumes IFR weather conditions occur roughly 10% of the time. It is considered applicable to VAY for demand/capacity analysis.
- **Percent Arrivals:** The model assumes arrivals equal departures, which is considered applicable to VAY for the demand/capacity analysis. The percent of arrivals as defined in the Advisory Circular has also considered touch and go operations. The percent of arrivals is computed as a summation of the number of arriving aircraft in an hour, plus half of the touch-and-go’s in the hour, divided by the sum of arriving and departing aircraft, and the total number of touch-and-go’s in the hour.
- **Percent Touch-and-go’s:** The percent of touch-and-go’s shall be within the ranges in Table 2-1 of the AC 150/5060-5. As estimated in **Section 2**, around 20% of the total operations are considered to be touch-and-go’s for the planning period, which is within the required range.
- **Taxiways:** The model assumes a full-length parallel taxiway, ample runway entrance/exit taxiways, and no taxiway crossing problems. VAY does not currently have a full-length taxiway, but it has ample runway entrance/exit taxiways and there are no taxiway crossing problems. A full-length parallel taxiway has been proposed. The capacity estimated by the model shall be discounted for the existing scenario to reflect the lack of a full-length taxiway.
- **Runway Instrumentation:** The model assumed the airport has at least one runway equipped with an ILS and has the necessary ATC facilities and services to carry out operations in a radar environment. VAY does not have an ILS at present, but it has three published instrument approaches. The capacity estimated by the model shall be discounted slightly to reflect the lack of an ILS.

The input and output data of the calculations for the airfield demand/capacity analysis are summarized in **Table 3-6**.

The input data in the calculations is related to the aircraft fleet mix as the types of aircraft operating at an airport affect airport capacity. For example, when smaller aircraft follow larger aircraft on approach, additional separation is required to account for wake turbulence. This additional separation increases the time between aircraft operations, resulting in a lower airfield capacity. The more homogenous the fleet mix, the higher the capacity of a given airfield configuration.

With reference to the fleet mix forecast in **Section 2**, even with a conservative estimate there will be less than 20% of operations by aircraft more than 12,500 lbs but less than 30,000 lbs does not degrade the capacity at VAY (although some of the multi-engine aircraft are smaller than 12,500 lbs, the conservative estimate assumes all of the jet and multi-engine aircraft are larger than 12,500 lbs and the proportion is still less than 20%).

Table 3-6: Airport Capacity and Delay for VAY

Description	Input Data	
C = Percent of airplanes over 12,500 lbs but not over 300,000 lbs	Less than 20	
D = Percent of airplanes over 300,000 lbs	0	
Mix Index (C+3D)	Less than 20	
Target level of annual operations (i.e. the Annual Demand)	35,000	
Predominate Operations (either air carrier or general aviation)	General Aviation	
Description	Output Data	
	Based on Figures 2-1 and 2-2 of AC 150/5060-5	Adjusted to reflect lack of parallel taxiway
Runway-Use Configuration	Sketch No. 1 of Figure 2-1, AC 150/5060-5, for a Single-Runway Configuration	
Annual Service Volume (ASV)	230,000	184,000
Capacity (Operations / Hour)		
VFR	98	78
IFR	59	47
Ratio of Annual Demand to ASV	0.15	0.19
Average Delay per Aircraft (minutes)		
Low	0.0	0.0
High	0.1	0.1

Source:

1. FAA AC 150/5060-5, Change 2, Airport Capacity and Delay, Chapter 2

Under the optimum conditions, VAY would have an ASV of 230,000, VFR hourly capacity of 98 operations and IFR hourly capacity of 59 operations. However, VAY does not have the required full length parallel taxiway or an ILS; therefore, the actual capacities are probably 15 to 20% less. Assuming a 20% discount to the capacity estimated from Figure 2-1 of AC 150/5060-5, the existing airfield capacity of VAY is approximately 184,000 ASV; VFR hourly capacity of 78 operations and IFR hourly capacity of 47 operations. With reference to **Section 2**, the baseline annual operations in 2011 are 31,234 with approximately 10 operations at peak hour. The forecast annual operations by 2031 are 34,262 with approximately 11 operations at peak hour; these demand levels are well below VAY's capacity. **Table 3-7** summarizes the demand and capacity ratios.

Table 3-7: Airfield Demand/Capacity Ratio

Year	Annual Operations (Demand)	Annual Service Volume (Capacity)	Demand / Capacity Ratio
2011	31,234	184,000	0.17
2016	34,398	184,000	0.19
2021	33,635	184,000	0.18
2031	34,262	184,000	0.19

Although changes in the assumptions could affect the capacity estimates, no substantial change is anticipated at this time. As shown in **Table 3-7**, the margin between demand and capacity is sufficient to conclude VAY would not experience an airfield capacity constraint during the planning period.

3.1.6 Summary of Airfield Requirements

The airfield requirements at VAY over the 20-year planning period are summarized below. These facilities would allow the Airport to accommodate future activity while complying with FAA standards for ARC B-II.

- Extend Runway 08/26 to a length of 4,220 feet and width of 75 feet
- Improve the slope of the runway and safety areas to meet the design gradient standards
- Construct 10-foot runway shoulders of turf, aggregate-turf, soil cement, lime, or bituminous stabilized soil
- Increase the separation distance between the runway centerline and taxiway centerline to 240 feet
- Increase the separation distance between the runway centerline and edge of aircraft parking to 250 feet
- Provide a full-length parallel taxiway with a taxiway width of 35 feet and taxiway shoulder width of 10 feet
- Publish WAAS-enabled vertically-guided approach procedures, LPV (localizer performance with vertical guidance) for Runway 08/26

3.2 General Aviation Facility Requirements

This section describes the facility requirements needed to accommodate the general aviation activities through the 20-year planning period. These will include aircraft parking aprons, aircraft storage facilities, and fixed base operator (FBO)/terminal building.

3.2.1 Aircraft Parking Apron

Aircraft parking aprons provide space for itinerant and based general aviation aircraft, allowing passengers to access FBO facilities, fueling, and ground transportation, and allowing service trucks and FBO personnel access to the aircraft. The size of aircraft parking aprons depends on the peak demand for parking positions and the average size of the aircraft to be accommodated.

A total of approximately 56,500 square yards (120 parking spaces) of apron area are currently available at VAY, including approximately 40,000 square yards (78 parking spaces) at the Main Apron, 8,500 square yards (19 parking spaces) at the Transient Apron, adjacent to the Main Apron, and 8,000 square yards (23 parking spaces) at the East Apron (**Figure 3-3**). These areas provide both ramp parking for itinerant/transient aircraft and tie-down positions for based aircraft. Most of the apron areas are paved, including the entirety of the Transient Apron. Turf parking in the Main Apron covers 9,000 square yards (24 parking spaces), and turf parking in the East Apron comprises 2,000 square yards (6 parking spaces).



Figure 3-3: Existing Aircraft Parking Apron Areas

Itinerant and based aircraft apron requirements were calculated using the following methodology and assumptions:

- In accordance with the guidance in Appendix 5 of FAA AC 150/5300-13, Airport Design, itinerant aircraft apron requirements were determined assuming 50% of the itinerant aircraft using the Airport on the busy day of the peak month and the busy day is 10% more active than the average day. In other words, the busy day activity is 110% of the ADPM forecast given in **Section 2**. Since each itinerant aircraft performs two operations (takeoff and landing), the busy day itinerant operations were divided by two and reduced the touch-and-go operations (20% of the total operations were touch-and-go operations) to determine the transient parking requirements. AC 150/5300-13 allows an area of 360 square yards per transient airplane. Taking into consideration the required maneuvering areas and the existing conditions at VAY, an area of approximately 450 square yards is assumed (based on existing 8,500 square yards with 19 parking spaces).

- Based aircraft parking apron requirements were estimated assuming 50% of based single and multi-engine aircraft will use ramp parking throughout the planning period. The guidance in FAA AC 150/5300-13 allows 300 square yards of apron space per based aircraft tie-down position. Taking into consideration the required maneuvering areas, such as the taxilanes between apron parking areas, and the existing conditions at VAY, an area of approximately 480 square yards is assumed (based on existing 48,000 square yards with 101 parking spaces). It was assumed no based jet aircraft will use tie-down space.

The aircraft parking apron requirements are summarized in **Table 3-8**.

Table 3-8: Aircraft Parking Apron Requirements

Description	Existing Capacity	Requirements			
		Base Year 2011	2016	2021	2031
Based Aircraft ¹					
Single Engine (Nonjet)	N/A	68	78	75	72
Multi Engine (Nonjet)		7	9	11	14
Jet Engine		0	0	1	2
Helicopter		2	2	2	2
Other		0	0	0	0
Total Based Aircraft		77	89	89	90
Busy Day Itinerant Operations					
Annual Itinerant Operations ¹	N/A	11,557	12,727	12,445	12,677
Peak Month Itinerant Operations ²		1,156	1,273	1,244	1,268
Busy Day Itinerant Operations ³		42	47	46	46
Aircraft Parking Spaces on Apron					
Based Aircraft Parking Spaces on Apron ⁴	101	38	44	43	43
Transient Aircraft Parking Spaces on Apron ⁵	19	9	10	10	10
Total Apron Parking Spaces	120	47	54	53	53
Aircraft Parking Apron Area (Sq. yards)					
Based Aircraft Parking Apron	48,000	18,240	21,120	20,640	20,640
Transient Aircraft Parking Apron	8,500	4,050	4,500	4,500	4,500
Total Aircraft Parking Apron	56,500	22,290	25,620	25,140	25,140

Note:

- Refer to **Table 2-16** in **Section 2**, Aviation Demand Forecast.
- With reference to **Section 2.5.4**, peak month operations were projected as 10% of annual operations.
- With reference to **Section 2.5.4**, ADPM is obtained by dividing the peak month activity by 30 days. As mentioned in **Section 3.2.1**, busy day activity is 110% of the ADPM forecast.
- 50% of the based single and multi-engine aircraft will park on apron
- Busy day itinerant operations divided by two (since takeoff and landing are counted as two operations) less 20% for touch-and-go operations are the transient parking spaces required

As shown in **Table 3-8**, throughout the 20-year planning period, a total of 54 apron parking spaces are required, including 44 for based aircraft and 10 for transient aircraft parking on apron. A total of 25,620 square yards of apron area are required, including approximately 21,120 square yards for based aircraft and 4,500 square yards for transient aircraft. The existing aircraft parking apron has adequate area for both based aircraft and transient aircraft in the 20-year planning period.

3.2.2 Aircraft Storage Facilities

There are approximately 40,500 square feet of conventional hangar space (24,000 total square feet for Community Hangars #2 to #4, 16,500 total square feet for Industrial Building #1 to #3) and 28,560 square feet of T-hangars space (Hangar A and Hangar D) currently at VAY. Total existing aircraft storage space is 69,060 square feet. It is estimated the existing Community Hangars can store approximately 22 based aircraft (including at least 2 jet aircraft, 3 multi-engine aircraft, 2 helicopters and 15 single-engine aircraft spaces). With the 20 T-hangar spaces, the existing capacity is sufficient for approximately 42 based aircraft.

Aircraft storage facility requirements are based on the forecast number and fleet mix of based aircraft. Aircraft storage facility requirements were calculated based on the following planning assumptions and guidelines:

- Throughout the planning period, approximately 50% of the single and multi-engine aircraft owners will desire hangar space. This is typical of areas experiencing snow and inclement weather during the winter season. Out of these hangar space requirements, 60% will be accommodated in T-hangars and 40% will be accommodated in conventional hangars. All jet aircraft and helicopters will occupy conventional hangar space.
- Storage requirements in conventional hangars were assumed to be: 3,100 square feet per jet aircraft, 2,750 square feet per multi-engine aircraft, 1,400 square feet per single engine aircraft, and 1,000 square feet per helicopter.
- Each T-hangar consists of 1,450 square feet. (The existing 28,560-square foot area provides 20 spaces, i.e. an average of 1,450 square feet per T-hangar space)

The aircraft storage requirements are summarized in **Table 3-9**.

Table 3-9: Aircraft Storage Requirements

Description	Existing Capacity	Requirements			
		Base Year 2011	2016	2021	2031
Aircraft Storage Positions					
Based Aircraft in T-Hangars ¹	20	23	26	26	26
Based Aircraft in Conventional Hangars ²	22	17	19	20	21
Total Aircraft Storage Positions	42	40	45	46	47
Aircraft Storage Area (Sq. feet)					
T-Hangar Spaces	28,560	33,350	37,700	37,700	37,700
Conventional Hangar Spaces	40,500	24,350	28,500	31,600	36,050
Total Aircraft Storage Spaces	69,060	57,700	66,200	69,300	73,750

Note:

1. 50% of the based single and multi-engine aircraft plus all based jet aircraft and helicopters, and multiply by 60% for T-Hangars

2. 50% of the based single and multi-engine aircraft plus all based jet aircraft and helicopters, and multiply by 40% for Conventional Hangars

As shown in **Table 3-9**, 37,700 square feet of T-hangar space and 36,050 square feet of conventional hangar space are projected to accommodate the demand in the 20-year planning period. Based on the existing facilities, there will be adequate conventional hangar space during the planning period if the Industrial Buildings # 1 to #3 at the East Apron are fully utilized to provide hangar space. The existing T-Hangar space in Hangar A and Hangar D will not be sufficient to accommodate the projected demand for 37,700 square feet of T-Hangar space. It is recommended to add approximately 9,200 square feet of T-Hangar space.

To provide safe taxiing to the hangars on the southern side of Hangar A, approximately 276 square yards of pavement is required to be added to the apron area. The new pavement will satisfy the FAA design standards taxiway safety area width allowing aircraft to have a safe distance between the main gear and the edge of the pavement, as well as adequate wingtip clearances from nearby objects.

3.2.3 Terminal Building and Facilities

The demand for terminal building space relates to the need for facilities accommodating pilots and passengers at the airport. These facilities normally include a public waiting area, a pilot briefing room, restrooms, a lounge with a café or vending machines, and business offices.

The waiting area is the central meeting and waiting space for passengers, visitors, pilots and airport employees. It is the focal point of the building and should merge with or be in close proximity to other required spaces as the manager/airport operator's office, eating facilities, and public restrooms. A comfortable seating arrangement with a view of the airfield activities is recommended.

The Main Building of VAY consists of approximately 9,000 square feet and contains all of the above mentioned basic facilities for a general aviation airport. It is functionally located to provide short and direct pedestrian routes from the car parking areas to the public waiting lobby, airport operator's office, and to the aircraft parking apron.

To estimate the future demand for terminal building space at VAY, it is assumed each peak hour operation involves a pilot and one passenger for single-engine aircraft or helicopter, two passengers for multi-engine aircraft, and three passengers for jet aircraft, and each pilot or passenger requires approximately 150 square feet of terminal space, including customer/passenger services, public waiting areas, food and beverage, meeting and briefing rooms, administrative offices, circulation space, restrooms, and so on. **Table 3-10** summarizes the terminal building requirements.

Table 3-10: Terminal Building Requirements

Description	Existing Capacity	Requirements			
		Base Year 2011	2016	2021	2031
Peak Hour Operations ¹	N/A	10	11	11	11
Pilot and passenger per flight ratios ²	N/A	2.1	2.1	2.1	2.2
Terminal Building Floor Area Requirements (sq. feet)	9,000	3,150	3,465	3,465	3,630

Note:

1. Refer to **Table 2-14** in **Section 2**, Aviation Demand Forecast.

2. Assume each flight includes one pilot and one passenger for single-engine aircraft or helicopter, two passengers for multi-engine aircraft and three passengers per jet aircraft and distribute according to the annual operations by aircraft type as given in **Table 2-12** in **Section 2**, Aviation Demand Forecast, to obtain the combined pilot and passenger per flight ratio.

As shown in **Table 3-10**, the existing 9,000 square feet Main Building at VAY has adequate floor space and facilities to meet the forecast demand throughout the 20-year planning period.

3.3 Landside Facility and Ground Access Requirements

3.3.1 Roadways

The demand for on-airport circulation roadways is a function of anticipated airfield operations, as well as anticipated staff requirements. Some operations could generate two or more vehicle trips, as pilots and passengers were dropped off or picked up by a third party. Others would generate only one or two trips per operation, as pilots and passengers park their cars at the public parking area during the operation.

A factor of 2 vehicle trips per operation was used to estimate vehicle trips related to pilots and passengers (assuming one trip by the pilot and one by the remaining passengers). This factor was increased to 2.5 to account for employee and other visitors' demand, such as those visiting the Air Victory Museum and restaurant. This is conservative given touch-and-go operations comprise an estimated 10% of the flight activity, and that activity generates two operations. **Table 3-11** presents the estimated roadway combined access/egress demand.

Table 3-11: Peak Hour Roadways Demand

Description	Base Year 2011	2016	2021	2031
Peak Hour Operations ¹	10	11	11	11
Peak Hour Roadway Demand (vehicles per hour),	25	28	28	28

Note:

1. Refer to **Table 2-14** in **Section 2**, Aviation Demand Forecast.

The impact to the regional transportation network by the airport requires an estimate of the demand currently existing on the regional network. Given the ingress/egress demands are low, the impact to only the immediate airport area was considered. Beyond the immediate area, the influence of the airport traffic is negligible.

The nearest traffic count conducted by the NJDOT is at Elbo Lane, which is approximately 2 miles away on the extended section of Stacy Haines Road. These traffic counts in 2009 found a peak two-way count of 355 vehicles per hour. It should be noted that this section of the road is fronted by housing developments on either side, and the demand would be much higher than the rural road nature of Stacy Haines Road at the airport.

A 2008 count was conducted on Ark Road, approximately 1.3 miles south of the intersection of Stacy Haines and Ark Road. The peak hourly bi-directional count was 417 vehicles per hour.

A typical two-lane unsignalized rural road (bi-directional) with 10-foot wide lanes has a capacity of approximately 1,200 vehicles per hour per lane. In light of the very low existing traffic volumes, the comparatively small anticipated demand caused by the airport will not require any additional roadway infrastructure.

3.3.2 Parking

The existing public car parking area with 52 parking spaces is located to the west of the Main Building. On the east side of the Main Building is the airside restricted area with several parking spaces for staff (approximately 8 spaces) and the hired cars/limousines (approximately 5 spaces).

Parking demand at the airport is comprised of public and employee parking. Public parking demand is a function of airfield operations and the Air Victory Museum. Employee parking is a function of staff size. Additional parking space is used by a hired car service.

To determine the public parking demand for VAY, it is assumed every two peak hour operations (since takeoff and landing are counted as two operations) generate two ground trips (one trip by the pilot and one by the remaining passengers) and require two parking spaces for two hours. Although pilots frequently park near their aircraft in the hangar areas, to be conservative all flight-related parking was assumed to occur in the terminal area.

Based on an October 2011 site visit to the Air Victory Museum, most of the visitors to the museum are from schools or organized groups which normally arrive in vans or buses. It is recommended to provide two bus parking spaces at the public parking area. Other than group visits, it is estimated that two parking spaces for staff and two car parking spaces for visitors will be required for the museum at the public parking area. Since the museum is located in Community Hangar #1, the public parking area to the west of the Main Building is also utilized by the Museum. The four parking spaces for the two museum staff and visitors are recommended to be included in this public parking area, rather than the airside staff parking area to the east of the Main Building.

For employee or staff parking to the east of the Main Building, it is assumed two parking spaces for the Airport Operator (i.e. the airport manager and the assistant airport manager/secretary), four parking spaces for the airport restaurant (Runway Café), and two parking spaces for the hired car service will be required. Since the restaurant and its entrance is located at the west of the Main Building facing the public parking, the staff parking for the restaurant can also be located in the public parking area as an alternative.

With reference to FAA AC 150/5300-13, additional parking areas should be considered if the terminal building contains eating facilities patronized by non-aviation related customers on a regular basis. During the October 2011 site visit, the Runway Café at VAY had a few non-aviation related customers dining at the Café during breakfast and lunch hours. It is recommended to provide two parking spaces for the airport restaurant's non-aviation related customers.

Based on these assumptions, the estimated car parking requirements for VAY are summarized in **Table 3-12**.

Table 3-12: Car Parking Requirements

Description	Existing Capacity	Requirements			
		Base Year 2011	2016	2021	2031
Peak Hour Operations ¹	N/A	10	11	11	11
Public Car Parking (west of Main Building)					
Air operations		20	22	22	22
Air Victory Museum (staff and visitors)		4	4	4	4
Restaurant (non-aviation related customers)		2	2	2	2
Total Public Car Parking Spaces	52	26	28	28	28
Staff Parking (east of Main Building)					
Airport Operator		2	2	2	2
Restaurant		4	4	4	4
Hired Car Service'		2	2	2	2
Total Staff Parking Spaces	8	8	8	8	8
Bus Parking					
Air Victory Museum	0	2	2	2	2

Note:

1. Refer to **Table 2-14** in **Section 2**, Aviation Demand Forecast.

According to the above analysis, the existing public parking area and the staff parking area will be adequate for the 20-year planning period. Furthermore, the true parking demand may be slightly lowered by the percentage of those aircraft owners who will continue to park their vehicles near the aircraft or in their hangar space, especially for aircraft parking at the east apron where no existing public parking spaces are provided.

Although no additional parking is required, compliance with the regulations set forth in the Americans with Disabilities Act (ADA) must be adhered to. The 2010 ADA Standard requires 3 accessible parking spaces in parking facilities with more than 51 but less than 75 parking spaces. With a supply of 3 spaces, the public parking area is in conformance with the number of spaces. These 3 accessible parking spaces shall be located to provide the shortest possible route for pedestrians to enter the facilities via an accessible pedestrian entrance. It is recommended to provide at least one of the accessible spaces closest to the Main Building, and another to the Air Victory Museum entrance.

The hired cars/limousines service is provided by an existing tenant operating at the Main Building. The tenant has made use of the existing available parking spaces (approximately 5 spaces). The demand for the hired car services is not directly related to airport operations; therefore there is no anticipation to change the existing provision. The existing hired car spaces could be increased if a supportive business decision from the tenant or Airport Operator warranted a change in the hired car/limousine services offered.

In summary, the projected public parking and staff parking demand is within the forecast demand throughout the 20-year planning period. The projection is on the conservative side and does not anticipate an expansion is required of the existing parking area. It is recommended to add two bus parking spaces for the Air Victory Museum in the vacant area on the section of grass along the south edge of the public parking lot.

3.4 Airport Support Facility Requirements

3.4.1 Fuel Storage

The analysis of the existing fuel facilities at VAY evaluated the average daily demand for fuel (AVGAS and Jet-A) and the number of days the fuel storage tanks could sustain airport operations. A minimum fuel supply of three days is recommended for a general aviation airport like VAY. **Table 3-13** provides the summary of fuel requirements based on the forecast demand.

Average fuel demand per operation represents the correlation between fuel flowage and annual operations. Historical fuel sales from July 2006 to June 2007, June 2008 to June 2009 and January 2011 to October 2011 were analyzed, and the corresponding average daily fuel demand per operation are 69, 77, and 82 gallons per operation with the ratio between AVGAS and Jet-A being 72.1:27.9, 76.3:23.7 and 53.5:46.5 respectively. The recent increase in fuel demand per operation and the higher proportion on Jet-A fuel demand was probably facilitated by the change in Airport Operator since early 2011. It is anticipated this trend will continue with the current Airport Operator, and an average daily fuel demand per operation of 82 gallons per operation with a ratio of AVGAS to Jet-A demand at 53.5:46.5 were used to estimate the fuel requirements as shown in **Table 3-13**.

Table 3-13: Fuel Storage Requirements

Description	Base Year 2011	2016	2021	2031
Annual Total Operations ¹	31,234	34,398	33,635	34,262
Total Fuel Demand				
Annual Fuel Demand (Gallons)	2,561,188	2,820,615	2,758,035	2,809,476
Average Fuel Demand per Operation (Gallons/ops)	82	82	82	82
Average Daily Operations	86	94	92	94
Average Daily Fuel Demand (Gallons)	7,017	7,728	7,556	7,697
AVGAS Demand				
Average Daily AVGAS Demand (Gallons)	3,754	4,134	4,043	4,118
Existing AVGAS Storage Capacity (Gallons)	12,000	12,000	12,000	12,000
AVGAS Storage Capacity (Days)	3.2	2.9	3.0	2.9
Jet-A Demand				
Average Daily Jet-A Demand (Gallons)	3,263	3,593	3,514	3,579
Existing Jet-A Storage Capacity (Gallons) ²	12,000	12,000	12,000	12,000
Jet-A Storage Capacity (Days)	3.7	3.3	3.4	3.4

Note:

1. Refer to **Table 2-14** in **Section 2**, Aviation Demand Forecast.
2. Assuming the new 12,000-gallon fuel tank for Jet-A is in place.

The capacity of the existing AVGAS storage facility will be enough to provide a three-day supply for the anticipated future demand. Additional AVGAS fuel storage capacity is unlikely to be required during the planning period because of the generally declining levels of activity by lower-end general aviation aircraft (i.e. AVGAS users). Therefore, the existing AVGAS storage capacity is considered to be sufficient to accommodate the existing and forecast demand.

The capacity of the new Jet-A storage facility, a 12,000-gallon storage tank, will be adequate to serve the demand for higher-end general aviation activity at the airport (i.e. Jet-A users) and provide a minimum of a three-day supply for the projected future demand throughout the 20-year planning period.

3.4.2 Aircraft Rescue and Firefighting

Aircraft rescue and firefighting (ARFF) services are only required for 14 CFR Part 139 certified airports. Part 139 certification is for airports providing scheduled passenger service with greater than nine passenger seats, or airports specially required by FAA Administration to provide ARFF services at the airport. VAY does not provide scheduled passenger service, and there is no requirement for on airport ARFF services.

Emergency services for VAY are provided by the nearest Lumberton Fire Company Number 1 at 561 Main Street, approximately 3 miles to the northeast of VAY.

3.4.3 Airport Maintenance Facilities

Airport maintenance equipment is mainly stored at the northern half of Community Hangar #1 and the front end loader with its shelter is at the vacant space between Hangar A and Hangar D. Airport and airfield maintenance facility needs do not necessarily increase proportionally with aviation activity, but are more a function of the overall pavement and grass areas requiring maintenance, as well as climatic conditions (for snow/ice removal). As no significant airfield expansions are recommended in the Master Plan, it is not expected additional facilities will be required throughout the planning period.

3.4.4 FAA Facilities

There is no existing FAA facility, such as an Airport Traffic Control Tower (ATCT), at VAY. The forecast determined no FAA facilities are required at VAY during the planning period.

3.4.5 Airport Security

The Transportation Security Administration (TSA), in cooperation with the general aviation community, has developed guidelines to enhance security at general aviation airports. To evaluate security needs at a specific airport, TSA has developed an Airport Characteristics Measurement Tool. **Table 3-14** presents the Airport Characteristics Measurement Tool along with VAY's ranking. Overall risk is measured on a scale of 0 (lowest risk) to 55 (highest risk), and grouped into four levels. Suggested security enhancements are given for each level (see **Figure 3-4**).

Existing Airport Security

As shown in **Table 3-14**, the existing security characteristics at VAY fall into the second lowest level of risk, at 23 points. **Figure 3-4** displays the suggested security measures for this risk level and are summarized below.

- *Law Enforcement Officer Support.* Airport operators are encouraged to have regular patrols of the airport by local law enforcement. City law enforcement and airport staff regularly patrol the airport.
- *Security Committee.* An airport security committee is composed of airport tenants and users drawn from all segments of the airport community. The main goal of the group is to involve airport stakeholders in developing effective and reasonable security measures and disseminating timely security information. Meetings should be held regularly for the purpose of giving coordinated direction to the overall airport security program.
- *Transient Pilot Sign-In/Out Procedures.* Sign-in and out procedures can help identify non-based (transient) pilots and aircraft using the airport. No current procedures are in place.
- *Signs.* Signs should be posted to warn against unlawful activity. Signs are present at main entrances.
- *Documented Security Procedures.* These are written procedures to guide airport operators on security guidelines, protocols, and procedures. Documented procedures do not currently exist for the airport.

- *Positive Passenger/Cargo/Baggage ID.* Prior to boarding an aircraft, the pilot should ensure that the identities of all passengers are verified and all baggage and cargo belongs to the occupants.
- *All Aircraft Secured.* All aircraft secured in locked hangar facilities or locked on the apron.
- *Community Watch Program.* A community watch program encourages tenants and airport users who frequent VAY to identify an outsider or suspicious behavior and notify the appropriate authorities.
- *Contact List.* Should include law enforcement and other emergency contacts.

Future Airport Security

The forecasted increase in based aircraft over 12,500 lbs (e.g. multi-engine or jet aircraft) could increase VAY's security risk. **Table 3-14** also shows the future security risk of the airport. It should be noted that future security needs may change, but using the present guidelines the following needs could arise:

- *Access Controls.* Physical barriers, such as fences, should be constructed around the airport perimeter securing it from unauthorized access. Physical barriers can also be in the form of natural barriers. VAY is secured with perimeter fencing and natural barriers (vegetation and Masons Creek). Access gates are present and they are suggested to be controlled electronically or monitored to maintain the integrity of the secured area. As outlined in **Section 1**, there are two separate "through-the-fence" operations which allow direct access to the Airport and do not include a security fence. One is from a private residence at the south of Hangar A (under a current easement condition), while the other is for an aviation related business off airport property. Controlled access gates are suggested to improve the safety of the Airport by restricting the access to only the owners of the properties with direct access to the apron area. It is recommended to resume the CCTV surveillance system and monitor the areas without a perimeter fence.
- *Lighting System.* Security lighting provides a means to deter theft, vandalism, or other illegal activity at night. Security lighting should not interfere with aircraft operations. Lights are present at the main building area.
- *Personnel ID System.* Airport operators may wish to implement a method to badge employees and other authorized tenants; granting access to various areas of the airport.
- *Vehicle ID System.* Vehicles can be identified through the use of decals, stickers, or tags, aiding airport personnel and law enforcement in identifying authorized vehicles.
- *Challenge Procedures.* Challenge procedures include developing community watch program, and encouraging airport tenants to challenge unfamiliar people at the airport. Tenants are encouraged to challenge strangers or people performing suspicious activities.

Table 3-14: Airport Characteristics Measurement Tool

Security Characteristics	Assessment Scale for Public Use Airports ¹	VAY	
		Existing	Future
Location			
Within 30 nm of mass population areas ²	5	5	5
Within 30 nm of a sensitive site ³	4	4	4
Falls within outer perimeter of Class B airspace	3	3	3
Falls within boundaries of restricted airspace	3	0	0
Based Aircraft			
Greater than 101 based aircraft	3	-	-
26-100 based aircraft	2	2	2
11-25 based aircraft	1	-	-
10 or fewer based aircraft	-	-	-
Based aircraft over 12,500 pounds	3	0	3
Runways ⁴			
Runway length equal to or greater than 5,000 feet	5	-	-
Runway length less than 5,000 feet, greater than 2,001 feet	4	4	4
Runway length 2,000 feet or less	2	-	-
Asphalt or concrete runway	1	1	1
Operations			
Over 50,000 annual operations	4	0	0
Part 135 operations	3	0	0
Part 137 operations	3	0	0
Part 125 operations	3	0	0
Flight training	3	0	0
Flight training in aircraft over 12,500 pounds	4	0	0
Rental aircraft	4	0	0
Maintenance, repair, and overhaul facilities conducting long term storage of aircraft over 12,500 pounds	4	4	4
Total	55	23	26

Note:

1. Assess points for every characteristic that applies to the airport.

2. Mass population area – area with total metropolitan population of at least 100,000 people.

3. Sensitive sites – areas which would be considered key assets or critical infrastructure of the United States. Sensitive sites can include certain military installations, nuclear and chemical plants, centers of government, monuments and iconic structures, and/or international ports.

4. Facilities with multiple runways should only consider the longest runway on the airport.

Source:

1. TSA Security Guidelines for General Aviation Airports, Information Publication A-001, May 2004

2. AECOM Analysis

Points/Suggested Guidelines						
>45	25-44	15-24	0-14			
Fencing						
Hangars						
Closed Circuit TV						
Intrusion Detection System						
Access Controls						
Lighting System						
Personnel ID System						
Vehicle ID System						
Challenge Procedures						
Law Enforcement Officer Support						
Security Committee						
Transient Pilot Sign-In/Out Procedures						
Signs						
Documented Security Procedures						
Positive Passenger/Cargo/Baggage ID						
All Aircraft Secured						
Community Watch Program						
Contact List						

Figure 3-4: Risk Level and Suggested Airport Security Enhancement

Source:

1. TSA Security Guidelines for General Aviation Airports, Information Publication A-001, May 2004

Section 4

Airport Development Alternatives



Prepared for
The New Jersey
Department of Transportation

4 Airport Development Alternatives

One of the primary components to the Master Planning process is the selection of the preferred development alternative. The alternative that materializes from the analysis will ensure the airport is prepared to meet the aviation demand for the next 20 years. The alternatives have been evaluated to coincide with **Section 3**, with improvements for the three main operating elements being analyzed: airfield, general aviation facilities, and landside facilities. The alternatives and improvements that were identified are necessary to meet the goals of the New Jersey DOT, the South Jersey Regional Airport (VAY), and to conform to the latest FAA design standards.

4.1 Alternatives Analysis

This section defines the alternatives analysis utilized with reference to *FAA AC 150/5070-6B Airport Master Plan*, and the evaluation criteria used to analyze the development alternatives. The goals and objectives of the New Jersey DOT served as the basis for the evaluation criteria.

4.1.1 The Alternatives Analysis Process

An organized approach to identifying and evaluating a variety of alternative development options is essential for the effective planning of the Airport. The key elements followed during this process are:

1. Identify alternative ways to address the facility requirements outlined in **Section 3**, including the development constraints outlined in Section 4.2 below.
2. Evaluate the alternatives individually and collectively, including the strengths, weaknesses, and other implications unique to each alternative.
3. Select the recommended alternative based on the evaluation criteria.

The process of identifying, analyzing, and recommending alternatives for VAY is illustrated in **Figure 4-1**. The alternatives analysis process starts with a group of alternatives for the primary element and reduces them to a single recommended alternative based on the evaluation criteria. The requirements for the secondary elements are then incorporated into the recommended primary alternative to become the recommended airport development plan for VAY. The process is summarized below:

Step 1: Determine Primary and Secondary Elements - Due to the FAA design standard deficiencies revolving primarily around the existing runway and taxiway, these large-scale airfield elements are deemed the primary element of the analysis. The layout of the airfield is the largest component in the alternatives development, with secondary elements having the flexibility to be included on the airfield as appropriate. These secondary elements are identified as the requirements for general aviation facilities, landside facilities, and the airport support facilities.

Step 2: Identify Primary Element Alternatives - Alternatives are developed for the airfield layout based on the requirements and development constraints. These identified airfield layout alternatives are presented in Section 4.3.

Step 3: Evaluate the Alternatives and Select Recommended Alternative - The airfield layout alternatives are evaluated using a mostly subjective and qualitative analysis, based on the evaluation criteria listed in Section 4.1.2. The outcomes of the evaluation and recommendations are presented in Section 4.3.4.

Step 4: Develop Layouts for Secondary Elements – The simplicity of the requirements for the secondary elements at VAY eliminated the need to develop various alternatives. Focused layouts are developed to meet the requirements for general aviation facilities, landside facilities, and airport support facilities. These layouts and improvements are given in **Sections 4.4 to 4.6** respectively.

Step 5: Combine and Prepare Recommended Airport Development Plan –The final step in the process is the combination of the recommended alternative for the primary and secondary elements. The recommended layouts for the general aviation facilities, landside facilities, as well as airport support facilities are included in the recommended airfield layout and become the overall recommended airport development plan as presented in **Section 4.7**. The evaluation criteria were considered for all elements of the recommended airport development plan. All of the identified improvements are intended to reinforce the safe and efficient operation of the Airport, and were evaluated according to social, financial, operational, and environmental parameters.

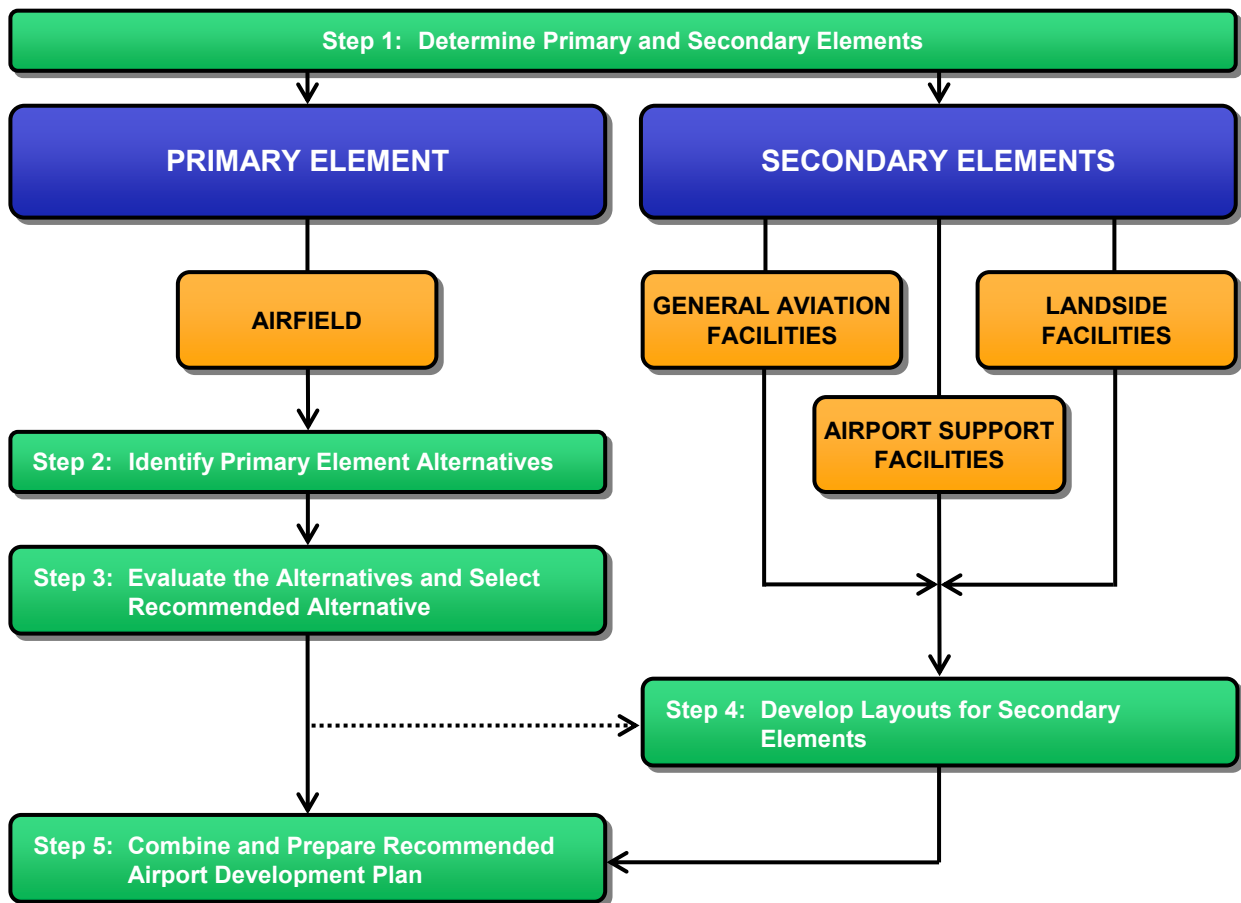


Figure 4-1: Alternatives Analysis Process for VAY

4.1.2 Evaluation Criteria

The evaluation criteria were developed to be consistent with sustainability principles encouraging a holistic approach to the planning process, in which economic viability, operational efficiency, natural resource preservation, and social responsibility were considered. The evaluation criteria are both strategic and qualitative to ensure the evaluation process remains at an appropriate level of detail. A color coded scoring system is used. If the alternative does not support the criterion (i.e., a less desirable result), the alternative was assigned the color red. A white color was given if the alternative was neutral and had neither a positive nor negative impact relative to the other alternatives. If the alternative had a more favorable impact (i.e., creates a benefit in line with the goals and objectives), a green color was assigned. The evaluation criteria utilized for the airfield alternatives are as follows:

- **Operational Performance:**
 - **Meets Long-Term Capacity Needs:** Ability to provide sufficient capacity to address the VAY facility requirements through 2031.
 - **Meets Runway Length Requirements:** Satisfies the runway length requirement for larger B-II business aircraft (weighing less than 30,000 lbs) and a GPS vertically-guided LPV approach.
- **Financial Feasibility:**
 - **Capital Investment Required:** Cost associated with implementing the alternative such as the amount of new pavement, environmental impacts, and land acquisition required in developing the alternative.
 - **Requirement for Land Acquisition:** Land acreage required to facilitate the alternative.
- **Operational Efficiency:**
 - **FAA Design Standard Improvements:** Ability to address the FAA design standard deficiencies outlined in Section 3.
 - **Safety and Efficiency of Aircraft Operations:** Ensures a safe and efficient operation on and around the airfield. This includes reducing potential runway incursions, preventing taxiing on the runway, and a reasonable taxiing time from the taxilane system to the runway.
 - **Impact of Construction Phasing:** Ability to construct the alternative without undue interference to existing airport operations.
- **Environmental Impact and Land Use:**
 - **Impact on Existing Environmental Features:** Magnitude of the impact to the environmentally sensitive features and associated mitigation measures.
 - **Compatible with Local Zoning Ordinances:** Compliance with the local zoning ordinances, development restrictions, and surrounding land uses.

4.2 Development Constraints

Constraints on and around the Airport are primarily existing environmental constraints, and the local zoning ordinances concerning farmland areas. Due to the amount of undeveloped property owned by the Airport, the constraints discussed below are the major obstacles to future airport development.

4.2.1 Environmental Constraints

The relevant environmental features were identified in **Section 1** as potential constraints to future airport development due to the severity of mitigation measures, reporting requirements, and additional studies that may be required. They do not necessarily preclude development; however, they require coordination with the New Jersey Department of Environmental Protection (NJDEP), and further study prior to any proposed construction. The environmental concerns include: Streams with Water Quality, NJDEP Freshwater Wetlands, Floodplains, and Threatened and Endangered species.

While the environmentally sensitive areas were not restrictive to airport development, the timing and costs associated with mitigating the alternatives are an important evaluation criterion.

Figure 4-2 provides a map of the environmental constraints.

4.2.2 Local Zoning Constraints

Lumberton Township imposes land use restrictions to zoning parcels. Unfortunately, a majority of the Airport's eastern property lies within an area zoned as a Transfer of Development Rights (TDR) Sending Area. The TDR Sending Area zone, as depicted in **Figure 4-2**, was considered an obstacle for the development alternatives due to the zoning restrictions on the agricultural use of the parcel; however, it was not considered restrictive to airport development. The Deed of Easement states that every 10 years the restrictions can be reviewed or rescinded, with the review period beginning in 2019. The Airport should begin the discussions with the township well in advance of any proposed construction to reduce any potential delays. The TDR Sending Area zone was still considered a cost hindrance and delay to any potential expansion, which is reflected in the evaluation criteria.

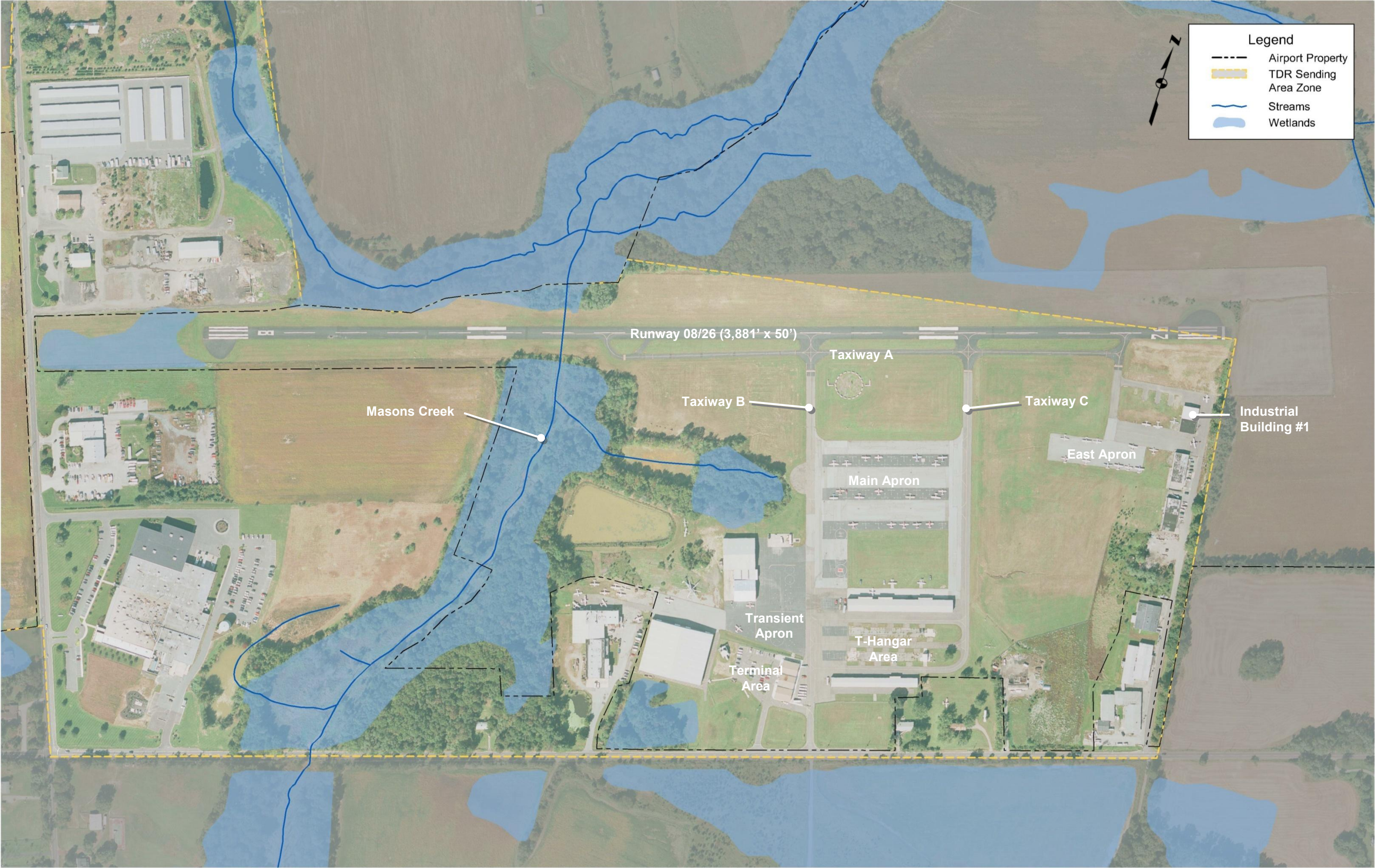


Figure 4-2: Constraints Map
Source: Lumberton Township Zoning GIS layer, received from the Burlington County Bridge Commission on July 25th, 2012

4.3 Airfield Development

4.3.1 Airfield Requirements

The South Jersey Regional Airport must improve its airfield infrastructure to satisfy the latest FAA design standards. The FAA design standards are required for airports that receive, or wish to receive federal funding for airfield development projects. With the new and updated design standards, VAY must conform to these requirements to the greatest extent practicable. If unique site constraints limit the ability of the Airport to adhere to the design standards, the FAA performs a separate independent study to determine if the proposed modification to the standards would allow the Airport to operate in a safe manner. This study would also apply in the “no build” scenario, in which the deficient standards would remain at VAY.

The airfield requirements identified in **Section 3** over the 20-year planning period and those which are relevant to the airfield layout alternatives are summarized below:

- Extend the runway to a length of 4,220 feet
- Increase the separation distance between the runway centerline and taxiway centerline to 240 feet
- Provide a full-length parallel taxiway

The airfield layout alternatives are developed based on different combinations of the above requirements.

4.3.2 Alternatives

Ten variations of airfield alternatives were developed through the alternatives analysis process. Except for the “no-build” scenario, all alternatives widen the runway, relocate and widen the taxiway, and incorporate the runway extension unless otherwise noted below in **Table 4-1**. Four sub-alternatives explore the feasibility of accommodating a partial parallel taxiway in lieu of a full length parallel taxiway. A total of 14 alternatives were evaluated against the criteria, and the results were compiled in a comparison matrix to easily discern the benefits and weaknesses of each alternative.

Table 4-1: Summary of Airfield Alternatives

Airfield Alternatives	Runway					Taxiway	
	Existing	Extension	Shift East	Shift North	Reorient	Partial Parallel	Full Parallel
1							
2A							
2B							
3A							
3B							
4A							
4B							
5A							
5B							
6							
7							
8							
9							
10							

Figure 4-3 presents all of the airfield alternatives in a single graphic. This provides an easy to compare format to visualize the differences between the alternatives listed in **Table 4-1**.

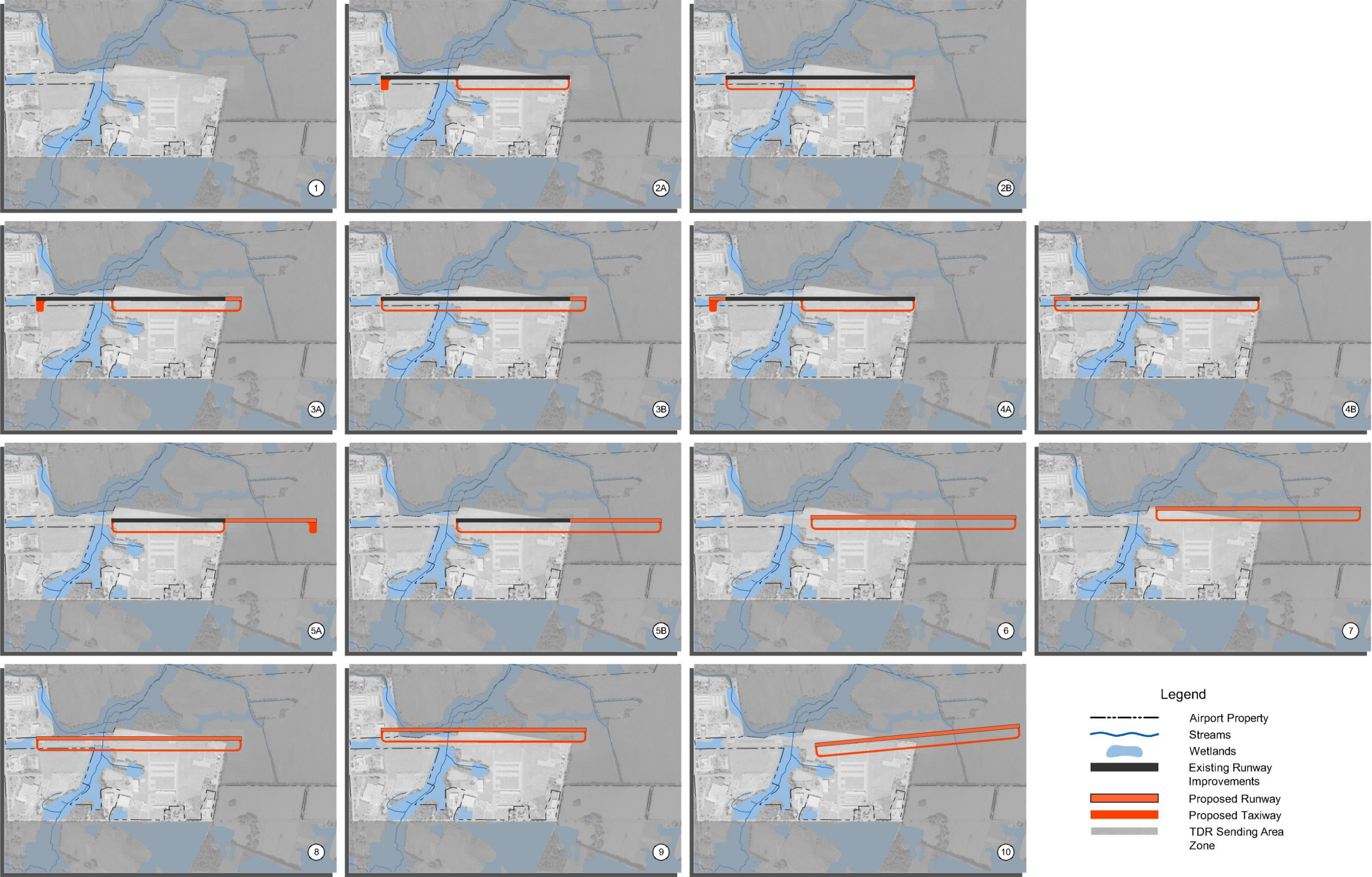


Figure 4-3: Airfield Alternatives

4.3.3 Alternatives Evaluation

Airfield Alternative 1:

As shown in **Figure 4-4**, the airfield in Alternative 1 will remain in its current configuration with no proposed improvements. The Airport will continue to operate as it does today without addressing the FAA design deficiencies. There are no construction costs or environmental impacts associated with this alternative. Implementing an LPV approach is not viable with this alternative because it does not meet the minimum runway length requirements, nor does it meet the runway to taxiway separation requirements.



Figure 4-4: Alternative 1

Airfield Alternative 2:

Airfield Alternative 2 is a minimal development alternative that focuses on addressing the Airport's safety concerns. Improving the existing runway width would also include the regrading of the runway centerline to satisfy the FAA runway profile design requirements. The upgrade requires property acquisition north and south of the runway to gain control of the Runway Object Free Areas (ROFA). Alternative 2 includes an A and B, as shown in **Figures 4-5** and **4-6**; the primary difference being the length of the parallel taxiway.

Alternative 2A shifts Taxiway A 165 feet to the south to satisfy the runway to taxiway separation standards through a partial parallel taxiway. Aircraft would still taxi along the runway to access the Runway 8 end.



Figure 4-5: Alternative 2A

Alternative 2B provides a full-length parallel taxiway with the required runway to taxiway separation. The full-length taxiway significantly improves the operational efficiency of the airfield; however, it requires greater environmental mitigation than Alternative 2A.

Overall, the relative cost of the improvements for these alternatives is low, however they lack the necessary runway length required to allow for larger aircraft and the minimum runway length for upgrading to an LPV instrument approach procedure. In addition, construction phasing will be an issue for both alternatives, as it requires closing the existing runway to make the necessary improvements. Both alternatives require relocating Industrial Building #1 due to the Taxiway Object Free Area (TOFA).



Figure 4-6: Alternative 2B

Airfield Alternative 3:

This alternative extends the runway 339 feet to the east, to a total length of 4,220 feet, and reconstructs the runway to meet current design standards. The eastern extension keeps the runway on Airport property. Similar to Alternative 2, Alternative 3 includes an A and B, as shown in **Figures 4-7** and **4-8**, which evaluate the merits of a full-length parallel taxiway.

Alternative 3A, shifts Taxiway A 165 feet to the south to achieve the standard runway to taxiway separation, but it stops short of Masons Creek. Aircraft would still taxi along the runway to access the Runway 8 end.

Alternative 3B extends the taxiway the full length of the runway which optimizes aircraft movement and improves the overall safety of the airfield. However, the parallel taxiway crosses Masons Creek which requires a greater level of environmental mitigation than Alternative 3A.

Both alternatives require property acquisition north and south of the runway to gain control of the RSAs, with Alternative 3B requiring more property for the parallel taxiway. Construction phasing and the local zoning ordinance will be issues with these alternatives, requiring Airport and township coordination. The cost to implement these alternatives is relatively low due to the redevelopment of existing pavement. Both alternatives require relocating Industrial Building #1 due to the TOFA.

Airfield Alternative 4:

Airfield Alternative 4 extends the runway 339 feet west, to a length of 4,220 feet, and reconstructs the existing portion of the runway to meet current design standards. Alternative 4 includes an A and B, as shown in **Figures 4-9** and **4-10**; the difference is the length of the parallel taxiway.

Alternative 4A shifts Taxiway A south 165 feet to meet the separation standard, but it utilizes a partial parallel taxiway while Alternative 4B utilizes a full-length parallel taxiway to optimize aircraft movements and improve the overall safety of the airfield.

Both alternatives require land acquisition north and south of the runway to gain control of the RSAs. Environmental mitigation is required for both alternatives, with a greater impact applied to 4B due to the full-length parallel taxiway. Phasing will also be an issue for both alternatives. These alternatives have a relatively low construction cost, as they both redevelop existing pavement, and are compatible with local zoning ordinances. The alternatives also require relocating Industrial Building #1 due to the TOFA.



Figure 4-7: Alternative 3A



Figure 4-8: Alternative 3B



Figure 4-9: Alternative 4A



Figure 4-10: Alternative 4B

Airfield Alternative 5:

Airfield Alternative 5 shifts and extends the runway east to clear the RSA from Masons Creek. The alternative extends the runway to a total length of 4,220 feet and shifts the Runway 8 threshold 1,550 feet east. This shift however, places the Runway 26 end 1,890 feet from the existing Runway 26 threshold, thus requiring aircraft to taxi longer distances to the terminal and apron areas.

Alternative 5 includes an A and B, as shown in **Figures 4-11** and **4-12**, which evaluate the impacts of a parallel taxiway.

Alternative 5A shifts Taxiway A south 165 feet through a partial parallel taxiway to minimize costs and environmental impacts. Alternative 5B includes a parallel taxiway for the full length of the newly constructed runway.

Phasing for the two alternatives is improved over previous alternatives because the construction can be phased such that the existing runway would not have to be closed. This alternative does not require any land acquisition; however, township coordination will be required to address the zoning ordinance issues. Both alternatives require relocating Industrial Building #1 due to the TOFA.

Airfield Alternative 6:

As shown in **Figure 4-13**, airfield Alternative 6 shifts the Runway 70 feet north to allow Industrial Building #1 and its associated aircraft to continue utilizing the existing facilities. This runway shift provides sufficient clearance to meet TOFA requirements. The runway is also shifted east to eliminate the environmental impacts and keep the runway on Airport property. A benefit to this shift allows for the improvements to be completed in phases, with the eastern portion of the new runway being built without having to close and impact the existing runway. However, the majority of the runway falls within the TDR.

Airfield Alternative 7:

Alternative 7, as shown in **Figure 4-14**, shifts the runway north 240 feet and east reusing a portion of the existing runway for the parallel taxiway. This alternative minimizes the environmental impact and keeps the runway on airport property. This alternative allows the construction to occur without impacting the existing runway. The new runway is largely located within the TDR; however, the environmental impacts are minimal.



Figure 4-11: Alternative 5A



Figure 4-12: Alternative 5B



Figure 4-13: Alternative 6



Figure 4-14: Alternative 7

Airfield Alternative 8:

As shown in **Figure 4-15**, Airfield Alternative 8 shifts the Runway 70 feet north, similar to alternative 6, to retain Industrial Building #1. This runway shift provides sufficient clearance to meet TOFA requirements. A new, full-length parallel taxiway is incorporated and the runway extension is added to the Runway 26 end. Land acquisition is required both north and south of the Runway 8 end to accommodate the proposed taxiway and runway shift. Environmental impacts are greater than the previous alternatives due to the runway shifting into the wetlands on the north side of the runway. The local zoning ordinances will also affect the implementation of the alternative.

**Figure 4-15: Alternative 8****Airfield Alternative 9:**

As shown in **Figure 4-16**, this alternative is similar to the 1997 Airport Layout Plan recommendation. It shifts the runway north 240 feet, similar to alternative 7, but reuses the entire existing runway as the parallel taxiway. The runway extension is added to the Runway 26 end, impacting the local zoning ordinance. The entire runway can be constructed without impacting the current runway's operations. The improvements, however, will have a considerable impact on the environmental features, and they will also require extensive property acquisition and adjacent business relocation.

**Figure 4-16: Alternative 9****Airfield Alternative 10:**

Airfield Alternative 10 reorients the runway to the northeast to take advantage of the open land; see **Figure 4-17**. The new runway orientation allows for Industrial Building #1 and the associated apron to continue operations outside of the TOFA. This orientation also virtually eliminates the environmental impacts and keeps the entire runway on Airport property. However, this alternative places the majority of the runway inside of the TDR which may hinder its feasibility.

**Figure 4-17: Alternative 10**

Table 4-2 below summarizes the airfield alternatives as they relate to the applied evaluation criteria.

Table 4-2: Overall Airfield Alternatives Evaluation

	Airfield Alternatives													
	1	2A	2B	3A	3B	4A	4B	5A	5B	6	7	8	9	10
Operational Performance														
Meets Long-Term Capacity Needs	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Meets Runway Length Requirements	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Financial Feasibility														
Capital Investment Requirement	●	●	●	●	○	●	○	●	●	●	●	●	●	●
Requirement for Land Acquisition	●	○	○	○	○	●	●	●	●	●	●	●	●	●
Operational Efficiency														
FAA Design Standard Improvements	●	○	●	○	●	○	●	○	●	●	●	●	●	●
Safety and Efficiency of Aircraft Operations	●	●	●	○	●	○	●	○	○	○	○	●	●	○
Impact of Construction Phasing	●	●	●	●	●	●	●	○	○	○	●	●	●	○
Environmental Impact and Land Use														
Impact on Existing Environmental Features	●	●	○	●	○	○	●	○	○	○	●	●	●	○
Compatible with Local Zoning Ordinances	●	●	●	○	○	●	●	●	●	●	●	○	○	●
Totals:														
More favorable ●	6	4	5	4	4	4	5	3	4	4	5	4	5	4
Neutral ○	0	2	2	4	4	3	1	4	3	3	1	1	1	3
Less favorable ●	3	3	2	1	1	2	3	2	2	2	3	4	3	2

4.3.4 Key Findings and Issues

A summary of the key findings and issues regarding the 14 alternatives are summarized below. These issues and critical differences were incorporated into the evaluation criteria and analysis, which led to the ultimate selection of the recommended airfield alternative.

- In order to extend the runway, it will be necessary to impact the TDR. Nine of the fourteen alternatives conflict with the local zoning ordinance; Alternatives 1, 2A, and 2B are the only alternatives that do not impact the TDR.
- The alternatives that utilize all or a portion of the existing runway will have construction phasing issues, as the runway will require closure to make the necessary improvements.
- Adding a full-length parallel taxiway improves both the efficiency and safety of the airfield, and provides the Airport with the greatest amount of flexibility for future operations.
- The majority of the alternatives will have some environmental impact; however, the impacts associated with Alternatives 8 and 9 are significantly greater than any of the other alternatives.
- The capital investment required to construct the proposed improvements increases as the alternatives progress numerically. The major cost differential begins with the alternatives that do not utilize existing airport pavement; thus requiring an increase in earthwork, environmental mitigation, and construction material.
- The evaluation matrix reveals the more preferable development alternatives using the color coded scoring system. The alternatives with larger gaps between the 'more favorable' and 'less favorable' scores were considered preferable.
- Alternatives 3 and 4 are the most cost effective solutions for upgrading the existing facility and extending the runway, as was determined through the color coded totals.

4.3.5 Recommendation

Alternative 3B is the recommended airfield alternative. Alternative 3B balances the environmental impacts and development costs while meeting the future requirements. Incorporating the eastern extension on the runway impacts the TDR parcel; however the property acquisition and environmental mitigation costs associated with extending the runway to the west (Alternative 4B), are far greater than the costs associated with Lumberton Township coordination. The local zoning ordinance can be reviewed and coordinated with the township well in advance of any proposed construction to aid the facilitation and potential rescinding of the ordinance. All of the airfield alternatives require coordination and approval from the FAA regarding any objects within the Runway Object Free Areas (OFA) on, and off Airport property. Airfield Alternative 3B provides a full-length parallel taxiway that improves the safety, efficiency, and accessibility of the airfield for the current and long-term vitality of the Airport. The full-length parallel taxiway requires the relocation of the Segmented Circle to the north and west of the Main Apron, and Industrial Building #1 to the south side of the East Apron, due to the TOFA impacts.

Figure 4-18 depicts the recommended airfield alternative.

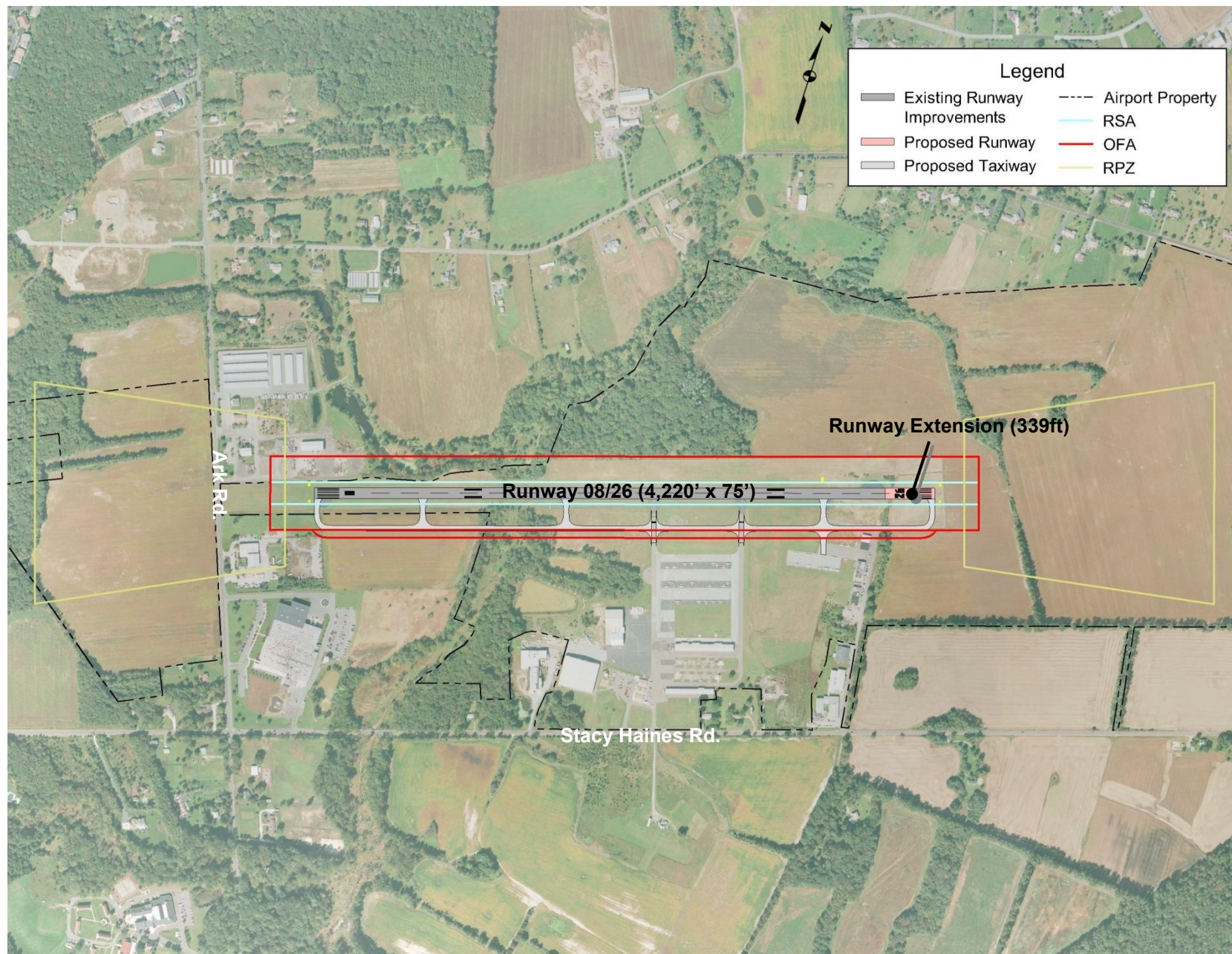


Figure 4-18: Recommended Airfield Alternative

4.4 General Aviation Development

4.4.1 Transient Apron

The transient apron parking arrangements were evaluated to ensure proper compliance with the FAA design standards. The existing parking capacity of approximately 19 parking spaces satisfies the demand identified in **Section 3** for a minimum of 10 transient parking positions throughout the 20-year planning period. However, part of the Transient Apron is used for taxiing to Community Hangar #1, and therefore requires proper taxilane object free area clearances. To ensure safe maneuvering around the transient and terminal apron, centerline striping was incorporated to ensure aircraft are parked outside of the taxilane OFA. With the Airport classified as B-II, the taxilane OFA was applied to the Cessna Citation V wingspan, which is the largest B-II aircraft limited to 30,000 lbs that can operate at the Airport. This allows the existing taxilanes to be utilized without impacting existing facilities. Tie-down positions were placed to allow power-in/power-out maneuvers by transient aircraft. The improved layout can accommodate at least nine aircraft, and as many as 11 if the positions next to Community Hangar #4 are utilized. The new layout also has the capability of parking five Cessna Citation V's simultaneously, however only two are shown for reference in **Figure 4-19**. If the need arises, due to an unforeseen increase in demand, based aircraft positions adjacent to, and south of Hangar D can also be converted to transient parking.

The proposed transient apron layout can be seen in **Figure 4-19**.

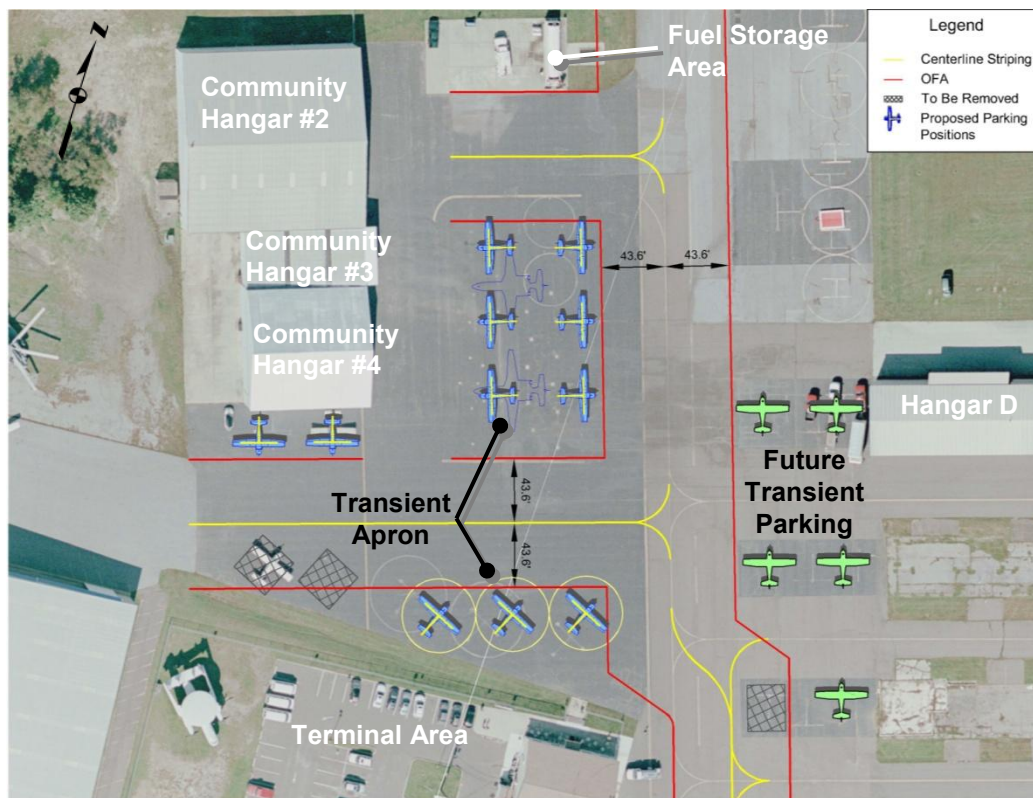


Figure 4-19: Transient Apron Layout

4.4.2 T-Hangar Requirements

To meet the recommendations outlined in **Section 3**, a 10-unit, standard nested T-Hangar is proposed. The standard nested T-Hangar provides a narrow building footprint, which can utilize the pavement area from the previous T-Hangars (Hangar B) that were demolished in 2007/2008; see **Figure 4-20**. Proper taxiway wingtip clearance is provided for airplane design group (ADG) I aircraft that will utilize the hangars. The site of former Hangar B was selected because the spacing between Hangars A and former Hangar B meet the required taxiway OFA clearances.

To accommodate ADG I design standard clearances, the taxiway should be restriped to denote the clear area where objects can be safely parked outside of the taxiway OFA. Additional pavement is also required south of Hangar A to ensure compliance with the taxiway edge safety margin of at least five feet, providing adequate pavement to granting safe aircraft taxiing to the southernmost T-Hangars. In this configuration, the vehicle storage canopy should be relocated to the parking area north of the proposed hangar.

ADG II aircraft will be restricted from accessing the T-Hangars because the required OFA clearances cannot be met.

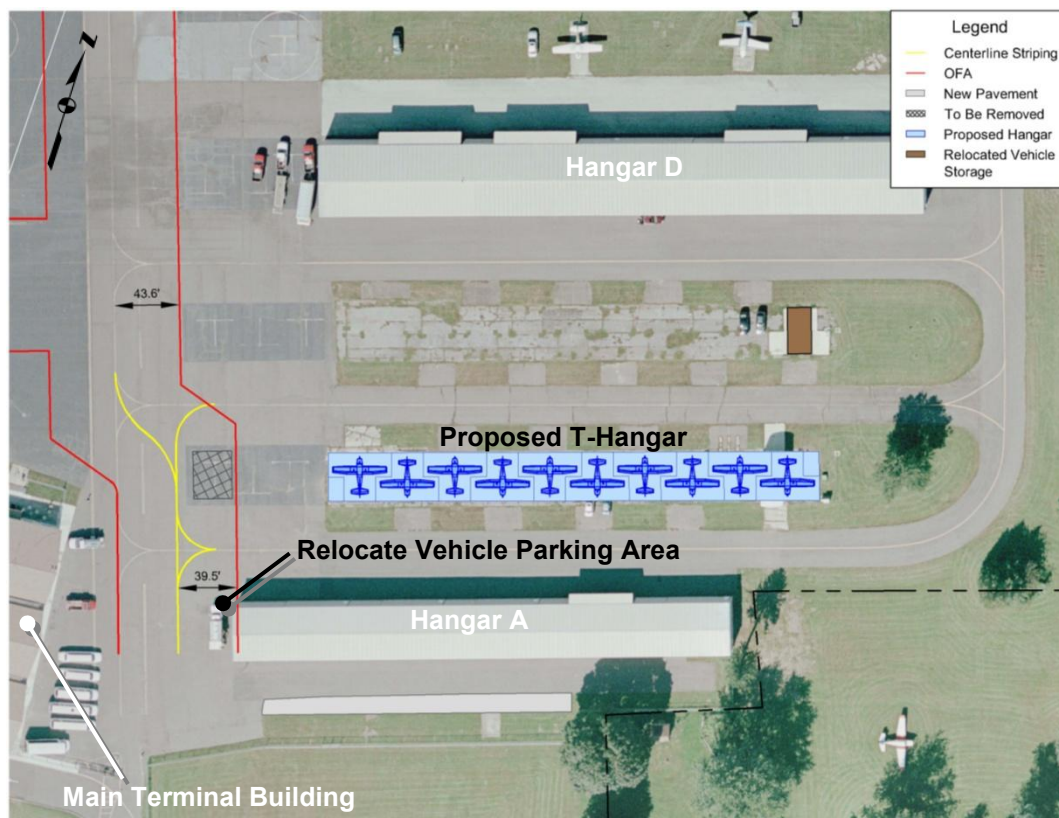


Figure 4-20: Recommended Hangar Development

4.5 Landside Development

4.5.1 Parking Layout Analysis

As identified in **Section 3**, two bus parking positions were recommended at the Air Victory Museum to accommodate large groups. To improve accessibility to the museum, and maintain the existing parking capacity for the terminal area, four spaces are included adjacent to the Air Victory Museum and Community Hangar #1. The area adjacent to the museum has adequate spacing for the bus and automobile parking, without impacting the display aircraft located in front of the museum. The recommended parking layout for these spaces is shown in **Figure 4-21**.

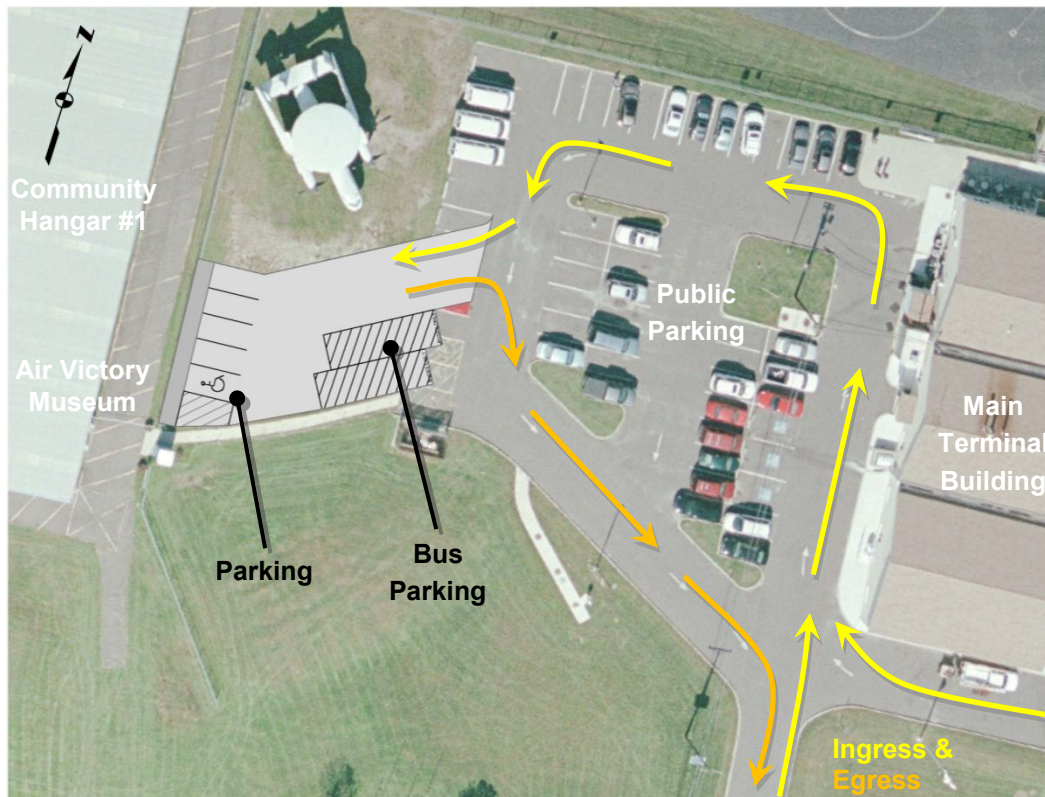


Figure 4-21: Recommended Landside Layout

4.6 Airport Support Facility Development

4.6.1 Fuel Storage

The planned 12,000-gallon Jet-A fuel storage tank is assumed to be placed adjacent to the current 12,000-gallon AVGAS fuel tank. No further analysis or impacts to the apron areas were identified.

4.6.2 Airport Security

The Airport currently has security measures in place to deter unwanted access to the airfield. The main security feature utilized at the Airport is in regards to access controls. These controls include the security perimeter fencing around the airfield, natural vegetation barriers, and controlled access gates. To improve upon the existing security measures, the fence should be fully enclosed around the airfield, as shown on the overall development plan (**Figure 4-22**). This will ensure the airfield is maintained as a secure environment for aircraft operations.

Coinciding with the enclosure of the existing security perimeter fence, the existing “through-the-fence” operations which allow direct access to the airfield should be addressed. These two points of direct access should be fenced by appropriate airfield access gates to control entry to the Airport. The two properties that are currently noted as “through-the-fence” operations are the residential property southeast of Hangar A, along Stacy Haines Road, and the aircraft maintenance hangar operated by B P Air, Inc., located west of Community Hangar #1. The security fence will aid in improving the safety regarding the two access points on the airfield; however, a proper access control plan, or easement is required per the FAA’s March 2011 guidance. Incorporating an access control gate for the residential property could be a challenge for the Airport due to the existing easement and deed currently in place allowing direct airfield access. The FAA guidance requires airports to demonstrate compliance with the policy prior to applying for an Airport Improvement Program (AIP) grant.

The Airport’s existing CCTV surveillance system should also be brought back online to monitor the areas of the airfield that currently do not have perimeter fencing. The CCTV system will aid the Airport in deterring unwanted access and help monitor operations.

4.7 Recommended Development Plan

The culmination of this analysis has resulted in a recommended airport development plan to bring South Jersey Regional Airport into compliance with the FAA design standards, and prepare the Airport to meet the needs of the next 20 years by improving their accessibility and reliability for business aircraft, and improving the overall efficiency of the airfield. The recommended improvements are summarized below, and shown on **Figure 4-22**.

Airfield

- Extend the runway 339 feet east to a length of 4,220 feet
- Widen the runway to 75 feet
- Improve the slope of the runway and safety areas to meet the design gradient standards
- Increase runway to taxiway separation to 240 feet
- Widen taxiways to 35 feet
- Relocate Northern Hangar of Industrial Building #1

Airfield Alternative 3B was refined to incorporate the necessary improvements included in the recommended airport development plan. The runway would be re-striped with nonprecision runway markings to improve the visibility and safety for arriving aircraft. The existing Taxiway B and C connectors currently meet the design standards, and would continue to serve the widened runway. Two new exit taxiway connectors would be required, with the existing connector to the East Apron upgraded to ADG II standards. The taxiway connector located on the east side of Masons Creek reduces the overall impact to the wetlands. This exit taxiway is also located to allow smaller aircraft to exit the runway in a timely manner; thus minimizing runway occupancy time.

The widening and regrading of the runway must account for the additional structure and strength required to bridge Masons Creek without jeopardizing the integrity of the runway pavement. The proposed culvert must be located a minimum of one foot below the runway pavement, with the concrete headwalls located outside of the RSA. The regrading of the runway should account for the existing topography, and it should minimize the required earthwork to meet the FAA runway gradient design standards. To reduce the damage of jet blast and prop wash, ADG II runways and taxiways should have 10-foot shoulders composed of one of the following: turf, aggregate-turf, soil cement, lime, or bituminous stabilized soil. These improvements will be identified and outlined in **Section 6**.

Due to the narrow airport property surrounding the Runway 8 end, property acquisition is inevitable to incorporate the full parallel taxiway south of the runway, and to ensure proper compliance with the RSAs. Approximately 12 acres is required for acquisition to allow for the RSAs and OFAs to be properly graded and clear of obstacles on both the north and south sides of the runway.

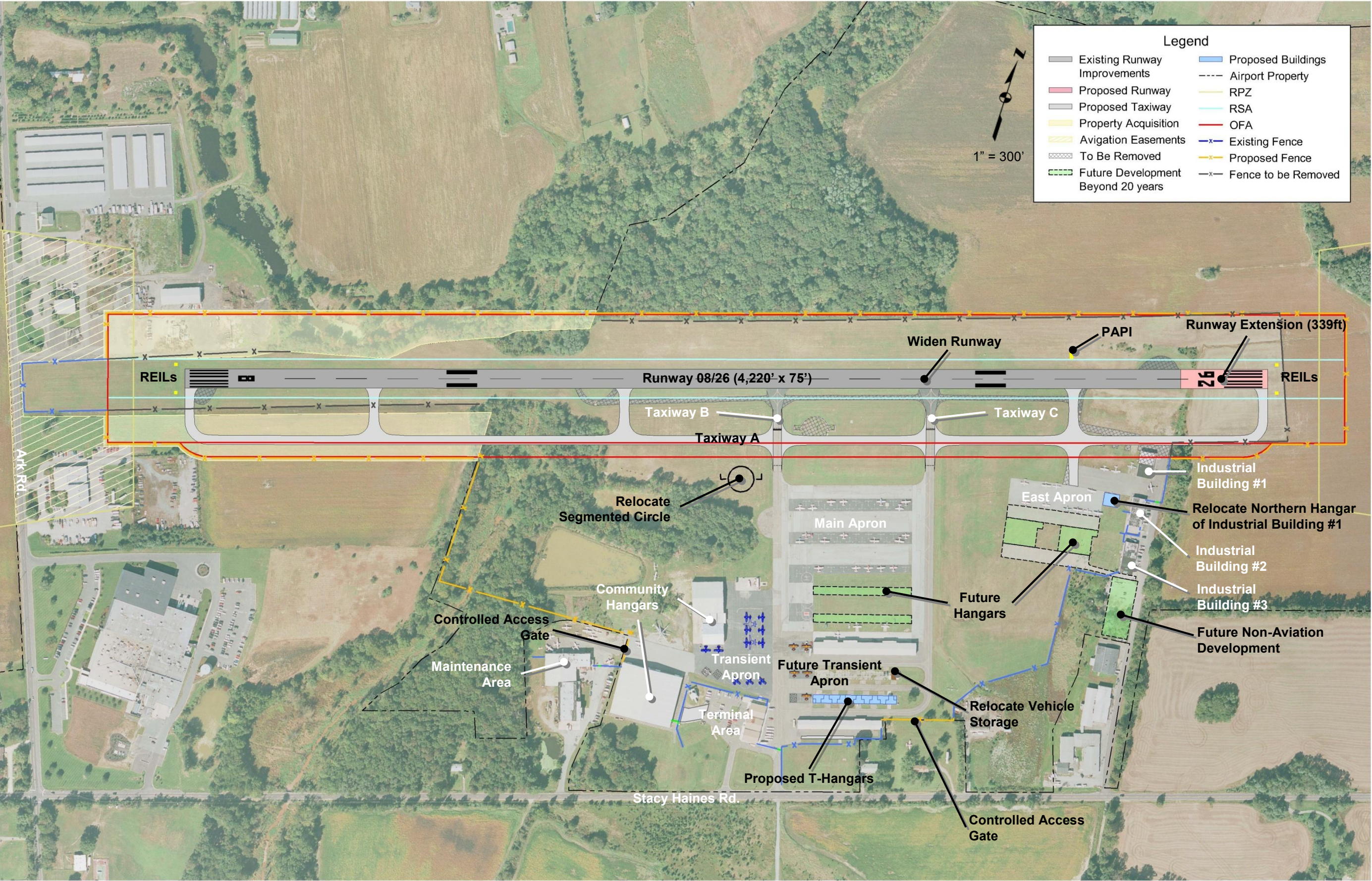


Figure 4-22: Recommended Airport Development Plan

Navigational and Landing Aids

- Relocate the Segmented Circle
- Relocate Runway 26 PAPI
- Relocate Runway 26 REILs
- Publish GPS vertically-guided LPV approach procedures

Due to the runway extension, the current PAPI and REIL's for the Runway 26 end should be relocated. The Navigational Aid's (NAVAIDS) on the Runway 8 end can remain in their existing locations. To implement the GPS vertically-guided LPV approach procedures, no new airport infrastructure or NAVAIDS are required.

General Aviation Facilities

- Improve Transient Apron Parking positions
- Construct a 10-unit T-Hangar

Beyond the requirements outlined in **Section 3** that were incorporated into the recommended development plan, the potential for future aviation development beyond the 20-year planning period was evaluated. To allow the Airport to adequately plan for future growth and potential needs of the users of the Airport, two community hangars were located south of the existing East Apron. This area was identified as the preferred area to incorporate community hangars due to the reuse of existing pavement, adequate spacing requirements for apron depth, and vehicular access.

If future demand should warrant the need for additional T-Hangar development, the grass section of the Main Apron was identified as a suitable area to safely accommodate two additional standard nested T-Hangars. Due to the inadequate spacing for a new T-Hangar south of Hangar D, the Main Apron area was chosen as a suitable location for additional T-Hangar development. The existing and future apron parking demand has a surplus capacity that will not be affected by the additional T-Hangars. Additionally, the pavement south of Hangar D could be utilized for overflow, or future transient aircraft parking as needed.

Landside and Support Facilities

- Incorporate two bus parking positions, and paved parking adjacent to the Air Victory Museum
- Enclose airport perimeter fence, and bring the CCTV system online

Despite the natural barriers surrounding VAY, it is recommended the perimeter security fencing be enclosed around the airfield. The two existing "through-the-fence" operations should be the priority of installing perimeter fencing and controlled gated access to the airfield.

The recommended development plan identified the vacant area south of Industrial Building #3 could be utilized for future aviation, or industrial development that would not require airfield access.

Environmental

Prior to the proposed construction and implementation of the recommended development, the environmental features that are affected required further study, and potential mitigation measures to alleviate their impacts. A summary of the requirements are listed below, with the full environmental overview in **Section 5**.

Water Quality

Lumberton Township is considered to be under the jurisdiction of the Delaware River Basin Commission (DRBC); therefore, prior to any construction or airport improvement that could affect Masons Creek, the DRBC, along with the NJDEP should be contacted. The onsite water quality at VAY does not impose any additional constraints upon the recommended airport

development plan, other than what is typically required for NJDEP approval and mitigation measures pursuant to the *Stormwater Management Rules* at NJAC 7:8.

Wetlands and Floodplains

The subject site contains regulated wetlands, wetland transition areas, floodplains, and riparian zones under the jurisdiction of the NJDEP. To verify the presence, absence, and the extent of the existing wetlands and wetland transition areas on the airfield, an NJDEP Letter of Interpretation (LOI) should be obtained. The LOI is then classified as a legally binding document that remains current for a period of five years. The LOI would then be utilized to determine the full extent of any proposed development impacts, and the required mitigation to alleviate the issues relative to wetlands and wetland transition areas. The eastern airport property should be included in the LOI, considering those areas could be suitable for wetland enhancement and mitigation, due to the recommended airfield improvements.

To verify the presence, absence and extent of floodplains and riparian zones on the airfield, an NJDEP Verification should be obtained. The Verification is a legally binding document that can be used to determine the full extent of any proposed development impacts and the required mitigation to alleviate the issues relative to floodplains and riparian zones. The eastern Airport property should be included in the Verification, considering those areas could be suitable for wetland enhancement and mitigation, due to the recommended airfield improvements.

Threatened and Endangered species

The NJDEP identified specific protected species that were noted, or observed to be located within the vicinity of the Airport. The American kestrel and upland sandpiper were noted as potentially being on the airport property; however, a detailed survey to be completed and reviewed by the NJDEP is required prior to any proposed construction. The U.S. Fish and Wildlife Service (USFWS) also lists Lumberton Township as having the potential occurrence for bog turtle and swamp pink; both federally threatened and State endangered. Suitable habitat for these species is present on airport property; therefore, the USFWS should be consulted concurrently with the planning and design of the recommended airport development plan.

4.7.1 Modifications to Design Standards

As discussed in **Section 4.2.1**, unique site constraints limit the ability of the Airport to adhere to the FAA dimensional design standards as outlined in *AC 150/5300-13: Airport Design*, due to the potential high cost associated with meeting these standards. The FAA allows for certain modifications to the design standards that are required due to the local conditions. However, they require a separate FAA independent study and approval to determine if the proposed modification to the standards would allow the Airport to operate in a safe manner. The modifications that are recommended for the Airport are listed below.

Runway Object Free Area (ROFA):

The ROFA requires appropriate clearing standards and grading requirements involving the clearing of ground objects that protrude above the runway end elevation. The local environmental constraints north of Runway 08/26 do not allow for the ROFA to be properly graded and clear of obstacles. The existing wetlands, Masons Creek, and the forested areas are all within the ROFA. The existing airport security fence also protrudes into the ROFA by approximately 10 feet, with its relocation limited due to the wetlands and forested areas. All obstacles should be removed to the extent practicable (lowering, or removing trees for example), however for VAY this would be cost prohibitive. The RSA is more critical in being clear of obstacles, and considering no obstacles penetrate the RSA, and the ROFA penetrations are an existing condition, we recommended a modification to design standard in regards to the ROFA.

Taxilane Object Free Area (OFA):

The taxilanes at VAY are located outside of the movement area, beginning south of Taxiway A. These taxilanes provide access to the apron areas and T-Hangars located on the airfield. In regards to the Taxilane OFA, the full ADG II clearance standards cannot be met without the relocation of certain facilities and parking positions. However, considering that VAY is classified as B-II, the taxilane OFA was applied to the Cessna Citation V wingspan (56 feet), which is the largest B-II aircraft limited to 30,000 lbs that can operate at the Airport. The FAA utilizes taxilane OFA equations that have been determined to

demonstrate a modification to the design standard can achieve an acceptable level of safety for a specific aircraft wingspan. This taxilane OFA distance was calculated as 43.6 feet, versus the standard of 57.5 feet. Utilizing the taxilane OFA specific to a Cessna Citation V allows for the Transient Apron, Terminal Building, and Community Hangar #1 to remain outside of the taxilane OFA, while still providing the required level of safety at the Airport.

Due to the size of the T-Hangar bays and the associated existing pavement, the apron taxilanes serving T-Hangars A and D are specific to ADG I single engine aircraft with a maximum wingspan of 36 feet. This wingspan is equivalent to a Cessna 172 aircraft or smaller.

Section 5

Environmental Overview



Prepared for
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Department of Transportation

5 Environmental Overview

This section is an overview of the existing environmental features anticipated to be affected by the Recommended Airport Development Plan, identified in **Section 4**. The existing environmental resources at the South Jersey Regional Airport (VAY) require further evaluation regarding the specific environmental impacts associated with the proposed development. The environmental overview focuses primarily on the required surveys and necessary steps that NJDOT must comply with prior to any proposed construction. The environmental resources reviewed herein can be applied to, and supplemented by the Federal Aviation Administration (FAA) guidelines for implementing the National Environmental Policy Action (NEPA) pursuant to FAA Orders 5050.4B and 1050.1E. These guidelines identify these items that would need to be addressed under a subsequent NEPA document prior to a proposed project or action requiring FAA decision making and approval.

5.1 Recommended Environmental Studies

Prior to the implementation of the Recommended Airport Development Plan, the appropriate environmental studies and surveys must be performed to determine the full extent of the existing environmental features located at the Airport. Identifying the full extent of the existing environmental resources are required to adhere to the Federal and State agency jurisdictions, and thus provide the appropriate information to determine potential environmental impacts due to proposed construction. The survey of the environmental resources will allow the FAA to conduct the NEPA decision making process, prior to approving and implementing the Recommended Airport Development Plan.

5.1.1 Water Quality

As documented in Section 1.3.1, onsite and downstream water quality designations do not pose additional constraints upon the site relative to wetland transition areas, riparian zones, and Special Water Resource Protection Areas (SWRPA) other than what is normally imposed by the NJDEP. The water quality designation of water bodies in the State of New Jersey plays a part in the NJDEP assessing the width of wetland transition areas, riparian zones, and SWRPAs for project sites. The most common width of a wetland transition area and riparian zone assessed by NJDEP is 50 feet. For example, high water quality classifications such as a trout production (TP) designation require a 150-foot wide wetland transition area, and a 150-foot wide riparian zone as opposed to the previously mentioned 50-foot wide requirement. A Category One (C-1) classification requires a 300-foot wide riparian zone as opposed to a 50-foot wide riparian zone. Therefore, it has been preliminarily determined at the time this document was prepared that onsite wetland transition areas should be assessed a 50-foot width by NJDEP solely based on the water quality designation.

Proposed development defined as a “major project” under the *New Jersey Stormwater Management Rules Act* (N.J.A.C. 7:8), requires incorporating certain water quality treatment techniques into the project design. A major project is defined as development that disturbs one or more acres of land and/or results in the placement of ¼-acre or more of impervious surfaces. Only a major project resulting in the addition of ¼-acre or more of impervious surfaces will require water quality design measures. Once the design is underway for the proposed development, the design engineer will be responsible for ensuring that the stormwater management design is in compliance with water quality treatment standards enumerated in N.J.A.C. 7:8. This includes, but is not limited to, 80% removal of total suspended solids (TSS) from new impervious surfaces prior to discharge to a surface-water. It is expected that development at the Airport will be considered a “major project” pursuant to N.J.A.C. 7:8. Determination of applicability of N.J.A.C. 7:8 to a proposed development and subsequent compliance with these rules is not part of the scope of this Master Plan and must be addressed by the design engineer at the time a development is proposed and designed.

The rules for N.J.A.C. 7:8 require a 300-foot wide buffer along all C-1 watercourses and their upstream perennial and intermittent tributaries within the same HUC-14 (i.e., subwatershed). This buffer is known as a SWRPA, which is not applicable to onsite watercourses.

5.1.2 Wetlands

The first recommended course of action relative to onsite wetlands involves completing a comprehensive wetland and State Open Waters (SOWs) delineation (i.e., flagging) and mapping. This will ensure the jurisdictional areas are placed on a base map depicting existing conditions, including topography at two-foot contours. As noted in Section 1.3.2, onsite wetlands presented in this document include wetlands mapped by the NJDEP, which do not represent a jurisdictional boundary for specific design purposes. These wetlands should only be utilized as a preliminary planning tool, and are shown in **Figure 5-2** relative to the proposed development. As noted in Section 1.1, several onsite areas were observed to conflict with the mapped wetlands identified by the NJDEP. It is imperative onsite wetlands be ground-truthed to ensure project design constraints are specifically identified and addressed accordingly.



Figure 5-1: Wetlands on Airport Property

The NJDEP is the lead agency for establishing and verifying the jurisdictional limits of wetlands and SOWs in the State of New Jersey. For the NJDEP to validate the jurisdictional limits of the wetlands, a request for a Letter of Interpretation (LOI) must be submitted. The LOI will stipulate the width(s) of the wetland transition area. As long as surveys for threatened and endangered species outlined in Section 5.1.4 Biotic Communities result in the absence of the target species, the width of the wetland transition area is expected to be 50 feet; however, the NJDEP will make the final determination in the LOI. The LOI request can only be completed once the comprehensive delineation and mapping of wetlands on Airport property has been conducted. An LOI issued for the Airport is estimated to be issued by the NJDEP within 9-12 months after a complete application is received.

An LOI verifying wetlands and SOWs must cover the full extents of one or more tax lots. However, with the Airport being publically owned, a partial LOI covering no more than 10% of the total site area is possible. Determining the limit of the LOI boundary must account for several factors, which should be included in the request for an LOI:

- The project sequence identified in the Implementation Plan (**Section 6**)
- If onsite mitigation is available on Airport Property
- All tax lots comprising the entire site
- Land acquisition areas located north and south of Runway 8

If the western adjacent area and/or the eastern adjacent area are deemed unsuitable for mitigation, it may be possible to exclude these lands from the delineation and LOI, thereby reducing the effort and cost associated with obtaining the LOI. However, further analysis and review are required to make a final determination relative to including or excluding the adjacent parcels. This analysis and review would be determined following the wetland delineation previously mentioned. The analysis would include a determination of wetland impacts, the mitigation requirements, and appropriateness of the adjacent areas for mitigation relative to potential wildlife hazards. The approved LOI will have a term of five years, with the opportunity for one, five year extension; for a total of 10 years, as long as a formal request for an extension to the LOI is received by the NJDEP prior to its expiration. If the LOI is allowed to expire, a completely new LOI application must be prepared and submitted, including the full application filing fee. Therefore, the approved LOI and an extension will cover the timeframe which encompasses both Phase I and Phase II of the Airport Implementation Plan. To proceed with the activities associated with Phase III of the Airport Implementation Plan, a new wetland delineation must be completed, along with a new LOI issued by the NJDEP. However, the wetland location data and survey information previously prepared and approved can be utilized to obtain a new LOI, thus potentially reducing the effort, cost, and timeframe to obtain the new LOI.

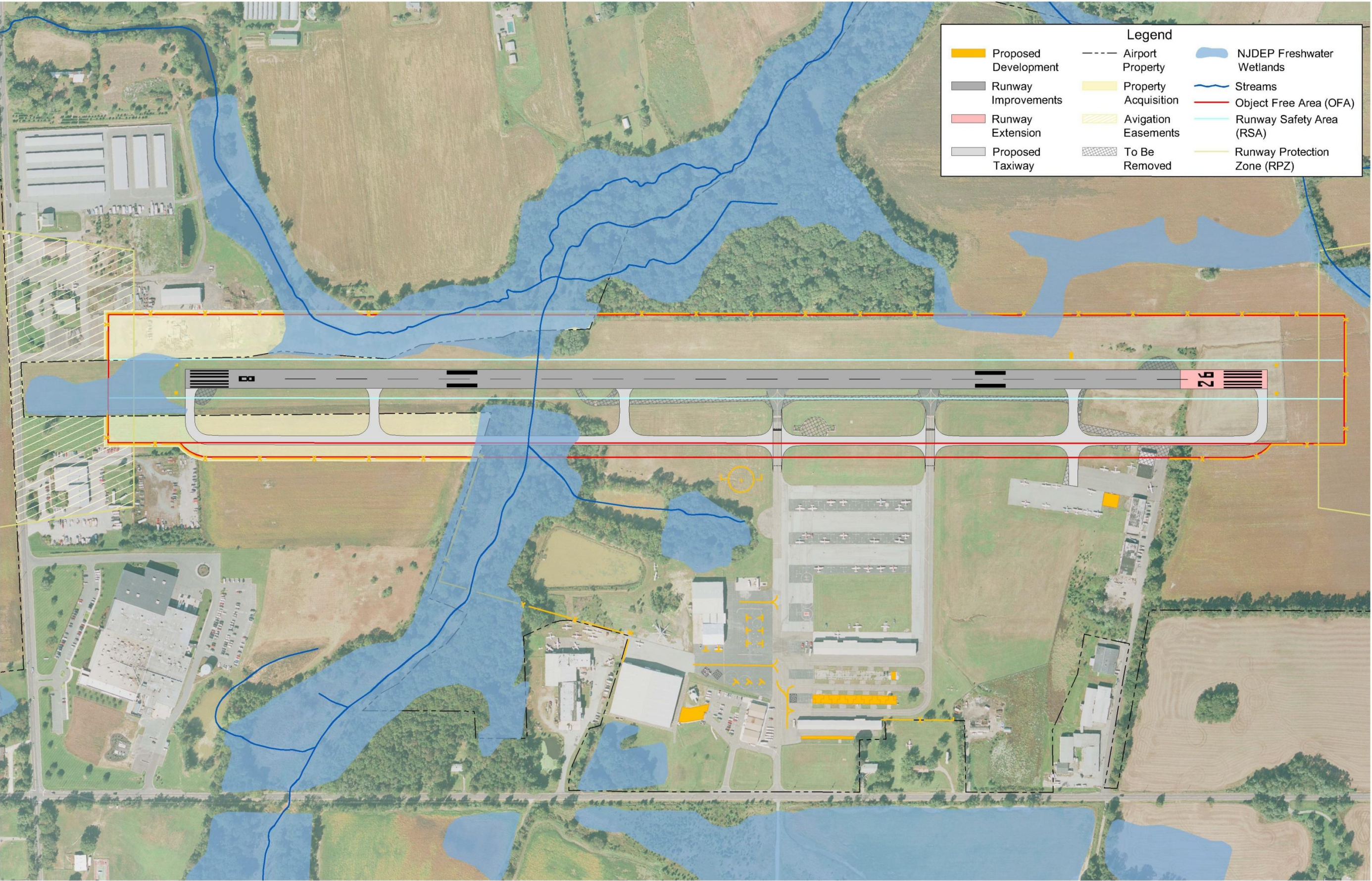


Figure 5-2: Affected Environmental Features
Note: For more detail on the proposed development, see Section 4.3.5

It is anticipated that the proposed wetlands, SOWs, and transition area disturbances will require an Individual Permit (IP) pursuant to the *Freshwater Wetland Protection Act Rules* (N.J.A.C. 7:7A), based on the NJDEP mapped wetlands and the Recommended Airport Development Plan. Regrading the runway at Masons Creek, the crossing of Masons Creek for the construction of a full parallel taxiway, and the installation of a chain link fence through wetlands and wetland transition areas will likely require an IP. The IP approval process will require certain biological surveys for wetland-dependent threatened and endangered species, specifically bog turtle (*Clemmys muhlenbergii*) and swamp pink (*Helonias bullata*). The U.S. Fish and Wildlife Service (USFWS) and NJDEP should be consulted throughout the planning and design of the Recommended Airport Development Plan. The IP approval process will need to be completed twice during the span of the 20-year planning period; once for Phase I and a second for Phase III projects. It is highly recommended that NJDOT coordinate closely with the NJDEP to understand the purpose and need to segment the proposed activities and construction over a 20-year period.

The NJDEP typically issues an IP within 9-18 months after an application is received, and compensatory mitigation is required for the loss of wetlands and SOWs. Any proposed onsite wetland compensatory mitigation efforts, such as the creation or enhancement of habitat on the western or eastern adjacent areas will require prior approval from the FAA, U.S. Environmental Protection Agency (EPA), USFWS, NJDEP, and U.S. Department of Agriculture. This approval process is to ensure wildlife attractants will not affect the safety of airport operations in regards to increasing the risk of potential wildlife aircraft strikes. In essence, these agencies may not approve the creation or enhancement of wetland and wildlife habitat near the Airport for wetland mitigation. If this is determined for VAY, the purchase of wetland mitigation credits must be utilized. If an offsite alternative is pursued, the NJDOT will need to conduct a mitigation site search and ultimately purchase property suitable for wetland creation or enhancement. As noted above, the optimal mitigation option may be to purchase wetland mitigation credits from an approved wetland mitigation bank, since this will eliminate the need to search for and purchase land dedicated solely to the construction and monitoring of a wetland mitigation project. The NJDOT's obligations relative to the viability and success of a constructed mitigation site will extend at least five years after the mitigation project is constructed. The purchase of wetland mitigation bank credits will not require any future obligations for the NJDOT; however, the cost of credits is expensive. The subject site is within the service area (WMA#19) of the Willow Grove Lake wetland mitigation bank. At the time this report was prepared, this mitigation bank is approved by NJDEP to sell credits, and the estimated cost per credit is \$400,000. A single credit equals one acre of impact; however, the actual amount of credits to be purchased will be determined by NJDEP as part of the IP approval.

The following represents a summary of the wetland approval process, which must be repeated during Phase III (Years 10-20) of the Airport Implementation Plan:

- Wetland delineation, survey, and mapping
- Prepare and submit application for LOI and NJDEP filing fee
 - Obtain LOI from NJDEP in 9-12 months after submission
 - Determine wetland impacts based on proposed Development Design
- Prepare and submit application for IP, Conceptual Mitigation Plan, and NJDEP filing fee
 - Complete protected species habitat assessments and/or target species surveys
 - Obtain Wetlands IP from NJDEP in 9-18 months after submission
- Finalize and satisfy mitigation obligations (preferably purchase wetland mitigation credits)

5.1.3 Floodplains

The first recommended course of action relative to onsite floodplains and riparian zones involves completing a comprehensive mapping of the State-established flood hazard area, including the floodway, and the riparian zones (i.e., stream buffers). Similar to the wetland requirements, the floodplain mapping is vital to ensuring the jurisdictional areas are established. The comprehensive mapping is then submitted to the NJDEP for verification under the *Flood Hazard Area Control Act Rules* (N.J.A.C. 7:13). As noted in Section 1.3.3, the NJDEP established flood hazard areas for both Masons Creek and the South Branch Rancocas Creek tributary, must be utilized as the jurisdictional limit. The expected width of onsite riparian zones will be a combination of 50 feet and 150 feet, depending on the presence of acid-producing soils. However, at the time this report was prepared, the NJDEP was considering removing the acid-producing criteria for imposing a 150-foot wide riparian zone from the adoption of the new regulations. If this change is included in the rule adoption, the riparian zone is expected to be 50 feet wide across the entire site.

The NJDEP issued Verification is valid for a period of five years and cannot be extended; however, if a permit is subsequently issued by the NJDEP which relied on the Verification, then the Verification is automatically extended with the issuance of the permit. For example, if a Verification is issued within six months upon project notice to proceed, then three years later an IP is issued for Phase I activities, the Verification utilized with the permit will expire when the permit expires (i.e., five years). An IP issued under N.J.A.C. 7:13 is valid for five years and cannot be extended. Similar to the wetland approval process, activities covered under Phase I are expected to require an IP, with another Verification and IP required for activities covered under Phase III; including the full application filing fee.

Proposed development is expected to require both flood storage and riparian zone compensatory mitigation efforts. Project development will be held to a zero net fill requirement pursuant to the rules, and any loss in flood storage capacity must be compensated by creating an equal amount of storage. The NJDOT can comply with the zero net fill requirement by removing fill, structures, and/or natural material from the flood hazard area to create storage volume. However, the flood storage volume creation area must be appropriate and not situated within a wetland or riparian zone to the extent possible. Additionally the proposed activities may require riparian zone compensatory mitigation in the form of planting native vegetation in the riparian zone where little to none exists; such as within a maintained lawn or agricultural field. Any proposed riparian zone mitigation and plantings will require approval from the same agencies listed in Section 5.1.2 due to the potential risk of attracting wildlife and creating potential wildlife aircraft strike hazards.

The following represents a summary of the floodplain approval process:

- Delineate (in office) and map the NJDEP flood hazard area and riparian zone
- Determine flood hazard area and riparian zone impacts based on proposed Development Design
- Prepare and submit application for IP, Conceptual Mitigation Plan, and NJDEP filing fee
- Complete protected species habitat assessments and/or target species surveys
- Obtain Verification and IP from NJDEP
- Finalize and satisfy flood hazard area and riparian zone mitigation obligations (bank credits currently not an option)

5.1.4 Biotic Communities

Environmental approval will necessitate performing certain biological surveys and investigations to determine the presence or absence of threatened and endangered species and their habitats. As discussed in Section 1.3.4, several State and Federally protected species are potentially present on the Airport property. From strictly a State protection standpoint, American kestrel (**Figure 5-3**) and upland sandpiper (**Figure 5-4**) (i.e., breeding populations) may require conducting the presence/absence surveys during certain times of the year, specifically during their breeding seasons.



Figure 5-4: Upland Sandpiper

The breeding season for American kestrel is from March until early June, and the breeding season for upland sandpiper is mid-April to early May. A reviewing agency will not accept a survey conducted outside of the breeding season, due to the breeding population of these species being protected by NJDEP. These two bird species do not result in a consequence to the wetland resource value classification because they are not wetland-dependent species; however, the NJDEP may require a presence/absence survey aimed at providing protection to these species under the Flood Hazard Area approval process, as all State-listed species within a jurisdictional area pursuant to N.J.A.C. 7:13 are afforded protection under these rules.



Figure 5-3: American Kestrel

As discussed in Section 1.3.4, Lumberton Township is identified by the USFWS as containing a potential presence of bog turtle and swamp pink, both State and Federally protected species. Since the Airport property contains habitat suitable for these species, the NJDEP and USFWS will require surveys for these species during the permit approval process. The results will be reported to issuing agencies prior to the issuance of environmental land use permits. All of the steps and processes outlined herein must be advanced in close coordination with the USFWS. The first step in dealing with these two species is to complete a habitat assessment and delineation to ascertain the size, structure, and extent of suitable habitat. This assessment must be approved by the USFWS. Relative to bog turtle, this survey is known as a Phase I Habitat Assessment Survey. Both the Phase I survey and the swamp pink habitat assessment can be conducted at any time of the year as long as the site is substantially free of snow and ice.

Upon review and approval of the Phase I bog turtle and swamp pink habitat assessment results, the USFWS will likely require a presence/absence survey for bog turtle known as a Phase II Visual Survey, which involves the careful onsite examination of suitable wetlands for individual bog turtles. The performance of this survey must be completed between April 15 and June 15 when turtles are most active. If suitable onsite wetlands exceed two acres and no bog turtles are found after the second survey, or the area is dominated by cattails and/or reed canary grass, the USFWS will likely require a Phase III Trapping Survey which must be completed between May 15 and June 15. To ensure Phase III is conducted in the same season as Phase II, close coordination with USFWS is imperative during the early stages of the Phase II survey period. If the USFWS deems a Phase III survey necessary, it is desirable to do so immediately following Phase II to eliminate the off-season time lapse that would be required to conduct the survey the following season. This would delay the proposed development by a full calendar year before a Phase III survey can be completed. Relative to swamp pink, the presence/absence survey can be completed any time of the year; however, the USFWS prefers the survey be conducted between March and May.

One of the onsite surface water features is identified by NJDEP as a potential vernal pool, pictured in **Figure 5-5**. This feature is the pond located northwest of the main office building and directly north of the man-made detention pond. Other onsite surface water features may also be potential vernal pools. If regulated activities are proposed within a potential vernal pool or within the transition area of a potential vernal pool, the NJDEP may require a survey to confirm or deny the presence of vernal species during the permit review process. A vernal species survey must be conducted between April and June during their active season.



Figure 5-5: Potential Vernal Pool

5.1.5 Farmland Soils

On the Federal level, the *Farmland Protection and Policy Act* (FPPA) of 7 USC 4201 was enacted in 1981 to minimize the loss of prime and unique farmlands as a result of development converting these lands to non-agricultural uses. The FAA is responsible for compliance with the FPPA, prior to authorizing any proposed development that could potentially result in the conversion of prime or unique farmland not already committed to urban development or water storage. Compliance is to be coordinated with the U.S. Department of Agricultural (USDA) Natural Resources Conservation Service (NRCS). Furthermore, in accordance with FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementation Instructions for Airport Action*, Chapter 7 states the FAA requires an Environmental Assessment for an airport project that would convert land protected under the FPPA to non-agricultural uses when the total score on the USDA's Farmland Conversion Impact Rating Form (Form AD-1006) exceeds 200 points. To determine the Farmland Conversion Impact Rating, further analyses, comparisons, and coordination with the USDA is required prior to any proposed development, to ensure compliance with the FPPA since the Airport property contains prime farmland soils.

NJDEP regulations pertaining to the required approvals do not contain provisions for the identification or protection of farmland soils; therefore, no further investigations or surveys are anticipated.

5.1.6 Historic and Archaeological Sites

As discussed in Section 1.3.6 it is recommended that previous cultural resource investigations be updated or new investigations be completed by a qualified professional. The first step in the process, known as a Phase IA Survey, identifies resources and establishes sensitivity. The Phase IA survey should be completed early in the process during Phase I (Years 0-5) of the Implementation Plan. The results of the Phase IA survey will be reviewed by the State Historic Preservation Office (SHPO), which will provide concurrence and/or comments on the results and determine the next appropriate course of action. This course of action may involve subsurface testing for archaeological resources known as a Phase IB Survey. The SHPO will review the testing results and provide guidance on the next appropriate course of action. These investigations and surveys can be completed any time of the year as long as the site is not burdened by substantial snow and ice cover.

5.1.7 Air Quality

As outlined in Section 1.3.7, the Airport Environmental Handbook states that no air quality analysis is required if a general aviation airport has less than 180,000 operations forecasted annually. The number of forecasted operations for the year 2031 is forecasted at 34,262. With the forecasted operations being less than 180,000, no further air quality analysis is necessary, and no significant air quality impacts will occur as a result of the Recommended Airport Development Plan.

5.1.8 Compatible Land Use

The existing land use in the Airport environs is compatible with aircraft operations, which includes a mix of agricultural and wooded areas, low-density residential developments, and commercial establishments. There are no places of public assembly (schools, churches, hospitals, or shopping centers) located in the NJ Airport Safety Zone and adjacent to the airport facilities. As identified in Section 1.3.8, the existing noise contours identified local businesses and agricultural land as the only areas affected by the 65 DNL contour located off airport property.

The proposed noise contours were developed for 2031 by incorporating the forecasted operations and aircraft fleet mix previously identified in **Section 2**. The 2031 noise contours are increased within the 65 DNL contour by roughly 8%, with the increase attributed to the Runway 26 extension. The majority of the noise contours are located on airport property and do not pose any noise sensitivity issues, as shown in **Figure 5-6**.

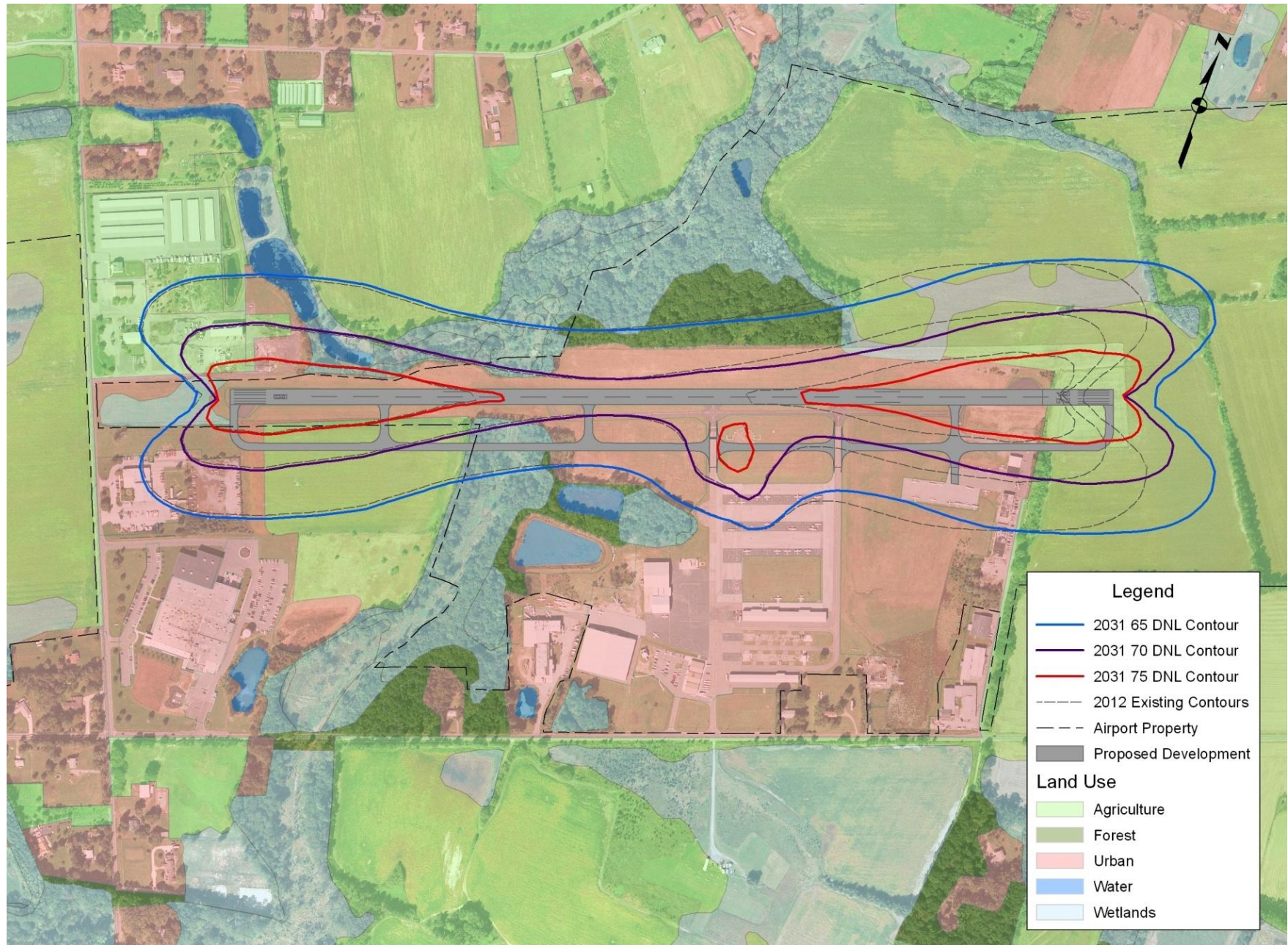


Figure 5-6: Existing and Future Noise Contours

The Recommended Airport Development Plan is compatible with the surrounding land uses, due to the runway extension being located on airport property, and thus only affecting adjacent agricultural areas. However, the zoning classification adjacent to Runway 26 is the Transfer of Development Rights (TDR) Sending Area, which requires coordination with Lumberton Township to modify the zoning classification and restriction. As outlined in Section 1.2.8, the existing TDR parcels that were transferred by the previous owner are outside the areas of proposed development, and therefore do not restrict airport development. Therefore, the TDR Sending Area zoning classification should be rezoned prior to implementing the runway extension.

5.1.9 Hazardous Materials and Waste Sites

As discussed in Section 1.3.9, the airport property is not mapped by NJDEP as containing a groundwater Classification Exception Area/Well Restriction Area (CEA), a Currently Known Extent of groundwater contamination designation (CKE) or a deed notice for hazardous materials. The previous environmental investigations should be updated or a new investigation should be completed by a qualified professional to ensure that no new hazardous materials or waste sites exist on airport property.

Section 6

Implementation Plan



Prepared for
The New Jersey
Department of Transportation

6 Implementation Plan

The last section evaluated airfield development alternatives at the South Jersey Regional Airport (VAY) over the next 20 years based on the forecast activity, operational efficiency, safety, and design standard compliance requirements, and have developed a recommended airport development plan. The next element of the master planning process is to present a phased facilities implementation plan, which provides guidance for New Jersey Department of Transportation (NJDOT) on how to implement the findings and recommendations of the master plan throughout the 20-year planning period.

The implementation plan provides an overview of the proposed projects including approximate start dates and duration. This schedule is broken down into three phases throughout the 20-year planning period: Phase I, Phase II, and Phase III. Phase I encompasses years 0 to 5 of the overall implementation plan, Phase II is years 6 to 10, and Phase III is years 11 to 20.

Due to the unique conditions associated with VAY, the majority of the recommended airport development and implementation projects are based on satisfying the FAA design standards and increasing the safety and efficiency of the Airport. The runway and taxiway improvements are the major components required to satisfy the FAA design standards, as identified through the facility requirements and alternatives analysis. The phased implementation evaluates and identifies the projects that are of the highest priority, regarding facility requirements and adhering to the FAA design standards; and should thus be completed in the first five years of the planning period. The phased implementation also ensures all of the interrelated projects or third-party studies are completed prior to the construction of the improvements identified in the Implementation Plan.

6.1 Key Activities and Responsibilities

Per the guidance and best practices presented in *FAA Advisory Circular 150/5070-6B Airport Master Plans*, the key activities and responsibilities associated with the proposed projects are identified in the Implementation Plan. Due to the unique and often extensive lead-time associated with certain projects and any collaboration required between government agencies, these key activities and responsibilities are essential to the implementation of the recommended airport development plan. The activities include:

- **Sponsor-Specific Project Approvals:** Certain projects that require NJDOT approval, various budgetary approvals, and funding appropriations; and similar sponsor-specific items would be included in this activity.
- **Airport Operator and Tenant Approvals:** Includes the approvals required for any lease modifications.
- **Project Funding:** This activity includes the FAA and other government agency grant applications.
- **Environmental Processing:** Activities required and identified accordingly through the Environmental Overview, and required under *FAA Order 1050.1E Environmental Impacts: Policies and Procedures*, and *FAA Order 5050.4B NEPA Implementing Instructions for Airport Actions*.
- **Land Acquisition:** The activities that require land acquisition and coordination with the NJDOT, Lumberton Township, and affected property owners.
- **South Jersey Regional Airport Project Implementation Process:** All of the projects included in the implementation plan will address the design and construction activities.
- **Agency Coordination:** These agencies include the FAA, the Airport Operator (Flight 114, LLC), NJDOT, New Jersey Department of Environmental Protection, and any other agencies that may have direct involvement with the airport for the proposed projects.
- **Public Coordination:** Activities that carry the public involvement process into the project implementation phase regarding any necessary proposed projects.

6.2 Phase I (0-5 Years)

The Phase I Implementation Plan includes projects that are recommended for immediate and near-term implementation to address the existing safety issues, perform appropriate environmental studies prior to any construction, and to allow the Airport to adhere to the current FAA design standards. Due to the long-lead times involved with the environmental studies, the design and permitting required prior to project construction, and the airport operational restrictions during runway construction as outlined in the following pages, certain projects were identified as encompassing more than one phase.

6.2.1 Airfield

The airfield projects are primarily associated with the runway and taxiway improvements required to address FAA design standard deficiencies, along with the required environmental studies and discussions on the Transfer of Development Rights required to facilitate the future runway extension.

Environmental Studies and Mitigation (A1)

Environmental Studies pertaining to the Wetlands, Flood Hazard Areas, Endangered Species, and Historic and Archeological Sites are required to determine the presence/absence of these features, and determine if mitigation actions are required. The Airport should immediately begin the studies to avoid any delays in development of the parallel taxiway and runway improvements. The Wetlands, Flood Hazard Areas, and Endangered Species permitting and approval process can only be completed once 80% of the runway and taxiway design has been prepared, and are therefore the critical studies that determine when the projects identified in Phase I can begin. Due to this lead-time and design requirement, all of the construction projects identified in Phase I cannot begin until year three of the planning period.

Modify Transfer of Development Rights Zoning (A2)

To avoid any potential delays for the proposed construction in Phases II and III, the NJDOT should begin the discussions with Lumberton Township to rescind, modify, or redefine the restrictions and limits on the Transfer of Development Rights (TDR) zoning. The TDR zoning and associated parcels can be reviewed or rescinded every 10 years, with the coming review period beginning in 2019. Coordination should begin well in advance of 2019 to ensure any proposed projects are not inadvertently delayed.

Widen and Regrade Runway, Regrade RSA (A3)

The runway widening, the runway profile, and runway safety area improvements should be initiated in the first phase of development. The major area of concern is related to the portion of the runway that overruns Masons Creek, which appears to have settled approximately five feet lower than the surrounding runway, and the nonstandard RSA grading beyond the Runway 26 threshold. The runway profile in this area was raised approximately 26 inches to allow for an increase in fill, and space for the necessary box culverts beneath the runway to improve the stability over the creek, and minimize the risk of any resettling occurring. Due to the runway profile being raised in this section, the remainder of the runway required regrading to attain consistency with the FAA design standards. The remainder of the runway regrading follows the existing runway profile to the greatest extent possible to minimize the total construction cost, and ensure an optimal runway profile is achieved. Coinciding with regrading the runway profile, the runway transverse gradient utilized a maximum slope of 2% to allow for minimal earthwork to tie into the existing elevations.

Runway Profile Evaluation

A runway profile analysis was performed to justify the runway improvements can be phased in a manner that would allow the airport to remain operational during construction, and can be completed in a cost effective manner that minimizes areas of re-work and will tie-into the long-term runway extension.

As shown in **Figure 6-1**, two options were developed; Option 1 re-grades the existing runway and RSA in two stages, while Option 2 reconstructs the existing runway and the proposed extension in a single stage. Option 1 (Stage 1 to be implemented in Phase I) reconstructs the existing runway in-place while maintaining the existing runway end elevations, and minimizing the regrading required to meet the FAA design standards. The regrading of the RSA on the Runway 26 end validates the extension can be facilitated with minimal construction time and cost. Option 1 (Stage 2 to be implemented in Phase III) demonstrates how the proposed extension would tie-into the new runway profile. Option 2 lowered the Runway 26 threshold elevation in an attempt to minimize the amount of earthwork required for the RSA tie-in, but still required 1,600 cubic yards more earthwork and construction material than Option 1. To further reduce the overall construction cost of Option 1, the excess cut from Option 1, Stage 1 allows the airport to stockpile suitable material on airport property to be utilized during the Option 1, Stage 2 construction. Therefore, addressing the existing deficiencies in the near-term and deferring the runway extension to a later phase will not increase the overall cost of the runway improvements over the 20-year planning period.

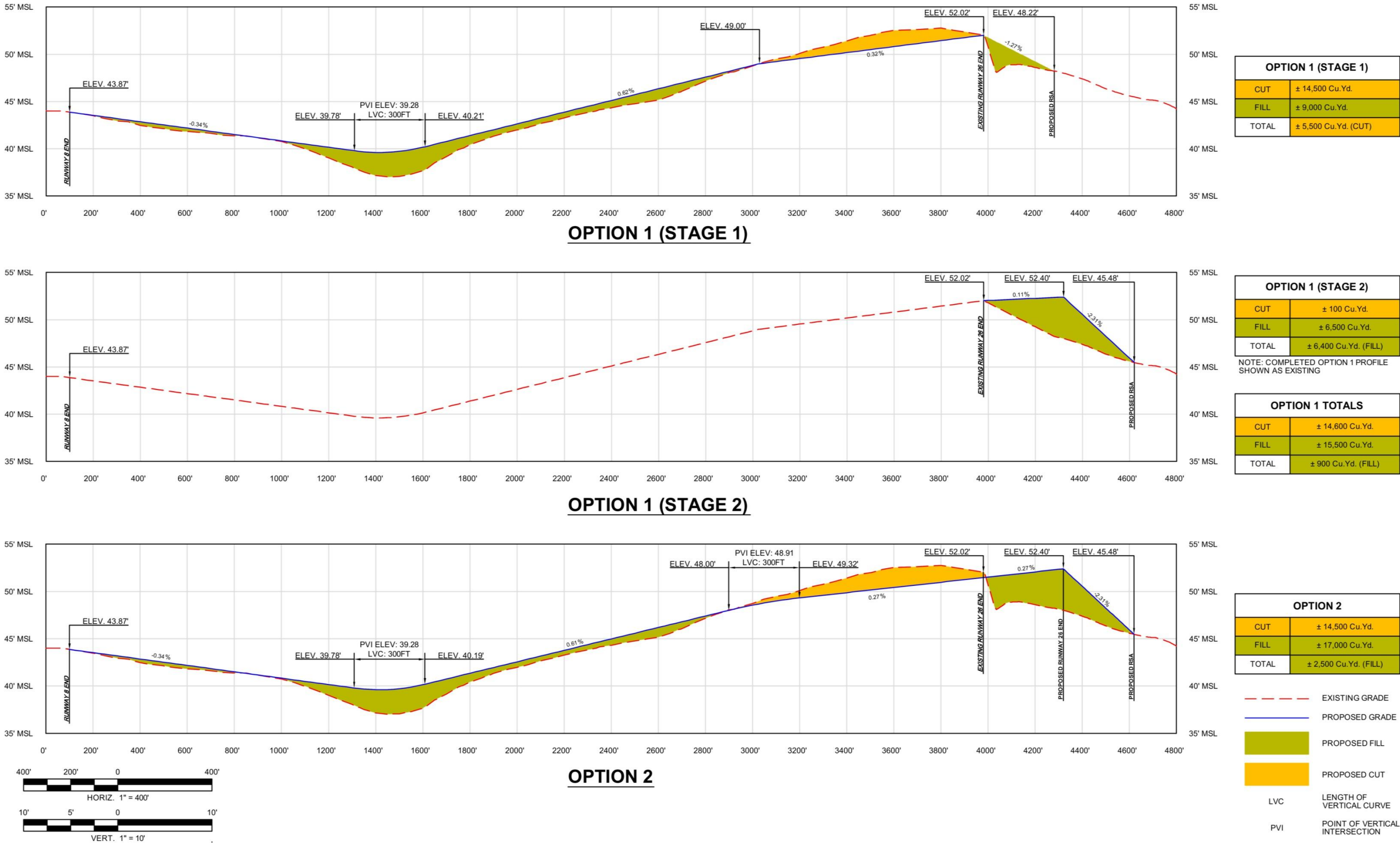


Figure 6-1: Runway Profile Analysis

Maintaining Airport Operations

To allow the Airport to continue operating during the runway construction, the improvements can be sequenced to maintain minimum safety standards. However, addressing the depression associated with Masons Creek requires reconstructing a 1,000-foot section (the area between the 900-foot station and the 1,900-foot station as depicted on **Figure 6-1**) in a single phase to reduce the total cost of construction. Due to this restriction, the runway length would be limited to 1,700 feet during construction, which restricts use to ADG-I or approximately 70% of the single-engine aircraft without any weight penalties. As shown in **Figure 6-2**, the RSA for ADG I aircraft and the Threshold Siting Surface (TSS) were evaluated to ensure arriving and departing aircraft would maintain 30 feet of clearance above the runway construction. *AC 150/5370-2E, Operational Safety on Airports During Construction* states that these surfaces must be clear of obstacles throughout construction.

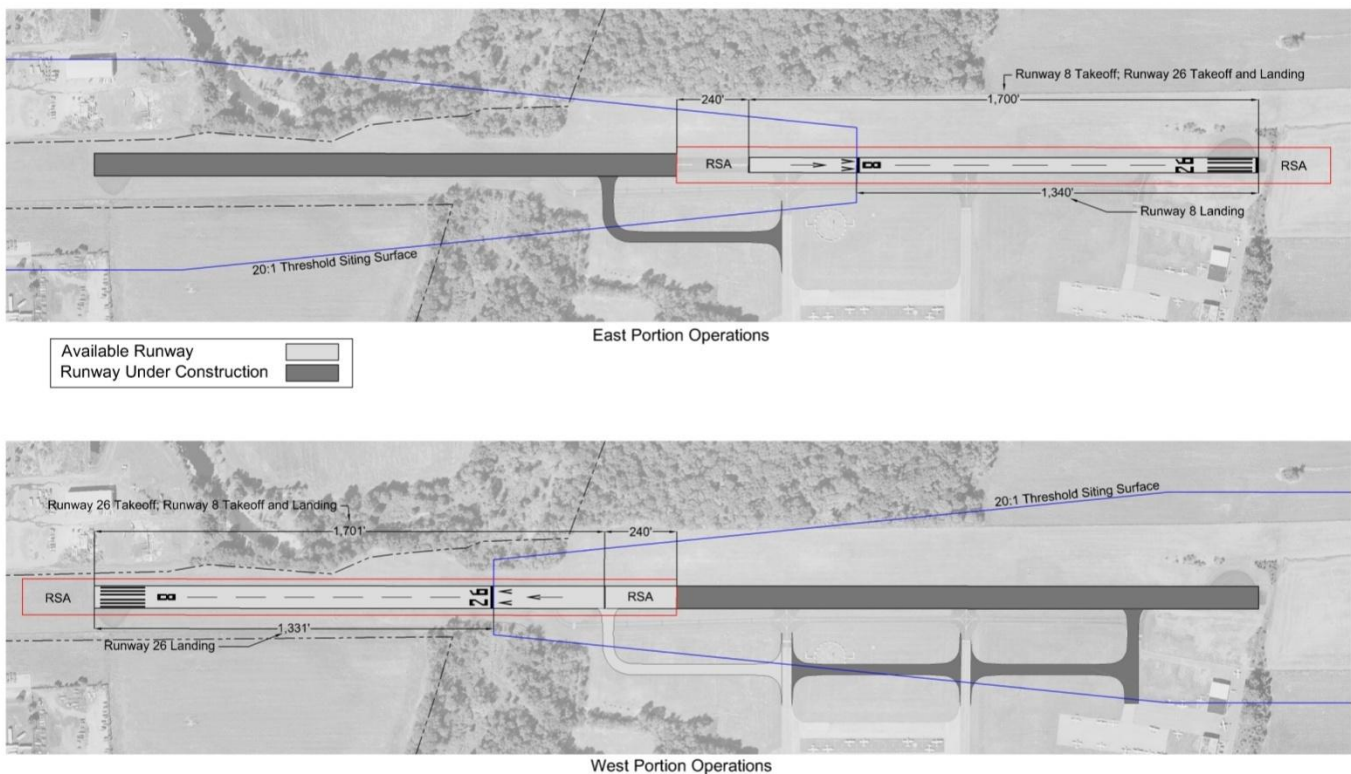


Figure 6-2: Runway Construction Sequencing

While the western portion of the runway (Runway 8 end) is being constructed, aircraft can utilize the 1,700 feet of temporary runway on the eastern portion of the existing runway (Runway 26 end). During west-flow operations and east-flow departures, aircraft would utilize 1,700 feet of runway. However, the Runway 8 threshold requires displacement to provide TSS clearance over the construction area which limits east-flow arrivals to a runway length of 1,340 feet.

Upon completion of the western portion of the runway, the eastern portion would be closed and the temporary runway and restrictions are reversed; west-flow arrivals would be limited to 1,331 feet of usable runway.

Construct Partial Parallel Taxiway A (A4)

The construction of the new partial parallel Taxiway A should begin concurrently with the regrading and widening of the runway due to the grading requirements and modifications, as shown in **Figure 6-3**. The parallel taxiway was phased to coincide with the runway construction sequencing identified in **Figure 6-2**, however, should budget permit, the entire taxiway reconstruction could be completed as a standalone project, which requires the connector taxiways to be completed once the widened and regraded runway is complete.

Demolish Existing Taxiway (A5)

The existing taxiway should be demolished simultaneously with the runway and taxiway improvements. This project is dependent upon the runway and taxiway improvements due to the required elevations and regrading of the RSA adjacent to the runway.

6.2.2 Navigational and Landing Aids

The navigational and landing aids (NAVAIDS) identified for Phase I construction are both necessary to improve the safety of the airfield, and allow for the construction of associated projects to begin.

Relocate Segmented Circle (N1)

The segmented circle needs to be relocated prior to constructing the portion of Taxiway A that connects Taxiways B and C.

Install REILs (N2)

NJDOT has recently installed the Runway End Identifier Lights (REILs).

6.2.3 General Aviation Facilities

The GA facility improvements recommended in Phase I are those required to ensure aircraft can adequately maneuver around the apron area.

Improve Transient Apron Parking Positions (G1)

The existing Transient Apron parking arrangements, located adjacent to the main building and Community Hangars #2 to #4, were improved to allow proper wingtip clearance while taxiing adjacent to parked aircraft. This improvement involves eradicating the existing parking positions and their associated tie-downs, and re-striping and relocating the tie-down positions and taxilane centerlines. The completion of this project is not dependent on any of the other projects outlined in Phase I, and should therefore be completed as early as possible to provide for safe aircraft movement.

Install Jet-A Fuel Tank (G2)

The planned 12,000-gallon Jet-A fuel storage tank is assumed to be placed adjacent to the current 12,000-gallon AVGAS fuel tank. This location has an existing concrete base that can be utilized, and will obtain efficiency for re-fueling due to the co-location with the current AVGAS fuel storage tank. This project is not dependent on any of the other projects outlined in Phase I, and is currently under planning through the NJDOT.

Improve T-Hangar Pavement (G3)

To allow for aircraft to safely taxi and access the south side of Hangar A, 276 square yards of new taxilane apron pavement is required. This pavement will allow adequate clearance and safety for the aircraft that are utilizing the T-Hangars. This improvement does not encroach upon the residential property adjacent to the hangar, however this requires the last unit of Hangar A to be limited to smaller ADG I aircraft due to the reduction of pavement and proximity to the airport fence.

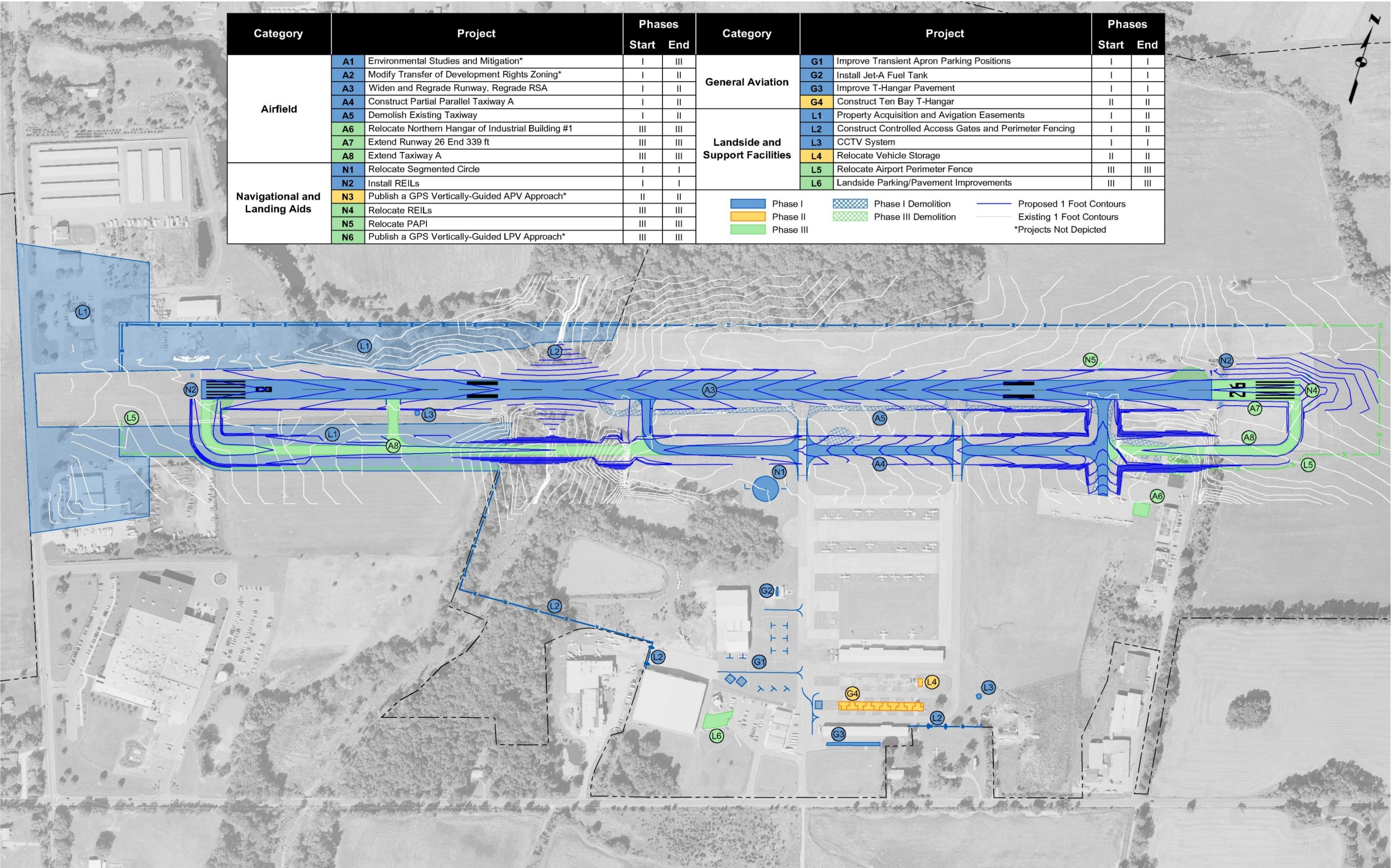


Figure 6-3: Phased Implementation Plan

6.2.4 Landside and Support Facilities

The landside and support facilities in Phase I include:

Property Acquisition and Avigation Easements (L1)

In order to control the runway and taxiway obstacle free areas that ensure the safe operation of aircraft utilizing the Airport, NJDOT should acquire approximately 12 acres of land (6.25 acres distributed through five parcels on the north side of the runway and one parcel measuring approximately 5.75 acres on the south side). It should also secure avigation easements on approximately 8.91 acres of land west of Runway 8, of which 4.36 acres of the property is owned by Ark Rd. Storage northwest of the runway; and approximately 3.41 acres of property is owned by Flanagan's southwest of the runway.

Construct Controlled Access Gates and Perimeter Fencing (L2)

Gates should be installed to control the access of the "through the fence" operators; B P Air, Inc. and the homeowner adjacent to Hangar A. Despite the easement that is currently in place with the property owner, an access plan is required per the FAA guidelines regarding "through-the-fence" operations, and should include a controlled access gate to the greatest extent possible.

The existing security perimeter fence does not fully enclose the airfield, and thus utilizes natural barriers (wooded areas north and south of the runway, and Masons Creek) to secure the airfield. To deter unwanted access of individuals and wildlife through these areas, the airport security fencing should enclose the entire airfield, as identified through the *TSA Security Guidelines for General Aviation Airports*. This includes relocating the existing fence located north of the runway outside of the ROFA, along with the new fencing required to enclose the airfield. It is assumed all of the fence improvements to enclose the airfield will occur during Phase I; however, the new fencing north of the runway is contingent upon the property acquisition of the five parcels previously mentioned, and is therefore assumed to occur in Phase II.

CCTV System (L3)

Currently under development by the NJDOT, the CCTV system should be brought back online in Phase I to monitor areas of the airfield to deter unwanted access and monitor airport operations. This project can be completed independently from the other improvements.

6.3 Phase II (6-10 Years)

Phase II of the Implementation Plan includes projects recommended for implementation during the 6-10 years of the 20-year planning period. The projects during this time period include improvements that are still in construction from Phase I of the Implementation Plan, and the inclusion of a new T-Hangar.

6.3.1 Airfield

Modify Transfer of Development Rights Zoning (A2)

The official review period for the use restrictions on the TDR zoning parcels begins in 2019, which falls within Phase II. NJDOT should coordinate with Lumberton Township to officially rescind, modify, or redefine the restrictions and limits on the TDR zoning and associated parcels by the expiration of the extended 10-year period (i.e by 2019) in accordance with the provisions of the Lumberton Township Transfer of Development Rights Ordinance. This modification to the TDR zoning will facilitate the Phase III runway extension.

Widen and Regrade Runway, Regrade RSA (A3)

The eastern portion of the runway reconstruction is expected to finish in Phase II. Upon completion, the Airport can re-open the full runway, as shown in **Figure 5-3**.

Construct Partial Parallel Taxiway A (A4)

The construction of the new partial parallel Taxiway A began in Phase I and will be completed in Phase II. The existing taxiway connectors for Taxiways B and C currently adhere to the FAA design standards, and will remain in their existing locations. The regrading of the runway allows for the existing elevations of Taxiways B and C to be maintained with minimal modification or tie-in to the existing pavement.

The parallel taxiway will tie into Runway 26 at its current location in order to defer the relocation of Industrial Building #1. Ultimately, the runway extension in Phase III will include a new taxiway connector to the runway threshold.

Demolish Existing Taxiway (A5)

The demolition of the remaining taxiway will be completed simultaneously with the runway widening and regrading during Phase II. The construction of the new taxiway does not have to be completed prior to demolishing the existing taxiway, due to closure of the eastern portion of the Airport during this phase. Aircraft will continue to operate on the western portion of the runway. During this construction however, aircraft will be unable to access and utilize the East Apron.

6.3.2 Navigational and Landing Aids

The navigational improvements in Phase II are as follows:

Publish a GPS Vertically-Guided APV Approach (N3)

With the completion of the runway regrading and parallel taxiway projects, the Airport should publish vertically-guided (APV) approaches pending an updated survey, in accordance with the Vertically Guided Airport Airspace Analysis Criteria listed in *AC 150/5300-18*. The APV approach procedures allow the Airport to improve the safety and accessibility for arriving aircraft prior to the Phase III implementation of the LPV approach procedure that coincides with the runway extension. The LPV approach procedure allows for improved approach minimums over the APV procedures.

6.3.3 General Aviation Facilities

Construct Ten-Bay T-Hangar (G4)

Phase II of the implementation plan should see the construction of the ten-bay T-Hangar. This will provide the necessary aircraft storage for the current and forecast demand. Prior to the construction of the new T-Hangar facility, the vehicle storage requires relocation north of the proposed T-Hangar site.

The current Airport Operator, Flight 114, also expressed interest in renting out some of the available community hangar space to potentially interested businesses to generate more revenue. Space in Community Hangar #1 could be utilized during this time for renting to aviation related businesses, with space in Community Hangars #2 to #4 remaining as storage for based aircraft.

6.3.4 Landside and Support Facilities

Property Acquisition and Avigation Easements(L1)

Finalization of avigation easements and the acquisition of the property adjacent to the runway should be completed in Phase II to coincide with the commissioning of the runway. This will ensure the RSA and the OFAs remain under Airport control. The property south of Runway 8 is also required for the construction of the extension to Taxiway A during Phase III of the Implementation Plan.

Relocate Vehicle Storage (L4)

The construction of the ten-bay T-Hangar requires relocation of the storage canopy for the front loader. The proposed location of the relocated vehicle storage is on the pavement where Hangar B used to reside, north of its current location.

6.4 Phase III (11-20 Years)

Phase III of the Implementation Plan includes long-term projects such as the construction of the runway extension, the full-length parallel taxiway, and any adjustments associated with the extended taxiway. Other improvements include the relocation of navigational aids, and landside parking/pavement improvements.

6.4.1 Airfield

Airfield projects in Phase III are intended to increase the capacity to accommodate the future airfield demand, as shown in **Figure 5-3**.

Environmental Studies and Mitigation (A1)

Due to the length of validity of each environmental study performed in Phase I, the Wetlands, Flood Hazard Areas, Endangered Species, and Historic and Archeological Sites must be re-evaluated during Phase III due to the expiration of the previous studies. The re-evaluation of the environmental features in Phase III is not as extensive as the studies performed in Phase I, due to the recent survey data and mapping that was provided during Phase I. The surveys in Phase III can utilize the information from the surveys developed during Phase I to expedite the process.

Relocate Northern Hangar of Industrial Building #1 (A6)

Relocation of the northern hangar of Industrial Building #1 is an enabling project for the extension of Taxiway A. The northern hangar is located within the Taxiway Object Free Area (TOFA). The northern hangar will be relocated adjacent to Industrial Building #2, thus utilizing the southern portion of the East Apron, and the apron north of the current Industrial Building #1 will be demolished.

Extend Runway 26 end 339 feet (A7)

The runway will be extended 339 feet to a length of 4,220 feet, which allows the Airport to accommodate B-II aircraft up to 30,000 lbs MTOW, and increases the overall safety of the airfield by enabling the addition of a GPS vertically-guided LPV approach. This project is contingent upon redefining the limits or use restrictions of the TDR.

Extend Taxiway A (A8)

Taxiway A will be extended to a full-length parallel taxiway in Phase III as the final upgrade to the taxiway system. Connectors are located along the runway to facilitate aircraft entry and exit. The addition of the taxiway extensions and the associated connectors will increase the efficiency and safety of the airport operations by ensuring aircraft landing have the ability to exit the active runway as soon as possible. The relocation of Industrial Building #1 is a prerequisite of the extension of the taxiway on the Runway 26 end.

6.4.2 Navigational and Landing Aids

The upgrades suggested in this Phase are primarily focused around the relocation of navigational aids due to the extension of the Runway 26 end.

Relocate REILs (N4)

The REILs located on the existing Runway 26 end are to be relocated with the extension of the runway.

Relocate PAPI (N5)

To maintain the correct glide path and approach for Runway 26, the PAPI will need to be relocated to correspond with the runway extension. This project includes the appropriate electrical conduit required for relocating the PAPI system, and ensuring the relocated system is fully operational.

Publish a GPS Vertically-Guided LPV Approach (N6)

Coinciding with the runway extension, the Airport should upgrade the APV approaches with the improved accuracy of LPV approach procedures. Using GPS satellites and WAAS geostationary satellites, LPV approach procedures can be published at VAY to improve the safety of the runways by providing ILS comparable vertical guidance approach abilities, without having to purchase ground-based navigation equipment.

6.4.3 Landside and Support Facilities

Landside projects for Phase III include safety improvements, as well as landside accessibility improvements.

Relocate Airport Perimeter Fence (L5)

With the new runway and taxiway extensions, the Airport perimeter fence will need to be moved outside of the OFAs and RSA.

Landside Parking/Pavement Improvements (L6)

Phase III includes new public parking for the Air Victory Museum. For larger parties requiring bus parking, two dedicated bus parking positions are added for the safe loading and unloading of passengers visiting the museum.

6.5 Schedule

The preliminary phasing schedule was developed for the projects identified through the implementation plan previously discussed. The schedule includes planning level design, permitting, and construction estimates to complete the identified projects. Estimated durations for the projects are shown with their associated phase, and are categorized by the following: Airfield, Navigational and Landing Aids, General Aviation, and Landside and Support Facilities, as shown in **Figure 6-4**.

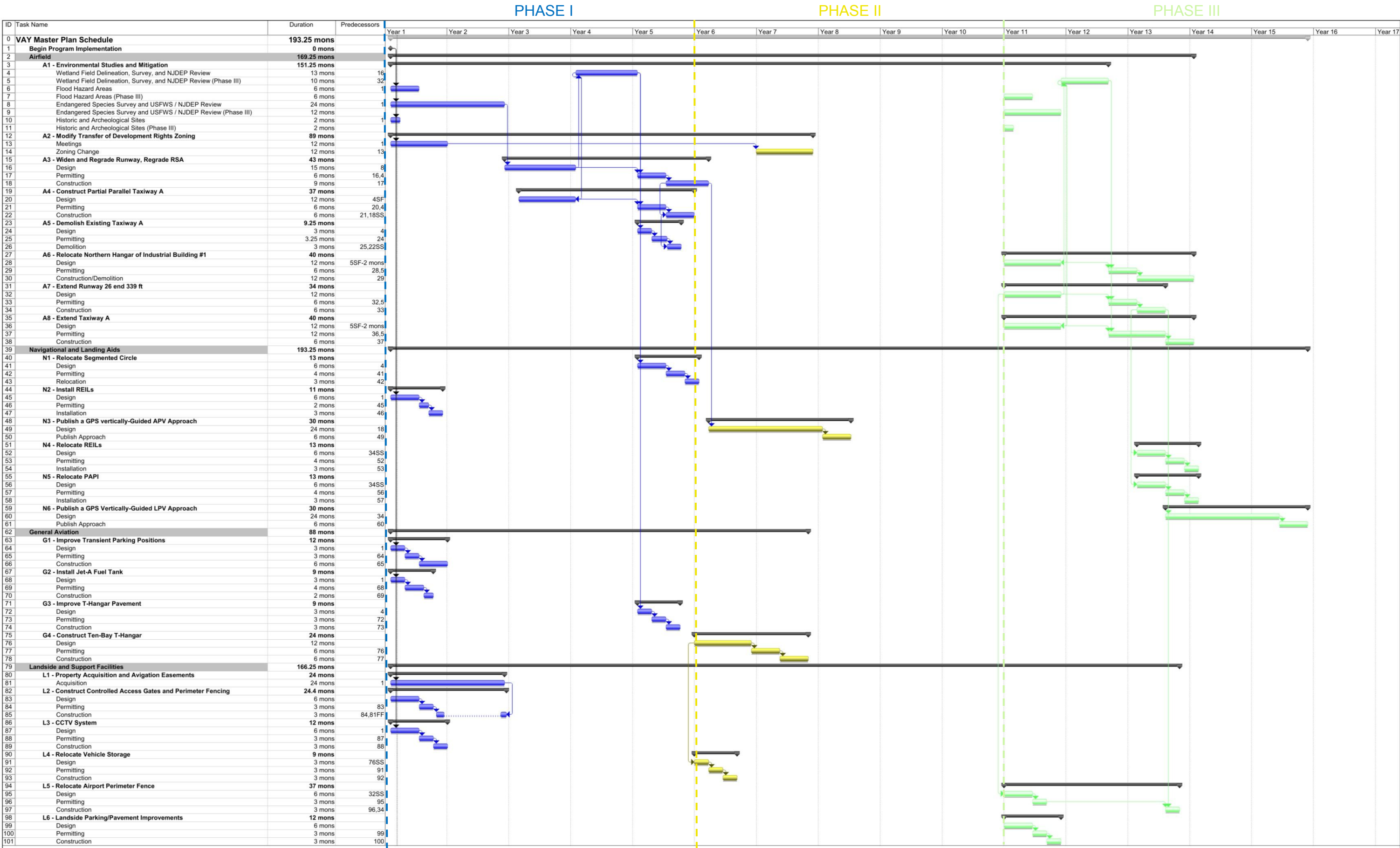


Figure 6-4: Preliminary Schedule

Section 7

Financial Plan



Prepared for
The New Jersey
Department of Transportation

7 Financial Plan

In Section 6, the implementation plan for VAY's recommended 20-year development plan was outlined. The preliminary schedule and project sequencing for the implementation plan was established in three phases: Phase I (0-5 years), Phase II (6-10 years) and Phase III (11-20 years). Section 7 contains an overview of the cost and funding considerations that facilitate the implementation of the airport improvement projects. It identifies the estimated costs of the proposed development and the funding sources for these projects on the federal, state, and local levels and organizes them into a Capital Improvement Plan (CIP). The CIP for VAY includes all of the projects in the Implementation Plan and their related costs. The CIP provides the necessary information to enable the New Jersey Department of Transportation (NJDOT) to program funding for these projects in the CIP throughout the 20-year planning period. The CIP indicates which agencies are anticipated to provide grants-in-aid, and by doing so helps the Airport determine how much local funding will be required.

Although the airport improvements are planned in three phases, some of the development proposed for the Airport is contingent upon future levels of aviation demand. The Airport should evaluate these projects individually during the appropriate time period. Construction of the projects could occur at varying intervals than those previously identified in this master plan, due to the actual demand and the availability of FAA grants and other sources of funding to the Airport.

7.1 Capital Improvement Plan Cost Estimates

Table 7-1 presents the estimated CIP costs by project and the totals for each respective phase. These costs were developed based on recent construction costs at similar airports, contacting suppliers, and construction experience on recent projects. Costs are shown in constant 2012 dollars.

The following conditions and assumptions apply to the cost estimates:

- Project costs include estimated engineering design fees, mobilization, construction management and inspection fees, and contingency allowances. Contingency allowances are 2%; temporary construction items are 3%; mobilization is 5%; and engineering allowances, construction management, and inspection are 10% of project cost. Contingency allowances for the Environmental Studies are 10%.
- Property acquisition costs are order-of-magnitude planning estimates and are made without the benefit of appraisals. The acquisition costs shown do not represent estimates of true market value or purchase offers by the owners, but an estimated value determined through the latest New Jersey Assessment Records. These records pertain to the undeveloped land on the affected properties, and only the acquisition was accounted for in the planning estimate. The portions of the affected properties included a 20% contingency.
- New runway, taxiway, and apron pavement will be six inches of bituminous asphalt over 16 inches of crushed aggregate base.
- Proposed T-hangar construction will include building construction, permits and fees, utilities, fire sprinklers, and bi-fold doors.
- The cost for establishing GPS vertically-guided APV and LPV approaches assumes a new obstruction aeronautical survey is required.
- Gate costs include the cost and installation of keyed entry automatic gates.
- Runway and taxiway lighting costs include: conduit, cable/wire, light fixtures, runway guidance signs, and base cans.

Phase I improvements total approximately \$10.4 million and represent 67% of the CIP costs for the 20-year planning period, as shown in **Table 7-1**.

Table 7-1: Airport Capital Improvement Cost Estimates (2012 Dollars)

No.	Project	Project Cost ^(4,5)
Phase I (0-5 Years)		
A1	Environmental Studies	\$ 533,500
A1A	Environmental Permit Application Fees	\$ 99,000
A1B	Environmental Mitigation	\$ TBD
A3	Widen and Regrade Runway, Regrade RSA ⁽¹⁾	\$ 6,848,400
A4	Construct Partial Parallel Taxiway A ⁽¹⁾	\$ 2,311,100
A5	Demolish Existing Taxiway A ⁽¹⁾	\$ 273,300
N1	Relocate Segment Circle	\$ 12,600
N2	Install REILs ⁽²⁾	\$ -
G1	Improve Transient Parking Positions	\$ 56,400
G2	Install Jet-A Fuel Tank ⁽²⁾	\$ -
G3	Improve T-Hangar Pavement	\$ 34,200
L1	Property Acquisition and Avigation Easements ⁽³⁾	\$ -
L2	Construct Controlled Access Gates and Perimeter Fencing	\$ 234,000
L3	CCTV System ⁽²⁾	\$ -
	Sub-Total for Phase I	\$ 10,402,500
Phase II (6-10 Years)		
N3	Publish a GPS Vertically-Guided APV Approach	\$ 75,000
G4	Construct Ten Bay T-Hangar	\$ 483,800
L4	Relocate Vehicle Storage	\$ 7,400
	Sub-Total for Phase II	\$ 566,200
Phase III (11-20 Years)		
A1	Environmental Studies	\$ 341,000
A1A	Environmental Permit Application Fees	\$ 99,000
A1B	Environmental Mitigation	\$ TBD
A6	Relocate Northern Hangar of Industrial Building #1	\$ 378,000
A7	Extend Runway 26 end 339 feet	\$ 638,400
A8	Extend Taxiway A	\$ 2,853,900
N4	Relocate REILs	\$ 52,900
N5	Relocate PAPI	\$ 52,900
N6	Publish a GPS Vertically-Guided LPV Approach	\$ 75,000
L5	Relocate Airport Perimeter Fence	\$ 118,000
L6	Landside Parking/Pavement Improvements	\$ 60,900
	Sub-Total for Phase III	\$ 4,670,000
All Phases		
	Total	\$ 15,638,700

Note:

1. Construction to be completed in Phase I and II.
2. Projects currently under development; costs have already been allocated in current (2012) CIP.
3. Property values to be determined through a property value assessment
4. Cost does not include On-Airport/Off-Site drainage design
5. Cost does not include overall Airport SWM improvements

The runway improvements, taxiway construction, and existing taxiway demolition should all be constructed consecutively and are also considered to occur during the Phase I and Phase II timeframe. However, the total costs of the projects are included in Phase I to appropriate the necessary funds for the entire project; regardless of how long the entire construction could last.

The Phase I improvements focus on addressing the FAA design standard deficiencies at the Airport. The Phase I improvements total approximately \$10.4 million and account for roughly 67% of the CIP costs.

The Phase II improvements total approximately \$0.6 million and account for roughly 4% of the CIP costs.

The total cost for the Phase III improvements is approximately \$4.7 million. This phase represents 30% of the total CIP costs during the 20-year planning period.

The grand total for all the three phases is approximately \$15.6 million.

7.2 Capital Improvement Plan Funding Sources

Capital improvement funding for VAY is available through various grant-in-aid programs on both the federal and state levels. In identifying potential sources of funds, it is necessary to examine each project element to determine its eligibility for a specific program or funding source. It is also important to consider the availability of funds from each funding source. The following paragraphs briefly describe the primary external funding sources which may be available to provide funding for VAY.

7.2.1 Federal Grants

Over the years, various federal grant-in-aid programs have been established to develop and maintain a system of public airports and airways across the United States. Congress enacted the Airport and Airway Revenue Act of 1970, which established the Airport and Airways Trust Fund (Trust Fund). Since then, Congress has passed multiple legislative measures for the development of the national air transportation system. The major legislations include the Airport and Airway Improvement Act of 1982 which established the Airport Improvement Program (AIP) and was amended most recently by the FAA Modernization and Reform Act of 2012. Prior to the latest FAA Modernization and Reform Act of 2012, federal funding was administered under the Century of Aviation Reauthorization Act of 2003, or Vision 100, which ended on September 30, 2007. Between the current act and Vision 100, short-term extensions (over 20) authorized the FAA to continue operations and provide grant funding to airports.

The Trust Fund finances capital improvements of the airport and airway system, and to the extent funds are made available, it funds FAA's operation and maintenance of that system. The Trust Fund has provided the funding for the three capital accounts of the FAA, which include:

- The Airport Improvement Program (AIP) provides grants for construction and safety projects at airports, as well as airport planning projects
- The Facilities and Equipment account, which funds technological improvements to the air traffic control system, including the Next Generation Air Transportation System (NextGen)
- The Research, Engineering, and Development account, which funds research on issues related to aviation safety, mobility, and the environment.

In addition, the Trust Fund may provide all or some portion of the funding for the FAA's operations account, which funds the operation of the air traffic control system, safety inspections, and other activities. General revenues from the U.S. Treasury may be used to supplement the Trust Fund revenues for FAA operations; however, this General Fund will not provide funding for capital accounts.

The Trust Fund is funded principally by a variety of excise taxes paid by users of the national airspace system, as well as by interest revenue. Typical examples of excise taxes are those imposed on airline tickets, aviation fuel, and shipments of cargo.

Out of the three capital accounts of FAA supported by the Trust Fund, it is the AIP which will provide grants for VAY's capital improvements. Details on the AIP are elaborated upon below.

FAA's Airport Improvement Program (AIP)

The FAA AIP distributes funds to airports through grants in a manner that reflects the priorities and objectives of the nation's airport system. The distribution of AIP grants is based on a combination of entitlement funds and discretionary funds. Entitlements are apportioned into major use categories including primary airports, cargo airports, and general aviation airports, and may be used for any eligible airport or planning project identified by the airport. The remaining AIP funding is known as discretionary funding which covers specific set-aside categories such as airport noise programs and essential air service grants. In administering the AIP, FAA must comply with various statutory requirements established by legislation that specify how AIP grant funds are to be distributed among airports. FAA uses the statutory formulas to determine the amount of entitlement funds to be made available to each airport or state every year. The FAA then informs each airport or state of the amount of funding available for that year. To receive the funds it is entitled to, an airport or state has to submit a valid grant application to the FAA. The FAA Modernization and Reform Act of 2012 allows most airports and states up to three years to use their apportionment funds. Once the apportionments have been determined, the remaining amount of AIP funds is deposited in that program's discretionary fund, which consists of set-asides that are established by statute and other distributions.

General Aviation Airport Categories

In May of 2012, the FAA published an 18-month review titled: *General Aviation Airports: A National Asset*, that was conducted on the 2,952 landing facilities that are categorized as general aviation airports through the current National Plan of Integrated Airport Systems (NPIAS). This report was developed due to the changing landscape of how general aviation airports are utilized since the NPIAS was originally developed more than 40 years ago. General aviation airports now offer a wide range of services, operational aircraft types, various activity levels, and funding needs that are unique to general aviation airports. This report concluded that general aviation airports should be further classified into four categories based on their existing activity levels, as well as the volume and type of flights at the airport. The four categories that were identified are:

- National
- Regional
- Local
- Basic

VAY has been classified as a local general aviation airport through this report, signifying the airport has 10 or more instrument operations and 15 or more based aircraft. As is the case for VAY, general aviation airports that also meet the requirements of a reliever airport will continue to be classified as such in the new categories. Local airports across the nation account for 42% of the general aviation airports that are eligible for Federal Funding through the AIP. This airport category also accounts for approximately 38% of the total flying that occurs at the 2,952 general aviation airports around the nation. The majority of the flights at Local Airports tend to be within the state or immediate region.

The new general aviation categories will allow the FAA to improve their distribution of AIP funds by improving the ability to make informed planning decisions about the necessary improvements at each individual airport. Airport operators and owners will continue to provide updated information to the FAA and corresponding state agencies to ensure the airport needs are included in their individual master plan updates and incorporated into the state or regional system plans as appropriate.

The future development projects of general aviation airports will continue to be included in the NPIAS based on eligibility, justification, and priorities; however the new categories will provide a framework in which funding can be appropriated in a more consistent manner. These new general aviation categories will be implemented into the NPIAS, starting with the 2013-2017 NPIAS report currently under development. This could aid VAY in justifying the improvements that have been identified in this master plan due to their impact on the local community and immediate region.

AIP Entitlement Funds

Eligibility

An airport must be included in the NPIAS to be eligible to receive a grant from the AIP. According to the NPIAS (2011-2015), VAY is classified as a Reliever Airport eligible for entitlement funds. The estimated five-year development costs (excluding planning costs) for airport improvements at VAY that are eligible for FAA grants under the AIP are \$1,311,734. This estimate

will be reviewed and updated in the next NPIAS based on the new general aviation categories as previously described and the CIP for VAY prepared in this master plan.

Projects eligible for AIP funding consist of, but are not limited to the following:

- Runway, taxiway, and apron construction / rehabilitation
- Airfield lighting, signage, and drainage
- Land acquisition
- NAVAIDS (i.e. REILs and PAPIs)
- Access roads within airport boundaries (except for access to areas providing revenue, such as parking lots and aviation industrial areas)
- Environmental studies
- Safety area improvements
- Security equipment (i.e. airport perimeter fencing, surveillance cameras, etc.)

Grants may not be made for the construction of automobile parking facilities, buildings not related to the safety of persons in the airport, landscaping or art work, or routine maintenance and repair. Hangars are now eligible for funding with entitlement funds if all airside needs (such as pavement rehabilitation) have been previously met. The implementation plan for VAY identifies which development projects are eligible for AIP funding.

Apportionment Formula

The AIP provides a federal share of 90-95% for all eligible projects for small primary, reliever, and general aviation airports, based on statutory requirements. The recently expired reauthorization had temporarily increased the maximum share to 95% for some airports through 2011. However, the 2012 Act as signed rescinded the temporary increase in AIP assistance. Therefore, for purposes of this analysis it is assumed the FAA's share of AIP eligible projects for VAY will be 90%. Due to the large number of projects competing nationally for AIP funds, not all eligible projects identified for VAY can be funded.

AIP Discretionary Funds

FAA requires a benefit-cost analysis (BCA) to demonstrate the merit of capacity projects for which airport sponsors are seeking AIP discretionary funds. Projects subject to BCA are those projects that enhance airfield capacity in terms of increased aircraft operations, and increased aircraft seating capacity. FAA policy requiring BCA does not apply to projects undertaken solely for the objectives of safety, security, conformance with FAA standards, or environmental mitigation. Due to these requirements, only the long-term (Phase III) proposed projects could be considered capacity oriented, however it is unlikely that AIP discretionary funds are applicable to VAY.

AIP Funds for VAY

The historical AIP funds granted for development projects at the Airport since 2004 are summarized in **Table 7-2** for reference.

Table 7-2: Historical FAA AIP Funds Granted for VAY

Year	Grant No.	Project Description	Entitlement Funding	Discretionary Funding	Total AIP Funding
2007	3-34-0054-006-2007	Acquire Snow Removal Equipment	\$ 116,057	\$ 0	\$ 116,057
2008	3-34-0054-007-2008	Rehabilitate Taxiway (Hangar Area)	\$ 127,656	\$ 0	\$ 127,656
2009	3-34-0054-008-2009	Rehabilitate Apron	\$ 69,300	\$ 0	\$ 69,300
2009	3-34-0054-008-2009	Rehabilitate Taxiway	\$ 63,244	\$ 0	\$ 63,244
2009	3-34-0054-008-2009	Rehabilitate Runway	\$ 127,413	\$ 0	\$ 127,413
2009	3-34-0054-009-2009	Improve Airport Drainage	\$ 80,748	\$ 0	\$ 80,748
2011	3-34-0054-010-2011	Conduct Airport Master Plan Study	\$ 487,903	\$ 0	\$ 487,903
Totals			\$ 1,072,321	\$ 0	\$ 1,072,321

Source: FAA Airport Improvement Program (AIP) and American Recovery and Reinvestment Act (ARRA) Projects: Fiscal Years 2005-2009, and NJDOT provided information.

FAA AIP grants for capital projects are now funded in two segments. One grant is given for the design of the given project, while the second grant is provided for the construction of the project after construction bids are received and the overall construction cost based on the design is known.

The projects identified in the recommended airport development plan that are AIP eligible, are shown in **Table 7-3**. The total cost, estimated FAA funding, and the applicable AIP funding priority categories are included in the summary.

Table 7-3: AIP Eligible Projects for VAY

No.	Project	Project Cost	Estimated AIP Funds	AIP Priority Category
Phase I (0-5 Years)				
A1	Environmental Studies	\$ 533,500	\$ 480,200	Environmental Requirements
A1A	Environmental Permit Application Fees	\$ 99,000	\$ 89,100	Environmental Requirements
A1B	Environmental Mitigation	\$ TBD	\$ TBD	Environmental Requirements
A3	Widen and Regrade Runway, Regrade RSA	\$ 6,848,400	\$ 6,163,600	Conform to FAA standards Enhance the safety of the airfield
A4	Construct Partial Parallel Taxiway A	\$ 2,311,100	\$ 2,080,000	Conform to FAA standards Enhance the safety of the airfield
A5	Demolish Existing Taxiway A	\$ 273,300	\$ 246,000	Conform to FAA standards Enhance the safety of the airfield
N1	Relocate Segment Circle	\$ 12,600	\$ 11,300	Conform to FAA standards Enhance the safety of the airfield
G1	Improve Transient Parking Positions	\$ 56,400	\$ 50,800	Conform to FAA standards Enhance airfield safety & efficiency
G3	Improve T-Hangar Pavement	\$ 34,200	\$ 30,800	Conform to FAA standards Enhance the safety of the airfield
L1	Property Acquisition ⁽¹⁾	\$ -	\$ -	Gain control over Object Free Areas Enhance the safety of airfield
L2	Construct Controlled Access Gates and Perimeter Fencing	\$ 234,000	\$ 210,600	Enhance the airport security
Sub-Total for Phase I		\$ 10,402,500	\$ 9,362,400	
Phase II (6-10 Years)				
N3	Publish a GPS Vertically-Guided APV Approach	\$ 75,000	\$ 67,500	Enhance airfield safety & efficiency
Sub-Total for Phase II		\$ 75,000	\$ 67,500	
Phase III (11-20 Years)				
A1	Environmental Studies	\$ 341,000	\$ 306,900	Environmental Requirements
A1A	Environmental Permit Application Fees	\$ 99,000	\$ 89,100	Environmental Requirements
A1B	Environmental Mitigation	\$ TBD	\$ TBD	Environmental Requirements
A6	Relocate Northern Hangar of Industrial Building #1	\$ 378,000	\$ 340,200	Preserve/enhance airfield capacity & efficiency
A7	Extend Runway 26 end 339 feet	\$ 638,400	\$ 574,600	Preserve/enhance airfield capacity & efficiency
A8	Extend Taxiway A	\$ 2,853,900	\$ 2,568,500	Preserve/enhance airfield capacity & efficiency
N4	Relocate REILs	\$ 52,900	\$ 47,600	Preserve/enhance airfield capacity & efficiency
N5	Relocate PAPI	\$ 52,900	\$ 47,600	Preserve/enhance airfield capacity & efficiency
N6	Publish a GPS Vertically-Guided LPV Approach	\$ 75,000	\$ 67,500	Enhance airfield capacity & efficiency
L5	Relocate Airport Perimeter Fence	\$ 118,000	\$ 106,200	Enhance the airport security
Sub-Total for Phase III		\$ 4,609,100	\$ 4,148,200	
All Phases				
Total		\$ 15,086,600	\$ 13,578,100	

Note:

1. Property values to be determined through a property value assessment

7.2.2 State Funding Program

Airport Safety Fund Program

The source for state grants is the Airport Safety Fund Program which was established by the New Jersey Airport Safety Act of 1983. The Airport Safety Fund, as part of the New Jersey Transportation Trust Fund (TTF), provides funding to preserve and rehabilitate the State general aviation airport system and to promote aviation safety, education, and aeronautics. The following paragraphs describe the state grants included in the Airport Safety Fund Program, as listed in the current NJDOT New Jersey Administrative Code Title 16, Chapter 56.

Airport Improvement Grants

An airport may apply for an airport improvement grant to obtain financial assistance for airport improvement projects meeting the purpose of the Airport Safety Fund Program. Projects eligible for this grant may include the following:

- Runway, taxiway and aircraft parking apron construction, reconstruction, overlay, rehabilitation, preventive maintenance, lighting and marking
- Development, redevelopment, rehabilitation, improvement, lighting and marking of turf and natural surface runways, taxiways, and aircraft parking aprons
- Airport beacons, approach lighting, and electronic and visual navigation aids
- Airport security equipment and security projects
- Permanently installed above ground aircraft fueling equipment
- Airport and runway obstruction removal, mitigation and marking
- Airport equipment dedicated to aircraft crash, fire, and rescue purposes

Financial assistance for airport improvement grants shall not exceed 95% of the total project cost, and the recipient's share shall not be less than 5% of the total project cost.

Matching Grants

For those projects that are eligible for the 90% federal AIP funding, an airport may apply for a matching grant from the New Jersey Airport Safety Fund Program. Matching grants shall not exceed 5% of the total project cost, to aid the airport in supplementing a portion of the remaining funding required for the project. For emergency purposes, a matching grant may be up to 100% of the airport's required match. NJDOT may also enter into multi-year matching grant agreements of up to seven years for multiple eligible projects requiring matching funds, when receiving Federal grants during the term of the agreement.

Airport Acquisition Grants

Publicly owned airports may apply for an airport acquisition grant to obtain financial assistance for the acquisition of lands, rights in land and easements, including those necessary for clear zones or clear areas. The airport acquisition grants shall not exceed 95% of the total project cost, and the recipient's share shall not be less than 5% of the total project costs.

Aviation Studies Grants

Financial assistance is available for airports and the State to conduct studies associated with safety projects, including, but not limited to, feasibility, system plan, master plan, airport layout plan, facility siting, engineering, environmental, or aviation economic study. The aviation studies grants shall not exceed 95% of the total project cost, and the recipient's share shall not be less than 5% of the total project cost.

State Fund Allocation

With reference to the Transportation Capital Program for Fiscal Year (FY) 2013, the state fund allocation to the Airport Improvement Program is \$5 million. Based on the FY 2012-2021 Statewide Transportation Improvement Program (STIP), the fund allocation to the Airport Improvement Program is \$5 million per year for the 10-year period.

For the purpose of this study, it is assumed all FAA AIP eligible projects for VAY will be funded by the FAA up to 90% as shown in **Table 7-2**. The New Jersey matching grants provide 5% of the project costs for FAA AIP eligible projects. The remaining 5% of the project costs shall be provided by the Airport Sponsor, Airport Operator, or other private sources which will be discussed in the subsequent paragraphs.

For those projects not included in the FAA AIP, but are eligible for the state airport improvement grant, it is assumed financial assistance from the state airport improvement grant will cover 95% of the project costs. However, it is noted the criteria for eligible projects under the state airport improvement program are very similar to the FAA AIP requirements. For the CIP of VAY, eligible projects are allocated with the FAA AIP grants prior to applying the state Airport Safety Fund Program.

7.2.3 Airport Sponsor

The State of New Jersey purchased VAY for \$8.2 million in March 2004 and became the owner of the airport, i.e., the Airport Sponsor. On January 1, 2011, the State awarded a private operator, Flight 114, LLC, to be the Airport Operator for VAY with the responsibility of operations and management of the Airport for 20 years. The agreement specified the Airport Operator would receive the revenue generated from VAY and pay the State a fixed monthly fee plus a percentage of the revenue from airport operations. The airport generates revenue through leases, fuel sales, hangar fees, and concessions.

There are smaller and less reliable sources of revenue that may be considered at the Airport, including landing fees and automobile parking fees. These fees are not typically charged at general aviation airports due to the low return for the cost of implementing and accounting for the collection. Landing fees on larger aircraft that may use VAY in the future could be considered; however, these fees can be a deterrent for the larger aircraft to use the airport. The landing fees as a deterrent could be detrimental to the potential fuel revenues that could be gained from the increase in based aircraft and operations that would otherwise use the Airport if no landing fee was required.

The revenue generated from VAY and received by the Airport Sponsor may be considered to contribute for the remaining 5% of project costs for eligible projects. The use of this funding is subject to the net revenue available to the Sponsor and the Sponsor's decision to use it as such. Should the revenue generated from VAY not be available for the remaining 5% of eligible project costs, the Sponsor may apply for the state airport improvement grants or other sources. Although VAY is owned by the State, the fund sources are from different state accounts and the financial responsibility of the Airport Sponsor is kept separate from the state grants that fund capital improvements at VAY.

7.2.4 Airport Operator / Private Sources

Private funding is often a source for certain airport improvements, such as Fixed Base Operator (FBO) site development, aviation industrial site development, and aircraft hangar construction. These types of funding sources include the Airport Operator / FBO, economic development grants, and other small businesses or individual investments through other private organizations.

7.3 Airport Capital Improvement Plan

Based on the above identified fund sources and assumed allocation, **Table 7-4** presents the Airport CIP with estimated costs by funding sources and categorized by implementation phases.

Phase I (0-5 Years) improvements total approximately \$10.4 million and represent approximately 67% of the CIP costs. The split between federal grant, state grant, and Airport Sponsor is approximately \$9.3 million (59.9%), \$0.52 million (3.3%), and \$0.52 million (3.3%) respectively. All of the projects for the enhancement of the airfield to conform to FAA design standards are included in Phase I funding, even though the duration of the project extends into Phase II. Most of the funds required during Phase I are for the regrading and widening of the existing runway which amounts to \$6.8 million (66% of Phase I).

The Phase II (6-10 Years) improvements total approximately \$0.6 million and account for approximately 3.7% of the CIP costs. The cost for the aeronautical survey for the GPS vertically-guided APV approach is approximately \$0.075 million (0.5%) and is proposed to be shared between the FAA, state grant, and Airport Sponsor. The funds required for the ten-bay T-hangar and relocation of the affected vehicle storage are approximately \$0.5 million (3.2%), which will be funded by the Airport Operator or other private sources on an as needed basis.

The total cost for the Phase III (11-20 Years) improvements is approximately \$4.7 million. This phase represents approximately 29.9% of the CIP costs. The projects in Phase III primarily focus on the runway extension, the associated Taxiway A extension to both runway ends, relocation of the REILs, PAPI, perimeter fence, affected Industrial Building #1, and an aeronautical survey for the GPS vertically-guided LPV approach. Due to the lapse of time between the environmental studies to be performed in Phase I, these studies should be revisited in Phase III to ensure the identified projects are in compliance with the environmental requirements in place at the time. The split for AIP projects is approximately \$4.2 million (26.5%) from the FAA, \$0.2 million (1.5%) from state grants, and \$0.3 million (1.9%) from the Airport Sponsor. Phase III also includes the parking area improvements that provide two bus parking spaces for the Air Victory Museum. It is unlikely the revenue or patronage from the Air Victory Museum can finance the construction of the parking spaces; however, partial funds from the other sources of revenue from the Airport could be utilized. In view of the benefit to the Airport and the community, fund sources from the Airport Sponsor and Operator are assumed for the preparation of the CIP. The cost for the parking spaces is approximately \$0.06 million (0.4%) shared between the Airport Sponsor and Operator.

The grand total cost for all three phases spanning the 20-year planning period is approximately \$15.6 million.

Table 7-4: Airport Capital Improvement Plan (2012 Dollars)

No.	Project	Project Cost	Estimated Federal Grant	Estimated State Grant	Airport Sponsor	Airport Operator / Private Sources
Phase I (0-5 Years)						
A1	Environmental Studies	\$ 533,500	90% \$ 480,200	5% \$ 26,700	5% \$ 26,700	0% \$ -
A1A	Environmental Permit Application Fees	\$ 99,000	90% \$ 89,100	5% \$ 4,950	5% \$ 4,950	0% \$ -
A1B	Environmental Mitigation	\$ TBD	90% \$ TBD	5% \$ TBD	5% \$ TBD	0% \$ -
A3	Widen and Regrade Runway, Regrade RSA	\$ 6,848,400	90% \$ 6,163,600	5% \$ 342,400	5% \$ 342,400	0% \$ -
A4	Construct Partial Parallel Taxiway A	\$ 2,311,100	90% \$ 2,080,000	5% \$ 115,550	5% \$ 115,550	0% \$ -
A5	Demolish Existing Taxiway A	\$ 273,300	90% \$ 246,000	5% \$ 13,650	5% \$ 13,650	0% \$ -
N1	Relocate Segment Circle	\$ 12,600	90% \$ 11,300	5% \$ 600	5% \$ 600	0% \$ -
G1	Improve Transient Parking Positions	\$ 56,400	90% \$ 50,800	5% \$ 2,800	5% \$ 2,800	0% \$ -
G3	Improve T-Hangar Pavement	\$ 34,200	90% \$ 30,800	5% \$ 1,700	5% \$ 1,700	0% \$ -
L1	Property Acquisition ⁽¹⁾	\$ -	90% \$ -	5% \$ -	5% \$ -	0% \$ -
L2	Construct Controlled Access Gates & Perimeter Fencing	\$ 234,000	90% \$ 210,600	5% \$ 11,700	5% \$ 11,700	0% \$ -
	Sub-Total for Phase I	\$ 10,402,500	\$ 9,362,400	\$ 520,050	\$ 520,050	\$ 0
Phase II (6-10 Years)						
N3	Publish a GPV Vertical-Guided APV Approach	\$ 75,000	90% \$ 67,500	5% \$ 3,750	5% \$ 3,750	0% \$ -
G4	Construct Ten Bay T-Hangar	\$ 483,800	0% \$ -	0% \$ -	0% \$ -	100% \$ 483,800
L4	Relocate Vehicle Storage	\$ 7,400	0% \$ -	0% \$ -	0% \$ -	100% \$ 7,400
	Sub-Total for Phase II	\$ 566,200	\$ 67,500	\$ 3,750	\$ 3,750	\$ 491,200
Phase III (11-20 Years)						
A1	Environmental Studies	\$ 341,000	90% \$ 306,900	5% \$ 17,050	5% \$ 17,050	0% \$ -
A1A	Environmental Permit Application Fees	\$ 99,000	90% \$ 89,100	5% \$ 4,950	5% \$ 4,950	0% \$ -
A1B	Environmental Mitigation	\$ TBD	90% \$ TBD	5% \$ TBD	5% \$ TBD	0% \$ -
A6	Relocate Northern Hangar of Industrial Building #1	\$ 378,000	90% \$ 340,200	5% \$ 18,900	5% \$ 18,900	0% \$ -
A7	Extend Runway 26 end 339 feet	\$ 638,400	90% \$ 574,600	5% \$ 31,900	5% \$ 31,900	0% \$ -
A8	Extend Taxiway A	\$ 2,853,900	90% \$ 2,568,500	5% \$ 142,700	5% \$ 142,700	0% \$ -
N4	Relocate REILs	\$ 52,900	90% \$ 47,600	5% \$ 2,650	5% \$ 2,650	0% \$ -
N5	Relocate PAPI	\$ 52,900	90% \$ 47,600	5% \$ 2,650	5% \$ 2,650	0% \$ -
N6	Publish a GPS Vertically-Guided LPV Approach	\$ 75,000	90% \$ 67,500	5% \$ 3,750	5% \$ 3,750	0% \$ -
L5	Relocate Airport Perimeter Fence	\$ 118,000	90% \$ 106,200	5% \$ 5,900	5% \$ 5,900	0% \$ -
L6	Landside Parking/Pavement Improvements	\$ 60,900	0% \$ -	0% \$ -	95% \$ 57,850	5% \$ 3,050
	Sub-Total for Phase III	\$ 4,670,000	\$ 4,148,200	\$ 230,450	\$ 288,300	\$ 3,050
Total						
	Total	\$ 15,638,700	\$ 13,578,100	\$ 754,250	\$ 812,100	\$ 494,250

Note: 1. Property values to be determined through a property value assessment

7.3.1 Summary of Funding Program

In summary, the total VAY CIP cost is \$15.6 million, developed in constant 2012 dollars, as shown in **Table 7-5**. It is anticipated the VAY CIP will be funded by Federal Grants (\$13.6 million – 86.8% of the total); State Grants (\$0.75 million – 4.8% of the total); Airport Sponsor (\$0.80 million – 5.2% of the total); and Airport Operator / private sources (\$0.49 million – 3.2% of the total). Since the State of New Jersey purchased VAY in 2004, the financial burden of the state is the total of the State Grants and the funds required under Airport Sponsor (\$1.5 million – 10% of the total).

Table 7-5: Summary of Capital Improvement Plan (2012 Dollars)

Phase	Estimated Federal Grant		Estimated State Grant		Airport Sponsor		Airport Operator / Private Sources		Total	
Phase I (0-5 Years)	\$ 9,362,400	59.87%	\$ 520,050	3.33%	\$ 520,050	3.33%	\$ 0	0%	\$ 10,402,500	66.52%
Phase II (6-10 Years)	\$ 67,500	0.43%	\$ 3,750	0.02%	\$ 3,750	0.02%	\$ 491,200	3.14%	\$ 566,200	3.62%
Phase III (11-20 Years)	\$ 4,148,200	26.53%	\$ 230,450	1.47%	\$ 288,300	1.86%	\$ 3,050	0.02%	\$ 4,670,000	29.86%
Total	\$ 13,578,100	86.82%	\$ 754,250	4.82%	\$ 812,100	5.19%	\$ 494,250	3.16%	\$ 15,638,700	100%

Appendix A

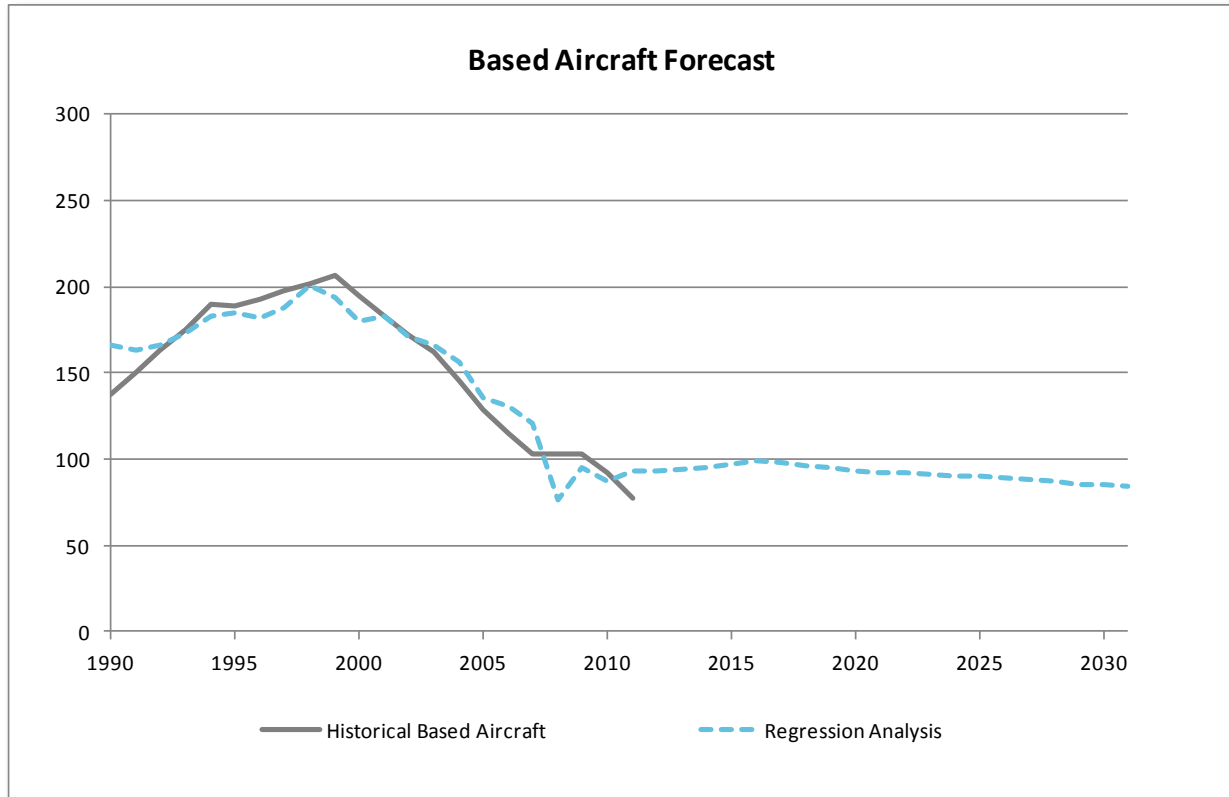
Regression Analysis



Prepared for
The New Jersey
Department of Transportation

Appendix A. Regression Analysis

Regression Analysis on Based Aircraft



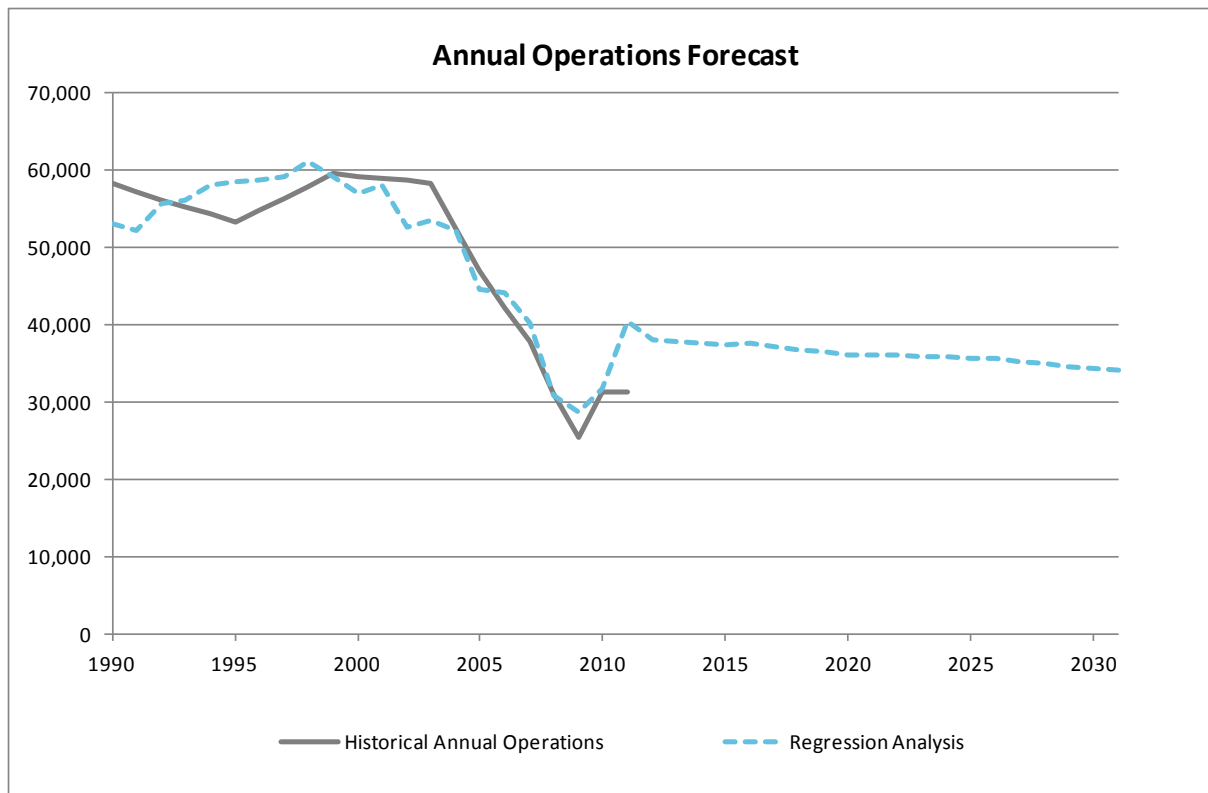
Summary Output

Regression Statistics	
Multiple R	0.93025255
R Square	0.865369806
Adjusted R Square	0.840126645
Standard Error	14.18518769
Observations	20

ANOVA					
	df	SS	MS	F	Significance f
Regression	3	20694.2372	6898.079067	34.28135621	3.38063E-07
Residual	16	3219.512798	201.2195499		
Total	19	23913.75			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	249.402486	30.2126955	8.254890265	3.68293E-07	185.3544331	313.4505389	185.3544331	313.4505389
GDP of New Jersey	-7.149166821	3.528090375	-2.026355921	0.059733993	-14.62838425	0.330050611	-14.62838425	0.330050611
Oil Prices	1.945712143	2.45220886	0.793452864	0.439123148	-3.252738379	7.144162665	-3.252738379	7.144162665
Unemployment Rate	-1.379823051	0.159539421	-8.648790612	1.98779E-07	-1.718031513	-1.041614588	-1.718031513	-1.041614588

Regression Analysis on Annual Operations



Summary Output

Regression Statistics	
Multiple R	0.93862035
R Square	0.881008162
Adjusted R Square	0.858697192
Standard Error	3728.713302
Observations	20

ANOVA

	df	SS	MS	F	Significance f
Regression	3	1647027024	549009007.9	39.48766796	1.26882E-07
Residual	16	222452846.2	13903302.89		
Total	19	1869479870			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	64541.36575	7941.698202	8.126897309	4.5186E-07	47705.71775	81377.01374	47705.71775	81377.01374
GDP of New Jersey	-1063.274293	927.3925587	-1.146520191	0.26843759	-3029.25868	902.7100934	-3029.25868	902.7100934
Oil Prices	1762.455383	644.586733	2.73424086	0.014702484	395.9925609	3128.918205	395.9925609	3128.918205
Unemployment Rate	-345.1205728	41.93647457	-8.229603855	3.83415E-07	-434.0219269	-256.2192187	-434.0219269	-256.2192187

Appendix B

FAA Master Plan Review Letter



Prepared for
The New Jersey
Department of Transportation

Appendix B. FAA Master Plan Review Letter



**U. S. Department
Of Transportation**

**Federal Aviation
Administration**
February 6, 2013

Harrisburg Airports District Office
3905 Hartzdale Drive, Suite 508
Camp Hill, PA 17011
717-730-2830
717-730-2838 (fax)

Ashwin Patel
South Jersey Regional Airport
1035 Parkway Avenue
Trenton, NJ 08625

Dear Mr. Patel:

We completed our review of the Aviation Demand Forecast and Capacity Analysis for South Jersey Regional Airport Master Plan. Your forecasts were compared to the latest FAA Terminal Area Forecasts and were below but consistent with other regional airports in the area. The methods used in the report were generally acceptable for a Master Plan Forecast.

The 2011 Estimated Based Aircraft (77) is comparable to other regional airports with similar activity, size and economic impacts. The projected based aircraft over 20 years is acceptable at 89 in 2016, 89 in 2021 and 90 in 2031.

The Operations recommended a medium growth developed from all three methods. The recommended operations forecast is above the TAF but is consistent with average growth rates for the region for future years 2016 - 2031. The projected growth rate for operations over 20 years is now accepted as 34,398 in 2016, 33,635 in 2021, and 34,262 in 2031.

The analysis recommends a B-II ARC for South Jersey Regional. However, the math behind justification for 500 annual itinerant operations of a B-II ARC is not presented in the report. Therefore, we do not support the B-II as the critical aircraft, at this time. The analysis of the based aircraft, the historical data, and flight data better supports the current critical aircraft as a B-I, at 93% of itinerant operations. In general, the critical aircraft would be better justified with stronger supporting documentation such as flight data numbers and aircraft list, or fuel logs.

The existing airport layout does not currently meet design standards for the B-I or B-II, and it is recognized that the previous planning documents have shown and approved a proposed layout for ARC B-II. Therefore, the proposed development based on a B-II ARC may remain on the ALP as the NJDOT's ultimate plan, with the understanding that the development and increase to a B-II may happen, if justified beyond the airports current 12 year plan.

If you have any questions or comments regarding this approval, please feel free to contact me at (717) 730-2835.

Sincerely,

A handwritten signature in blue ink, appearing to read "L. B. R. Ledeborn".

Lori B. R. Ledeborn
Community Planner