Introduction to the Study

Updating an Airport Master Plan (AMP) is a standard industry practice. The need may be developed based on some dramatic change at the airport, but as a "rule of thumb" the Federal Aviation Administration (FAA) suggests that updates should be considered approximately every five years to maintain the currency of the data, the airport standards, and reassess airport needs.

The airport master plan has basically two components; the report which documents the analytical process and the Airport Layout Plan (ALP), which serves as the graphic representation for future development at the airport. It is the ALP which is approved by the FAA and the airport sponsor, in this case the Rhode Island Airport Corporation (RIAC).

The first AMP was completed for North Central State Airport (SFZ) in 1984. It was updated in 2000 and the ALP was approved November 9, 2001.

This updated planning document will be used by RIAC and FAA to direct implementation of capital improvement projects at SFZ from the short term (5 year) through the long term (20 year) planning period. In addition it will determine how well SFZ meets the current FAA design standards, which have under gone some changes since the last approved ALP. In those cases where it does not meet standards it will evaluate how best to meet standards.

A specific task of this master plan update is to provide a preliminary assessment of the capabilities of the airport to support an Instrument Landing System (ILS) or similar precision approach capability.

Alternative uses of the AMP are to guide RIAC when reviewing private investment at airport. Or similarly it can be effective for the Town when reviewing land use development around the airport to ensure compatibility with FAA airspace requirements and the environment.

North Central State Airport is a part of the Rhode Island State Airport System Plan (RIASP), which is an element of the State Guide Plan (SGP). This Airport Master Plan report is being developed to ensure consistency with the SGP, and any future updates of this document will include a review of the SGP. Any change in the role of SFZ within the RIASP will require coordination with Rhode Island Statewide Planning Program.

The planning activity is more completely described in a scope of work, which follows the guidelines provided by the FAA Advisory Circular 150-5070-6B, *Airport Master Plans*. It is also incorporated in the airport grant offer received from FAA in May 2008. The objectives of the study are to:

- Create an effective coordination and communication process to ensure input from all affected parties;
- Update the existing inventory of airport and environmental conditions;
- Update forecasts to assess the airport role and facility requirements;
- Conduct a assessment of the Airport's ability to meet current FAA design standards;
- Conduct an analysis to consider engineering, operational, environmental and financial factors;
- Identify the recommendations that result from the alternatives analysis; and
- Prepare and approve a new Airport Layout Plan.

The first objective was achieved through the creation of a Local Advisory Group (LAG) that was established to discuss and provide comments on technical reports and recommendations developed during the planning process. Membership on the LAG represented an airport user, Chamber of Commerce, Town Planners for Lincoln and Smithfield and an airport neighbor. A copy of the AAC membership and their roles and responsibilities will be included in Appendix B of the Master Plan.

In addition to five LAG meetings, a Public Information Meeting (PIM) was held to get public input on the draft AMP and ALP. The purpose of the PIM was to provide the general public with the opportunity to learn about the study and provide input into the process. Notification of these meetings was provided by publishing notices in local newspapers. The Minutes of all these meetings will also be included in Appendix B. Finally, an airport website was created to provide project information including draft working papers, public notices, and the scope of work.

This Airport Master Plan will be prepared and is presented in the following Chapters:

Chapter 1 – Baseline Conditions
Chapter 2 – Approach Feasibility Study
Chapter 3 – Airport Role and Forecasts
Chapter 4 – Facility Requirements
Chapter 5 – Alternatives Analysis
Chapter 6 – Environmental Review
Chapter 7 – Airport Layout Plan
Chapter 8 – Implementation Plan
Appendices

The Airport Master Plan report is being prepared by The Louis Berger Group, Inc. and the following staff:

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The Project Management Team also included Mr. Vincent Scarano, RIAC, Project Manager and Ms. Gail Lattrell, FAA, Community Planner.

Chapter 1.0 - Baseline Conditions

This Chapter of the Master Plan provides an inventory, of the North Central State Airport (SFZ). It is a compilation of all pertinent data relative to the airport, including airfield conditions, operational activity, environmental conditions, and economic conditions.

The inventory involved data collection over an array of data sources. These include:

- The Rhode Island State Airport System Plan (2004),
- SFZ Airport Layout Plan Update (2001),
- Other pertinent reports and studies (varied)

Baseline conditions data was also collected through site visits on June 24th and July 17th, 2008. This Chapter is categorized into the following main sections:

- Section 1 – North Central State Airport
- Section 2 – Airfield Conditions
- Section 3 – Operational Activity
- Section 4 – Environmental Conditions
- Section 5 – Economic Conditions

The information collected in this effort was utilized throughout the master planning process to assess, project and recommend a master plan and Airport Layout Plan for the Airport.

1.1 Introduction to North Central State Airport

1.1.1 History

The airport serves the multi-faceted general aviation needs of the area and is a vital component of the Rhode Island Airport System operated by the Rhode Island Airport Corporation (RIAC). The services include aircraft parking/storage, fueling, maintenance and flight training.

The Airport was dedicated as a state airport on December 15, 1951. The original airport consisted of 916.23 acres of land and one runway (Runway 5-23). On October 1, 1951, Northeast Airlines started scheduled airline service at North Central. The service lasted for almost a decade; however, in May 1960 the Civil Aeronautics Board (CAB), authorized Northeast Airlines to suspend service. In September 1961, the CAB recommended the permanent discontinuance of Northeast Airlines' service at North Central. In March 1952, Wiggins Airlines started operations at the airport. The service was cancelled when the airline's operating certificate was withdrawn by the CAB on July 31, 1953.

In the mid 1950's the Air National Guard Unit based at T.F. Green Airport considered moving to North Central, but after some consideration the National Guard Bureau could not justify the expenditures and the proposed move was abandoned.

On January 7, 1963, the Pawtucket Industrial Area was awarded 252.95 acres of North Central's airport property, reducing the airport land area to 663 acres. On October 10, 1963 a second (crosswind) runway (Runway 15-33) was completed.

On December 9, 1992, RIAC was formed as a semiautonomous subsidiary of the then Rhode Island Port Authority, now the Rhode Island Economic Development Corporation, to operate and maintain the state's airport system, which includes North Central. The Airport is currently managed by Landmark Aviation (Landmark), which is responsible for the state's other four general aviation airports (Block Island, Newport, Quonset, and Westerly).

1.1.2 Airport Property and Vicinity

North Central State Airport is located in the northwestern portion of Rhode Island, situated between the towns of Smithfield and Lincoln, and sits at an elevation of 441 feet above mean sea level (MSL). The Airport is situated on approximately 663 acres. The airport provides general aviation services to the Blackstone Valley region, which includes Woonsocket, North Smithfield, Cumberland Hill, and Pawtucket in Rhode Island, and Plainville and Attleboro in Massachusetts.

1.1.3 Previous Airport Planning and Airport Improvements

Table 1.0 identifies the improvements made at SFZ over the past twenty five years.

Table 1.0
Airport Improvement Projects

Year	Project Description	FAA Funds
1983	Rehabilitate Runway Lighting, Install Apron Lighting & Improve Airport Drainage	$321,278
1984	Install Apron Lighting & Extend Taxiway	$525,076
1987	Rehabilitate Taxiway & Expand Apron	$357,075
1987	Expand Apron	$461,742
1987	Extend Runway	$712,315
1995	Acquire Snow Removal Equipment	$108,037
1996	Acquire Snow Removal Equipment	$206,931
1998	Conduct Master Plan Study	$90,000
1999	Remove Obstructions	$89,387
2000	Remove Obstructions	$321,287
2001	Runway 15-33 Rehabilitation	$1,147,219
2002	Conduct an Environmental Study	$107,311
2005	Remove Obstructions	$501,947
2006	Runway 5-23 Rehabilitation	$3,072,863
2007	Rehabilitate Taxiway A	$776,398
2008	Airport Master Plan Update	-

Source: FAA Grant History

Figures 1.1 and 1.2 provide the general airport layout of SFZ.

Figure 1.1
SFZ Aerial Photo

Photo Source: Rhode Island Airport Corporation, April 2008.

Figure 1.2
SFZ Existing Airport Layout
(Line Drawing with Labels)

1.2 Inventory of Airfield Conditions

A complete inventory of the airfield conditions at SFZ were reviewed looking at airfield pavement, lighting and NAVAIDS, airport terminal and other airport structures, airport access and parking, airport equipment, airspace and runway approaches.

The conditions reported are based upon the site inspections completed on June 24 and July 17, 2008. The site condition inspections were conducted by RIAC, Landmark, and project team staff, as well as a review of other airport plans and discussions with airport staff.

Basic guidelines for airport design are set forth in the FAA's Advisory Circular (AC) 150/5300-13 *Airport Design*. Each airport can be classified based on the aircraft which it is designed to serve using the Airport Reference Code (ARC). The ARC is established by two separate factors: ***Approach Category*** which group aircraft based on approach speed and ***Design Group*** which group aircraft based on wingspan.

Aircraft approach categories are defined as follows:

- Category A: Speed less than 91 knots.
- Category B: Speed 91 knots or more, but less than 121 knots.
- Category C: Speed 121 knots or more, but less than 141 knots.
- Category D: Speed 141 knots or more, but less than 166 knots.
- Category E: Speed 166 knots or more.

Aircraft design groups are defined as follows:

- Group I: Up to but not including 49 feet (with a subcategory for small aircraft).
- Group II: 49 feet or more, but less than 79 feet.
- Group III: 79 feet or more, but less than 118 feet.
- Group IV: 118 feet or more, but less than 171 feet.
- Group V: 171 feet or more, but less than 214 feet.
- Group VI: 214 feet or more, but less than 262 feet.

The current operations at SFZ are characterized by single and twin-engine piston aircraft activity. *The previous Master Plan and the Rhode Island State Aviation System Plan both identified the airport as typically serving aircraft from Category B, and Design Group II for Runway 5/23 and aircraft from Category B, and Design Group I for Runway 15/33.* As a part of this planning effort, the airport's designation was reassessed to determine if that designation is still appropriate.

1.2.1 Airfield Pavement

Figure 1.2 – Existing Airport Layout identifies each runway. Runways are numbered based on their magnetic heading, to the nearest 10 degrees, and by removing the final "0". For example, if an aircraft is on the end of the runway labeled "16" facing the "34" end, the magnetic compass for that aircraft should read 160°. Therefore, the difference in runway numbers will always be 18, or 180°. For aviation purposes, North is considered 360°, East is 90°, South is 180°, and West is 270°.

Table 1.1
SFZ Runway Inventory

Name	Runway 5/23	Runway 15/33
Length	5,000 feet	3,210 feet
Width	100 feet	75 feet
Material	Bituminous Concrete[1]	Bituminous Concrete[1]
Strength	60,000 lbs. Double Wheel	12,500 lbs. Single Wheel
Lighting	HIRLS	MIRLS
Markings	Non-Precision Instrument	Basic
Visual Aids	5 – VASI and MALS 23 – PAPI	15 – PAPI 33 – None
RSA	150 feet wide by 300 feet long	150 feet wide by 300 feet long

Abbreviations:
HIRLS – High Intensity Runway Lighting System
VASI – Visual Approach Slope Indicator
PAPI – Precision Approach Path Indicator
RSA – Runway Safety Area
MIRLS – Medium Intensity Runway Lighting System
MALS – Medium Approach Lighting System
REIL – Runway End Identification Lights
VASI – Visual Approach Slope Indicator

There is a partial system of taxiways. Back taxiing is required on Runway 15 due to the lack of a full parallel taxiway. Taxiways are identified by letters of the alphabet. Figure 1.2 shows the designations of each taxiway. A detailed description of each runway and taxiway follows in this section.

Table 1.2
SFZ Taxiway Inventory

Name	Taxiway A	Taxiway B	Taxiway C	Taxiway D
Width	35 feet	50 feet	50 feet	50 feet
Type	Partial Parallel to 15-33	Full Parallel to 5-23	Exit from 5-23	Exit from 5-23
Runway Centerline Separation	200 feet	350 feet	n/a	n/a
Material	Bituminous Concrete	Bituminous Concrete	Bituminous Concrete	Bituminous Concrete
Lighting	MITLS	MITLS	MITLS	MITLS

Abbreviations:
MITLS – Medium Intensity Taxiway Lighting System

Aircraft parking aprons are accessed from taxiways and are used for maneuvering, parking, and servicing of aircraft. SFZ has a single paved aircraft apron used for both based and transient aircraft parking that extends from New England Aviation to the old terminal building. It is shown in Figure 1.2. The aircraft apron is 38,966 square yards in size, and can accommodate 98 aircraft. There are also tie-downs located at the Rossetti hanger, a privately owned facility, which can accommodate 4 aircraft.

[1] Bituminous concrete is commonly referred to as asphalt, which is a type of concrete with bituminous materials replacing cement as the binder in the mixture. Bituminous material is a mixture of residual organic fluids obtained during the distillation of crude oil.

Figure 1.3 – The Pavement History and Condition Plan provides a graphical representation of the history and condition of the runways, taxiways, and aprons at SFZ. The figure provides the visual pavement rating along with the year the pavement was last rehabilitated and the FAA grant number that funded the improvement.

Using the Pavement Surface Evaluation and Rating (PASER) system established by the FAA, pavement ratings were established for the airside pavement. PASER uses visual inspections to evaluate pavement surface conditions for four major categories of pavement surface distress:

- Surface defects: loss of pavement, loss of pavement grooving, or excess asphalt caused by poor mix design;
- Surface deformation: ruts, pavement distortion;
- Cracks: includes but is not limited to thermal cracking, edge and joint cracks, and alligator cracks; and
- Patches and potholes: original surface repairs and pavement holes

Based up on the results of the visual inspection, each pavement area is given a rating from 1-5, which is further described as follows:

- Rating 5 – Excellent: No maintenance is required;
- Rating 4 – Good: Minor routine maintenance, crack sealing as needed;
- Rating 3 – Fair: Preservative treatments, crack sealing and surface treatment is necessary; and
- Rating 2 – Poor: Structural improvement and leveling is needed
- Rating 1 – Failed: Reconstruction is necessary

Airport Aprons

Figure 1.3 – Pavement History and Condition Plan

1.2.2 Utilities, NAVAIDS and Lighting

1.2.2.1 Airport Utilities

The following is a summary of the utilities serving SFZ. Information on utilities was obtained from a review of airport files, on-site investigation, and discussions with airport personnel.

Electric Service

Electrical service to the airport is supplied by National Grid from utility poles located along the airport access road. Service to airport buildings is through underground cables from the utility poles. The electrical vault which controls the airfield lighting is located inside the old terminal building, and the airport's generator is located to the east of the old terminal building. The existing generator provides emergency service to the entire airfield with the exception of the white hangar that currently houses the FBO. The construction of a new generator that will provide service solely to this hangar is anticipated in the near future.

Emergency Generator

Water Service

Water service is provided by the City of Lincoln. It is provided to the Old Terminal, Terminal Building, and New England Aviation.

Sanitary Sewer

Sanitary sewer is waste is handled by a septic system, which is routinely emptied by a private contract service.

1.2.2.2 Airport Navigational Aids (NAVAIDS)

Navigational Aids (NAVAIDS) are electronic facilities providing enroute or approach guidance information used by pilots to navigate to and from an airport. NAVAIDS are generally used in concert with airport runway lighting and visual aids (such as approach lights, VASI, PAPI, etc.).

They provide visual cues and orientation to the pilot. SFZ approaches have three NAVAIDS:

- Localizer (LOC);
- Very High Frequency Omni-Directional Range (VOR); and
- Global Positioning System (GPS) approach (RNAV).

This section describes the NAVAIDS and a summary of the approaches is provided at the end. See Table 1.1 for an inventory of NAVAID facilities and Figure 1.4 for locations.

Localizer (LOC)

A localizer provides horizontal alignment for approaches to Runway 5. A LOC is typically installed in conjunction with a Glide Slope (GS). The GS provides vertical guidance to the runway. Together they form an instrument landing system (ILS). That provides a precision approach. In the absence of a GS the R/W 5 approach at SFZ is identified as a non-precision. The LOC is on a frequency of 108.4 MHz and is identified by the Morse code of ISFZ.

Very High Frequency Omni-Directional Range (VOR)

There are two VOR in the airport area and they are used for navigation and non-precision instrument approaches. One of them, the PROVIDENCE VOR, is located at T.F. Green Airport. This system provides guidance for the non-precision approach to Runway 33. This VOR also has Distance Measuring Equipment (DME) associated with it, providing distance-to-runway information to the pilot.

Global Positioning System (GPS) Approach (RNAV)

Global Positioning System (GPS) is a recent development in air navigation technology and is widely implemented. GPS works on a system of 24 satellites in orbit above the earth. A receiver in the plane accepts signals from multiple satellites and calculates its position and altitude based on the distance from each satellite. GPS technology (when not supported by ground-based error correction stations) has been approved for enroute navigation and non-precision approaches. The GPS approach for North Central State Airport is based on the airport identifier “SFZ”.

Automated Surface Observation System (ASOS)

This system provides pilots with airport meteorological conditions such as wind speed, direction, and ceiling. SFZ does not have an ASOS on-site, but rather relies on ASOS data transmitted from T.F. Green Airport. This weather data is transmitted through an Automated Weather Observation System (AWOS) on a frequency of 120.025 MHz.

1.2.2.3 Airport Lighting

Just as NAVAIDS provide pilots with enroute and approach guidance information, airport runway lighting and visual aids are intended to help orient the pilot when in the Airport environment. See Table 1.1 and Table 1.2 for the inventory of runway lighting and taxiway lighting.

The backup generator located in the Airport's electrical vault provides service to the airfield lighting. The generator does not support the MALS, terminal, or New England Aviation facilities during a power failure. The airfield lighting system can be remotely activated by pilots through the "clicking" of their microphone button on the UNICOM frequency.

The wind cone and segmented circle wind indicators are lighted. The rotating beacon is located on top of the old terminal building and operates from dusk to dawn or during periods of Instrument Meteorological Conditions (IMC). The rotating beacon is white on one side and green on the other side, which identifies SFZ as a non-military, lighted land airport.

Figure 1.4 – The NAVAID/Lighting History and Condition Plan provides a graphical representation of the NAVAIDS and lighting at SFZ. The figure provides the location of the equipment on the airfield. All NAVAIDS are owned and operated by the Federal Aviation Administration (FAA).

Figure 1.4 – NAVAID/Lighting History and Condition Plan

1.2.3 Airport Terminal and Structures

This section describes the landside facilities at SFZ. These facilities include the terminal building, hangar, AWOS, electrical vault, fuel farm, and other leased buildings. Figure 1.2 identifies the locations of landside facilities.

Terminal Building

Old Terminal Building

AWOS

1.2.3.1 Airport Services

Several businesses on the airport provide a range of services. These services include aircraft maintenance, flight training, helicopter tours, and skydiving. Businesses providing services at the airport include:

Table 1.3
Airport Businesses

Business	Service
Landmark Aviation	Airport management, maintenance, and fueling.
New England Aviation	Aircraft maintenance
Rhode Island Aviation	Aircraft maintenance
Skylane	Flight training
Major Aircraft Interiors	Aircraft interior maintenance

Source: Landmark Aviation

1.2.3.2 Fuel Storage

There is a single area designated at the airport for fuel storage as identified in Figure 1.2. For aircraft fueling services, there are two above ground tanks. Both the Jet A and 100LL tanks hold 12,000 gallons each. There are two fuel trucks, one for each type of aircraft fuel, with each accommodating 250 gallons. SFZ is a full-service fuel provider, with no self service fuel available.

Airport equipment uses diesel fuel, which is stored in a 250-gallon above ground tank with a secondary 250-gallon above ground tank, both of which are located adjacent to the aircraft fuel storage tanks.

A spill kit station is located between the aircraft and diesel fuel tanks.

Fuel Tanks

1.2.3.3 Buildings

There are six (6) main structures located on the Airport. Table 1.4 summarizes the airport buildings along with their condition. The information on this table was obtained from airport staff, supplemented by field observations from the consultant team.

Table 1.4
Airport Building's

Building	Use	Approximate Size (S.F.)	Visual Condition
Terminal Building (White Hangar)	Offices, lounge, flight planning	22,700	Excellent
Old Terminal Building	Rental property, public observation	7,480	Fair
New England Aviation Hangar	Aircraft maintenance	7,000	Fair
Brown (RIAC) Hangar	Aircraft storage	23,000	Good
T-hangars	Aircraft storage	7 units	Fair
Rosetti Hangar	Private aircraft storage	10,000	Excellent
White (RIAC) Hangar	Aircraft storage and maintenance, offices	13,500	Excellent

Source: RIAC and Landmark Aviation

RIAC Brown Hangar

New England Aviation Hangar

T-Hangars

Rossetti Hangar

RIAC White Hangar

1.2.4 Airport Access and Parking

North Central State Airport is located between Albion Road and Jenks Hill Road. These roads are two-lane east-west connector roads connecting to Route 146. Interstate 295 can be accessed via Route 146. Airport signs are placed at locations on both roads and Route 146.

Auto parking areas are located in front of and adjacent to the main terminal entrance and the old terminal facility. There are 24 standard and 3 handicapped parking spaces adjacent to the terminal; a single standard and a single handicapped space behind the brown hangar adjacent to the terminal; and 12 standard spaces and 1 handicapped space behind the New England Aviation hangar. Parking at the old terminal facility consists of 3 standard spaces and 1 handicapped parking space in front of the facility and an open parking area adjacent to the access road leading to the terminal.

The terminal operation has moved from the old terminal building to the Landmark Hangar. Access from the upper level parking area to the new terminal operation is lacking. Options to remedy this situation are discussed in the alternatives analysis of this Master Plan.

1.2.5 Airport Equipment

Various pieces of equipment are utilized to provide a safe operation and maintenance of the facility. Table 1.5 Airport Equipment, summarizes a list of major equipment used for maintenance, upkeep and safety of the Airport.

Table 1.5
Airport Equipment

Equipment	Quantity	Year	Visual Condition
Mack Snow Plow	3	78,79,85	Good
Ford Snow Plow	1	1995	Good
Sicard Snow Blower	1	1989	Good
Sweepster Runway Sweeper	1	1985	Good
Caterpillar Backhoe	1	N/A	Good
Chevrolet Pickup	1	2001	Good
Ford Pickup	1	1999	Good

Source: Landmark Aviation

1.2.6 Airspace and Approaches

Landing or departing aircraft from an airport are subject to a system of air traffic controls designed to provide the safe separation of one aircraft from another. Aircraft are subject to varying degrees of control, depending on the specific airspace and meteorological conditions in which they operate. The air traffic control system is the statutory responsibility of the FAA. They establish, operate and maintain air traffic control facilities and procedures.

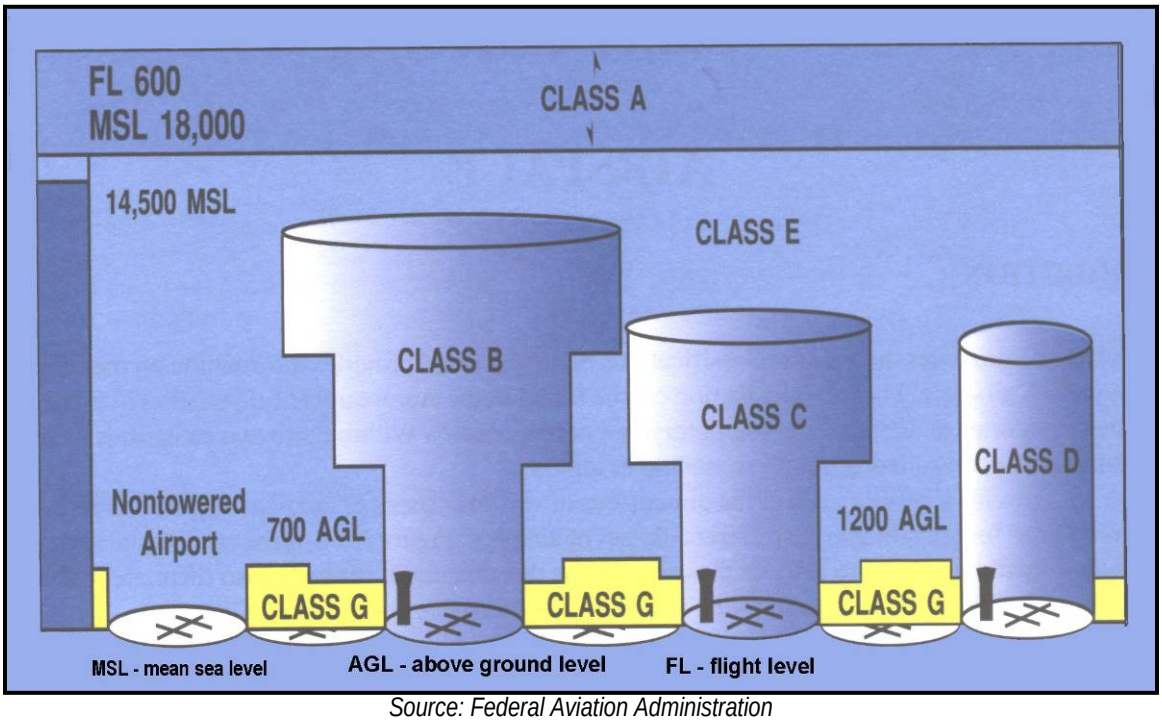
There are two basic types of aircraft flight regimes recognized by the air traffic control system; those operating under visual flight rules (VFR) which depend primarily on the “see and be seen” principal for separation, and those operating under instrument flight rules (IFR) which depend on radar detection for separation by ground controllers. IFR flights are controlled from takeoff to touchdown, while certain types

VFR flights are generally uncontrolled, unless there is an open and operating control tower at the airport. The FAA provides guidance and separation for both flight regimes, but the degree of positive control varies in different types of airspace.

1.2.6.1 Airspace Structure

United States airspace is structured into controlled and uncontrolled areas. Controlled airspace, reclassified in 1993, is further delineated as Class A, B, C, D, or E. Uncontrolled airspace is referred to as Class G. Each class of airspace classifications is identified in Figure 1.5. North Central State Airport is in Class G Airspace.

Figure 1.5
Airspace Classifications



Source: Federal Aviation Administration

1.2.6.2 Air Traffic Control Facilities

Information and guidance are available to pilots through several sources. Most public airports are equipped with a Universal Integrated Communication (UNICOM) system, which is a nongovernmental air-to-ground communication station that can provide airport information. The UNICOM frequency is used by pilots to report their position and intentions and obtain runway and wind information. Additionally, some airports have a Common Traffic Advisory Frequency (CTAF), which is used by pilots to coordinate arrivals and departures safely, giving position reports and acknowledging other aircraft in the airfield traffic pattern.

1.2.6.3 Air Traffic Control – North Central State Airport

SFZ has no ATCT, and operates as Class G airspace wherein the pilots are responsible for reporting their positions and intentions to other pilots. Both CTAF and UNICOM communications are transmitted on 123.075, and weather information is also available on the airports Automated Weather Observation System (AWOS) frequency 120.025. Weather, navigational aid status, and other pertinent airport information is also available through the Bridgeport Flight Service Station (FSS).

1.2.6.4 Airport Imaginary Surfaces and Approach Categories

Regulations on the protection of an airport's airspace are defined by *Federal Aviation Regulation (FAR) Part 77, Objects Affecting Navigable Airways*. The regulation establishes a requirement for anyone proposing to build a structure near an airport to report their intentions to the FAA. In addition it defines a series of standards used for determining obstructions to an airport's navigable airspace. This is accomplished through the establishment of a set of airport imaginary surfaces, that if penetrated represent an obstruction to air navigation. In some cases they may be classified by the FAA as a "hazard". Typical FAR Part 77 surfaces are shown in Figure 1.6 and defined later in this section. Airport imaginary surfaces consist of the following elements:

- Primary Surface: This surface is longitudinally centered on each runway and extends 200 feet beyond each runway end (if the runway is paved). The elevation of the primary surface of a given runway is the same as that of the nearest point on the runway centerline.

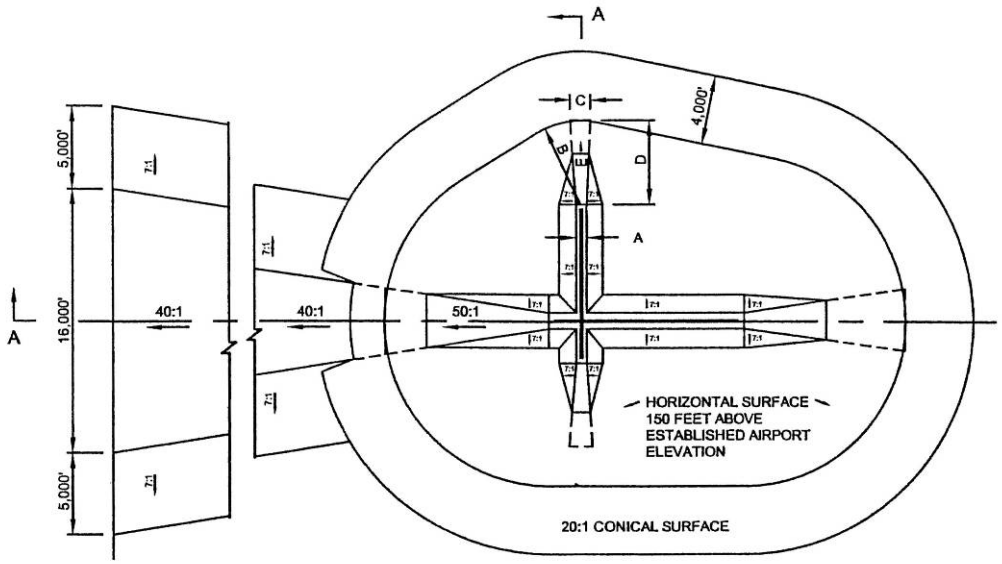
- Approach Surface: The approach surface is a trapezoidal-shaped surface that begins at the primary surface of each runway end, upwards and outwards for a prescribed slope and distance based on the type of approach (visual, non-precision, or precision).

- Transitional Surface: This surface is a plane with a 7:1 slope (horizontal to vertical) that extends upwards, outwards, and at right angles from the primary and approach surfaces, terminating at the airport horizontal surface.

- Horizontal Surface: This is a horizontal plane 150 feet above the established airport elevation. This surface is defined by drawing semi-circles of a given radius from the ends of the primary surfaces. The radius of the circle is determined by the type of approach serving each runway end.

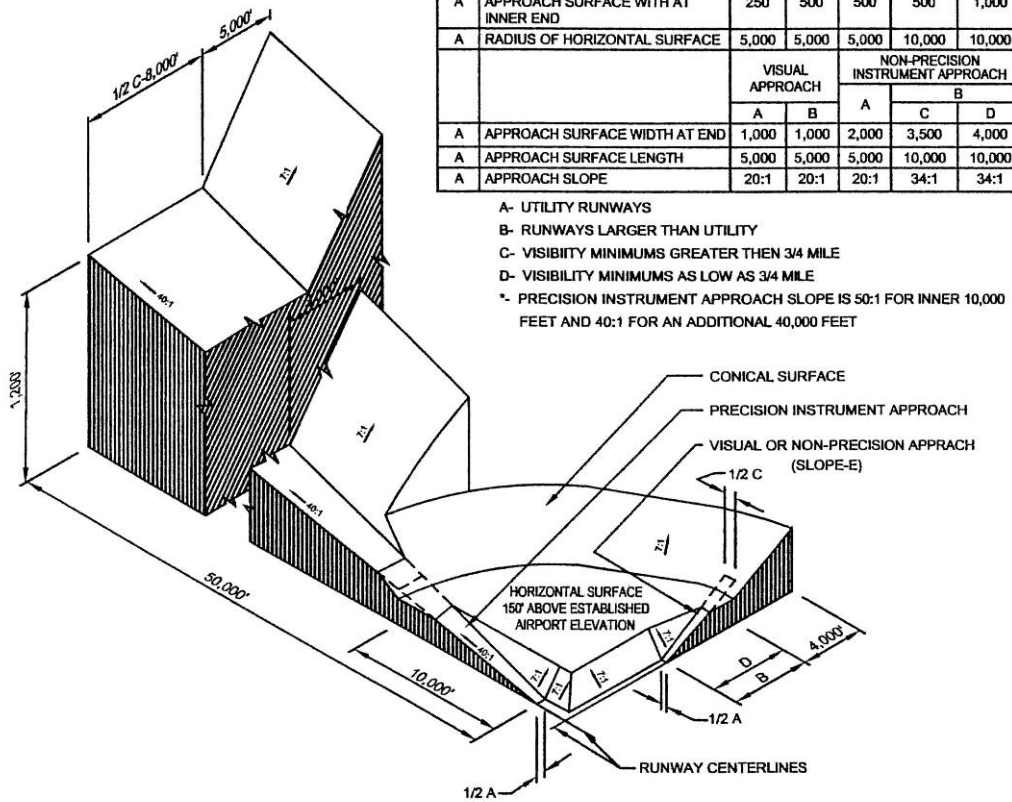
- Conical Surface: The conical surface is an enclosed plane that extends upward and outward from the horizontal surface at a 20:1 slope.

Figure 1.6
Typical FAA Part 77 Imaginary Surfaces



DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT APPROACH
		A	B	A	B C	B D	
A	WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WITH AT INNER END	250	500	500	500	1,000	1,000
A	RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
		VISUAL APPROACH		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT APPROACH
		A	B	A	B C	B D	
A	APPROACH SURFACE WIDTH AT END	1,000	1,000	2,000	3,500	4,000	16,000
A	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	*
A	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	*

A- UTILITY RUNWAYS
B- RUNWAYS LARGER THAN UTILITY
C- VISIBIITY MINIMUMS GREATER THEN 3/4 MILE
D- VISIBILITY MINIMUMS AS LOW AS 3/4 MILE
*- PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET



ISOMETRIC VIEW OF SECTION A-A

All runway ends have an approach surface associated with them. This is an imaginary surface, as previously described, which no obstacles should protrude. This provides a clear area to allow a gradual descent to landing. There are three categories of approach surfaces: visual, non-precision and precision. The slope of the approach surface is based on the category. Table 1.6 identifies the slope of each approach category and Table 1.7 identifies the SFZ approach categories.

Table 1.6
Approach Categories

Category	Description	Slope
Visual	No instrument approach	20:1
Non-Precision	Served by a non-precision instrument approach (LOC, VOR, NDB, GPS, etc.)	34:1
Precision	Served by a precision instrument approach (ILS, GPS, CAT I, etc.)	50:1

Source: FAR Part 77

Table 1.7
SFZ Approach Categories

Runway	Category	Required Slope	Actual Slope
5	Non-Precision	34:1	38:1
23	Non-Precision	34:1	30:1
15	Visual	20:1	24:1
33	Visual	20:1	18:1

Source: FAR Part 77 and FAA Form 5010: Airport Master Record (July 31, 2008)

1.2.6.5 North Central's Approaches

An instrument approach is used by a pilot who is on an IFR flight plan. The instrument approach provides guidance to an airport or to a specific runway during good, marginal, or bad weather conditions and utilizes a specific NAVAID facility located on or off the airport. Instrument approaches are categorized as either a precision approach, providing horizontal and vertical guidance, or a non-precision approach, giving horizontal guidance only. The instrument approach procedure requires that a pilot fly a specific descent profile. Upon reaching an identified point, the pilot must have visual contact with the runway, or perform a missed approach. The missed approach takes the pilot away from the airport to a point where the approach may be initiated

again. Each instrument approach has a ceiling and visibility limit, referred to as minimums. If the reported weather conditions fall below the approach minimums, the approach cannot be attempted. SFZ currently has 6 instrument approaches. These approaches are summarized in Table 1.8 and in the figures on the following pages.

Table 1.8
SFZ Instrument Approaches

Approach	Minimum Height Above Runway (ft.)	Minimum Visibility (mi)
Runway 5 Localizer	391	¾
Runway 5 GPS	411	¾
Runway 5 NDB	1,051	1 ¼
Runway 23 GPS	411	1
VOR/GPS A*	459	1
VOR/GPS B*	479	1

Minimums shown for approach category A and B aircraft.
*Circle to land approaches. Height is shown above airport elevation.

Figure 1.7
Localizer Runway 5

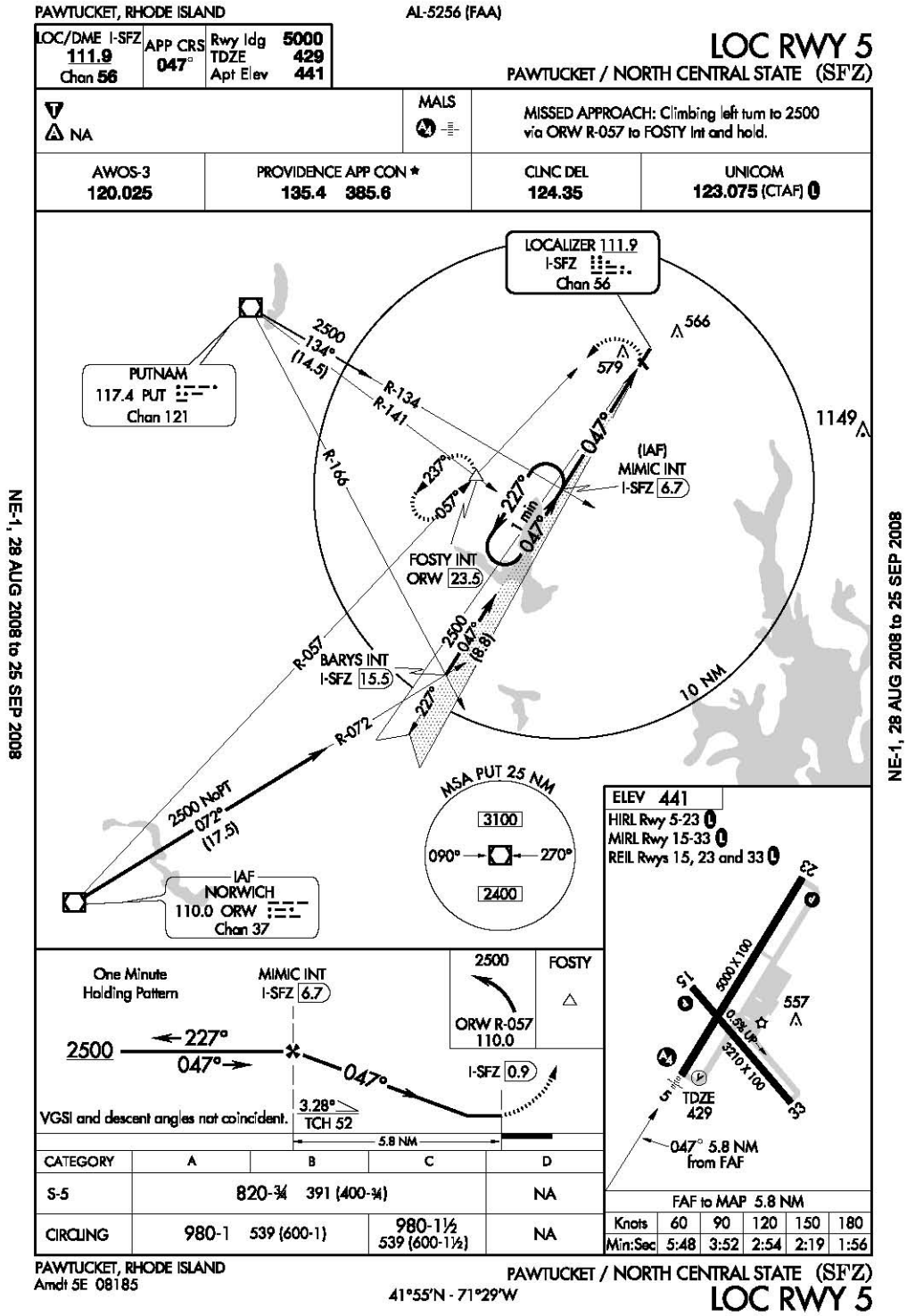


Figure 1.8
GPS Runway 5

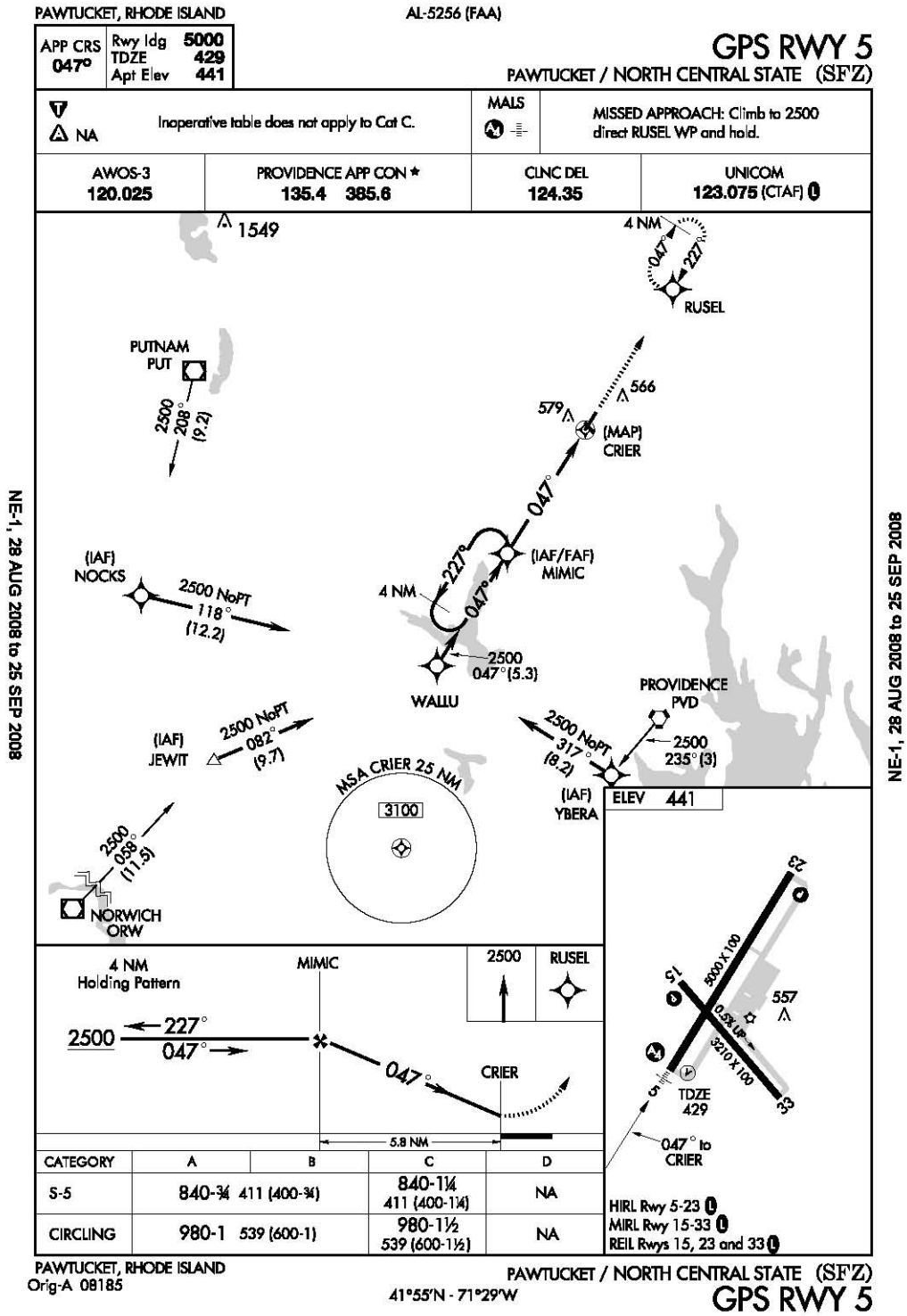


Figure 1.9
VOR/GPS-A

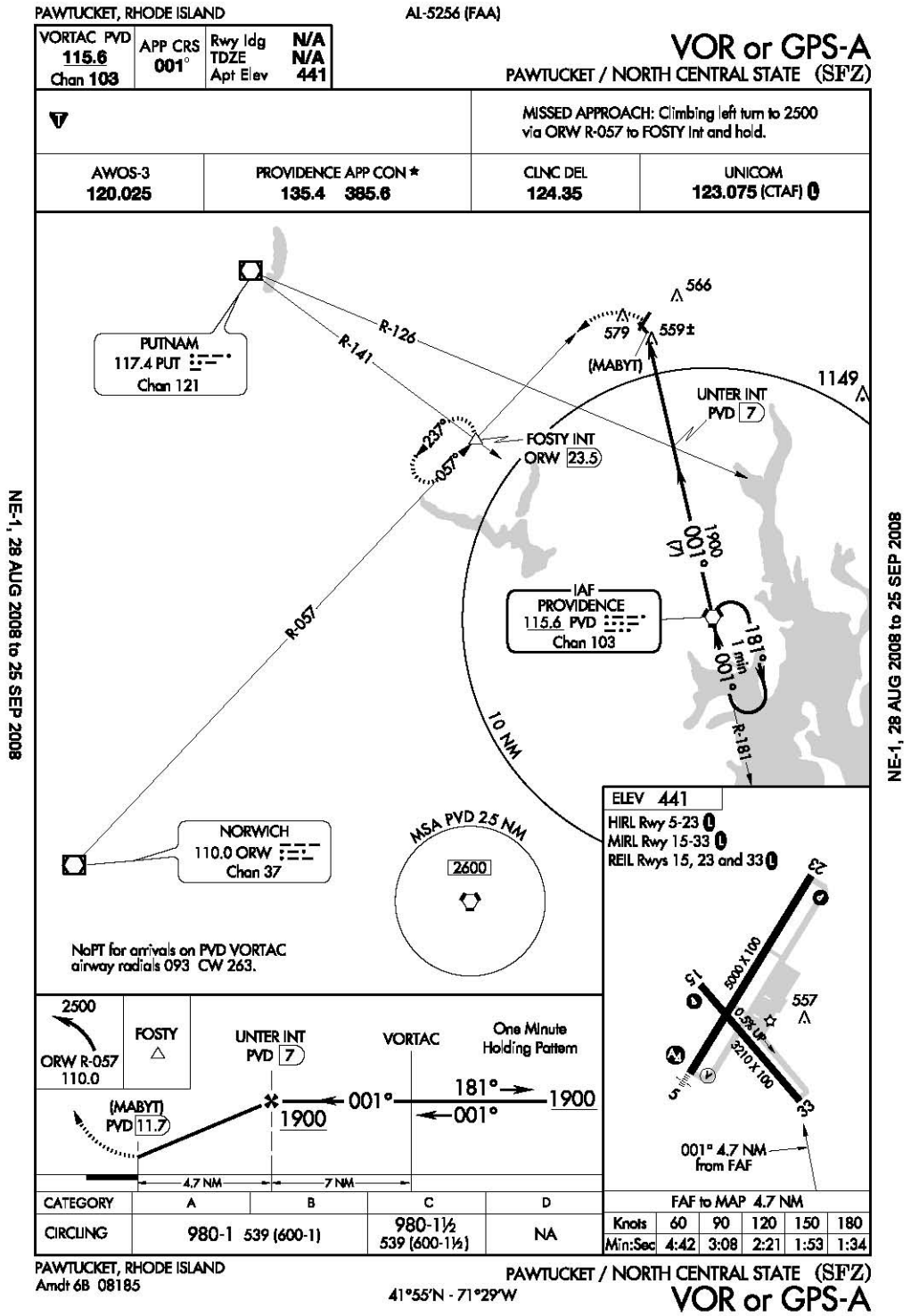
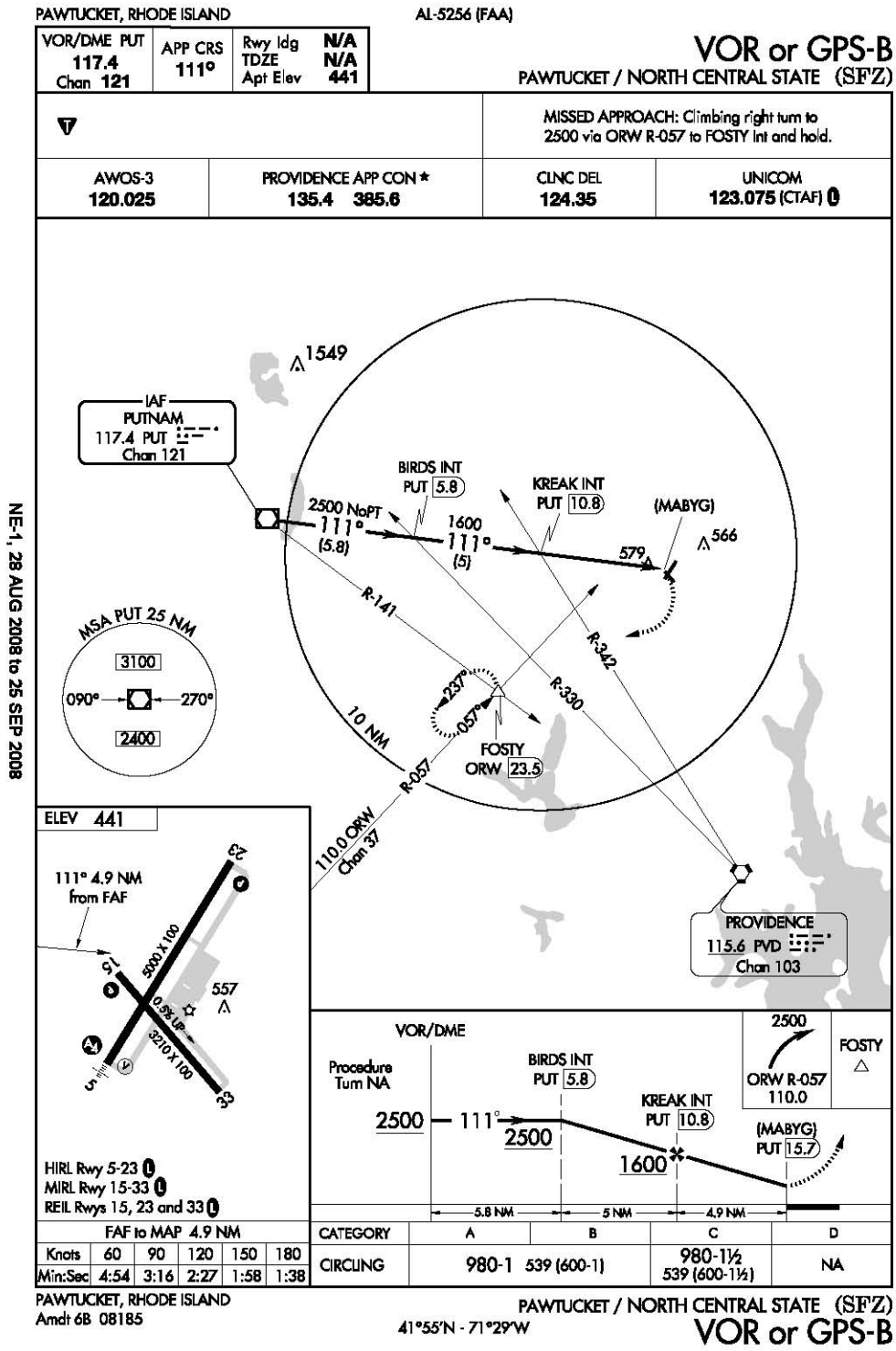


Figure 1.10
VOR/GPS-B



1.2.6.6 Airport Airspace Obstructions

The FAR Part 77 Surfaces for SFZ are summarized in Table 1.9. These dimensions reflect the fact that Runways 5 and 23 have non-precision approaches, while Runways 15 and 33 are visual approach runways. It should be noted that any changes in the category of approach designated for a runway will change these dimensions.

Table 1.9
SFZ Part 77 Surfaces

Runway	15	23	33	5
Primary Surface Width	250’	500’	250’	500’
Approach Surface Length	5,000’	10,000’	5,000’	10,000’
Approach Surface Outer Length	1,250’	3,500’	1,250’	3,500’
Approach Surface Slope	20:1	34:1	20:1	34:1
Horizontal Surface Radius	5,000’	10,000’	5,000’	10,000’

Source: RIAC and FAR Part 77

1.2.6.7 Runway Use and Noise Abatement

North Central State Airport has standard left-hand traffic patterns for operations on all runways. Traffic pattern altitude is the standard 1,000 feet above the indicated airport elevation (in this case 441 feet MSL) therefore, North Central’s traffic pattern altitude is 1,441 feet MSL.

The existing voluntary noise abatement procedures established for SFZ request pilots to climb on runway heading when taking off to the southwest on Runway 23 until they are 1.1 miles from the end of the runway before turning on course. Noise abatement procedures are published in flight information publications and there are signs next to the taxiways at the airport notifying pilots of the procedure as well.

1.3 Inventory of Operational Activity

This section provides an overview of historical and current aircraft activity at SFZ. In the forecast effort for this master plan, this information will be supplemented with other data to develop projected airport activity for a twenty-year planning period. Data sources utilized for this section include: RIAC records, the Rhode Island Airport System Plan (RI/ASP), previous Airport Master Plan (AMP/ALP) efforts and other studies, FAA records, statewide and regional activity statistics, and discussions with local officials.

1.3.1 Airport Operations

The FAA distinguishes airport operations between local an itinerant.

- Local Operations: Generally, operations occurring within sight of the airport or 20 nautical miles; these are typically training operations. Local Operations are subdivided into two classes:
    - Civil: All operations other than military operations; and
    - Military: All operations performed by the military (Air National Guard, etc.)

- Itinerant Operations: All aircraft operations other than local operations. Itinerant Operations are subdivided into three classes:
    - Air Taxi: Scheduled and non-scheduled passenger service;
    - General Aviation: Includes aircraft used for personal, recreational, or business use; and
    - Military: All operations performed by the military (Air National Guard, etc.)

The traditional method of defining local and itinerant operations at airports is described above. However, in this inventory the airport operator, Landmark Aviation, tracks aircraft operations by the following definition:

- Local Operation: If an aircraft is based at any of RIAC airports and the operation occurs between any of those airports, then the operation is considered a local operation.

- Itinerant Operation: This operation is any other operation other than a local operation, in this case, a transient aircraft.

The definition of the data is not as important as knowing the methods of collection to be sure the numbers are used appropriately in later sections of this Master Plan. Tables 1.10 and 1.11 summarize annual operations at SFZ for a 10-year period from 1998 to 2007.

Table 1.10
Annual Historical Aircraft Operations

Year	Total Operations
1998	41,054
1999	54,956
2000	42,400
2001	47,269
2002	48,015
2003	32,108
2004	24,880
2005	29,510
2006	31,337
2007	27,181
2008*	22,819
YTD 2009*	15,418
* Note: These are provided as an update to the data set since this Chapter was put together.	

Source: FAA Form 5010-1 Airport Master Record (July 31, 2008)

Table 1.11
Historical Local vs. Itinerant Aircraft Operations

Year	Itinerant	%	Local	%	Total
1998	20,240	49%	20,814	51%	41,054
1999	27,508	50%	27,448	50%	54,956
2000	22,862	54%	19,538	46%	42,400
2001	26,518	56%	20,751	44%	47,269
2002	6,732	14%	41,283	86%	48,015
2003	1,562	5%	30,546	95%	32108
2004	3,543	14%	21,337	86%	24,880
2005	11,556	39%	17,954	61%	29,510
2006	4,813	15%	26,524	85%	31,337
2007	12,034	46%	14,789	54%	27,181

Source: Rhode Island Airport Corporation and Landmark Aviation

1.3.2 Based Aircraft

Based aircraft are defined as non-transient aircraft that either hangar or tie down at the airport. These aircraft are one of the biggest factors in planning for future facility needs. The number of based aircraft correlates to operational demands it places on airport facilities such as runways, taxiways, lighting and navigational/visual aids. These based numbers also directly relate to ground facilities, like hangar storage, fueling facilities, and aircraft service and repair needs.

Based aircraft data for SFZ was collected from the FAA Terminal Area Forecast (TAF) data. Table 1.12 and 1.13 identify the based aircraft for each aircraft category dating from 1998. Landmark Aviation has indicated

that there is a waiting list for tie-down and hangar space at the airport of more than 20 aircraft. The current fleet mix of SFZ based aircraft includes: 107 single-engine; 9 twin-engine; and 0 helicopters.

Table 1.12
2007 Based Aircraft Fleet Mix Percentage

Aircraft Type	Number of Based Aircraft	Percentage of Total Aircraft
Single Engine	107	92%
Twin Engine	9	8%
Helicopters	0	0%
Total	116	100%

Source: Rhode Island Airport Corporation and Landmark Aviation

Table 1.13
North Central Historical Based Aircraft

Year	Total Based Aircraft	Local Ops Per Based Aircraft
1998	144	145
1999	117	235
2000	117	167
2001	115	180
2002	115	359
2003	115	266
2004	115	186
2005	115	156
2006	115	231
2007	116	127
2008*	110	N/A
YTD 2009*	113	N/A
* Note: These are provided as an update to the data set since this Chapter was put together.		

Source: Rhode Island Airport Corporation, Landmark Aviation and the Louis Berger Group, Inc.

1.3.3 Fuel Sales

Full fueling services are provided by Landmark Aviation, including 100LL and JetA. Table 1.14 shows the historical fuel sales at SFZ between 1998 and 2007.

Table 1.14
North Central Historical Fuel Sales

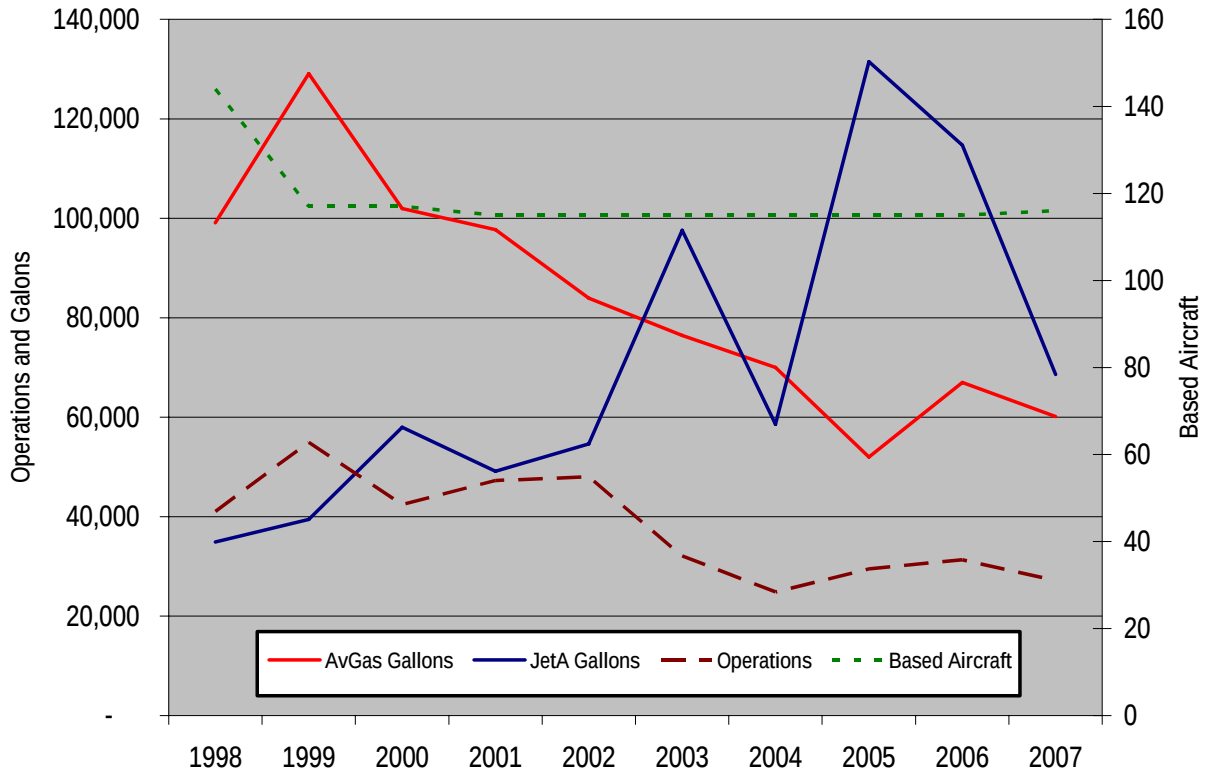
Year	JetA Gallons	AvGas Gallons
1998	34,911	99,086
1999	39,484	129,070
2000	57,973	101,963
2001	49,110	97,710
2002	54,655	83,958
2003	97,585	76,440
2004	58,598	70,004
2005	131,486	52,009
2006	114,672	66,973
2007	68,625	60,126

Source: Rhode Island Airport Corporation, Landmark Aviation and The Louis Berger Group, Inc.

1.3.4 Summary

The graph below summarizes the historical data provide above for the past ten years and will be used as the basis for the airport forecasts.

Figure 1.11
10-Year Historical Activity - North Central State Airport – 1998 to 2007



1.4 Environmental Inventory

1.4.1 Introduction

This section provides an inventory of environmental conditions at SFZ. It is a compilation of pertinent environmental data relative to the airport, including physical setting, water resources, ecology, air quality, hazardous materials, and historical and cultural resources.

The environmental inventory is based on a review of available information. This information includes airport, Federal, State, and municipal records; a review of previous studies such as Master Plan reports and Environmental Assessments; as well as a site inspection and interviews with officials familiar with airport operations.

1.4.2 General Setting

North Central State Airport is located in the north-central portion of the State of Rhode Island, approximately 4.5 miles northwest of the City of Pawtucket, Rhode Island. The airport occupies approximately 663 acres, primarily in the northeast part of the Town of Smithfield. The northeast corner of SFZ, off of Runway 23, is located in the Town of Lincoln. Figure 1.12 identifies the location of North Central Airport on a U.S. Geological Survey (USGS) topographic map for the Georgiaville and Pawtucket, Rhode Island Quadrangles.

The climate within the region is the moist temperate type. Warm ocean currents and accompanying sea winds generate a more moderate climate than other New England states. There is a complete weather record maintained at T.F. Green Airport (PVD), located in Warwick, Rhode Island. Annual temperature in the area can range from a mean of 28°F in January to 73°F in July. The mean annual precipitation is 42.7 inches. Monthly precipitation levels are fairly uniform ranging only between 3.2 and 4.4 inches. The highest monthly precipitation recorded at PVD since 1905 was 12.2 inches in 1946.

The populations of the Towns of Smithfield and Lincoln have grown steadily over the past 50 years as suburbs to the larger urban areas of Providence, and Woonsocket, Rhode Island area. The Town of Smithfield has an estimated population of 20,613 residents, according to the 2000 U.S. Census. The Town population has grown steadily from about 9,442 in 1960 (Rhode Island Office of Statewide Planning, 2008). In 1900, Smithfield's population was 2,107 (Town of Smithfield, 2008). The population of the Town of Lincoln as of 2000 was 20,898. The Town population has grown steadily from about 13,551 in 1960 (Rhode Island Office of Statewide Planning, 2008). In 1900, Lincoln's population was 8,937 (Town of Smithfield, 2008).

1.4.3 Zoning and Land Use

The area in which North Central Airport is located can be described as a mix of residential, commercial, light industrial and forested areas. The Town of Smithfield's Zoning Ordinance (1998) has designated the airport as Industrial-Planned (I), intended to provide for general industrial, manufacturing and related activities and office uses. Smithfield also has an Airport Hazard Overlay District, which is "intended to protect areas of land or water upon which an airport hazard might be established, if not prevented, as provided in Chapter 3 (Airport Zoning Act), of the General Laws of Rhode Island, as amended."

Article 4 of the Smithfield Zoning Ordinances states: any structures on the airport shall be at least 100 feet from any street or lot line and at least 500 feet from any residential district boundary. Airports within the Town are also required to provide adequate space for off-street parking for at least 50 vehicles, subject to increase depending on the opinion of the Zoning Board.

The Town of Lincoln Zoning Ordinance (amended 2008) states: airports are allowed as a special use only in manufacturing limited (ML) and manufacturing general (MG) zoning districts. Town of Lincoln zoning also includes an Airport Hazard Zone, within which the "height of structures and trees shall be restricted to a height below the airport approach plan as prepared by the State of Rhode Island."

A Land Use Map in the Smithfield Comprehensive Community Plan (2006) indicates that land surrounding SFZ consists of brushland (shrub and brush areas, reforestation) to the north and west, a "mixed barren area" to the northwest, deciduous forest (>80% hardwood) to the south and east, and some commercial/industrial mixed land to the east. Additional property adjacent to airport to the south and west is zoned R-80, low density residential. Land use proximate to North Central Airport is shown on Figure 1.13.

A "Future Land Use" map in the Smithfield Comprehensive Community Plan (2006) indicates the area surrounding the airport south of the George Washington Highway (Rhode Island Route 116) and north of Limerock Road is planned for industrial and light industrial use.

Currently there is no local zoning and building code enforcement that occurs on state properties, including SFZ.

Figure 1.12 – Airport Location Map

Figure 1.13 – Airport Zoning

1.4.4 Topography and Geology

North Central State Airport is located within the New England physiographic province, near the boundary of the New England Upland and Seaboard Lowland sections. The elevation of North Central State Airport in the vicinity of the terminal building is about 490 feet above mean sea level. The topography of the region of northern Rhode Island is hilly with altitudes increasing to the north and west. While the terrain of the airfield is flat, the airfield exists on filled land creating a plateau above the surrounding area. Steep drops in topography characterize the north, west, and south perimeters of the airport.

According to the *Soil Survey of Rhode Island*, as mapped by the Natural Resources Conservation Service (NRCS, formerly Soil Conservation Service), soils on airport property consist of several types. Primary soil groups in the airport area consist of glacial till uplands. The primary soil unit on the airport is mapped as Udorthents-Urban land complex (UD), consisting of moderately well drained to excessively drained soils that have been disturbed by cutting or filling, and areas covered by buildings or pavement. Soils along the airport perimeter include the following groups:

- Ridgebury, Whitman, and Leicester extremely stony fine sandy loam (Rf) soils, which are poorly to very poorly drained;
- Woodbridge (WoB) series, Woodbridge fine sandy loam (WhA) soils, and Woodbridge extremely stony fine sandy loam (WrB), which are moderately well drained soils occurring on side slopes and crests of upland hills and drumlins;
- Canton and Charlton very stony fine sandy loams (ChB) and fine sandy loams (CeC), which are gently sloping to sloping, well drained soils on side slopes and crests of glacial upland hills and ridges; and
- And Paxton fine sandy loam (PaA) and Paxton very stony fine sandy loam (PbB), which is nearly level to gently sloping, well drained soil on crests and side slopes of glacial till uplands and drumlins.

Paxton (PaA) and Woodbridge (WoB) soil types are identified as prime farmland soils as described in Section 1.4.19.

Information on geology was provided by the Office of the Rhode Island State Geologist (1994) and U.S. Geological Survey (USGS) publications. Bedrock in northern Rhode Island consists primarily of granitic igneous rocks and metamorphic rocks of the Esmond-Dedham Subterrane. Bedrock underlying the airport consists of granite of the Esmond Igneous Suite, formed during the Late Proterozoic (about 1 billion to 540 million years ago). These rocks consist of gray, tan, greenish, or pale-pink, medium- to coarse-grained, mainly equigranular rock (Rhode Island State Geologist, 1994). Frequent bedrock outcrops and boulders are located on the airport, especially along the perimeter.

The bedrock formations in Rhode Island are almost completely mantled by deposits of outwash and glacial till. Soils in the vicinity of North Central Airport are largely comprised of a relatively thin layer of glacial till. Till is an ice-deposited sediment, and it is highly variable in texture (clay to boulder size), composition, thickness, and structural features. This variability is often reflected in its hydraulic properties. Outwash or stratified drift deposits consist of well-sorted fine to coarse-grained sand and silt deposited from glacial meltwaters.

The glacial deposits in Rhode Island can be divided into four principal types: upland till plains, Narragansett till plains, Charlestown and Block Island moraines, and outwash deposits. The area of the North Central Airport is dominated by the upland till plains, which consist of till derived mostly from granite, schist, and gneiss.

1.4.5 Surface Water Resources

Surface water resources in the airport vicinity include Harris Brook and Crookfall Brook, which drain into a series of reservoirs and into the Woonasquatucket River and Blackstone River, respectively. The Woonasquatucket and Blackstone rivers both ultimately discharge to Providence Harbor/Narragansett Bay in Providence, Rhode Island. An unnamed pond is located approximately 500 feet southeast of the Runway 5 end on the south side of Limerock Road. Several smaller ponds are also located west of Runway 5/23 on the airport.

Drainage from the north and east sides of the airport flows into Towne Line Swamp, located approximately 2,000 feet north of the Runway 23 end, which drains into Woonsocket Reservoir #3. Crookfall Brook flows from Woonsocket Reservoir #3, ultimately discharging to the Blackstone River. Drainage from the south and west sides of the airport flows into Harris Brook, which flows into Georgiaville Pond, and ultimately the Woonasquatucket River. The southeastern portion of airport property drains south to the unnamed pond and wetland system south of Limerock Road. Crookfall Brook and Harris Brook are not listed on the Rhode Island List of Impaired Waters (Rhode Island Department of Environmental Management (DEM), 2008).

Public water supply for the Towns of Smithfield and Lincoln is purchased from the Providence Water Supply Board, which gets its supply from surface water sources in the Scituate Reservoir watershed in the Town of Scituate (Smithfield Water Supply Board, 2007 and Lincoln Water Commission, 2008).

1.4.6 Stormwater Drainage

The stormwater drainage system at the Airport consists of an underground storm drainage system, channelized flow, and overland flow/infiltration. On the airport there are depressions, or swales, parallel to Runway 23 which is influenced by run-off from the terminal area. According to Berger's Draft Stormwater Pollution Prevention Plan (2008) for North Central State Airport, the airport is subdivided into 19 drainage areas (Figure 1.14). A structural stormwater drainage system consisting of storm drains, catch basins, underground piping, and grass swales serve the airport's eastern drainage areas, including the airport operations facilities and portions of the airfield. A summary of the airport drainage areas follows:

- Drainage Area 1, which includes the airport operations facilities, and Drainage Area 4, which includes the northern portion of the parking lot and airport entrance road, are served by storm drains and catch basins, which discharge to an underground piping system. Stormwater discharge from Drainage Area 1 combines with open channel flow in Drainage Area 2 and eventually discharges off-site to a tributary that drains to Towne Line Swamp to the north. Stormwater in Drainage Area 8, located along the west side of Runway 5-23, collects in a grass swale and also discharges to the northern tributary;

- Drainage Area 3, which includes the apron and airport operations facilities, and Drainage Area 5, which includes the southern portion of the airport parking lot and entrance road, is served by storm

drains and catch basins. Storm drains collect stormwater in Drainage Area 3, which is conveyed beneath Runway 15-33 via underground piping. The pipe discharges at a headwall located near the airfield windsock. From this point, the stormwater discharges as open channel flow and eventually joins the Harris Brook tributary system. Stormwater which is generated in Drainage Area 5 collects in storm drains and discharges to a ditch along the south side of the parking lot. The drainage ditch eventually joins with open channel flow from Drainage Area 14, subsequently crossing beneath Runway 15-33 and discharging to the Harris Brook tributary system. Drainage Area 17, which includes most of the southwest portion of airport property, directly contributes stormwater to the Harris Brook tributary system via sheetflow and baseflow; and

- Stormwater in Drainage Areas 10, 12, and 18, located between Runway 5-23 and the adjacent taxiway, collects in grass depressions which serve as infiltration/detention basins. The remaining drainage basins discharge off-site as overland flow and infiltration.

All new development in the Town is required to incorporate in design and construction Best Management Practices for stormwater runoff.

Figure 1.14 – Airport Drainage Areas

1.4.7 Ground Water Resources

The majority of Smithfield and Lincoln, including the Airport, contain groundwater resources known or presumed to be suitable for drinking without treatment (GA classification). According to the Rhode Island Groundwater Regulations (DEM, 2005), "pollutants shall not be in groundwater classified GA, except within an approved pollutant discharge zone or residual zone, in any concentration which will adversely affect the groundwater as a source of potable water or which will adversely affect other beneficial uses of the groundwater, to include but not be limited to recreational, agricultural and industrial uses and the preservation of fish and wildlife habitat through the maintenance of surface water quality."

North Central State Airport has an on-site Individual Sewage Disposal System (ISDS). The terminal building and RIAC hangars are connected to a sanitary sewer main that discharges to a septic tank and leach field located on the airfield. The sewer pipe begins at the Skylanes/New England Aviation hangar and extends south along the other airport buildings. The sewer pipe passes underneath Runway 15-33 and discharges to a septic tank and leach field located approximately 100 feet southeast of the airfield windsock.

During the past several years, RIAC has worked with the Rhode Island Department of Administration (DOA) to quantify historic environmental liabilities and concerns that were in existence prior to the 1993 Lease and Operating Agreement between the state and RIAC. The replacement of the ISDS at North Central State Airport was a project that DOA agreed to fund. RIAC conducted a feasibility study to determine appropriate options to replace the ISDS including an assessment of sanitary sewer connection. RIAC provided this study to DOA for their review to determine the appropriate course of action and funding. Upon DOA providing the preferred alternative and allocating funds, RIAC will contract design and subsequent construction.

The airport is not located within a sole-source aquifer or wellhead protection zone, but is located within the Drinking Water Reservoir System for the City of Woonsocket Water Division. There is one non-community wellhead protection area (WHPA) in proximity to the airport based on information provided on the Rhode Island Geographic Information System (RIGIS) web site. This WHPA is located north of the airport and the George Washington Highway (Rhode Island Route 116) in Smithfield.

1.4.8 Wetlands

Wetlands edge delineation for North Central State Airport was prepared by Thalmann Engineering Co., Inc. of Greenville, Rhode Island in February 2006. Figure 1.15 shows wetland areas proximate to North Central Airport based on this delineation. Figure 1.15 also indicates the presence of wetland areas in the vicinity of the airport, as provided on the RIGIS web site. The Town of Smithfield also has mapping of wetlands within the Town limits, as described in the Airport Layout Plan Update (Edwards and Kelcey, 2001).

There are several wetland areas in the vicinity of the airport, primarily along the perimeter of the airfield and along the northwest and southeast boundaries of the airport property. Wetland areas are present on and within the vicinity of airport property. On airport property, wetlands occur at various locations adjacent to the perimeter of the airfield. In 2004, an Environmental Assessment (EA) was prepared by Dufresne-Henry, Inc. of Portland, Maine on behalf of RIAC for the removal of airport obstructions and improvement of the Runway 5/23 Safety Areas. Based on information contained in that EA, wetlands exist along the perimeter

of the airport and consist of riverine, palustrine forested, palustrine scrub-shrub, and palustrine open water and emergent wetland systems. The term palustrine is used under the U.S. Fish and Wildlife Service wetland classification system (Corwardin et al. 1979) to describe freshwater wetlands which are not bordering lakes or rivers.

The 2006 wetlands delineation generally confirmed the findings of the 2004 EA. Wetland habitats are regarded as sensitive since activities in and around these habitat types are generally regulated by Federal, State and local regulations. Environmental impact would result from:

- Direct loss of Federal- or State-protected plant or animal species;
- Disturbance, alteration, or loss of a preferred vegetation community type known to be used by a Federal- or State-protected plant or animal species;
- Disturbance, alteration, or loss of a unique or important vegetation community type; or
- Disturbance, alteration or loss of Federal- or State-protected wetland habitats.

The Rhode Island Freshwater Wetlands Act regulates a buffer (a.k.a. perimeter wetland) upland area adjacent to wetlands (including rivers and streams). DEM regulates a 50-foot perimeter wetland around wetlands (swamps, marshes, bogs, ponds); and 100- and 200-foot perimeter wetlands adjacent to rivers and streams depending on their width. Loss or disturbance of wetlands generally requires permits from DEM and the U.S. Army Corps of Engineers (USACE), as described in Section 1.4.15. The Town of Smithfield has adopted a 100 foot buffer on all wetlands (Smithfield Zoning Ordinances). No primary structures are allowed within this buffer.

Constructed wetlands at Runway 23 end to “make up” for destruction during construction of drainage ditch (1980s).

Figure 1.15 – Airport Wetlands

1.4.9 Floodplains

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps for the Towns of Smithfield (1991) and the Town of Lincoln (1982), there are no FEMA designated 100-year floodplains or flood hazard areas on or in proximity to North Central Airport. The entire airport is located outside of mapped floodplains as "Zone C". Figure 1.16 shows floodplain boundaries proximate to North Central Airport.

Figure 1.16 – Floodplains

1.4.10 Biotic Communities

Potential wildlife habitat at the Airport consists mainly of grasslands along the runways and property perimeter. Vegetation in the runway safety areas and runway infield areas are mowed regularly and is dominated by various grasses and other herbaceous species. The airport was formerly part of a larger area of deciduous forest and is surrounded by woodland and shrub and brush area as identified on a Town of Smithfield Land Use Map (2006). Vegetation types on the airport property are shown also identified in RIAC's Vegetation Management Program (Fuss & O'Neill, Inc., 2004). Mapping in this document shows areas of shrub and small trees (heights less than 10 feet) surrounding the airfield and areas of taller trees off the runway ends. Wetland areas are shown on the airfield and around the perimeter of the airport.

Upland forested vegetation located on or adjacent to airport property, includes primarily white pine (Pinus strobus), red oak (Quercus rubra), birch (Betula spp.), and black cherry (Prunus serotina). Forested wetlands, located in the northeastern part of the airport property are dominated by red maple (Acer rubrum) and gray birch (Betula populifolia). Other wetland vegetation is typical of palustrine scrub-shrub wetland systems, including speckled alder (Alnus rugosa), gray birch saplings and meadowsweet (Spirea latifolia) (Dufresne-Henry, 2004).

According to the U.S. Fish and Wildlife Service (FWS), no Federally-listed or proposed, threatened or endangered species are known to occur on airport grounds. Based on a letter provided by the FWS in response to an inquiry by Berger, and follow-up review of the FWS New England Field Office web site, preparation of a Biological Assessment or further consultation under Section 7 of the Endangered Species Act is not required.

The DEM Rhode Island Natural Heritage Program (RINH) was contacted and its web site was reviewed to determine whether any species of concern are located in the airport vicinity. No response was received from the RINH following inquiry from Berger. Further review did not identify any species of concern at the Airport. Animals have been observed at North Central Airport according to airport personnel. These animals are noted because they are potentially hazardous to aircraft safety. These animals include birds, deer, fox, coyote, and raccoons.

Wildlife management programs in place at North Central Airport are described in Piedmont Hawthorne's document *Wildlife Control Policies, Procedures, and Training Manual for Hawthorne Aviation Rhode Island Airports*. This document includes procedures for reporting bird and wildlife strikes, wildlife control field practices, and requirements for completion of daily logs and monthly summaries. This document also identifies three main problem species specific to SFZ; Canada geese, deer and turkeys.

1.4.11 Parks, Recreation and Open Space

North Central Airport is located within an area of mixed industrial, commercial, and residential land use as well as undeveloped open land and forest land. There are many parks and recreation areas in Smithfield and Lincoln; however, there are no parks within the immediate vicinity of North Central Airport.

The Town of Smithfield has proposed a Forest/Woodland Conservation Ordinance that if approved would forbid clear-cutting of any development site and require retention of a certain percentage of forest cover depending on the zoning of a property.

1.4.12 Historical, Cultural and Archaeological Resources

Section 106 of the National Historic Preservation Act of 1966, as amended (Section 106), requires the Federal Aviation Administration (FAA) to evaluate potential effects on properties listed or eligible for listing in the National Register of Historic Places (National Register) prior to an undertaking. An undertaking means a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including, among other things, processes requiring a Federal permit, license, or approval. In this case, the undertaking is the North Central State Airport Master Plan. Potential effects associated with improvements proposed in this Master Plan may include those resulting from ground disturbance, construction, or subsequent operation of the airport.

Historic properties are cultural resources listed or eligible for listing in the National Register. Historic properties represent things, structures, places, or archaeological sites that can be either Native American or Euro-American in origin. In most cases, cultural resources less than 50 years old are not considered eligible for the National Register. Cultural resources also have to have enough internal contextual integrity to be considered historic properties. For example, dilapidated structures or heavily disturbed archaeological sites may not have enough contextual integrity to be considered eligible.

Section 106 also requires that the FAA seek concurrence with the State Historic Preservation Officer (or SHPO; in this instance, the Rhode Island Historical Preservation and Heritage Commission or RIHPHC) on any finding involving effects or no effects to historic properties, and allow the Advisory Council on Historic Preservation (Council) an opportunity to comment on any finding of effects to historic properties. If Native American properties have been identified, Section 106 also requires that the FAA consult with interested Indian tribes that might attach religious or cultural significance to such properties. The Narragansett Indian Tribal Historic Preservation Office should be contacted prior to commencement of intended projects.

According to the 2001 Airport Layout Plan Update (Edwards and Kelcey, 2001), which referenced Town mapping, there is an “archeological site” just to the north of the Runway 15 end. One property in Smithfield and five properties in Lincoln are listed on the National Register of Historic Places and none of these properties are in the immediate vicinity of the airport. Berger contacted the Rhode Island Historical Preservation & Heritage Commission (RIHPHC) to determine whether any historic property could be affected by any proposed undertakings at the Airport. A response from the RIHPHC is pending.

1.4.13 Air Quality

The U.S. Environmental Protection Agency (EPA) defines ambient air in Code of Federal Regulations 40, Part 50, as “that portion of the atmosphere, external to buildings, to which the general public has access”. In compliance with the 1970 Clean Air Act (CAA) and the 1977 and 1990 Amendments (CAAA), the EPA has promulgated ambient air quality standards and regulations. The National Ambient Air Quality Standards (NAAQS) were enacted for the protection of the public health and welfare, allowing for an adequate margin of safety. To date, the EPA has established NAAQS for six criteria pollutants: carbon monoxide (CO), sulfur dioxide (SO_2), particles with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM10), ozone (O_3), nitrogen dioxide (NO_2), and lead (Pb).

There are two types of standards: primary and secondary. Primary standards are designed to protect sensitive segments of the population from adverse health effects, with an adequate margin of safety, which may result from exposure to criteria pollutants. Secondary standards are designed to protect human health and welfare and, therefore, in some cases, are more stringent than the primary standards. Human welfare is considered to include the natural environment (vegetation) and the manmade environment (physical structures). Areas that are below the standards are in "attainment," while those that equal or exceed the standards are in "non-attainment." All of Providence County is a non-attainment area for the 8-hour ozone standard, as are all other counties in Rhode Island.

Although the EPA has the ultimate responsibility for protecting air quality, each state and local government has the primary responsibility for air pollution prevention and control. The CAA requires that each state prepare and submit a plan (State Implementation Plan) describing how the state will attain and maintain air quality standards in non-attainment areas. In order for projects to comply with the CAA and the CAAA, they must conform to attainment plans documented in the State Implementation Plan. The agency responsible for implementing the State Implementation Plan in Rhode Island is the DEM, which maintains air monitoring sites.

The region surrounding North Central State Airport is largely residential, forested, or light industrial. There are no obvious air pollution emission sources located in proximity to the airport with non-point air pollution from automobile and airplane exhaust most likely the main source of air pollution emissions in the area. It is not anticipated that these emissions are of a level that warrants concern.

Given that the Airport is a commercial service airport with less than 1.3 million annual passengers and less than 180,000 annual general aviation operations through the forecast period, in accordance with FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions* (Section 47.e.(5)(c)1a), an air quality assessment for long term impacts is not required for proposed projects that will not increase these passenger and operations numbers. The FAA thresholds are based on an understanding that relatively small airports with limited operations have been found to have little or no impact on air quality.

1.4.14 Hazardous Materials and Petroleum Products

Aircraft fueling operations at North Central are conducted by Landmark Aviation. Two 12,000-gallon aboveground storage tanks (AST) are located south of the old administration building and are used to store JetA aviation fuel and Avgas (100 LL). These AST replaced underground storage tanks (UST) formerly located adjacent to the main terminal/hangar building. These former UST were removed in 1997. This AST is equipped with secondary/overfill containment, spill prevention and safety measures as required by current State and Federal regulations. The installation is surrounded by crash barriers (bollards). Emergency spill response equipment such as Speedy-dry, absorbent pads, brooms, and shovels are stored in a shed adjacent to the AST. Landmark Aviation operates two active fuel trucks, which are refueled at the AST fuel farm. Aircraft are fueled by truck on the airport apron and ramps.

There is also a 250-gallon diesel fuel AST with fuel dispenser at this location. This AST is used to fuel various airport vehicles. It is equipped with secondary containment and overfill protection to prevent potential contact with stormwater.

The bottom floor of the old terminal building is used as a garage bay for vehicle and equipment maintenance. Landmark Aviation operates and maintains snow removal equipment, which are stored adjacent to the AST fuel farm. Sand is applied to paved roads and sidewalks as necessary during the winter. Landmark Aviation maintains an outdoor sand pile which is also located adjacent to the AST fuel farm. Aircraft deicing fluid (propylene glycol based Types I and IV) is stored seasonally on an as-needed basis in the vicinity of sand pile. Aircraft are deiced in a designated area on the pavement in front of the former AeroServe hangar. This area is not directly connected to the storm drainage system.

The airport generator is located adjacent to the old terminal building. The diesel generator and associated AST are situated atop a grass embankment south of the terminal building. The 250-gallon AST is located immediately south of the generator. The AST is equipped with secondary containment and overfill protection.

The Main Terminal Building is heated using by oil from a 500-gallon heating oil AST, labeled A-001, which is located at the southwest corner of the building. Tank A-001 is complete with secondary and overfill protection. In the lower level of the terminal building is the airport's maintenance/storage garage. Materials stored in this building include: waste oil, used absorbents, hydraulic oil, antifreeze, and gasoline.

New England Aviation performs aircraft service and maintenance inside the Skylanes/New England Aviation hangar. RI Aviation is a small aircraft maintenance and service facility. Miscellaneous aircraft maintenance supplies (paint, cleaning fluids, etc.), engine fluids (motor oil, hydraulic oil, gasoline, etc.), and waste materials are stored inside the Skylanes/New England Aviation hangars.

New England Aviation occupies the hangar located north of the Aero-Serve hangar. New England Aviation, a charter aviation and aircraft rental company, leases the hangar for aircraft storage and maintenance. Materials with the potential for stormwater contact at the hangar include mineral spirits, kerosene, heating oil, and waste oil. New England Aviation services aircraft inside the hangar. Kerosene for the building's heating system is stored in a 275-gallon AST at the northwest corner of the building. The AST does not have secondary containment. There is also a 275-gallon heating oil AST inside the building. There is no secondary containment for this tank.

The interior of the private hangar occupied by Rossetti Construction was not inspected during Berger's site visits. Two sets of vent and fill pipes located on the north side exterior of this building indicate that the building is likely heated using fuel oil stored in AST.

Potential hazardous building materials at the airport include fluorescent light ballasts, which may contain polychlorinated biphenyls. Asbestos-containing building materials may be located in piping insulation, floor finishes, roofing materials, and glazing products. Based on the age of airport buildings, lead paint may also be present.

Limited aircraft deicing is performed at North Central State Airport. A sprayer containing propylene glycol is located in the fuel storage area south of the old terminal building. Snow removal equipment is also stored in this area. All snow removal is conducted by Landmark Aviation personnel. Minor quantities of sand and salt are applied to roads and sidewalks. Landmark Aviation does not employ chemical deicers on airfield pavement.

1.4.15 Environmental Permitting in Rhode Island

The DEM regulates activities that may affect the State's natural resources and environment through multiple permitting programs, as well as other environmental policies. The Federal and local governments also regulate activities that can affect the environment. Some of the permits that may be required for various potential projects as described in an FAA Advisory Circular for airport master planning (FAA, 2005) include:

- Clean Water Act, Section 404 Dredge and Fill Permit;
- Air Quality Permit for on-site batch plants or other construction-related activities;
- Local government construction permits;
- Growth Management Permits;
- United States Fish and Wildlife Service, National Marine Fisheries Service opinions, or State Wildlife and Game Commission permits, if protected and endangered species could be impacted; and
- Clean Water Act, National Pollution Discharge Elimination System Permits.

Many airport-related capital projects require Federal, State, or local environmental permits. A summary of some of the potential permitting requirements is provided here:

Rhode Island Pollutant Discharge Elimination System (RIPDES) Permit Section 46-12-15(b) of the Rhode Island General Laws, as amended, prohibits the discharge of pollutants into Waters of the State. The only exceptions are discharges in compliance with the terms and conditions of a Rhode Island Pollutant Discharge Elimination System (RIPDES) Permit issued in accordance with State regulations.

Rule 31 of the RIPDES Regulations, as amended on February 25, 2003, requires all discharges of stormwater associated with industrial activity to obtain a RIPDES permit. To be covered by the General Permit for Storm Water Discharge Associated with Construction Activity, applicants must complete a Notice of Intent Form. Provided all required information is submitted and it is determined that a general permit is appropriate for the site, a letter of authorization to discharge will be issued by the DEM.

A Storm Water Pollution Prevention Plan (SWPPP) shall be developed for construction activities covered by the permit. The SWPPP shall identify potential sources of pollutants that may reasonably be expected to affect the quality of storm water discharges associated with the construction activity. In addition, the SWPPP shall describe and ensure the implementation of best management practices to be used to reduce or eliminate the pollutants in the storm water discharge at the site and assure compliance with the terms and conditions of the RIPDES permit. Upon completion of projects completed under the RIPDES permit, the airport's Facility SWPPP for Industrial Activities shall be amended to reflect the changes/alterations resulting from the construction activities.

Rhode Island Wetlands Permit Potential work in or adjacent to wetland areas of the airport would require permitting under the Freshwater Wetlands Program of DEM. Wetland permitting is also conducted by the USACE. Effective February 11, 1997, the New England Division of the USACE

has issued a programmatic general permit (PGP) for the review of proposals in coastal and inland water and wetlands within the State of Rhode Island. This permit covers work and structures that are located in, or that affect, navigable waters of the United States, and the discharge of dredges or fill material into the waters of the United States, including wetlands and streams (regulated by the Corps under Section 404). The PGP is intended to streamline the permitting process for such activities by eliminating the need to apply to both the USACE and the DEM Freshwater Wetlands Program. Thus any permit issued by the DEM under the PGP will also satisfy Federal wetlands permitting requirements. Wetlands at the North Central Airport are outside of the Rhode Island Coastal Resource Management Council's jurisdiction.

Minor Source Air Permit A Minor Source Permit may be required from the DEM Office of Air Resources to address temporary siting and emissions from a temporary batch asphalt plant should one be necessary for potential airport projects. The submission requirements for a Minor Source Permit do not include substantial information on air quality impacts or current Best Available Control Technology as would be required for a Major Source Permit but Best Available Control Technology review and screening level air quality analysis should be performed to ascertain whether potential air impacts might be problematic. The production of such information is proposed to be the responsibility of the potential contractor and/or asphalt supplier.

1.4.16 Wild and Scenic Rivers

The Wild and Scenic Rivers Act (16 U.S.C. 1271 as amended) protects rivers designated for their wild and scenic values from activities which may adversely impact those values. There are no designated Wild and Scenic Rivers in Rhode Island (U.S. National Wild and Scenic Rivers System web site, 2008), and therefore no designated rivers in Smithfield, Lincoln, or at North Central State Airport.

1.4.17 Coastal Zone Management

The CRMC claims jurisdiction over projects within 200 feet of a coastal feature. The CRMC also claims jurisdiction over projects that affect freshwater wetlands that are contiguous with a coastal feature, and any project resulting in 20,000 square feet of impervious area located in a designated watershed of poorly flushed estuaries. Finally, CRMC technical staff reviews some specific projects due to their potential impact on coastal areas regardless of where in the state they are located (power plants, petroleum storage facilities of 2,400 barrel capacity or greater, chemical or petroleum processing, minerals extraction, desalination projects, etc.).

FAA Order 5050.4B requires that Federal actions be consistent with the objectives and purposes of approved State coastal zone management programs, if in effect. North Central Airport is not located in a coastal area.

1.4.18 Coastal Barriers

As stated in Section 47.3. (14) of FAA Order 5050.4B, the Coastal Barriers Act of 1982 applies to some areas on the shores of the Atlantic Ocean. North Central State Airport is not located within a coastal zone area.

1.4.19 Farmland

Soil types beneath the airport were mapped by the U.S. Department of Agriculture Soil Conservation Service (now known as the Natural Resources Conservation Service) and published in the *Soil Survey of Rhode Island* (1981), and are shown on Figure 1.17. As described in Section 1.4.4, primary natural soil types at North Central are Ridgebury, Whitman, and Leicester, Woodbridge, Canton and Charlton, and Paxton stony silt loams.

Soils suitable for farmland have been identified throughout the State of Rhode Island by the NRCS and the Rhode Island Department of Administration, Division of Planning. Farmland is broken into the following categories by the Federal Farmland Protection Policy Act: prime farmland, unique farmland, and land of statewide or local importance.

The majority of land within the airport and vicinity is not suitable farmland; however, some suitable farmland is located in the airport vicinity. Prime farmland exists in an area immediately east of the airport mapped as Paxton fine sandy loam (PaA) and Woodbridge fine sandy loam (WhA). Prime farmland is defined by NRCS as land that has the best combination of physical and chemical characteristics for producing feed, forage, fiber, and oilseed crops, and is also available for these uses. The locations of these soils with respect to the proposed project areas are shown on Figure 1.17.

Farmland of statewide importance is classified as lands that, generally, are nearly prime farmland and produce high economic yields of crops when treated and managed according to acceptable farming methods. No soils classified as soils of state-wide importance (other than the prime farmland) are located in the immediate airport vicinity.

If it is determined that proposed projects may affect soils protected under the Federal Farmland Protection Act, it may be necessary to contact the U.S. Natural Resources Conservation Service (NRCS) for completion of a Farmland Conversion Impact Rating Form. Based on the impact rating score developed by the NRCS based on this Form, the NRCS may recommend consideration of alternate project sites. The need for completing this form is contingent on the local zoning within the proposed project area since prime farmland does not include land already in or committed to urban development. Areas zoned for commercial, industrial, or high-density residential use may be exempt from this requirement.

Figure 1.17 – Farmland

1.4.20 Energy Supply and Natural Resources

FAA Order 5050.4B *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions.* states that airport energy use typically falls into one of two categories:

- That which relates to stationary sources such as a terminal buildings, airfield lighting, etc.
- That which involves the movement of aircraft or ground vehicles.

FAA Order 5050.4B states that use of natural resources may become an issue warranting discussion only if the airport requires use of unusual materials in short supply.

1.4.21 Light Emissions

The runway lights and approach lighting system to Runway 5 are radio activated (Unicom frequency) by the airport manager or pilots (Edwards and Kelcey, 2001). The airport is generally well-buffered from surrounding land uses by a green perimeter and light emissions from the airport are not considered a major nuisance to surrounding property owners.

1.4.22 Solid Waste

The airport's daily generation of solid wastes is relatively minor and well within the capabilities of waste haulers and disposal firms in the area. Trash is removed and disposed of by a waste disposal contractor on a regular basis. Outdoor trash dumpsters and recycling bins are maintained at individual airport facilities.

1.4.23 Public Lands

The U.S. Department of Transportation Act, Section 4(f) states that:

"the Secretary shall not approve any program or project which requires the use of any publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance or land of an historic site of national, state or local significance as determined by the officials having jurisdiction thereof unless there is no feasible and prudent alternative to the use of such land and such program or project includes all possible planning to minimize harm resulting from the use. If the proposed action involves the taking or other use of any Section 4(f) land, the initial assessment shall determine if the requirements of Section 4(f) are applicable."

Section 6(f) of the Land and Water Conservation Act (LWCA) prohibits recreational facilities funded under the LWCA from being converted to non-recreational use unless approval is received from the director of the National Park Service.

Based on a review of the existing land uses, it has been determined that there are no publicly owned parks, recreation areas or wildlife refuges in the immediate vicinity of the Airport.

1.5 Inventory of Economic Conditions

This section provides information regarding the economic contribution the Airport provides to the region. Airport financial data is provided to understand the current and most recent airport finances. This is reviewed to understand the airport's ability to undertake future capital improvements and its continued day-to-day operation. In addition, RIAC recently completed a statewide economic impact of all airports in Rhode Island.

1.5.1 Airport Financial Data

The income statements for North Central indicate that the airport derives revenues primarily from landing fees, sales of jet and avgas fuel, aircraft tie-down fees, hangar leases, and other miscellaneous sales.

The following table summarizes the net income for the airport:

Table 1.14
Net Income – North Central State Airport

Fiscal Year	Profit	Loss
2007	-	$80,329
2006	$3,822	-
2005	-	$64,405
2004	-	$89,016
2003	$13,991	-

Source: RIAC and Landmark Aviation

1.5.2 Airport Economic Impact

According to the results of a 2006 RIAC sponsored economic impact study, the total economic activity of the airport in the local economy totals 100 jobs and $9,583,900.