Chapter 4

DEMAND CAPACITY ANALYSIS & FACILITY REQUIREMENTS

This Chapter investigates the capacity of the airport, its ability to meet current demand, and the facilities required to meet forecasted needs as established in Chapter 3 (Forecasts). The objective of this analysis is to determine the adequacy of existing facilities, which will lead to a preliminary determination of what is required to satisfy future requirements. The results of these preliminary findings are subjected to an analysis of development alternatives before being finalized.

Facility requirements are also based on issues not related to capacity and demand. FAA design standards, safety, and services for airport users are also considered in the AMPU.

The airside and landside capacity needs are determined by comparing the capacity of the existing facilities to forecasted demand for them. In cases where demand exceeds capacity, additional facilities are recommended. The time frame for assessing development needs usually involves the three forecast periods: short- (0-5 years), intermediate- (6-10 years), and long-term (11-20 years).

Long-term planning is concerned with the ultimate role of the airport and its related development; intermediate-term planning involves a more detailed assessment of needs. Short-term is geared to an immediate action program and may include details not appropriate to the longer periods. On the other hand, the intermediate and long-terms target development needs based on the attainment of specific demand levels. Therefore, demand levels are directly tied to each recommended development proposal and will usually be coupled with specific milestones or triggers that must be attained before development is considered.

In this Chapter the AMPU evaluates the following airside and landside issues and makes specific recommendations pertaining to each.

- Airside
  - Runway length, width, standards, location, and configuration
  - Taxiway configuration and design standards
  - Aprons, tiedowns, and hangars
  - Airport lighting, signage, and markings

- Landside

  - Terminal space and automobile parking
  - Aircraft fueling and maintenance facilities, equipment, and airport utilities

AIRSIDE CAPACITY & REQUIREMENTS

The theoretical capacity of an airport depends on a number of variables, including aircraft fleet mix, air traffic operating rules and separation, runway usage, and weather conditions. As each invariably changes, so does airport capacity. The first analysis is to determine whether the runway configuration is adequate. That is, does the current runway layout at Biddeford meet existing and future demands? The capacity of a given runway system is dependent upon its basic configuration, the types and mix of aircraft and their use of the system, and air traffic service availability.

Runway Capacity

An analysis was completed using the FAA Design Software to determine the airport service volume (ASV) and hour capacity. The Airport is currently using 13 percent of its available capacity (30,000 operations versus a capacity of 230,000). As forecasted, annual operations will grow at the rate of 2 percent per year, reaching a projected high of 42,000 in 2022, or 18 percent of total capacity. No measures must be taken until the ratio reaches 60 percent, which in the case of Biddeford, would mean 138,000 operations.

Runway Orientation

A factor influencing runway orientation (alignment in relation to magnetic north) and the number of runways is wind. Ideally a runway should be aligned with the prevailing wind. Wind conditions affect all airplanes in varying degrees. Generally, the smaller the airplane, the more it is affected by wind, particularly crosswind components, which is the resultant vector that acts at a right angle to the runway. Pilots' inability to cope with wind is a leading cause of accidents.

The most desirable runway orientation based on wind is the one that has the largest wind coverage and minimum crosswind components. Wind coverage is that percent of time crosswind components are below an acceptable velocity. The desired wind coverage for an airport is where the wind falls within certain coverage at least 95 percent of the time. As addressed in Chapter 2 (see *Wind*, Page 53) wind coverage at the Airport under all-weather conditions meets the requirement only 86 percent of the time.

The two previous master plan updates addressed this issue at length, concluding that a second runway was necessary. "The analysis shows a runway orientation with a 20 degree band; i.e., [runway] 13-31 to 15-33 would provide acceptable wind coverage with respect to the combined use of Runway 06-24 and a new runway."[1] If all things were equal, a new runway would be constructed to supplement or replace the existing runway. However, terrain, land availability, demand, cost, and the airport's overall role in NPIAS are also factors that must be weighed.

Runway Length Analysis

Runway length requirements are evaluated using two separate methods to determine both a general runway length based on a wide variety of generic aircraft and a length based on existing and forecasted aircraft.

An analysis using FAA Design Software indicates that the runway at Biddeford will support 95 percent of all small aircraft with up to 10 passenger seats, using 2,990 of its 3,000 feet of available runway (see Table 4-1). However, at 2,990 feet, there is absolutely no room for error. According to this analysis, the runway at Biddeford would have to be extended to 4,100 feet to support the entire small aircraft fleet. This analysis does not compute aircraft takeoff distances, which are generally shorter than landing distances.

Table 4-1
Generic Runway Takeoff Length

Aircraft Weight Class/Category	Required Runway Length
Small airplanes with approach speeds less than 30 knots	300
Small airplanes with approach speeds less than 50 knots	810
Small airplanes with less than 10 passenger seats	
75% of All Aircraft	2,440
95% of All Aircraft	2,990
100% of All Aircraft	3,550
Small Airplanes with 10 or more Passenger Seats	4,100

Parameters:
Mean High Summer Temperature: 79°F
Airport Eleveation: 157 feet
Maximum difference in runway end elevation: 8.3 feet

Source: FAA Design Software

A second means of evaluating aircraft takeoff and landing performance is a method using specific aircraft performance data and applying it to industry standard calculations for temperature, pressure, runway gradient, aircraft weight, and surface

[1] Master Plan Update Study, Final Report (Page IV-9), prepared by Hunter-Ballew Associates, January 1985

conditions (wet or dry runway). Standard and adjusted takeoff distances for a range of general aviation aircraft, which have or will most likely use the airport are listed in Table 4-2. While the data is not all inclusive, it does represent a broad range of aircraft, primarily in the A-II and B-II ARC groupings. As the data illustrate, the 3,000 foot runway at Biddeford meets most aircraft needs in this small group, but higher performance aircraft, such as the Beech King Air 90B and 200, can only operate out of Biddeford under very light operating weights with cooler temperatures. Smaller turbofan aircraft, like the Citation Jet 525 and Lear 31 could not use Biddeford except under perfect conditions and a very light payload. Additionally, the distances

Table 4-2
Type Specific Aircraft Takeoff Performance Data

MANUFACTURER, MAKE, MODEL	ARC	MGTOW	TAKEOFF DISTANCE			
			ISO	ADJUSTED FOR BIDDEFORD		
				DRY	WET	80%
Aviat Huskey A-1B	A-I	2,000	200	224	258	206
Beech Bonanza 33C	A-I	3,900	1,769	1,982	2,280	1,824
Cessna 172 Skyhawk	A-I	2,300	1,200	1,345	1,546	1,237
Cessna 182 Skylane	A-I	3,100	1,400	1,569	1,804	1,443
Cirrus SR-20	A-I	2,900	1,310	1,468	1,688	1,351
Eclipse 500	A-I	4,700	2,060	2,308	2,655	2,124
Grumman AA-5B	A-I	2,200	1,050	1,177	1,353	1,082
Piper Saratoga	A-I	3,600	1,759	1,971	2,267	1,813
Scotia Trinidad TB-21	A-I	3,100	1,193	1,337	1,537	1,230
Vans RV-6	A-I	1,600	475	532	612	490
Pilatus PC-12	**A-II**	**9,000**	**2,230**	**2,499**	**2,874**	**2,299**
Beech Baron 55	B-I	5,100	1,400	1,569	1,804	1,443
Cessna 421	B-I	7,400	2,323	2,602	2,994	2,395
Learjet 31A	B-I	17,000	3,280	3,676	4,224	3,382
Beech King Air 200	**B-II**	**12,500**	**2,579**	**2,890**	**3,324**	**2,659**
Beech King Air 90B	B-II	9,650	2,710	3,037	3,492	2,794
Cessna 525A (CJ2)	B-II	12,500	3,420	3,832	4,407	3,526
Beechjet 400-A	C-I	16,100	4,169	4,672	5,373	4,298

Legend: ISA - International Standard Atmopshere; AS - Approach Speed; MGTOW - Maximum Gross Takeoff Weight; 80% means 80% load factor. Aircraft in **BOLD** are the existing and forecasted design aircraft.

Sources: Regional Guidance Letter (RGL 00-1), Airports Division, FAA Southern Region (March 1, 2001); Regional Guidance Letter (RGL 01-2), Airports Division, FAA Southern Region (August 10, 2001); Various Aircraft Manufactures; Dufresne-Henry, Inc., analysis shown do not reflect unique operator operating restrictions, such as those imposed by federal regulations or insurance requirements. They are also based on aircraft manufacture test data using new aircraft with experienced test pilots. Experience has shown that the data in these tables represent the shortest possible distances attainable under the conditions shown.

Runway Summary

Capacity is not an issue at the Airport, however orientation and length are. The existing runway alignment does not provide optimum wind coverage. In addition, the existing 3,000 foot length is considered too short to meet future demand. A new runway built to the optimum length and located west of the existing facility would solve many existing problems, including the obstruction issue (addressed later); assuming the existing runway was decommissioned. However, because the airport is used predominantly by recreational pilots, constructing a new runway is probably not economically feasible at this time.

While a second runway is not deemed essential at this time, lengthening Runway 06-24 is considered central to the airport's growth and its relationship to the local industrial park complex. It is recommended that a minimum takeoff runway length of approximately 3,500 feet be developed. Optimally, a takeoff runway length of 4,000 feet should be preserved for future consideration; however, there is no justification at this time for a runway longer than 3,500 feet. The forecasted design aircraft (Beech King Air-200) has a takeoff distance of 2,890 feet during dry runway conditions and 3,324 feet on a wet runway at MGTOW. This distance does not include additional runway required for safety considerations or variations in pilot performance or weather. A 3,000 foot runway leaves a 110 foot margin of error on a dry, warm summer day; far less than many aircraft operators would prefer or even consider safe.

Runway ARC Requirements

It was determined that the ARC for Biddeford should be changed from A-II to B-II. This change requires no significant adjustment to the airport design standards because most of the FAA requirements are based on the latter part of the ARC classification, Design Group II. The change from aircraft approach category "A" to "B", the first part of the ARC, affects RPZ standards, which are addressed later in this Chapter.

Runway Geometric Standards

The runway geometric standards were addressed in Chapter 2 (Page 18). The following addresses standards based on forecasted changes.

Runway Safety Areas - As addressed in Chapter 2 (see Runway Safety Areas, Page 27), the RSAs do not meet FAA standards. While the side RSA is satisfactory, both runway end safety areas are short of the required distance. Table 4-3 shows the required and actual dimensions of the RSAs.

Table 4-3
Runway Safety Areas

Runway	Required Length	Actual Length	Required Width	Actual Width
6	300	220	150	150
24	300	180		

Source: AC 150/5300-13, Table 3-1

- ***Runway 06 RSA -*** The Runway 06 End RSA is approximately 100 feet too short, falling off rapidly into a deep ravine, creating a safety hazard should an aircraft land short or overrun the runway when using the opposite end, Runway 24.

- ***Runway 24 RSA*** - The Runway 24 End RSA is approximately 120 feet too short, with uneven grading and small shrubs in the zone.

Runway Protection Zones - The size of the RPZ is based on the type of instrument approach serving a runway end as well as the approach category. The airport currently has, with no forecasted change, a non-precision approach to the Runway 06 end and a visual approach to the Runway 24 end. The RPZs will remain as shown in Table 4-4.

Table 4-4
Runway Protection Zones

Runway	Standards	Length	Inner Width	Outer Width	Area	Non Conforming Issues
6	Not lower than 1 mile visibility and Approach Category A and B	1,000	500	700	13.77	Obstructions (trees and shrubs); Not under control of the airport.
24	Visual; Small Aircraft Exclusively	1,000	250	450	8.04	None

Distances in feet, area in acres

Source: AC 150/5300-13, Table 2-4

Runway Object Free Area - The Runway 06-24 ROFAs do not meet FAA requirements because of issues involving parked aircraft in the main apron. This was addressed in Chapter 2 (Page 30). The change in the ARC to B-II will have no impact on the size or location of the ROFA; however the non-conforming issues remain that can only be corrected by restricting aircraft parking in the OFA and relocating the apron further away from the runway. Table 4-5 lists the dimensions and issues.

Table 4-5
Runway Object Free Area

Standards	Required Width	Actual Width	Required Length	Actual Length	Non-Conforming Issues
Design Group II Approach Category A & B visual runway	500	370	300	300	Aircraft apron, tiedowns, and parked aircraft on the main ramp

Source: AC 150/5300-13 Table 3-1

Runway Obstacle Free Zone - The existing ROFZ, as discussed in Chapter 2 (Page 30) is based on "small aircraft exclusively" standards. Like the RPZ, if a runway extension in the 4,000 foot range is completed, the ROFZ should be widened to accommodate large category aircraft, those weighing more than 12,500 pounds. Table 4-6 lists the dimensions and issues.

Table 4-6
Runway Obstacle Free Zone

Standards	Required Width	Actual Width	Required Length	Actual Length	Non-Conforming Issues
Runways serving small aircraft with approach speeds of 50 knots or more	250	250	200	200	Aircraft apron, tiedowns, and parked aircraft on the main ramp

Source: AC 150/5300-13, Paragraph 306

Taxiways

The airport does not have a taxiway system. However, forecasted operations and based aircraft will require changes that will increase the safety level. Current procedures require aircraft to taxi onto and along the runway to reach takeoff position. Arriving aircraft that roll past the mid-field turnoff to the ramp must turn around and taxi back. Both situations create hazards that can lead to incidents. Several options should be explored involving both aircraft turnaround/holding areas at the end of each runway and full- or partial parallel taxiways. In both cases the alternatives should analyze wetland impacts by looking at development on both the north and south side of the runway.

Airport Lighting, Markings, and Signage

Changes in forecasted operations will ultimately necessitate some minor upgrades to the runway and airport.

Lighting - Existing airport lighting was discussed in Chapter 2 (Page 32). Table 4-7 shows existing and recommended changes.

Table 4-7
Recommended Airfield Lighting

System	Existing	Recommended
Runway Lights	MIRL	Replace with same
Taxiway Lights	None	LITL
Visual Approach Guidance	VASI - Runway 6	PAPI - Runway 6 PAPI - Runway 24
REILS	Runway 6	Runway 6 Runway 24
Threshold Lights	Standard, medium intensity	Replace with same
Rotating Beacon	Manairco AB-1000A	Replace with FAA approved system

MIRL - Medium Intensity Runway Lights; LITL - Low Intensity Taxiway Lights; REILS - Runway End Identifier Lights; VASI - Visual Approach Slope Indicator; PAPI - Precision Approach Path Indicator
Source: Dufresne-Henry, Inc., analysis

Markings - Runway markings should be maintained at the existing level for a non-precision runway. If a taxiway or aircraft turn-around system is built, markings should be consistent with FAA criteria.

Signage - Runway and taxiway signs should be upgraded as addressed in Chapter 2 of this report (Page 34). This involves placing runway exit signs at the existing taxiway exit off the runway and a sign directing pilots to the apron area. In addition, new signs consistent with the development of new taxiways and/or turn-around areas must be considered.

LANDSIDE CAPACITY & REQUIREMENTS

This chapter addresses issues related to landside facility capacity and the recommended changes. These changes include aircraft apron and hangar space, terminal building space, including automobile parking, and other miscellaneous storage facilities.

Aircraft Storage

The first assumption that must be made is how the mix of aircraft that park on ramps and those in hangars will change during the planning period. Currently the mix is approximately 50 percent in hangars and 50 percent in tiedowns. However, industry trends and current demand for hangars, particularly reasonably priced hangars, is leaning toward a higher percentage of aircraft being stored in a protected area. A New York State Department of Transportation (NYSDOT) study[2] indicates that aircraft owners overwhelming prefer hangars to tiedown space, provided they are reasonably priced. The study further indicates that 43 percent prefer T-Hangars (lower cost) and 38 percent prefer conventional hangars. The remaining either preferred tiedown space (6.5 percent) or were unspecified in their choices.

The NYSDOT study is consistent with similar studies undertaken by the consultant. Given the choice between a reasonably priced hangar and a tiedown, studies show that aircraft owners will choose the hangar between 60 and 80 percent of the time. As the cost of owning an aircraft goes up and as the fleet mix changes in favor of more turboprop and turbofan aircraft, away from the traditional single-engine reciprocating aircraft, the demand for hangars will increase.

The current 50/50 split is based on current supply, not demand. Demand for hangars is high and would probably support increasing the number of available spaces by 10 to 20 percent immediately. It is forecasted that the current 50/50 split at Biddeford will change in favor of more hangars as soon as they are built. Ultimately the tiedown to hangar relationship will change to a 30-70 split respectively in the long-term. Therefore, the current demand is estimated to be around 40 percent in favor of tiedown and 60 percent preferring hangars. This will increase to 70 percent in favor of hangars by the end of the planning period, with the remaining 30 percent using apron tiedown areas. Table 4-8 compares the projected general aviation based aircraft growth rate to the apron versus hangar demand for the next 20-years. The table also shows the current relationship (2002 data), the estimated current demand, and the traditional short-, intermediate-, and long-term demand through the year 2022.

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[2] 1999 Aircraft Owners and Aviation Users Marketing Survey and Regional Analysis. New York State Department of Transportation, Passenger Transportation Bureau, Albany, New York. New York State Small Business Development Center.

Based Aircraft Apron Requirements - Existing apron facilities were addressed in Chapter 2 (Page 35). There are two apron requirements; those for based aircraft and the area required for itinerant aircraft. The majority of space at Biddeford is used by based aircraft. There are two areas where aircraft park: the South and Main ramps. As discussed, Biddeford has 22 based aircraft parked on the two aprons. The total capacity of these three areas is 20 aircraft. As the airport develops more hangars, the shift away from tiedowns to hangars will result in a decreasing demand for apron space.

Table 4-8
Apron v. Hangar Requirements

Period	Based Aircraft	Apron Tiedowns	Hangar Space
2002	43	22	21
2003	43	17	26
2007	47	17	31
2012	52	17	35
2022	60	18	42

Source: Dufresne-Henry, Inc., analysis

Table 4-9 shows the resulting calculations of apron demand during the three elements of the planning period and is based on the assumption that the apron to hangar demand will result in a 30 percent apron to 70 percent hangar ratio.

Table 4-9
Based Aircraft Apron Requirements

Period	Tiedown Requirements	Apron Area Required
2002	22	59,400
2007	17	45,900
2012	17	45,900
2022	18	48,600

Apron Area in Square Feet
Source: Dufresne-Henry, Inc., analysis

Itinerant-Aircraft Apron Requirements - Itinerant aircraft apron space is determined by using the peak activity levels developed as part of the forecasting process. Based on FAA guidelines, Itinerant-aircraft apron requirements developed from the PMAD data reported in Chapter 3 (Page 75) are shown in Table 4-10. Itinerant space requirements will increase from the present 39,000 to 55,000 in 20 years.

Total Apron Requirements - The combined based and itinerant aircraft parking requirements are shown in Table 4-11. The airport has and is forecasted to have a deficit of parking space of approximately 41,500 square feet today, increasing to a 47,000 square foot shortfall in 20 years.

Table 4-10
Itinerant Aircraft Parking Requirements

Condition	Current	2006	2011	2021
PMAD (From Subsection C.1.g.i.)	30	33	36	42
Peak-Day Operational Demand (110% of PMAD)	33	36	40	46
Actual Aircraft Anticipated 50% of Peak-Day Operational Demand)	17	18	20	23
Estimated Parking Demand (75% of Actual Aircraft Anticipated)	12	14	15	17
Itinerant Aircraft Parking Demand (3,240 square feet per aircraft)	38,880	45,360	48,600	55,080

Source: Dufresne-Henry, Inc., analysis

Table 4-11
Total Aircraft Apron Requirements

Period	Based Aircraft Apron Required	Itinerant Aircraft Apron Required	Total Apron Required	Total Existing Apron Space	Surplus (Deficit)
2002	59,400	38,880	98,280	56,800	(41,480)
2007	45,900	45,360	91,260		(34,460)
2012	45,900	48,600	94,500		(37,700)
2022	48,600	55,080	103,680		(46,880)

Source: Dufresne-Henry, Inc., analysis

Hangar Requirements - The base year data had 21 based aircraft parked in hangars, or 50 percent of total based aircraft. It is anticipated that to meet current demand this number will increase as quickly as hangars can be developed to an estimated 26 spaces. This number will grow to 42 spaces based on findings discussed earlier. The type of hangars is important because of the need to keep costs competitively low. T-hangers generally offer the best value for individual aircraft owners, while conventional hangars are ideal for commercial enterprise. In addition, the need for commercial space has not been evaluated.

Table 4-12
Hangar Space Requirements

Period	Existing	Required	Surplus (Deficit)
2002	22	21	1
2003		26	(4)
2007		31	(9)
2012		35	(13)
2022		42	(20)

Note: Numbers reflect aircraft spaces not hangar units
Source: Dufresne-Henry, Inc, analysis

Table 4-12 reflects the need to add more hangars at Biddeford during the three planning cycles. As shown, the airport has an immediate need for about 4 more spaces, and will have a long-term planning need for approximately 20 more aircraft hangar slots, whether individual T-hangars or larger conventional hangars, or a combination of both.

Terminal Building Requirements

Biddeford does not have commercial service and as such does not require a terminal building in the conventional sense; however the State of Maine requires certain facilities be available.[3] These amenities include adequate toilet facilities and a public telephone. The existing facility meets these requirements.

Passengers and pilots utilize the FBO facility as a waiting area, as well as pilot and passenger needs. The FBO building offers the basic amenities required by the traveling public, as well as based and itinerant pilots: waiting areas, restrooms, weather briefing and pilot filing areas, fuel, maintenance, and general assistance, etc. In addition there is a public payphone and emergency (9-1-1) wireless phone outside the terminal building.

Because business related facilities are not eligible for AIP funding, developing a new or larger facility would be solely a local funding enterprise. As currently developed the FBO facility is publicly owned and revenue transferred to the airport sponsor through monthly rent. Regardless of the type of facility and public/private relationship, the need for one or more facilities large enough to handle future demand may be necessary. Existing and future demand was evaluated in Chapter 3 (Page 75) and is now used to determine the amount of space

[3] Maine Revised Statutes Annotated (MRSA) Title 6 § 103

necessary for the people impact anticipated during the planning period. As a general rule of thumb, 50 square feet of public space is recommended for each PH passenger (and pilot) anticipated. The airport has approximately 1,000 square feet of public space in the FBO building. Currently the airport has an excess of required space but will have a deficit starting in the intermediate-term (see Table 4-13).

Table 4-13
Terminal Building Requirements

Period	PH Demand	Required Space	Existing Space	Surplus (Deficit)
2002	17	844	1,000	156
2007	19	928		72
2012	27	1,350		(350)
2022	39	1,969		(969)

Area in square feet of public space

Source: Dufresne-Henry, Inc, analysis

Automobile Parking Requirements

Automobile parking space is also based on the PH passenger/pilot demand on the facilities using an industry rule-of-thumb of 1.3 parking spots per PH passenger, plus space for employees. The airport currently has approximately 8-10 auto parking spaces (about 700 square feet). Based on the existing and forecasted PH passenger demand, there is an immediate need for 14 additional spaces. This reflects an increase to 51 total spaces at the end of the planning period. Refer to Table 4-14.

Table 4-14
Automobile Parking Requirements

Period	PH Demand	Required Spaces	Existing Spaces	Surplus (Deficit)
2002	17	22	8	(14)
2007	19	24		(16)
2012	27	35		(27)
2022	39	51		(43)

Source: Dufresne-Henry, Inc, analysis

MISCELLANEOUS AIRPORT FACILITY REQUIREMENTS

This section addresses other future needs of the airport.

NAVAIDS and Instrument Approach Procedures

There are two published IAPs into Biddeford and no instrument departure procedures (see Chapter 2, Paragraph I.2 of this report). A VOR Runway 06 approach off the Kennebunk VOR (5.4 miles west) with minimums down to 680 feet (minimum descent altitude, or MDA) and 1 mile visibility, and a GPS Runway 06 approach with a 580 foot MDA and 1 mile visibility.

There are no IAPs aligned to Runway 24, however both the VOR and GPS are approved for circle-to-land maneuvering with little to no loss in MDA.

Recommended Coverage

Based on the wind data provided in Table 2-18 (Page 50), the all-weather coverage for the airport occurs 86 percent of the time, 47 percent for Runway 06, and 60 percent for Runway 24. Neither end offers ideal coverage. IFR coverage slightly favors Runway 06 with 60 percent coverage, compared to 50 percent coverage for Runway 24. The type of instrument approach procedures recommended for each runway end must be established before the ultimate FAR Part 77 surfaces are defined. The surface dimensions vary depending on the type of aircraft using the facility (size and speed) and the type of approach (precision, non-precision or visual). Upgrading the existing procedures will have an impact on the surrounding airport and local community because of the size of the Part 77 protected surfaces. Any change in their size will increase the number (and possibly type) of obstructions.

FAR Part 77 Surfaces

Runway 06-24 is defined as a "utility" runway and currently has a non-precision approach to the Runway 06 end only, with visibility minimums of 1 mile. Runway 24 is a visual runway. FAR Part 77 identifies several different surfaces around a runway, airport, and along the approach corridors that must remain clear of obstructions. Because the airport currently primarily serves aircraft weighting 12,500 pounds or less, the runway is designated a "utility" runway, which also helps establish the size of the primary and approach surfaces.

The current approach surface to Runway 06, based on non-precision utility runway standards, is 500 feet wide at its inner width, expanding to 2,000 feet wide at the outer width, with a 5,000 foot length. The approach slope is 20:1. The primary area runs uniformly around the perimeter of the runway, 250 feet either side of the runway centerline and extending 200 feet from each runway end. This rectangular area, along with the approach surface at both ends of the runway must be clear of obstructions.

If a precision approach were developed, the size of the primary area would increase to 1,000 feet in width (500 feet either side of the runway centerline), extending out 200 feet from each runway threshold. The approach surface would extend from the existing 5,000 feet to 50,000 feet in length, and the outer width from the existing 2,000 feet to 16,000 feet. In addition, the approach slope would change from a relatively steep 20:1 gradient to 50:1 for the first 10,000 feet and rising marginally at a 40:1 gradient for the remaining 40,000 feet. Even to the most casual observer, this change would have a serious impact on the existing facility infrastructure and local community because of the wide swath of land that would be impacted and protected from vertical encroachment.

With a 1,000 foot wide primary surface (500 feet either side of the runway centerline), half of the existing airport terminal area would fall inside the primary surface, including several new hangars. In addition, a large area of the civilian community east and south of the airport would also be impacted. The amount of additional obstructions to be removed would increase substantially from the existing area because of the wide area of protective coverage and low slope compared to the existing size and slope.

A second option is to develop a non-precision approach to both runway ends using "non utility" standards, which results in a 34:1 approach surface, in an attempt to gain lower approach minimums, from the current 1 mile to ¾ mile. The inner width would remain 500 feet wide, however the length would increase to from 5,000 to 10,000 feet, and the outer width would change from 1,250 feet to 2,000 feet. This creates two problems. First it naturally increases the amount of obstructions in the approach surface and would result in the need to acquire more private property on the Runway 24 end, and second, it would result in a larger RPZ, increasing the overall size from the existing 8.035 acres to 48.978 acres. This too would result in the need to acquire even more private property.

Proposed New Middle School

Early in the process of developing this AMPU the PAC raised the possible issue of the school's location and the potential impact it would have on the existing and future airport infrastructure (refer to Chapter 1 *Goals and Objectives*, Page 2). Part of this assessment was based on the city's plans to construct a new middle school. The proposed location is behind the existing middle school located at 335 Hill Street in Biddeford. The field behind the school (where the new school will be built) is approximately 3,200 feet (0.6 miles) northeast of the ARP (airport reference point) and 700 feet north of the extended runway centerline. While the future of the school's construction is still pending voter approval, it would seem prudent to review its proposed location and include this in the analysis of future operations, including approach procedures at the airport.

The school does not appear to pose a problem for the airport, no more than any other buildings or structures around the facility, provided building heights remain below the FAR Part 77 surfaces and well clear of the ultimate RPZ, which extends 1,200 feet from the end of the runway.[4] Assuming the school remains reasonably close to the area shown earlier in Figure 5-A, and apply a 20:1 gradient for a non-precision approach, the maximum height permitted would be approximately 160 feet. The airport sponsor may want to consider changing the airport traffic pattern for Runway 06 from left to right traffic and adopt noise abatement procedures that deter

[4] The ultimate RPZ for Runway 24 will be 1,000 feet in length, but starts 200 feet from the end of the runway.

operations over the existing and future schools. In addition, further study may be warranted once final plans are in place for the school's construction.

Table 4-15
Existing and Ultimate IAP Coverage

Runway	Existing	Recommended
6	VOR, GPS	Same
24	Visual	Same

Source: Dufresne-Henry, Inc., analysis

IAP Summary

Realistically the available land and extensive existing obstructions make developing a precision approach into the airport, or even a non-precision approach to Runway 24 next to impossible to achieve. The required wider and shallower approach surfaces, larger safety areas, and bigger RPZs cannot be accommodated at the airport without an extensive and expensive acquisition of private land. This is highly unlikely given the nature of this airport and its role within NPIAS. Table 4-15 lists the existing and recommended IAP coverage for Biddeford. As addressed earlier the development of a precision approach or even a non-precision approach with minimums lower than 1 mile is not feasible without extensive changes to the airport infrastructure and surrounding community. Widespread obstruction clearing would be required, both on and off airport, and a large portion of the terminal area, including newly constructed hangars, would have to be moved. While upgrading the approaches would be highly desirable, it is not economically justified.

Airport Security and Fencing

As discussed in Chapter 2 (Page 42 the airport has very little security fencing, with no gates, and no monitoring system. Unauthorized intrusion on airport property and vandalism is an on-going problem, primarily limited thus far to runway lights (see Figure 2-F, Page 33). The airport needs a complete security fence around the entire runway and apron complex, with access gates at the FBO and leading to the west ramp. An 8-foot fence is one possible solution. The section of fence that runs parallel to Granite Street and off the end of Runway 24 should be aesthetically pleasing, such as the use of vinyl coated material.

Snow Removal Equipment and Facilities

Since this AMPU was started, the airport acquired a new fleet of SRE. Maintaining this equipment and providing adequate storage is essential. The airport should plan on constructing an SRE building in the very near future. A 3,000 square foot facility is typical for airports of this size, and the site selected for construction should allow for future expansion.

Fuel Storage and Sales

The FBO reported fuel sales (100LL only) for the 12-month period from September 2001 to October 2002 of approximately 35,000 gallons. This equals 1.16 gallons per operation. If operations increase at the rate forecasted, 2 percent per year, sales should increase somewhat uniformly to approximately 50,000 gallons at the end of the planning period. However, with the increasing use of turboprop and limited turbofan aircraft, the demand for Jet A fuel will increase as well. Eventually the FBO will realize the need for added 100LL capacity and the addition of Jet A service.

SUMMARY OF AIRPORT FACILITY REQUIREMENTS

Table 4-16 summarizes the current and short-term facility requirements, and Table 4-17 summarizes the intermediate- and long-term facility requirements and recommendations presented in this chapter. Proposed changes do not have to be implemented in the period noted. If the demand does not materialize or if financial obstructions prevent development, then that particular change automatically slides to the next planning period. Additionally, the 5-, 10-, and 20-year planning cycles addressed elsewhere in this AMPU are dynamic in nature, not fixed or rigid; projects can be moved freely from one period to the next, when demand and resources permit.

Table 4-16
Summary of Recommended Changes
(Current and Short-Term)

Object	2002	2007
Runway Length and Width	3,000 x 75	3,500 x 75
RSA	Bring into conformance	Keep in conformance
RPZ	Acquire property or easements	Maintain control
Runway OFA and OFZ	Bring into conformance	Keep in conformance
Runway Markings	Non-Precision	Same
ARC	A-II	B-II
Runway Lighting	MIRL	Same
Turn Around/Hold Areas	Runway 24 end	None
Parallel Taxiway	None	Parallel to 24 end
Taxiway Lighting	LITL	LITL
REILS	Runway 6	Runway 6 and 24
VLGS	VASI Runway 6	PAPI Runway 6 and 24
Apron Area (sf)	98,280	91,260
Hangar Spaces (total)	26	31
Terminal Building Space (sf)	844	928
Auto Parking Spaces (total)	22	24
FAR Part 77 Designation	Utility	Utility
IAPs		
Runway 6	Non-Precision VOR and GPS	Non-Precision VOR and GPS
Runway 24	Visual	Visual
Security/Wildlife Fence	Complete airport coverage	Same
SRE	Front-end loader w/attachments	Same
SRE Building	None	3,000 sf bulding
Fuel	100LL	100LL

Abbreviations and Acronyms are listed in Appendix A

Table 4-17
Summary of Recommended Changes
(Intermediate and Long-Term)

Object	2012	2022
Runway Length and Width	3,500 x 75	3,500 x 75
RSA	Same	Same
RPZ	Same	Same
Runway OFA and OFZ	Same	Same
Runway Markings	Same	Same
ARC	B-II	B-II
Runway Lighting	Same	Same
Turn Around/Hold Areas	None	None
Parallel Taxiway	Full parallel	Full parallel
Taxiway Lighting	LITL	LITL
REILS	Same	Same
VLGS	Same	Same
Apron Area (sf)	94,500	103,680
Hangar Spaces (total)	35	42
Terminal Building Space (sf)	1,350	1,969
Auto Parking Spaces (total)	35	51
FAR Part 77 Designation	Utility	Utility
IAPs		
Runway 6	Non-Precision VOR and GPS	Non-Precision VOR and GPS
Runway 24	Visual	Visual
Security/Wildlife Fence	Same	Same
SRE	Same	Same
SRE Building	Same	Same
Fuel	100LL and Jet A	Same

Abbreviations and Acronyms are listed in Appendix A

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