Millinocket Municipal Airport

Airport Master Plan

April 2004

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Introduction

The consultant Hoyle, Tanner & Associates, Inc. (HTA) was awarded the contract from the Maine Department of Transportation – Office of Passenger Transportation (MDOT-OPT) to conduct an update to the existing 1997 Airport Master Plan Study Update (AMPU) for Millinocket Municipal Airport. The master planning effort took place between October 2002 and December 2003. The purpose of this AMPU is to:

- Provide a comprehensive update of the existing 1997 AMPU;
- Project future activity levels;
- Clarify airport uses and requirements;
- Identify future development options;
- Identify potential environmental impacts;
- Develop a capital improvement plan (CIP); and
- Produce a Storm Water Pollution Prevention Plan (SWPPP) and a Vegetation Management Plan (VMP)

According to the Federal Aviation Administration (FAA) in Advisory Circular (AC) 150/5070-6A, *Airport Master Plans*, the goal of the master plan is to provide guidelines for future airport development which will satisfy aviation demand in a financially feasible, environmentally responsible manner.

To provide guidelines for future airport development and as part of this AMPU for Millinocket Municipal Airport, the Town of Millinocket formed a Planning Advisory Committee (PAC). The PAC is a review group responsible for providing input and insight on technical issues as they pertain to the airport and related elements to be addressed in the master planning process. The PAC consists of representatives from the Town, the MDOT-OPT, and the FAA.

During the initial meeting held on April 18, 2003, the PAC developed the following goals and objectives for the airport:

Goal #1: Attract larger and faster aircraft capable of transporting more corporate and pleasure travelers to the region.

Objective 1: Extend Runway 11-29 length from 4,713 ft. to 5,000 ft.

Objective 2: Determine if the Runway 11 end can be converted from a visual to a non-precision instrument (NPI) approach.

Objective 3: Evaluate inoperative medium-intensity approach lighting systems (MALS) and determine the most cost-effective method of reducing approach visibility minimums.

Goal #2: Compare the FAA criteria for airspace and airfield requirements with existing conditions at Millinocket Municipal Airport and propose solutions that enhance safety.

Objective 1: Evaluate penetrations to FAR Part 77 and TERPS imaginary surfaces.

Objective 2: Evaluate the runway visibility zone.

Objective 3: Recommend vegetated areas to be cleared, clearing methods, and long-term management procedures for these areas.

Goal #3: Increase revenues and improve airport's ability to pay for operating costs and local match for capital improvement program (CIP) projects.

Objective 1: Analyze current FBO/Field Manager lease and future lease structures.

Objective 2: Examine crosswind runway (16-34) size requirements and identify possible excess property available for future industrial park and aircraft hangar.

A key aim of this master plan is to meet the goals and objectives established by the PAC. As the AMPU process developed, we compared the overall direction and recommendations of this document to the goals and objectives, and made adjustments as directed by the PAC. At the end of *Chapter 7 – Plan Implementation*, we performed a final analysis of the goals and objectives to determine if all PAC concerns were addressed.

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Chapter One: Inventory

This chapter offers a "snapshot view" of Millinocket Municipal Airport and the Town of Millinocket.

1.0 GENERAL

Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5070-6A, *Airport Master Plans* outlines the necessary steps in the development of an Airport Master Plan (AMP). The initial step, inventory, is the collection of data pertinent to Millinocket Municipal Airport (MLT) and the area it serves. The objective of the inventory task for the airport is to provide background information for subsequent phases of analysis.

The development of a Master Plan for Millinocket Municipal Airport requires the collection and evaluation of data relating to the airport and surrounding area. This data was obtained through an on-site investigation of the airport, interviews with airport and Town representatives, and collection and analysis of previous reports and studies. The inventory is described in the following sections:

- Airport Setting and History
- Airside Facilities
- Landside Facilities
- Financial Baseline
- Legal Baseline
- Socioeconomic Data

2.0 AIRPORT SETTING AND HISTORY

This section provides a brief and general description of the Millinocket Municipal Airport's location, access roadways and history.

2.1 Location

The Town of Millinocket is located in the North-Central part of the State of Maine, 12 miles west of Interstate 95, 70 miles north of Bangor, and 80 miles south of the Trans-Canada Highway. (See Figure 1-1).

The Millinocket Municipal Airport is located one mile Southeast of the Town of Millinocket on 322 acres. At 408 feet above Mean Sea Level (MSL), the Airport Reference Point (ARP) or approximate geometric center of all useable Runway surfaces, is situated on latitude 45-38-52.210N and longitude 068-41-08.023W.

2.2 Access Roadways

The Major roadway providing vehicular access to Millinocket is Route 11, which can be reached via U.S. Interstate 95, offering businesses and residences excellent connections with Southern Maine and the rest of New England. For a graphical depiction of Millinocket see Figure 1-1.

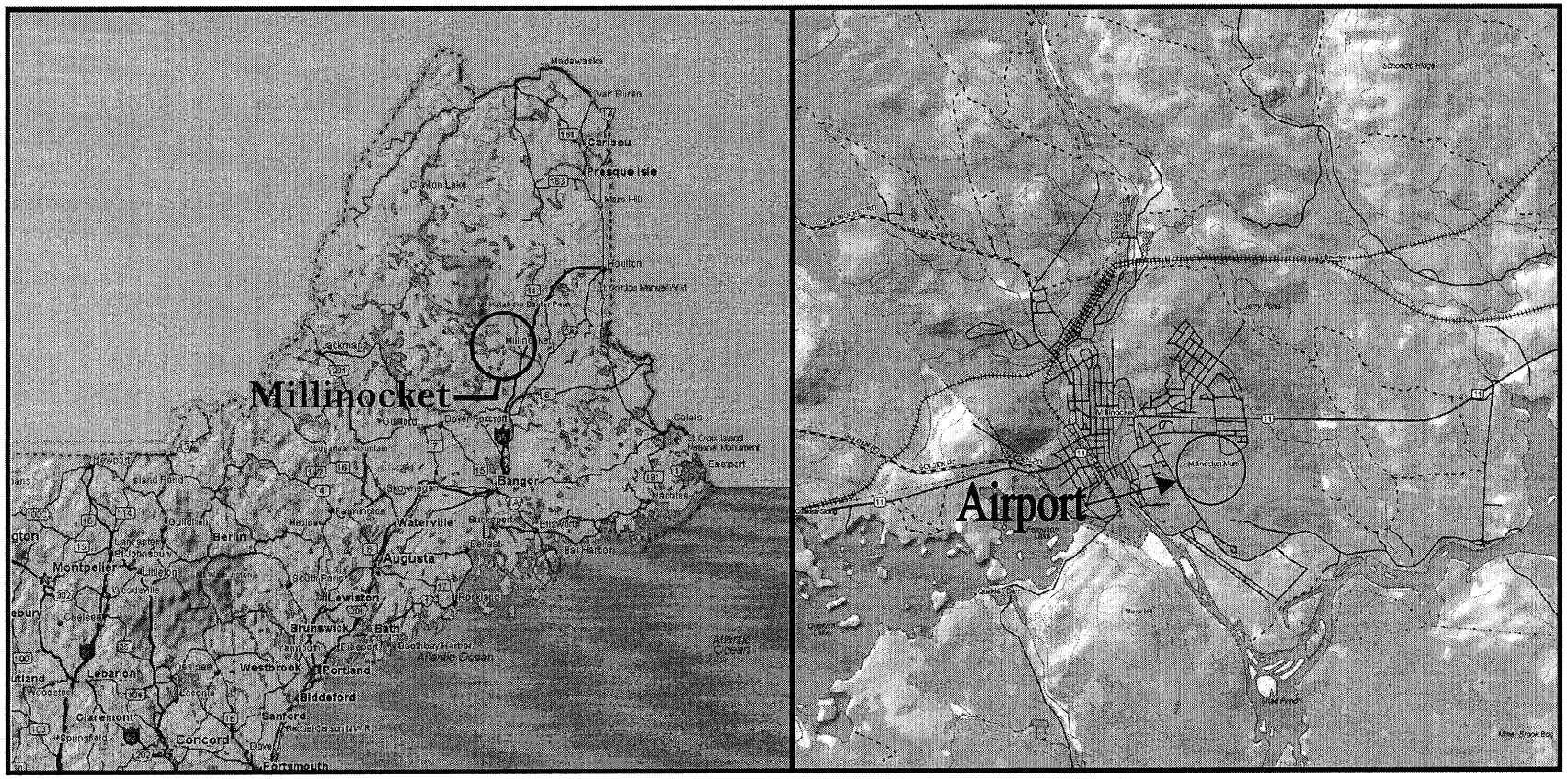

Figure: 1-1
Millinocket Municipal Airport
Penobscot County, Millinocket, Maine

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2.3 Airport History

The Civilian Conservation Corps built Millinocket Airport between 1934 and 1936. It was owned and operated by the Federal Government. During World War II, the Canadian Air Force, US Army Air Corps and Navy used the airfield as a stopover base for aircraft en route to Europe. After the war, the airport was turned over to the Town of Millinocket.

The remote location of Millinocket in the late 1940s and early 1950s made air transportation a popular mode of transportation for business and the general population. Ground transportation was limited to U.S. Route 2 and several secondary roads. At this time, Interstate 95 was under construction from southern Maine to Augusta. Northeast Airlines provided scheduled air service to Millinocket using the facility as an intermediate stop as part of its air carrier service from Portland, Maine to Presque Isle, Maine. The primary air traffic at Millinocket however, was general aviation with many local residents basing their aircraft at the airport and the facility offering flight instruction.

In the late 1950s Northeast Airlines ceased service to Millinocket. With the introduction of air carrier jets, an intermediate stop between Portland and Presque Isle was not required. In addition passenger traffic was not significant enough to warrant continuation of the service.

Well known as the "Magic City," the Town of Millinocket is set in a four-season recreational area, in the shadow of Mount Katahdin, Maine's largest mountain. Located in Penobscot County, it serves as the economic hub of that area. According to the 2000 census, the Town's population was reported to be 5,190.

Millinocket Municipal Airport (MLT) has two paved runways, measuring 4,713 ft. x 100 ft. (Runway 11-29) and 4,008 ft. x 100 ft. (Runway 16-34), and a 2,380 s.f. GA terminal in good condition. The airport also features a paved aircraft tie-down area and a partially paved parking area.

The Fixed Base Operator (FBO), West Branch Aviation LLC, provides basic aviation services, including 100LL AVGAS fuel sales, minor airframe and power plant repairs, scenic flights, flight instruction, tie-downs, and a passenger terminal.

The Airport Manager, who is also the Director of Public Works, oversees all airport operations and maintenance activities.

Table 1-1 provides a summary of the developments recommended by the 1997 Master Plan.

Table 1-1
1997 Airport Master Plan Update Summary

Recommendations	Short Range (1997-2001)	Intermediate Range (2002-2006)	Long Range (2007-2016)
Clearing			
Part 77 Tree Penetration	✓		
Topo Survey of Hill	✓		
Estimated Tree Clearing	✓		
Purchase Bowater Facility	✓		
Runways			
Runway Safety Areas	✓		
Taxiways and Holding Aprons			
Construct Parking & Fueling Apron	✓		
Construct Stub Taxiway Rwy 16-34	✓		
Partial Parallel Taxiway Rwy 11-29	✓		
Hangar Area Access Taxilane	✓		
Helicopter Parking Pad	✓		
Helicopter Ambulance Access Drive	✓		
Pavement Removal, Seed and Loam	✓		
Airfield Signs	✓		
Based Aircraft Parking Apron		✓	
Removal of Two Houses		✓	
5' Wide Paved Sidewalk		✓	
10,000 Gal Above Ground Fuel Tank		✓	
14 Unit T-Hangar		✓	
T-Hangar Access Taxilanes		✓	
Hangar/Tie-down Access Road		✓	
Hangar/Tie-down Auto Parking		✓	
Parallel Taxiway			✓
Taxiway Lights			✓
Airfield Signs			✓
Rehabilitate Existing Runway 11-29			✓
Rehabilitate Existing Runway 16-34			✓
Visual and Navigational Aids			
Obstruction Lights	✓		
Segmented Circle & Wind Cone		✓	
Terminal Area			
Extend Auto Parking Lot	✓		
Security			
Security Fence		✓	

Source: 1997 AMPU and the Town of Millinocket

A description of the development that has occurred at the airport since 1997 is as follows in **Table 1-2**:

Table 1-2 Airport Improvements Since 1997 Master Plan

Completed	Airport Improvements	Funding Source
Late 1990's	Taxiway Overlay	State/Local

Source: Town of Millinocket

3.0 AIRSIDE FACILITIES

This section describes the airport's existing airfield facilities in terms of location, configuration, size and use characteristics.

3.1 Runways And Taxiways

Millinocket Municipal Airport is currently served by two runways; Runway 11-29, the airport's primary runway, is classified by FAR Part 77 as a Category 'A', *Utility Runway.* Runway 16-34, the crosswind runway, is a Category 'B', *Runway Larger than Utility.* It is not plowed in the winter and is only suitable for aircraft equipped with skis. **Table 1-3** provides a summary of runway/taxiway data. For a graphical depiction see *Drawing 2* in *Chapter 6-Airport Plans.*

Table 1-3 Runway/Taxiway Data

Runways	**11**	**29**	**16**	**34**
Length (feet)	4,713		4,008	
Width (feet)	100		100	
Surface Material/Condition/PCI	Asphalt/Excellent/98		Asphalt/Good/65	
Weight Limitations (lbs)	SW – 30,000; DW – 44,000		SW – 12,500	
Part 77 Approach Slope Ratio				
Desired	20:1	20:1	20:1	20:1
Actual	20:1	34:1	20:1	20:1
Marking Type/Condition	Visual/Good	NPI/Good	Visual/Good	Visual/Good
Visual and Navigational Aids	**11**	**29**	**16**	**34**
Lighting	MIRL		None	
Runway End Identifier Lights	Yes	No	No	No
Visual Approach Slope Indicator	No	Yes	No	No
Approach Lighting System	No	MALS—Not Operating	No	No
Localizer	No	Yes	No	No
Non-Directional Beacon (NDB)	No	Yes	No	No
Very High Frequency Omnirange Station (VOR)/Distance Measuring Equipment (DME)	Yes			
Rotating Beacon	Yes			
Wind Indicators	Unlighted Wind Cone/Lighted Wind Tee			
Weather	ASOS			
Taxiways	**No Designation**	**No Designation**	**Rwy 29 Turnaround**	
Width (ft.)	30	35	50	
Surface Type/Condition	Asphalt/Good	Asphalt/Good	Asphalt/Good	
Lighting	None	None	MITL	

Source: 1997 AMPU and the Town of Millinocket

3.2 Run-up/Holding Areas, Aprons and Tie-Down Areas

Millinocket Municipal Airport has a 465 ft. long, 34 ft. wide run-up area on the Runway 29 end. The existing pavement is in good condition.

The airport has one parking apron (good condition), adjacent to the terminal (4,290 s.y. with 13 tie-down spots). A second apron further northwest is not useable due to its proximity to the Runway 11 end safety area and Runway 29 localizer critical area. A privately owned apron southeast of the Town apron provides access to the southern-most taxiway stub.

3.3 Hangars

There is one Town-owned conventional 5,460 s.f. aircraft storage hangar at Millinocket Municipal Airport. The FBO, West Branch Aviation, provides aircraft storage and maintenance/repairs in this facility. The rest of the hangars are off airport property and are privately owned.

Table 1-4
Aircraft Hangars

Hangar Location/Owner	Hangar Type	Dimensions (ft.)	SF
On-Airport/Town	Maintenance Hangar	84x65	5,460
Off-Airport/Bowater	T-Hangar	71x62	4,402
Off-Airport/Unknown	Box Hangar	51x43	2,193
Off-Airport/FBO	Box Hangar	61x60	3,660
Off-Airport/FBO	Quonset Hut	37x28	1,036
Off-Airport/Unknown	T-Hangar	42x26	1,092
Total Storage Area			**17,843**

3.4 Fuel Facilities

Millinocket Municipal Airport has one underground 10,000-gallon, 100LL fuel tank, installed in October 1985, operated by the FBO and owned by the Town of Millinocket. The most recent inspection performed by MDEP (November 2002) found the tank and associated piping "passed." However, Maine statutes (Title 38, §564) require this tank and piping be removed by January 1, 2008 because the manufacturer's warranty is no longer in effect and the tank was installed prior to December 31, 1985.

Fuel flowage data is limited to the amount sold from August 2001 to February 2003 (25,800 gallons).

Bowater (former owner of the paper mill) owns a 10,000 gal. jet fuel tank off airport property. The tank is currently empty.

3.5 Wind and Runway Usage

Runway orientation and usage is based on wind coverage and minimum crosswind components. FAA's recommended minimum wind coverage is 95 percent, with a maximum (all-weather) crosswind component of 13.0 knots.

This report re-utilizes wind data and analysis included in the December 1997 Master Plan Study Update. That report provided two wind roses (all-weather and instrument flight rules-IFR).

As shown on **Table 1-5**, both of Millinocket Municipal Airport's runways surpass the FAA's minimum wind coverage (all-weather) of 95 percent with a maximum crosswind of 13.0 knots. IFR conditions occur 9.7 percent of the time, mostly during the winter, and are well covered with both runways. However, predominant winds are from the southwest, making visual approaches to Runways 11 and 16 the preferred option.

Chapter 6, Drawing 4, ALP Data Sheet, contains the windroses.

Table 1-5

Wind Data Summary

		% Winds Favoring Rwy End					
Weather (% Occurrence)	**Crosswind Component**	**Rwy 16**	**Rwy 34**	**Rwy 11**	**Rwy 29**	**Calms**	**Combined**
All-Weather (100%)	13 knots (15 mph)	21.4	46.8	20.5	47.4	31.2	99.9
IFR (9.7%)	13 knots (15 mph)	40.5	27.3	43.8	23.9	N/A	99.9

Source: 1997 Master Plan Study Update

Table 1-6 is the runway usage by aircraft, as provided by the FBO.

Table 1-6
Runway Usage

11	29	16	34	Total
10%	45%	20%	25%	100%

Source: FBO

3.6 Visual and Navigational Aids

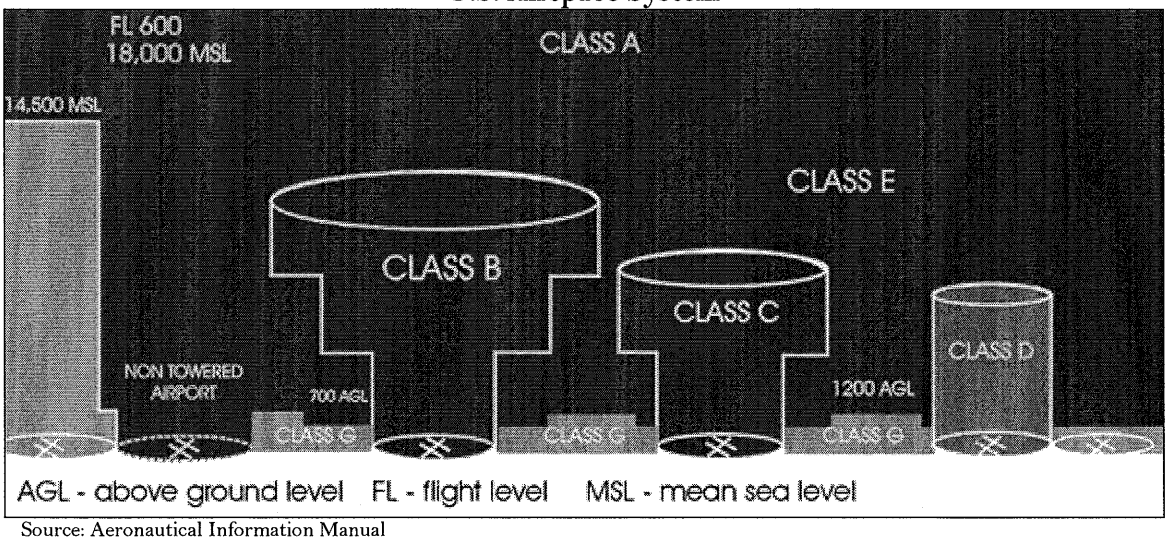
Navigational aids (NAVAIDS) include any visual or electronic devices, either airborne or on the ground, that provide point-to-point guidance information or position data to aircraft in flight.

As summarized in **Table 1-3**, Millinocket Municipal Airport's primary runway (11-29) provides adequate lighting and guidance, including medium intensity runway lights (MIRL), runway end identifier lights (REILS) (Runway 11 end only), a visual approach slope indicator (VASI) (Runway 29 end only), and a localizer and non-directional beacon (NDB)/Global Positioning System (GPS) approach for Runway 29. However, the medium intensity approach lighting system (MALS) has been out of service since 1988 due to electrical problems. A VOR/DME, rotating airport beacon, lighted wind cone, and ASOS provide other valuable aids to pilots.

3.7 Airspace and Pattern Use

The airspace surrounding Millinocket Municipal Airport is designated as Class E, U.S. General Controlled Airspace. There is no control tower, and operations may be conducted under instrument, special or visual flight rules (IFR/SVFR/VFR). Enroute ATC separation is provided by Boston Center only to aircraft operating under IFR and SVFR within a surface area. A graphic depiction of the United States Airspace System is provided below.

Figure 1-2
U.S. Airspace System



Source: Aeronautical Information Manual

The airport has a designated unicom frequency (122.8) that pilots can utilize to announce their position to other pilots in the area for safety purposes.

The aircraft traffic at Millinocket Municipal Airport for both Runways 16-34 and 11-29 uses a standard left-hand traffic pattern.

4.0 LANDSIDE FACILITIES

Landside facilities at Millinocket Municipal Airport include a passenger terminal, aircraft maintenance and minor repairs facility, hangars and tie-downs, flight school, and automobile parking.

4.1 Administration/Terminal and Airport Maintenance Building

The airport's sole FBO, West Branch Aviation LLC, leases and administers the 2,380 s.f. passenger terminal. It includes a 205 s.f. pilot's lounge/waiting area, 820 s.f. café, a 300 s.f. conference room, and a 50 s.f. restroom. It also has 1,005 s.f. of office and storage space. There is no public telephone or ground transportation available. The single-story, wood frame structure is in good condition. There are no mowers dedicated to airport lawn maintenance.

Minor airport maintenance is carried out by the FBO, who is also the "Field Manager". Major airport repairs are carried out by the Millinocket Department of Public Works from their off-airport facility.

4.2 ARFF Facilities and Snow/Ice Control Capabilities

There are no aircraft rescue and firefighting (ARFF) facilities at the airport. Fire protection is provided 1.5 miles from the airport by the Town of Millinocket.

The Department of Public Works is responsible for initial snow/ice control work, while the FBO/Field Manager performs follow-up operations. The Town owns three dedicated snow/ice control vehicles: A 1994 International tandem axle plow truck, a 1994 Dresser 525 front-end

loader, and a 1993 Blanchet rotary plow that mounts on the loader. No additional snow/ice control vehicles/equipment are on order.

4.3 Auto Parking and Airport Signage

The passenger terminal has 13 paved parking spots.

The terminal does not provide handicapped parking spots or access to the building in accordance with the Americans with Disabilities Act (ADA).

Airport signage is limited to small directional signs approaching the airport.

4.4 Utilities

Utilities at the airport include electricity and water. The electricity is provided by Bangor Hydro Electric Company. Water to the terminal area is supplied by a 4-inch main and a ¾-inch copper service, maintained by the Consumer Maine Water. A nearby septic tank and leach field treats wastewater.

4.5 Tenants

As stated in paragraph 4.1 above, the Town of Millinocket leases, at no cost, a portion of the landside area to the FBO, West Branch Aviation LLC. Facilities leased include the main hangar, passenger terminal, and related facilities, including ramps, and fuel facilities. The Town pays the FBO to perform Field Manager duties that include monitoring and maintaining airport lights, equipment, beacons, buildings, radios, runways/taxiways, and safety conditions.

5.0 FINANCIAL BASELINE

The National Plan of Integrated Airport Systems (NPIAS) identifies more than 3,000 airports that are significant to national air transportation and thus eligible to receive Federal grants under the Airport Improvement Program (AIP). It also includes estimates of the amount of AIP money needed to fund infrastructure development projects that will bring these airports up to current design standards and add capacity to congested airports.

The August 28, 2002 edition of the NPIAS includes Millinocket Municipal Airport as a general aviation (GA) facility, with an estimated AIP funding requirement of $2,152,778 from 2001-2005.

To qualify for AIP grants, the airport must submit individual projects to FAA for eligibility determination. For eligible projects, FAA reimburses the sponsor for up to 95% of the project cost. The remaining 2.5% is split between the State and the local community. If no FAA funds are provided, the State's cost share is generally 80%, and the local share 20% (except runway overlays and crack sealing projects, which are 90% State, 10% local). However, State funds for State/local projects are very limited. The local community and/or private entities, such as the FBO or private developers, typically fund projects ineligible for Federal funding.

The Maine Aviation Systems Plan Update (MASPU), Phase I, 2001-2002, includes a stratification process that identifies: (1) how each airport performs and contributes to the State's aviation needs; and (2) assigns the airport a functional level. Appropriate funding may then be applied to upgrade the airport and fill shortfalls or voids in the State's aviation system. As the

State's airport system is evaluated in subsequent phases of the MASPU, it is possible that the assigned functional levels will be changed.

The MASPU designates Millinocket Municipal Airport as a Level III airport. These airports should be capable of accommodating all single-engine and some small twin-engine general aviation aircraft. Level III airports compete against each other for State funding.

An analysis of Millinocket Municipal Airport's operating budget is discussed in *Chapter 7 – Plan Implementation.*

6.0 LEGAL BASELINE

Millinocket Municipal Airport is owned and operated by the Town of Millinocket and is subject to the Federal regulations of the United States Department of Transportation (USDOT) and the FAA. At the state level, the airport is regulated through MDOT Office of Passenger Transportation (OPT). Local control belongs to the Town of Millinocket, whose Director of Public Works is also the airport manager. The airport is legally regulated through Maine statutory law, Title 6, *Aeronautics,* with additional rules and regulations pertaining to the use of that airport determined through MDOT-OPT. The Town of Millinocket has a code (§ 33-1 to 33-12) that governs administration of the airport. It includes business licenses, permits and fees, use of buildings, use of the airport, and responsibilities of the airport manager.

6.1 On Airport Land Use

According to real estate records obtained from the Town of Millinocket, the entire property contained within the Millinocket Municipal Airport is zoned *AD, Airport Development Zone.* It restricts non-compatible airport uses, such as residential, hospitals and schools, and permits compatible industrial and transportation activities. Current facilities within the airport boundary are directly related to aviation activities.

6.2 Off Airport Land Use

The general development around the airport is mixed commercial/light industrial and residential zoning. This includes R1, Downtown Residential Development, R2, Medium Density Residential Development, ID, Industrial Development, HC, Highway Commercial Development, NC, Neighborhood Commercial Development, OR, Open Space Recreation Protection, and RD, Rural Development. The majority of the land parcels that abut Millinocket Municipal Airport's property are downtown residential, industrial, and highway commercial.

6.3 Height Zoning

While the FAA does not exercise regulatory or permitting functions regarding structures that might penetrate navigable airspace, the FAA does rely on state and local zoning regulations to provide height and airspace protection. Such regulation around an airport limits encroachment of the runway protection zones (RPZs) and FAR Part 77 imaginary surfaces, therefore helping to ensure the safety of the airspace around the airport.

The Town of Millinocket discourages and restricts development within various zones. Zone 1 *discourages* sound sensitive activities, such as churches, auditoriums and theaters. Maximum building elevations within the runway clear and approach zones were established to *discourage* surface penetrations. Buildings, towers, and antennae are *not allowed* to penetrate the transition zone surfaces.

7.0 SOCIOECONOMIC DATA

This study includes a variety of historical data and socioeconomic data from the Penobscot County and the Town of Millinocket. It is used as one means of forecasting aircraft activity at the airport. Socioeconomic data collected include economic, employment, and population data, which are presented in subsequent sections below.

7.1 Economic Base

Service and retail trade primarily drive the economy in Penobscot County. The employment by major industry division for Penobscot County for 2000 is summarized in **Table 1-7**.

Table 1-7
Covered Employment and Wages by Major Industry Division, 2000 - Penobscot County

Industry Division	Employers at Year-End	% of Total	Average Employment	% of Total
Agriculture, Forestry, and Fishing	88	2.06%	569	0.84%
Mining and Construction	411	9.60%	2710	4.02%
Manufacturing	284	6.63%	8651	12.84%
Transportation and Public Utilities	276	6.45%	4234	6.28%
Wholesale Trade	233	5.44%	3269	4.85%
Retail Trade	960	22.42%	14518	21.54%
Finance, Insurance, and Real Estate	296	6.91%	2506	3.72%
Services	1423	33.24%	19355	28.72%
State Government	31	0.72%	4937	7.32%
Local Government	279	6.52%	6651	9.87%
Total:	**4,281**	**100.00%**	**67,402**	**100.00%**

Source: State of Maine Labor Department

7.2 Employment

According to the Maine Department of Labor, the overall unemployment rate in Penobscot County decreased steadily from 5.9% since the last Master Plan was completed in 1997 to a 4.5% average for 2002. The Town of Millinocket has an average unemployment rate of 8.1% in 2002, which is up from 6.9% in 2000, the lowest it had been in the last five years (1997-2002).

The major employers in the Town of Millinocket for 2003 are depicted in **Table 1-8**.

Table 1-8

Millinocket Major Employers	Employees
Service	
Millinocket Regional Hospital	200
Manufacturing	
Katahdin Paper LLC	600
Montreal Atlantic Railroad	25
Millinocket Foundry and Machine Company	20

Source: Town of Millinocket Web Site

7.3 Per Capita Income

Table 1-9 illustrates the historical relationship of personal or per capita income between Penobscot County, the State of Maine and the United States. The County income rose at approximately the same rate as the State and Country.

Table 1-9
Per Capita Income Comparison

	1990	1996	1997	1998	1999	2000	% Change
Penobscot County	$15,824	$19,512	$20,461	$21,605	$22,387	$23,653	+33.1
Maine	$17,473	$21,163	$22,134	$23,404	$24,187	$25,681	+31.9
United States	$19,572	$24,270	$25,412	$26,893	$27,880	$29,770	+34.2

Source: US Department of Commerce, Bureau of Economic Analysis, September 2002

7.4 Population

Table 1-10 indicates the population in the Town of Millinocket dropped at much higher rate than the County.

Table 1-10
Population Comparison

	1990	2000	% Change
Millinocket	6,956	5,190	-25.4
Penobscot County	146,601	144,919	-1.1%
Maine	1,227,928	1,274,923	+3.6

Source: U.S. Census Bureau, Census 2000

Chapter Two: Aviation Forecasts

1.0 GENERAL

Projections of aviation activity presented in this chapter are based on the 2001/2002 Maine Aviation Systems Plan Update (MASPU), Phase I report for the three future time periods (2006, 2011, and 2021). These time periods represent the short, mid and long-term planning periods for the development of the airport in this Airport Master Plan Update (AMPU).

The purpose of this chapter is to present the forecasted aviation activity at Millinocket Municipal Airport. The forecasts serve as the basis for planning the facilities needed to meet the area's aviation demand. These forecasts will update and replace the projections presented in the 1997 AMPU.

The following elements were forecasted, as they are key indicators of an airport's development needs:

- ***Based Aircraft***
  - Total
  - Fleet Mix[1]
- ***Aircraft Operations***
  - Total
  - Fleet Mix
  - Local/Itinerant
  - Visual Flight Rule/Instrument Flight Rule
- ***Fuel Flowage***
  - AVGAS (100LL)
  - Jet-A

1.1 Forecasts and Growth

Forecasts are merely estimates of future activity levels. The numbers projected for each of the categories above are not a policy statement as to the level of activity that should be at the airport. The projections are estimates of future activity based largely on past aviation trends in the area relating to the elements listed above and on other indicators such as population growth, income growth, etc., that historically track closely with aviation activity.

Projections for based aircraft and general aviation operations at Millinocket Municipal Airport are based on the MASPU.

Future development at the airport will build on the existing facilities, agreements and policies that have been developed in recent years. This includes runway configuration, service facilities, navigational aids, and the Fixed Based Operator (FBO) agreement. The AMP elements subsequent to these forecasts undertake the process of analysis and selection.

[1] Fleet Mix refers to: Single Engine Piston (SE), Multi Engine Piston (ME), Turboprop (TP), Jet and Ultra-Light

2.0 BASED AIRCRAFT FORECAST

General aviation activity is typically directly related to the number of aircraft based at a particular airport. Based aircraft projections are, therefore, a critical element in developing the AMP forecasts.

Table 2-1 provides the based aircraft forecast included in the 2001/2002 MASPU, Phase I report. It projects modest increases through 2021.

Table 2-1
Projections of Based Aircraft

Year	*Projected Based Aircraft*
2001	**13**
2006	**14**
2011	**15**
2021	**16**

Sources: 2001/2002 MASPU, Phase I

2.1 Based Fleet Mix

Limited fleet mix history is available. **Table 2.2** provides data obtained from the FBO and the FAA Form 5010, Airport Master Record.

Table 2-2
Based Fleet Mix History

Year	SE	ME	TP	Jet	HE	Ultra-Light	*Total*
2003 (% of Total)	11 (85%)	0	0	0	0	2 (15%)	***13***

Sources: FAA Fm 5010 and FBO

According to *FAA Aerospace Forecasts, Fiscal Years 2002-2013*, single and multi-engine aircraft are projected to grow at a rate of less than 0.5 percent per year over the forecast period. The MASPU projected that the State's fleet of jet aircraft would increase at a higher rate than single or multi-engine aircraft, but with overall increases in all categories. **Table 2-3** is our projection of fleet mix through 2021.

Table 2-3
Fleet Mix Projections

	Percent of Based	2006	Percent of Based	2011	Percent of Based	2021
SE	86%	12	87%	13	87%	14
ME	0%	0	0%	0	0%	0
TP	0%	0	0%	0	0%	0
Jet	0%	0	0%	0	0%	0
HE	0%	0	0%	0	0%	0
Ultra-Light	14%	2	13%	2	13%	2
Total	***100%***	***14***	***100%***	***15***	***100%***	***16***

Source: 2001/2002 MASPU, Phase I

3.0 AIRCRAFT OPERATIONS

The MASPU uses two methodologies to determine projected aircraft operations: market share and operations per based aircraft (OPBA). The market share used each airport's share of current statewide operations to project general aviation operations through 2021. Statewide operations were projected based on the combined average growth rate for total general aviation operations implied in all current Maine airport master plans. **Table 2-4** illustrates the results of the methodology applied to Millinocket:

Table 2-4
Projection of Annual
General Aviation & Military Operations

Year	Operations
2001	9,125
2006	9,730
2011	10,130
2021	10,980

Source: 2001/2002 MASPU, Phase I

Local and itinerant operations at Millinocket Municipal Airport, as shown in **Table 2-5,** were obtained from the MASPU, the FAA Form 5010, and the FBO's daily log book. The FAA defines local operations as operations performed by aircraft that:

- Operate in the local traffic pattern or within sight of an airport;
- Are known to be departing for or arriving from flight in local practice areas located within a 20-mile radius of the airport; or
- Are executing simulated instrument approaches or low passes at an airport

Itinerant operations are considered to be all operations other than those listed above.

Table 2-5
Projected Local and Itinerant Operations

	Itinerant		*Local*		
Year	**Percent**	**Operations**	**Percent**	**Operations**	***Total Ops***
2001	69%	6,296	31%	2,829	***9,125***
2006	69%	6,714	31%	3,016	***9,730***
2011	69%	6,990	31%	3,140	***10,130***
2021	69%	7,576	31%	3,404	***10,980***

Sources: 2001/2002 MASPU, Phase I, FAA Fm 5010, and FBO Log Book

Table 2-6 contains an itemization of the types of itinerant operations projected for Millinocket Municipal Airport, also derived using the MASPU, FAA Form 5010, and the FBO log book.

Table 2-6
Projected Itinerant Operations

Year	Percent	Air Taxi	Percent	Military	Percent	General Aviation	*Total Itinerant Ops*
2001	20%	1,259	3%	189	77%	4,848	***6,296***
2006	20%	1,343	3%	201	77%	5,170	***6,714***
2011	20%	1,398	3%	210	77%	5,382	***6,990***
2021	20%	1,515	3%	227	77%	5,834	***7,576***

Sources: 2001/2002 MASPU, Phase I, and FAA Form 5010, and FBO Log Book

3.1 Operating Fleet Mix

Fleet mix distribution percentages were used from Table 2-4 for based aircraft. **Table 2-7** illustrates the projected fleet mix distribution at Millinocket Municipal Airport.

Table 2-7
Projected Fleet Mix Operations

	Percent	2001	Percent	2006	Percent	2011	Percent	2021
SE	80%	7,300	80%	7,784	80%	8,104	80%	8,784
ME	8%	730	8%	778	8%	810	8%	878
TP	3%	274	3%	292	3%	304	3%	329
Jet	2%	183	2%	195	2%	203	2%	220
HE	3%	274	3%	292	3%	304	3%	329
Ultra-Light	4%	365	4%	389	4%	405	4%	439
Total	***100%***	***9,125***	***100%***	***9,730***	***100%***	***10,130***	***100%***	***10,980***

Sources: 2001/2002 MASPU, Phase I and FBO Log Book

3.2 Visual Flight Rule/Instrument Flight Rule Operation Projection

Projecting aircraft operations not only includes projecting the number of operations, itinerant versus local operations and operations by aircraft type; they also include projections of the type of operations to be conducted at the airport. For instance, a projection of the percentage of visual flight rule (VFR) operations versus instrument flight rule (IFR) operations is necessary in determining the need for additional instrument approach capabilities.

According to data contained in the 1997 AMPU, IFR conditions prevailed 9.7 percent of the time at Millinocket Municipal Airport. It is therefore assumed that IFR conditions will continue to be 9.7 percent of the operations during the planning period, as shown in **Table 2-8**.

Table 2-8
Projected Type Operations

	IFR		*VFR*		
Year	**Percent**	**Ops**	**Percent**	**Ops**	***Total Ops***
2001	9.7%	885	90.3%	8,240	9,125
2006	9.7%	944	90.3%	8,786	9,730
2011	9.7%	983	90.3%	9,147	10,130
2021	9.7%	1,065	90.3%	9,915	10,980

Sources: 2001/2002 MASPU, Phase I, and FBO

4.0 FUEL FLOWAGE

Fuel sale forecasts are developed to project the ability of the existing fuel facility to accommodate the future demands and to estimate the potential airport revenue. Projections for Millinocket Municipal Airport are based on FBO 100LL fuel sales since August 2001, as presented in *Chapter 1 – Inventory.*

To calculate the projected fuel flowage per year, we determined the average fuel flowage per operation by dividing the actual flowage for a 19-month period by the total estimated operations in that time period. We then multiplied this number times the projected total operations, as shown in **Table 2-9**.

Table 2-9
Fuel Flowage Projections

Year	**Total Operations**	**Actual Flowage (gal)**	**Average Fuel Flowage (gal/ops)**	**Projected Fuel Flowage (gal/yr)**
Aug 01- Feb 03	14,448	25,800	2	N/A
2006	9,730	N/A	2	19,460
2011	10,130	N/A	2	20,260
2021	10,980	N/A	2	21,960

Sources: 2001/2002 MASPU, Phase I and FBO

Since there is no history of Jet-A fuel sales at Millinocket Municipal Airport, an analytical projection is not possible. Jet-A fuel tank sizing is discussed in *Chapter 3 – Demand/Capacity & Facility Requirements.*

5.0 FORECAST SUMMARY

Table 2-10 displays the forecast summary for the major forecast elements previously discussed in this chapter. These forecasts are an integral part of the planning process and are the basis for determining the facility needs to accommodate future demand at Millinocket Municipal Airport.

Table 2-10
Airport Forecast Summary

Activity	2006	2011	2021
Based Aircraft:			
Single Engine Piston (SE)	12	13	14
Multi Engine Piston (ME)	0	0	0
Turboprop (TP)	0	0	0
Jet	0	0	0
Rotorcraft (HE)	0	0	0
Ultra-Light	2	2	2
Total Based Aircraft	***14***	***15***	***16***
Annual Operations:			
Single Engine Piston (SE)	7,784	8,104	8,784
Multi Engine Piston (ME)	778	810	878
Turboprop (TP)	292	304	329
Jet	195	203	220
Rotorcraft (HE)	292	304	329
Ultra-Light	389	405	439
Total Annual Operations	***9,730***	***10,130***	***10,980***
Itinerant Operations:			
Air Taxi	1,343	1,398	1,515
Military	201	210	227
General Aviation	5,170	5,382	5,834
Total Itinerant Operations	***6,714***	***6,990***	***7,576***
Local Operations:			
General Aviation	3,016	3,140	3,404
Fuel Sales:			
100LL	19,460	20,260	21,960

Sources: 2001/2002 MASPU, Phase I, FAA Fm 5010, and FBO

Chapter Three: Demand/Capacity & Facility Requirements

1.0 GENERAL

An airport facilities inventory and projections of aviation activity (levels of growth for based aircraft, aircraft operations and aircraft fleet mix) at Millinocket Municipal Airport were presented in *Chapter 1 – Inventory* and *Chapter 2 – Aviation Forecasts*, respectively. The inventory and forecasts serve as the basis for planning the facilities needed to meet the area's aviation demand.

The purpose of this chapter is to determine if the facilities at Millinocket Municipal Airport can accommodate the projected planning activity levels. The analysis has identified facility deficiencies where appropriate. This chapter did not focus on theoretical runway capacity levels as calculated in AC 150/5060-5, Airport Capacity and Delay, as operational capacity is not an issue at current and future levels.

The following elements were examined, as they are key indicators of an airport's development:

- ***Critical Aircraft Assessment***
- ***Facility Requirements***
  - Airside
  - Landside
  - Operations and Environment
  - Community Development

2.0 CRITICAL AIRCRAFT ASSESSMENT

Airports need to be developed and maintained according to the characteristics of the most demanding or critical aircraft that is expected to use the airport on a regular basis, which is defined as at least 500 operations per year. In AC 150/5300-13, *Airport Design*, the FAA has established the Airport Reference Code (ARC) as the method for determining the design. The criteria for determining the ARC of an aircraft is as follows:

Aircraft Approach Category

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

Aircraft Design Group

Group I:	Wingspan up to, but not including 49 feet
Group II:	Wingspan of 49 feet up to, but not including 79 feet
Group III:	Wingspan of 79 feet up to, but not including 118 feet
Group IV:	Wingspan of 118 feet up to, but not including 171 feet
Group V:	Wingspan of 171 feet up to, but not including 214 feet
Group VI:	Wingspan of 214 feet up to, but not including 262 feet

Table 3-1 shows the more demanding aircraft that operated and/or were based at the airport in 2002, along with their respective FAA classification.

Table 3-1
Most Demanding Aircraft

Aircraft	Approach Speed (knots)	Wing Span (feet)	ARC
Cessna 206	87	36.0	A-I
Piper PA-31-350	100	40.7	B-I

The 1996 MASP and 1997 Master Plan Update identified the ARC for Millinocket Municipal Airport as B-II. Currently, the most demanding aircraft with over 500 operations per year at Millinocket is the Piper PA-31-350 (Chieftain) with an ARC of B-I. Although application of the B-II designation increases several runway and taxiway design standards (safety area, object free area, etc.), this Master Plan recommends preserving the existing ARC of B-II because a number of corporate aircraft (the fastest growing segment of general aviation today) and charters are B-II category, such as the Cessna Citation II and Falcon 20. The remote location of Millinocket and the presence of a Canadian-owned mill as the centerpiece of the area economy place a premium on the availability of adequate air transportation facilities. An ARC of B-II will ensure the ability of the airport to meet those needs.

AC 150/5300-13 – Airport Design allows secondary runways and its associated taxiways to be designed to a lesser demanding ARC. This plan applies an ARC of B-I to Millinocket's crosswind Rwy 16-34.

Table 3-2 outlines the design criteria for Millinocket Municipal Airport's existing and future ARC of B-I (Rwy 16-34) and B-II (Rwy 11-29).

Comparing the B-I and B-II design criteria highlights the differences in safety standards between both runways. The design elements and their dimensions shown in Table 3-2 are described in *Section 3.1 – Airside Requirements* of this chapter.

Table 3-2
Airport Design Criteria

Design Element	B-I (Rwy 16-34)	B-II (Rwy 11-29)
Visual and instrument approach visibility minimums not lower than 1-mile		
Runway Protection Zone (RPZ):		
Length	1,000	1,000
Inner Width	500	500
Outer Width	700	700
Runway Safety Area (RSA):		
Width	120	150
Length beyond runway end	240	300
Runway Obstacle Free Zone (ROFZ):		
Width	400	400
Length beyond runway end	200	200
Runway Object Free Area (ROFA):		
Width	400	500
Length beyond runway end	240	300
Taxiway/Taxilane:		
Width	25	35
Taxiway Safety Area (TSA) Width	49	79
Taxiway Object Free Area (TOFA) Width	89	131
Taxilane Object Free Area Width	79	115
Separation Standards:		
Runway centerline to taxiway/taxilane	225	240
Runway centerline to edge aircraft parking area	200	250
Taxiway centerline to fixed or moveable object	44.5	65.5

Source: FAA AC 150/5300-13, *Airport Design*
Note: Dimensions are in feet.

3.0 FACILITY REQUIREMENTS

This section analyzes airside and landside requirements at Millinocket Municipal Airport. Airside facilities are analyzed in terms of airport design criteria for runway length, width, strength, pavement marking, separation distances, airport lighting, and approach types. Landside facilities examine aircraft storage hangars, aircraft tie-down parking, aircraft fueling facilities, automobile parking, and airport security fencing.

The provision of public safety services (fire, rescue and police) has not been identified as an issue under the existing arrangement with the Town of Millinocket. The nature of the airport will not change in the future; therefore no change in the provision of these services will be required.

Chapter 4 – Alternative Development, reviews methods and makes recommendations for airside and landside layout options to enable facilities identified in this chapter to meet FAA criteria and projected activity levels.

3.1 Airside Requirements

The following sections identify the ability of the airport's airside facilities to accommodate projected activity levels. These airside facilities include runways and their related elements.

3.1.1 *Runway Length*

Runway requirements at general aviation airports can vary substantially since there is a broad range of aircraft types that may use the facility. However, the Town is not required to upgrade the facility to meet the need of any particular aircraft. According to AC 150/5300-13 – *Airport Design*, a runway should be designed with adequate length, width, and pavement strength to accommodate the most demanding or critical aircraft. *AC 150/5325-4A – Runway Length Requirements for Airport Design*, provides runway design guidelines.

Millinocket Municipal Airport's critical aircraft, as noted in *Section 3.0 – Critical Aircraft Assessment*, is the Piper Chieftain, requiring 1,350 feet for takeoff ground roll, 1,040 feet for landing ground roll, and has a maximum gross takeoff weight of 7,000 pounds.[1] According to AC 150/5325-4A, aircraft with approach speeds of 50 knots or more and a maximum certified takeoff weight of 12,500 pounds or less require a runway length between 2,700 and 2,800 feet. Therefore, the asphalt runway lengths of 4,713 feet (Runway 11-29) and 4,008 feet (Runway 16-34) at Millinocket Municipal Airport are adequate. However, as noted in Section 3.0, increased numbers of faster/larger aircraft are expected during this planning period. For example, the Falcon 20 has a recommended takeoff field length of 5,000 feet[2], a length recommended by the Planning Advisory Committee (PAC). Runway 11-29 will require an additional 287 feet to provide that runway length.

FAA does not provide runway length criteria for ski operations. The FBO stated that the existing length of Rwy 16-34 (4,008 ft.) is adequate to support ski operations.

3.1.2 *Runway Width*

Runways 11-29 and 16-34 are paved to a width of 150 feet, 100 feet of which is useable. According to AC 150/5300-13, *Airport Design*, the FAA identifies the minimum width of paved runways within an ARC of B-II to be 75 feet. Based on the FAA's design criteria, the existing paved runway widths will be adequate throughout the planning period.

3.1.3 *Runway Pavement Strength/Runway Load Bearing Capacity*

According to AC 150/5320-6D, *Airport Pavement Design and Evaluation*, the FAA states that runway pavement should be designed for the maximum anticipated takeoff weight of the critical aircraft. The Piper Chieftain has a maximum gross takeoff weight of 7,000 pounds, while the Falcon 20 has a takeoff weight of 28,660 pounds. **Table 3-3** summarizes Millinocket Municipal Airport's load bearing capacity.

[1] Rising Up Aviation Resources, 5/13/03
[2] Aviation Week & Space Technology/March 10, 1986

Table 3-3
Runway Load Bearing Capacity

Runway	Single Wheel (SWL)	Dual Wheel (DWL)
11-29	30,000 lbs.	44,000 lbs.
16-34	12,500 lbs.	N/A

Sources: FAA Form 5010 and 2001/2002 Maine Aviation Systems Plan Update Phase I

The existing load bearing capacity accommodates the existing and future critical aircraft and is therefore considered adequate.

3.1.4 *Runway Pavement Condition*

The 2001/2002 Maine Aviation Systems Plan Update, Phase I published pavement condition indices (PCI) for Millinocket Municipal Airport. Typically, airport PCI is reported as a numerical designation from 100 (best) to one (worst). The PCI indicates the runway's relative condition, as presented in **Table 3-4**.

Table 3-4
PCI Index Legend

PCI Index	Pavement Condition
85-100	Excellent
70-84	Very Good
55-69	Good
40-54	Fair
25-39	Poor

Source: MDOT

Runway 11-29 has a PCI of 98 (*Excellent*), while Runway 16-34 is rated 65 (*Good*).

Due to Runway 11-29's excellent condition, only routine crack sealing of the pavement will be needed during the planning period. However, Runway 16-34 will require reconstruction in approximately 5 to 10 years.

3.1.5 *Runway Safety Areas*

The runway safety area (RSA) is a graded, rectangular area centered on the runway centerline and extended beyond the runway ends and runway edges. The RSA must be cleared, graded, drained, and free of objects (except those that need to be there due to their function) and able to support airport mobile equipment, rescue equipment, and the occasional passage of aircraft under dry conditions. Any object located within the RSA higher than three inches must be constructed with frangible supports, with the frangible point no higher than three inches above grade.

Transverse slopes in the safety area must be within 3 o 5 percent, 10 ft off the pavement, and 1.5% and 5% for the remainder of the safety area.

The maximum permissible longitudinal grade requirement for the first 200 feet of the RSA beyond the runway ends is between 0 and 3 percent sloping downward from the runway ends.

The maximum permissible longitudinal grade for the remaining length of 100 feet of the safety area is a negative grade of 5 percent. The negative grade is to ensure that no part of the RSA penetrates the approach surface for that runway.

According to the design criteria for ARC B-II, the required safety area dimensions at Millinocket Municipal Airport for Rwy 11-29 and 16-34 are 150 ft. wide by 300 ft. long (beyond the runway end), and 120 ft. by 240 ft., respectively. For the first 200 ft. of the runway safety area beyond the ends, the longitudinal grade must be between 0 and 3 percent, sloping downward from the runway ends. For the remainder of the safety area, no part shall penetrate the approach surface or clearway plane. The maximum allowable negative grade is 5 percent. Limitations on longitudinal grade changes are plus or minus 2 percent per 100 feet (30 m). Use parabolic vertical curves where practical. **Table 3-5** illustrates the slope gradient percentages for the Millinocket's runways.

Table 3-5
Runway Safety Area Longitudinal Grade

RSA	11	29	16	34	Criteria
Initial 200 feet	+0.5%	-5.5%	0%	-1.5%	0% to -3%
Remaining Length	0%	-1.7%	0%	-0.3%	See Above

Source: HTA

The Rwy 29 end exceeds FAA's longitudinal criteria for the first 200 ft. The remaining runway ends appear to meet the longitudinal criterion. Existing transverse grades for paved shoulders and for the RSA up to 200 feet beyond all four runway ends also appears to be in compliance, with the exception of rutting, humps, depressions, and other surface variations noted on the Rwy 34 end.

A graphic depiction of each RSA is shown at the end of *Chapter 6 – Airport Plans.* Methods and recommendations for meeting RSA criteria are discussed in *Chapter 4 – Alternative Development.*

3.1.6 *Runway Obstacle Free Zone and Runway Object Free Area*

The runway obstacle free zone (ROFZ) is defined as a volume of airspace centered above the runway centerline. This area precludes taxiing and parked aircraft. It is to remain free of obstacles, except for objects that need to be located in the ROFZ due to their function, such as navigational aids (NAVAIDS).

The runway object free area (ROFA) requires clearing of above ground objects protruding above the RSA edge elevation, except for NAVAIDS as mentioned above.

The ROFZ and ROFA design criteria for Runways 11-29 (B-II) and 16-34 (B-I) are shown in Table 3-2. Both runways comply with ROFZ, however, the ROFA for Runway 11-29 contains high ground and vegetation that protrude above the RSA edge.

A graphic depiction of each ROFZ and ROFA are shown at the end of *Chapter 6 – Airport Plans.* Methods and recommendations for meeting ROFA criteria are discussed in *Chapter 4 – Alternative Development.*

3.1.7 *Runway Protection Zones*

The runway protection zone (RPZ) is a trapezoidal surface on the ground, centered on the extended runway centerline, and begins 200 feet from the end of usable runway. In AC 150/5300-13, *Airport Design*, the FAA recommends that certain land uses, such as residences and buildings for public assembly, be prohibited from within the RPZ. They also recommend the exclusion of land uses that attract wildlife within the RPZ. If the RPZ extends into lands that are not owned by the airport, the airport should attempt to either acquire the property or obtain easements that allow the airport to control the height of objects within the RPZ.

RPZ dimensions are based on approach visibility minimums (visual and non-precision instrument not lower than 1-mile) and aircraft approach category of 'B'. This yields an inner width of 500 feet, an outer width of 700 feet, and a 1,000 feet length. Portions of the Runway 11, 16 and 34 RPZ's are located off airport property boundaries. While no residences or places of public assembly are within the zones, the airport should have positive control of those areas, either through a fee-simple purchase or easements.

A graphic depiction of each RPZ is shown at the end of *Chapter 6 – Airport Plans.*

3.1.8 *Runway Line-of-Sight Requirements*

AC 150/5300-13, Airport Design, states, "An acceptable runway profile permits any two points five feet above the runway centerline to be mutually visible for the entire runway length."

Neither Runway 11-29, nor Runway 16-34 meets runway profile line-of-sight criteria. Both should be corrected at the time the runways are reconstructed.

The line-of-sight standards also recommend objects between intersecting runways be mutually visible. According to AC 150/5300-13, "terrain needs to be graded and permanent objects need to be designated or sited so that there will be an unobstructed line-of-site from any point five feet above one runway centerline to any point five feet above an intersecting centerline, within the runway visibility zone (RVZ)." The RVZ is a collection of imaginary lines connecting the two runway's visibility points.

The RVZ between Runways 11-29 and 16-34 contains trees, brush and a hill that obstructs visibility criteria. The 1997 Master Plan Study Update states the hill consists of Colton Gravelly sand loam and Red Hook and Atherton silt loams.

Methods and recommendations for meeting line-of-sight and RVZ criteria are discussed in *Chapter 4 – Alternative Development.*

3.1.9 *Taxiway Width*

Taxiways link the independent airport elements and therefore require careful planning for optimum airport utility. A taxiway system should provide for free movement to and from the runways and various parking areas.

Millinocket Municipal Airport does not have a parallel taxiway. It does have two stub taxiways that connect the terminal area to Runway 16-34. The runways are, in fact, the primary taxiways. As indicated in Table 3-2 of this chapter, a minimum taxiway pavement width of 35 feet is required for ARC B-II design.

The Northern most taxiway stub width of 30 feet does not meet the design criteria for B-II. The Southern most stub is 35 feet wide and meets FAA criteria.

Methods and recommendations regarding the airport's taxiway system are discussed in *Chapter 4 – Alternative Development.*

3.1.10 *Taxiway Safety Area and Taxiway/Taxilane Object Free Area*

Similar to the RSA, a taxiway safety area (TSA) is an area surrounding the taxiway that is to remain free of obstacles or rough terrain, except for objects that need to be located in the TSA due of their function, such as NAVAIDS. The TSA provides for a suitable surface that reduces the risk of damage to aircraft in the event that an aircraft leaves the taxiway environment.

The taxiway object free area (TOFA) surrounds the TSA. Service vehicle roads, parked aircraft and fixed or moveable above ground objects are prohibited. Only objects that need to be located in the object free area because of their function, such as NAVAIDS, are allowed.

According to B-II ARC design criteria, the minimum TSA width is 79 feet, while the TOFA width is 131 feet. Millinocket's two taxiway stubs meet TSA and TOFA criteria. Any taxiway additions would also have to meet these criteria.

A graphic depiction of the TSA and TOFA are shown at the end of *Chapter 6 – Airport Plans.*

Taxilanes are the portion of the aircraft parking area used for access from taxiways to tie-downs and hangars. Millinocket Municipal Airport has one taxilane in front of the terminal. It does not comply with taxilane OFA width of 115 ft. (ARC B-II aircraft), but it does meet runway/taxilane centerline separation criteria of 225 ft.

3.1.11 *Run-up/Holding Areas*

Run-up/holding areas or holding bays provide space for aircraft doing pre-takeoff engine checks or awaiting air traffic control clearance onto a runway. Holding areas also provide a place for aircraft to wait their turn for clearance onto the runway when other traffic is using the runway.

According to AC 150/5300-13, "a holding bay should be provided when runway operations reach a level of 30 operations per hour". Projected operations are not expected to reach this level within the planning period. However, Runway 11, 16 and 34 ends should have turnaround areas. Runway 29 end has a turnaround that keeps holding aircraft behind the runway safety area.

A graphic depiction of the turnaround area is shown at the end of *Chapter 6 – Airport Plans.* Methods and recommendations regarding the airport's taxiway system are discussed in *Chapter 4 – Alternative Development.*

3.1.12 *Lighting and Visual Aids*

According to AC 150/5340-24, *Runway and Taxiway Edge Lighting Systems*, an edge lighting system should be selected based on the runway's approach type (i.e. precision, non-precision or visual). Runway 11-29 has medium intensity runway lights (MIRLs) recommended by the FAA for the Runway 29 end non-precision instrument approach.

Runway end identification lights (REILS) aid a pilot in locating the approach end of a runway by providing lateral and longitudinal limits of the usable landing area. The FAA recommends that REILS be installed on runways with circling and straight-in non-precision instrument approaches. Only the Runway 11 end has REILS, however, it is outdated and non-operational. The Runway 29 end has a medium intensity approach lighting system (MALS) that has been inoperative for 15 years. In lieu of repairing the MALS at a very high cost, we recommend installation of REILS to reduce approach visibility minimums, as determined by FAA.

The Runway 29 end is equipped with a visual approach slope indicator (VASI), providing pilots with slope guidance to the runway end. Since VASI systems are outdated technology with hard to find spare parts, we recommend replacement with a precision approach path indicator (PAPI).

Millinocket Municipal Airport's rotating beacon is operational but difficult to maintain due to its remote location. An access road is recommended.

The lighted wind tee and unlighted wind cone are in good condition. The airport should continue to maintain and monitor the condition of these aids throughout the planning period.

A graphic depiction of each the VASI/PAPI, rotating beacon, and REILs are shown at the end of *Chapter 6 – Airport Plans.* Methods and recommendations to perform this work are discussed in *Chapter 4 – Alternative Development.*

3.1.13 *NAVAIDS*

Straight-in non-precision instrument approaches to Runway 29 include a localizer, non-directional beacon (NDB) and Global Positioning System (GPS). All are working well and provide reliable service to pilots.

The wind analysis in *Chapter 1 - Inventory* indicates that a non-precision instrument approach to Runway 11 would be desirable if penetrations to FAR Part 77 and US Standard for Terminal Instrument Procedures (TERPS) imaginary surfaces can be removed or marked.

Methods and recommendations regarding a non-precision instrument approach to Runway 11 are discussed in *Chapter 4 – Alternative Development.*

3.1.14 *Runway Markings*

In AC 150/5340-1H, *Standards for Airport Markings,* the FAA outlines the criteria for runway markings based on the type of approach provided. Millinocket Municipal Airport's Runway 29 end has a non-precision instrument approach, with pavement markings (designation, centerline and threshold) that comply with the FAA circular. The airport should continue to maintain the markings during the planning period.

3.1.15 *Airside Obstructions/Imaginary Surfaces*

Federal Aviation Regulation (FAR) Part 77, *Objects Affecting Navigable Airspace,* establishes imaginary surfaces above airports in an effort to protect navigable airspace from objects/terrain that may penetrate the airspace surrounding our nation's airports. According to Part 77, obstructions are considered to be any manmade objects, objects of natural growth, such as trees or brush, and terrain (ground penetrations).

Table 3-6 depicts the dimensions of the imaginary surfaces at Millinocket Municipal Airport, which are based on the classification of the runways (Utility and Larger than Utility) and the type of approaches available (visual and non-precision instrument). Logically, the dimensions of the imaginary surfaces for a non-precision instrument approach runway are larger than those associated with a visual runway to provide greater safety margins for operations in instrument conditions. The location of future facilities should respect those surfaces to insure protection of the airport's airspace.

Table 3-6
FAR Part 77 Surfaces

Airport Imaginary	Runway 11[1]	Runway 29[1]	Runway 16[1]	Runway 34[1]
Classification:	B-Larger than Utility	B-Larger than Utility	A-Utility	A-Utility
Approach Type:	Visual	Non-Precision	Visual	Visual
Visibility	1 mile	1 mile	3 miles	3 miles
Airport Elevation	408 feet above MSL			
Primary Surface:				
Width	500	500	4,000	4,000
Length beyond	200	200	20:1	20:1
Horizontal Surface:				
Elevation	558			
Radius	5,000	10,000	5,000	5,000
Conical Surface:				
Horizontal	4,000	4,000	4,000	4,000
Slope	20:1	20:1	20:1	20:1
Approach Surface:				
Inner edge	500	500	250	250
Outer edge	1,500/3,500[3]	3,500	1,250	1,250
Horizontal	5,000/10,000[3]	10,000	5,000	5,000
Slope	20:1/34:1[3]	34:1	20:1	20:1
Transitional				
Slope	7:1	7:1	7:1	7:1

Notes: 1. Dimensions are in feet
2. Source: FAR Part 77, *Objects Affecting Navigable Airspace*
3. Existing and ultimate dimensions

Several trees and ground points in and outside of the airport penetrate the Part 77 surfaces. Some of these penetrations are lighted in accordance with *AC 70/7460-2I – Obstruction Marking and Lighting*. This includes:

- Smokestacks and towers at the Katahdin Paper mills southwest of the airport
- Radio towers and antennas West, Northwest and Southeast of the airport.
- High voltage electrical lines and towers West of the airport.
- Tree and ground penetrations within the Runway 11-29 and 16-34 transition surfaces, paralleling the runways.

- Tree and high terrain penetrations on Anderson and Shack hill, 6,500 feet North and 9,000 feet West of the airport.

Many of the FAR Part 77 surface penetrations also penetrate the Rwy 29 end, TERPS final approach surface (for straight-in descent). **Table 3-7** contains the dimensions of this surface.

Table 3-7

TERPS Final Approach Surface

	Rwy	Area	W_1	W_2	L	Slope
Ultimate	11	Straight-In	800	2,845	7,413	20:1
	29	Straight-In	800	2,876	7,524	20:1
Existing	11	N/A	N/A	N/A	N/A	N/A
	29	Straight-In	800	2,876	7,524	20:1

NOTES:

1. All dimensions are in feet
2. 'W1' is beginning width 200' from threshold
3. 'W2' is width at distance 'L'
4. 'L' is distance to visual descent point (VDP)

To maintain night operations and the lowest possible visibility and ceiling minimums on the existing and extended Rwy 29 end (to 5,000 ft.), these penetrations must be removed. As stated in paragraph 3.1.13 - NAVAIDS, a non-precision instrument approach to Rwy 11 is desirable, therefore, application of a TERPS 20:1 approach surface on the Rwy 11 end would also be required.

A graphic depiction of these trees and other penetrations to imaginary surfaces is shown at the end of *Chapter 6 – Airport Plans.* Methods and recommendations to meet airport imaginary surface requirements are discussed in *Chapter 4 – Alternative Development.* Additionally, a "Vegetation Management Plan" is being prepared separately from this document to provide the airport with a plan to remove and maintain areas of vegetation that interfere with these surfaces.

3.2 Landside Requirements

The following sections identify the ability of the airport's landside facilities to accommodate projected aviation activities. These landside facilities include the terminal, Aircraft Rescue and Firefighting (ARFF) facilities and snow removal capabilities, aircraft storage hangars, aircraft tie-down parking, automobile parking, aircraft fueling facilities, and airport security fencing.

3.2.1 *Terminal Building*

The size and functionality of Millinocket's terminal building is directly linked to the number of based aircraft and itinerant operations. As discussed in *Chapter 2 – Aviation Forecasts*, projected based and itinerant projections through 2021 are essentially level. We, therefore, do not recommend expansion of the facility, unless a trigger event (i.e., new concessionaire) is planned.

3.2.2 *Snow/Ice Control and Aircraft Rescue and Firefighting (ARFF)*

Existing off-airport capabilities are sufficient to meet the current ARFF needs.

An analysis of snow removal requirements based on AC 150/5220-20 indicates that Millinocket Municipal Airport is eligible for: one Class II rotary plow (2,500 tons/hr.); one 15-foot long displacement plow; and one carrier vehicle. A snowsweeper is desirable but not essential to supporting non-commercial service airports. The airport does not use deicing chemicals, so a material spreader is not required.

AC 150/5220-18 states that an adequate storage and maintenance building is needed to protect and service snow/ice control equipment and vehicles. The airport does not have this facility.

Methods and recommendations regarding snow/ice control equipment and storage facility are discussed in *Chapter 4 – Alternative Development.*

3.2.3 *Aircraft Storage Hangars, Aircraft Tie-Down Parking and Automobile Parking*

Table 3-8 shows the existing and projected landside facilities on airport property, including aircraft storage, aircraft tie-down parking and automobile parking, as outlined in *Chapter 1 – Inventory.*

Table 3-8
Existing and Projected Landside Storage Facilities
(On Airport Property Only)

Facility	Existing Capacity	2021	Change
Hangars:			
Conventional hangars	4	11	+7
Tie-Downs:			
Paved	13	17	+4
Automobile Parking Spaces:			
Paved	13	20	+7

Sources: FBO and 2001/2002 Maine Aviation Systems Plan Update, Phase I

As mentioned in *Chapter 2, Aviation Forecasts,* the number of based aircraft will increase by three aircraft through the planning period. In addition, aircraft operations will increase steadily, bringing more tie-down and hangar storage requirements to Millinocket.

Construction of a standard 7-unit T-hangar, for example, will alleviate the cramped storage conditions in the Town hangar, accommodating 68 percent of projected based aircraft. The remaining aircraft would be stored outdoors.

There are currently 13 itinerant aircraft parking spaces at Millinocket Municipal Airport; however, the number of spaces diminishes depending on the type of aircraft using the parking spaces such as a larger corporate aircraft requiring more apron space. In addition, the current apron layout, including the refueling area, restricts powered aircraft movement, a problem exasperated during the winter months. Therefore, the 13 spaces and the apron layout are inadequate to accommodate existing and projected based/itinerant aircraft parking.

It was projected in *Chapter 2 – Aviation Forecast*, that itinerant aircraft operations would remain at approximately 69 percent of the total annual operations throughout the planning period; currently 6,296 of the total annual operations of 9,125. This equals approximately 17 itinerant aircraft operations per day. The number of itinerant operations projected for 2021 is 7,576. This equals approximately 21 itinerant aircraft operations per day. However, the FBO's log book and experience at other northern airports suggests that operations are much higher in the spring/summer months (May through September) than in the winter, and during daytime hours (8:00 am through 4:00 pm) versus nighttime hours (4:00 pm through 8:00 am), which should be accounted for.

For the purpose of this study, demand for itinerant apron space was based on peak spring/summer months and peak daytime hours, assumed to be 75 percent of 2021 projected annual itinerant operations, or 5,682. There are 152 days within the peak spring/summer months; thus 37 itinerant operations take place per day in the spring/summer. The FBO reports that his daily peak hours are during the day from 8:00 am through 4:00 pm, and that 90 percent of all operations occur during the day. To forecast the number of itinerant parking spaces needed during peak daytime hours, the number of itinerant operations per day (37) is divided by two (half of operations are arrivals), and multiplied by 90 percent (daytime factor) for a total of 17 itinerant aircraft on the ground during any given day. Assuming a minimum length of stay for itinerant arrivals is four hours (1/2 of the peak daytime hours), then nine itinerant aircraft will require tie-down spots. Adding five based aircraft requiring tie-downs (as stated above), and three more spots for peak weekend events provides a total minimum requirement of 17 spots.

Vehicle access and parking is also inadequate. Expansion of the existing paved parking lot behind the terminal to at least 20 spots should meet future needs.

Methods and recommendations regarding provision of aircraft storage hangars, aircraft tie-down parking and automobile parking requirements are discussed in *Chapter 4 – Alternative Development.*

3.2.4 *Fueling Facilities*

As indicated in *Chapter 1 – Inventory*, Millinocket Municipal Airport has one, 10,000 gal. underground fuel tank that provides 100LL service to based and itinerant aircraft. In accordance with Maine statutes, it must be replaced by January 2008. Other general aviation airports have found that self-service, aboveground fuel tanks are a good alternative to traditional tanks and provide a relatively inexpensive method to sell fuel at a reasonable profit margin.

Jet-A fuel sales should also be considered, especially if Runway 11-29 is to be extended to 5,000 ft. Based on jet aircraft activity recorded in the FBO's logbook from August 2002 to April 2003, and interviews with the FBO, it is reasonable to assume that Millinocket can expect to receive one to two jet aircraft visits per week over the planning period. After discussions with the FBO and a fuel tank manufacturer, this report concludes that the most cost-effective Jet-A tank size for Millinocket is 10,000 gal. This would provide ample fuel dispensing capacity over the planning period for a reasonable price.

Methods and recommendations regarding provision of aircraft fueling facilities are discussed in *Chapter 4 – Alternative Development.*

3.2.5 Airport Security Fencing

Although airport security fencing is not required by FAA at small general aviation airports, the FAA recommends and funds security fencing to protect the airfield from possible wildlife hazards and inadvertent entry to the aircraft movement area (runways and taxiways) by unauthorized persons or vehicles.

Millinocket Municipal Airport has security fencing along Medway Road only. See *Chapter 4 – Alternative Development*, for specific methods and recommendations.

3.3 Community Development

Due to limited land available, there are few opportunities to designate areas for compatible, revenue-generating use. However, the airport's Planning Advisory Committee (PAC) discussed a number of airport promotion and community development ideas.

The PAC ultimately recommended the following:

1. Contact new owner of the paper mills (Brascan Corporation) and determine their aviation needs.
2. Make the airport more attractive to its users and potential customers by expanding the parking lot, constructing and leasing hangar space and extending Runway 11-29 to 5,000 feet.
3. Hold community activities at the airport
4. Set aside land north of Runway 11-29 for a potential Industrial Park.

See *Chapter 4 – Alternative Development*, for specific methods and recommendations regarding these development concepts.

4.0 SUMMARY

Millinocket Municipal Airport complies with most FAA design criteria for a safe and efficient facility. Runway 11-29 provides varying means of non-precision instrument approaches, has good visual aids, and will not require reconstruction during the planning period due to its excellent condition. Runway 16-34 is a very good visual runway, well oriented and with easy access to the terminal area. Both runways have considerable penetrations to FAR Part 77 imaginary surfaces, in addition to safety area, and runway visibility zone concerns.

Landside facilities are in excellent condition, though undersized for future needs (hangars, parking lot, etc.).

Methods and recommendations for meeting the facility requirements are discussed in *Chapter 4 – Alternative Development.* The facility requirements determined for Millinocket Municipal Airport are based on FAA design criteria, projected activity levels and discussions with PAC members.

An analysis of Millinocket Municipal Airport's operating budget, which includes these facility requirements, is discussed in *Chapter 7 – Plan Implementation.*

Chapter Four: Alternative Development

1.0 GENERAL

The objective of this chapter is to develop alternative scenarios for development of Millinocket Municipal Airport's facility requirements as depicted in *Chapter 3 – Demand/Capacity & Facility Requirements* and consistent with the goals and objectives of both the PAC members (listed in the *Introduction* section of this report) and of the Town of Millinocket. Two areas of the airport are analyzed in this chapter: airside (runways and taxiways); and landside (terminal, parking, etc.). During the second PAC meeting (May 30, 2003), HTA and FAA proposed the following runway configurations:

- Two Crossing Runways
- Two Converging, Open V Runways
- One Runway

The *Two Crossing Runways Configuration* retains both of Millinocket Municipal Airport's runways at full length and proposes projects that bring them up to FAA design criteria for current and future needs. This includes: reconstructing Runway 16-34 to full length and width; extending Runway 11-29 to 5,000 feet length; constructing a parallel taxiway for Runway 11-29; correcting runway line-of-sight and visibility zone obstructions; clearing obstacles within the runway object free area (ROFA), runway safety area (RSA), runway obstacle free zone (ROFZ), and FAR Part 77 imaginary surfaces; and typical preventive maintenance and major repair projects needed to extend the lifespan of both runways.

The *Two Converging, Open V Runways Configuration* was proposed by FAA as a means of avoiding the runway visibility zone (RVZ) line-of-sight problem discussed in Chapter 3. By shortening Runway 16-34 from 4,000 to approximately 2,000 feet, and shifting it as far South as possible, runways would converge but no longer cross each other. Aircraft departing from the Runway 34 end could "pop up" above the tree line and see traffic on Runway 11-29 in time to prevent an accident. In addition to reducing clearing costs of the RVZ, reconstruction of Runway 16-34 would be reduced significantly, and a considerable amount of land could be freed up on the Runway 16 end for construction of hangars and other aviation or non-aviation related development.

The *One Runway Configuration* would close Millinocket's shorter secondary runway (16-34), redirect resources to extending and improving the primary runway, while making the property along 16-34 available for development of aviation and compatible, non-aviation facilities. Two problems with this option, as identified by the PAC are: inability to support student training during severe crosswind conditions; and elimination of a landing area for winter ski plane operations.

During the second Planning Advisory Committee (PAC) meeting, the PAC developed a hybrid of the two runway scenarios discussed above--reduce the size of Runway 16-34 to 3,000 feet long by 75 feet wide, and shift the runway as far North as possible. This does not eliminate the RVZ problem, nor does it make land available for development, but it does reduce end of runway safety area and tree clearing requirements, and the costs of reconstructing Runway 16-34 to full length and width. Use of Runway 16-34 would be limited to small, single engine general aviation aircraft (ARC A-I), while Runway 11-29 continues to support B-II aircraft.

As shown in **Table 4-1**, the *One Runway Configuration* (column 5) contains the fewest number of projects and the lowest long-term costs, but at the sacrifice of airport flexibility and capacity. On the opposite side of the spectrum, the *Two Crossing Runways* option (column 2) requires significant resources to address current and future aviation needs. The two converging/crossing runway configurations (columns 3 and 4) emphasize projects that support a shorter Runway 16-34, help the airport meet FAA design criteria, and provide a safer, more secure air transportation facility. The main differences between these two options are that a longer (3,000 feet) Runway 16-34, shifted North (hybrid-column 4) will cost more to reconstruct, be more friendly to student pilots, but will provide no additional land for development.

After careful consideration, the PAC approved the ***Two Crossing Runways Configuration*** (column 2) with one exception. The full length of Rwy 16-34 will be reduced in width from 100 ft. to 75 ft.

Table 4-1
Alternative Runway Configurations

① Facility Improvements	② Two Crossing Runways	③ Two Converging Open V Runways	④ Two Crossing Runways (Hybrid)	⑤ One Runway
Runways and Taxiways				
Parallel Taxiway with Lights	✓	✓	✓	✓
Clear Rwy 11-29 Object Free Area	✓	✓	✓	✓
Extend Runway 29 End	✓	✓	✓	✓
Runway 11-29 Crack Sealing	✓	✓	✓	✓
Reconstruct Runway 16-34	✓	✓	✓	
Clear Runway Visibility Zone	✓		✓	
Clear Rwy 16-34 Object Free Area	✓			
Lighting and Visual Aids				
Runway 29 End PAPI	✓	✓	✓	✓
Runway 11 End PAPI	✓	✓	✓	✓
Runway 29 End REIL	✓	✓	✓	✓
Taxiway Stub Reflective Markers	✓	✓	✓	✓
NAVAIDS				
Rwy 11 Non-Prec. Inst. Approach	✓	✓	✓	✓
FAR Part 77 Imaginary Surfaces				
Rwy 11-29 Penetration Removal	✓	✓	✓	✓
Rwy 16-34 Penetration Removal	✓	✓	✓	

Table 4-2 contains a list of *Additional Landside Developments* linked to growth in based aircraft and operations, desire to attract charters and corporate aircraft, and revenue-generating initiatives that will help the airport be more self-sufficient.

Table 4-2
Additional Landside Developments

Self-Fueling 100LL/Jet-A Station
7-Unit T-Hangar with Apron
Access Road to Rotating Beacon
Reconstruct Terminal Apron
Expand Parking Lot
Snow/Ice Control Equipment Bldg.
Snow/Ice Control Equipment
Wildlife/Security Fence
Industrial Park

Although all considered improvements are listed in Table 4-1, the PAC is not obligated to adopt all improvements.

A graphic depiction of the proposed development is shown on the Ultimate Airport Layout Plan drawing at the end of *Chapter 6 – Airport Plans.*

2.0 TWO CROSSING RUNWAYS CONFIGURATION

Column 2 of Table 4-1 provides a list of projects, identified in *Chapter 3 – Demand/Capacity & Facility Requirements*, that will allow both runways at Millinocket Municipal Airport to meet current and future FAA airport design standards. The list is dominated by obstacle clearing requirements, on and off-airport property. Long-term improvements to Runway 11-29, such as a parallel taxiway and better visual and navigational aids, also play a key role in this plan.

Parallel Taxiway for Runway 11-29:

According to AC 150/5300-13, *Airport Design*, basic airport design consists of providing a parallel taxiway for each runway. Providing a full-length parallel taxiway to Runway 11-29 would provide adequate movement and a safer operating environment for aircraft at Millinocket Municipal Airport. Provision of a taxiway system will eliminate aircraft back taxiing on the runway, thereby reducing the chances of a runway incursion between taxiing and airborne aircraft.

A 35-foot wide parallel taxiway on the Southern side of Runway 11-29 is proposed. It includes a holding area on the Rwy 29 end and medium intensity taxiway lights (MITL). Millinocket's secondary runway is for visual use only and would not greatly benefit from a parallel taxiway. This assumes the line-of-sight problem identified in *Chapter 3, Demand/Capacity & Facility Requirements*, is corrected when the runway is reconstructed in 5 to 10 years.

See Drawing 3, Chapter 6, for the layout of this taxiway.

Widen/Relocate Taxiway Stubs:

Two taxiway stubs provide access from the terminal area to Runway 16-34 (and 11-29). The Southern taxiway stub, owned by the Town of Millinocket, connects Runway 16-34 to a privately owned taxiway/apron. There is no "through-the-fence" lease agreement between the

Town and the owners of the apron that permits either party to cross the property line and use each other's facilities. Unless a lease agreement is reached, we recommend construction of a replacement taxiway stub North of this location, completely located on airport property.

The Northern taxiway stub requires widening from 30 to 35 feet to meet ARC B-II criteria. See Drawings 3 and 5, Chapter 6, for the layout of these taxiway stubs.

Runway Safety Area (RSA) Improvements:

The longitudinal grades for the initial 200 feet beyond the Runway 11 and 29 ends do not meet FAA criteria. The Runway 11 end safety area is a paved, unusable surface that should be re-graded to a negative slope from the runway end (not to exceed 3 percent). This problem should be corrected when the runway is reconstructed (beyond the planning period).

The RSA off the end of Runway 29 slopes away from the edge of pavement (-5.5%), at a slightly higher grade than allowed (-3%). The Airport should re-grade this area as soon as possible and mitigate the impacts to existing wetlands within the disturbed areas.

Longitudinal grading criteria for Runway 16 and 34 ends comply with FAA criteria. However, the existing Runway 34 end has ruts, depressions and other surface irregularities that should be addressed.

Runway Obstacle Free Zone (ROFZ)/Runway Object Free Area (ROFA) Improvement:

The ROFZ along Runways 11-29 and 16-34 are clear of objects unrelated to NAVAIDS. The ROFA for Runway 11-29, however, does not meet FAA's criteria for B-II aircraft—500 feet total width, centered on the runway centerline. Most of these trees, shrubs and high ground areas are also penetrations to FAR Part 77 imaginary surfaces. Alternatives are discussed in the Part 77 paragraph below.

Runway 16-34 complies with ROFZ and ROFA criteria.

Extend Runway 29 End:

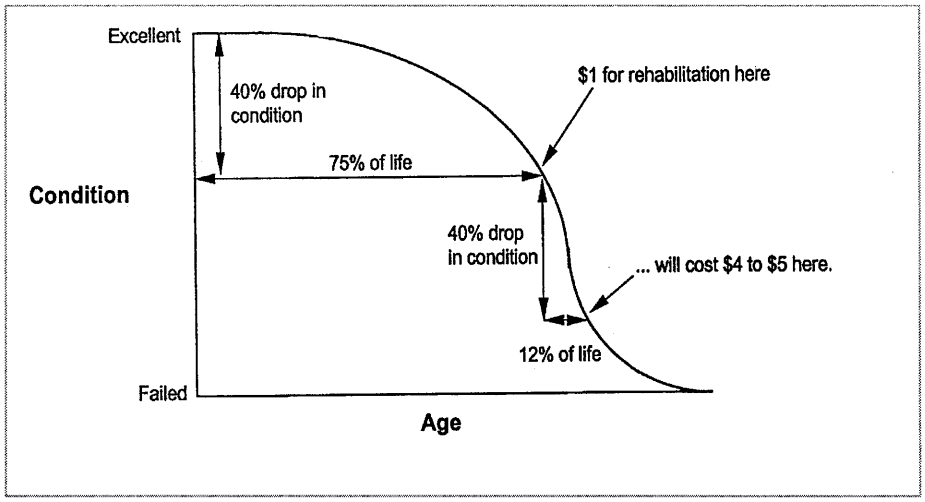
As stated in Chapter 3, an extension of 287 feet to the Runway 29 end is highly desirable to attract larger aircraft to Millinocket Municipal Airport. This would bring Runway 11-29's total length to 5,000 feet, a key factor for itinerant aircraft considering travel to Millinocket. This extension could be performed over multiple years, with suitable material from the runway visibility zone (RVZ) used to establish subgrade for the extended runway and safety area. Some additional trees will require removal—see the accompanying Vegetation Management Plan (VMP) for more information.

See Drawing 3, Chapter 6, for the layout of this proposed runway extension.

Runway Crack-Sealing:

Runway 16-34 displays typical pavement fatigue associated with its age. The proposed reconstruction project mentioned below will address this problem. Runway 11-29 will require crack sealing during the planning period. **Figure 4-3** illustrates the impact rehab work, such as crack sealing, has on pavement condition and overall costs.

Figure 4-1
Pavement Cost/Benefit Graphic



Source: NHDOT

Clear Runway 11-29 and 16-34 Visibility Zone:

The Runway Visibility Zone (RVZ) consists of a triangular area bordered on two sides by approximately half of Runways 11-29 and 16-34. It contains trees, brush and a hill made of mostly loam that must be removed. The sandy/silt loam could be relocated to several areas within airport property that require improved safety areas or to build the new Runway 29 safety area once the runway is extended to 5,000 feet. A soils study is needed to determine if the material is suitable to establish pavement subgrade.

See Drawings 3, 6 and 7, Chapter 6, for the location of the RVZ.

Reconstruct Runway 16-34:

As mentioned above and in *Chapter3 - Demand/Capacity & Facility Requirements,* Runway 16-34 is experiencing increased fatigue and longitudinal/transverse cracking. The Town is doing an excellent job sealing the cracks and minimizing major pavement failures. However, an overall reconstruction project of a narrower runway (75 feet wide) in a 5 to 10 year period is inevitable if failures increase and yearly maintenance costs continue to soar. The design should include eliminating the line-of-sight problem between runway ends by increasing the elevation of the Runway 34 end.

Lighting and Visual Aids:

A precision approach path indicator (PAPI) for both Runway 11-29 ends would enhance safety. PAPI's are normally installed on the left side of the runway approach end, unless a taxiway is also on the left side.

Installation of reflective markers on Millinocket's two taxiway stubs would be a cost-effective method of guiding aircraft at night. They are inexpensive, easy to install, require no wiring, or power and are practically maintenance free. They also are resistant to aircraft or vehicle collisions.

Runway end identifier lights (REILS) on the Runway 29 end are a suitable substitute for the inoperative medium intensity approach lights (MALS). REILS are far more cost-effective to install and maintain than the MALS, and can reduce visibility minimums as low as ¾ of a mile, as approved by FAA.

See Drawing 3, Chapter 6, for the layout of the proposed PAPIs and REILS.

NAVAIDS:

A non-precision instrument (NPI) approach to the Runway 11 end is highly desirable during IFR weather conditions. This occurs 9.7% of the time, mostly during the winter when winds approach from the Southeast.

A plan depicting penetrations to the TERPS 20:1 approach surface to Runway 11 is shown in *Chapter 6 – Airport Plans*, Drawing 6. Most of these penetrations are also included as a FAR Part 77 penetration, as discussed below.

Obstructions to Air Navigation

As discussed in *Chapter 3 - Demand/Capacity & Facility Requirements*, there are several trees, shrubs and high ground that penetrate FAR Part 77 and TERPS imaginary surfaces in and around the airport. In addition, some of these same trees are violations of the Runway 11-29 object free area (ROFA). The results are increased risks to pilots.

The Vegetation Management Plan (VMP), a separate document to this master plan, reviews penetration information and recommends methods to clear and maintain these areas. In cases where obstruction removal is not feasible, hazard beacons may be necessary.

See Drawings 3, 6 and 7, Chapter 6, for the areas impacted by the penetrations.

3.0 ADDITIONAL LANDSIDE DEVELOPMENTS

Wildlife/Security Fencing:

Installation of an 8 foot chain-link fence around the aircraft operations area (AOA) provides many benefits. First, it helps keep wildlife out of the aircraft movement areas, reducing potential for collisions. Secondly, it improves security and safety by denying unauthorized personnel access to aircraft, hangars and airfield operations.

Fencing includes clearing and grubbing an area about 20 feet in width that can be used as a service road to check for fabric breaks or suspicious activities.

See Drawing 3, Chapter 6, for the layout of the proposed fence.

Industrial Park:

With the PAC's selection of the *Two Crossing Runways Configuration*, setting an area aside for leasing to private developers for the purpose of attracting revenue-generating aviation and non-aviation activities is not possible within short distance of the airport's main access road, Medway Road.

To overcome this problem, two areas were identified for long-term property acquisition or reuse. First, the PAC identified an undeveloped portion of the airport, North of Runway 11-29 as a site for a potential non-aviation Industrial Park. Utilities are currently non-existent, but access is possible from a commercial area nearby.

The property bordered by the private hangars/apron, Medway Road, and Rwy 16-34 was identified as the most suitable location for aviation-related activities, such as additional FBO's, private hangars and other needs.

See Drawing 3, Chapter 6, for the location of the proposed developments.

Fueling:

A popular method of increasing revenues and improving service is to install a self-service fueling station. These aboveground tanks are pre-engineered, fully assembled, packaged and delivered for easy installation. Standard equipment includes dual wall fire rated tank, electronic dispenser with credit card reader, and top mount fill with containment.

Construction includes site preparation, electrical service, and a concrete pad. A typical 100LL tank size is 10,000 gal, much higher than the demand at Millinocket, but more cost-effective in the long-term due to fuel delivery charges. A 10,000 gal. Jet-A fuel tank should accommodate current and future jet aircraft needs through the planning period.

See Drawings 3 and 5, Chapter 6, for the layout of the proposed fueling area.

7-Unit Hangar Facility:

There is insufficient hangar space to meet Millinocket's current needs. The most cost-effective and space-use efficient solution is to construct a pre-engineered standard T-hangar. These hangars could be built by the Town and leased, or built by private developers who lease land from the Town. Under the *Two-Runway Configuration,* developable space on airport property is very limited. There is only one site within airport property where this building can be placed (between the Town hangar and the private hangars). This area is narrow and would require relocation of a major drainage ditch.

As stated in the *Industrial Park* paragraph, the private property between Medway Road and the southern part of Rwy 16-34 could accommodate a 7-unit hangar and many more facilities.

See Drawings 3 and 5, Chapter 6, for the layout of the proposed hangar.

Access Road to Rotating Beacon:

The airport's rotating beacon is functional, however, access to the site is nearly impossible with a vehicle. This plan recommends clearing a path (within airport property) and building a gravel road.

Reconstruct Terminal Apron:

To accommodate projected tie-downs demands identified in *Chapter 2 – Aviation Forecasts* and access for large and small aircraft to the proposed self-fueling station, this plan proposes reconstruction of the terminal apron. It includes two taxilanes, two tie-downs for large aircraft, and realigning both taxiway stubs.

Terminal Parking Lot:

The existing parking lot adjacent to the terminal is partially paved and too small to accommodate customers and FBO staff. Expansion to at least 20 spots within the existing parking lot is feasible and much needed.

Snow/Ice Control Equipment:

As discussed in *Chapter 1 - Inventory*, Millinocket Municipal Airport has one rotary plow (1993 Blanchet) with a carrier vehicle (front-end loader), and one displacement plow with a carrier vehicle (1994 International). All equipment/vehicles were partially funded through an FAA grant. Based on the total requirements listed in *Chapter 3 – Demand/Capacity & Facility Requirements*, the airport is eligible for FAA/State funds for one 15 ft. displacement plow, one Class II rotary plow and one carrier vehicle. Within the next 5 to 10 years, the existing rotary plow, displacement plow and front-end loader should be with this new equipment.

Snow/Ice Control Equipment Facility:

A 3,000 square foot building to house up to three plows is eligible for FAA/State funding. It should also accommodate a bathroom and small storage area.

4.0 SUMMARY

Although the airport needs were determined from local input and consideration of current design criteria, we should assume future events would change these needs. The master planning process attempts to present viable and flexible development alternatives for Millinocket Municipal Airport.

Of the four runway configurations presented, the PAC decided to retain both runways at full length (two crossing runways), requiring extensive tree and high ground removal in the runway visibility zone, but preserving the flexibility needed to support winter ski operations and student training.

A more detailed analysis of any environmental impacts associated with the selected facility development is provided in *Chapter 5 – Environmental Overview.*

Chapter Five: Environmental Overview

1.0 GENERAL

This chapter provides a summary of the primary environmental issues studied within this Master Plan. The topics include aircraft noise, wetlands, wildlife habitat and historic, archaeological, architectural and cultural resources.

2.0 NOISE STUDY

Noise from aircraft is one of the most controversial issues facing airports today. Aircraft noise is one of the most prominent indicators to the public that there is an airport operating locally. Even at small, general aviation airports such as Millinocket Municipal Airport, noise complaints are commonly the most prevalent commentary toward airports from the general public.

Potential noise impacts at Millinocket Municipal Airport were evaluated using the FAA's Integrated Noise Model (INM) version 6.0c, which is the current software version. Using runway geometry, forecast operations, typical flight tracks and aircraft types, the program creates noise contours representing areas of similar noise impact around the airport. The DNL (day-night average sound level) represents average daily noise levels that occur over a 24-hour period, with a 10-decibel penalty added to the noise levels of aircraft operating between the hours of 10:00 pm and 7:00 am. The penalty is based on the premise that there is a greater sensitivity to noise events occurring at night, when it is generally quieter and most residents are either sleeping or relaxing. The contours identify which areas are likely to have noise concerns. Generally, those areas falling within the 65 DNL contour are considered to be subject to noise disturbance.

Federal Aviation Regulation (FAR) Part 150, *Airport Noise Compatibility Planning*, contains federal standards on determining land use compatibility for given airport noise levels measured in terms of DNL thresholds. All land uses, including residential, are deemed compatible with levels less than DNL 65 dB, which is the unit for measuring DNL, the so-called A-weighted decibel which is structured to closely correlate with the human perception of noise. Other land uses, such as transportation, commercial, manufacturing, and recreational, are compatible with somewhat higher DNL levels. Using the 65 DNL contour allows the identification of noise sensitive communities within all compatible land uses. Therefore, this metric was used as the principal measure of noise impact for Millinocket Municipal Airport.

Drawing 9 – Land Use and Noise Contour Plan at the end of *Chapter 6 – Airport Plans* illustrates the 65 DNL noise contour for the projected aviation activity in 2021 for Millinocket Municipal Airport. There are no issues of noise incompatibility in and around the airport.

3.0 WETLANDS

Wetlands resource boundaries on airport property will be identified in the Vegetation Management Plan, a separate document that forms a part of the Airport Master Plan Update.

4.0 WILDLIFE HABITAT

Wildlife habitats on and off airport property will be identified in the Vegetation Management Plan, a separate document that forms a part of the Airport Master Plan Update.

5.0 HISTORIC, ARCHAEOLOGICAL, ARCHITECTURAL, AND CULTURAL RESOURCES

The National Historic Preservation Act was established in 1966 to advise the President and Congress on historic matters, recommend measures to coordinate federal historic preservation activities, and to comment on federal actions affecting properties included in or eligible for inclusion on the National Register of Historic Places.

The National Register of Historic Places is the United State's official list of cultural resources considered worthy of preservation. It is a part of a national program to bring together public and private efforts to identify, evaluate and protect historic and archeological resources. Properties that are more than 50 years old and are historically, architecturally, archeologically, or culturally significant are eligible to be listed on the National Register. **Table 5-1** identifies properties in the Town of Millinocket currently listed on the National Register. None of these properties are in the immediate vicinity of the airport.

Table 5-1
National Register Properties in the Airport Vicinity

Property Name	Address	Date Listed
Archeological Site No. 122—14	Address Restricted	October 31, 1995
Archeological Site No. 122—16	Address Restricted	October 31, 1995
Archeological Site No. 122—22	Address Restricted	October 31, 1995
Archeological Site No. 122—6	Address Restricted	October 31, 1995
Archeological Site No. 122—8	Address Restricted	October 31, 1995
Archeological Site No. 134—8	Address Restricted	October 31, 1995
Archeological Site No. 134—9	Address Restricted	October 31, 1995
Ambajejus Boom House	11 mi. NW of Millinocket and Ambajejus Lake	April 2, 1973
Archeological Site No. 122—4a	Address Restricted	October 31, 1995

Source: US Department of Interior Web Page (www.doi.gov)

The Archeological and Historic Preservation Act was passed in 1974 to provide for the survey, recovery, and preservation of significant scientific, prehistoric, historical, archeological or paleontological data when such data may be harmed or lost due to a federal, federally funded or federally licensed project.

Procedures in Section 106 of the National Historic Preservation Act and the Archeological and Historic Act are used to evaluate impacts to historic, archaeological, architectural, and cultural resources. The following criteria are used as a guideline to assist in determining if there would be an adverse impact on a National Register-listed or –eligible property:

- Destruction or alteration of all or part of a property;
- Isolation from, or alteration of, its surrounding environment;

- Introduction of visual, audible, or atmospheric elements that are out of character with the property and its setting;
- Transfer or sale of a federally owned property without adequate conditions or restrictions regarding preservation, maintenance, or use; and
- Neglect of a property resulting in its deterioration or destruction;

HTA contacted the Maine Historic Preservation Commission to determine if there were any properties listed on or eligible for the National Register of Historic Places near the airport; or if there were any areas of historic, architectural, and archaeological importance in the proximity of the airport. The Commission stated, "...there is insufficient information to determine whether historic architectural and/or archeological resources exist within the project area." Before specific projects recommended in the Master Plan are undertaken, the airport should coordinate with the Maine Historic Preservation Commission. (See Appendix B)

Chapter Six: Airport Plans

1.0 GENERAL

The airport plans or plan set have been designed to meet criteria established by the FAA in AC 150/5070-6A, *Airport Master Plans*, and AC 150/5300-13, *Airport Design*. The plan set is a graphic presentation to scale that illustrates both the current airport facilities and the airport development proposed through the PAC meeting process and the analysis conducted to develop the previous chapters within this report.

The plan set includes the following drawings:

- Cover/Title Sheet Drawing 1 of 9
- Existing Airport Layout Plan (ALP) Drawing 2 of 9
- Ultimate ALP Drawing 3 of 9
- ALP Data Sheet Drawing 4 of 9
- Terminal Area Plan Drawing 5 of 9
- Runways 11-29 Plan and Profile Drawing 6 of 9
- Runways 16-34 Plan and Profile Drawing 7 of 9
- FAR Part 77 Object Affecting Navigable Airspace Drawing 8 of 9
- Land Use and Noise Contour Plan Drawing 9 of 9

Standard 22 by 34 inch sheets of the plan set are available through the office of the Town's Director of Public Works. Reduced 11 by 17 inch sheets of the plan set are included at the end of this chapter. A brief description of each of the drawings within the plan set is provided in the following sections.

2.0 COVER/TITLE SHEET

Drawing one of nine, the Cover/Title Sheet, lists the subsequent drawings within the plan set, provides the MDOT's project number assigned to Millinocket Municipal Airport's Master Plan Update, and depicts the airport's general location.

3.0 EXISTING AND ULTIMATE AIRPORT LAYOUT PLAN

The Existing ALP, drawing two of nine, is provided as both a reference document to identify existing facilities (including runways, taxiways, buildings and other structures), and a presentation document to identify a beginning point to this study.

The Ultimate ALP, drawing three of nine, is a graphic depicting all of the existing facilities as well as the detail of the ultimate improvement for the 20-year development plan for Millinocket Municipal Airport, as identified in *Chapter 4 – Alternative Development* and refined by the PAC

meeting process. This allows the viewer the opportunity to visually identify all future development relative to the existing facilities.

FAA, MDOT, the Town of Millinocket, and airport tenants also use the Ultimate ALP for deliberations on land use proposals, budget/resource planning, and impacts to navigable airspace, and rescue/firefighting planning.

Once the FAA, MDOT, and the Town of Millinocket approve the Ultimate ALP, Millinocket Municipal Airport will be eligible for Federal and/or State funding of airport development projects.

4.0 ALP DATA SHEET

The ALP Data Sheet, drawing four of nine, provides a broad-spectrum of information about Millinocket Municipal Airport. Data included consists of general airport and runway data, approach slope data, runway protection zone data, property ownership data, and all-weather and IFR wind roses.

5.0 TERMINAL AREA PLAN

The Terminal Area Plan, drawing five of nine, focuses on the central aviation facilities by simply providing a blow-up of the administration/terminal area from the Ultimate ALP at Millinocket Municipal Airport.

6.0 RUNWAY PLAN AND PROFILES

The runway plan and profiles, drawings six and seven of nine, illustrates the approach areas immediately beyond the ends of the runways at Millinocket Municipal Airport. Each of the runways are shown in plan and profile with an exaggerated vertical scale to clearly depict any obstacles located within the existing and ultimate approaches to the runways, and to depict runway elevation changes, if any.

7.0 FAR PART 77, OBJECTS AFFECTING NAVIGABLE AIRSPACE

To protect aircraft from the hazard of manmade and natural obstructions in the airspace around the airport, the FAA relies upon imaginary surfaces on and around an airport, which are defined in FAR Part 77, *Objects Affecting Navigable Airspace.* Subpart C of FAR Part 77 establishes standards for determining obstructions to air navigation. These regulations enable the establishment of imaginary surfaces, which no object, manmade or natural, should enter. These surfaces at Millinocket Municipal Airport are depicted on drawing eight of nine.

FAR Part 77 surfaces are utilized in zoning and land use planning adjacent to the airport to protect the navigable airspace from encroachment by hazards, which would potentially affect the safety of airport operations. The FAR Part 77 Airspace Surfaces plan depicts the physical features of the area around the airport, the Part 77 surfaces, and identifies any obstructions to any of the surfaces.

Drawing eight also includes analysis of obstacles within the *Final Approach Segment* of the U.S. Terminal Instrument Procedures (TERPS). Specifically, we reviewed a *Straight-In* area, aligned with the runway centerline, with a 20:1 slope. It also includes the location of two bald eagle nests near the airport. (See Appendix C)

8.0 LAND USE AND NOISE CONTOUR PLAN

The Land Use and Noise Contour Plan, drawing nine of nine, depicts both the existing and ultimate on and off-airport land use as well as the ultimate noise contour plan.

Chapter Seven: Plan Implementation

1.0 GENERAL

A staging plan and a financial plan are presented to describe the steps required to reach the development discussed in *Chapter 4 – Alternative Development* and illustrated in *Chapter 6 - Airport Plans.* The staging plan considers the demand-driven need for facilities according to *Chapter 3 - Demand/Capacity & Facility Requirements,* as well as the financial feasibility of construction as determined in this task, so that the capital improvement plan can be reasonably implemented. The financial plan evaluates the airport's resources and proposes financial actions and revenue improvements.

2.0 CAPITAL IMPROVEMENT PLAN (CIP)

The CIP represents a schedule and cost estimate for implementing the airport improvements, which have been recommended as a result of the Airport Master Plan Update process. Scheduling of improvements has been divided into two phases: short-term (2004-2008) and long-term (2009-2023). The CIP must be viewed as a constantly evolving document. Planning for Millinocket Municipal Airport should remain flexible and should incorporate annually updated estimates of costs and priorities.

The CIP is structured in a manner that presents a logical sequence of improvements, while attempting to reflect available funding from the state and federal levels. Those airport improvements which are eligible for airport improvement program (AIP) funding in the State of Maine, such as the construction of a parallel taxiway to Runway 11-29, receive 95 percent of the funding from the FAA, 2.5 percent is funded by MDOT and the remaining 2.5 percent by the local sponsor. Projects ineligible for AIP funding must either be funded by the State, the airport or by private entities, such as the FBO at the airport or private developers.

The following sections describe the proposed airport improvements for both phases. The short-term phase represents a more detailed plan and it is broken down by individual fiscal years. The long-term phase only includes a prioritized list of project implementation. **Table 7-1** contains details for the short-term phase of the CIP and **Table 7-2** contains details for the long-term phase of the CIP.

Table 7-1
Short-Term CIP (2004-2008)

Projects	Construction Cost $	Engineering/ Contingency Cost $	TOTAL PROJECT COST $	AIP/MDOT Eligible Projects[1]			Other Projects [2]
				FAA $ (95%)	State $ (%)[3]	Local $ (%)[3]	
FY 2004							
Taxiway Stub Reflective Markers	3,000	0	3,000	0	2,400	600	
Total FY 2004:	**3,000**	**0**	**3,000**	**0**	**2,400**	**600**	
FY 2005							
Clear Penetrations Rwy 29 Approaches (Part 77/TERPS)	21,500	5,375	27,000	25,650	675	675	
Clear RVZ & Extend Runway 29 RSA	475,280	118,820	594,000	564,300	14,850	14,850	
Runway 29 End Wetlands Mitigation	40,457	10,114	51,000	48,450	1,275	1,275	
Extend Runway 29 by 287'	217,491	54,373	272,000	258,400	6,800	6,800	
Total FY 2005:	**754,728**	**188,682**	**944,000**	**896,800**	**23,600**	**23,600**	
FY 2006							
100LL/Jet-A Tanks w/Access Rd	155,000	38,750	194,000				194,000
Clear Transitional Surfaces Rwy 11-29 (Part 77)	228,900	57,225	286,000	271,700	7,150	7,150	
Clear Penetrations Rwy 11 Approaches (Part 77/TERPS)	10,000	2,500	13,000	12,350	325	325	
Total FY 2006:	**393,900**	**98,475**	**493,000**	**284,050**	**7,475**	**7,475**	**194,000**
FY 2007							
REILS for Rwy 29 End	23,300	5,825	29,125	27,669	728	728	
Clear Transitional Surfaces Rwy 16-34 (Part 77)	207,500	51,875	259,375	246,406	6,484	6,484	
Clear Runway 11-29 Object Free Area	21,100	5,275	26,000	24,700	650	650	
Total FY 2007:	**251,900**	**62,975**	**314,500**	**298,775**	**7,863**	**7,863**	
FY 2008							
Install Runway 11 PAPI	37,300	9,325	46,625	44,294	1,166	1,166	
Install Wildlife/Security Fencing	411,000	102,750	514,000	488,300	12,850	12,850	
Total FY 2008:	**448,300**	**112,075**	**560,625**	**532,594**	**14,016**	**14,016**	
SHORT-TERM PHASE TOTAL	**1,851,828**	**462,207**	**2,315,125**	**2,012,219**	**55,353**	**53,553**	**194,000**

Notes: 1. Projects eligible for Airport Improvement Program (AIP) and State aviation related funding.
2. Projects not eligible for AIP funding, typically funded through State grants, separate FAA funding, or private sector funds.
3. State and local share is 5%, unless otherwise noted.
4. Figures are in constant CY 2003 dollars, rounded to the nearest 100.

Table 7-2
Long-Term CIP (2009-2023)

Projects	Construction Costs $	Engineering/ Contingency Cost $	TOTAL PROJECT COST $	AIP/MDOT Eligible Projects[1]			Other Projects[2]
				FAA $ (95%)	State $ (%)[3]	Local $ (%)[3]	
Runway 11-29 Crack Sealing	45,800	11,450	57,250				57,250
Reconstruct Terminal Apron	754,617	188,654	943,000	895,850	23,575	23,575	
Reconstruct Runway 16-34 (4,008' X 75')	1,512,731	378,183	1,891,000	1,796,450	47,275	47,275	
Construct 7-Unit T-Hangars	230,000	57,500	288,000				288,000
Replace Runway 29 VASI with PAPI	40,300	10,075	50,000	47,500	1,250	1,250	
Construct Snow/Ice Control Equipment Building	283,300	70,825	354,000	336,300	8,850	8,850	
Snow/Ice Control Equipment	304,000	76,000	380,000	361,000	9,500	9,500	
Improve Access Road to Rotating Beacon	69,800	17,450	87,000	82,650	2,175	2,175	
Expand Parking Lot	35,200	8,800	44,000				44,000
Construct Runway 11-29 Parallel Taxiway	957,067	239,267	1,196,000	1,136,200	29,900	29,900	
LONG-TERM PHASE TOTAL	**4,232,815**	**1,058,204**	**5,290,250**	**4,655,950**	**122,525**	**122,525**	**389,250**

Notes: 1. Projects eligible for Airport Improvement Program (AIP) and State aviation related funding.
2. Projects not eligible for AIP funding, typically funded through State grants, separate FAA funding, or private sector funds.
3. State and local share is 5%, unless otherwise noted.
4. Figures are in constant CY 2003 dollars, rounded to the nearest 100.

2.1 Short-Term (2004-2008)

The list of short-term projects (Table 7-1) provides aircraft in the air and on the ground a safe operating environment by removing, marking or grading manmade objects, natural growth and uneven terrain that is potentially hazardous. Identification and removal or marking of objects/growth above ground level is governed by FAR Part 77, *Objects Affecting Navigable Airspace,* and FAA Order 8260.3B, *United States Standard for Terminal Instrument Procedures* (TERPS). Both documents generate imaginary surfaces that when compared to topography analysis determines potential obstructions.

The highest priority of Part 77 and TERPS projects proposed in the short-term is to remove trees/growth penetrating the existing and ultimate Runway 11 visual approach and in projects to remove penetrations to Runway 11-29 transitional surfaces and Runway 29 existing and ultimate Part 77/TERPS imaginary surfaces. Removal of Runway 29 end penetrations helps clear the way for the extension of Runway 11-29 to 5,000 ft. in FY 2007. Penetrations to Runway 16-34 transitional surfaces should be removed.

FAA Advisory Circular 150/5300-13, *Airport Design,* provides standards for two other safety-related projects: clear the runway visibility zone (RVZ) and clear the Runway 11-29 object free area (ROFA)..

To restore the Runway 29 approach lighting, we recommend installation of runway end identifier lights (REILS) in lieu of repairing the existing medium intensity approach lighting system (MALS). At the same time, the Runway 11-29 extension to 5,000 ft. should be accomplished.

The existing underground aviation gas fuel tank must be replaced by January 2008. The CIP includes replacing the 10,000 gal. 100LL aboveground tank, with a self-fueling system. A 10,000 gal. Jet-A tank would also enhance service at Millinocket. An access road from Medway Road and a taxilane to the station would provide easy access to suppliers and aircraft.

Finally, we recommend installation of a Runway 11 precision approach path indicator (PAPI). Together with an NPI approach to Runway 11, this project will make Runway 11 a viable option in most weather conditions.

2.2 Long-Term (2010-2023)

Four projects listed as long-term (Table 7-2) will increase aircraft and vehicular parking to meet future demand, as detailed in Chapter 2 – *Aviation Forecasts.* The terminal ramp reconstruction will provide additional tie-down spots for small (ARC B-I) and large (ARC B-II) aircraft, as well as required separation distances among parking spots, taxilanes and the Runway 16-34 runway centerline.

Other terminal area projects include construction of a T-hangar for seven small aircraft, expansion of the vehicular parking lot, and construction of a snow/ice control equipment building.

On the airside, we recommend a crack-sealing project for Runway 11-29, reconstruction of Runway 16-34, replacement of the existing Runway 29 VASI with a PAPI system, and improving the access road to the rotating beacon.

Millinocket's existing snow/ice control equipment will require replacement in the next 5 to 10 years. A new carrier vehicle, rotary plow (2500 tons/hour), and 15 ft. displacement plow is planned.

Finally, we recommend one on-airport and one off-airport area be identified to develop non-aviation and aviation-related activities, respectively.

3.0 FINANCIAL/MANAGEMENT PLAN

This section deals with the financial structure and management of Millinocket Municipal Airport. Although the airport is not currently a self-sustaining entity within the Town, it is considered a valuable resource to the community. One of the airport's goals is to realize the maximum revenue from the airport lease structure and improve the airport's ability to contribute to the operating costs and the local match for the CIP.

3.1 Existing Lease Structure

The Town of Millinocket owns the airport land, the terminal, one large hangar, underground fuel tank, and other small facilities located within the airport boundary line. There is one lease that ultimately defines the financial structure of Millinocket Municipal Airport—provision of fixed base operations and field manager services between the Town and the FBO, West Branch Aviation.

Table 7-3 summarizes the main provisions of this lease. It provides the FBO with control of the terminal, main hangar, fuel facilities, ramp and other related facilities at no costs to the FBO. The lease also pays the FBO $12,000 per year to perform Field Manager duties, including grass mowing, follow-up snow plowing, maintaining/operating airfield lights, beacons, radio communications, and other related activities.

If the current agreement included lease payments to the Town, federal regulations would require these funds remain on the airport and be used to offset airport expenses. Airport leases should provide for revenue generation from several different and separately recognized sources. A lease which only calls for a lump sum payment from the lessee does not clearly identify what the lessee is paying for and makes it more difficult to alter the lease if the lessee's conditions change in such a way as would warrant an adjustment in the lease terms. The following four major revenue components should be identifiable in future airport leases:

Land Rent: Land is an airport's major resource and the airport should be compensated for its use. Airport land should be leased, not sold, and at rates comparable to commercial and industrial rates.

Facility Rent: The airport should be adequately compensated by users who rent or lease space in airport-owned facilities, e.g. terminal buildings, hangars, etc.

Gross Receipts Fee (GRF): This fee is based on the fact that the airport's existence creates the market on which a commercial operator depends. The airport should be compensated for the expense of maintaining the airport and creating that market opportunity. Due to the difficulty of determining a commercial operator's gross, the GRF can be challenging to administer.

Additional Fees: These are charges to direct users of the airport. A typical example is the fuel flowage fee. The fuel flowage fee is a predetermined charge owed to the airport for each gallon of fuel purchased by the FBO's on the field.

Table 7-3
Current Lease Agreement

Lessee	Lease Dates	Premises Leased	Services Provided	Payments
West Branch Aviation	2001 to June 30, 2005	Main hangar; terminal; ramps; fuel facilities and all land, except the runway and taxiways.	Retail sale of aviation fuel & lubricants; pilot aids/charts; operate wind tee and lights; maintain & operate tie-downs and hangar; grass mowing; "initial attack" of snow & ice.	Town pays FBO $12,000 per year for Field Manager duties.

Source: Town of Millinocket

3.2 Revenues

While the FBO/Field Manager lease agreement has been successful in its goal of providing full-time services for based and transient aircraft, we recommend three improvements to leases with the current and future tenants that will help the airport become self-sustaining.

First, the Town should be compensated for the use of revenue-generating facilities, such as the terminal and the main hangar.

Second, the Town should establish a fuel flowage fee. A typical fee is $.06 per gallon. A minimum monthly fee to the entity operating the system is also usually charged at approximately $125.00.

Third, the Field Manager should collect a tie-down fee for based aircraft.

A 1993-1994 AAAE Survey of Airport Rates and Charges report, adjusted for inflation and location factors, provides the following proposed rates for Millinocket Municipal Airport:

- Based aircraft monthly tie-down fee: $25.00/mo.
- FBO hangar rental fee: $2.50/s.f./yr.
- Terminal building rental rate for counter space: $8.00/s.f./yr.
- Fuel flowage fee: $0.06/gal.
- T-hangar rate for single engine aircraft (if owned by airport): $125.00/mo.

Revenue generated from these charges should be deposited into a general revenue account managed by the Town of Millinocket. As previously mentioned in this chapter, revenues generated on airport land must remain on the airport and be used to offset airport expenses.

Table 7-4 illustrates Millinocket Municipal Airport's FY 2003 expense budget. Once the current FBO/Field Manager lease expires, we recommend the Town establish fair and reasonable fees for all tenants that will balance revenues and expenses. **Table 7-5** is a projection of future revenues and expenses based on average fees above and forecast data from Chapter 2 of this report. ,.

Table 7-4
Operating Capital History

Expenses	FY 2003
Part Time Employees	2,000
FBO Contract	12,000
Electricity and Water	4,100
Equipment Repairs	2,000
ILS Maintenance	3,000
Fuel	1,100
Other Operating	7,046
Total	***31,246***
Total Surplus (Deficit)	***(31,246)***

Source: Town of Millinocket
1. Budgeted figures were used and are therefore estimates.

Table 7-5
Revenue and Expense Projections

	FY 2003	FY 2013[1]	FY 2023[1]
Expenses			
Part Time Employees	2,000	2,264	3,359
FBO Contract[2]	12,000	15,000	15,000
Electricity and Water	4,100	5,380	6,886
Equipment Repairs	2,000	2,264	3,359
ILS Maintenance	3,000	3,936	5,039
Fuel	1,100	1,443	1,848
Other Operating	7,046	9,245	11,834
Total Expenses:	31,246	39,532	47,325
Revenues			
Based Aircraft Tie-Down Fee	0	1,584	2,520
FBO Hangar Rental Fee	0	17,909	22,932
FBO Terminal Rental Fee	0	10,553	13,507
Fuel Flowage Fee	0	1,096	1,198
T-Hangar for SE Aircraft (if owned by Town)	0	13,777	17,636
Total Revenues:	***0***	***44,918***	***57,793***
Total Surplus (Deficit)	***(31,246)***	***5,386***	***10,468***

Source: HTA
Notes: 1. Assumes 2.5% inflation per year
2. Negotiated

3.3 Management

The Town of Millinocket's Director of Public Works is also the Airport Manager. His responsibility is to oversee all aspects of airport operations, maintenance and administration, and advocate for Town, State and Federal resources. As explained in paragraph 3.1, the FBO is paid a fixed annual fee to perform Field Manager duties. This arrangement has proven to be beneficial to both the Town and the FBO. With the FBO responsible for day-to-day operations and routine maintenance, the Airport Manager is free to perform other Town duties while continuing to focus on short and long-term airport matters. With no rental fees owed to the Town, the FBO has directed his efforts on establishing a viable business that can help attract based and transient clients.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Millinocket Municipal Airport is a well maintained, managed, and operated GA airport that provides excellent service to based and transient aircraft. Projected aviation forecasts determined by the Maine Aviation Systems Plan Update, Phase I report suggests a gradual growth in based aircraft and aircraft operations over the next 20 years. Existing facilities are in good condition and are well cared for.

A review of environmental issues on and off-airport property found no noise, historic, archaeological, architectural, and cultural resource concerns that impede air navigation or airport development.

An analysis of FAR Part 77 and TERPS imaginary surfaces indicates tree and terrain penetrations that pose a potential hazard to air navigation. Other safety related concerns include an obstructed runway visibility zone and runway object free areas that should be graded. Projects that help the airport meet future aviation demand are the extension of Runway 11-29 to 5,000 ft., installation of PAPI's on both ends of Runway 11-29, a NPI approach to Runway 11, reconstruction of the terminal ramp, reduce width of Runway 16-34 from 100 ft. to 75 ft., construction of T-hangars, and the construction of a parallel taxiway to Runway 11-29.

Most projects listed in Tables 7-1 and 7-2 are eligible for Airport Improvement Program (AIP) funds. For eligible projects, FAA reimburses the sponsor for up to 95% of the project cost. The remaining 5% is split between the State and the local community. To help pay for operation and maintenance of the airport, and generate the local share for these projects, we recommend future leases include fair and reasonable fees for use of Town facilities and runways.

A final look at the original goals and objectives for Millinocket Municipal Airport established by the PAC (Introduction) establishes that the AMPU thoroughly addressed all issues.

Table 7-6
Goals and Objectives

Goal #1 – Attract Larger/Faster Aircraft	
Objective #1 – Extend Runway 11-29	Included in ALP
Objective #2 – Runway 11 NPI Approach	Possible. Survey of TERPS/FAR Part 77 approach surfaces needed.
Objective #3 – Evaluate Rwy 29 Approach Lights	Replace with REILS
Goal #2 – Enhance Safety	
Objective #1 – Evaluate Part 77/TERPS penetrations	See VMP
Objective #2 – Evaluate Rwy Visibility Zone	Completed
Objective #3 – Vegetation Management Plan	See VMP
Goal #3 – Increase Revenues/Self-Sufficiency	
Objective #1 – Analyze FBO/Field Mgr lease	Improved lease structure recommended
Objective #2 – Identify land available for development	Land north of Runway 11-29 set aside

Source: HTA

Appendix A

Acronyms

Acronyms

AC	Advisory Circular
ADA	American Disabilities Act
AGL	Above Ground Level
AIP	Airport Improvement Program
ALP	Airport Layout Plan
AMP	Airport Master Plan
ARC	Airport Reference Code
ARFF	Airport Rescue and Fire Fighting
ARP	Airport Reference Point
CIP	Capital Improvement Plan
dB	Decibel
DEP	Department of Environmental Protection
DNL	Day-Night Average Sound Level
DWL	Dual Wheel
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FBO	Fixed Base Operator
FL	Flight Level
FOD	Foreign Object Debris
GA	General Aviation
GU	General Utility
HE	Helicopter (Rotorcraft)
HTA	Hoyle, Tanner & Associates, Inc.
IFR	Instrument Flight Rules
INM	Integrated Noise Model
MASP	Maine Aviation System Plan
MDEP	Maine Department of Environmental Protection
MDOT	Maine Department of Transportation
MDOT-OPT	Maine Department of Transportation - Office of Passenger Transportation
ME	Multi-Engine Piston
MIRL	Medium Intensity Runway Lights
MITL	Medium Intensity Taxiway Lights
MSL	Mean Sea Level
NAVAIDS	Navigational Aids
NDB	Non-Directional Beacon
NPIAS	National Plan of Integrated Airport Systems
NRPA	Natural Resources Protection Act
ROFA	Runway Object Free Area
ROFZ	Runway Object Free Zone
OPBA	Operations Per Based Aircraft
PAC	Planning Advisory Committee
PAPI	Precision Approach Path Indicator
PCI	Pavement Condition Index
REILS	Runway End Identifier Lights
RPZ	Runway Protection Zone
RSA	Runway Safety Area
RTAC	Regional Transportation Advisory Committee
RVZ	Runway Visibility Zone
Rwy	Runway
SE	Single-Engine Piston
SWL	Single Wheel
SWPPP	Storm Water Pollution Prevention Plan
TERPS	Terminal Instrument Procedures
TOFA	Taxiway Object Free Area
TOFZ	Taxiway Obstacle Free Zone
TP	Multi-Engine Turboprop
TSA	Taxiway Safety Area
Twy	Taxiway
VFR	Visual Flight Rules
VMP	Vegetation Management Plan
VOR	Very High Frequency Omni-directional Range
VORTAC	Very High Frequency Omni-directional Range Tactical Air Navigation

Appendix B

Historic Architectural and Archaeological Resources

MAINE HISTORIC PRESERVATION COMMISSION
55 CAPITOL STREET
65 STATE HOUSE STATION
AUGUSTA, MAINE
04333

ANGUS S. KING, JR.
GOVERNOR

EARLE G. SHETTLEWORTH, JR.
DIRECTOR

November 25, 2002

Blakely Sullivan
HTA Consulting Engineers
45 Bromfield St., Suite 1001
Boston, MA 02108

Project: MHPC #2211-02 - Millinocket Municipal Airport
Location: Millinocket, ME

Dear Mr. Sullivan:

In response to your recent request, I have reviewed the information received November 12, 2002 to initiate consultation on the above referenced project. This project was reviewed pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended.

Based upon the location and scope of work for this project, I have concluded that there is insufficient information to determine whether historic architectural and/or archaeological resources exist within the project area. Therefore we are requesting additional information as outlined below:

- Provide photos of any buildings over fifty years old that are within the airport's area of potential effect. Photos should be keyed to a topographic map and submitted on the enclosed *Maine Historic Preservation Commission Historic Building/Structure Survey Form* with lines 3-5 filled out. If there are no buildings over fifty years old on or adjacent to the project site, please indicate this in writing.

Once this information is collected, our office will forward a response regarding the results of our evaluation. Please contact Mike Johnson of my staff if we can be of further assistance in this matter.

Sincerely,

Earle G. Shettleworth, Jr.
State Historic Preservation Officer

EGS/mj
enc:

Index by State and City
National Register Information System 11/08/2002 12:58:29

No filter Include filter in navigation ☐

Row	STATE	COUNTY	RESOURCE NAME	ADDRESS	CITY	LISTED	MULTIPLE
1	ME	Penobscot	**Archeological Site No. 122--14**	Address Restricted	Millinocket	1995-10-31	Penobscot Headwater Lakes Prehistoric Sites MPS
2	ME	Penobscot	**Archeological Site No. 122--16**	Address Restricted	Millinocket	1995-10-31	Penobscot Headwater Lakes Prehistoric Sites MPS
3	ME	Penobscot	**Archeological Site No. 122--22**	Address Restricted	Millinocket	1995-10-31	Penobscot Headwater Lakes Prehistoric Sites MPS
4	ME	Penobscot	**Archeological Site No. 122--6**	Address Restricted	Millinocket	1995-10-31	Penobscot Headwater Lakes Prehistoric Sites MPS
5	ME	Penobscot	**Archeological Site No. 122--8**	Address Restricted	Millinocket	1995-10-31	Penobscot Headwater Lakes Prehistoric Sites MPS
6	ME	Penobscot	**Archeological Site No. 134--8**	Address Restricted	Millinocket	1995-10-31	Penobscot Headwater Lakes Prehistoric Sites MPS
7	ME	Penobscot	**Archeological Site No. 134--9**	Address Restricted	Millinocket	1995-10-31	Penobscot Headwater Lakes Prehistoric Sites MPS
8	ME	Piscataquis	**Ambajejus Boom House**	About 11 mi. NW of Millinocket and Ambajejus Lake	Millinocket	1973-04-02	
9	ME	Piscataquis	**Archeological Site No. 122--4a**	Address Restricted	Millinocket	1995-10-31	Penobscot Headwater Lakes Prehistoric Sites MPS

Appendix C

Bald Eagle Habitat

STATE OF MAINE
DEPARTMENT OF INLAND FISHERIES & WILDLIFE
PENOBSCOT VALLEY REGIONAL OFFICE
73 COBB ROAD
ENFIELD, MAINE 04493

Phone (207) 732-4132 FAX (207) 732-4405
E-mail: kevin.stevens@maine.gov

GOVERNOR
John Elias Baldacci

COMMISSIONER
Roland D. Martin

June 30, 2003

David Guadalupe
Hoyle, Tanner & Associates, Inc.
150 Dow Street
Manchester, NH 03101

RE: Bald eagle nest 236A near Millinocket Municipal Airport.

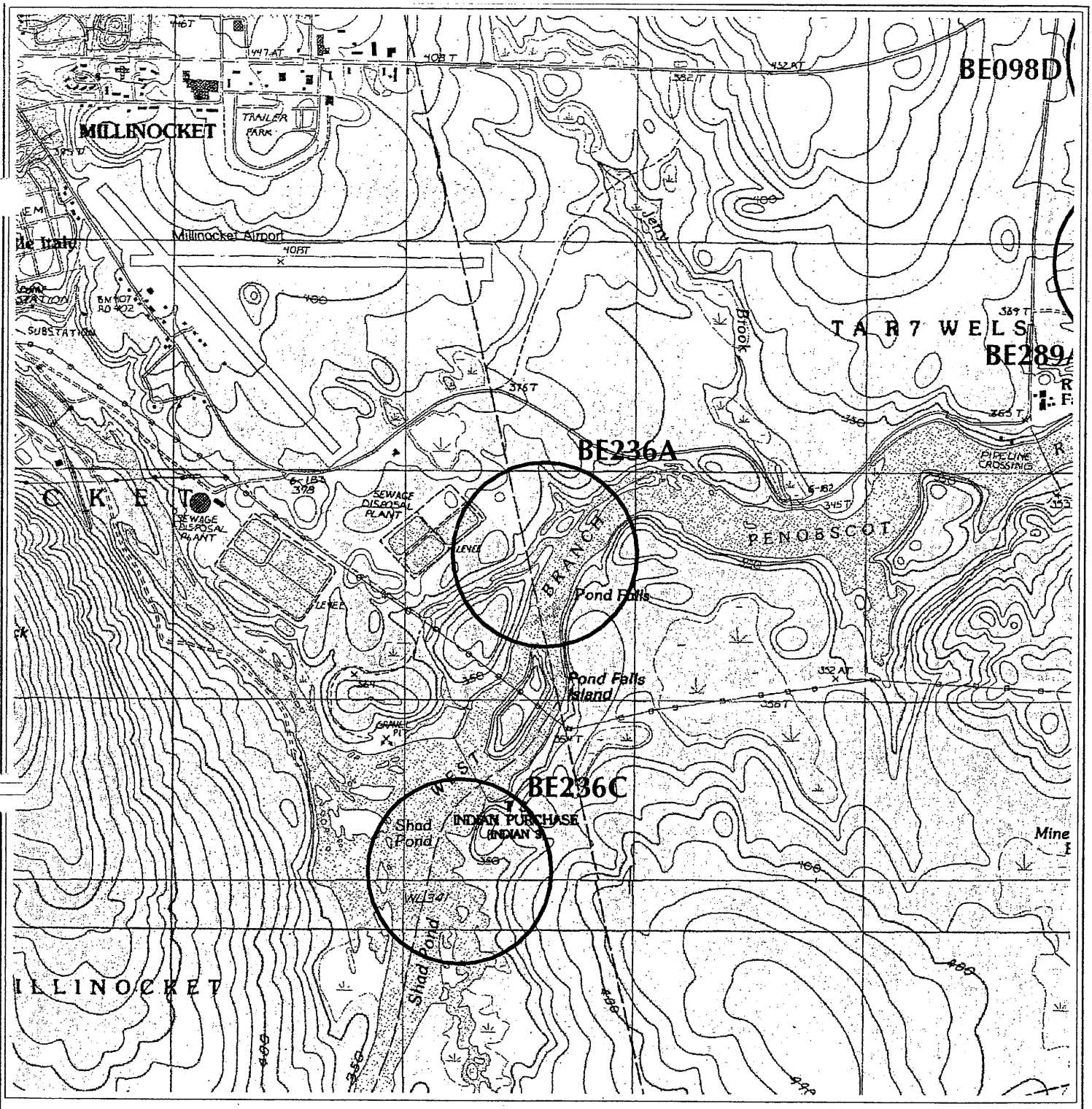
Dear Mr. Guadalupe:

Bald eagles are a threatened species that inhabit the vicinity of the Millinocket Municipal Airport. They also nest at the center of the circle designated BE 236A, on the enclosed map. The eagles have coexisted with the airport traffic for many years, and I do not believe the amount of increased air traffic anticipated will disturb them.

Our regional office files contain no other records of threatened, endangered, or special status wildlife species or habitats at this location. However, comprehensive surveys are lacking for most wildlife species, and our regional files contain only known records.

Sincerely,

Kevin C. Stevens
Regional Wildlife Biologist



0.25 0 0.25 0.5 0.75 1 Miles

ESSENTIAL HABITAT FOR ENDANGERED AND THREATENED SPECIES

DEPARTMENT OF INLAND FISHERIES AND WILDLIFE, Augusta, Maine 04333

N W E S

MAP LEGEND

BE 000A Bald Eagle (BE) Nest Site No. 000A

All boundaries are shown as a solid circular line (O) and the inside of the line is the edge of the boundary. Each circle has a radius of approximately 1,320 feet and a center located approximately on the nest. The e on the map determines the boundary. The area within each circle is approximately 126 acres.

For a complete description of Essential Habitat and regulations pertaining thereto, refer to Chapter 8.05 of the Department Regulations and 12 M.S.R.A., Chapter 713, Subchapter V.

This map of Essential Habitat For Endangered and Threatened Species is adopted by the Department of Inland Fisheries and Wildlife on March 28, 2002
This map is certified to be a true and correct copy of the official map of Essential Habitat For Endangered and Threatened Species by the Department of Inland Fisheries and Wildlife.
By:

Commissioner
Department of Inland Fisheries and Wildlife
This 7th day of May 2002.

Authority: 12 M.R.S.A., Section 7754(2)

Effective Date: May 31, 2002