Birchwood Airport Master Plan

AKSAS Project No. 54741

Draft Final

Prepared for:

Alaska Department of Transportation
and Public Facilities
Central Region

Prepared by:

HDR Alaska, Inc.
2525 C Street, Suite 305
Anchorage, Alaska 99503-2569

December 2005

Judy Chapman
269-0519

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Table of Contents

List of Tables

List of Figures

Appendices (on CD)

Attachment A: Airport Layout Plan

1.0 Overview and Issues

1.1 Overview

The Birchwood Airport is a general aviation (GA) airport located approximately 20 miles north of Anchorage and west of the Glenn Highway along Knik Arm (see Figure 1.1). The airport serves a regional role for Anchorage, Eagle River, Chugiak, Palmer, and Wasilla GA communities. Official records estimate the Birchwood Airport to have approximately 56,050 operations per year by private GA aircraft based at the airport, transient GA aircraft, flight schools operating at the airport, and ultralight vehicles. The airport has two runways. Runway 01L/19R is a paved runway that serves GA aircraft. It is 4,010 feet long and 100 feet wide, with taxiways on each side. Runway 01R/19L is 2,200 feet long (600 feet of pavement with 1,600 feet of gravel) and 50 feet wide and is intended for use by GA aircraft equipped with tundra tires or skis and by ultralight vehicles. Figure 1.2 depicts these airport features. Simultaneous operations on these parallel runways are not allowed. Official numbers indicate that there are 170 aircraft based at the airport. Unofficial counts estimate that upwards of 433 aircraft are on the airport at certain times. As a result, all lease lot space and tie downs are in use and airspace issues have become a primary concern for airport users.

The purpose of the Birchwood Airport Master Plan is to recommend actions at the Birchwood Airport to improve safety and capacity; identify facilities required to serve existing and future air traffic demand; and to develop a phased implementation plan to meet forecast aviation needs for the next 20 years.

Section 1.0 introduces the airport master planning process; presents a summary of the public involvement process; and identifies issues noted during public outreach.

Section 2.0 presents the conditions for the social, economic, and natural environment at and near Birchwood Airport.

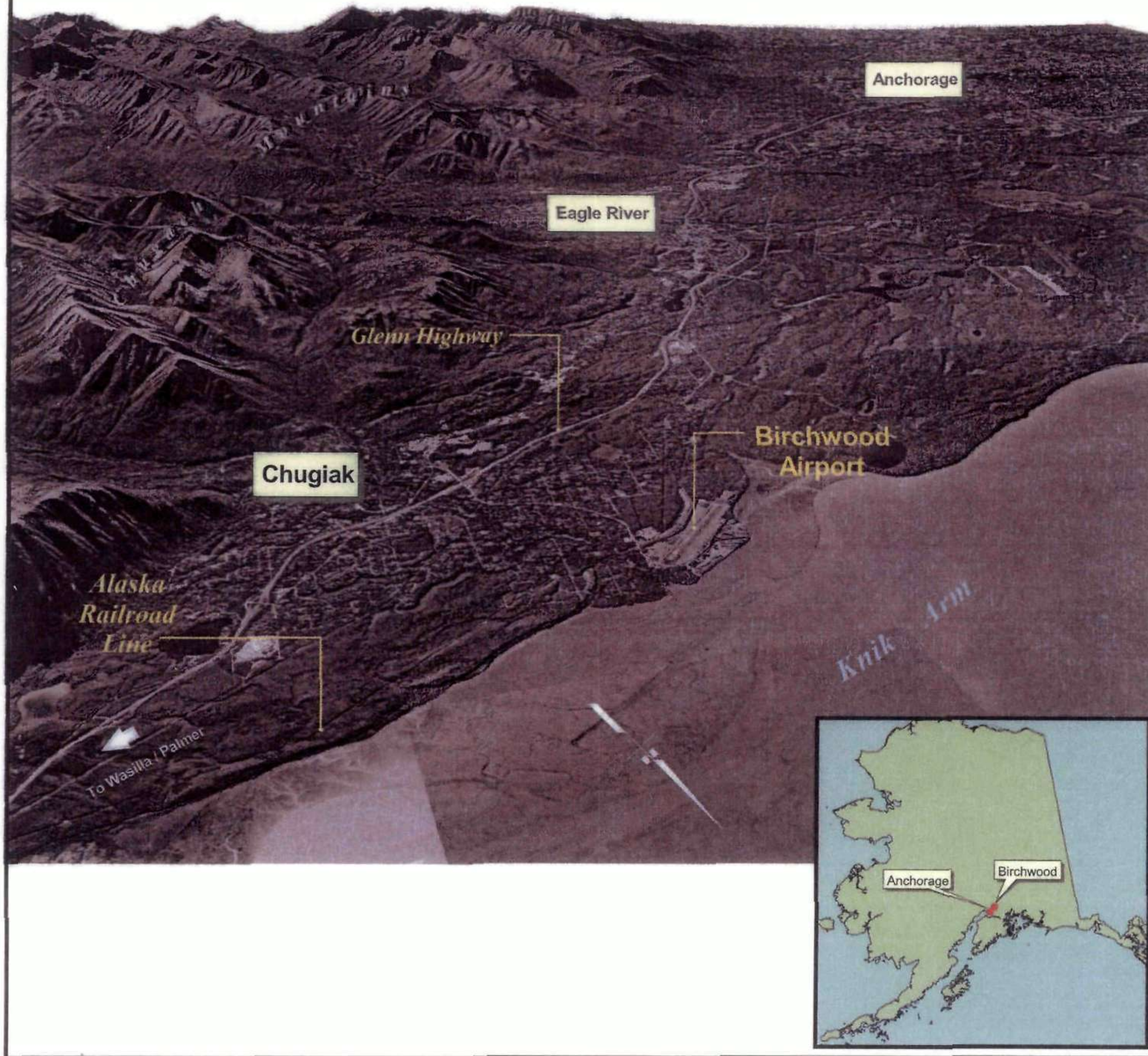
Section 3.0 identifies the existing aviation facilities at Birchwood Airport.

Section 4.0 includes Federal Aviation Administration (FAA) and Alaska Department of Transportation and Public Facilities (DOT&PF) air traffic data describing historic aviation activity at the airport, and presents a comparison of the FAA's Terminal Area Forecast and the 20-year air traffic forecast. The forecast was prepared in accordance with the process recommended in FAA Advisory Circular (AC) 150/5070-6A, *Airport Master Plans* and updated in *Forecasting Aviation Activity by Airport* (FAA 2001a) and FAA AC 150/5070-6B, Airport Master Plans (FAA 2005b).

Section 5.0 presents the alternatives considered.

Section 6.0 presents an analysis of the potential environmental impacts of each alternative. The alternatives presented are designed to rectify problems, bring the airport up to standard, and satisfy forecast demand for lease space and aircraft parking.

Section 7.0 presents the proposed airport development plan.



BIRCHWOOD PROJECT VICINITY

BIRCHWOOD AIRPORT MASTER PLAN

DATE: December 2005

FIGURE 1.1

Z:\07072 DOT&PF\204 Birchwood Airport Master Plan\CAD\GIS\birchwood_airport_EA2.apr - Project Vicinity 3D (EA)

1.2 Public Outreach

The DOT&PF is taking a practical and active approach to the public involvement component of this project. The intent is to involve the public, pilots, and lease lot holders throughout the planning process. This involvement has been key to the successful implementation of airport master plans. A proactive public involvement program was devised to inform citizens about the nature of the proposed project, identify concerns, cultivate support for the project, and set the stage for the public meeting process. The following are the key components of DOT&PF's public involvement program for the Birchwood Airport Master Plan.

Public Meetings. The project team held public meetings at two key points in the project. The first meeting was held to introduce the project and to provide an opportunity for people to ask questions about any aspect of the project. The second meeting was conducted in conjunction with the alternatives development and analysis during Office Study 2.

Potentially Affected Interest Identification and Project Mailing List. Another key element of the project's public involvement effort was the use of a project mailing list to identify and maintain contact with potentially affected interests. This list was used throughout the project to distribute information such as meeting notices and the availability of documents. The mailing list was updated after each public meeting (using sign-in sheets) and upon receiving comments from the public.

Newsletters and mailers. At key points in the project newsletters or postcard mailers were mailed to convey project information and status. These newsletters were also posted to the project website for public access.

Website. A cornerstone of the project's public involvement approach was the use of a project website (www.birchwoodairport.com). All reports and newsletters were posted to the website to allow for public easy access to the information available.

Airport Advisory Committee. Another public involvement tool incorporated into this project to ensure meaningful dialogue between team members and potentially affected interests is an Airport Advisory Committee (AAC). This group includes representatives from a broad range of airport interest groups such as existing lease lot holders, airport users, community members, and representatives from the Municipality of Anchorage (MOA), FAA, and DOT&PF representatives. The function of this group was to act as a sounding board for issues and ideas, and to review draft documents before they are made available to the general public. Meeting dates and locations varied to allow for flexibility and to coincide with the review of project reports.

1.3 Issues Identification

The main focus of initial public involvement efforts and field reconnaissance was to identify issues needing to be explored in the master plan. This section describes major categories of issues identified during the first phase of master plan development. Some of the issues identified during the public involvement process extended beyond the purview of the master planning effort.

<u>**General Mixed-Use Issues and Comments**</u>. The biggest safety concern identified was the diverse mix of aircraft operating at the airport – GA aircraft and ultralight vehicles. Pilots stated the need for better sequencing, communication, and safety practices for all types of aircraft using the airport. The two runways are too close together; two true parallel runways are needed to separate ultralight and fixed wing operations. This separation would allow for more normal traffic patterns and approaches.

Identified Needs and Concerns at the Birchwood Airport

1. Airport improvements are needed for the airport to meet DOT&PF and FAA design standards, including those pertaining to runway width, runway protection zone (RPZ), runway object free area (ROFA), and runway-taxiway separation.

2. The mix of fast and slow moving aircraft on Runway 01R/19L coupled with the close proximity of the parallel runway causes operational safety concerns.

3. Apron and lease lot expansion is needed because the facilities are currently operating at capacity and forecast demand is anticipated to continue growing.

LEGEND

- Airport Features
- Airport Property Boundary
- Waterway
- Alaska Railroad Tracks
- Runway 01L/19R: 4,010 X 100 ft, Asphalt, GA Operations.
- Runway 01R/19L: 2,200 X 50 ft, Gravel, GA Operations with Tundra Tires or Skis and Ultralight Operations.

N

EXISTING AIRPORT CONDITIONS AND FEATURES
BIRCHWOOD AIRPORT MASTER PLAN

DATE: May 2005

500 0 500 1000 1500 Feet

FIGURE 1.2

Z:\07072 DOT&PF\204 Birchwood Airport Master Plan\CAD\gis\birchwood_airport_EA1.apr - Airport Features (EA)

Ultralight Vehicle Specific Issues and Comments. An ultralight-only runway is needed. More space for ultralight vehicle operations is needed. A taxiway for ultralight vehicles is needed.

Noise and Land Use. Many people commented that there is a mix of aviation uses as well as a mix of land uses (residential, industrial, and commercial) within the vicinity or adjacent to the airport property. For the Chugiak-Eagle River area community, it is important that pilots are aware of traffic procedures for noise abatement, etc. A pilot noted that noise has only been an issue to the adjacent neighborhoods on a few occasions. A significant number of comments were received stating that the ultralight patterns over the recreation and shooting range would not be a compatible mix.

Navigation. The airport should have instrument and GPS approaches. A hotline telephone to the Flight Service Station (FSS) is needed.

Airport Condition/Maintenance Issues. Various maintenance issues were voice by airport users. Ownership and responsibility of the entire facility could be turned over to the MOA. Security gates that allow card or code access are needed to reduce incidences of vandalism and theft. Airport maintenance is a key issue. A need exists to:

- Overlay all asphalt cement surfaces.
- Install a complete new radio-controlled runway lighting system with the wires installed in conduit with junction boxes provided for maintenance access.
- Purchase and install a new heated, insulated regulator shed.
- Purchase and install a new upgraded beacon.
- Purchase and install a new backup generator.
- Purchase and install a new perimeter fencing with automatic security gate openers.
- Replace current snow blower with a new, upgraded unit.
- Replace the push blade attachment for the front-end loader with a new, wider plow.
- Install public restrooms.
- Add more lease lots and hangar spaces.
- Install guidance signs at all taxiway/runway intersections.
- Construct a new taxiway between the northeast and southeast apron, up tight against the access road, to keep pilots from using Runway 19L as a taxiway.

2.0 Social, Economic, and Natural Environment

An important component of producing and implementing an airport master plan is a base of knowledge of the area within which the master planning effort takes place. This section describes the social, economic, and natural environment of the Chugiak-Eagle River area. Understanding airport operations within these contexts is an essential component of producing and implementing an appropriate plan for the Birchwood airport.

2.1 Community Profile

2.1.1 Location and Regional Setting

The Chugiak-Eagle River area, which contains Eagle River, Eagle River Valley, South Fork, Chugiak, Birchwood, Peters Creek and Eklutna, begins approximately 10 miles north of the Anchorage metropolitan area and extends northeastward for approximatley15 miles until it meets its southern boundary at the Knik River. Approximately 20 miles north of Anchorage, the Birchwood Airport is located about one half mile west of the Glenn Highway off of Birchwood Loop Road.

2.1.2 Historical and Cultural Background

The Tanaina, a group of Native American Indians, originally inhabited the area several hundred years ago. They are currently represented by the Eklutna Tribe, many of whom live in the village of Eklutna at the northern end of the Chugiak-Eagle River area. These people lived by subsistence and moved from place to place seasonally for hunting and gathering food. Most settlements were located on the western side of Cook Inlet or on the Kenai Peninsula. A small group of Tanaina inhabited the eastern side of Knik Arm. Traditional lifestyles for the Tanaina began to change around the turn of the 19th century as a result of traders and prospectors.

The federal government and the construction of the Alaska Railroad have principally defined the modern history of the Birchwood area. Subsequent developments included the Glenn Highway. Settlement patterns were influenced through the federal government's homesteading programs; the development of two military installations (Fort Richardson and Elmendorf Air Force Base); and further local development of transportation, communication, and land management facilities in the area. As a result of the Alaska Native Interest Lands Act (ANILCA), Eklutna, Inc. is the largest landholder in the area.

2.1.3 Government Structure

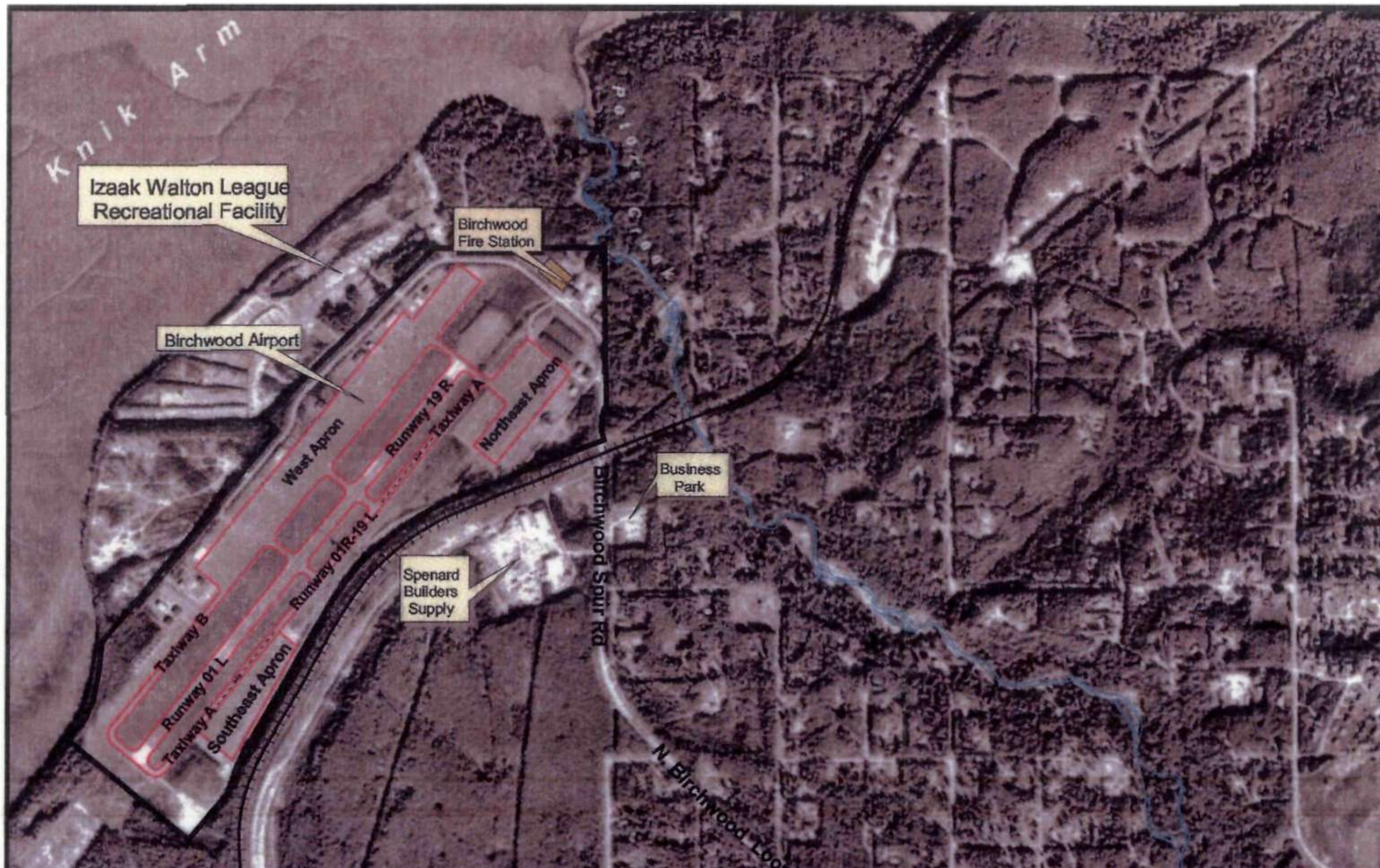
The Chugiak-Eagle River area is part of the MOA and is represented by Assembly District 2. Several active community councils in the area (Birchwood, Eklutna, Chugiak, and Eagle River) provide a forum for the dissemination of information and public comment on a broad variety of issues.

2.1.4 Economy

The Chugiak-Eagle River area is a suburban residential area with little commercial or industrial activity. Most residents who live in this area commute to Anchorage, Eagle River, or the Matanuska Valley for work. Section 2.3 discusses the socioeconomic condition of the community in more detail.

2.1.5 Community Facilities and Services

Figure 2.1 identifies the community features located near the airport and Figure 2.2 depicts area utilities.



LEGEND

- Airport Features
- Airport Propery Boundary
- Waterway
- Alaska Railroad Tracks

COMMUNITY FEATURES NEAR AIRPORT

BIRCHWOOD AIRPORT MASTER PLAN

DATE: March 2002

500 0 500 1000 Feet

FIGURE 2.1

Z:\07072 DOT&PF\204 Birchwood Airport Master Plan\CAD\Birchwood\Birchwood_airport2.apr

LEGEND

- Airport Features
- Airport Property Boundary
- Waterway
- Alaska Railroad Tracks
- Fire Hydrants
- Water Lines

Proposed Facilities

- Regional Sewage Treatment Plant
- Sewage Pump Station
- Sewer Gravity Trunk
- Sewer Force Main
- Transmission Line
- Vault and PRV

UTILITIES

BIRCHWOOD AIRPORT MASTER PLAN

DATE: March 2002

500 0 500 1000 1500 Feet

1" = 1000'

FIGURE 2.2

Z:\07072 DOT&PF\204 Birchwood Airport Master Plan\CAD\Birchwood\Birchwood_airport2.apr

Water System. Water facilities in the area include private individual wells, and small community wells. Approximately half of all residences and a small number of businesses rely on individual on-site wells. Currently, the Birchwood Airport is not served by any municipal water system (Figure 2.2).

Wastewater System. The areas currently served by municipal wastewater services are centered on the downtown Eagle River business district and surrounding residential areas. The Birchwood Airport is not currently provided with municipal wastewater service. A sewer gravity trunk and additional wastewater facility improvements are planned along the airport's eastern property boundary (Figure 2.2).

Electric Power. Electrical power in the area is supplied by Matanuska Electric Association. Electrical power is available to all lease lots on airport property. The airport does not have a back-up generator in the event of a power outage.

Natural Gas. Enstar Natural Gas provides natural gas service to the Birchwood Airport. Gas lines follow both the east and west airport access roads.

Telephone. Matanuska Telephone Association supplies telephone service to the Birchwood Airport.

Solid Waste. Solid waste disposal used to be served by the Hiland Landfill on the east side of the Glenn Highway. Currently, services are handled at the Anchorage Regional Landfill located on the west side of the Glenn Highway.

Police and Fire Protection. The Alaska State Troopers provide police service to the airport. A substation for the Anchorage Police Department is located in Eagle River. The Chugiak, Birchwood, Peters Creek, and Eklutna areas are within the Chugiak Fire Service Area and are served by the Chugiak Volunteer Fire Department (MOA 1993).

2.2 Land Use Inventory

Parks and Trails. In 1990, there were 25 municipal parks in the Chugiak-Eagle River area. The Mouth of Peters Creek Park and the Izaak Walton League Recreational Facility are the nearest park and recreational facility. Figure 2.3 depicts the nearest parks and recreational facilities to the airport (MOA 1993). Equestrians, cross-country skiers, snowmachiners, and dog mushers use the numerous trails in the area (Figure 2.3). Developed bike paths run from the Fire Lake Ice Arena to Spenard Builders Supply, from Meadow Creek to Eagle River Elementary School, and along the Glenn Highway (MOA 1993).

2.2.1 Existing Land Ownership

The existing airport property is owned by the State of Alaska and bounded by land owned by the Alaska Railroad Corporation, Eklutna Inc., and privately owned parcels comprising the Izaak Walton League Recreational Facility, also known as the Birchwood Recreation and Shooting Park (BRSP). Figure 2.4 depicts and ownership in the area.

2.2.2 Existing Land Use Inventory

Figure 2.5 depicts existing land use in the area. The airport is zoned and developed as industrial land while the Izaak Walton League Recreational Facility/BRSP and Spenard Builders Supply are zoned and developed as commercial property. Currently, there are large, un-subdivided, vacant tracks of land near the airport that are zoned industrial, as well as subdivisions of residential development. The ARRC

LEGEND

Airport Features	Parks
Airport Propery Boundary	Trails
Waterway	Biking
Alaska Railroad Tracks	Planned Trails
	Riding
	Skiing/Hiking

PARKS AND TRAILS

BIRCHWOOD AIRPORT MASTER PLAN

Trails information from "Chugiak - Eagle River Comprehensive Plan, 1993"

DATE: March 2002

500 0 500 1000 1500 Feet

1" = 1000'

FIGURE 2.3

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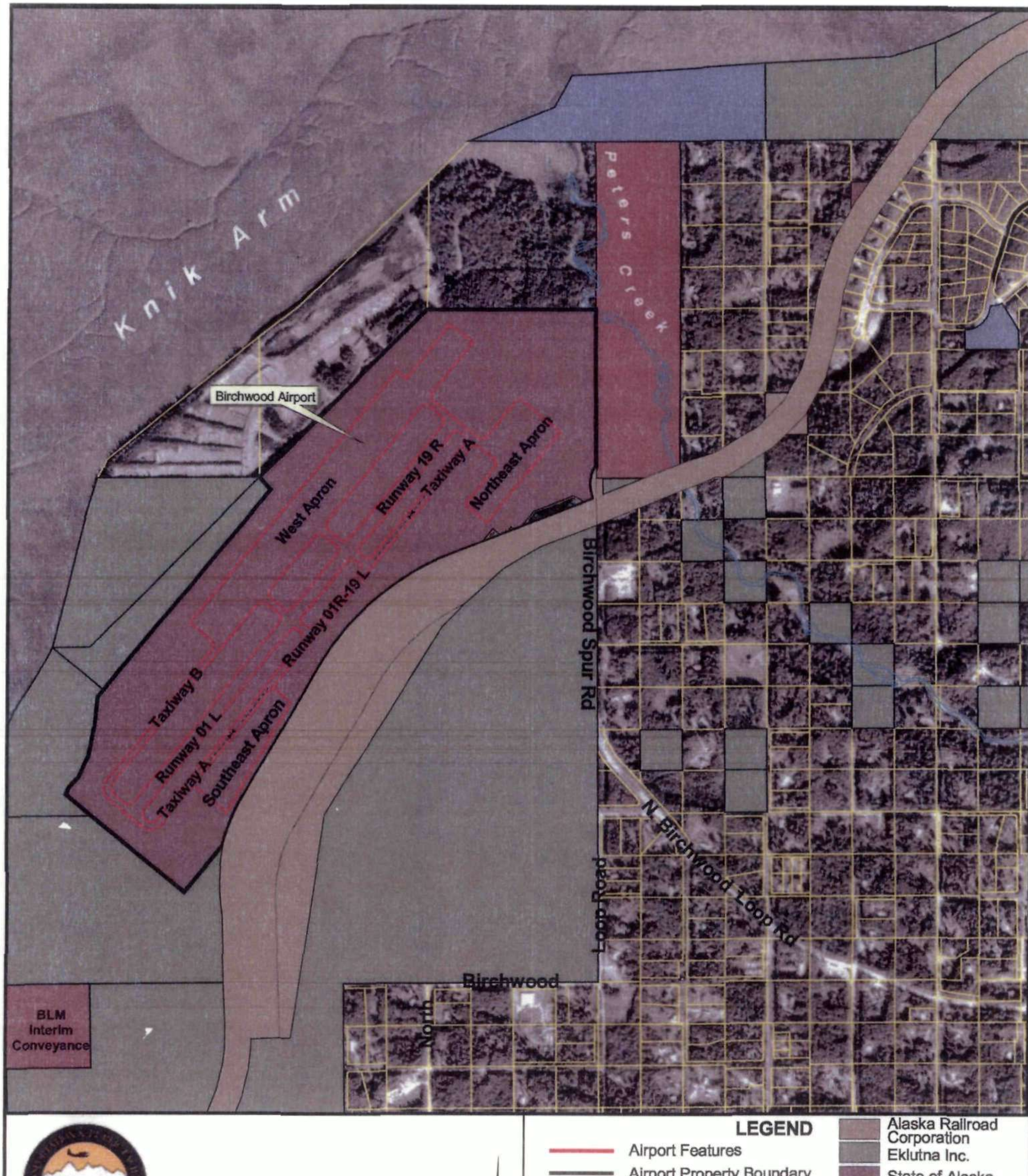


LEGEND

- Airport Features
- Airport Property Boundary
- Parcel Boundaries
- Waterway
- Alaska Railroad Tracks

- Alaska Railroad Corporation
- Eklutna Inc.
- State of Alaska
- US Dept. of Interior
- Municipality of Anchorage
- Private

N

LAND OWNERSHIP

BIRCHWOOD AIRPORT MASTER PLAN

DATE: March 2002

500 0 500 1000 1500 Feet

1" = 1000'

FIGURE 2.4

Z:\07072 DOT&PF\204 Birchwood Airport Master Plan\CAD\Birchwood\Birchwood_airport2.apr

property includes rail sidings and several lease lots. Light industrial activities (sawmill, ballast storage, etc) occur there. The Eklutna Inc. property is largely vacant. However, a lumber yard (a commercial land use) is located near the intersection of the airport access road and the ARRC tracks on Eklutna Inc. property. Residential land uses occur to the north-northeast of the airport on private property.

2.2.3 Zoning Inventory

Municipal zoning and platting ordinances do not apply to the Birchwood Airport because it is located on state property. The MOA, however, does regulate the way in which the land surrounding the airport is developed. Municipal zoning ordinances are important for maintaining compatibility between adjacent land uses and the airport. Future development surrounding the Birchwood Airport will likely follow the existing zoning patterns outlined in Figure 2.6. The airport property is presently zoned for Light Industrial (I-1). The surrounding land is zoned for Light Industrial (I-1), Heavy Industrial (I-2), Public Lands and Institutions (PLI), and Suburban Residential (R-6) (large lot).

Light Industrial District (I-1)

According to MOA code (Title 21.40.200), the I-1 district is intended primarily for urban and suburban light manufacturing, processing, storage, wholesale and distribution operations, but also permits limited commercial uses. Among the uses permitted outright that are relevant to airport operations are:

- Aircraft and marine parts and equipment stores
- Aircraft and boat display lots, new and used.
- Lumberyards and builders' supply and storage
- Bus terminals and air passenger terminals.
- Airplane, automobile or truck assembly, remodeling or repair

Airstrips and heliports are considered a conditional use subject to the requirements of the conditional use standards and procedures of Title 21 (MOA 2001).

Heavy Industrial District (I-2)

According to Title 21.40.200, the I-2 district is intended primarily for heavy manufacturing, storage, major shipping terminals and other related uses. Also permitted in the district are uses generally permitted in commercial districts. For instance, any legal business, commercial, manufacturing or industrial land use is permitted. Residential uses, including dwellings, rooming houses, boardinghouses or lodging houses, apartment buildings, hotels or motels, however, are prohibited. The primary requirement of the district is that no use shall be constructed or operated so as to cause excessive noise, vibrations, smoke, dust or humidity, heat or glare at or beyond any boundary of the I-2 district in which it is located. Airstrips and heliports are considered a conditional use subject to the requirements of the conditional use standards and procedures of Title 21 (MOA 2001).

Suburban Residential District (R-6) (large lot)

According to Title 21.40.080, the R-6 district is intended for those land areas where large lots or acreage development is desirable as an adjunct to the more typical urban and suburban residential zoning districts. The R-6 district is designed to encourage low-density residential development while at the same time protecting and enhancing those physical and environmental features that add to the desirability of suburban residential living. Airstrips and heliports are considered a conditional use subject to the requirements of the conditional use standards and procedures of Title 21 (MOA 2001).

EXISTING LAND USE

BIRCHWOOD AIRPORT MASTER PLAN

FIGURE 2.5

LEGEND

- Airport Features
- Airport Property Boundary
- Waterway
- Alaska Railroad Tracks

Zoning Codes

I-1 SL	Light Industrial
I-1 SL 2	Light Industrial
I-2 SL	Heavy Industrial
PL1	Public Lands & Institutions
T	Transition
R-	Residential

ZONING

BIRCHWOOD AIRPORT MASTER PLAN

DATE: May 2005

500 0 500 1000 Feet

FIGURE 2.6

Z:\107072 DOT&PF\204 Birchwood Airport Master Plan\CAD\gis\birchwood_airport_EA2.apr - Zoning (EA)

PLI Public Lands and Institutions District

According to Title 21.40.020, the PLI district is intended to include areas of significant public open space, major public and quasi-public institutional uses and activities and land reserves for which a specific use or activity is not yet identified. Heliports, airstrips and airports, and uses directly related to or within the area occupied by such facilities are considered conditional uses subject to the requirements of the conditional use standards and procedures of Title 21 (MOA 2001).

The Izaak Walton League Recreational Facility is zoned as PLI. The parcel is coded by the Municipality as a commercial use in its land use database, and identified in the future land use plan of the Chugiak-Eagle River Comprehensive Plan as a park. Commercial recreational uses, such as the Izaak Walton Recreational Facility, are considered conditional uses subject to the requirements of the conditional use standards and procedures of Title 21 and are to be operated for a period of time to be determined by the planning and zoning commission (MOA 2001).

2.2.4 Development Plans and Planned Land Uses

The Chugiak-Eagle River Comprehensive Plan (MOA 1993) recommends that the land immediately surrounding the Birchwood Airport be used as residential and industrial areas or parks. Some assembly-adopted planned trails are located on airport property—property that could be used for airport expansion. The comprehensive plan also recommends that the residential density be less than one dwelling unit per acre in the area surrounding the airport. In 2005, the MOA physical planning department began updating their Chugiak-Eagle River Comprehensive Plan.

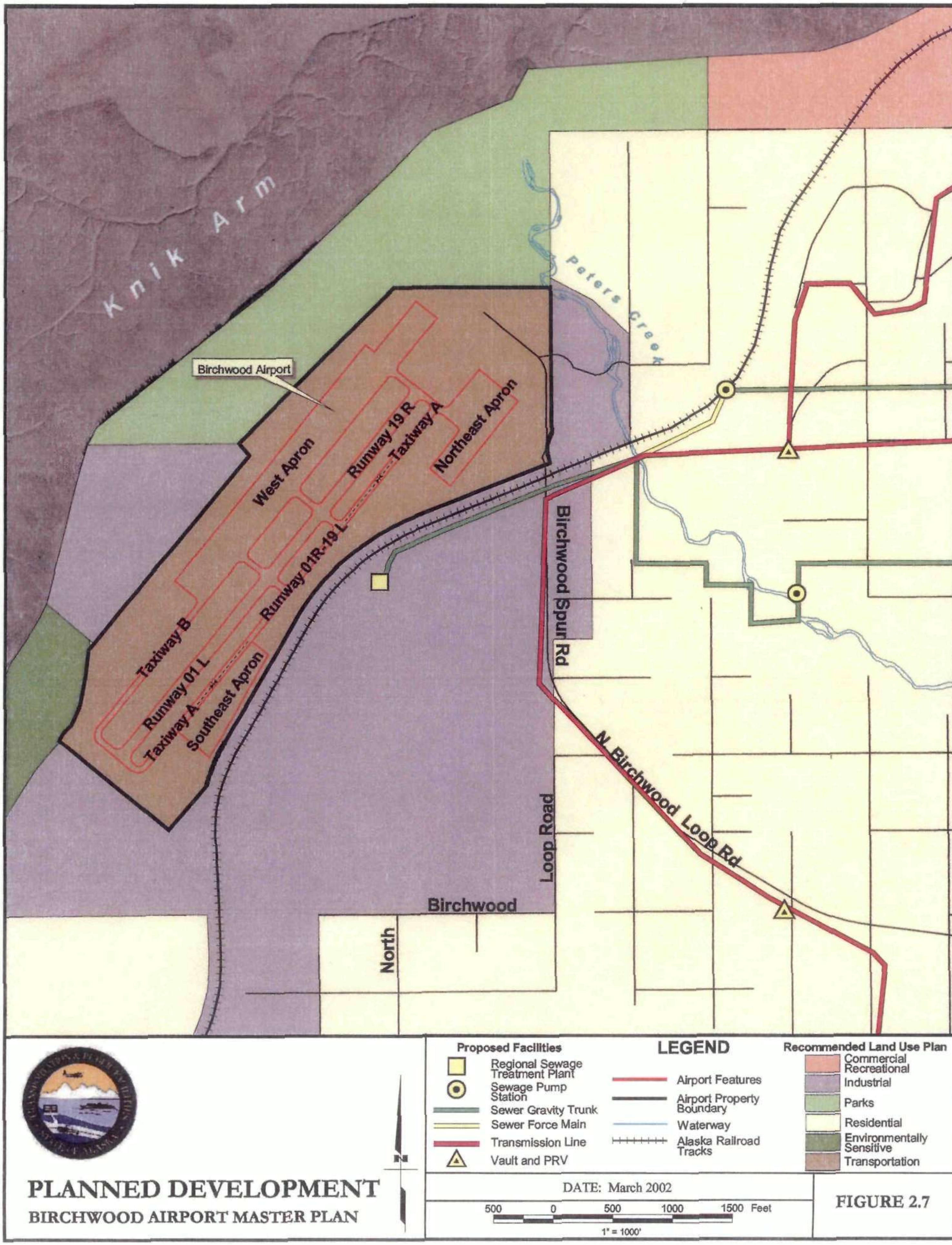
The Northern Communities Wastewater Study: Addendum Number 2 to the 1995 Anchorage Wastewater Master Plan (HDR Alaska 1998a) discusses capital improvement projects and priorities, and "did not find an immediate need to extend wastewater collection into the northern communities' area…the area generally has adequately performing wastewater disposal systems." There is, however, a proposed regional wastewater plant located right near the airport. The Northern Communities Water Study Addendum Number 1 to the 1995 Anchorage Water Master Plan (HDR Alaska 1998b) indicates that a water transmission line is proposed right outside the airport area as well. These new developments are depicted in Figure 2.7. The Anchorage Water and Wastewater Utility is currently updating their Water and Wastewater Master plans for the Eagle River-Northern Communities area; both of which are planned to be published in 2006.

2.3 Socioeconomic Evaluation

The socioeconomic situation in a community or region can have a significant impact on the future demand for aviation activity. This section presents information on the socioeconomic factors affecting aviation demand at the Birchwood Airport.

2.3.1 Population

Population, size, and potential for growth in a community are key features in forecasting future needs for air transportation service. A community's historical population growth can help determine the potential future demand for air transportation. This information is available from three sources: One source is the record of population for the MOA; the second source is the record of population for the Eagle River area, and the third source is information on the community of Birchwood itself. Figure 2.8 illustrates the population for Anchorage from 1990 to 2000, and Figure 2.9 illustrates the population from 1980 to 2000 for Eagle River and vicinity; it also shows the population for the community council area of Birchwood; Birchwood has consistently made up about 8.5 percent of the area's population over the last few years.



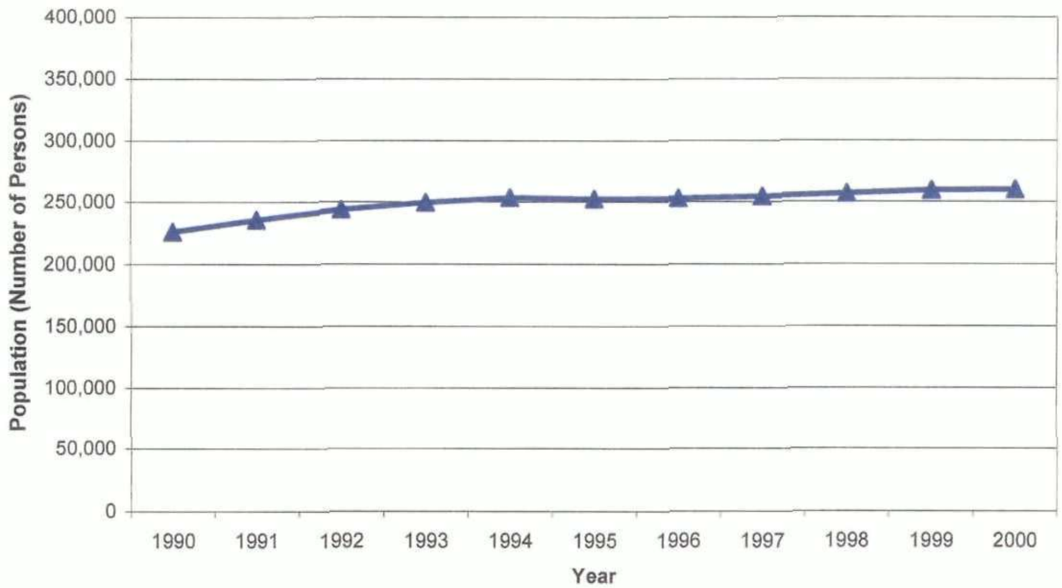
PLANNED DEVELOPMENT

BIRCHWOOD AIRPORT MASTER PLAN

FIGURE 2.7

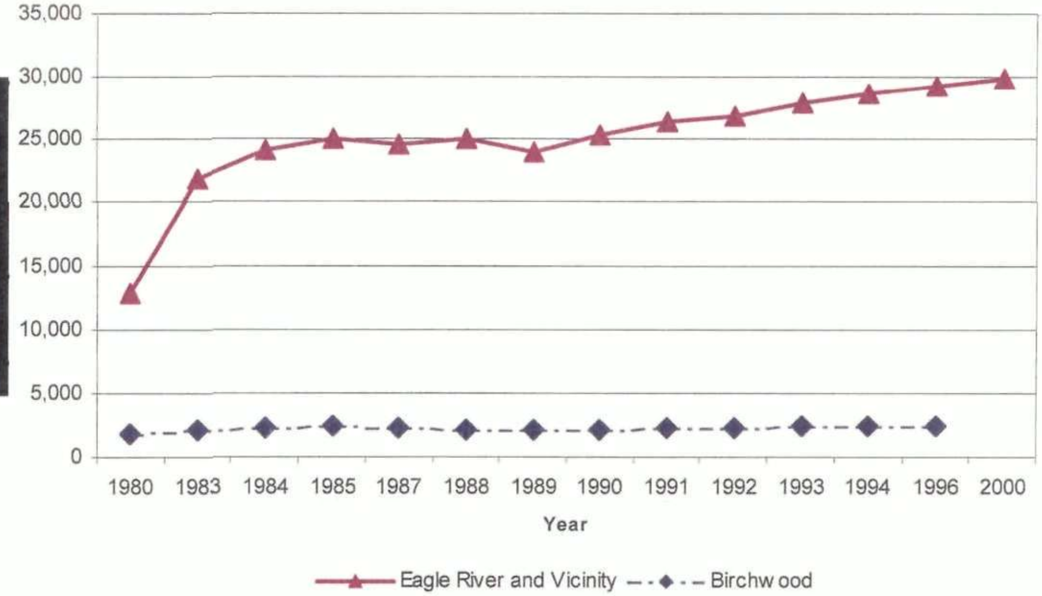
Anchorage's population has increased a total of 15 percent since 1990, and the population of Eagle River and the surrounding area has increased 18 percent in the same time period. Since 1980 however, the population of the Eagle River area has more than doubled—it increased 133 percent in from 1980 to 2000. This population growth is largely a result of the availability of developable and affordable land for residents who work in Anchorage but want to live outside of the metropolitan area.

Figure 2.8
Historic Population of the Municipality of Anchorage, 1990-2000



Source: Alaska Department of Labor and Workforce Development, 2001.

Figure 2.9
Historic Population, Eagle River and Birchwood, 1980-2000

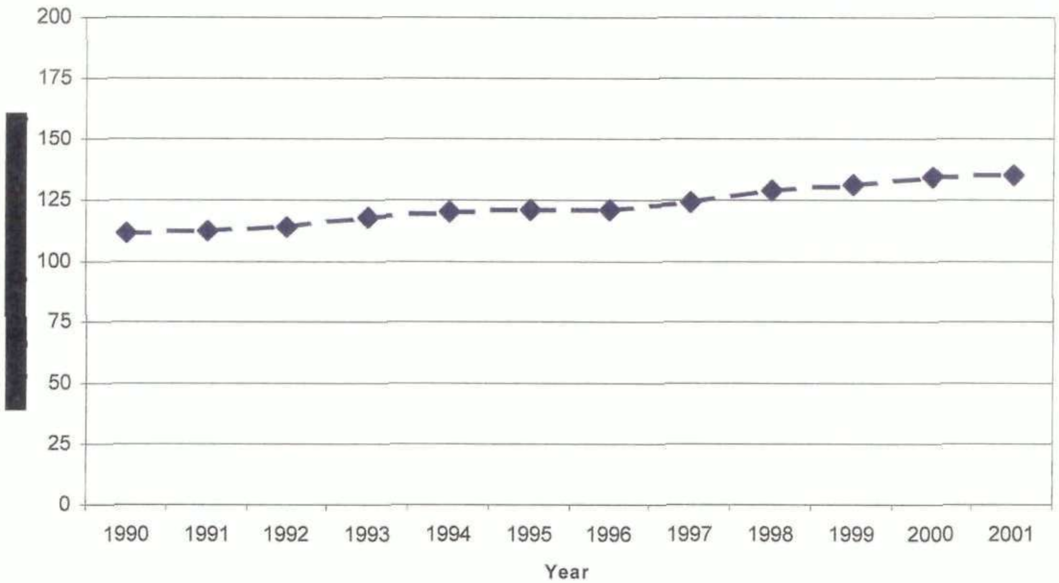


Source: MOA 1997 and the U.S. Census 2000.

2.3.2 Employment

Employment characteristics of an area are indicators of its economic development and can significantly affect the potential for generating air traffic. Figure 2.10 illustrates the total annual average monthly employment within the MOA from 1990 to 2001—employment levels have remained relatively flat over the last eleven years (an increase of 21 percent). Table 2-1 presents annual average monthly employment by sector for the Municipality of Anchorage from 1990-2001 (the 2001 employment figures include through June of 2001). Employment in the retail trade industry has increased 24 percent, and employment in the services industry has increased 39 percent from 1990 to 2001. Most of the growth in these industries can be attributed to the growth of tourism in the Anchorage area. Figure 2.11 presents the breakdown of employment by occupation in the entire Eagle River area and Birchwood in 1990; service occupations and sales persons (occupations that are often dependent on tourism) made up a combined 23 percent of Eagle River employment and 27 percent of Birchwood employment in 1990.

Figure 2.10
Annual Average Monthly Employment in the Municipality of Anchorage, 1990-2001



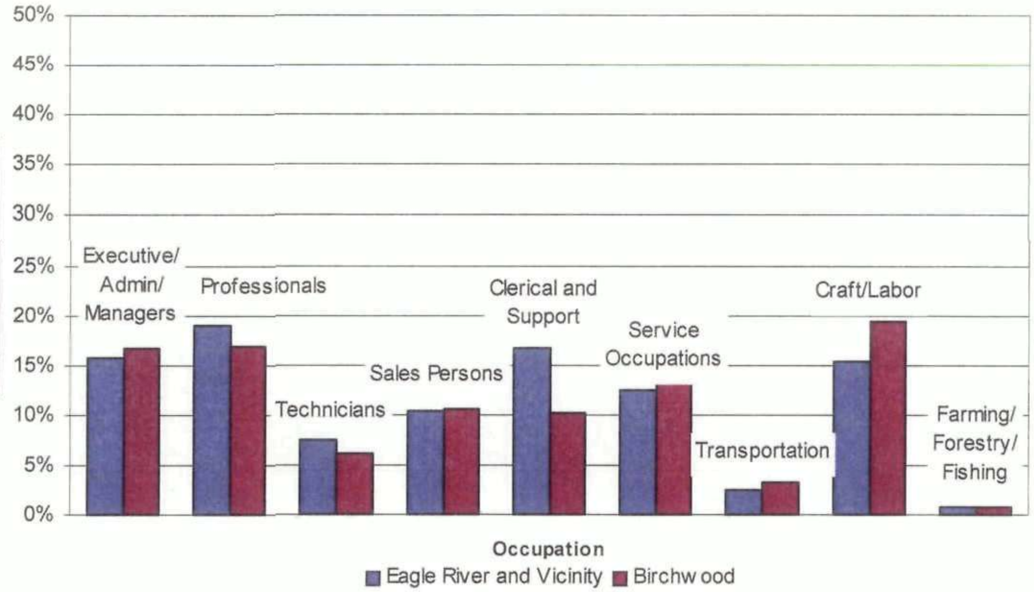
Source: Alaska Department of Labor and Workforce Development, 2001.

Table 2-1
Annual Average Monthly Employment in the Municipality of Anchorage by Sector, 1990-2001

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Industry	**Employment (thousands)**											
Mining	3.8	4.0	3.4	3.4	3.2	2.7	2.5	2.4	3.0	2.5	2.7	2.9
Construction	5.8	5.6	5.4	6.2	6.4	6.4	6.4	6.6	7.0	7.2	7.3	6.9
Manufacturing	2.4	2.6	2.0	1.9	2.0	2.1	2.0	2.0	2.0	2.1	2.2	2.2
Transportation/ Communication/ Utilities	11.1	11.9	12.0	12.4	12.6	12.0	11.9	12.3	13.2	13.8	14.8	14.4
Wholesale Trade	5.9	5.7	5.8	5.8	6.1	6.4	6.5	6.3	6.4	6.4	6.3	6.3
Retail Trade	20.3	20.3	20.4	20.6	22.6	23.3	23.3	24.4	24.6	25.2	25.6	25.2
Finance/ Insurance/ Real Estate	6.5	6.6	6.5	6.8	7.2	7.2	7.2	7.2	7.5	7.7	7.6	7.6
Services and Miscellaneous	28.8	28.7	29.9	31.1	31.3	32.4	33.6	34.9	36.3	37.6	39.2	40.1
Government	26.9	27.3	28.4	29.4	28.8	28.1	27.7	27.9	28.6	28.5	28.8	29.1
Total Employment	111.4	112.5	113.8	117.5	120.1	120.5	121.1	123.9	128.7	131.1	134.5	134.7

Source: Alaska Department of Labor and Workforce Development, 2001.
Note: The 2001 employment figures include data through June of 2001.

Figure 2.11
Occupation of Employed Persons in the Eagle River Area and in Birchwood, 1990



Source: MOA 1997.

2.3.3 Industry Employment and Earnings

Table 2-2 illustrates the 1999 annual total yearly earnings, annual average monthly earnings, and percent of earnings in Anchorage by industry. Tourism, a growing sector of the Alaskan economy, appears to be gaining strength as Anchorage has become more aggressively marketed as a tourist destination. Though not typically high-paying industries, retail trade and services still make up a combined 33.2 percent of all earnings in 1999 in the MOA.

Table 2-2
Municipality of Anchorage Employment and Earnings by Industry, 1999

Industry	Yearly Earnings ($)	Annual Average Monthly Earnings ($)	Percent of Total Earnings (%)
Agriculture/Forestry/Fishing	16,326,157	1,963	0.4
Mining	315,681,422	7,485	6.9
Construction	347,542,103	4,090	7.6
Manufacturing	72,871,378	2,812	1.6
Transportation/Communication/Utilities	630,655,698	3,674	13.8
Wholesale Trade	229,097,156	3,051	5.0
Retail Trade	503,414,920	1,704	11.1
Finance/Insurance/ Real Estate	257,988,427	3,148	5.7
Services	1,007,556,861	2,370	22.1
Government	1,171,062,904	3,577	25.7
Non-Classified	2,324,243	1,481	0.1
Total Industries	4,554,521,269	2,958	100.0

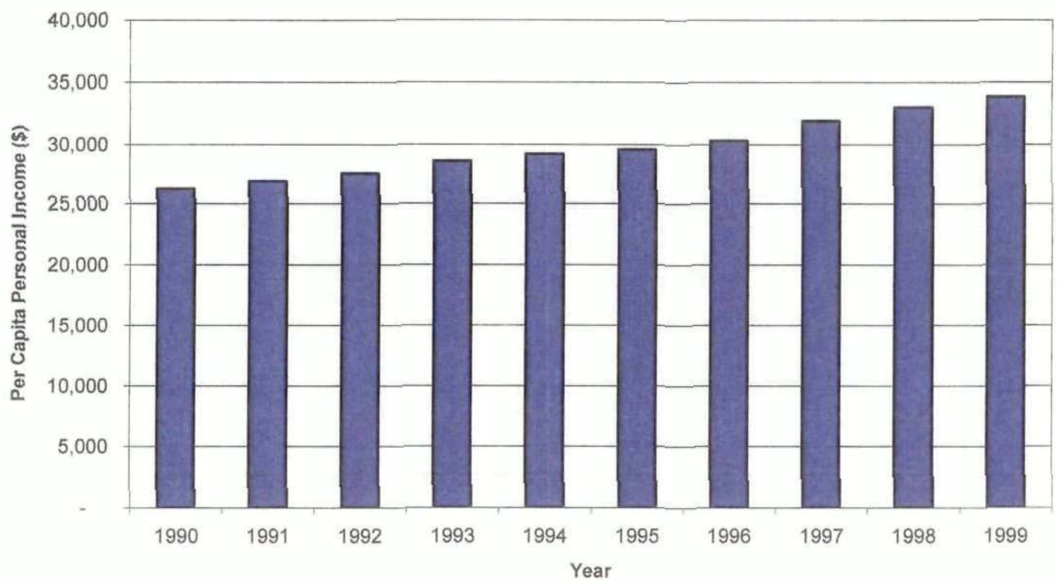
Source: Alaska Department of Labor and Workforce Development, 2001.

2.3.4 Personal Income

Personal income statistics are a function of several factors, including employment and population, and are a critical indicator of an area's output and economic well-being. Personal income is the sum of employment earnings minus social security contributions, other income (rents, dividends, and interest), and transfer payments (social security or welfare payments). In statistical data, personal income is measured before the deduction of personal income taxes and is reported in current dollars, with no adjustment made for price changes (U.S. BEA 2001). The income available to residents over time is a good indicator of their financial ability to travel and participate in GA activities; high-income levels indicate a strong basis for higher than average levels of spending on leisure and GA activity. Conversely, low-income levels can dampen people's spending on these pursuits.

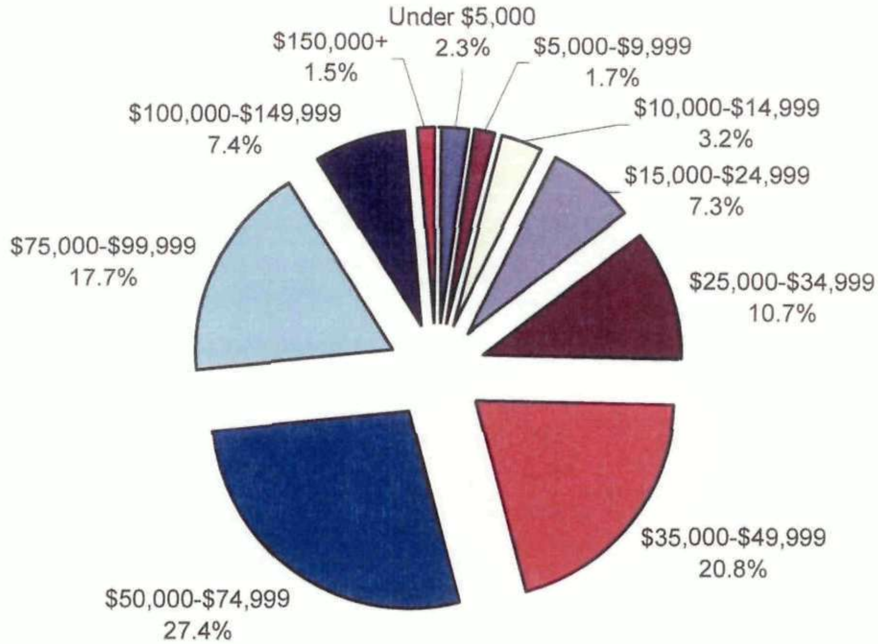
Figure 2.12 indicates historic per capita personal income within the Municipality of Anchorage from 1990 until 1999—it increased 28.9 percent in that time period. Figure 2.13 illustrates total household income in 1989 for the residents of Birchwood—households were asked on the 1990 Census how much money they made in 1989. Less than half of the households in the Eagle River area (46 percent) made less that $50,000 in 1989 (the median income was $52,741). However, more than half of the households (58 percent) in Birchwood made less than $50,000 in 1989 (the median income in Birchwood was $44,321).

Figure 2.12
Municipality of Anchorage per Capita Personal Income, 1990-1999



Source: U.S. Bureau of Economic Analysis, 2001.

Figure 2.13
Total Household Income in Birchwood, 1989



Source: MOA 1997

2.4 Environmental Conditions

Knowledge of the natural environment and the environmental conditions is an important component of the master planning process. This section provides an overview of such topics as climate, topography, wind, wetlands, wildlife, and vegetation.

2.4.1 Climate

The Chugiak-Eagle River area is located in a transitional climate zone between a marine west coast climate and a sub-arctic climate. The area does not experience significant extremes in temperature or precipitation ranges. The monthly mean temperature for July is 59.2°F. The monthly mean temperature for January is 8.9°F. Precipitation is usually greatest from July through September.

2.4.2 Wind

A primary factor influencing runway orientation and number of runways is wind. Ideally a runway should be aligned with the prevailing wind and generally, the smaller the airplane; the more it is affected by wind, particularly crosswinds.

Wind data (speed and direction) for the Birchwood Airport was acquired for a period between July 1996 and December 1998 and used to compute wind coverage percentages. Wind data was analyzed using the FAA 4.2D version *Airport Design, Standard Wind Analysis* microcomputer program. Table 2-3 presents a summary of wind coverage estimates.

The crosswind component shown in Table 2-3 is the resultant vector, which acts at a right angle to the specified runway. The Airport Reference Code (ARC) refers to the aircraft's performance and wingspan dimensions; the letter corresponds to the aircraft's approach speed while the Roman numeral refers to the aircraft's wingspan dimensions. Wind coverage is the percent of time crosswind components are below the specified velocity for the specified runway.

Table 2-3
Birchwood Airport Wind Coverage Analysis

Crosswind Component	Airport Reference Code	% Coverage Runway 1L-19R	Runway 1R-19L
10.5 Knots	A-I and B-I	99.65%	99.65%
13.0 Knots	A-II and B-II	99.81%	99.81%

FAA AC 150/5300-13, Airport Design, states that when a runway orientation provides less than 95 percent wind coverage for any aircraft forecasted to use the airport on a regular basis, a crosswind runway is recommended (FAA 2005a). As shown in Table 2-3, the 95 percent wind coverage is computed on the basis of the crosswind not exceeding 10.5 knots for an ARC of A-I and B-I and 13 knots for an ARC of A-II and B-II.

Both runways have an orientation of approximately 39 degrees true north. The wind analysis indicates that both runways have wind coverage exceeding 95% for all small single engine aircraft with an ARC of A-I through B-II such as the Cessna 180 and Piper PA-208. The optimal runway orientation for maximum wind coverage ranges from 39.2 degrees to 48 degrees. Based on an analysis of the available wind data, the existing runways have sufficient wind coverage.

2.4.3 Geology and Soil Types

The Birchwood Airport lies on a large alluvial fan chiefly comprised of gravel and bordered by tidal flats of silt (clay and fine grained sand). The DOT&PF reports (1987) that drainage and stability at Birchwood Airport are good. Chiefly gravel and sand, with cobbles and small boulders, and small amounts of silt and clay are present. Deposited by larger streams at the mountain front, these fans have been mapped separately and are exceptionally suitable for construction materials and ground-water development. Foundation conditions and drainage are very good. These deposits are good water-bearing materials and may yield relatively large quantities of water to wells.

The *Environmental Atlas of Alaska* indicates that the Birchwood Airport and surrounding area is generally free from permafrost. The alluvial soils common to the Birchwood Airport are very well drained (Hartman and Johnson 1978).

2.4.4 Wetlands

According to the 1996 Anchorage Wetlands Management Plan (AWMP), there are mapped wetlands east, west, and southwest of the airport property. The only impacted MOA-mapped wetland in the project vicinity is adjacent to Fire Creek and consists of Class "A" and "B" wetlands. See Figure 2.14. In addition to the AWMP wetland mapping, HDR conducted field-delineated wetlands in September 2003 to verify the wetlands boundaries (See Appendix C). A preliminary jurisdictional determination for these field-delineated wetland boundaries was completed and subsequently approved by the U.S. Army Corps of Engineers on July 20, 2004 (See Appendix E within the EA for agency correspondence). The following wetlands were field-delineated to the south and southwest of the existing airport boundary: intertidal

LEGEND

Airport Features	Wetlands
Airport Property Boundary	Class A
Waterway	Class B
Alaska Railroad Tracks	

DATE: March 2002

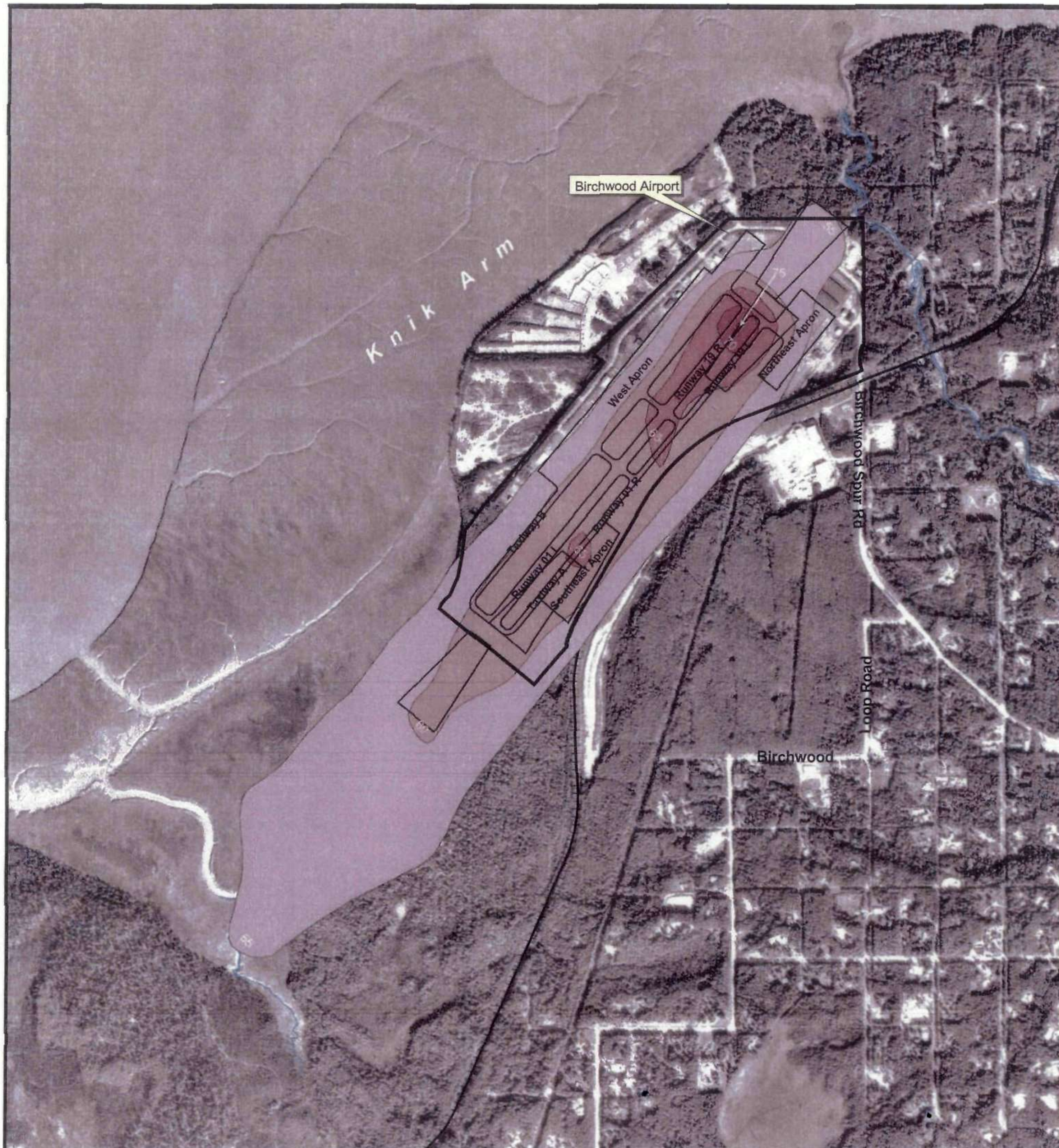
500 0 500 1000 1500 2000 Feet

1" = 1250'

WETLANDS

BIRCHWOOD AIRPORT MASTER PLAN

FIGURE 2.14



LEGEND

- Airport Features
- Airport Property Boundary
- Waterway
- Alaska Railroad Tracks

Noise Contours

- 55 Decibels
- 60 Decibels
- 65 Decibels
- 70 Decibels
- 75 Decibels

NOISE ISSUES

BIRCHWOOD AIRPORT MASTER PLAN

DATE: May 2005

500 0 500 1000 1500 Feet

1" = 1000'

FIGURE 2.15

Z:\07072 DOT&PF\204 Birchwood Airport Master Plan\CAD\gis\birchwood_airport_EA1.apr - Noise (AMP)

Also located within the project area is a paper birch-black spruce plant community. Common plant species in the community include paper birch, black spruce, Labrador tea, and low bush cranberry.

Black spruce forest is found along low-lying areas to Fire Creek and north of the existing Alaska Railroad tracks. Common plant species in this community include black spruces with an understory of Labrador tea, low bush cranberry, woodland horsetail, and meadow horsetail.

A shrub-grass meadow is located in a small pocket along the edge of the black spruce forest. Common plants include bluejoint reedgrass, dwarf birch, bog blueberry, and meadow horsetail.

Shrub thickets are located immediately adjacent to the airport landing strip and existing railroad tracks and west of the airport adjacent to the firing range and appear to be in areas of past disturbance. Common plant species in the shrub thicket community include green alder with scattered species of paper birch, bluejoint reedgrass, willow, aspen, and fireweed.

2.4.7 Wildlife

Large fur-bearing mammals such as black bear, brown bear, goat, moose, and Dall sheep are found in the Chugach Mountains. The area also supports small furbearers such as coyote, red fox, lynx, squirrel, wolf and wolverine. Moose are known to concentrate along the Peters Creek drainage northwest of the airport (Figure 2.16). In addition to game animals, there are populations of smaller mammals such as beaver, muskrat, marten, mink, weasel, snowshoe hare, arctic ground squirrel, porcupine, hoary marmot and possibly land otter (MOA 1993).

Common lake birds include common loons, mallards, red-necked grebes, goldeneyes, scaup, and green-winged teal. Shovelers, pintails, widgeons and Canada geese also nest in the area. The deltas of Fire Creek and Eklutna River are important areas of bird concentrations during migrations (MOA 1993). The Chugiak-Eagle River Comprehensive Plan (MOA 1993) identifies a large area southwest of the airport (the Fire Creek delta) as bird habitat for bald eagle, northern harrier, hawk, owl, and willow ptarmigan (Figure 2.16).

2.4.8 Anadromous Fish Streams

Anadromous fish streams are those streams that support runs of fish whose life-cycle includes spawning in fresh water and rearing in salt-water habitats. According to the Alaska Department of Fish and Game's (ADF&G) Anadromous Stream catalog (2002), there are two anadromous fish streams in the vicinity of the airport:

- Peters Creek (Stream No. 247-50-10160)
- Fire Creek (Stream No. 247-50-10150)

Peters Creek is located approximately 650 feet north of the Birchwood Spur Road. Peters Creek provides habitat for Chinook (*Oncorhynchus tshawytscha*) and pink (*O. gorbuscha*) salmon and rearing habitat for coho (*O. kisutch*) salmon. Fire Creek is located 4,500 feet south of the threshold for the approach end of Runway 01L. Fire Creek provides habitat for Chinook salmon and rearing and spawning habitat for coho salmon.

ENVIRONMENTAL CONSIDERATIONS

BIRCHWOOD AIRPORT MASTER PLAN

Source: "Chugiak - Eagle River Comprehensive Plan, 1993"

FIGURE 2.16

2.4.9 Air Quality

The Birchwood Airport is outside the PM-10 Zone established by the EPA for the Chugiak-Eagle River area. Birchwood air quality is not monitored and is assumed to be generally good.

2.4.10 Hydrology

The existing airport property is in the vicinity of Fire Creek, Peters Creek, and the Knik Arm. The Fire Creek Delta is located south of the airport property. Knik Arm is located to the southwest and Peters Creek is located to the northeast of the airport property. Approximately the southern four-fifths of the airport property drains directly into Knik Arm without entering any stream system. As a result, of well-drained gravels underlying the airport, drainage conditions at the airport are good and no hydrology issues have been identified. The northeast corner of the airport drains into Peters Creek prior to discharging into Knik Arm. Knik Arm is characterized by deposits of silt from the glacier rivers that run into it, and its waters are turbid. Because the exchange of water in Knik Arm, due to tidal action, is so great, the pollution of Knik Arm as a whole has not been considered a problem. Peters Creek is a glacier-fed river, and Fire Creek flows out of Lower Fire Lake. Peters Creek and Fire Creek are not on the Alaska Clean Water Act, Section 303(d) list of impaired water bodies (ADEC 2004b).

2.4.11 Hazardous Materials

A Phase I Environmental Site Assessment (ESA) of the property located at the Birchwood Airport was completed in December of 1998. The ESA suggests that there is a moderate to high potential that the Birchwood Airport property has been impacted by petroleum hydrocarbons and/or hazardous substances from on-site activities. At the same time, the ESA suggests that there is low potential that petroleum hydrocarbon and hazardous substances from off-site sources have impacted the soil and groundwater at the airport property.

A search of the Alaska Department of Environmental Conservation (ADEC) Contaminated Sites, Spills, and Leaking Underground Storage Tank (LUST) program databases (ADEC 2004a) for the Chugiak area provided the following results:

- *Contaminated Sites:* Eight contaminated sites in Chugiak are listed, one of which was located at the Birchwood Airport. It was closed in 1992 and the contamination was cleaned up.
- *Leaking Underground Storage Tank (LUST) Sites:* Of the 15 sites listed for the Birchwood/Chugiak area, five DOT&PF-Chugiak Volunteer Fire Station; Birchwood Airport; Civil Air Patrol; Kenai Supply Inc.; and Aviation North) are located at or near the Birchwood Airport. These sites have all been closed and cleaned up.

According to the ESA, there are registered underground storage tanks (USTs), known or suspected underground tanks, and observed stationary ground tanks on the airport property. All of these are located on lease lots.

2.4.12 Hazards

Seismic Activity

The potential for damage or ground failure as a result of earthquakes varies in the Chugiak-Eagle River area. However, no areas in the immediate vicinity of the airport are believed to be highly susceptible to ground failure. One area with greater potential for more serious damage parallels the Glenn Highway in a

AHRS records, the trail in the Birchwood Airport ran roughly north-south, past the northeastern end of the runway toward Cook Inlet. However, its exact route is unknown, since no one has yet located any remaining physical evidence of the trail. The Crow Pass Trail (ANC-214) ran along the coast west and northwest of the airport to connect with the Eagle River-Knik Trail east of Peters Creek. The Crow Pass Trail was a secondary route associated with the Iditarod system.

3.0 Existing Aviation Facilities

Another essential component of an airport master plan is an inventory of the airport's existing aviation facilities and an overview of its airspace and air traffic control. The following section presents a summary of information collected from research and field reconnaissance.

3.1 Aviation Facilities Inventory

The existing airport facilities were identified through a review of airport and on-site inspection records. Existing documentation reviewed included the 1990 Birchwood Airport Master Plan (Environmental Science and Engineering 1990), FAA Form 5010 Airport Master Record (FAA 2000), aerial photography (Aeromap 2000), and current airport layout plans (ALP) (DOT&PF 2000b). A site reconnaissance was also conducted on August 9, 2001 by HDR Alaska (HDR 2001). Figure 3.1 depicts existing airport features.

3.1.1 Airport Classification

According to the 1999 *National Plan of Integrated Airport Systems* (NPIAS) planning criteria, the Birchwood Airport is classified as a GA Airport. NPIAS defines a GA airport as one that does not receive scheduled commercial service. The NPIAS airport role classification is GA. GA airports can accommodate nearly all GA aircraft with a maximum gross takeoff weight of 12,500 pounds.

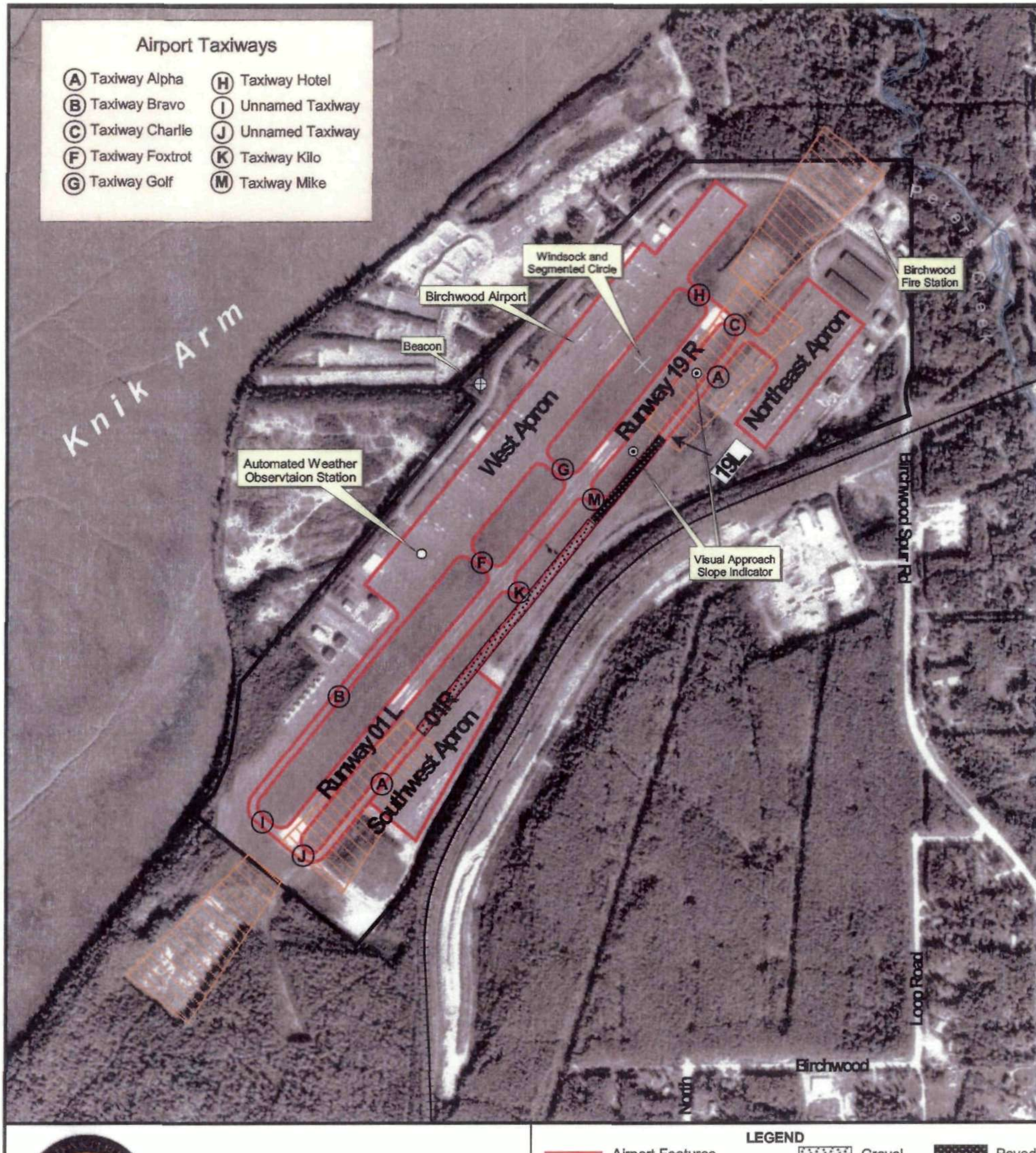
The *Alaska Aviation System Plan* (AASP) establishes a three-tier classification system for all Alaska airports (TRA●BV March 1996). This system considers design criteria for the type of aircraft expected to use the airport and the importance of the airport's function to the community, the region, and the state. The 1996 AASP classifies the Birchwood Airport as a Local Airport. Local airports serve as secondary access to communities connected to the road network or already served by a close-by larger airport. The AASP classifies each Alaska airport as one of the following:

- Regional airports are airports that are primary or secondary hubs for passenger, cargo, or mail traffic; provide primary access to populations greater than 1,000; or support economic activities or unusual requirements of regional or statewide significance.
- Community airports are the main airports, heliports, or seaplane facilities that serve rural communities of at least 25 permanent year-round residents.
- Local airports are airports, heliports, or seaplane facilities that are not in the regional or community classes.

3.1.2 Airport Reference Code

The Airport Reference Code (ARC) is a coding system used by the FAA to relate airport design criteria to the operational and physical characteristics of the airplanes intended to regularly operate at the airport. Regular operation is defined as at least 250 operations per year. The ARC has two components (approach category and design group) relating to airport design aircraft. The first component, depicted by a letter code (A, B, C, or D), is the aircraft approach category and relates to an aircraft's approach speed. The second component, depicted by a Roman numeral (I, II, III, or IV), is the airplane's design group and relates to wingspan.

The category and group for airports classified as a Local Airport by the AASP is B-I; however, the 1990 Birchwood Airport Layout and Access Plan lists the ARC as B-II for the long runway and A-I for the



LEGEND

Airport Features
Airport Property Boundary
Waterway
Alaska Railroad Tracks
Runway Protection Zone (RRZ)

Gravel   Paved

Runway 01L/19R: 4,010 X 100 ft, Asphalt, GA Operations.

Runway 01R/19L: 2,200 X 50 ft, Gravel, GA Operations with Tundra Tires or Skis and Ultralight Operations.

DATE: March 2002

500 0 500 1000 Feet

1" = 1000'

AIRPORT FACILITIES

BIRCHWOOD AIRPORT MASTER PLAN

FIGURE 3.1

Z:\07072 DOT&PF\204 Birchwood Airport Master Plan\CAD\Birchwood\Birchwood_airport2.apr

short runway. A-I aircraft have approach speeds less than 91 knots and wingspans less than 49 ft. B-II aircraft have approach speeds between 91 and 121 knots and wingspans between 49 and 79 ft.

The AASP recommended runway length for A-I aircraft is 2,000 ft. FAA Advisory Circular 150/5325-4A, Runway Length Requirements for Airport Design, runway length recommendations for B-II aircraft are as follows: with less than ten seats, 3,600 ft; with more than ten seats, 4,150 ft. FAA Advisory Circular 150/5325-4A runway length recommendation for ultralight vehicles is 300 ft. Table 3-1 lists examples of A-I and B-II aircraft that could use the airport.

Table 3-1
Common types of A-I and B-II Aircraft at Birchwood Airport

A-I	B-II
Beech Baron Beech Bonanza	Beech King Air A-100 Beech Airliner 1900
Beech Duchess	Cessna Citation Cessna Conquest
Piper Seneca DeHavilland Beaver	Shorts 330 & 360
Small single engine aircraft	Aerocommander 840

The runway at the Birchwood Airport has the length and width to accommodate larger aircraft; however, the DOT&PF has restricted aircraft over 12,500 pounds from using the airport due to the heavy impact to the asphalt surfaces. The largest aircraft observed to operate at the airport is a DC-3 (design group A-III, 25,200 lbs gross weight, 95-ft wing span) and a DeHavilland Caribou (design group A-III, 28,500 lbs gross weight, 96-ft wing span).

3.1.3 Runways

The Birchwood Airport has two parallel runways oriented to magnetic north and south. The airport elevation is 95.93 feet mean sea level (msl). Runway 01L/19R is the larger of the two runways and has the higher number of operations. It is paved with asphalt and is 4,010 feet long and 100 feet wide. Runway 01R/19L is a gravel runway, 2,200 feet long (600 feet pavement and 1,600 feet gravel) and 50 feet wide, intended for use by GA aircraft equipped with tundra tires or skis and by ultralight vehicles.

Runway 19L's threshold is located 800 feet from the northern edge of Taxiway Alpha. From the threshold the runway continues 2,200 feet. The threshold of 01R is marked with reflective cones and is approximately 475 feet south of the northerly edge of the southeast apron. In practice, aircraft have been observed to takeoff and land along the whole length of the gravel portion of Taxiway Alpha.

The centerlines of Runways 01L/19R and 01R/19L are too close for simultaneous operations on the two parallel runways. Standard minimum separation between runways is 700 feet; only 200 feet separates these runways. FAA Airspace case number 98-AAL-137-NRA describes these non-standard conditions at the Birchwood Airport.

Both runways have a load bearing capacity that can accommodate an aircraft maximum gross weight of 12,500 pounds.

Both runways have a magnetic northern heading marked and listed as 010 degrees and a southern heading marked as 190 degrees. According to the Birchwood Airport Land Use and Terminal Plan the centerline bearing for both runways is N39°17'E. The 2005 variation in this area is 20°48"E. The difference between the centerline bearing and the variation gives a northern centerline magnetic heading of 18°29' and a southern magnetic heading of 198°29'. The runway magnetic headings are now closer to 20 and 200. One of the recommended airport improvement projects is to repaint the runway headings to 2 and 20.

3.1.4 Taxiways

Ten taxiways provide access to Birchwood's two runways; all are 50 feet wide and can support an aircraft maximum gross weight of 12,500 pounds. The aprons and parking areas lead to two taxiways that run parallel to Runway 01L/19R. Eight short taxiways connect the parallel taxiways to the runway. Figure 3.1 depicts these taxiways.

1. ***Taxiway Alpha*** is the north/south taxiway on the east side of the large runway and at the ends of Runway 01R/19L. The northern section of Taxiway A is approximately 800 feet long. The southern portion of Taxiway A is approximately 1,100 feet long. These gravel taxiways connect the northeast and southeast aprons to the large runway. The centerlines of Taxiway Alpha and Runway 01L/19R are closer together than standard. The standard separation is 240 feet for B-II aircraft; the existing condition is 200 feet.
   Taxiway Alpha is the north/south taxiway on the east side of the large runway and was originally 4010 feet long. Runway 01R/19L now occupies the middle 2200 feet of this taxiway leaving 800 feet of taxiway on the north and approximately 1400 feet on the south. The centerlines of Taxiway Alpha and the main runway are too close for B-II aircraft. The present separation is 200 feet; B-II standards require 240 feet.
2. ***Taxiway Bravo*** is the north/south taxiway on the west side of the large runway and is 4,585 feet long. This taxiway is paved its entire length and connects the west apron to the runway. There is a 50-foot buffer zone between the western edge of the taxiway and the eastern edge of the west apron.

The following shorter taxiways connect the north/south taxiways to the large runway; all are paved except as noted.

3. ***Taxiway Charlie*** connects the northeast apron to the northern end of Taxiway Alpha and Runway 19R.
4. ***Taxiway Foxtrot*** is 2,025 feet down 19R and connects to the west apron.
5. ***Taxiway Golf*** is 1,325 feet down 19R and connects to the west apron.
6. ***Taxiway Hotel*** connects the west apron to the end of Runway 19R.
7. ***Taxiway Kilo*** is 2,025 feet down 19R and connects to the section of Taxiway Alpha that is Runway 01R/19L. Only half of this taxiway is paved.
8. ***Taxiway Mike*** is 1,325 feet down 19R and connects to the section of Taxiway Alpha that is Runway 01R/19L.
9. ***Unnamed Taxiway*** connects the southern ends of Taxiway Bravo to the end of Runway 01L. The eastern taxiway is unpaved.
10. ***Unnamed Taxiway*** connects the southern end of Taxiway Alpha to the end of Runway 01L. The eastern taxiway is unpaved.

3.1.5 Aprons

The Birchwood Airport provides three paved locations to accommodate aircraft parking and tie-downs – a SE Apron, NE Apron, and a West Apron. There are 45 lease lots: 22 are used for aviation business operations and 23 are used to store the lessee's aircraft. The SE Apron is associated with Runway

01R/19L and is intended for operations by aircraft equipped with tundra tires in the summer and skis in the winter. The NE Apron has the largest number of public tie-downs, and accommodates the majority of ultralight vehicles and other GA aircraft. The DOT&PF handles tie-down leasing and maintenance at the southeast and northeast aprons; both aprons are open to the public under a use permit. The West Apron is comprised of 16 individual lease lots and a transient aircraft parking area (with space for approximately 10 aircraft) that together form the total apron. Table 3-2 provides a summary of the area and number of tie-downs associated with each apron.

Table 3-2
Tie downs at Birchwood Airport

Apron	Area (ft^2)	TIE-DOWNS
Southeast	194,625	45
Northeast	388,875	99
West	631,675	221
Apron Total	1,215,175	365
Tie downs outside the aprons		65
Total Tie Downs		430

In spring of 2004, the Building Restriction Line (BRL) was relocated on the West Apron and a number of leaseholders began expanding their hangar/T-hangar facilities. The BRL relocation allows buildings to be placed closer to the runway. Any new building will reduce the effective capacity of the apron and therefore, will reduce the current number of available tie-downs on the airport. The BRL relocation could require replacing up to as many as 200 tie-downs over the course of 20 years, elsewhere on the airport (upwards of 10 per year depending on the amount and type of buildings developed and the ultimate uses of those buildings on the west apron).

3.1.6 Paved Surfaces

Most of the airport was paved originally in 1978, and the southeast apron was paved in 1989 (DOT&PF 1998). According to the February 2002 Pavement Condition Index (DOT&PF February 2002), the majority of pavement is currently in need of corrective maintenance, with the entire airport in need of corrective maintenance by 2006. Aerial photography (Aeromap 2000) also depicts that all paved runways and taxiways exhibit longitudinal and lateral cracking.

3.1.7 Lighting

The Birchwood Airport currently uses a variety of airport lighting to aid navigation, approach procedures, and ground operations. Matanuska Electric Association provides power to the airfield lighting. There is no on-airport backup generator for airfield lighting in the event of a power failure. The lighting systems available at the Birchwood Airport are described below.

Until recently, the existing lights at Birchwood were on all night and were regulated by a photocell switch this resulted in unnecessary energy consumption and light pollution. A lighting replacement project was completed in November 2005, which upgraded the existing lighting system for the runway to a pilot-keyed (on demand) light switch. The rotating beacon, lighted wind cone and flood lights are regulated by a photocell switch; they are on at night and off during the day.

Identification Lighting: Pilots can identify the geographical location of the Birchwood Airport at night by a green and white airport beacon. The beacon is located approximately 1,300 ft down Runway 19R and approximately 716 ft to the west between Birchwood Spur Road and the rifle range, west of Lot 7A, Block 500 (see Figure 3.1).

Visual Approach Slope Indicator: Visual approach slope indicators (VASIs) provide visual descent guidance and safe wheel clearance (eye-to-wheel height) over the runway threshold for visual approaches on Runway 19R. The Birchwood Airport has one 4-box VASI that can be remotely activated by pilots (see Figure 3.1).

Medium Intensity Runway Lighting: Runway lighting provides positive delineation for the edge of usable runway. Runway 01L/19R is lighted with medium intensity runway lighting (MIRL) for its entire length that can be remotely activated by pilots.

Taxiway Lighting: The portion of Taxiway Alpha that is not Runway 19L no longer has blue taxiway lights along the west side. Taxiway Alpha/Runway 19L has Type I Reflective Markers (traffic cones) its entire length. Taxiway Bravo has blue taxiway lights along the east side.

Wind Cone Illumination: The windsock between Runway 19R and Taxiway Bravo is illuminated by four lights (see Figure 3.1).

3.1.8 Visual Aids

A segmented circle and wind cone are located about 450 feet from the threshold and on the west side of Runway 19R (see Figure 3.1). The segmented circle and traffic pattern indicators consist of half-buried oil drums painted orange. From the air the segmented circle is difficult to see due to the faded orange paint and the weak color contrast with surrounding vegetation.

Runway 19R has a 4-box VASI light system. Runway 19L has displaced threshold markings and colored markers delineating the runway edge. The wind cone for 19L is located approximately 675 feet from the threshold, 75 feet to the left. According to DOT&PF leasing, the wind cone for 19L was placed there by ultralight vehicle operators and has not been approved by the FAA or the DOT&PF.

3.1.9 Fueling Facilities

Gas-N-Go is the only Fixed Base Operator (FBO) at the Birchwood Airport that sells aviation fuel to the general public. No aviation grade kerosene is available. No inadequacies with existing fuel services have been identified.

3.1.10 Circulation and Access

Birchwood Spur Road enters the airport property at the northeast corner, continues across the north runway protection zone, and then turns south along the west side of the airport boundary. The lease lot driveways on the west side of the airport connect directly to Birchwood Spur Road. An access road follows the length of the east airport boundary to the southeast apron and connects to Birchwood Spur Road near the northeast corner. Both of these roads are paved with asphalt. A small gravel access road leaves Birchwood Spur Road, opposite the DOT&PF maintenance facility, to connect with the northeast apron.

There is no designated public vehicle parking area on the airport. Vehicles park on lease lots and on the aprons.

3.1.11 Helicopter Operations Areas

The 1990 Birchwood Airport Layout and Access Plan shows a helicopter practice landing area located within Runway 1R/19L about 375 feet from the threshold of Runway 19L. The September 2000 aerial photo does not show any markings for this practice landing area on Runway 19L. Helicopters are to land within Runway 1R/19L. They are not to land on the taxiway. The helicopter traffic pattern is roughly the same as the ultralight vehicle pattern; patterns are to be flown to the east of the runway.

The aerial photo does show two helicopter landing areas, identified by a large "H," at the middle of the east side of the NE apron. These helipads are located on lots 19 and 20, block 100 and were placed there by a business that conducted helicopter flight instruction. This business closed down about five years ago; no business currently offers helicopter flight instruction on the airport.

Helicopter training activity was observed during a project site reconnaissance (HDR 2001); a Bell Jet Ranger was conducting touch and go landings on Runway 01R/19L.

3.1.12 Lease holders, Fixed Base Operators and General Aviation Services

Table 3-3 presents the leased lots reported within the Birchwood Airport property. There are 45 lease lots: 22 are used for aviation business operations and 23 are used to store the lessee's aircraft.

Table 3-3
Airport Tenants at Birchwood Airport

Block	Lot	Lessee	Size	Term	Use
0100	001A	Derry Thompson, Elinor Jones-Elg, Rodney C. Elg, F. Leland Jones and Carolyn Jones	49,200	9/20/96-9/19/16	Construction and maintenance of two aircraft hangars; maintenance of a portion of the access road and taxiway adjacent to the premises; parking and maintenance of lessee's private aircraft only.
0100	002C 002C1	Debra J. Bartlett	14,250 15,000	10/1/98-9/30/15	Construction, operation, and maintenance of a hangar for aircraft maintenance, repair, and painting; aircraft parking; rental of aircraft tie-downs; and vehicle parking all in support of lessee's aviation business operations.
0100	002B 002B1 002B2	Eldridge, Walsh & Wilson	14,250 3,000 2,050	10/1/98-9/30/24	Construction and maintenance of a hangar for maintenance, storage, and parking of lessee's private aircraft only; vehicle parking; installation and maintenance of a well and septic system.
0100	003A 003A1	Marty List or John Emmi	29,000 4,000	12/15/98-12/14/33	Construction and maintenance of a hangar for maintenance, storage, and parking of lessee's private aircraft only; vehicle parking; installation and maintenance of a well and septic system.
0100	004A	Matthew Freeman, Jack Schommer & Steve Powell	13,390	8/17/98-8/16/18	Construction and maintenance of a hangar, well and septic system for lessee's private use only.
0100	017	Jack M. Laub	22,500	5/15/91-5/15/06	Construction, operation, and maintenance of an aircraft hangar for aircraft maintenance and repair; aircraft tie-down rentals, vehicle parking.

Block	Lot	Lessee	Size	Term	Use
0100	023A	Birchwood Hangars Association	145,613	6/17/92-6/16/47	Construction, operation, maintenance, lease and sale of individual T-hangars for aircraft storage, aircraft and vehicle parking.
0100	023B	Birchwood Partners	52,489	7/25/91-7/25/16	Construction and maintenance of a hangar(s) for storage and maintenance of aircraft; vehicle and aircraft parking, in support of lessee's commercial aircraft maintenance operations.
0100	18, 19, 20, 21, 22a	Al Hand	116,856	7/1/71-7/1/05	The construction, operation, and maintenance of a two (2) bay hangar with offices for the repair and maintenance of aircraft; aircraft tie-down rentals; ground school and flight instruction; sale of aircraft and aircraft parts; storage and dispensing of aircraft fuel for lessee's use; aircraft and vehicle parking; in support of commercial aviation operations.
0500	001A	Kelly Vrem	61,580	1/1/99-12/31/18	Construction, operation, and maintenance of an aircraft hangar(s) for commercial aircraft maintenance and repair, air taxi operations, flight school, aircraft sales and tie-down rentals, vehicle parking, all in support of lessee's aviation business.
0500	002D	Harvey Dennis Harms	21,600	7/1/93-7/1/13	Construction and maintenance of an aircraft hangar for storage of lessee's private aircraft.
0500	002F	J&M Hangar LLC	28,890	4/15/98-4/14/27	The construction, operation and maintenance of an aircraft hangar. Parking, storage, maintenance and repair of lessee's private aircraft; vehicle parking for lessee and lessee's guest and invitees.
0500	002B	Ken Kastner, Allan Wallinder, Ken Ashby, & David Erickson	60,475	8/3/94-8/3/24	Construction, operation and maintenance of a hangar, vehicle and aircraft parking, aircraft maintenance, in support of lessee's commercial aircraft operations.
0500	003	John Air Aviation, Inc.	70,950	9/1/82-9/1/02	Operation and maintenance of a hangar to perform commercial aviation.
0500	004	Terry C. Holliday dba Holliday Aircraft Services	86,277.50	9/28/83-9/28/18	Construction, operation and maintenance of a hangar/office facility. Operation of a commercial aviation business including aircraft maintenance; aircraft parking and tie-down. SC 12: In addition to authorized uses in BP 2, lessee is authorized to maintain temporary living quarters on the premises for security purposes only.
0500	005	Greiner Force, Inc.	92,375	2/19/97-2/18/27	Construction, maintenance and operation of a hangar with office and shop space, aircraft and vehicle parking, aircraft tie-downs and storage, all in support of lessee's commercial aircraft maintenance operation.
0500	006B	Cecil R. Shuman dba C-Air	40,872	1/27/97-1/26/17	Construction and maintenance of an aircraft hangar for aircraft storage and maintenance in support of lessee's air taxi operations; rental of aircraft tie-downs.
0500	006A	Jody D. French	42,384	1/8/82-1/7/15	Operation and maintenance of a hangar to store and maintain lessee's private aircraft; aircraft tie-down rentals; and vehicle parking.

Block	Lot	Lessee	Size	Term	Use
0500	007A	Patrick M. O'Hare	65,844	2/1/95-1/31/10	The placement, maintenance, and operation of an office; construction of an access road and installation of a gate on the premises; mobile fuel dispensing system for permittee's use only; aircraft and vehicle parking; aircraft tie-down rentals; all in support of permittee's flight school and flying club.
0500	008	Meyer's Aircraft Service	105,875	3/25/84-3/25/14	Construction and maintenance of a permanent aircraft hangar; parking and storage of aircraft; maintenance of aircraft; and vehicle parking in support of a commercial aviation business.
0500	009	Ronald L. Metcalf	52,700	3/15/96-3/14/16	Construction, operation and maintenance of AST fuel dispensing system, fuel sales, aircraft and vehicle parking; small office building.
0500	010 010A	Kenneth L. Knecht & Bob Adams	51,307 1,071	7/1/99-6/30/20	The construction, operation and maintenance of a hangar for use as an FAA certified aircraft repair and inspection station; engine and accessory shop; private aircraft storage; aircraft tie-down rentals; and air taxi operations.
0500	002E	Louise P. Pogany	27,830.50	9/25/93-9/25/23	Construction and maintenance of an aircraft hangar for storage of lessee's private aircraft, operation and parking of a fuel tanker truck for lessee's use only, vehicle parking.
0600	001C	Dennis Warth, William Clark, Eugene Morris, & Arthur Haefliger	32,000	8/15/95-8/14/25	The construction, operations, and maintenance of an aircraft hangar for storage and maintenance of lessee's private aircraft.
0600	001B	Herb & Melanie Hancock	30,000	9/27/94-9/27/14	Construction, operation and maintenance of a hangar, vehicle and aircraft parking, to store and maintain lessee's aircraft only.
0600	003A	Gary Wayne Quarles	22,500	9/15/93-9/15/08	Construction and maintenance of an aircraft hangar for storage of lessee's private aircraft.
0600	003B	Michael Petrie dba MLJ Aircraft Services	32,000	12/15/94-12/14/14	Construction, operation and maintenance of a hangar, vehicle and aircraft parking, aircraft maintenance, in support of lessee's commercial aircraft operations.
0600	004B	Alaska Wing Civil Air Patrol	93,050	6/9/83-6/9/18	Search and rescue activities of the lessee; fueling, parking, and maintenance of lessee owned or leased aircraft; fueling and parking of Civil Air Patrol member owned aircraft during search and rescue operations only; lessee membership meetings and training sessions; and the storage of lessee owned equipment and materials.
0700	001	Thomas J. Prunty	4,409	1/1/98-12/31/03	The continued operation and maintenance of a T-hangar to park and store permittee's private aircraft only; vehicle parking.
0700	002	Rodney M. Miland	3,960	1/1/98-12/31/03	The continued operation and maintenance of a T-hangar to park and store permittee's private aircraft only; vehicle parking.
0700	003	Theodore F. White	3,951	1/1/98-12/31/03	The continued operation and maintenance of a T-hangar to park and store permittee's private aircraft only; vehicle parking.

Block	Lot	Lessee	Size	Term	Use
0700	004	Ashley Marquardt	3,942	1/1/98-12/31/03	The operation and maintenance of a covered A/C storage unit, commonly referred to as a T-hangar, to park and store lessee's private A/C only; vehicle parking.
0700	005	Lochner Family Trust, LTD. Partnership	4,048	1/1/98-12/31/03	The continued operation and maintenance of a T-hangar to park and store permittee's private aircraft only; vehicle parking.
0700	006	Lochner Family Trust, LTD. Partnership	4,048	1/1/98-12/31/03	The continued operation and maintenance of a T-hangar to park and store permittee's aircraft only; vehicle parking.
0700	007A	Eric E. Johnson	4,048	10/10/93-10/10/03	Construction and maintenance of a T-hangar for storage of permittee's private aircraft.
0700	008	James Lavery	4,048	10/10/98-10/09/03	The continued use and maintenance of a T-hangar for storage of permittee's private aircraft only.

Source: DOT&PF 2001.

3.1.13 Utilities and Services

All lease lots have access to telephone, electric power, and natural gas. Some airport users have requested electrical outlets at the tie-downs. A working public telephone is located on the north wall of the former Arctic Sparrow building, Lot 19 Block 100. No water or sewer service is provided to the airport. The nearest sewer system network is in Eagle River 5 miles to the south. Septic systems, holding tanks, and portable outhouses handle the wastewater requirements. On-site wells supply all the water requirements. The main water trunk line from Eklutna Lake passes within 1.5 miles of the airport, but no branch line services this area.

Matanuska Electric Association (MEA) supplies electrical power to the airport. Matanuska Telephone Association (MTA) supplies telephone service to the airport. Enstar natural gas lines follow both the east and west airport access roads. Freedom Refuse supplies some lessees with dumpsters; other lessees haul the solid waste themselves. Waste oil is taken by the individual lessees to the Anchorage Landfill.

3.1.14 Airport Maintenance

Maintenance at the Birchwood Airport is provided by the State of Alaska. The DOT&PF maintenance building is located north of the northeast apron. This facility is used to store state maintenance and is shared with the Chugiak Fire Department. A sand storage building is located just south of the maintenance building. The airport staffs no maintenance personnel on site during the summer but staffs one person during the winter.

The DOT&PF maintenance personnel plows and maintains the paved surfaces and unpaved safety areas. Airport personnel also perform routine maintenance on the airport property. Maintenance vehicles include one front-end loader with a plow attachment, one snow blower, and one grader.

3.2 Airspace and Air Traffic Control

The Birchwood Airport does not have a control tower, a flight service station, or any ground based air navigation facilities. The airport does have an Automated Weather Observing System (AWOS) located near the southern end of the west apron, Lot 4B Block 500 (see Figure 3.1).

U.S. Airspace has varying degrees of control to make sure aircraft separation is safe with respect to the types and volume of air traffic. FAA is responsible for managing and controlling airspace. FAA controls airspace through air route traffic control centers, terminal approach control facilities, and individual airport air traffic control towers. There are five alphabetic designations for controlled airspace (A, B, C, D, E). The letter G designates uncontrolled airspace. The FAA describes the categories of airspaces as follows (FAA No Date):

Class A (formerly PCA, Positive Control Area). Extends from 18,000 feet MSL up to and including flight level (FL) 600 (60,000 ft pressure altitude). Only instrument flight rules (IFR) operations are permitted.

Class B (formerly TCA, Terminal Control Area). Extends upward from the surface and outward at designated elevations, and located to include at least one primary airport. IFR and visual flight rules (VFR) operations are permitted. Class B airspace typically looks like an up-side down wedding cake and surrounds the nation's busiest airports.

Class C (formerly ARSA, Airport Radar Service Area). Extends from the surface to 4,000 ft above the airport elevation surrounding those airports that have an operational control tower, a radar approach control, and numerous IFR operations. IFR and VFR operations are permitted. The airspace around the Ted Stevens Anchorage International Airport is Class C.

Class D (formerly ATA, Airport Traffic Area, and CZ, Control Zone). Generally, that airspace from the surface to 2,500 feet above the airport elevation (charted in msl) surrounding those airports that have an operational control tower. Unless otherwise authorized, each person must establish two-way radio communications with the ATC facility providing air traffic services prior to entering the airspace and thereafter maintain those communications while in the airspace. The airspace around Merrill Field is Class D.

Class E (formerly General Controlled Airspace). Generally, if the airspace is not Class A, Class B, Class C, or Class D, and it is controlled airspace, it is Class E airspace. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. Also in this class are federal airways, airspace beginning at either 700 or 1,200 feet above ground level (AGL)[1]. Unless designated at a lower altitude, Class E airspace begins at 14,500 feet msl over the United States, including that airspace overlying the waters within 13.8 statute miles of the coast of the 48 contiguous States and Alaska, up to, but not including 18,000 feet msl, and the airspace above flight level (FL) 600.

Class G, Uncontrolled Airspace. Includes all airspace below 14,500 feet msl, except class A, B, C, D, and E airspace. FAA air traffic control has neither the authority nor the responsibility for exercising control over air traffic in Class G airspace. (FAA No Date)

Birchwood Airport underlies Class E airspace. Class E airspace is controlled airspace with a floor set to 1,200 feet above the ground. The recommended pattern altitude is at 1,000 feet above sea level; the airport is 96 feet above sea level, so therefore, the pattern altitude is 904 feet above the ground. Thus, all operations at Birchwood Airport take place in uncontrolled, Class G airspace.

In Alaska, Anchorage Air Route Traffic Control Center (Anchorage Center) oversees operations in controlled airspace outside of areas served by or control towers. An air route traffic control center provides air traffic control service to aircraft operating on flight plans under instrument flight rules (IFR)

[1] Above ground level is the vertical distance between an aircraft or top of an obstruction and the ground directly below.

within controlled airspace and principally during the en route phase of flight. When equipment capabilities and controller workload permit, certain advisory/assistance services may be provided to aircraft flying under visual flight rules (VFR).

3.2.1 Airspace Penetrations

Part 77 of the Federal Aviation Regulations (FAR) establishes standards for determining obstructions to air navigation. As this regulation states, obstructions are classified as existing and proposed manmade objects, objects of natural growth, and terrain. For airports with visual approaches like the Birchwood Airport, the outer edge of the Part 77 conical surface extends 1.7 miles (9,000 feet) from the centerline of the runway and to an elevation 350 feet above the airport elevation (in this case, 446 feet above sea level). A number of trees are obstructions to the approach and transition surfaces. DOT&PF has an avigation and hazard easement for routine removal of trees. There is no agreement between either Eklutna, Inc. or the MOA for the removal of trees beyond the approach end of Runway 01R/19L.

3.2.2 Airways

Currently no defined airways serve the Birchwood Airport. Defined airways are airways that provide safe, unobstructed flight paths between major en route radio navigational aids. The closest airway is V438-456, 15 miles to the west, between Anchorage VOR and Big Lake VORTAC. The term VOR is a general term covering very high frequency (VHF) omni directional range-bearing facilities. The VOR station provides navigational guidance by sending out VHF signals in the direction of each of the 360 degrees of the compass.

As indicated above, airspace in Alaska is controlled by Anchorage Center. Controllers guide aircraft toward the intended destination by way of vectors and/or airway assignments. These airways, known as Victor and Colored Low/Medium Frequency Airways, provide unobstructed flight paths between major en route radio navigational aids. The Victor Airways extend vertically from 1,200 feet above the terrain up to 18,000 feet msl and are 8 miles wide. Aircraft are also routed around weather and other traffic.

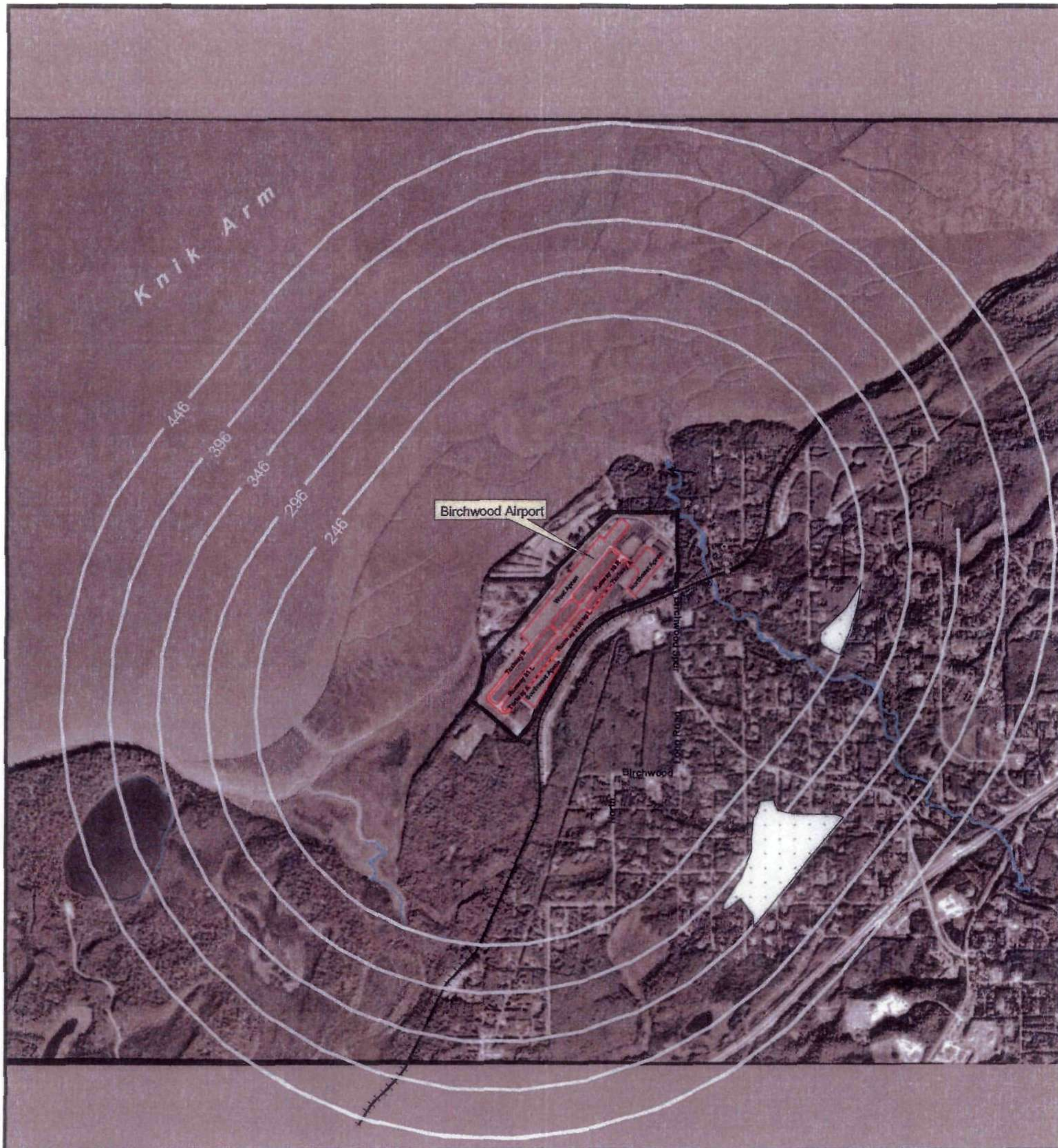
3.2.3 Radio Aids to Navigation

Radio aids to navigation are electronic devices and systems designed to assist with the navigation of aircraft and to determine their position in relation to known reference points on the surface of the earth. A VOR station (a general term denoting very high frequency, or VHF, omni directional range-bearing type facilities) provides navigational guidance by sending out VHF signals in the direction of each of the 360 degrees of the compass. Some VORs have Distance Measuring Equipment (DME) associated with them. The DME receiver in the aircraft will tell the pilot what the distance between the aircraft and the VOR station is.

Nondirectional beacons (NDBs) emit a low-frequency radio signal that provides pilots with a homing marker. By itself, it does not provide accurate directional positioning, but with an internal automatic directional finder on the plane, the pilot can determine the position of the plane relative to the non-directional beacon.

No radio navigation aids are located within the airport boundary. Four navigational aids outside airport property can be used to locate the Birchwood Airport. The following list highlights the airport's distance and directions from these navigational aids:

1. Big Lake VORTAC: 18.5 miles out on the 100-degree radial.



LEGEND

- Airport Features
- Airport Property Boundary
- Waterway
- Alaska Railroad Tracks
- Penetration
- Surface Contours

Runway 01L/19R: 4,010 X 100 ft, Asphalt, GA Operations.

Runway 01R/19L: 2,200 X 50 ft, Gravel, GA Operations with Tundra Tires or Skis and Ultralight Operations.

DATE: March 2002

1000 0 1000 2000 3000 4000 Feet

AIRSPACE PENETRATION

BIRCHWOOD AIRPORT MASTER PLAN

FIGURE 3.2

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2. Anchorage VOR/DME: 29.6 miles out on the 027-degree radial.
3. Campbell Lake NDB: 24.6 miles out on a heading of 022 degrees.
4. Bruck NDB: 28.1 miles out on a heading of 027 degrees.

Table 3-4 provides an overview of radio aids to navigation that can be used to locate the Birchwood Airport.

Table 3-4
Birchwood Radio Aids to Navigation

	BIG LAKE VORTAC	**ANCHORAGE VOR/DME**	**CAMPBELL LAKE NDB**	**BRUCK NDB**
Description	**VOR Navigational Facility**	**VOR Navigational Facility with Distance Measuring Equipment**	**Nondirectional Radio Beacon**	**Nondirectional Radio Beacon**
Location	North of Big Lake	Fire Island	Near Pt. Campbell	Fire Island
Lat/Long	61-34-10.035N 149-58-01.72W	61-09-02.915N 150-12-23.696W	61-10-15.713N 150-02-51.773W	61-10-03.300N 150-10-37.200W
Elevation	160	280	--	279
Variation	25E (1985)	25E (1985)	25E (1985)	25E (1985)
Type	VORTAC	VOR/DME	NDB	NDB
Class	H-ABVORTACW	H-ABVORWDME	HW-SAB	MH-SAB
Frequency	112.50	114.30	338	387
TACAN Channel	072X	090X	-	-
Use at High Altitude	H (high)	H (high)	-	-
FSS hours of operation	24	24	24	24
Owner	Federal Aviation Administration	Federal Aviation Administration	Federal Aviation Administration	Federal Aviation Administration

Source: http://www.airnav.com/airports/

3.2.4 Airport Operating Conditions

On December 13, 2000, DOT&PF approved a document entitled "Birchwood Airport General Aviation and Ultra light Air Vehicles Operating Rules and Procedures." This document establishes the unique operating procedures currently in place at the Birchwood Airport. These procedures are intended to separate GA aircraft operations from ultralight vehicle operations.

Instrument Approach and Departure Procedures

No instrument approach procedures are established for this airport. All aircraft operations are conducted under VFR.

Visual Approach and Departure Procedures

A VASI on Runway 19R provides obstruction clearance. This VASI establishes a 3.5-degree glide slope, which will place the aircraft 48 ft over the threshold of the runway. The VASI lights (and runway/taxiway lights) are pilot activated using the Common Traffic Advisory Frequency (CTAF) 123.0 MHz.

Aircraft Traffic Patterns

For GA fixed wing aircraft, the recommended pattern altitude is 1,000 feet above sea level. The Runway 01L pattern has standard left-hand turns; Runway 19R has non-standard right hand turns (see Figure 3.3).

For ultralight vehicles, the recommended pattern altitude is 600 feet above sea level. Runway 01R has a right hand pattern and Runway 19L has a left hand pattern. As the yellow line on Figure 3.3 depicts, GA aircraft have an extended leg for use of Runway 1R/19L.

Arrival and Departure Routes

Aircraft arriving and departing the Birchwood Airport generally follow the same routes, as noted below.

- From Anchorage: Cruise at 1,500 to 2,000 feet between the Glenn Highway and the Chugach Mountains to Fire Lake to Chugiak High School. Head directly to the airfield to cross the runway, midfield, at 1,000 feet and enter either pattern depending on the wind.
- From Wasilla: Fly across Knik Arm from the west and make a standard 45-degree entry to either pattern. All this takes place over the water.
- From Palmer: Fly along the south shore of Knik Arm.

Airspace Conflicts and Constraints

Restricted area R-2203B overlying the training grounds of Fort Richardson Army Base is intended to exclude all aircraft not participating in military training exercises. Restricted area R-2203B is located 1.7 miles to the south of the Birchwood Airport and extends to 11,000 feet. Time in use is 0500 to 2400 Monday through Friday. The location of this restricted area forces aircraft to fly over Eagle River while going to and from Anchorage. When the restricted airspace is not in use, civilian GA aircraft and ultralight vehicles may pass through it. Pilots can contact Anchorage Approach Control to learn if the restricted airspace is "hot," or in use by the military. The combination of R-2203B and the Chugach Mountains, 3.5 miles to the east, will affect the design of a possible future instrument approach.

3.2.5 Aircraft Fleet Mix

The current fleet mix, as reported during observation and personal communication with airport tenants, is shown below in Table 3-5.

Table 3-5
Aircraft Fleet Mix at Birchwood Airport

Multi-Engine	Single-Engine	Rotorcraft
	Piper Super Cub	
Beech 18	Cessna 172	Bell Jet Ranger
Piper Apache	Cessna 180	Hughes 500
Piper Aztec	DeHavilland Beaver	
Grumman Widgeon	Beechcraft Bonanza	
Cessna 310	Mooney	
	Lake Amphibian	

Source: *HDR 2001.*

LEGEND

- Airport Features
- Airport Property Boundary
- Waterway
- Alaska Railroad Tracks
- Runway Protection Zone (RRZ)

Traffic Patterns

- Ultralights
- Ultralights (alt.)
- Main

Runway 01L/19R: 4,010 X 100 ft, Asphalt, GA Operations.
Runway 01R/19L: 2,200 X 50 ft, Gravel, GA Operations with Tundra Tires or Skis and Ultralight Operations.

N

FLIGHT PATTERNS

BIRCHWOOD AIRPORT MASTER PLAN

DATE: March 2002

1000 0 1000 Feet

FIGURE 3.3

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3.3 Airport Financial Data

Specific financial data and information necessary to provide adequate financial evaluation of any proposed development are identified in this section. Financial information has been collected from the Alaska DOT&PF, FAA, and other available sources.

3.3.1 Capital Improvement Projects

This section presents a summary of the historical capital improvements projects at the Birchwood Airport. By identifying past projects, current airport issues can be better resolved. Past FAA Airport Improvement Program (AIP) projects at Birchwood Airport include the following:

- *Taxiway and Access Road Construction and Drainage*
This project was completed in 1979. The project's purpose was "land acquisition, site preparation, widen and improve existing runway (4,012' x 100'); construct two parallel taxiways (4,300' x 50' and 4,200' x 50') and connecting taxiways; construct three aprons; construct an access road (3,900' x 30'); and drainage."

- *Runway, Taxiway, Apron, Access Road Paving*
This project was also completed in 1979 and its purpose was "site preparation; pave runway, one parallel taxiway, north portion of east taxiway, connecting taxiways, two aprons, and access road; crushed aggregate base course on south portion of east taxiway and connecting taxiways; marking; medium circle; beacon; perimeter fence; and erosion control."

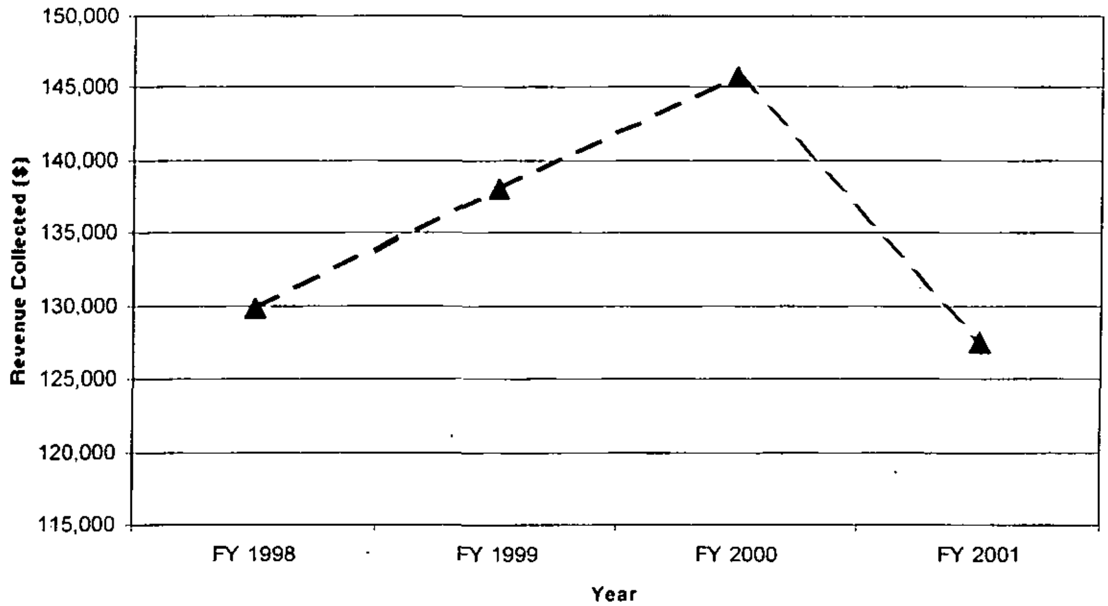
- *Pave, Mark, Light Apron*
In 1987, federal funds were used to "expand, pave, mark apron; construct, pave, mark, light apron (249,800 sq ft); reconstruct, realign, pave access road; construct snow removal equipment building (40' x 70'); and acquire land."

- *Lighting Replacement and Reconstruction*
More recently, an airport lighting project at the Birchwood Airport was federally funded and completed in November 2005. This project replaced runway and taxiway lighting, replaced and added additional lit and unlit signs, and associated electrical equipment that had reached the end of its useful life.

3.3.2 Operational Costs and Revenue

The Birchwood Airport has three sources of revenue—leased tie-downs, land rents, and fuel flowage fees. Tie-down permits are $35/month for tail-in spaces and $45/month for taxi-through spaces (Norton 2005). Land rents are collected from tenants at the airport and currently cost $0.076 per square foot per year. (Land rent is expected to increase to $0.084 per square foot per year with the new changes to 17AAC45.127 that are planned to be effective in Spring 2006). Fuel flowage revenues include $500/year for each fuel dispensing permit plus a fuel flowage fee of $.02 per gallon.
Figure 3.4 illustrates the leasing revenues for fiscal years 1998 through 2001. The revenues collected in fiscal year 2001 decreased by 1.8% since fiscal year 1998 and decreased 12.5% from the previous year, 2000.

Figure 3.4
Birchwood Airport Revenues Collected, Fiscal Years 1998-2001



Source: DOT&PF Leasing.

Table 3-6 presents the revenues collected for the Birchwood Airport for fiscal years 1998 through 2001.

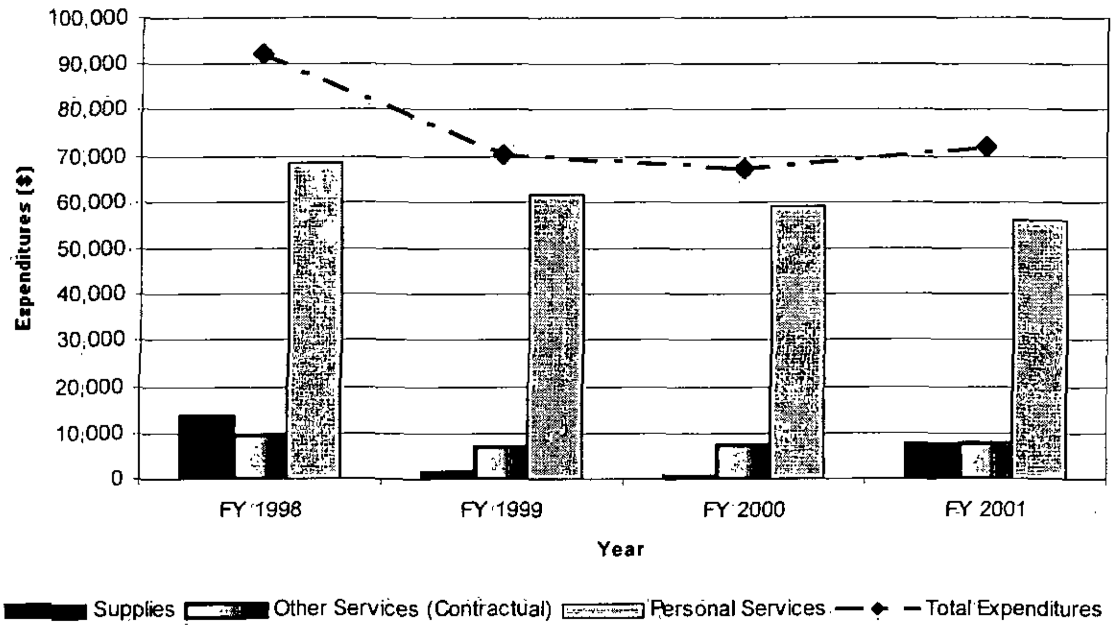
Table 3-6
Birchwood Airport Revenues Collected, Fiscal Years 1998-2001

	FY 1998	FY 1999	FY 2000	FY 2001
Revenue Collected ($)	129,853	138,084	145,797	127,552

Source: DOT&PF Leasing.

Figure 3.5 illustrates the airport expenditures for fiscal years 1998 through 2001. The total expenditures in fiscal year 2001 are down 22.1% since fiscal year 1998 but increased 6.6% from the previous year. The Birchwood Airport has three categories of expenditures: personal services (employment), other services (contractor services), and supplies. On average, roughly 80% of expenditures in the last four years have been for personnel and employment.

Figure 3.5
Birchwood Airport Expenditures, Fiscal Years 1998-2001



Source: DOTP&F Leasing.

Table 3-7 presents the expenditures dispensed for the Birchwood Airport for fiscal years 1998 through 2001.

Table 3-7
Birchwood Airport Expenditures, Fiscal Years 1998-2001

	FY 1998	*FY 1999*	*FY 2000*	*FY 2001*
Supplies ($)	13,989	1,844	1,015	7,854
Other Services (Contractual) ($)	9,606	7,037	7,165	7,826
Personal Services ($)	68,527	61,525	59,182	56,096
Total Expenditures ($)	**92,122**	**70,406**	**67,362**	**71,776**

Source: DOTP&F Leasing.

4.0 Air Traffic Forecasts

The proposed methodology for the Birchwood Airport air traffic forecast is based on the process recommended in FAA AC 150/5070-6B, *Airport Master Plans* and updated in Forecasting Aviation Activity by Airport (FAA 2001a). These documents provide national guidance for the preparation of airport master plans and are recommended for use in preparing individual airport master plan forecasts. The advisory circular has been the primary guidance in the preparation of master plans since enactment of the Airport and Airways Development Act of 1970 and has been recently updated with a seven-step process for the development of aviation forecasts. The recommended steps are:

Step 1. Identify aviation activity parameters and measures to forecast
Step 2. Collect and review previous airport forecasts
Step 3. Gather historical data
Step 4. Select forecast methods
Step 5. Apply forecast methods and evaluate results
Step 6. Summarize and document results
Step 7. Compare airport planning forecast results with the Terminal Area Forecast

4.1 Step 1. Identify Aviation Activity Parameters and Measures to Forecast

4.1.1 Identified Parameters to Forecast

The level and type of aviation activity anticipated at an airport as well as the nature of the planning to be done determines the parameters to be forecast. Generally, the most important activity forecast for airfield planning is the level and type of aviation demand generated at the airport. It is this demand that defines the runway and taxiway requirements.

Some aviation planning is conducted on a regional basis and would include both regional demand and distribution of demand among airports in a region. Other planning efforts, such as this master plan, are conducted on an airport specific basis and require detailed analysis of activity at the airport being studied.

At the time the forecast aviation activity was conducted for this airport master plan update, the DOT&PF was preparing the Anchorage Area General Aviation System Plan (AAGASP). The intention of the AAGASP was to forecast GA activity and identify future needs for GA facilities and services in the Anchorage area. The intended outcome of the AAGASP was to determine the level and type of regional demand to be accommodated at Anchorage area GA facilities, including the Birchwood Airport. The AAGASP was considered in the aviation forecast conducted for the Birchwood Airport Master Plan.

As indicated in *Forecasting Aviation Activity by Airport* (FAA 2001a), practical considerations dictate the level of detail and effort that should go into airport planning forecast. The Alaska Aviation System Plan (AASP) currently categorizes Birchwood Airport as a Local Airport that includes recreational and emergency airstrips and that serve as secondary access to communities. Air traffic activity at the Birchwood Airport is comprised of single and twin-engine GA aircraft, ultralight vehicles, gliders, and other experimental aircraft. Passenger and cargo enplanements have not historically comprised a significant percentage of the total annual activity and are not predicted to do so in the future. As a GA airport, passenger and cargo enplanements are not called for as a role to be served by Birchwood in the AASP or AAGASP and are not predicted to place a significant demand on the airport facilities and are therefore not presented in the forecast.

As a general rule, GA airports require aircraft operations and based aircraft forecasts. The forecast of air traffic at Birchwood Airport will concentrate on aircraft operations and GA fleet characteristics.

4.2 Step 2. Collect and Review Previous Airport Forecasts

This step recommends acquiring existing FAA and other related forecasts for the area and airport served. The relevant forecasts for Birchwood Airport include the FAA Terminal Area Forecast (TAF), the Alaska Aviation System Plan (AASP), the Birchwood Airport Master Plan, the Anchorage Area General Aviation System Plan (AAGASP), and the September 2000 Birchwood Airport Layout Plan (ALP) Narrative Report.

4.2.1 Federal Aviation Administration, Terminal Area Forecast

The FAA TAF (Table 4-1) for Birchwood Airport contains the air traffic forecast for fiscal years 2000 – 2015. The TAF reports passenger enplanements, aircraft operations, and based aircraft for four major users of the Birchwood Airport: air carriers, air taxi and commuters, GA, and the military. A further division is made between local and itinerant aircraft operations.

Table 4-1
Air Traffic Forecast, Birchwood Airport
Federal Aviation Administration, Terminal Area Forecast (2000 – 2015)

	Passenger Enplanements			Itinerant Aircraft Operations					Local Operations			
Year	AC	Commuter	Total	Air Carrier	Air Taxi	GA*	Military	Total	GA	Total	Total Operations	Based Aircraft
2000	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2001	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2002	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2003	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2004	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2005	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2006	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2007	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2008	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2009	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2010	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2011	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2012	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2013	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2014	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2015	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170

* GA = general aviation

The TAF forecasts an annual average growth rate of 0%. The assumption behind this forecast could be that if no additional facilities are developed at the Birchwood Airport that there will be no additional based aircraft and hence little to no growth in activity (all lease lots and tie-downs are currently at capacity). Under these circumstances few factors remain that could influence additional activity at the airport.

4.2.2 Alaska Aviation System Plan

Table 4-2 presents the air traffic forecasts for Birchwood Airport reported in the 1996 AASP. The AASP forecast is important because it reflects local conditions and policy considerations at a state level.

Table 4-2
Air Traffic Forecast, Birchwood Airport
Alaska Aviation System Plan Update

Operations	Base (1992)	1995	2000	2005	2010
Air Carrier	0	0	0	0	0
Air Taxi	1,500	1,500	1,500	1,500	1,500
-General Aviation Local	50,000	54,310	63,760	72,390	82,200
-General Aviation Itinerant	4,500	4,890	5,740	6,510	7,400
General Aviation Total	54,500	59,200	69,500	78,900	89,600
Total	***56,000***	***60,700***	***71,000***	***80,400***	***91,100***

Fleet Mix	Base (1990)	1995	2000	2005	2010
Single Engine	158	186	210	235	258
Multi Engine	2	2	3	3	3
Jet	0	0	0	0	0
Rotorcraft	3	4	4	5	5
Other	7	8	9	10	11
Total	***170***	***200***	***226***	***253***	***278***

Source: Alaska Aviation System Plan. 1996.

The annual average rate of growth used to forecast was 2.5% for both aircraft operations and based aircraft. This forecast presents a reasonable estimate and comes closest to matching the base year estimate developed by HDR Alaska, Inc. in Section 3.10.

4.2.3 Birchwood Airport Master Plan

Table 4-3 presents the 20-year air traffic forecast for Birchwood Airport as developed in the 1990 Birchwood Airport Master Plan (AMP).

Table 4-3
Air Traffic Forecast, Birchwood Airport
Birchwood Airport Master Plan 1990

Year	Single-Engine	Multi-Engine	Turbo Prop	Jet	Rotorcraft	Glider	Total	Peak Hour Ultralight Vehicles	Ski-Equipped
1985	263	3	0	0	3	2	271	40	53
1990	324	4	0	0	3	2	333	55	65
1995	376	5	1	0	4	3	389	60	75
2005	517	6	3	2	5	3	536	84	103

Table 4-3 (continued)
Air Traffic Forecast, Birchwood Airport
Birchwood Airport Master Plan 1990

Year	T&G*	Local	Itinerant	Total Ops	Total Annual Ultralight Vehicle Ops	Air Taxi Operations
1985	50,925	67,900	29,100	97,000	15,000	1,000
1990	59,119	82,110	36,890	119,000	20,000	1,389
1995	66,164	95,520	44,480	139,000	22,000	1,525
2005	80,698	124,150	66,850	191,000	31,000	2,104

* Touch and goes

Year	Single-Engine	Multi-Engine	Turbo Prop	Jet	Rotorcraft	Glider	Total	General Aviation Pilots and Passengers	Air Taxi Enplaned Passengers
1985	92,250	2,100	1,000	0	1,100	550	97,000	48,379	1,400
1990	113,060	2,800	1,500	0	1,100	550	119,000	62,875	1,946
1995	131,280	3,500	2,000	20	1,400	800	139,000	76,478	2,136
2005	181,900	4,200	2,500	200	1,400	800	191,000	115,817	2,946

Source: Birchwood Airport Master Plan, October 1990

The annual average rate of growth used to forecast operations was 3.5% and based aircraft was 3.4%. The AMP forecasts the most aggressive rate of growth for both based aircraft and operations of all the air traffic forecasts examined.

4.2.4 Anchorage Area General Aviation System Plan

The Anchorage Area General Aviation System Plan (AAGASP) provides a 20-year aviation demand forecast for the estimated GA and air taxi activity in the Anchorage area (see Table 4-4). The forecast is not airport specific and, therefore, does not forecast based aircraft or operations for Birchwood Airport specifically. It provides a gross volume for airports in the Anchorage area and does not provide a useful means of comparison for the preparation of the forecast for Birchwood Airport. The annual average rate of growth used to forecast aircraft operations in the Municipality of Anchorage is 1.5% and based aircraft is 1.1%.

Table 4-4
Aviation Demand Forecast
Anchorage Area General Aviation System Plan 2000-2020

AIRCRAFT	Base Year 2000	Forecasts 2005	2010	2015	2020
REGISTERED AIRCRAFT					
Registered Aircraft per 1,000 Population	4,027	4,224	4,327	4,601	4,985
BASED AIRCRAFT DEMAND	2,925	3,170	3,245	3,450	3,740
Wheeled Aircraft	2,224	2,395	2,435	2,570	2,770
Percent of Total	76	75.5	75	74.5	74
Annual Operations	180	185	190	195	200

AIRCRAFT	Base Year 2000	Forecasts 2005	2010	2015	2020
Floatplanes	701	775	810	880	970
Percent of Total	24	24.5	25	25.5	26
Annual Operations per Aircraft	120	123	126	129	132
AIR TAXI					
Passengers (Enplaned and Deplaned)	136,000	144,400	148,000	158,000	171,000
Cargo and Mail (tons)	2,150	2,380	2,620	2,900	3,200
AIRCRAFT OPERATIONS					
Air Taxi	40,445	42,300	44,700	47,300	50,100
General Aviation					
Local	186,683	205,880	213,204	229,785	252,776
Itinerant	256,894	290,220	306,806	337,585	379,164
Subtotal	443,577	496,100	520,010	567,370	631,940
TOTAL	484,022	538,400	564,710	614,670	682,040
AIRCRAFT OPERATIONS					
Wheeled	400,320	443,075	462,650	501,150	554,000
Floatplanes	83,702	95,325	102,060	113,520	128,040
TOTAL	484,022	538,400	564,710	614,670	682,040

Source: DOT&PF 2000c.

4.2.5 Birchwood Airport Layout Plan Narrative Report

The September 2000 ALP presents a recalculated forecast based on the 1990 master plan air traffic forecast. The base year (2000) estimate for based aircraft was estimated at 386. Table 4-5 presents the forecast as presented in the ALP Narrative Report. The annual average rate of growth used to forecast operations is 0.19% and based aircraft is 0.26%. This forecast appears high, not because of a high growth rate but because it is based on an extremely high base year estimate (which is not reported). The report does not explain the forecast methodology nor does it provide any justification other than noting that aircraft parking and lease space is nearing capacity.

Table 4-5
DOT&PF ALP Narrative Report, Birchwood Airport

Year	Based Aircraft	Annual Itinerant Operations	Total Annual Operations
2002-2005	390	45,000	135,000
2006-2010	400	47,000	138,000
2010-2020	410	49,000	140,000

Source: DOT&PF

4.3 Step 3. Gather Data

As a non-towered airport with no local FSS, records of air traffic at the Birchwood Airport are not maintained onsite. Historical air traffic data for the Birchwood Airport was acquired from FAA's Form 5010 Airport Master Record, the TAF for Birchwood Airport, the *General Aviation and Air Taxi Activity* Survey (FAA 2001b), and onsite counts performed for a total of 75 hours over ten days. Data was also acquired from the Alaska Department of Transportation and Public Facility's AASP, the AAGASP, the Birchwood Airport ALP Narrative Report, and leasing information.

In addition, HDR mailed a survey requesting annual aircraft operations, annual touch and go operations, annual passenger enplanements, and annual freight tonnage to all Birchwood Airport tenants; and in an effort to supplement and validate FAA and DOT&PF data, HDR collected onsite counts of aircraft operations for seven days from July to September of 2001.

Base year air traffic estimates presented in the FAA's TAF and the DOT&PF's AASP and AAGASP are identical or very similar. There are only two years (1998 and 1999) of historical data presented in the TAF for Birchwood Airport. This data was likely extrapolated from estimates made during the most recent airport inspection conducted in May of 1996. Estimates presented in the AASP and the AAGASP appear to have been based on the TAF. Relying on the two years of TAF data, which are based on five-year-old estimates, puts into question the accuracy of the base year air traffic estimates reported in the TAF, AASP, and AAGASP.

Data presented in FAA's *General Aviation and Air Taxi Activity Survey* (FAA 2001b) and DOT&PF's ALP *Narrative Report* and lease lot reports provides more current data that better reflects current activity levels. Recent data collection efforts performed between 2000 and 2001 include onsite counts, surveys, aerial photo reviews, and airport user counts and provide current data that is more accurate than the estimates made during the last airport inspection.

4.3.1 Federal Aviation Administration Air Traffic Data

The following sections present air traffic data as reported by the FAA and includes the FAA Form 5010 Airport Master Record; the FAA TAF, the General Aviation and Air Taxi Activity Survey (FAA 2001b), and the results from a traffic count survey at Birchwood Airport performed by the FAA Air Traffic Division from May through September of 2000.

Form 5010 Airport Master Record

Table 4-6 presents aircraft operations data as reported on the FAA's Form 5010 *Airport Master Record* for Birchwood Airport. Form 5010 reports basic airport identifying information plus manager and owner name, address, and phone number in addition to runway and taxiway information and air traffic activity estimates. The operations data reported for Birchwood Airport reflects an estimate made during an airport inspection during May 21, 1996. During the airport inspection, the inspector estimates the number of operations and based aircraft with assistance of airport personnel. In some cases, this data is supplemented with data from the airport master plan.

Table 4-6
Federal Aviation Administration, Airport Master Record (Form 5010), Birchwood Airport

Local General Aviation	49,702
Transient General Aviation	4,467
Military	<1% of total
Air Taxi	1,675
Annual Aircraft operations (avg. 153/day x 365 days)	55,845

Source: Compiled by HDR Alaska, Inc., January 2001.

As shown in Table 4-6, Form 5010 reports an average of 153 operations per day resulting in a total of 55,845 annual aircraft operations for Birchwood Airport. Of these annual aircraft operations 89% were attributed to local GA operators, 8% were attributed to transient GA operators, and 3% were attributed to air taxi operators. Form 5010 also reports less than 1% of these operations attributed to military operations. In addition to the estimated activity data, Form 5010 estimates a total of 170 based aircraft at the airfield comprised of the following mix of aircraft:

- 158 single engine airplanes
- 2 multi engine airplanes
- 3 helicopters
- 2 gliders
- 5 ultralight vehicles

Terminal Area Forecast

Table 4-7 presents historical air traffic data as presented in the FAA Terminal Area Forecast (TAF) for Birchwood Airport. According to FAA personnel, for non-towered airports with no local FSS, data reported in the TAF are extrapolated from estimates recorded on FAA's form 5010 Airport Master Record during routine airport inspections.

Table 4-7
Historical Passenger Enplanements and Aircraft Operations, TAF (1990-1999)
Birchwood Airport

	Passenger Enplanements			Aircraft Operations					
Year	Air Carrier	Commuter	Total	Itinerant Air Carrier	Commuter Air Taxi[1]	Military	Transit GA*	Local GA	Total
1990	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	1,500	50	4,500	50,000	56,050
1999	0	0	0	0	1,500	50	4,500	50,000	56,050

[1] Estimates Reported on the FAA, TAF, and FAA Airport Master Record Form 5010;
* GA = general aviation
Source: U.S. DOT, Bureau of Transportation Statistics, Office of Airline Information.

Activity for commuter/air taxi and GA is a gross estimate of the volume of air traffic. Per communication with FAA personnel, air traffic data for non-towered airports, such as Birchwood, is only an estimate. As in form 5010, the TAF also reports 170 based single engine aircraft from 1998 to 2000. No data is reported for Birchwood Airport until 1998, two years after the most recent airport inspection. It should also be noted that no data is reported for passenger enplanements or operations for itinerant air carriers. Birchwood Airport is not certified to receive scheduled air carrier service.

General Aviation and Air Taxi Activity Survey (March 2001)

The General Aviation and Air Taxi Activity Survey (FAA 2001b) is an annual sample based survey of registered civil aircraft, except for scheduled commercial air carriers that operate under Federal Aviation Regulation (FAR) Part 121, Operating Requirements and scheduled operations under Part 135. The survey provides estimates of the number of active aircraft, hours flown, primary use, and many other characteristics by aircraft type, by FAA region and state.

Table 4-8
General Aviation and Air Traffic Activity Survey
1999 General Aviation and Air Taxi Data for Alaska

Total Number of Active Aircraft	Total Number of Landings	Average number of Landings per Aircraft	Average number of operations per aircraft
6,122	1,260,735	206	412

Source: (FAA 2001b; Table 2.3 and 2.4, Chapter Two).

Table 4-8 presents the estimated number of active aircraft and total number of landings for Alaska in 1999. As shown above, the total number of active aircraft in Alaska for 1999 was estimated at 6,122. Total number of landings in Alaska was estimated at 1,260,735. Dividing the total number of landings by the total number of aircraft resulted in the average number of landings per aircraft. Doubling the average number of landings resulted in the average operations per aircraft. Estimating the average operations per aircraft allows for comparison between the number of based aircraft and the relative activity at Birchwood Airport.

FAA Air Traffic Division, Air Traffic Count Survey

In response to some airport users' request for the establishment of an air traffic control tower (ATC) at Birchwood Airport, FAA personnel undertook a traffic count survey in 2000 (see Table 4-9). The survey consisted of ten days and a total of 75 hours of observation.

Table 4-9
FAA Traffic Count Survey (May-Sept. 2000), Birchwood Airport

Date	Hours of Observation	Aircraft Operations
23-May	8	164
24-May	7	117
25-May	8	214
26-May	5	168
3-Jun	7	190
27-Jul	11	263
14-Aug	7	80
17-Aug	7	186
18-Aug	7.5	225
1-Sep	7.5	55
Total	75	1,662

Source: FAA, Air Traffic Division

4.3.2 Alaska Department of Transportation and Public Facilities Data

The DOT&PF has prepared several documents evaluating the air traffic activity at the Birchwood Airport. Prepared in March of 1996, the AASP is a comprehensive airport system plan that identifies the aviation facilities needed to meet air transportation needs and provides an air traffic forecast for Birchwood Airport.

During the airport master planning process, the DOT&PF was preparing the AAGASP. This system plan forecasted GA activity and identified future needs for GA facilities and services in the Anchorage Area. The intention of the plan was for alternatives to be developed and evaluated to handle the future GA needs, and a strategic implementation plan will identify how to fulfill those needs. Initiated in early 1998, the project began in June of 2000. A draft Technical Memorandum providing an inventory of GA airport facilities and an aviation demand forecast was prepared and consulted as part of this master planning process.

The September 2000 ALP *Narrative Report* presents an up-to-date set of drawings and includes a basic air traffic forecast. The DOT&PF also maintains a database of leasing information for Birchwood Airport that identifies the number and type of lease lots and tie-downs currently leased.

<u>Alaska Aviation System Plan</u>

The Alaska Aviation System Plan Update (DOT&PF 1996) reports based aircraft and aircraft operations for the Birchwood Airport for the base year 1990. According to the plan, a total of 170 aircraft were based at the airport; 158 single engine, 2 multi-engine, 0 jet aircraft, 3 rotorcraft, and 7 other aircraft. The plan reported a total of 56,000 aircraft operations; exactly the same as the number of GA and commuter aircraft operations combined and reported in the TAF for 1998 and 1999.

<u>Anchorage Area General Aviation System Plan, Technical Memorandum I</u>

Technical Memorandum I of the Anchorage Area General Aviation System Plan (AAGASP), presents an inventory of GA airport facilities and aviation demand forecast for GA activity at six publicly owned, public-use airports in the Anchorage area.

The memorandum reports based aircraft and annual operations for the Birchwood Airport for the calendar year 2000. The source of this data is indicated as the DOT&PF, airport site visits, and communication with persons knowledgeable of the airport. Table 4-10 presents this information.

Table 4-10
AAGASP, Technical Memorandum I
Based Aircraft, Birchwood Airport

Single Engine	Multi-Engine	Jet	Helicopter	Gliders	Military	Other	Total
381	4	0	0	0	0	53	438

Source: DOT&PF 2000c.

As shown in Table 4-10 the AAGASP estimated a total of 438 (381 single, 4 multi- engine, and 53 other) based aircraft at the Birchwood Airport in the year 2000. The AAGASP does not specify the type of 53 'other' aircraft. These aircraft are probably ultralight vehicles.

Table 4-11 reports annual aircraft operations as estimated in the AAGASP. A total of 86,100 aircraft operations were estimated for the year 2000.

Table 4-11
AAGASP, Technical Memorandum I
Annual Aircraft Operations, Birchwood Airport

Itinerant					Local			
Air Carrier	Commuter/ Air Taxi	GA	Military	Subtotal	GA	Military	Subtotal	Total
0	2,200	27,900	100	30,200	55,900	0	55,900	86,100

Source: DOT&PF 2000c

Birchwood Airport Layout Plan Narrative Report

The most current Airport Layout Plan (ALP) dated September 2000 includes a narrative which estimates based aircraft and provides a forecast of air traffic activity through 2020. The narrative reports that aircraft parking and lease lots are nearly full and the primary factor driving the number of future operations will be how the based aircraft will operate, how the number of itinerant training aircraft will change, and how the ultralight vehicle operations will change. Table 4-12 presents based aircraft and operations information reported in the ALP.

Table 4-12
DOT&PF ALP Narrative Report, Birchwood Airport

Year	Based Aircraft	Annual Itinerant Operations	Total Annual Operations
2000-2005	390	45,000	135,000

Source: DOT&PF.

Lease Lot Information

The DOT&PF lease lot information reports 40 lots and 128 tie-downs currently leased. The information does not reflect sub-leasing of lots or hangars and/or tie-downs. It should be assumed that some degree of sub-leasing does occur with lease lots and hangars and certainly occurs with tie-downs associated with lease lots. Therefore, these numbers do not accurately reflect the actual number of based aircraft or aircraft operators at the airfield. However, they do provide a good base level from which comparisons and assumptions can be made. Table 4-13 summarizes the lease lot information.

Table 4-13
DOT&PF Lease Lot Report, Birchwood Airport

Lease Lots	Tie-Downs
40	144

Source: DOT&PF, Leasing Information.

Based Aircraft Counts

DOT&PF Leasing Officer Ron Stroman indicated that he counted based aircraft at the Birchwood Airport in the summer of 2001. Mr. Stroman counted 363 GA aircraft. He did not count ultralight vehicles.

Air Traffic Data collected by HDR Alaska, Inc.

In an effort to obtain the most accurate and current aircraft operation and passenger and cargo enplanements data since there is minimal and suspect historical data for Birchwood Airport, tenants at the Birchwood Airport were surveyed to obtain actual or estimated air traffic data for the year 2000. HDR also counted actual aircraft operations for a total of 41 hours from July to September of 2001. Year 2000 aerial photography was also used to obtain a based aircraft estimate.

Airport Tenant Survey Results

Table 4-14 presents the results from the air traffic survey performed by HDR for Birchwood Airport for 2000. These results reflect 2000 data provided directly from airport tenants. Of the 150 tenants surveyed, approximately one-third (45) responded.

Table 4-14
Air Traffic Survey Results, 2001, Birchwood Airport

Survey Respondents	Takeoffs and Landings	Touch and Go Operations	Passenger Enplanements	Based Aircraft
45	4,257*	1,590*	0*	77*

*Data reflect actual or estimated air traffic activity provided by pilots with aircraft based at Birchwood.
Source: HDR Alaska, Inc.

Actual Aircraft Counts and Based Aircraft Aerial Photo Review

HDR staff counted aircraft operations at the Birchwood Airport during a period of seven days for a total of 41 hours from July to September 2001. The data presented in Table 4-15, reports the number and type of aircraft operations performed during the count.

Table 4-15
Counts of Aircraft Operations, 2001, Birchwood Airport

Date	Hours of Observation	Aircraft Operations	Type of Operations	Aircraft Types
July 5	2.5	19	1(TO), 11(L), 14(T&G)	3(SE), 40(UL)
July 18	2.8	32	16 (TO), 13(L), 6(T&G)	22(SE, 4(TE), 10(UL)
July 27	7.2	78	39(TO), 32(L), 14(T&G)	68(SE), 11(UL)
Aug. 14	8.2	57	24(TO), 13(L), 40(T&G)	51(SE), 4(UL), 4(G)
Aug. 16	6.1	56	27(TO), 22(L), 14(T&G)	37(SE), 19(UL)
Aug. 22	4.4	79	31(TO), 26(L), 44(T&G)	52(SE), 2(TE), 24(UL), 1(G)
Aug. 29	3.9	86	29(TO), 22(L), 70(T&G)	67(SE), 21(UL)
Sept. 4	6.0	38	10(TO), 17(L), 22(T&G)	37(SE), 1(TE)
Total	41.1	557	177(TO), 156(L), 224(T&G)	337(SE), 7(TE), 129 (UL), 5(G)
			TO = Take Off L = Landing T&G = Touch and Go	SE = Single Engine TE = Twin Engine UL = Ultralight G = Glider

Source: HDR Alaska, Inc.

Aerial photography dated September 2000 was used to estimate the average number of based aircraft on the airfield at Birchwood Airport. There are a total of 233 aircraft visible on the aerial photo. Of the 233 visible aircraft, 229 appeared to be single-engine and four appeared to be twin-engine fixed wing aircraft. No helicopters or ultralight vehicles were observed parked anywhere on the airfield.

Several private hangars as well as three banks of T-hangars are also clearly visible on the aerial photo. All the hangars appear in good condition and appear to have been in use at the time the photo was taken. Assuming all of the private hangars are in use and contain at least one aircraft, and assuming the T-hangars are completely full adds an additional 58 aircraft to the 233 visible on the photo. It is impossible to positively identify the type of aircraft in the private hangars from the photo. However, aircraft parked within the T-hangars are most likely single engine, fixed-wing aircraft and would increase the number of single engine aircraft by 32 to an estimated 261. Of the private hangars, seven appear large enough to contain twin-engine aircraft. Assuming these hangars do indeed contain twin-engine aircraft increases the estimated total number of based twin-engine aircraft to eleven. The remaining private hangars (19) appear suitable for single engine aircraft. Again, assuming that these hangars do indeed contain one single engine aircraft would result in an increase from 261 to 280 single engine aircraft. Two public helipads are also visible on the photo and provide some justification for the presence of one or two helicopters at the airport.

Though gliders or ultralight vehicles were not observed on the airfield, the counts of operations by these aircraft in Table 4-16 provide justification for their presence. It is assumed that gliders and ultralight vehicles are stored only inside private hangars and would not therefore be visible on the photo.

Table 4-16 presents the estimated based aircraft at Birchwood Airport.

Table 4-16
Based Aircraft, Aerial Photo Review (Sept. 2000), Birchwood Airport

Single Engine	Multi-Engine	Helicopter	Ultralight	Glider	Total
280	11	2	30	2	325

Source: HDR Alaska, Inc.

Airport User Data

Table 4-17 presents the results of an independent count of based aircraft at the Birchwood Airport performed by Dick Lochner on Friday May 11, 2001. The count resulted in 349 aircraft occupying tie-down space with an additional 30 tie-down areas empty but in use. Mr. Lochner identified an additional 30 ultralight vehicles and 12 experimental aircraft for a total of 433 based aircraft at the Birchwood Airport.

Table 4-17
Based Aircraft Count. May 11, 2001, Birchwood Airport

Single Engine	Ultralight	Experimental	Total
379[1]	42[2]	12	433

[1] The majority of aircraft are single engine. However, this estimate likely includes a few twin-engine aircraft.
[2] Mike Jacober, owner and operator of Arctic Sparrow Aircraft, Inc. indicates he has approximately 42 ultralight vehicles on his lease lot.
Source: Lochner 2001 and Jacober 2002.

4.3.3 Historical Air Traffic Summary

Table 4-18 presents the air traffic data collected and summarized for purposes of comparison. It should be noted that not all data sets presented in Table 4-18 report data for each column heading. Additionally, some datasets either do not report data specific to the Birchwood Airport or had to be extrapolated to arrive at total annual values. Further discussion of the total annual estimates is presented in the notes following Table 4-18.

Table 4-18
Historical Air Traffic Data, Birchwood Airport

		Aircraft Operations		
	Based Aircraft	GA	Air Taxi	Total
FAA Form 5010	170	54,169	1,675	55,845
FAA TAF	170	54,500	1,500	56,050
Extrapolation of FAA GA Survey[1]	--	--	--	70,040
Extrapolation of FAA Traffic Count Survey[2]	--	--	--	100,429[1]
DOT&PF AASP	170	--	--	54,500
DOT&PF AAGASP	483	54,500	1,500	56,050
DOT&PF ALP Narrative	386	--	--	135,000
DOT&PF Leasing[3]	180	--	--	--
HDR Counts	325	--	--	61,419

-- = No Data Available or Not Reported

Notes:

[1]The FAA GA survey does not report activity specific to Birchwood Airport but rather reflects the average aircraft operations (412 ops/aircraft) by the estimated number of active aircraft for the entire state of Alaska. Assuming the based aircraft estimate (170) reported on the FAA TAF for Birchwood is indicative of the active aircraft at the airport, the total annual aircraft operations would be approximately 70,040. Considering the relatively high volume of aircraft activity and though the FAA GA Survey does not reflect specific existing conditions at the Birchwood Airport, this estimate is not considered grossly inaccurate.

[2]Annual data shown for the FAA Traffic Count survey was extrapolated by HDR from 75 hours of observation in 2000. The hourly average (22.16 ops/hour) was multiplied by the total annual daylight hours between civil twilight (4,532) to derive an estimate of annual operations. Based aircraft were not counted nor were aircraft operations categorized by type during the FAA Traffic Count survey.

[3]The DOT&PF leasing information only reflects current lease contracts and does not account for sub-lease agreements offered by airport tenants. The DOT&PF leasing information does not report aircraft operations. The estimate of based aircraft from DOT&PF leasing information reflects the current lease contracts maintained by DOT&PF.

4.3.4 Base Year (2001) Air Traffic Activity Estimate

Table 4-19, presents base year (2001) air traffic activity estimates generated by HDR. Activity estimates are derived from actual and estimated aircraft operations data provided by aircraft operators based at the Birchwood Airport as well as actual counts collected by the DOT&PF, FAA, and HDR personnel.

Table 4-19
Air Traffic Estimate, Base Year (2001), Birchwood Airport

Based Aircraft	Military	Air Taxi/Commuter	General Aviation	Total Operations
423	100	2,200	83,808	86,108

Source: Compiled by HDR Alaska, Inc., November 2001.

Total aircraft operations estimated from actual aircraft counts performed by HDR and FAA were derived by dividing the total hours of observation by the number of aircraft operations recorded to arrive at an average number of hourly operations. The average hourly operations estimate was multiplied by the total annual daylight hours between civil twilight (approximately 4,532 hours) calculated for the Birchwood

Airport. The hours between civil twilight most closely reflect the total annual hours of daylight during which the majority of operations are likely to occur.

A total of 86,108 aircraft operations are estimated for the year 2001. This estimate includes all aircraft: air carrier, military, air taxi/commercial, and GA. This estimate reflects total aircraft operations estimated from actual aircraft counts performed by HDR and FAA and a review of the trends in the aircraft activity data. During the counts, a total of 2,219 aircraft operations were recorded during 116 hours of observation. The average number of aircraft operations for slightly more than 50% of the observation hours was equal to or less than 19. During half of these hours the average aircraft operations per hour were less than 10. The average number of aircraft operations for approximately 38% of the total observation hours was between 20 and 30. During only 10% of the total observations hours were there more than 30 aircraft operations per hour. The peak number of operations per hour (33 ops/hr) occurred on Friday May 26, 2000 for a period of five hours. The fewest operations per hour (6 ops/hr) occurred on Tuesday September 4 for a period of six hours.

Based on the above analysis and a review of the trends in the aircraft activity data, the average number of aircraft operations per hour for 2001 was determined to be 19. This estimate was selected to represent the annual average aircraft operations. Use of the peak number of operations per hour to develop the base year estimate was not selected because it results in an exaggerated estimate nearing 150,000 base year operations, far greater than any base year estimate reported in Table 4-19 above. Likewise, use of the fewest number of operations was not used since it also results in a grossly understated estimate of around 16,000 aircraft operations.

The average hourly operation estimate of 19 aircraft operations per hour was multiplied by the total annual daylight hours between civil twilight (approximately 4,532 hours) calculated for the Birchwood Airport. The hours between civil twilight most closely reflect the total annual hours of daylight during which the majority of operations are likely to occur. The base year estimate for annual aircraft operations is considered reasonable in that it falls in the middle of the range of base year estimates extrapolated from the air traffic data collected.

Table 4-20 presents the expected allocation of based aircraft by type at the Birchwood Airport. This estimate is based on the most current sources of documented information. It should be noted that some seasonal fluctuation of the total based aircraft may occur and that this estimate provides a reasonable average of the based aircraft at the airport.

Table 4-20
Based Aircraft, Base Year (2001), Birchwood Airport

Single Engine	Multi-Engine	Helicopter	UltraLight	Glider/Experimental	Total
367	12	2	342	12	435

Compiled by HDR Alaska, Inc., November 2001.

4.4 Step 4. Select Forecasting Methods

As noted previously, the DOT&PF is currently preparing a GA system plan for the Anchorage area.

Per direction from FAA (June 2002), the forecast for Birchwood airport has been prepared prior to the completion of the AAGASP and based on the assumptions identified below. As of June 2002, Technical

Memorandum 2 of the AAGASP identifies the following five potential alternatives to satisfy aviation demand in the Anchorage area:

Alternative 1 –	Do Nothing – Use Existing Airports
Alternative 2 –	Expansion of Existing Airports
Alternative 3 –	Expand Existing Airports Plus One New Floatpond
Alternative 4 –	Expand Existing Airport Plus Two New Floatponds
Alternative 5 –	Expand Existing Airports Plus One New Floatpond and One New Paved/Gravel Runway Airport

Three forecast scenarios have been developed based on the following assumptions:

- Alternative One, explained above, of the AAGASP will be forwarded into the final system plan,
- No new floatplane facility will be developed at the Birchwood Airport in the next 20-years, and
- Birchwood Airport will continue as the sole ultralight vehicle facility in the Anchorage area.

Existing floatplane facilities within the Anchorage area are at maximum capacity. Based on current land status in the Anchorage area it does not appear reasonable to anticipate the development of new or additional floatplane facilities within the Anchorage area.

It should also be noted that FAA is currently proposing new certification requirements for light-sport aircraft and pilots. There are two parts to the sport pilot proposal. The first part would establish a new pilot certificate, sport pilot, created specifically for those who want to fly simple, lightweight, and diverse single- and two-seat aircraft for fun and recreation. The second part of the sport pilot proposal would define a new aircraft category, light-sport aircraft. This proposal could result in an increase of activity by lightweight aircraft at Birchwood airport.

There is insufficient accurate historical activity data for Birchwood airport to perform a regression analysis. The only historical data available is presented in the FAA TAF. This data is limited and is a gross level estimate that when compared to more recent estimates made from actual counts of based aircraft and aircraft operations appears to be low by approximately 30,000 operations. Forecasting this erroneous historical air traffic activity into the future would exacerbate this error and result in an inaccurate forecast of air traffic activity at Birchwood airport. The following three scenarios for future demand were developed using the base year estimates presented in Section 4.4.2 Base Year (2001) Air Traffic Activity Estimate (this document) and the forecast of overall Anchorage area future demand as presented in the draft AAGASP. These scenarios also reflect the bulleted assumptions above.

4.5 Step 5. Apply Forecast Methods and Evaluate Results

This section presents three scenarios of air traffic forecasts for based aircraft and aircraft operations for Birchwood Airport. Figure 4.1 graphically displays the three forecast scenarios using the base year estimate for based aircraft (423). Figure 4.2 presents the same forecast scenarios using the base year estimate for aircraft operations (86,108).

The low forecast scenario (0.0% growth rate) predicts 100% of the future demand forecast for the Anchorage area would be accommodated at a new GA facility in the Anchorage area. This scenario assumes that no additional demand would be accommodated at Birchwood Airport in the next 20 years. Additional capacity for aircraft operations or based aircraft would neither be planned nor developed. This scenario reflects the lowest potential rate of growth at Birchwood.

The moderate forecast (1.3% growth rate) scenario assumes future aviation demand in the Anchorage area will be distributed among all currently active Anchorage area airports based on the existing (2001) distribution of based aircraft. Under this scenario, Birchwood airport would continue to accommodate all ultralight vehicle traffic in the Anchorage Area. Growth under this scenario most closely corresponds with the annual average population growth (1.2%) for Birchwood during the last 15 years (1985-2000) and is also the growth rate used in the AAGASP forecasting. Floatplanes would not be accommodated at Birchwood Airport. Scenario two reflects a moderate level of potential growth.

The high scenario (3.8% growth rate) assumes 100% of the future GA demand (excluding floatplane traffic) would be accommodated at Birchwood airport. Under this scenario, Birchwood Airport would be the sole airport for future demand in the Anchorage area and would be expanded to accommodate all the forecast GA.

Figure 4.1
Forecast Scenarios using the Base Year Estimate for Based Aircraft, Birchwood Airport

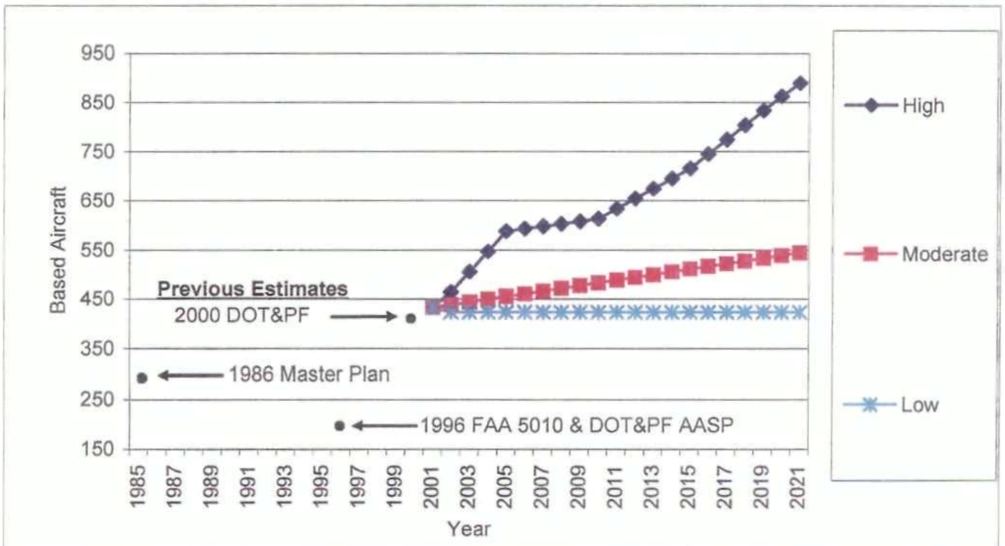
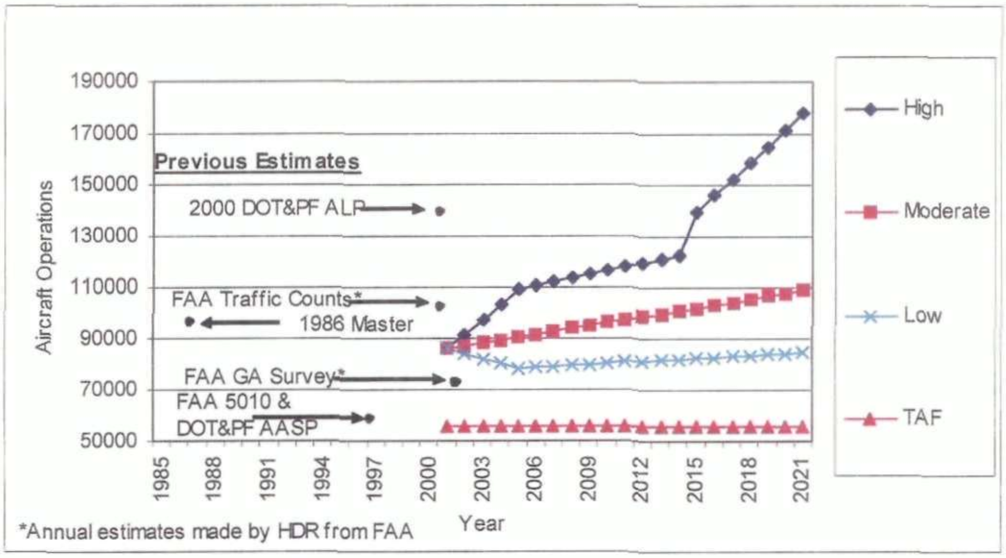


Figure 4.2
Forecast Scenarios using the Base Year Estimate for Aircraft Operations



Figures 4.1 and 4.2 Note: The forecast for the high scenario assumes 100% of future demand will be accommodated at Birchwood Airport and is based on the rate of growth as presented in the AAGASP forecast of air traffic activity. For an explanation of the variation in the growth rate over the twenty-year period shown for the High scenario please refer to the AAGASP.

4.6 Step 6. Summarize and Document Results

Table 4-21 presents the 20-year air traffic forecast for the Birchwood Airport and is based on the moderate scenario as described above. Average annual growth rates are presented for purposes of comparison.

Table 4-21
20-Year Comprehensive Forecast of Aviation Activity (2001-2021), Birchwood Airport

	Forecast Levels, Base Year 2001					Average Annual Compound Growth Rates			
	Base Yr. Level	Base Yr. + 1yr.	Base Yr. + 5yrs.	Base Yr. + 10yrs.	Base Yr. + 20yrs.	Base yr. to +1	Base yr. to +5	Base yr. to +10	Base yr. to +20
Aircraft Operations									
Itinerant									
Total Commercial Operations	2,200	2,229	2,346	2,492	2,785	1.2%	1.2%	1.2%	1.2%
General aviation	27,900	28,271	29,754	31,609	35,317	1.2%	1.2%	1.2%	1.2%
Military	100	101	107	113	127	1.2%	1.2%	1.2%	1.2%
Local									
General aviation	55,908	56,651	59,624	63,340	70,771	1.2%	1.2%	1.2%	1.2%
Military	0	0	0	0	0	1.2%	1.2%	1.2%	1.2%
TOTAL	86,108	87,253	91,831	97,554	109,000	1.2%	1.2%	1.2%	1.2%
Peak Hour Operations	33	33	35	36	42	1.2%	1.2%	1.2%	1.2%
Based Aircraft									
Single Engine (Nonjet)	367	370	381	409	423	1.3%	1.3%	1.3%	1.3%
Multi Engine (Nonjet)	12	12	13	14	15	1.3%	1.3%	1.3%	1.3%
Helicopter	2	2	2	3	3	1.3%	1.3%	1.3%	1.3%
Ultralight Vehicles	42	45	57	88	104	1.3%	1.3%	1.3%	1.3%
Other (Gliders, etc.)	12	12	13	14	15	1.3%	1.3%	1.3%	1.3%
TOTAL	435	446	491	509	560	1.3%	1.3%	1.3%	1.3%

Source: HDR 2002.

4.7 Step 7. Compare Forecasts with TAF

Table 4-22 presents a comparison between the updated air traffic forecast for Birchwood airport and the FAA TAF. Based on communication with FAA personnel, the FAA TAF is an estimate of air traffic activity and may not accurately reflect actual conditions at the Birchwood Airport. The updated forecast presented in this report is based on current actual data as described in Section 4.3 of this report and is more representative of actual air traffic at Birchwood Airport.

Table 4-22
Air Traffic Forecast Comparison, Birchwood Airport

	Year	Airport Forecast	TAF	Difference	AF/TAF (% Difference)
General Aviation Operations					
Base yr.	2001	83,808	54,500	29,308	35%
Base yr. + 5yrs.	2006	89,378	54,500	34,878	39%
Base yr. + 10yrs.	2011	94,948	54,500	40,448	43%
Base yr. + 15yrs.	2016	100,518	54,500[1]	46,018	46%
Base yr. + 20yrs.	2021	106,088	54,500[1]	51,588	49%
Total Operations					
Base yr.	2001	86,108	56,050	30,058	35%
Base yr. + 5yrs.	2006	91,831	56,050	35,781	39%
Base yr. + 10yrs.	2011	97,554	56,050	41,504	43%
Base yr. + 15yrs.	2016	103,277	56,050[1]	47,227	46%
Base yr. + 20yrs.	2021	109,000	56,050[1]	52,950	49%

[1] The TAF does not provide a forecast beyond 2015. TAF data shown for 2016 is actually 2015. TAF data for 2021 was extrapolated by HDR Alaska, Inc.
Note: TAF data is on a U.S. government fiscal year basis (October through September)

4.8 Design Criteria

FAA Advisory Circular 150/5300-13, *Airport Design*, establishes an airport reference code (ARC) to identify specific design criteria appropriate for the types of aircraft expected to be accommodated at a particular airport. The ARC is a coding system used by the FAA to relate airport design criteria to the operational and physical characteristics of the airplanes intended to regularly operate at the airport. Regular operation is defined as at least 250 operations per year. The ARC has two components (approach category and design group) relating to airport design aircraft. The first component, depicted by a letter code (A, B, C, or D), is the aircraft approach category and relates to an aircraft's approach speed. The second component, depicted by a Roman numeral (I, II, III, or IV), is the airplane's design group and relates to wingspan.

The category and group for airports classified as a Local Airport by the AASP is B-I; however, the 1990 Birchwood Airport Layout and Access Plan lists the airport reference code as B-II for Runway 01L/19R and A-I for Runway 01R/19L. B-II aircraft have approach speeds between 91 and 121 knots and wingspans between 49 and 79 ft. A-I aircraft have approach speeds less than 91 knots and wingspans less than 49 ft.

The AASP recommends 2,000 ft. of runway length for A-I aircraft. FAA Advisory Circular 150/5325-4A, Runway Length Requirements for Airport Design, recommends 3,600 ft. of runway length for B-II aircraft with less than ten seats. FAA Advisory Circular 150/5325-4A runway length recommendation for ultralight vehicles is 300 ft.

The Birchwood Airport is currently used by small single and twin-engine aircraft, such as the Cessna 170-320, Piper Aztec, Piper Navajo, and Beech 18. These aircraft fit into approach categories A through B and design groups I through II. The airport is also used frequently by ultralight vehicles, gliders, and aircraft equipped with tundra tires during the summer and skis during the winter. Ultralight vehicles fall into approach category A and design group I. Aircraft equipped with tundra tires or skis at the Birchwood Airport include Piper PA-12s and PA-18s, which are categorized in approach category A and design group I.

The forecast fleet mix for the Birchwood airport will be comprised of A-I and B-II aircraft. Table 4-23 presents the most common aircraft forecast to operate at the Birchwood airport.

Table 4-23
Forecast Fleet Mix, Birchwood Airport

ARC A-I	ARC B-II
Cessna 172, 180, 210, 310-320	Piper Aztec
Beech 18	Piper Navajo
Piper PA-12, PA-18	
Cessna Caravan, Stationair	
Ultralight vehicles	

Source: HDR Alaska, Inc. July 2002

4.8.1 Runway 01L/19R

Wheeled aircraft (excluding ultralight vehicles and aircraft using tundra tires or skis) operate on Runway 01L/19R and are expected to continue to do so into the future. Of the aircraft forecast to regularly operate at the Birchwood Airport, the Piper Navajo requires the most runway length (2,700 feet.). The Navajo also requires at least 75 feet of runway width.

Based on the anticipated fleet mix, the ARC applicable to Runway 01L/19R is B-II.

4.8.2 Runway 01R/19L

Runway 01R/19L (2,200 feet long by 50 feet wide) currently serves as the sole runway for ultralight vehicles and aircraft equipped with tundra tires or skis. Of the aircraft forecast to regularly operate on Runway 01R/19L, the Cessna 180 (ARC A-I) is the most demanding aircraft and requires 1,310 feet of runway length. The minimum runway width for the FAA ARC A-I is 60 feet.

Based on the anticipated fleet mix, the ARC applicable to Runway 01R/19L is A-I.

5.0 Alternatives

This section presents a summary of the alternatives considered as part of the airport master plan process and the reasons for eliminating alternatives to arrive at the preferred alternative. For a more detailed operational analysis of the alternatives, see Office Study #2 in Appendix D. There are three primary development needs represented in the range of alternatives presented:

(1) Bringing the airport facilities, such as the runway width, runway protection zone, runway object free area, and the runway-taxiway separation, up to DOT&PF and FAA design standards

(2) Expanding the aprons for additional lease lot and aircraft parking;

(3) Providing a safe operating environment for the diverse mix of GA aircraft operating at the airport

Four alternatives were considered during the alternatives development phase of the Birchwood Airport master planning process – one no action alternative and three action alternatives. Each of the three action alternatives were designed to bring the airport up to FAA standards, provide the capacity to handle the air traffic forecast, and improve the operating environment for the diverse mix of aircraft operating at the airport. To safely accommodate the mixing of slower ultralight vehicles and the faster GA airport, each action alternative explores providing an ultralight vehicle/sport aircraft operating area that includes a parallel runway with minimum 700-foot separation from existing runways to allow ultralight vehicle and sport aircraft to operate simultaneously with other GA operations and allow for a safe traffic flow in the respective patterns. Runways 01L/19R and 01R/19L will function as one runway and share the same traffic pattern in each alternative. Alternatives 1, 2, and 3 (the Proposed Action) are depicted on Figures 5.1, 5.2, and 5.3 respectively.

The proposed smaller runway should be designed to light-sport aircraft requirements[2]. Light-sport aircraft will require longer runway lengths than the ultralight vehicles presently using Birchwood Airport. For now, the small proposed runway will be referred to as the ultralight runway. Advisory Circular 150/5325-4A, Runway Length Requirements for Airport Design, recommends 800 feet for runway length for aircraft with approach speeds less than 50kts. Light-sport aircraft approach speed is 50.7kts. (This is based on the accepted practice of using 1.3 times the stalling speed for the approach speed.) The Experimental Aircraft Association's AeroCrafter sourcebook indicates that the majority of aircraft that meet light-sport aircraft criteria will require takeoff and landing distances of 400 feet or less. For reference, Soldotna Airport's ultralight runway is 1,500 feet x 50 feet. For initial planning and assessment the proposed runway length will be 1,000 feet x 60 feet. As more detailed analysis is conducted this runway length and width may vary between 800 feet and 1,200 feet.

5.1 Project Alternatives

5.1.1 Preferred Alternative

Ski/Tundra Tire Operations. To remedy design deficiencies associated with runway 01R/19L (inadequate width, deficient RPZ, ROFA, runway-taxiway separation, and to reduce the likelihood for simultaneous operations to occur) tundra tire and ski operations would be relocated to a widened portion of Runway 01L/19R. This widened portion would be surfaced in gravel and remain unplowed in the winter to continue to serve tundra tire and ski operations. The new surface would be off-set from the

[2] Currently there is a Notice of Proposed Rule Making (NPRM) to create a new pilots license call the Sport Pilot license. This license will require less instruction and training time than the Private Pilot license and qualify pilots to fly aircraft of limited weight and performance called light-sport aircraft. Light-sport aircraft have the following criteria: maximum takeoff weight = 1,232lbs; maximum stall speed = 39kts, maximum operating speed = 115kts, the aircraft can have a maximum of 2 seats, the pilot and one passenger.

existing pavement edge of 01L/19R by 20 feet to keep errant gravel from accumulating on the pavement surface. The gravel surface would be 60 feet wide and 1,535 feet long (of sufficient length and width to accommodate planes in ARC class A-I). The two runway surfaces (pavement and gravel) would operate as one runway and be denoted as "Runway 01/19." The relocated runway surface would make it clearer that operations on the various surfaces would function as one runway, sharing the same traffic pattern.

Ultralight Operations. The preferred alternative would entail locating a new ultralight runway southeast of the existing runways between Fire Creek and the Alaska Railroad tracks. The ultralight runway is proposed to be 1,000 feet long by 50 feet wide. The proposed runway would be offset 1,052 feet east of the main runway – Runway 01L/19R – (950 feet from the relocated ski/tundra tire strip) which would allow simultaneous operations for ultralight vehicles and GA aircraft. Space for up to 3 lease lots and 57 ultralight vehicle tie downs would be available. The runway and apron surface would be grass or asphalt depending on public input during design. The runway is positioned so that the ultralight traffic pattern could be flown, to the extent possible, to the west of the railroad tracks while also minimizing involvement with adjacent wetlands.

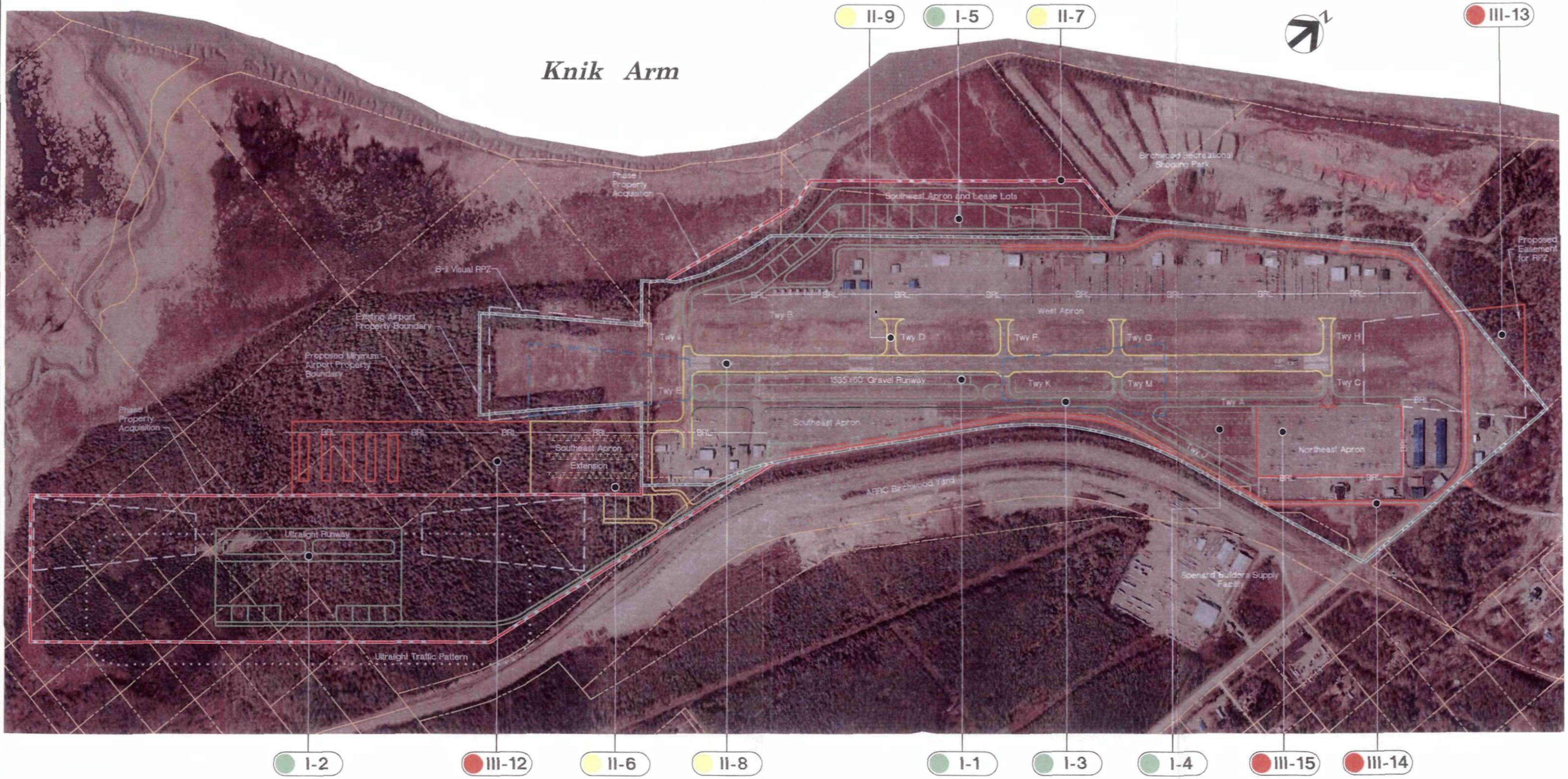
Taxiways and Aprons. After moving the tundra tire/ski and ultralight operations, Runway 01R/19L would be returned to use as a taxiway (to be denoted as Taxiway A). In front of the SE Apron it would continue to be intended to serve the SE Apron tundra tire/ski planes in the A-1 category. To provide adequate separation between the runway and Taxiway A, the taxiway would be shifted 50 feet east, to meet A-1 standards. Along the NE apron, the taxiway would be designed to B-II standards. Taxiway A from Taxiway K to E would be offset to the east by 50 feet from the original; Taxiway A from Taxiway C to K would be offset to the east 40 feet from the original.

The NE Apron would also be expanded to accommodate approximately 39 additional tiedown spaces and a new entry/exit taxiway constructed. The first phase is a triangular expansion of the NE Apron to provide an additional 39 tiedowns. The final phase would put lease lots into the triangular area and reduce the tiedown spaces to 25. To accommodate aircraft parking and lease lot development, however, the preferred alternative would provide an expansion of the SE and West Aprons. These apron expansions would accommodate approximately 12 GA lease lots and T-hanger development to meet forecast demand. New lighted taxiways that meet B-II standards would be developed to access these lease lots; a taxiway of 535 feet by 60 feet would access the SE Apron expansion and a taxiway of 400 feet by 60 feet would access the West Apron expansion.

Vehicle Access and Circulation. The SE Apron access road would be extended approximately 3,800 feet to the southeast to provide access for the new ultralight runway. A cul-de-sac turnaround at the end of the road would be large enough to accommodate commercial trucks. A new driveway and short access road would be connected to this road extension to the new lease lots on the SE Apron expansion. 4,300 feet of the existing west side access road would be reconstructed and it would be extended an additional 1,870 feet to access new T-hangar development areas on the West Apron expansion. For the eastside Apron expansion, 2,950 feet of new eastside access road would need to be built and 1,220 feet of existing eastside access road would require reconstruction.

5.2 Alternative 2

Under Alternative 2, an ultralight runway would have been relocated to the vacant parcel of land south of the BRSP and west of the west apron. Enough space is present in this area for a 1,000-foot runway, attendant tie-downs, and lease lots. The proposed runway would have been offset 1,165 feet from Runway 01L/19R, which would have allowed for simultaneous operations on the new ultralight runway and Runway 01L/19R. The ultralight operations would have taken place over the shoreline of Knik Arm within the larger GA traffic pattern. The proposed traffic pattern, however, would have introduced ultralight operations directly over the BRSP; where people congregate for open-air competitions. Flying



GRAPHIC SCALE
300' 0 300' 600'
SCALE IN FEET

COLOR INDEX

PHASE I

PHASE II

PHASE III

III-11 — See Legends — Phase Color Index

PHASE I LEGEND

I-1 Move gravel/ski strip

I-2 Construct ultralight runway, apron, and access road

I-3 Move taxiway 'A' to satisfy A-I/B-II standards

I-4 Expand Northeast apron

I-5 Develop 12 new lease lots

PHASE II LEGEND

II-6 Develop new lease lots and tiedown spaces

II-7 Install new security fence

II-8 Runway/taxiway pavement rehabilitation

II-9 Construct new taxiway

II-10 Part 77 obstruction removal

PHASE III LEGEND

III-12 Develop 7 new lease lots

III-13 RPZ property acquisition

III-14 Airport roadway pavement rehabilitation

III-15 Northeast apron pavement rehabilitation

Figure 5.1

ALTERNATIVE 1

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BIRCHWOOD AIRPORT
MASTER PLAN
PROJECT No. 54741

DEVELOPED BY:
HDR ALASKA, INC.

12-20-05

over development is prohibited by the ultralight operating rules (FAR Part 103), and the RSA for the airstrip would have precluded the gathering of people for competitions. As such, part or all of the land currently occupied by the BRSP would have been acquired to prevent stray bullets from striking ultralight vehicles and to ensure the RPZ did not allow large gatherings of people. Runways 01L/19R and 01R/19L would have continued to function as one runway and share the same traffic pattern. Simultaneous operations on 01L/19R and 01R/19L would still have been prohibited.

Of the three action alternatives developed during the master plan, Alternative 2 was not carried forward. Under Alternative 2, an ultralight runway would have been relocated to the vacant parcel of land south of the BRSP and west of the west apron. Alternative 2 was eliminated from further evaluation and was not carried forward for the following reasons:

- Low-level ultralight traffic patterns over and in front of the shooting range would have been unsafe.
- Ultralight traffic patterns and RPZ would have conflicted with the remaining BRSP activities, which would have required relocating the BRSP or a significant size reduction of the BRSP, causing unacceptable impacts to the shooting public.
- Finding a potential replacement location for the shooting park would have been difficult, if not impossible, and would have had a high potential for impacts and public controversy in whatever location was found.
- Slower moving ultralight vehicle patterns would occur within the larger, faster, GA pattern posing potential safety problems, especially when ultralights are entering or leaving the pattern. This situation would be exacerbated because the ultralights are not required to carry radios.
- The mouth of Fire Creek and shoreline adjacent to the proposed ultralight strip has been identified as critical bird habitat. Concentrations or shorebirds and waterfowl could cause a potential bird strike hazard to ultralight aircraft with the Alternative 2 configuration.

5.3 Alternative 1

Ski/Tundra Tire Operations. Under Alternative 1, the ski and tundra tire operations would be relocated to a widened operating area along Runway 01L/19R in the identical manner and location as the Proposed Alternative.

Ultralight Operations. Under Alternative 1, a new ultralight runway would be constructed southeast of the existing runways between Fire Creek and the Alaska Railroad tracks in the identical manner and location as the Proposed Action.

Taxiways and Aprons. Just as in the Proposed Action, Runway 01R/19L would be returned to use as a taxiway and would be shifted 40 feet east, to meet B-II separation standards. Identical to the Proposed Action, the SE Apron tie downs would be rotated 90 degrees and vehicle parking developed.

To accommodate aircraft parking and lease lot development, Alternative 1 would provide additional space on three separate aprons. (1) A new apron area would be located west of the airport and south of the BRSP. It would accommodate a row of lease lots with taxiway access connecting to Taxiway I. This expansion could accommodate approximately 18 GA lease lots. A new lighted taxiway (1,100 foot x 35 foot) that meets B-II standards would be developed to access these lease lots. As part of the work on the existing SE Apron, the tie downs would be rotated 90 degrees, which would allow 11 additional tie downs to be developed. In addition, vehicle parking would be developed along the apron, to allow space for vehicles to park without having to drive on (and rut-up) the snow surface of the apron during winter. (2) Expansion of the NE Apron would accommodate approximately 39 additional tie-down spaces. A new entry/exit taxiway would connect the expanded parking area with Taxiway A. (3) Ultralight apron and lease lot development would be constructed in association with the ultralight runway development as described earlier. No taxiway would be constructed between the new ultralight facility and the existing airport. Security fencing and ROW would be a component of the project.

Vehicle Access and Circulation. The SE Apron access road would be extended approximately 3,800 feet to the southeast to provide access for the new ultralight runway. A cul-de-sac turnaround at the end of the road would be large enough to accommodate commercial trucks. A new loop access road would extend from the existing west side access road to the new lease lots.

LEGEND

WHITE LINES ARE PROPOSED FEATURES

YELLOW LINE IS PROPOSED AIRPORT BOUNDARY

GREEN LINE IS EXISTING AIRPORT PROPERTY BOUNDARY

ALTERNATIVE 2

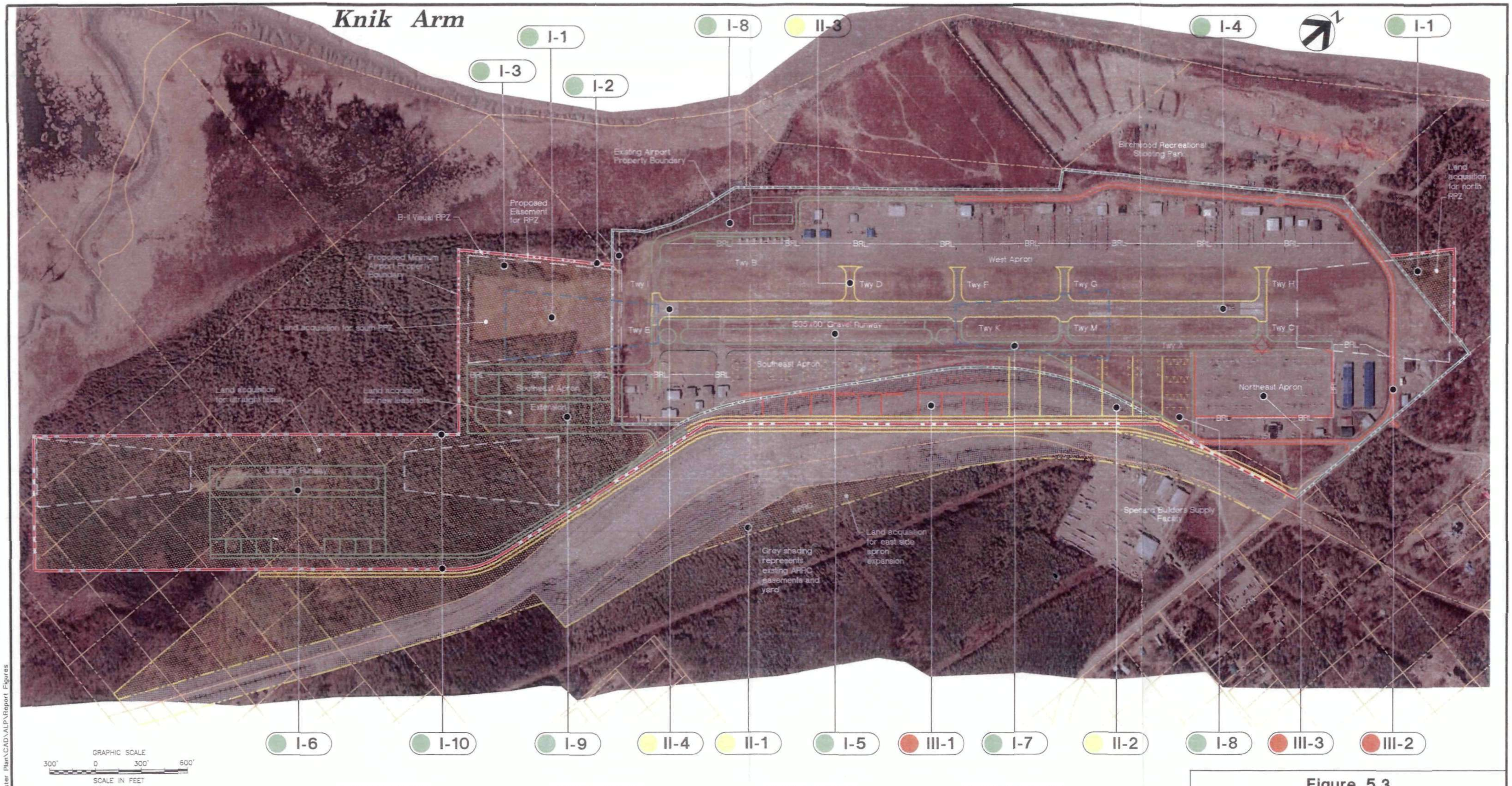
NOT TO SCALE
7-02-03

TRANSPORTATION & PUBLIC FACILITIES
STATE OF ALASKA

DEVELOPED BY:
HDR ALASKA, INC.

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND
PUBLIC FACILITIES
BIRCHWOOD AIRPORT
MASTER PLAN
PROJECT No. 54741

FIGURE 5.2



COLOR INDEX

- PHASE I
- PHASE II
- PHASE III

III-1 — See Legends; Phase Color Index

PHASE I LEGEND

- I-1 RPZ property acquisition
- I-2 Security fence relocation
- I-3 FAR Part 77 obstruction removal
- I-4 Change main runway designation markings
- I-5 Construct new gravel runway 02S/20S

PHASE I LEGEND

- I-6 Construct new ultralight runway 02U/20U
- I-7 Relocate taxiway A
- I-8 Northeast & southwest apron expansion
- I-9 Develop new lease lots
- I-10 Security fence

PHASE II LEGEND

- II-1 Purchase property for compatible land use
- II-2 East side apron expansion
- II-3 New taxiway
- II-4 Runway & taxiway pavement rehabilitation

PHASE III LEGEND

- III-1 Additional east side lease lot development
- III-2 Airport perimeter road improvements
- III-3 Northeast apron pavement rehabilitation

Figure 5.3
ALTERNATIVE 3
(Proposed Action)

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BIRCHWOOD AIRPORT
MASTER PLAN
PROJECT No. 54741

DEVELOPED BY: HDR ALASKA, INC.

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12-20-05

6.0 Preferred Alternative and Development Recommendations

This section presents the proposed airport development plan to bring the airport up to full standards and meet airport needs over the 20-year planning horizon. The airport layout plan set (see Attachment A) depicts the preferred alternative. Figure 5.3 depicts each project under the three phases of the airport master plan preferred alternative.

6.1 Demand-Capacity Analysis

Table 6-1 depicts the forecast needs for based aircraft and lease lot development by phase of development. In the 0-5 year phase of development, 15 new lease lots and space for an additional 81 based aircraft will be needed. New lease lots and aprons would need road access to the public road system and efficient taxiway access to the runway system. Taxiway development should include lighting that matches the existing lighting. In the 20-year planning horizon, a total of 30 additional lease lots and space for an additional 325 based aircraft would be needed.

6.2 Airfield Facility Requirements

Birchwood Airport should continue to serve primarily as a GA airport, and should remain classified as a local airport in the AASP. The forecast fleet mix for the Birchwood Airport will be comprised primarily of ARC A-I and ARC B-II aircraft, and therefore the airport should be designed to these ARC A-I and ARC B-II design standards. A-I aircraft have approach speeds less than 91 knots and wingspans less than 49 feet. B-II aircraft have approach speeds between 91 and 121 knots and wingspans between 49 and 79 feet.

6.2.1 Runways

Table 6-1 depicts the existing and proposed runway dimensions for ARC A-I and B-I design standards. Birchwood Airport will continue to have two runways.

To remedy the design deficiencies associated with runway 01R/19L (inadequate width, deficient RPZ, ROFA, runway-taxiway separation, and to reduce the likelihood for simultaneous operations to occur), tundra tire and ski operations would be relocated to a widened portion of Runway 01L/19R. The gravel surface would be 60 feet wide and 1,535 feet long (of sufficient length and width to accommodate ARC A-I aircraft). This widened portion of the runway would be surfaced in gravel and remain unplowed in the winter to continue to serve tundra tire and ski operations. The two runway surfaces (pavement and gravel) would operate as a single runway and share the same traffic pattern and be denoted as "Runway 01/19."

Moving the gravel runway to be adjacent the main runway will enable the following deficiencies to be brought up to standards:

- The width of Runway 01R/19L will be brought up to A-I standards, from 50 feet to 60 feet.
- It will ensure full dimensions of the runway protection zone on Runway 01R/19L; the southern RPZ for the gravel runway will be contained within the southern RPZ for the main runway.
- By moving the gravel runway away from the southeast apron access road this road will no longer penetrate the gravel ROFA.
- The existing separation between Runway 01R/19L and the southeast apron taxilane, which is deficient by 45 feet, will meet the required 150 foot separation standard.
- The conflict between UL vehicles and GA aircraft sharing the same airspace will be eliminated by the construction of the new ultralight runway. The new ultralight runway (proposed at 1,000 feet long by 50 feet wide) will be built and offset 1,052 feet east of the main runway (and 950 feet from the relocated ski/tundra tire strip) which will safely allow simultaneous operations for

LEGEND

- Airport Property Boundary
- Airport Features
- Alaska Railroad Tracks
- Alt. 1 (Phase 1)
- CriticalHabitatAreas
- 5 foot contours
- Alt. 2 (all phases)
- Alt. 3 (Phase 1)

Wetlands*
- A
- B

Floodplains
- 100 Year
- 500 Year
- Floodway

* The Municipality of Anchorage classifies wetlands as A, B, or C, depending upon their functions and values.

N

DATE: December 2005

0 500 1,000 2,000 Feet

ENVIRONMENTAL CONSIDERATIONS

BIRCHWOOD AIRPORT MASTER PLAN

FIGURE 6.1

Z:\07072 DOT&PF\204 Birchwood Airport Master Plan\GIS\MXD\Environmental Considerations (EA).mxd ultralight vehicles and GA aircraft. The actual length, width and surface of the UL runway and apron will be determined via public input during design.

The runway safety area will also be extended on the approach end to 01L by 100 feet, in addition to the need for taxiway and runway pavement rehabilitation in the intermediate-term.

Table 6-1
Runway Geometric Dimensional Standards, Birchwood Airport

	FAA ARC B-II Standards	FAA ARC A-I Standards	Existing Runway 1L / 19R	Existing Runway 1R/19L
Runway Length	3,300 feet	2,100 feet	4,010 feet	2,200 feet
Runway Width	75 feet	60 feet	100 feet	50 feet
Runway Shoulder Width	10 feet		10 feet	10 feet
Runway Protection Zone Length	1,000 feet	1,000 feet	1,000 feet	1,000 feet
Runway Protection Zone Inner Width	500 feet	250 feet	250 feet	250 feet
Runway Protection Zone Outer Width	700 feet	450 feet	450 feet	450 feet
Obstacle Free Zone Length[1]	200 feet	200 feet	200 feet	200 feet
Obstacle Free Zone Width	250 feet	250 feet	500 feet	250 feet
Object Free Area Length[1]	300 feet	240 feet	300 feet	240 feet
Object Free Area Width	500 feet	250 feet	500 feet	250 feet
Runway Centerline to:				
Taxiway/Taxilane Centerline	240 feet	150 feet	300 feet	200 feet
Aircraft Parking Area	250 feet	125 feet	390 feet	595 feet

[1] Extends this length beyond each end of the runway

6.2.2 Taxiways

There are ten taxiways that provide access to Birchwood's two runways; all are 50 feet wide. Of the ten taxiways, two taxiways run parallel to Runway 01L/19R from the aprons and parking areas and eight short taxiways connect the parallel taxiways to the runway.

With the new gravel runway, connecting taxiways will be developed on the north and south ends to A-I standards. Taxiway A will be relocated 240 feet east of Runway 01L/19R between Taxiways C & K, where it would be constructed to B-II standards (35 feet wide) and to A-I standards (25 feet wide) between Taxiways K & E. A new connecting taxiway would also be constructed between Taxiways F and I, to link Runway 01L/19R to Taxiway B.

6.2.3 Aprons/ Lease Lots

The forecast of air traffic activity estimates that 125 new aircraft will be based at Birchwood Airport by the year 2020. These aircraft will be stored in a combination of hangars and tiedowns. The full east side apron expansion will provide enough space for tiedowns and hangar lease lots for these new aircraft..

The first phase of the NE apron expansion will accommodate 39 new tiedown spaces; the final phase will reduce the number of tiedowns to 25 but make room for new commercial lease lots. The southeast apron will be expanded to provide capacity for 12 GA lease lots. The east apron will be expanded to provide capacity for five commercial and 7 private GA lease lots, with apron capacity for 97 public and 30 commercial GA tiedowns. In conjunction with the construction of the new ultralight runway, an apron will be sized to accommodate 3 lease lots and 57 total based ultralight vehicles. Phase III calls for the east apron expansion of 3 additional ultralight lease lots and space to accommodate 104 ultralight vehicles total. In the long-term, the northeast apron pavement will be rehabilitated.

6.2.4 Airspace

A number of trees obstruct the approach and transition surfaces and will be removed or cleared. Obstruction removal will also be needed where the east apron expansion will occur. Before obstruction removal, a more complete obstruction survey should be completed.

6.2.5 Navigational and Communications

6.2.6 Fueling Facilities

6.2.7 Airport Maintenance Facilities

6.2.8 Aircraft Rescue and Fire Fighting

6.2.9 Utilities

6.2.10 Airport Security

Airport facilities need to be secure from unauthorized access. Unauthorized persons and vehicles, and preferably large animals, should be kept off of active aircraft areas. Install a new security fence. The preferred alternative includes relocating the chain link security fence out of the approach end of Runway 01L ROFA. A new security fence would be constructed in conjunction with the SE apron expansion and ultralight runway construction.

6.2.11 Access

The rehabilitation of the airport perimeter roadways is called for in the long-term.

6.3 Phasing

The recommended improvements are summarized in the following table. Projects have been identified for near-, intermediate-, or long-term implementation by the following phases:

Phase I	=	0 to 5 Years
Phase II	=	5 to 10 Years
Phase III	=	10 to 20 Years
Phase IV	=	20 + Years

The development costs are planning estimates and should be used to establish "order of magnitude" only. Detailed estimates must be prepared prior to committing any funds for individual projects.

The airport master plan, development schedule, and cost estimates should be reviewed periodically as it may be necessary to shift individual projects within or between planning periods to satisfy actual demand.

Table 6-2
Projects and Estimated Costs by Phase, Birchwood Airport

	Phase I (0-5 years) Proposed Projects	**Cost**
I-1	**Acquire property for Runway Protection Zone** (for the north end and south end of the main runway).	$370,000
I-2	**Relocate security fence** out of approach end of Runway 01L ROFA.	$40,000
I-3	**Remove FAR Part 77 obstructions.**	$94,000
I-4	**Change main runway designation markings.**	$110,000
I-5	**Construct new gravel runway**; move gravel/ski runway (1,535' x 60') and construct to A-I standards. Develop connecting taxiways on the north and south ends (to A-I standards). Construct parking areas at the southeast apron so that vehicles have a place to park in the winter without driving on the apron.	$1,100,000
I-6	**Construct new ultralight runway** (1,000' x 50') and apron sized to accommodate 3 lease lots and 57 total based ultralight vehicles. Construct access road (two 12-foot lanes) including right-of-way (ROW) acquisition.	$4,400,000
I-7	**Relocate Taxiway A** 240 feet east of Runway 01L/19R, construct to B-II standards (35 feet wide) between Taxiways C & K and to A-I standards (25 feet wide) between Taxiways K & E.	$950,000
I-8	**Expand northeast and southwest apron** to provide 50 tiedowns.	$750,000
I-9	***Develop new lease lots** to provide capacity for 12 general aviation lease lots,* with associated taxiway access (B-II standards) and vehicle access (two 12-foot lanes). Includes ROW acquisition and security fencing. Develop T-hangar lease lot area on the west side of the airport.	$2,500,000
I-10	**Install new security fence.**	$350,000
	Subtotal Phase I	**$10,664,000**
	Phase II (5-10 years) Proposed Projects	
II-1	**Purchase property for compatible land use** (for future east side apron expansion).	$2,700,000
II-2	**Expand east apron** to provide capacity for five general aviation lease lots, with apron capacity for 33 public general aviation tiedowns. Construct associated roadway and taxiway access. Relocate railroad track to provide space for the east apron expansion.	$25,000,000
II-3	**Construct new connecting taxiway**, between Taxiways F and I, to link Runway 01L/19R to taxiway B.	$68,000
II-4	**Runway and taxiway pavement rehabilitation**; extend the runway safety area (RSA) on approach end to 01L by 100 feet.	$500,000
	Subtotal Phase II	**$28,268,000**
	Phase III (10-20 years) Proposed Projects	
III-1	**Develop additional east apron lease lots**; Develop 3 additional ultralight lease lots, and additional apron space to accommodate 104 ultralight vehicles total.	$3,200,000
III-2	**Rehabilitate airport perimeter roadways.**	$200,000
III-3	**Rehabilitate northeast apron pavement.**	$500,000
	Subtotal Phase III	**$3,900,000**

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Birchwood Airport Master Plan

Office Study 1

AKSAS Project No. 54741

Draft

Prepared for:

Alaska Department of Transportation
and Public Facilities
Central Region

Prepared by:

HDR Alaska, Inc.
2525 C Street, Suite 305
Anchorage, Alaska 99503-2569

July 2002

Table of Contents

List of Tables

List of Figures

On or following page

Appendices

1.0 Overview and Issues

1.1 Introduction

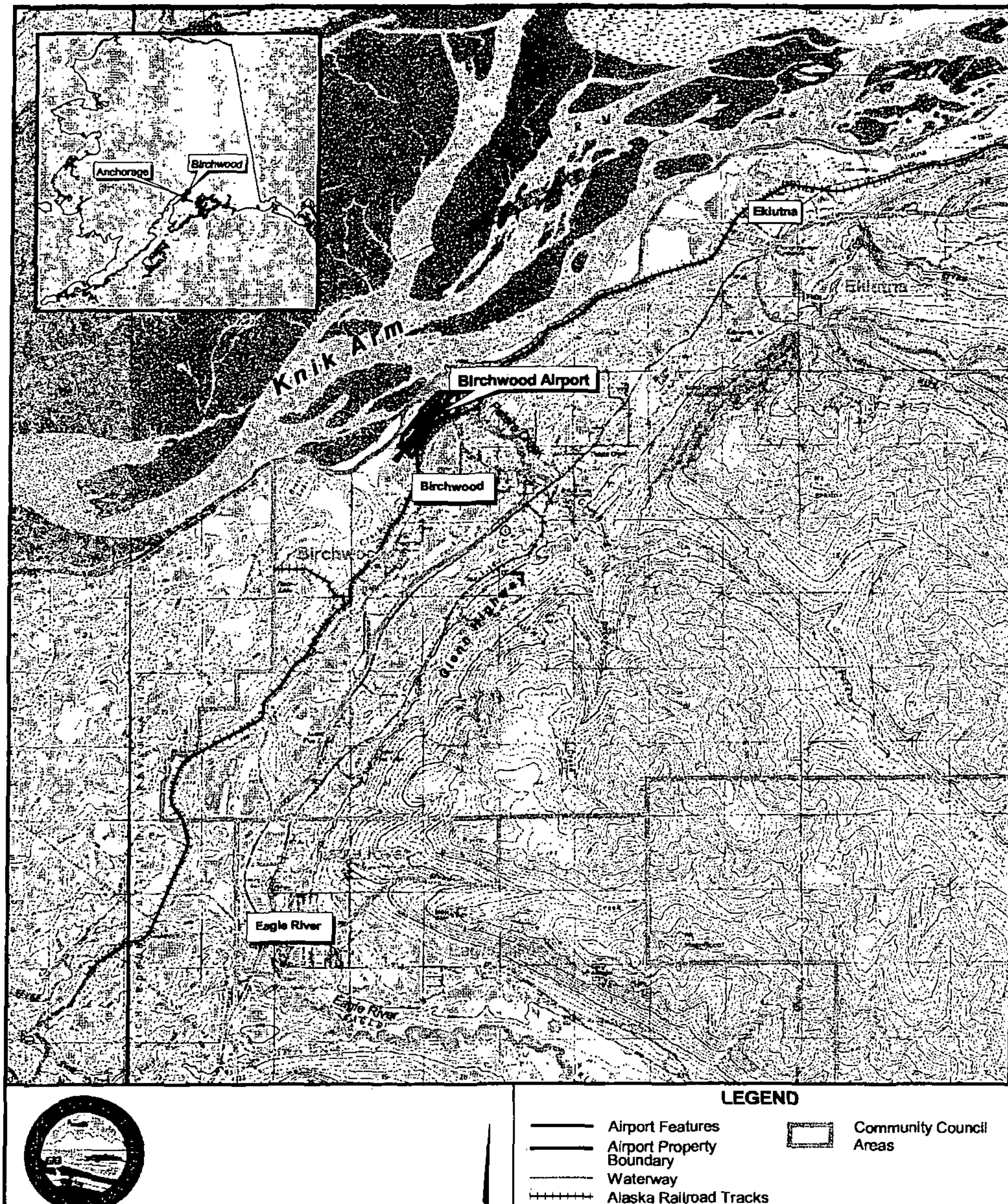
The purpose of the Birchwood Airport Master Plan is to recommend actions at the Birchwood Airport to improve safety and capacity; identify facilities required to serve existing and future air traffic demand; and to develop a phased implementation plan to meet forecast aviation needs for the next 20 years. This study presents the results of the first phase of the project. ***Section 1.0*** introduces the project; presents a summary of the public involvement process; and identifies issues noted during public outreach. ***Section 2.0*** presents the results of a background study of the community and its social, economic, and natural environment. ***Section 3.0*** presents the results of a background study and field reconnaissance of the airport. ***Section 4.0*** presents a forecast of future aviation demand for the planning period.

A second document, titled "Office Study 2," will be completed after this document is reviewed and finalized to present findings from the next phase of the project. "Office Study 2" will present information on airport facility standards, analyze demand and capacity, and evaluate potential airport development alternatives. Once both documents have been finalized, they will be adapted to form the final "Birchwood Airport Master Plan."

1.2 Overview

The Birchwood Airport is a general aviation (GA) airport located approximately 20 miles north of Anchorage and west of the Glenn Highway along Knik Arm. (See Figure 1.1.) The airport serves a regional role for Anchorage, Eagle River, Chugiak, Palmer, and Wasilla GA communities. Official records estimate the Birchwood Airport to have approximately 56,050 operations per year by private GA aircraft based at the airport, transient GA aircraft, flight schools operating at the airport, and ultra light vehicles. The airport has two runways. Runway 01L/19R is a paved runway that serves GA aircraft. It is 4,010 ft long and 100 ft wide, with taxiways on each side. Runway 01R/19L is 2,200 ft long (600 ft of pavement with 1,600 ft of gravel) and 50 ft wide and is intended for use by GA aircraft equipped with tundra tires or skis and by ultra light vehicles. Figure 1.2 depicts these airport features. Simultaneous operations on these parallel runways are not allowed. Official numbers indicate that there are 170 aircraft based at the airport. Unofficial counts estimate that upwards of 433 aircraft are on the airport at certain times. As a result, all lease lot space and tie downs are in use and airspace issues have become a primary concern for airport users.

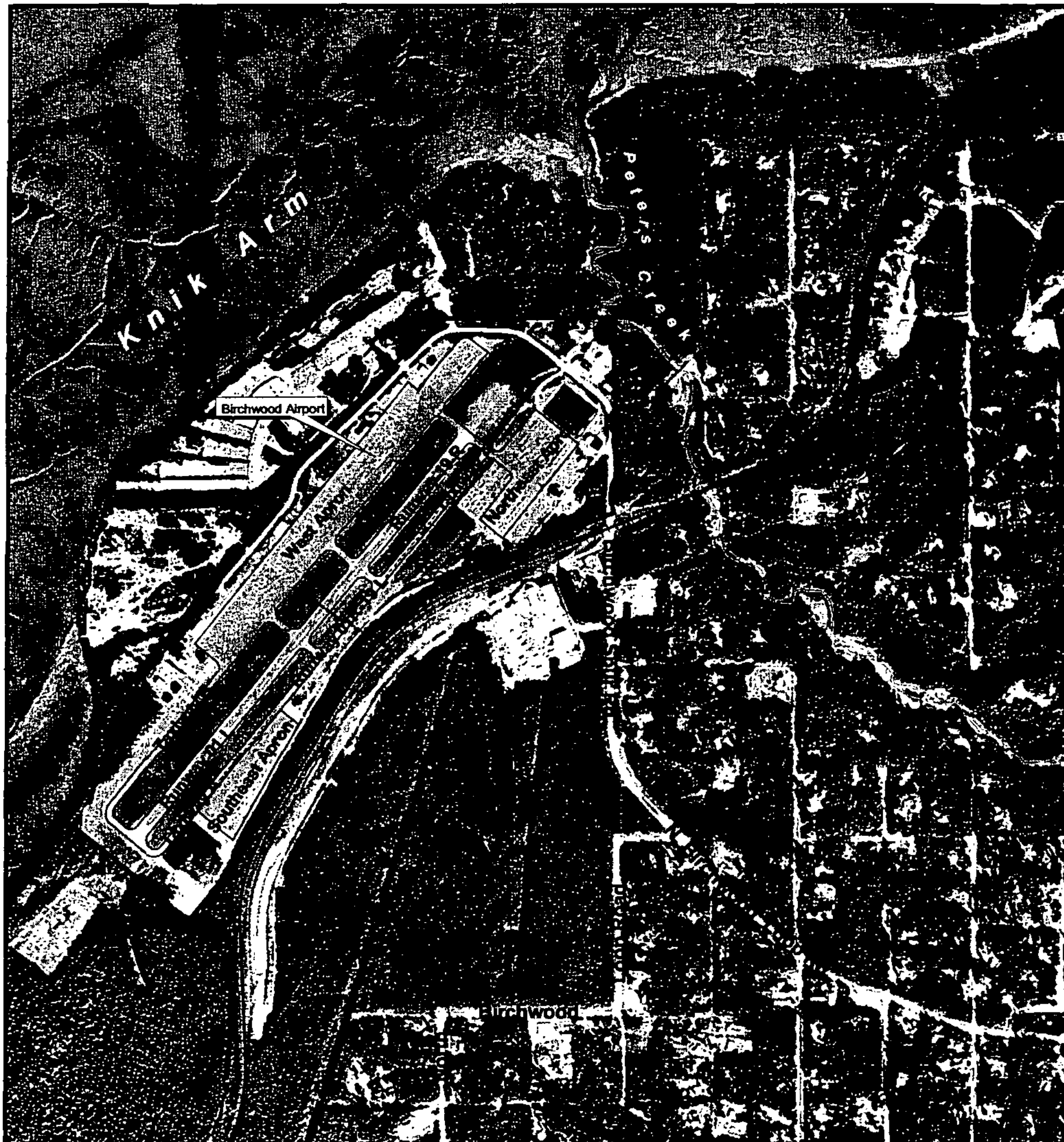
The Alaska Department of Transportation and Public Facilities (DOT&PF) has undertaken this master planning process at the Birchwood Airport as part of its periodic review of all airports under its purview. The DOT&PF operates and maintains over 250 airports statewide, and must determine through ongoing planning each airport's capability to accommodate forecast demand and to resolve any existing operational or environmental challenges. The Birchwood Airport Master Plan represents DOT&PF's evaluation of the Birchwood Airport and its recommendation for future improvements.



PROJECT VICINITY
BIRCHWOOD AIRPORT MASTER PLAN

DATE: March 2002

FIGURE 1.1



LEGEND

Airport Features	Runway 01L/19R: 4,010 X 100 ft, Asphalt, GA Operations.
Airport Property Boundary	Runway 01R/19L: 2,200 X 50 ft, Gravel, GA Operations with Tundra Tires or Skis and Ultralight Operations.
Waterway	
Alaska Railroad Tracks	

DATE: March 2002

500 0 500 1000 1500 Feet

1" = 1000'

AIRPORT FEATURES

BIRCHWOOD AIRPORT MASTER PLAN

FIGURE 1.2

1.3 Public Outreach

The DOT&PF is taking a practical and active approach to the public involvement component of this project. The intent is to involve the public, pilots, and lease lot holders throughout the planning process. This involvement has been found to be key to the successful implementation of airport master plans. A proactive public involvement program was devised to inform citizens about the nature of the proposed project, identify concerns, cultivate support for the project, and set the stage for the public meeting process. The following are the key components of DOT&PF's public involvement program for the Birchwood Airport Master Plan. Appendix A includes the Public Involvement Plan in its entirety.

Public Meetings. The project team will hold public meetings at key points in the project. The first meeting was held to introduce the project and to provide an opportunity for people to ask questions about any aspect of the project. The second meeting will occur in conjunction with alternatives development and analysis. The third public meeting will provide the public with an opportunity to comment on the draft environmental assessment (EA), the environmental analysis required by the National Environmental Policy Act (NEPA).

Potentially Affected Interest Identification and Project Mailing List. Another key element of the project's public involvement effort is the use of a project mailing list to identify and maintain contact with potentially affected interests. See Attachment A in Appendix A for the initial mailing list. This list will be used throughout the project to distribute information such as meeting notices and the availability of documents. It will be updated after each public meeting (using sign-in sheets) and upon receiving comments from the public.

Newsletters. At four key points in the project, the team will write and distribute newsletters to convey project information. Each newsletter will be timed to notify people of the three public meetings and to announce the completion of the project. These newsletters will also be posted to the project website.

Website. A cornerstone of the project's public involvement approach is the use of a project website (www.birchwoodairport.com). All reports and newsletters will be posted to the website for the public's easy access.

Airport Advisory Committee. Another public involvement tool incorporated into this project to ensure meaningful dialogue between team members and potentially affected interests is an Airport Advisory Committee (AAC). This group includes representatives from a broad range of airport interest groups such as existing lease lot holders, airport users, community members, Municipality of Anchorage (MOA) representatives, and Federal Aviation Administration (FAA) and DOT&PF representatives. See Attachment B of Appendix A for a list of the proposed AAC. The function of this group is to act as a sounding board for issues and ideas, and to review draft documents before they are made available to the general public. Meeting dates and locations will remain flexible and will be scheduled to coincide with the review of project reports.

1.4 Issues Identification

The main focus of initial public involvement efforts and field reconnaissance was to identify issues needing to be explored in the master plan. This section describes major categories of issues identified during the first phase of master plan development. These comments will be important for focusing the master planning effort. Some issues identified, however, may extend beyond the purview of the DOT&PF. Others may or may not be supported by further analysis to be conducted as part of the airport master plan process.

General Mixed-Use Issues and Comments

- The mixing of aircraft with widely varying performance capabilities is a safety issue. Better sequencing, communication, and safety practices are needed for all involved.
- Safety between ultra light and general aviation (GA) traffic is a top issue.
- More education and/or enforcement of existing airport operating procedures is needed.
- More information needs to be spread to GA pilots about ultra light vehicle and helicopter patterns.
- Two **true** parallel runways are needed.
- The two runways are too close together.
- Not enough real estate is available to accommodate the varied activities and traffic density.
- There is a need to buy additional land from Eklutna Inc. to separate ultra light and fixed wing operations. This separation would allow for more normal traffic patterns and approaches.
- Another option is to buy land in the area of the existing railroad tracks and locate an additional ultra light runway there.
- The existing Runway 19L/1R traffic pattern builds in conflict between ultra lights and GA aircraft.
- A remote communicator outlet (RCO) should be located on the field so that pilots can more readily talk to Anchorage Center.
- Guidance signs should be installed at all taxiway/runway intersections.
- Threshold markers should be installed on Runway 1R.
- A new taxiway between the northeast and southeast apron should be constructed. This taxiway would be up tight against the access road and would keep pilots from using Runway 19L as a taxiway.
- The taxiways should be widened.

GA Specific Issues and Comments

- The run-up areas at the runway ends should be wider to allow airplanes to turn 360 degrees to check for other aircraft in the pattern.
- The runway should be extended.
- It is important to keep the ski strip (Runway 19L/1R) in future plans.
- A larger ski area is needed.
- More tie-down space for ski planes should be provided.
- Pilots want electrical outlets at tie-downs.
- A dedicated gravel/ski strip is needed.

- There is a need to keep parking in the southeast ramp (ski/tundra tire) so an aircraft can "taxi through." This activity is more convenient on skis.

Ultra Light Vehicle Specific Issues and Comments

- A taxiway for ultra light vehicles is needed.
- An ultra light-only runway is needed.
- Turnouts or elephant ears on the ultra light vehicle runway are needed to let ultra lights perform a 360-degree turn to check for approaching GA aircraft or to get out of the way.
- Taxiways should extend to both ends of the ultra light vehicle landing zone.
- More space for ultra light vehicle operations is needed.
- There is a need to recognize that ultra light vehicle pilots have the right to use publicly funded/owned airports and facilities.

Glider Specific Issues and Comments

- Arrangements should be made to accommodate glider operations. Providing specific glider accommodations will help operations at the field run more smoothly by reducing the time it takes for the gliders to takeoff and land.
- A glider staging area is needed.
- White runway lights and blue taxiway lights should be mounted flush to the ground to accommodate long wing gliders and snow plow operations.
- It would be difficult to keep lights mounted flush to the ground free of snow and ice.

Environmental Issues

- For the Chugiak-Eagle River area community, it is important that pilots are aware of traffic procedures for noise abatement, etc.
- A pilot noted that noise has only been an issue to the adjacent neighborhoods on a few occasions. Summer, with the long daylight hours, is really the only time when there is a potential for a problem, but such problems occur only occasionally.

Navigation

- The airport should have instrument and GPS approaches.
- A hot-line telephone to the Flight Service Station (FSS) is needed.

Airport Condition/Maintenance Issues

- Ownership and responsibility of the entire facility could be turned over to the Municipality of Anchorage.
- Security gates that allow card or code access are needed to reduce incidences of vandalism and theft.
- Airport maintenance is a key issue. A need exists to:
    - Overlay all asphalt cement surfaces.
    - Install a complete new radio-controlled runway lighting system with the wires installed in conduit with junction boxes provided for maintenance access.
    - Purchase and install a new heated, insulated regulator shed.
    - Purchase and install a new upgraded beacon.

   - Purchase and install a new backup generator.
   - Purchase and install a new perimeter fencing with automatic security gate openers.
   - Replace current snow blower with a new, upgraded unit.
   - Replace the push blade attachment for the front-end loader with a new, wider plow
- Public restrooms are needed.
   - In general.
   - On the southern end.
   - On the northern end.
   - Midfield.
   - As part of a DOT&PF facility.
   - As part of a private development on airport property.
- A pilot shack/lounge (with a telephone and a restroom) is needed.
- Public pay phones are needed. There is a working public pay phone on the north side of the Arctic Sparrow hangar, but this is not a convenient location for GA pilots.
- Telephones should be part of a private development only.
- A public-use hangar is needed to allow pilots to thaw aircraft in winter or to perform light maintenance.
- Public-use space for a café, snack bar, showers, etc, is needed.
- A fence is needed around Eklutna Inc. land to prevent shooting on it.
- An access road around Runway 1L and 1R is needed to minimize runway incursions.
- Access to and the cost of tie-downs and leases are issues.
- More lease lots should be added.
- More land for hangars is needed.
- The southwest corner behind the metal "T" hangars needs development. When those "T" hangars went in (circa 1987) the plan was to fill and level the low area behind them and put in more "T" hangars (from the existing eight to up to 60).
- The existing 100 yards of gravel road from Birchwood Loop to the northeast apron should be paved.
- There should be no "lottery" for parking.
- Lighting should be added for the entire west ramp and especially for the transient parking area.
- Runway 01R is lower than Runways 01L and 19L resulting in poor drainage and ponding of water.
- Private snow removal from the lease lots has been a problem and is a safety issue. Leasees should take care of their own snow removal. Lessees could haul their snow away or store it on their own lease lot. Another possibility is to allow the lessees to use the southwest undeveloped area for snow storage.

<u>Summary of Safety Issues</u>

- Safety issues arise as a result of mixed operations of two different aircraft types (GA aircraft and ultra light vehicles) and the right-of-way rules for each.
   - The two runways are too close together

- Effective implementation of the Birchwood Airport Operating Rules and Procedures requires the full participation of all the pilots using the airport.
    - GA pilots have been observed to land short, land long, turn crosswind too soon, and at too low of an altitude. When traffic is heavy, these unexpected operations cause delay and frustration.
    - Ultra light vehicles are not allowed to fly over buildings, and therefore they fly a non-standard pattern.
    - Radio use at this airport is not mandatory, which complicates the issue of unexpected operations and non-standard patterns.
- Operating procedures are now enforceable under both state statute and regulation.
- There is a big difference in airspeed of a GA aircraft and ultra light vehicles.
- Under normal operating procedures, ultra light vehicles must give way to all aircraft and gliders.
- Any aircraft (including ultra light vehicles) has the right of way when an emergency is declared.
- Ultra light vehicle pilots do not have right-of-way (except in an emergency) and simultaneous operations on the two runways are prohibited. A situation can occur, therefore, where the slower-flying ultra light vehicle can be on final for landing and have a faster GA airplane pass by to land slightly ahead of the ultra light vehicle. When this happens the ultra light vehicle pilot must abort his or her landing attempt and fly a full circle (fly a 360) to create time for the GA plane to taxi off the runway.

- The existing Runway 19L/1R traffic pattern builds in conflict.
- The gravel runway is too short.

<u>Ideas for Alternatives</u>

- Add a floatplane basin. A floatplane facility could be accommodated by shifting the railroad tracks east and locating the floatplane basin in the area of the existing tracks.
- Construct two **true** parallel runways.
- Separate the two runways by the required 700-ft spacing:
    - Buy additional land from Eklutna Inc. and relocate one runway.
    - Buy land in the area of the existing railroad tracks and locate an additional ultra light vehicle runway there.
- Create a taxiway and runway only for ultra light vehicles.
- Construct turnouts or elephant ears on the ultra light vehicle runway to let ultra light vehicles perform a 360-degree turn to check for approaching GA aircraft or to get out of the way.
- Extend taxiways to both ends of the ultra light vehicle landing zone.
- Create a glider staging and landing area.
- Modify the infield between the runways to an open grass infield for alternate/emergency landings or staging for gliders. This would also require moving the existing windsock to the opposite side and mounting white runway lights and blue taxiway lights flush to the ground to accommodate long-wing gliders. This type of system is used successfully in Canada, but it may be problematic during snow removal.
- Install guidance signs at all taxiway/runway intersections.

- Install threshold markers on Runway 1R.
- Construct a new taxiway between the northeast and southeast apron, up tight against the access road, to keep pilots from using Runway 19L as a taxiway.
- Create taxiway access with a hold point midway on Runway 19L/1R.
- Widen taxiways.
- Widen run-up areas to allow airplanes to turn 360 degrees to check for other aircraft in the pattern.
- Extend the runway.
- *Create a larger ski area.*
- Provide more tie-down space for ski planes.
- Construct a dedicated gravel/ski strip.

Other Comments

- Campbell Airstrip could be opened to relieve pressure at Birchwood.
- It is important for the Birchwood Airport to be a self-supporting facility.
- Use should be expanded for economic development.
- It could be useful to study the mixed-use issues in Soldotna (a contact is Doug Anderson) and in Fairbanks at Bradley Field, two airports with ultra light vehicle activity.
- Is there a need for the airport to be relocated within the 20-year planning horizon?
- Given that this is a 20-year planning process, it stands to reason that by the end of this planning period, every available area of land at the Birchwood Airport will be developed.
- The airport contributes to the state economy—many businesses are located at the airport.
- Providing a safe operating condition at the airport is the most important issue.

2.0 Social, Economic, and Natural Environment

2.1 Community Profile

This section describes the social, economic, and natural environment of the Chugiak-Eagle River area. Understanding airport operations within these contexts is an essential component of producing and implementing an appropriate plan for the Birchwood airport.

2.1.1 Location and Regional Setting

The Chugiak-Eagle River area is located approximately 10 miles north of the Anchorage metropolitan area. It extends northeastward for approximatley15 miles until it meets its southern boundary at the Knik River.

2.1.2 Historical and Cultural Background

The Tanaina, a group of Native American Indians, originally inhabited the area several hundred years ago. They are currently represented by the Eklutna Tribe, many of whom live in the village of Eklutna at the northern end of the Chugiak-Eagle River area. These people lived by subsistence and moved from place to place seasonally for hunting and gathering food. Most settlements were located on the western side of Cook Inlet or on the Kenai Peninsula. A small group of Tanaina inhabited the eastern side of Knik Arm. Traditional lifestyles for the Tanaina began to change around the turn of the 19th century as a result of traders and prospectors.

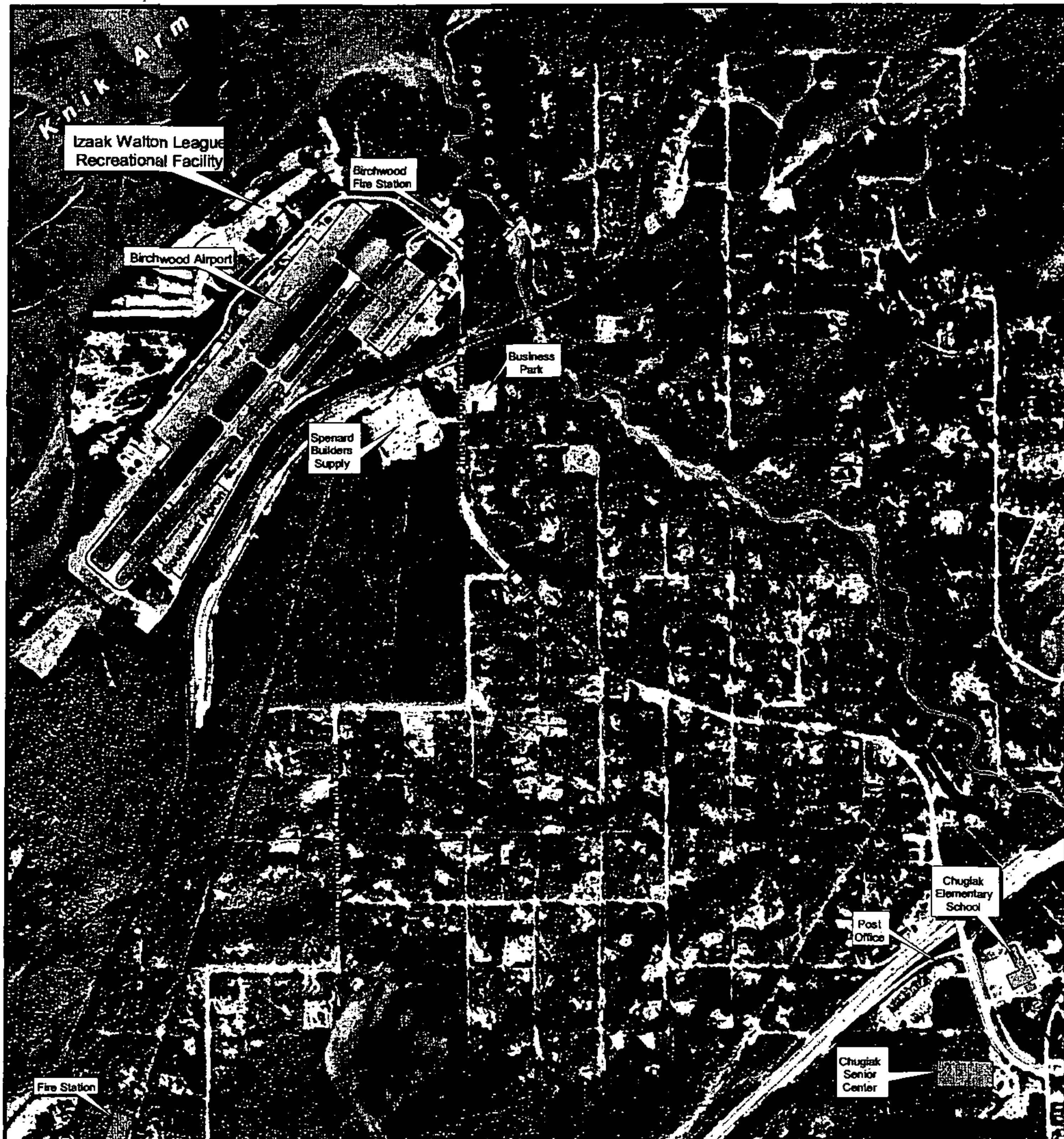
The federal government and the construction of the Alaska Railroad have principally defined the modern history of the Birchwood area. Subsequent developments included the Glenn Highway. Settlement patterns were influenced through the federal government's homesteading programs; the development of two military installations (Fort Richardson and Elmendorf Air Force Base); and further local development of transportation, communication, and land management facilities in the area. As a result of the Alaska Native Interest Lands Act (ANILCA), Eklutna, Inc. is the largest landholder in the area.

2.1.3 Government Structure

The Chugiak-Eagle River area is part of the Municipality of Anchorage and is represented by Assembly District 2. Several active community councils in the area (Birchwood, Eklutna, Chugiak, and Eagle River) provide a forum for the dissemination of information and public comment on a broad variety of issues.

2.1.4 Economy

The Chugiak-Eagle River area is a suburban residential area with little commercial or industrial activity. Most residents who live in this area commute to Anchorage, Eagle River, or the



LEGEND

- Airport Features
- Airport Propery Boundary
- Waterway
- Alaska Railroad Tracks

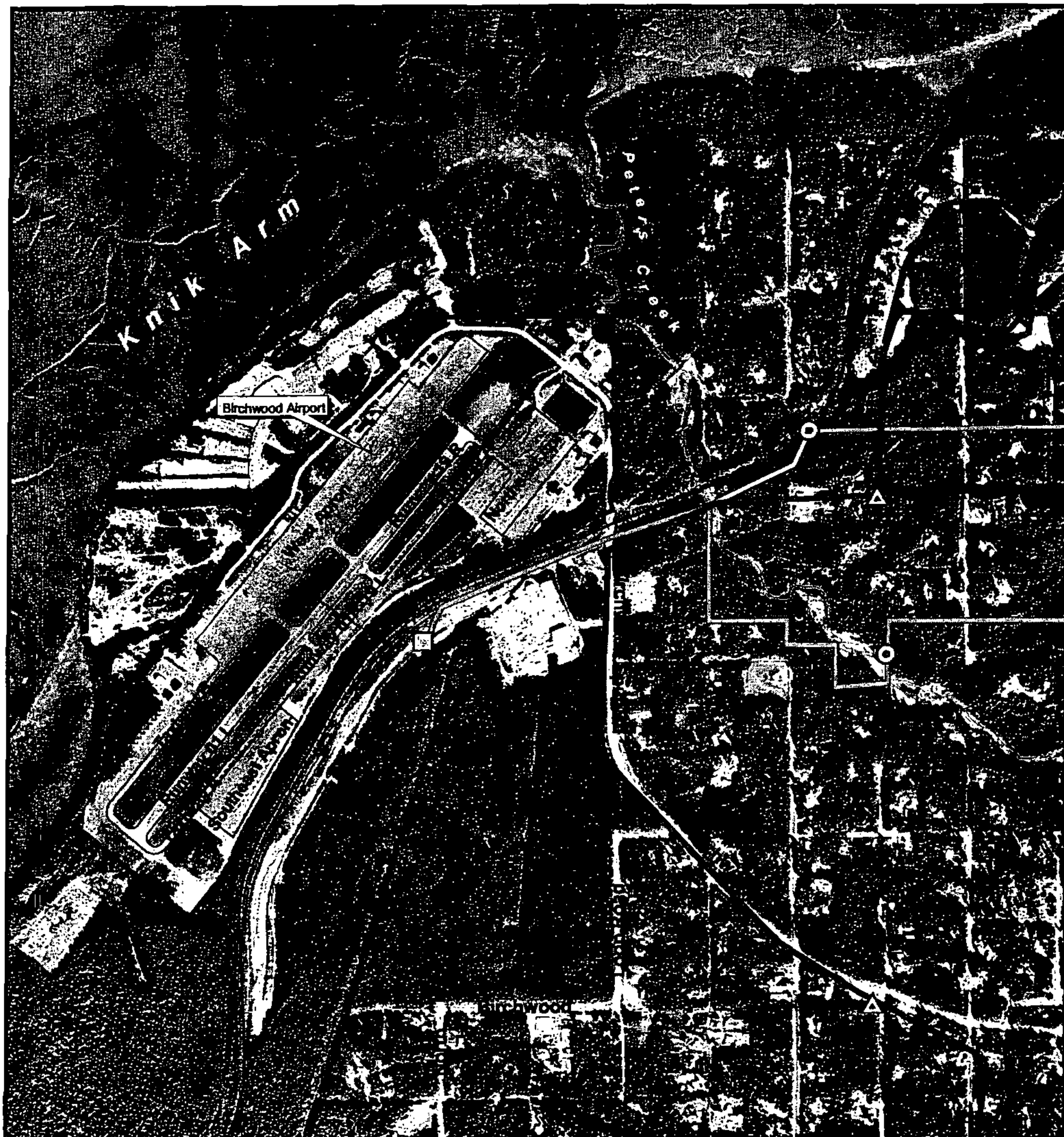
COMMUNITY FEATURES NEAR AIRPORT

BIRCHWOOD AIRPORT MASTER PLAN

DATE: March 2002

500 0 500 1000 Feet

FIGURE 2.1



LEGEND

- Airport Features
- Airport Property Boundary
- Waterway
- Alaska Railroad Tracks
- Fire Hydrants
- Water Lines

Proposed Facilities

- Regional Sewage Treatment Plant
- Sewage Pump Station
- Sewer Gravity Trunk
- Sewer Force Main
- Transmission Line
- Vault and PRV

UTILITIES

BIRCHWOOD AIRPORT MASTER PLAN

DATE: March 2002

500 0 500 1000 1500 Feet

1" = 1000'

FIGURE 2.2

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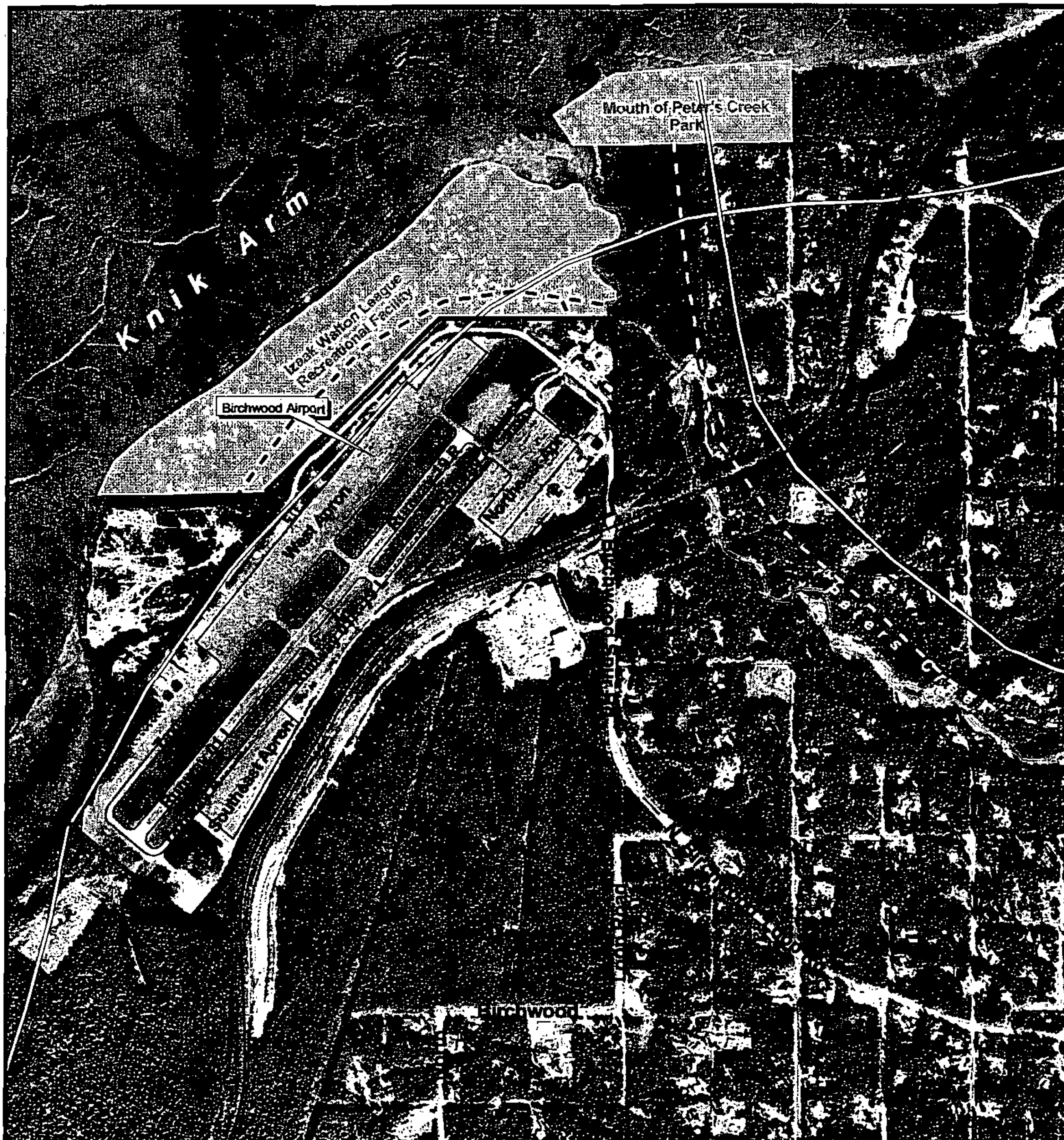


LEGEND

- Airport Features
- Airport Propery Boundary
- Waterway
- Alaska Railroad Tracks
- Parks
- Trails
  - Biking
  - Planned Trails
  - Riding
  - Skiing/Hiking

PARKS AND TRAILS

BIRCHWOOD AIRPORT MASTER PLAN

Trails information from "Chugiak - Eagle River Comprehensive Plan, 1993"

DATE: March 2002

500 0 500 1000 1500 Feet

1" = 1000'

FIGURE 2.3

Matanuska Valley for work. Section 2.3 discusses the socioeconomic condition of the community in more detail.

2.1.5 Community Facilities and Services

Figure 2.1 identifies the community features located near the airport.

Water System. Water facilities in the area include private individual wells, and small community wells. Approximately half of all residences and a small number of businesses rely on individual on-site wells. Currently, the Birchwood Airport is not served by any municipal water system (Figure 2.2).

Wastewater System. The areas currently served by municipal wastewater services are centered on the downtown Eagle River business district and surrounding residential areas. The Birchwood Airport is not currently provided with municipal wastewater service. A sewer gravity trunk and additional wastewater facility improvements are planned along the airport's eastern property boundary (Figure 2.2).

Electric Power. Electrical power in the area is supplied by Matanuska Electric Association. Electrical power is available to all lease lots on airport property. The airport does not have a back-up generator in the event of a power outage.

Natural Gas. Enstar Natural Gas provides natural gas service to the Birchwood Airport. Gas lines follow both the east and west airport access roads.

Telephone. Matanuska Telephone Association supplies telephone service to the Birchwood Airport.

Solid Waste. Solid waste disposal used to be served by the Hiland Landfill on the east side of the Glenn Highway. Currently, services are handled at the Anchorage Regional Landfill located on the west side of the Glenn Highway.

Figure 2.2 locates area utilities.

Police and Fire Protection. The Alaska State Troopers provide police service to the airport. A substation for the Anchorage Police Department is located in Eagle River. The Chugiak, Birchwood, Peters Creek, and Eklutna areas are within the Chugiak Fire Service Area and are served by the Chugiak Volunteer Fire Department (MOA 1993).

2.2 Land Use Inventory

Parks. In 1990, there were 25 municipal parks in the Chugiak-Eagle River area. The Mouth of Peters Creek Park and the Izaak Walton League Recreational Facility are the nearest park and recreational facility. Figure 2.3 depicts the nearest parks and recreational facilities to the airport (MOA 1993).

Trails. Equestrians, cross-country skiers, snowmachiners, and dog mushers use the numerous trails in the area (Figure 2.3). Developed bike paths run from the Fire Lake Ice Arena to Spenard Builders Supply, from Meadow Creek to Eagle River Elementary School, and along the Glenn Highway (MOA 1993).

2.2.1 Existing Land Ownership

The existing airport property is owned by the State of Alaska and bounded by land owned by the Alaska Railroad Corporation, Eklutna Inc., and privately owned parcels comprising the Izaak Walton League Recreational Facility. Figure 2.4 depicts the area's land ownership.

2.2.2 Existing Land Use Inventory

Figure 2.5 depicts the types of development on and around the Birchwood Airport. The airport is zoned and developed as industrial land while the Izaak Walton League Recreational Facility and Spenard Builders Supply are zoned and developed as commercial property. Currently, there are large, un-subdivided, vacant tracks of land near the airport that are zoned industrial, as well as subdivisions of residential development.

2.2.3 Zoning Inventory

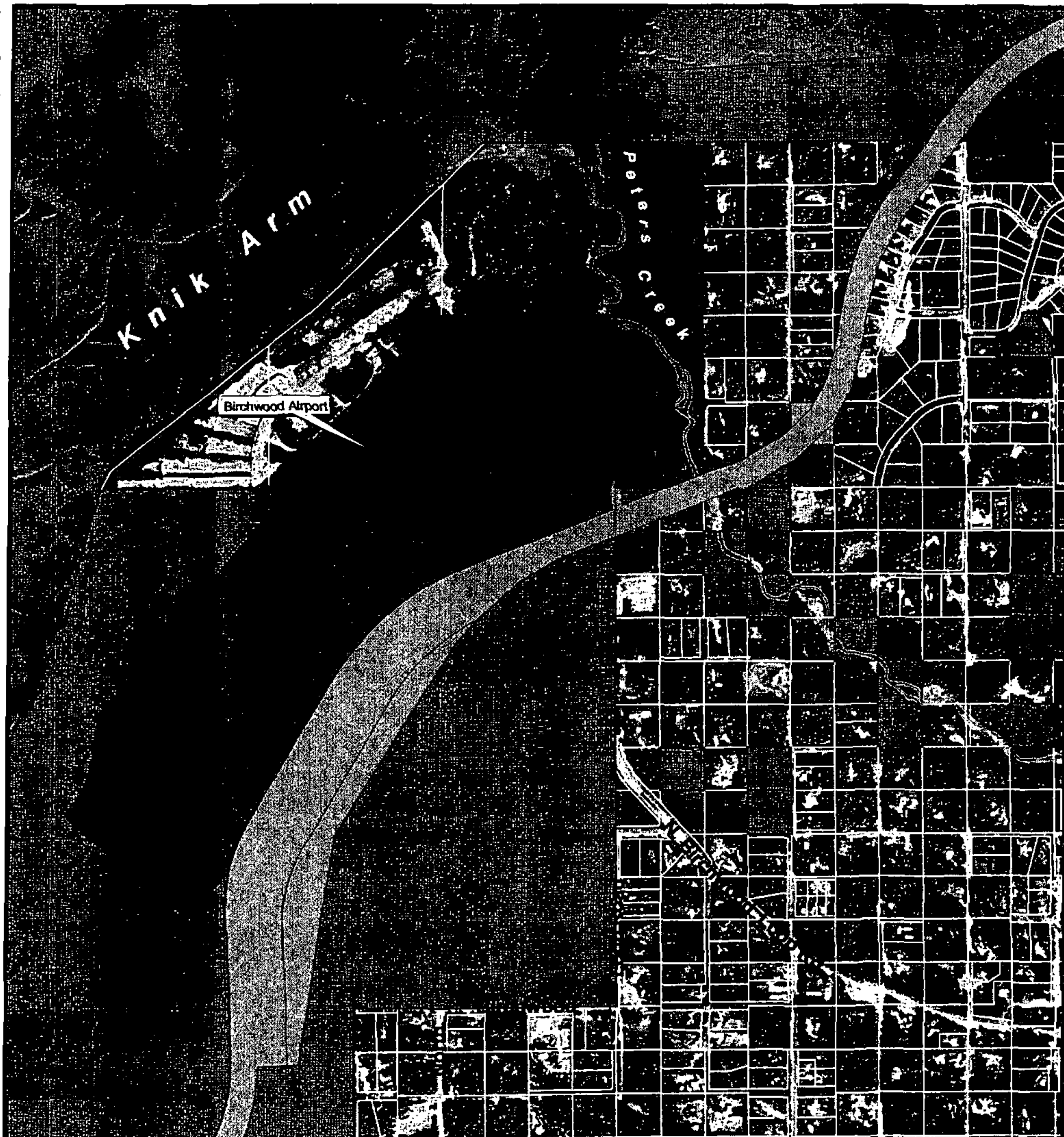
Municipal zoning and platting ordinances do not apply to the Birchwood Airport because it is located on state property. The MOA, however, does regulate the way in which the land surrounding the airport is developed. Municipal zoning ordinances are important for maintaining compatibility between adjacent land uses and the airport. Future development surrounding the Birchwood Airport will likely follow the existing zoning patterns outlined in Figure 2.6. The airport property is presently zoned for Light Industrial (I-1). The surrounding land is zoned for Light Industrial (I-1), Heavy Industrial (I-2), Public Lands and Institutions (PLI), and Suburban Residential (R-6) (large lot).

Light Industrial District (I-1)

According to MOA code (Title 21.40.200), the I-1 district is intended primarily for urban and suburban light manufacturing, processing, storage, wholesale and distribution operations, but also permits limited commercial uses. Among the uses permitted outright that are relevant to airport operations are:

- Aircraft and marine parts and equipment stores
- Aircraft and boat display lots, new and used.
- Lumberyards and builders' supply and storage
- Bus terminals and air passenger terminals.
- Airplane, automobile or truck assembly, remodeling or repair

Airstrips and heliports are considered a conditional use subject to the requirements of the conditional use standards and procedures of Title 21 (MOA 2001).



LEGEND

Airport Features	Alaska Railroad Corporation
Airport Property Boundary	Eklutna Inc.
Parcel Boundaries	State of Alaska
Waterway	US Dept. of Interior
Alaska Railroad Tracks	Municipality of Anchorage
	Private

LAND OWNERSHIP

BIRCHWOOD AIRPORT MASTER PLAN

DATE: March 2002

500 0 500 1000 1500 Feet

1" = 1000'

FIGURE 2.4

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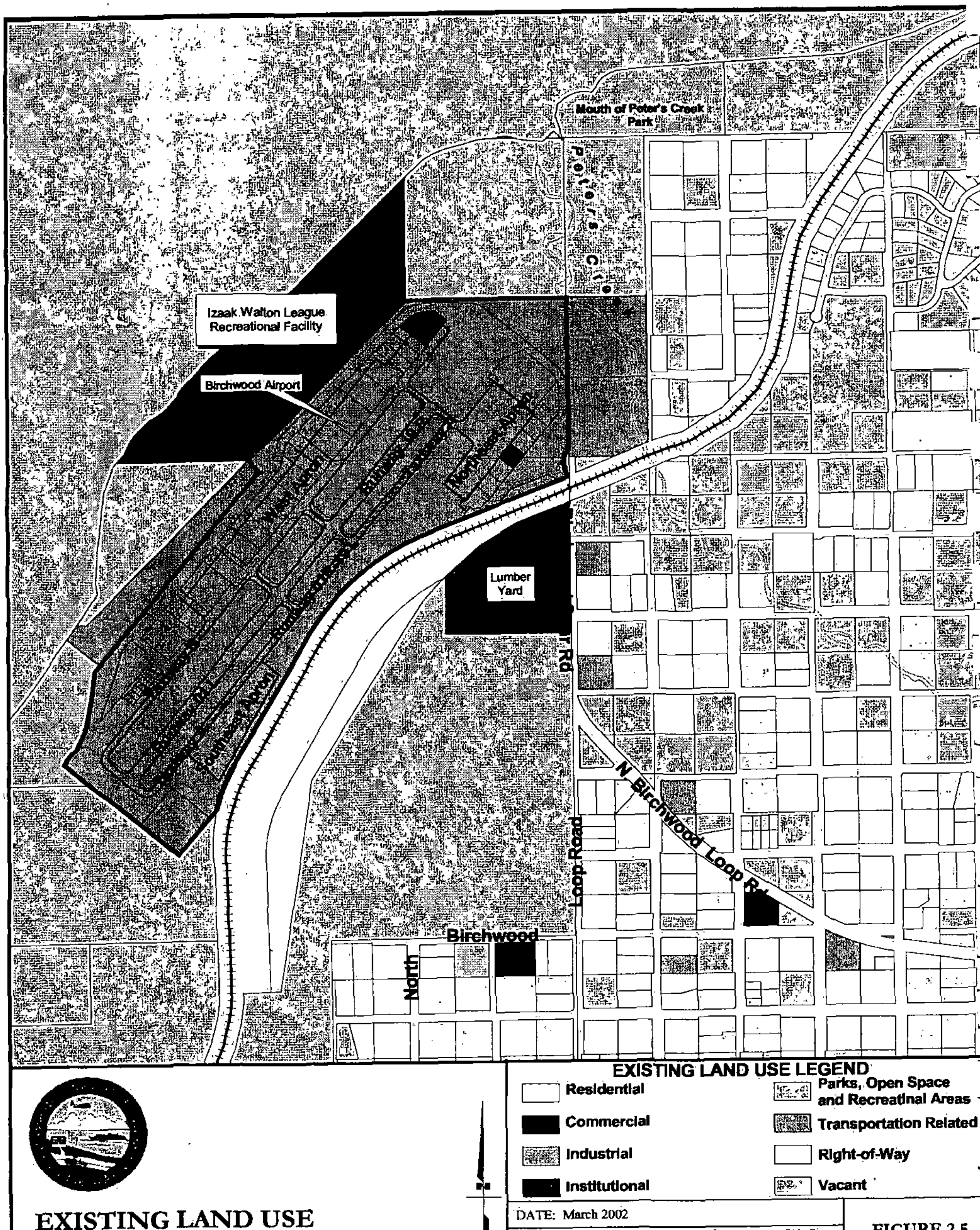


EXISTING LAND USE

BIRCHWOOD AIRPORT MASTER PLAN

FIGURE 2.5

LEGEND

- Airport Features
- Airport Property Boundary
- Waterway
- Alaska Railroad Tracks
- Zoning Codes

DATE: *March 2002*

500 0 500 1000 1500 Feet

1" = 1000'

ZONING

BIRCHWOOD AIRPORT MASTER PLAN

FIGURE 2.6

Z:\07072 DOT&PF\204 Birchwood Airport Master Plan\CAD\Birchwood\Birchwood_airport2.apr

Heavy Industrial District (I-2)

According to Title 21.40.200, the I-2 district is intended primarily for heavy manufacturing, storage, major shipping terminals and other related uses. Also permitted in the district are uses generally permitted in commercial districts. For instance, any legal business, commercial, manufacturing or industrial land use is permitted. Residential uses, including dwellings, rooming houses, boardinghouses or lodging houses, apartment buildings, hotels or motels, however, are prohibited. The primary requirement of the district is that no use shall be constructed or operated so as to cause excessive noise, vibrations, smoke, dust or humidity, heat or glare at or beyond any boundary of the I-2 district in which it is located. Airstrips and heliports are considered a *conditional use subject to the requirements of the conditional use standards and procedures of* Title 21 (MOA 2001).

Suburban Residential District (R-6) (large lot)

According to Title 21.40.080, the R-6 district is intended for those land areas where large lots or acreage development is desirable as an adjunct to the more typical urban and suburban residential zoning districts. The R-6 district is designed to encourage low-density residential development while at the same time protecting and enhancing those physical and environmental features that add to the desirability of suburban residential living. Airstrips and heliports are considered a conditional use subject to the requirements of the conditional use standards and procedures of Title 21 (MOA 2001).

PLI Public Lands and Institutions District

According to Title 21.40.020, the PLI district is intended to include areas of significant public open space, major public and quasi-public institutional uses and activities and land reserves for which a specific use or activity is not yet identified. Heliports, airstrips and airports, and uses directly related to or within the area occupied by such facilities are considered conditional uses subject to the requirements of the conditional use standards and procedures of Title 21 (MOA 2001).

The Izaak Walton League Recreational Facility is zoned as PLI. The parcel is coded by the Municipality as a commercial use in its land use database, and identified in the future land use plan of the Chugiak-Eagle River Comprehensive Plan as a park. Commercial recreational uses, such as the Izaak Walton Recreational Facility, are considered conditional uses subject to the requirements of the conditional use standards and procedures of Title 21 and are to be operated for a period of time to be determined by the planning and zoning commission (MOA 2001).

2.2.4 Development Plans and Planned Land Uses

The Chugiak-Eagle River Comprehensive Plan (MOA Physical Planning Division 1993) recommends that the land immediately surrounding the Birchwood Airport be used as residential and industrial areas or parks. Some assembly-adopted planned trails are located on airport property—property that could be used for airport expansion. The comprehensive plan also recommends that the residential density be less than one dwelling unit per acre in the area surrounding the airport.

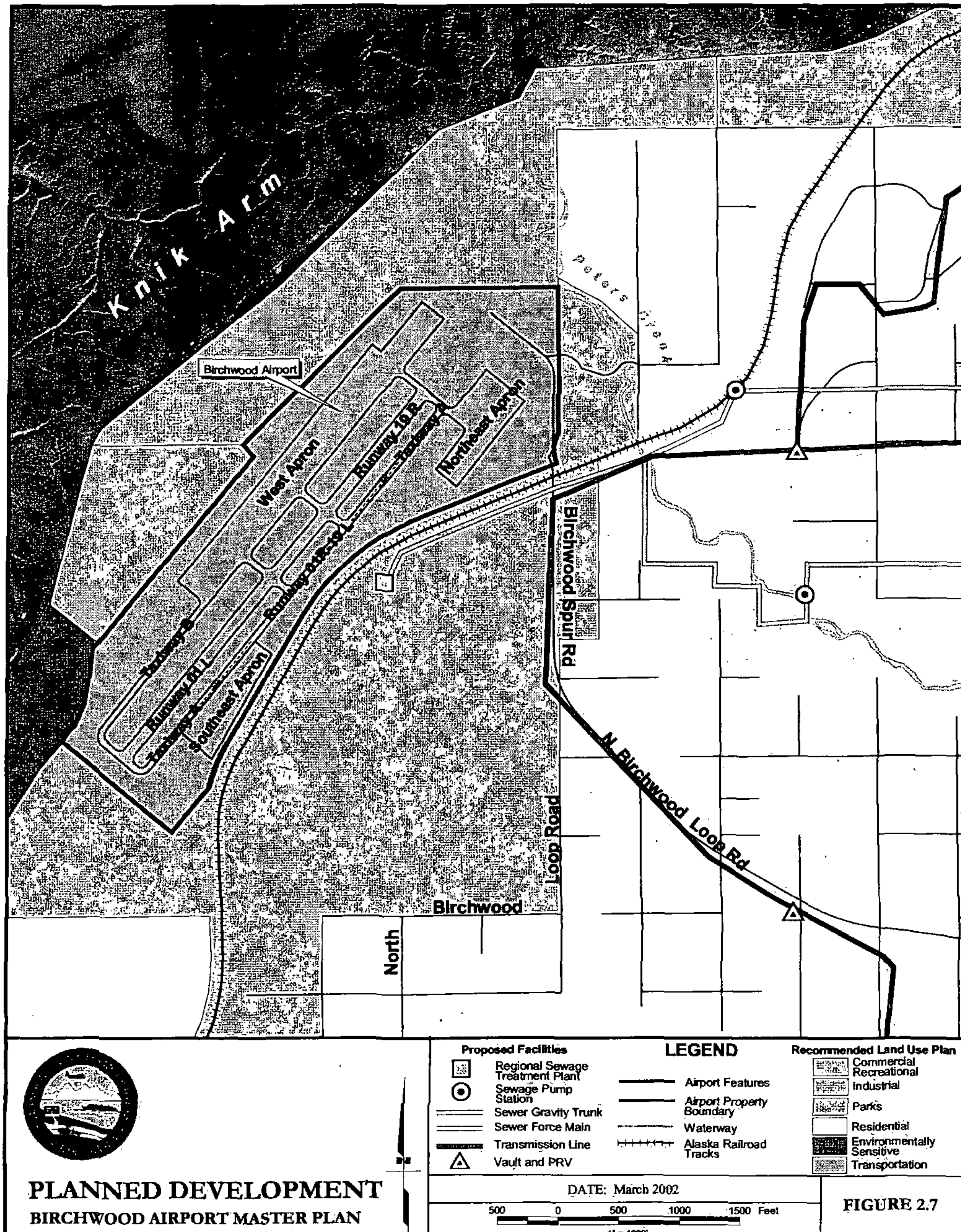
The Northern Communities Wastewater Study: Addendum Number 2 to the 1995 Anchorage Wastewater Master Plan (HDR Alaska 1998a) discusses capital improvement projects and priorities, and "did not find an immediate need to extend wastewater collection into the northern communities area...the area generally has adequately performing wastewater disposal systems." There is, however, a proposed regional wastewater plant located right near the airport. The Northern Communities Water Study Addendum Number 1 to the 1995 Anchorage Water Master Plan (HDR Alaska 1998b) indicates that a water transmission line is proposed right outside the airport area as well. These new developments are depicted in Figure 2.7.

2.3 Socioeconomic Evaluation

The socioeconomic situation in a community or region can have a significant impact on the future demand for aviation activity. This section presents information on the socioeconomic factors affecting aviation demand at the Birchwood Airport.

2.3.1 Population

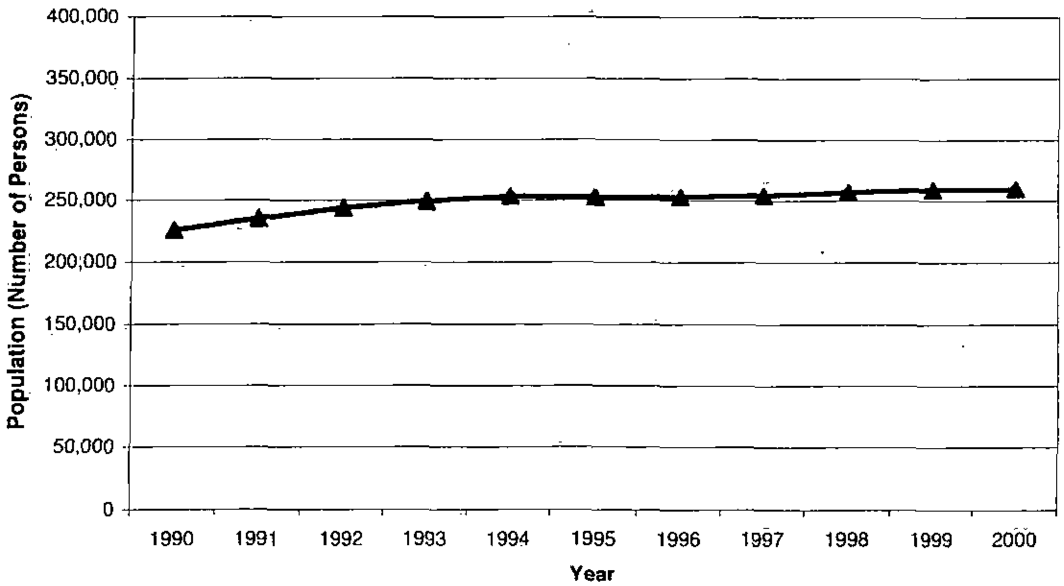
Population, size, and potential for growth in a community are key features in forecasting future needs for air transportation service. A community's historical population growth can help determine the potential future demand for air transportation. This information is available from three sources: One source is the record of population for the Municipality of Anchorage (MOA); the second source is the record of population for the Eagle River area, and the third source is information on the community of Birchwood itself. Figure 2.8 illustrates the population for Anchorage from 1990 to 2000, and Figure 2.9 illustrates the population from 1980 to 2000 for Eagle River and vicinity; it also shows the population for the community council area of Birchwood; Birchwood has consistently made up about 8.5 percent of the area's population over the last few years. Anchorage's population has increased a total of 15 percent since 1990, and the population of Eagle River and the surrounding area has increased 18 percent in the same time period. Since 1980 however, the population of the Eagle River area has more than doubled—it increased 133 percent in from 1980 to 2000. This population growth is largely a result of the availability of developable and affordable land for residents who work in Anchorage but want to live outside of the metropolitan area.



PLANNED DEVELOPMENT
BIRCHWOOD AIRPORT MASTER PLAN

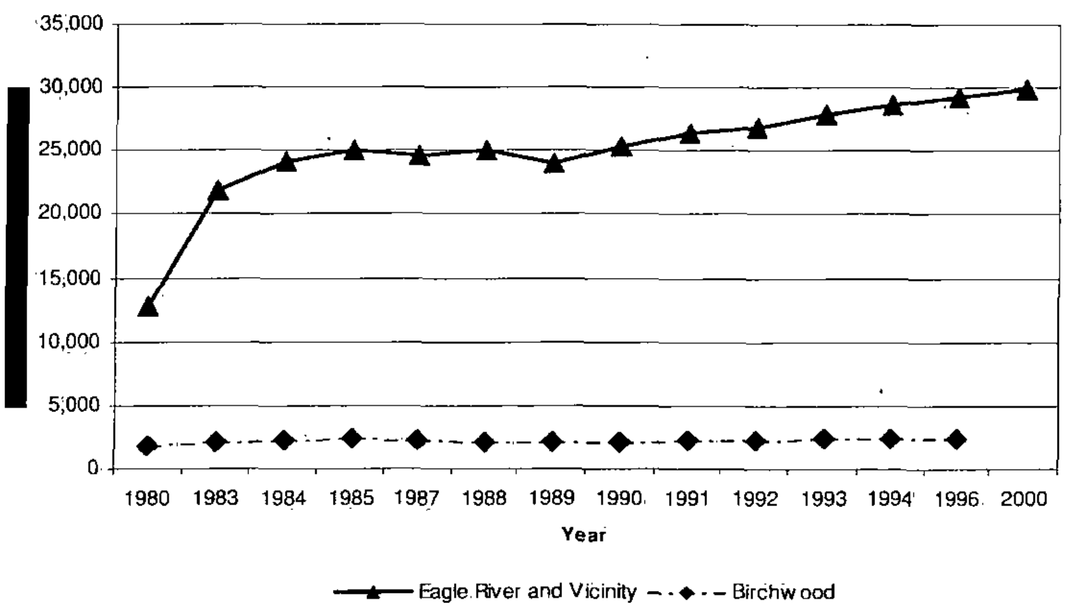
FIGURE 2.7

Figure 2.8
Historic Population of the Municipality of Anchorage, 1990-2000



Source: Alaska Department of Labor and Workforce Development Research and Analysis Section, 2001

Figure 2.9
Historic Population, Eagle River and Birchwood, 1980-2000

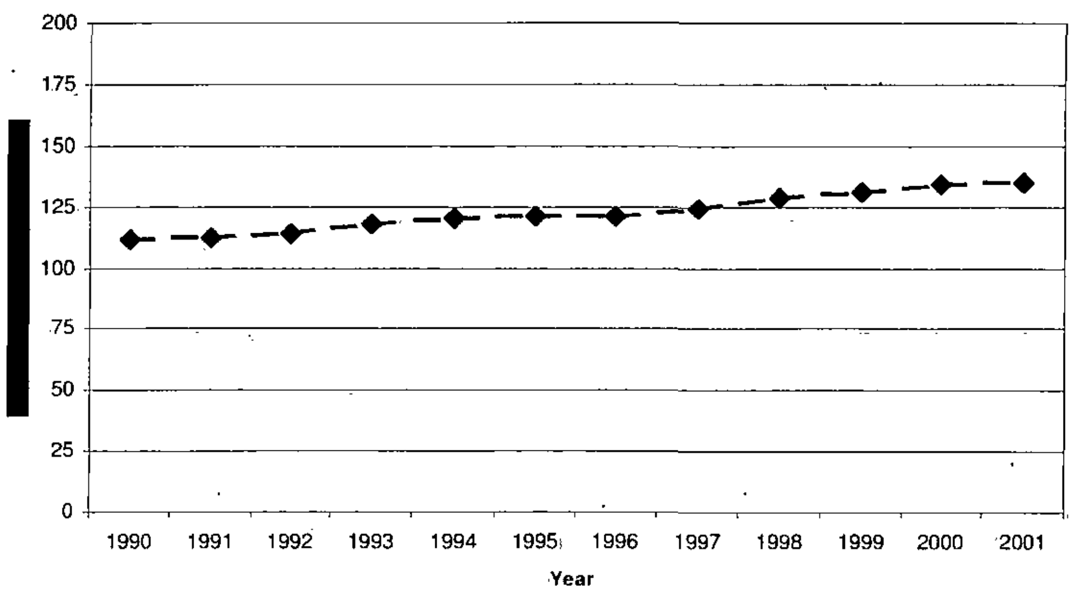


Source: Anchorage Indicators Neighborhood Sourcebook, 1997 and the U.S. Census, 2000.

2.3.2 *Employment*

Employment characteristics of an area are indicators of its economic development and can significantly affect the potential for generating air traffic. Figure 2.10 illustrates the total annual average monthly employment within the Municipality of Anchorage from 1990 to 2001—employment levels have remained relatively flat over the last eleven years (an increase of 21 percent). Table 2-1 presents annual average monthly employment by sector for the Municipality of Anchorage from 1990-2001 (the 2001 employment figures include through June of 2001). Employment in the retail trade industry has increased 24 percent, and employment in the services industry has increased 39 percent from 1990 to 2001. Most of the growth in these industries can be attributed to the growth of tourism in the Anchorage area. Figure 2.11 presents the breakdown of employment by occupation in the entire Eagle River area and Birchwood in 1990; service occupations and sales persons (occupations that are often dependent on tourism) made up a combined 23 percent of Eagle River employment and 27 percent of Birchwood employment in 1990.

Figure 2.10
Annual Average Monthly Employment in the Municipality of Anchorage, 1990-2001



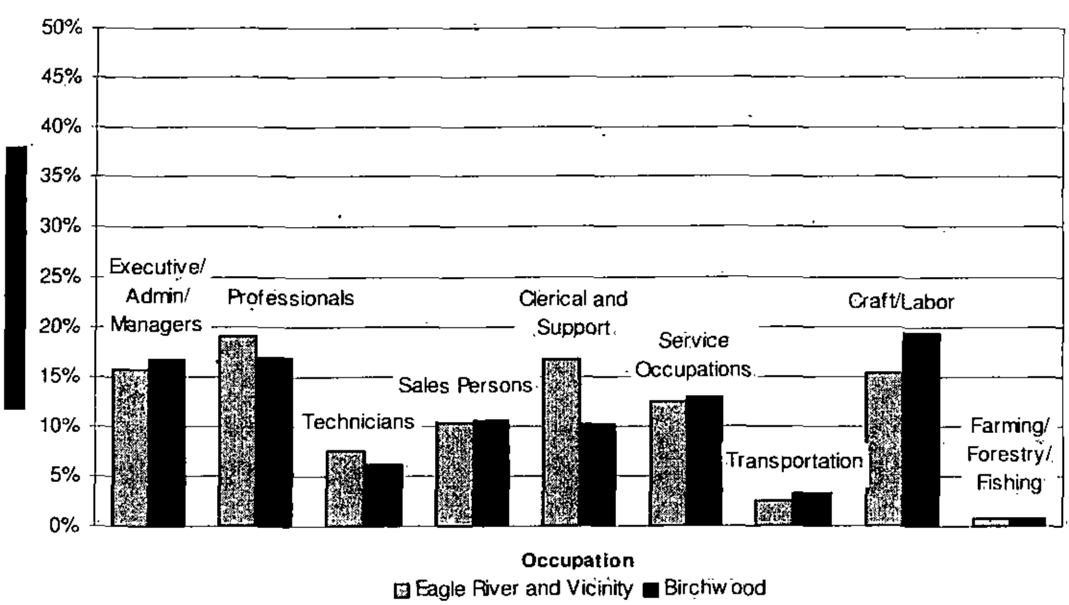
Source: Alaska Department of Labor and Workforce Development Research and Analysis Section, 2001.

Table 2-1
Annual Average Monthly Employment in the Municipality of Anchorage by Sector, 1990-2001

Industry	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
	Employment (thousands)											
Mining	3.8	4.0	3.4	3.4	3.2	2.7	2.5	2.4	3.0	2.5	2.7	2.9
Construction	5.8	5.6	5.4	6.2	6.4	6.4	6.4	6.6	7.0	7.2	7.3	6.9
Manufacturing	2.4	2.6	2.0	1.9	2.0	2.1	2.0	2.0	2.0	2.1	2.2	2.2
Transportation/ Communication/ Utilities	11.1	11.9	12.0	12.4	12.6	12.0	11.9	12.3	13.2	13.8	14.8	14.4
Wholesale Trade	5.9	5.7	5.8	5.8	6.1	6.4	6.5	6.3	6.4	6.4	6.3	6.3
Retail Trade	20.3	20.3	20.4	20.6	22.6	23.3	23.3	24.4	24.6	25.2	25.6	25.2
Finance/ Insurance/ Real Estate	6.5	6.6	6.5	6.8	7.2	7.2	7.2	7.2	7.5	7.7	7.6	7.6
Services and Miscellaneous	28.8	28.7	29.9	31.1	31.3	32.4	33.6	34.9	36.3	37.6	39.2	40.1
Government	26.9	27.3	28.4	29.4	28.8	28.1	27.7	27.9	28.6	28.5	28.8	29.1
Total Employment	111.4	112.5	113.8	117.5	120.1	120.5	121.1	123.9	128.7	131.1	134.5	134.7

Source: Alaska Department of Labor and Workforce Development Research and Analysis Section, 2001.
Note: The 2001 employment figures include data through June of 2001.

Figure 2.11
Occupation of Employed Persons in the Eagle River Area and in Birchwood, 1990



Source: Anchorage Indicators Neighborhood *Sourcebook*, 1997.

2.3.3 Industry Employment and Earnings

Table 2-2 illustrates the 1999 annual total yearly earnings, annual average monthly earnings, and percent of earnings in Anchorage by industry. Tourism, a growing sector of the Alaskan economy, appears to be gaining strength as Anchorage has become more aggressively marketed as a tourist destination. Though not typically high-paying industries, retail trade and services still make up a combined 33.2 percent of all earnings in 1999 in the Municipality of Anchorage.

Table 2-2
Municipality of Anchorage Employment and Earnings by Industry, 1999

Industry	Yearly Earnings ($)	Annual Average Monthly Earnings ($)	Percent of Total Earnings (%)
Agriculture/Forestry/Fishing	16,326,157	1,963	0.4
Mining	315,681,422	7,485	6.9
Construction	347,542,103	4,090	7.6
Manufacturing	72,871,378	2,812	1.6
Transportation/Communication/Utilities	630,655,698	3,674	13.8
Wholesale Trade	229,097,156	3,051	5.0
Retail Trade	503,414,920	1,704	11.1
Finance/Insurance/ Real Estate	257,988,427	3,148	5.7
Services	1,007,556,861	2,370	22.1
Government	1,171,062,904	3,577	25.7
Non-Classified	2,324,243	1,481	0.1
Total Industries	4,554,521,269	2,958	100.0

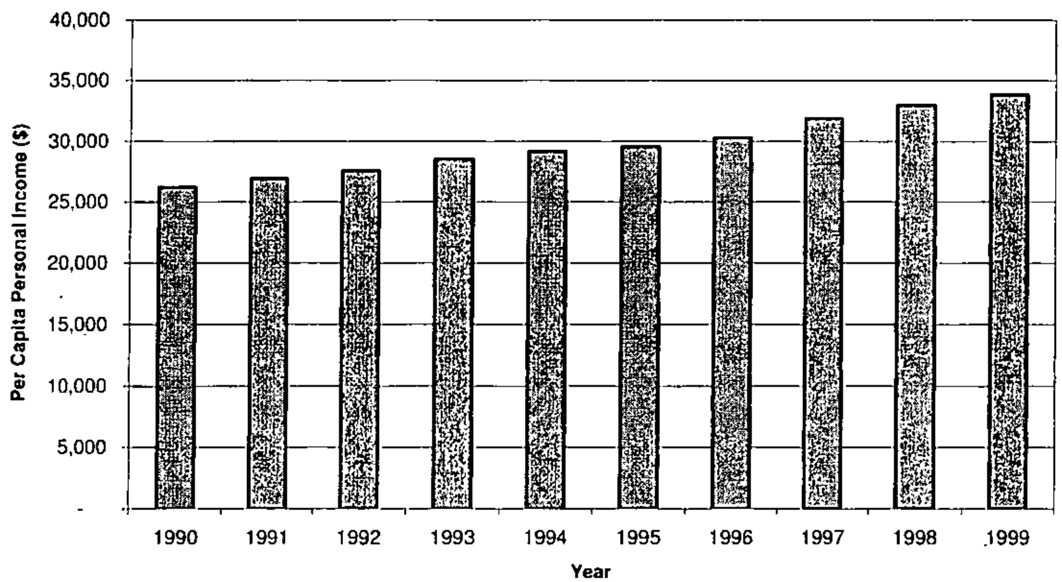
Source: Alaska Department of Labor and Workforce Development, 2001.

2.3.4 Personal Income

Personal income statistics are a function of several factors, including employment and population, and are a critical indicator of an area's output and economic well-being. Personal income is the sum of employment earnings minus social security contributions, other income (rents, dividends, and interest), and transfer payments (social security or welfare payments). In statistical data, personal income is measured before the deduction of personal income taxes and is reported in current dollars, with no adjustment made for price changes (BEA 2001). The income available to residents over time is a good indicator of their financial ability to travel and participate in general aviation activities; high-income levels indicate a strong basis for higher than average levels of spending on leisure and general aviation activity. Conversely, low-income levels can dampen people's spending on these pursuits.

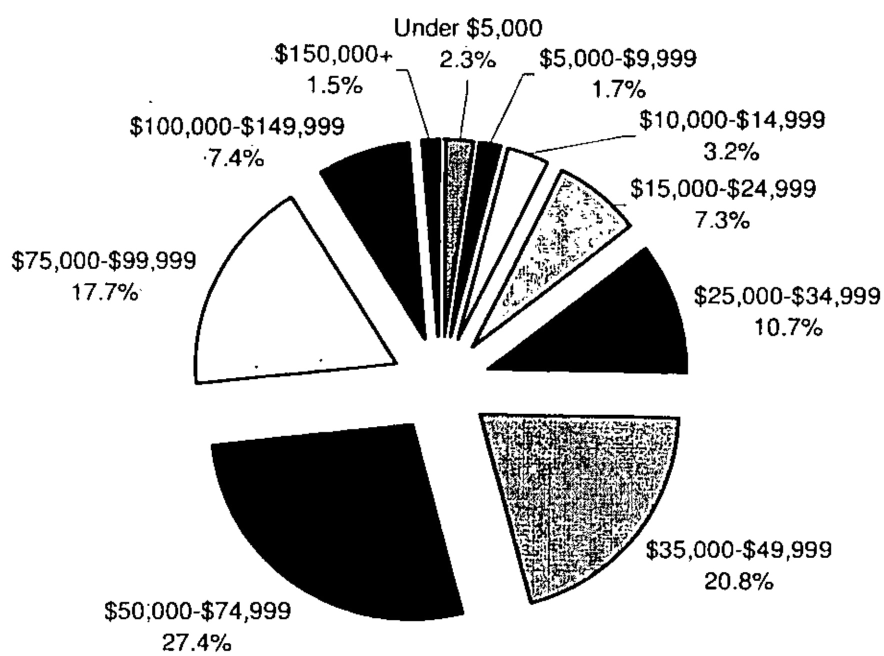
Figure 2.12 indicates historic per capita personal income within the Municipality of Anchorage from 1990 until 1999—it increased 28.9 percent in that time period. Figure 2.13 illustrates total household income in 1989 for the residents of Birchwood—households were asked on the 1990 Census how much money they made in 1989. Less than half of the households in the Eagle River area (46 percent) made less that $50,000 in 1989 (the median income was $52,741). However, more than half of the households (58 percent) in Birchwood made less than $50,000 in 1989 (the median income in Birchwood was $44,321).

Figure 2.12
Municipality of Anchorage Per Capita Personal Income, 1990-1999



Source: U.S. Bureau of Economic Analysis, 2001.

Figure 2.13
Total Household Income in Birchwood, 1989



Source: Anchorage Indicators Neighborhood Source Book, 1997

2.4 Environmental Conditions

Knowledge of the natural environment and the environmental conditions is an important component of the master planning process. This section provides an overview of such topics as climate, topography, wind, wetlands, wildlife, and vegetation.

2.4.1 Climate

The Chugiak-Eagle River area is located in a transitional climate zone between a marine west coast climate and a sub-arctic climate. The area does not experience significant extremes in temperature or precipitation ranges. The monthly mean temperature for July is 59.2°F. The monthly mean temperature for January is 8.9°F. Precipitation is usually greatest from July through September.

2.4.2 Wind

A primary factor influencing runway orientation and number of runways is wind. Ideally a runway should be aligned with the prevailing wind and generally, the smaller the airplane, the more it is affected by wind, particularly crosswinds.

Wind data (speed and direction) for the Birchwood Airport was acquired for a period between July 1996 and December 1998 and used to compute wind coverage percentages. Wind data was analyzed using the FAA 4.2D version *Airport Design, Standard Wind Analysis* microcomputer program. Table 2-3 presents a summary of wind coverage estimates.

The crosswind component shown in Table 2-3 is the resultant vector, which acts at a right angle to the specified runway. The Airport Reference Code refers to the aircraft's performance and wingspan dimensions; the letter corresponds to the aircraft's approach speed while the Roman numeral refers to the aircraft's wingspan dimensions. Wind coverage is the percent of time *crosswind components are below the specified velocity for the specified runway.*

Table 2-3
Birchwood Airport
Wind Coverage Analysis

Crosswind Component	Airport Reference Code	% Coverage Runway 1L-19R	% Coverage Runway 1R-19L
10.5 Knots	A-I and B-I	99.65%	99.65%
13.0 Knots	A-II and B-II	99.81%	99.81%

FAA AC 150/5300-13, Airport Design, states that when a runway orientation provides less than 95 percent wind coverage for any aircraft forecasted to use the airport on a regular basis, a crosswind runway is recommended. As shown in Table 2-3, the 95 percent wind coverage is computed on the basis of the crosswind not exceeding 10.5 knots for an ARC of A-I and B-I and 13 knots for an ARC of A-II and B-II.

Both runways have an orientation of approximately 39 degrees true north. The wind analysis indicates that both runways have wind coverage exceeding 95% for all small single engine aircraft with an ARC of A-I through B-II such as the Cessna 180 and Piper PA-208. The optimal runway orientation for maximum wind coverage ranges from 39.2 degrees to 48 degrees. Based on an analysis of the available wind data, the existing runways have sufficient wind coverage. Appendix C contains wind roses for the Birchwood Airport.

2.4.3 Geology and Soil Types

The Birchwood Airport lies on a large alluvial fan chiefly comprised of gravel and bordered by tidal flats of silt (clay and fine grained sand). The DOT&PF reports (1987) that drainage and stability at Birchwood Airport are good. Chiefly gravel and sand, with cobbles and small boulders, and small amounts of silt and clay are present. Deposited by larger streams at the mountain front, these fans have been mapped separately and are exceptionally suitable for construction materials and ground-water development. Foundation conditions and drainage are very good. These deposits are good water-bearing materials and may yield relatively large quantities of water to wells.

The *Environmental Atlas of Alaska* indicates that the Birchwood Airport and surrounding area is generally free from permafrost. The alluvial soils common to the Birchwood Airport are very well drained (Hartman and Johnson 1978).

2.4.4 Wetlands

Anchorage Wetlands Management Plan

According to the Anchorage Wetlands Management Plan Wetland Designations Map, there are no mapped wetlands within a quarter of a mile of the airport property boundary. Peters Creek is located a few hundred-feet from the northeast end of the runway, and the northwest side of the airport does back up to and enter into the Anchorage Coastal Zone Management Boundary, indicating that a Coastal Project Questionnaire would be needed if work is to be performed. If work is to extend beyond property lines to the north or to the west, riverine and/or estuarine wetlands could be impacted, indicating a potential need for Corps permits and agency coordination.

Municipality of Anchorage Database Coverage

No wetlands are shown in the affected project area on this map.

Aerial Photos

Aerial photos indicate that there could potentially be some low-lying wet areas just southwest of the airport property line. If work is being planned along the airport property line in this area, a site visit might be warranted.

Conclusion

Work performed within the existing property lines is not likely to encounter wetlands. However, if work is to extend beyond property lines into the estuarine Coastal Zone Management Boundary or into the Peters Creek riverine wetland corridor, there is a potential need for Corps permits and agency coordination. Additionally, if work is to extend southwest of the airport, a site visit and/or wetland determination might be needed. Two areas of wetlands have been identified outside Birchwood Airport property (Figure2.14).

2.4.5 Noise

Sound travels in waves through the air similar to waves in water. The greater the number of waves there are, the greater the frequency or pitch. Pitch is measured in Hertz (Hz) (cycles per second). The strength or the loudness of the sound is measured in decibels (dB). The decibel scale is a logarithmic scale based on powers of ten. A small increase in decibels represents a great increase in the intensity. The average human hears every 10 dB as a doubling in loudness.

Specific noise/land use criteria have been established by which noise and its impacts can be evaluated. The most common noise/land use compatibility standard or criterion is the 65 dB Day Night Average Sound Level (Ldn) for residential land use with outdoor activities. Ldn is the 24-hour average sound level, in decibels, for the period from midnight to midnight. Noise occurring between the hours of 10 pm and 7 am are penalized by 10 dB. This penalty is selected to account for the higher sensitivity to noise in the nighttime and the expected further decrease in background noise levels that typically occur at night. FAA specifies use of the 65, 70, and 75 Ldn contours for community and airport noise assessments, as does the Environmental Protection Agency. In those areas where Ldn values exceed 65 dB or greater, FAA requires the airport operator to identify land uses and assess land use compatibility.

The criteria for assessing aviation noise exposure falls into two categories 1) actions that are significant and, 2) actions that have the potential for controversy. Significant impacts are those that cause a 1.5 dB change above 65 dB. Also, people exposed to 65 dB and higher are said to have significant impacts. Controversial actions are those that cause changes in the noise exposure of 5 dB or more outside of 60 dB and 3 dB changes between 60 - 65 dB.

Formulated using the aviation activity base year estimate of operations and fleet mix, baseline noise exposure maps have been modeled using the latest version of FAA's Integrated Noise Model (INM) in accordance with Federal Aviation Regulation (FAR) Part 150 and AC 150/5020-1, "Noise Control and Compatibility Planning for Airports." Figure 2.15 presents contours of noise exposure at the Birchwood Airport. As can be seen in the figure, the 65 dB noise contour does not extend beyond airport property.

2.4.6 Vegetation

Natural vegetation in the Chugiak-Eagle River area can be classified into several types, including coniferous, deciduous, mixed, forested bog, shrub, open bog, and alpine tundra. The coniferous,

LEGEND

Airport Features	Wetlands
Airport Property Boundary	Class A
Waterway	Class B
Alaska Railroad Tracks	

WETLANDS

BIRCHWOOD AIRPORT MASTER PLAN

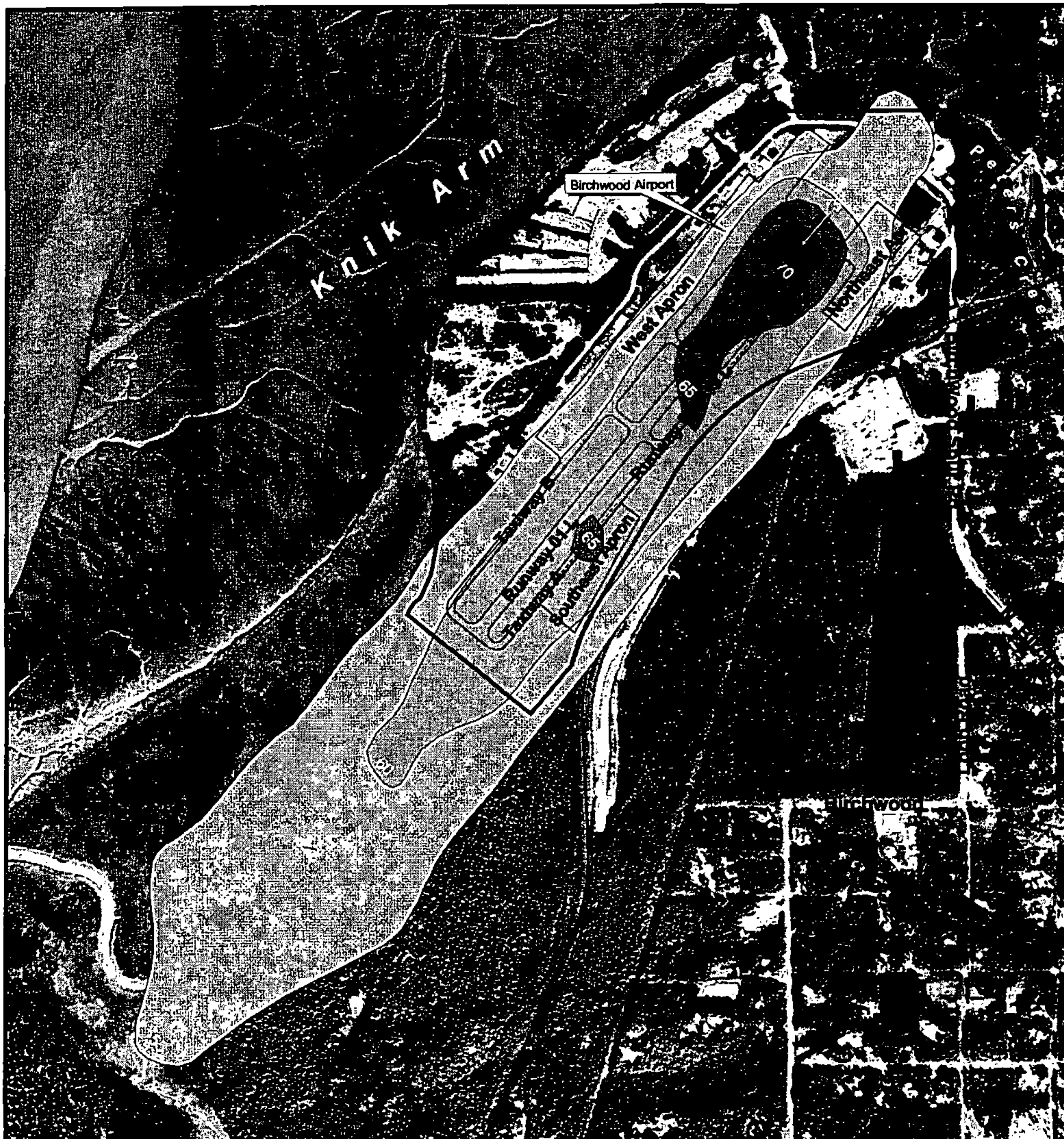
DATE: March 2002

500 0 500 1000 1500 2000 Feet

1" = 1250'

FIGURE 2.14

Z:\07072 DOT&PF\204 Birchwood Airport Master Plan\CAD\6\Birchwood\Birchwood_airport2.apr



NOISE ISSUES

BIRCHWOOD AIRPORT MASTER PLAN

Noise contours estimated from FAA INM 6.0

LEGEND

Airport Features
Airport Property Boundary
Waterway
Alaska Railroad Tracks

Noise Contours
55 Decibels
60 Decibels
65 Decibels
70 Decibels
75 Decibels

DATE: March 2002

500 0 500 1000 1500 Feet

1" = 1000'

FIGURE 2.15

deciduous and mixed vegetation types are generally found in drier, upland sites, while forested bog, shrub and open bog types are associated with wetland sites (MOA 1993).

2.4.7 Wildlife

Large fur-bearing mammals such as black bear, brown bear, goat, moose, and Dall sheep are found in the Chugach Mountains. The area also supports small furbearers such as coyote, red fox, lynx, squirrel, wolf and wolverine. Moose are known to concentrate along the Peters Creek drainage northwest of the airport (Figure 2.16). In addition to game animals, there are populations of smaller mammals such as beaver, muskrat, marten, mink, weasel, snowshoe hare, arctic ground squirrel, porcupine, hoary marmot and possibly land otter (MOA 1993).

Common lake birds include common loons, mallards, red-necked grebes, goldeneyes, scaup, and green-winged teal. Shovelers, pintails, widgeons and Canada geese also nest in the area. The deltas of Fire Creek and Eklutna River are important areas of bird concentrations during migrations (MOA 1993). The Chugiak-Eagle River Comprehensive Plan (MOA 1993) identifies a large area southwest of the airport (the Fire Creek delta) as bird habitat for bald eagle, northern harrier, hawk, owl, and willow ptarmigan (Figure 2.16).

Fisheries

Grayling, rainbow trout, Dolly Varden, sculpin, and stickleback are the main resident fish in the Chugiak-Eagle River area. The most significant populations of coho and king salmon exist in Eagle River. Historically, many of the streams in the area supported salmon runs. Peters Creek is an anadromous stream.

2.4.8 Air Quality

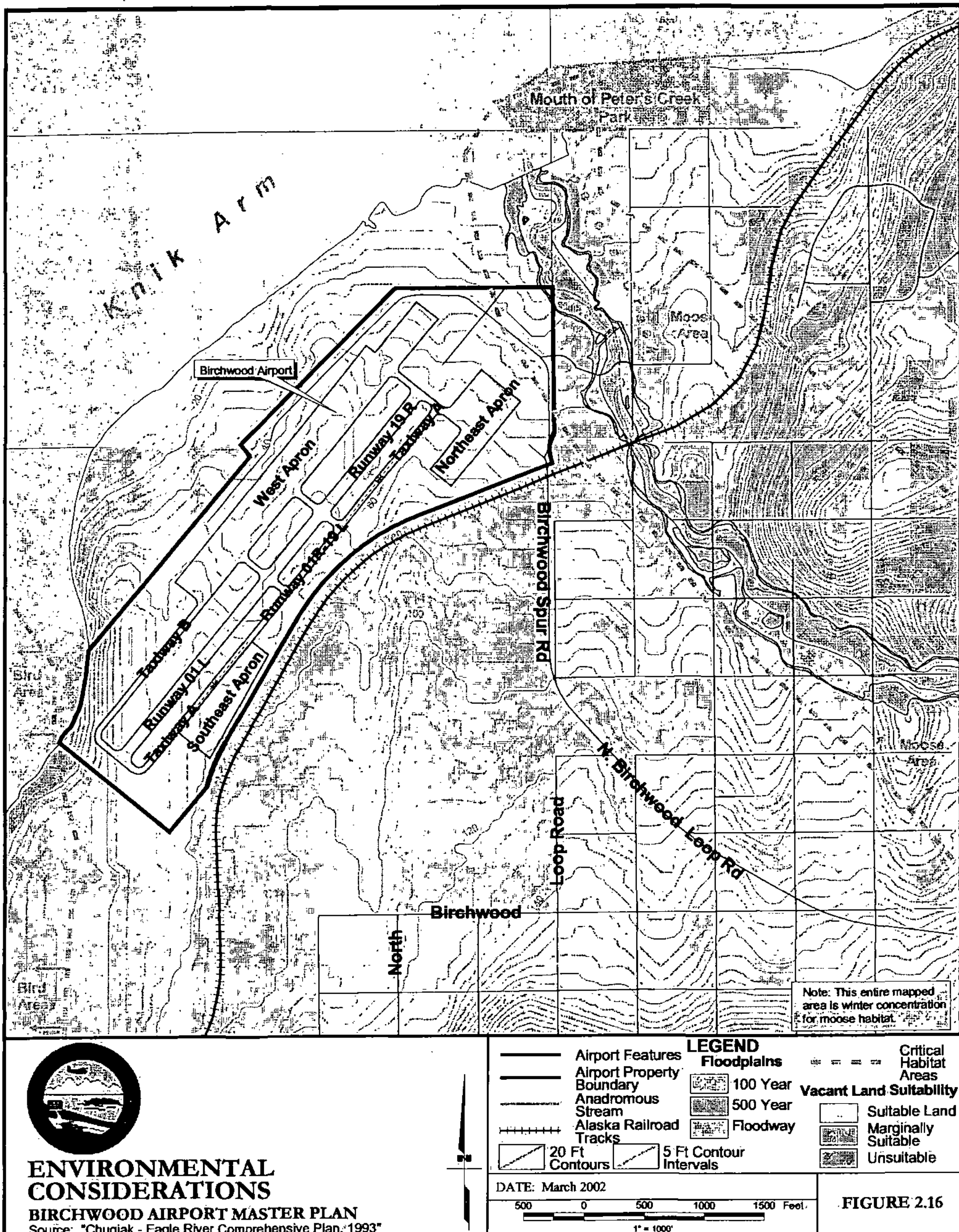
The Birchwood Airport is outside the PM-10 Zone established by the EPA for the Chugiak-Eagle River area. Birchwood air quality is not monitored and is assumed to be generally good.

2.4.9 Hydrology

The nearest water body to the Birchwood Airport is Peters Creek (Figure 2.16). Approximately the southern four-fifths of airport property drains directly into Knik Arm without entering any stream system. The northeast corner of the airport drains into Peters Creek prior to discharging into Knik Arm. As a result of the well-drained gravels under lying the airport, drainage conditions at the airport are good and no hydrology issues have been identified.

2.4.10 Hazardous Materials

A Phase I Environmental Site Assessment (ESA) of the property located at the Birchwood Airport was completed in December of 1998. The ESA suggests that there is a moderate to high potential that the Birchwood Airport property has been impacted by petroleum hydrocarbons and/or hazardous substances from on-site activities. At the same time, the ESA suggests that there is low potential that petroleum hydrocarbon and hazardous substances from off-site sources have impacted the soil and groundwater at the airport property.



ENVIRONMENTAL CONSIDERATIONS

BIRCHWOOD AIRPORT MASTER PLAN

Source: "Chugiak - Eagle River Comprehensive Plan, 1993"

FIGURE 2.16

2.4.11 Hazards

Seismic Activity

The potential for damage or ground failure as a result of earthquakes varies in the Chugiak-Eagle River area. However, no areas in the immediate vicinity of the airport are believed to be highly susceptible to ground failure. One area with greater potential for more serious damage parallels the Glenn Highway in a broad band to the base of the mountains. This area is presumed to be the pathway of the suspected Knik Fault Zone. The Border Ranges Fault also passes through the Chugiak-Eagle River area (MOA 1993).

Mass Wasting

Mass wasting includes landslides, rock falls, mudflows, and avalanches and is a potential problem in some areas of Chugiak-Eagle River. There is no known mass wasting potential in areas surrounding the Birchwood Airport (MOA 1993).

Flooding

Periods of flooding due to high water flow or diversion of normal flow resulting from ice blockage present localized problems in the Chugiak-Eagle River area. In the historic past, areas adjacent to Meadow Creek, Mink Creek, and Peters Creek have experienced flooding, particularly in the broad lowlands adjacent to the downstream portion of Peters Creek (MOA 1993). The closest floodplain near the Birchwood Airport is Peters Creek (Figure 2.17). While the airport has not experienced flooding problems, expansion of the airport to the north could be subject to a 100 or 500-year flooding event.

2.4.12 Parklands and Recreation Areas

Section 4(f) of the Department of Transportation Act requires that transportation projects not use land from parks, recreation areas, wildlife refuges, or historic or cultural sites unless there is no feasible or prudent alternative. Figure 2.3 displays the identified parks and recreational facilities in the project area. The Izaak Walton League Recreational Facility is a shooting range bordering the airport's northwestern property boundary. Peters Creek Park is located north of the Izaak Walton League Recreational Facility at the mouth of Peters Creek.

2.4.13 Historic, Architectural, Archaeological, and Cultural Resources

An inventory of Anchorage's historic resources, including those in the Chugiak-Eagle River area, was undertaken in the mid-1980s. Six structures were included in the inventory, none of which are in proximity to the Birchwood Airport.

3.0 Existing Aviation Facilities

Other essential components of an airport master plan are an inventory of the airport's existing aviation facilities and an overview of its airspace and air traffic control. The following sections present a summary of information collected from research and field reconnaissance.

3.1 Aviation Facilities Inventory

The existing airport facilities were identified through a review of airport and on-site inspection records. Existing documentation reviewed included the 1990 Birchwood Airport Master Plan (Environmental Science and Engineering 1990), FAA Form 5010 Airport Master Record, aerial photography (Aeromap 2000), and current airport layout plans (ALP) (DOT&PF November 2000). Site reconnaissance was also conducted on August 9, 2001 by HDR Alaska. Figure 3.1 depicts existing airport features.

3.1.1 Airport Classification

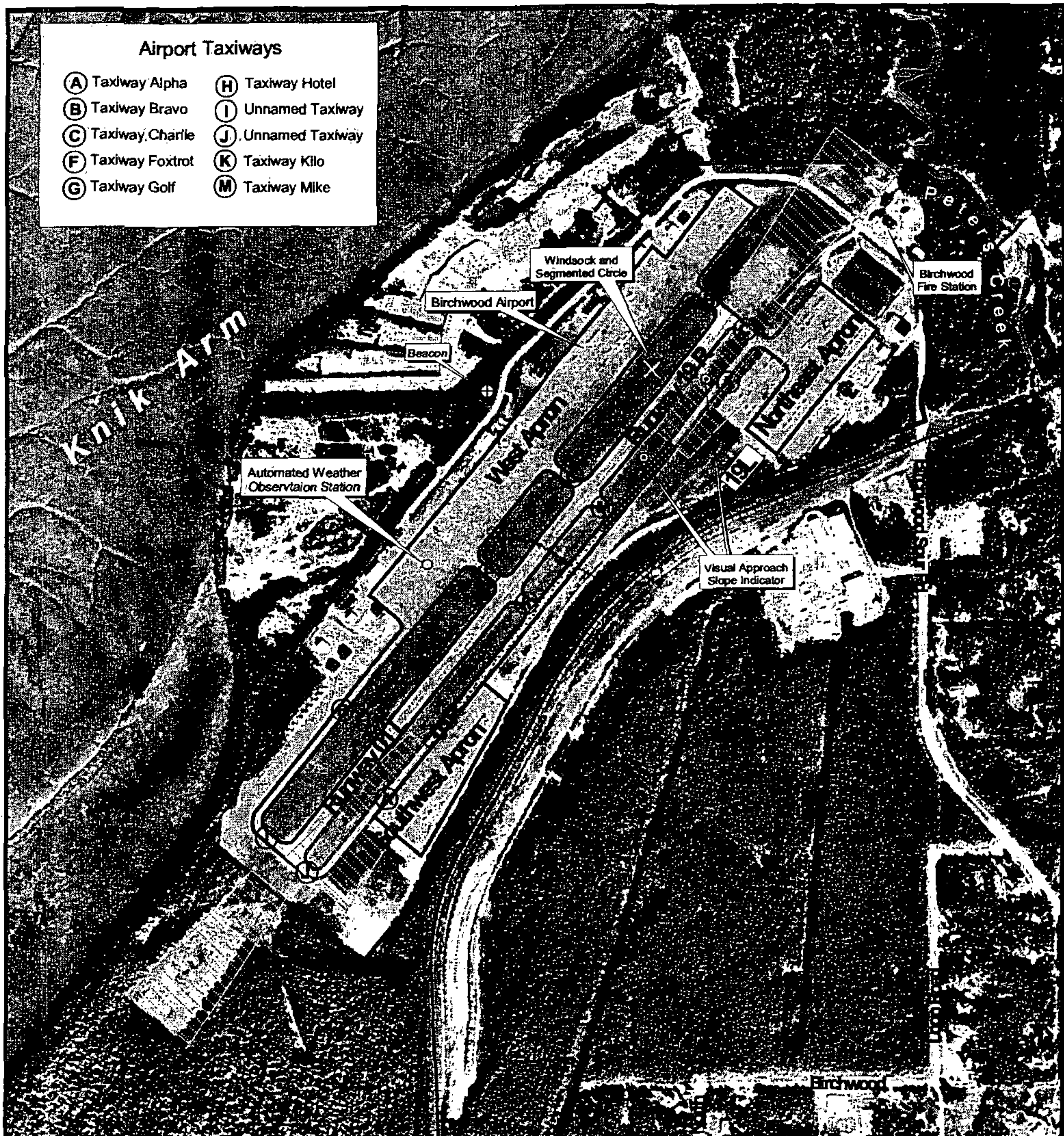
According to the 1999 *National Plan of Integrated Airport Systems* (NPIAS) planning criteria, the Birchwood Airport is classified as a General Aviation Airport. NPIAS defines a General Aviation airport as one that does not receive scheduled commercial service. The NPIAS airport role classification is General Aviation. General Aviation airports can accommodate nearly all general-aviation aircraft with a maximum gross takeoff weight of 12,500 pounds.

The *Alaska Aviation System Plan* (AASP) establishes a three-tier classification system for all Alaska airports (TRA•BV March 1996). This system considers design criteria for the type of aircraft expected to use the airport and the importance of the airport's function to the community, the region, and the state. The 1996 AASP classifies the Birchwood Airport as a Local Airport. Local airports serve as secondary access to communities connected to the road network or already served by a close-by larger airport. The AASP classifies each Alaska airport as one of the following:

- Regional airports are airports that are primary or secondary hubs for passenger, cargo, or mail traffic; provide primary access to populations greater than 1,000; or support economic activities or unusual requirements of regional or statewide significance.
- Community airports are the main airports, heliports, or seaplane facilities that serve rural communities of at least 25 permanent year-round residents.
- Local airports are airports, heliports, or seaplane facilities that are not in the regional or community classes.

3.1.2 Airport Reference Code

The Airport Reference Code (ARC) is a coding system used by the FAA to relate airport design criteria to the operational and physical characteristics of the airplanes intended to regularly operate at the airport. Regular operation is defined as at least 250 operations per year. The ARC has two components (approach category and design group) relating to airport design aircraft. The



AIRPORT FACILITIES

BIRCHWOOD AIRPORT MASTER PLAN

LEGEND

- Airport Features
- Airport Property Boundary
- Waterway
- Alaska Railroad Tracks
- Runway Protection Zone (RRZ)
- Gravel
- Paved

Runway 01L/19R: 4,010 X 100 ft, Asphalt, GA Operations.

Runway 01R/19L: 2,200 X 50 ft, Gravel, GA Operations with Tundra Tires or Skis and Ultralight Operations.

DATE: March 2002

500 0 500 1000 Feet

1" = 1000'

FIGURE 3.1

first component, depicted by a letter code (A, B, C, or D), is the aircraft approach category and relates to an aircraft's approach speed. The second component, depicted by a Roman numeral (I, II, III, or IV), is the airplane's design group and relates to wingspan.

The category and group for airports classified as a Local Airport by the AASP is B-I; however, the 1990 Birchwood Airport Layout and Access Plan lists the airport reference code as B-II for the long runway and A-I for the short runway. A-I aircraft have approach speeds less than 91 knots and wingspans less than 49 ft. B-II aircraft have approach speeds between 91 and 121 knots and wingspans between 49 and 79 ft.

The AASP recommended runway length for A-I aircraft is 2,000 ft. FAA Advisory Circular 150/5325-4A, Runway Length Requirements for Airport Design, runway length recommendations for B-II aircraft are as follows: with less than ten seats, 3,600 ft; with more than ten seats, 4,150 ft. FAA Advisory Circular 150/5325-4A runway length recommendation for ultra light vehicles is 300 ft. Table 3-1 lists examples of A-I and B-II aircraft that could use the airport.

Table 3-1
Common types of A-I and B-II Aircraft

A-I	B-II
Beech Baron Beech Bonanza	Beech King Air A-100 Beech Airliner 1900
Beech Duchess	Cessna Citation Cessna Conquest
Piper Seneca DeHavilland Beaver	Shorts 330 & 360
Small single engine aircraft	Aerocommander 840

The runway at the Birchwood Airport has the length and width to accommodate larger aircraft; however, the taxiways at the airport have insufficient width to accommodate large aircraft. Therefore, the DOT&PF has restricted aircraft over 12,500 pounds from using the airport. The largest aircraft observed to operate at the airport is a DC-3 (design group A-III, 25,200 lbs gross weight, 95-ft wing span) and a DeHavilland Caribou (design group A-III, 28,500 lbs gross weight, 96-ft wing span).

3.1.3 Runways

The Birchwood Airport has two parallel runways oriented to magnetic north and south. The airport elevation is 95.93 ft mean sea level (msl). Runway 01L/19R is the largest of the two runways and has the higher number of operations. It is paved with asphalt and is 4,010 ft long and 100 ft wide. Runway 01R/19L is a gravel runway, 2,200 ft long (600 ft pavement and 1,600 ft gravel) and 50 ft wide, intended for use by GA aircraft equipped with tundra tires or skis and by ultra light vehicles.

Runway 19L's threshold is located 800 ft from the northern edge of Taxiway Alpha. From the threshold the runway continues 2,200 ft. The threshold of 01R is marked with reflective cones and is approximately 475 ft south of the northerly edge of the southeast apron. In practice, aircraft have been observed to takeoff and land along the whole length of the gravel portion of Taxiway Alpha.

The centerlines of Runways 01L/19R and 01R/19L are too close for simultaneous operations on the two parallel runways. Standard minimum separation between runways is 700 ft; only 200 ft separates these runways. FAA Airspace case number 98-AAL-137-NRA describes these non-standard conditions at the Birchwood Airport.

Both runways have a load bearing capacity that can accommodate an aircraft maximum gross weight of 12,500 pounds.

Both runways have a magnetic northern heading marked or listed as 010 degrees and a southern heading marked as 190 degrees. According to the Birchwood Airport Land Use and Terminal Plan the centerline bearing for both runways is N39°17'E. The 1995 variation in this area is 24°E. The difference between the centerline bearing and the variation gives a northern centerline magnetic heading of 15°17' and a southern magnetic heading of 195°17'.

3.1.4 Taxiways

Ten taxiways provide access to Birchwood's two runways; all are 50 ft wide and can support an aircraft maximum gross weight of 12,500 pounds. The aprons and parking areas lead to two taxiways that run parallel to Runway 01L/19R. Eight short taxiways connect the parallel taxiways to the runway. Figure 3.1 depicts these taxiways.

1. ***Taxiway Alpha*** is the north/south taxiway on the east side of the large runway and at the ends of Runway 01R/19L. The northern section of Taxiway A is approximately 800 ft long. The southern portion of Taxiway A is approximately 1,100 ft long. These gravel taxiways connect the northeast and southeast aprons to the large runway.

   The centerlines of Taxiway Alpha and Runway 01L/19R are closer together than standard. The standard separation is 240 ft for B-II aircraft; the existing condition is 200 ft.

2. ***Taxiway Bravo*** is the north/south taxiway on the west side of the large runway; it is 4,585 ft long. This taxiway is paved its entire length. This taxiway connects the west apron to the runway. *There is a 50-foot buffer zone between the western edge of the taxiway and* the eastern edge of the west apron.

The following shorter taxiways connect the north/south taxiways to the large runway; all are paved except as noted.

3. ***Taxiway Charlie*** connects the northeast apron to the northern end of Taxiway Alpha and Runway 19R.
4. ***Taxiway Foxtrot*** is 2,025 ft down 19R and connects to the west apron.

5. ***Taxiway Golf*** *is 1,325 ft down 19R and connects to the west apron.*
6. ***Taxiway Hotel*** connects the west apron to the end of Runway 19R.
7. ***Taxiway Kilo*** is 2,025 ft down 19R and connects to the section of Taxiway Alpha that is Runway 01R/19L. Only half of this taxiway is paved.
8. ***Taxiway Mike*** is 1,325 ft down 19R and connects to the section of Taxiway Alpha that is Runway 01R/19L.
9. ***Unnamed Taxiway*** connects the southern ends of Taxiway Bravo to the end of Runway 01L. The eastern taxiway is unpaved.
10. ***Unnamed Taxiway*** connects the southern end of Taxiway Alpha to the end of Runway 01L. The eastern taxiway is unpaved.

3.1.5 Aprons

The Birchwood Airport provides three paved locations to accommodate aircraft parking and tie-downs. The southeast apron is associated with Runway 01R/19L and is intended for operations by aircraft equipped with tundra tires in the summer and skis in the winter. The northeast apron has the largest number of public tie-downs. The DOT&PF handles tie-down leasing and maintenance at the southeast and northeast aprons; both aprons are open to the public under a use permit. The west apron is comprised of 16 individual lease lots and a transient aircraft parking area (with space for approximately 10 aircraft) that together form the total apron. Each lease lot is typically associated with a building or hangar and provides space to park and store aircraft. Table 3-2 provides a summary of the area and number of tie-downs associated with each apron.

Table 3-2
Tie downs at Birchwood Airport

Apron	Area (ft^2)	Tie-downs
Southeast	194,625	45
Northeast	388,875	99
West	631,675	221
Apron Total	1,215,175	365
Tie downs outside the aprons		65
Total Tie Downs		430

3.1.6 Paved Surfaces

Most of the airport was paved originally in 1978, and the southeast apron was paved in 1989 (DOT&PF 1998). According to the February 2002 Pavement Condition Index (DOT&PF February 2002), the majority of pavement is currently in need of corrective maintenance, with the entire airport in need of corrective maintenance by 2006. (Appendix D depicts this information in more detail.) Aerial photography (Aeromap 2000) also depicts that all paved runways and taxiways exhibit longitudinal and lateral cracking.

3.1.7 Lighting

The Birchwood Airport currently uses a variety of airport lighting to aid navigation, approach procedures, and ground operations. Matanuska Electric Association provides power to the airfield lighting. There is no on-airport backup generator for airfield lighting in the event of a power failure. The lighting systems available at the Birchwood Airport are described below.

Identification Lighting: Pilots can identify the geographical location of the Birchwood Airport at night by a green and white airport beacon. The beacon is located approximately 1,300 ft down Runway 19R and approximately 716 ft to the west between Birchwood Spur Road and the rifle range, west of Lot 7A, Block 500. (See Figure 3.1.)

Visual Approach Slope Indicator (VASI): Visual approach slope indicators provide visual descent guidance and safe wheel clearance (eye-to-wheel height) over the runway threshold for visual approaches on Runway 19R. The Birchwood Airport has one 4-box VASI that can be remotely activated by pilots. (See Figure 3.1.)

Medium Intensity Runway Lighting (MIRL): Runway lighting provides positive delineation for the edge of usable runway. Runway 01L/19R is lighted with MIRL for its entire length.

Taxiway Lighting: The portion of Taxiway Alpha that is not Runway 19L has blue taxiway lights along the west side. Taxiway Bravo has blue taxiway lights along the east side.

Wind Cone Illumination: The windsock between Runway 19R and Taxiway Bravo is illuminated by four lights. (See Figure 3.1.)

3.1.8 Visual Aids

A segmented circle and wind cone are located about 450 ft from the threshold and on the west side of Runway 19R. (See Figure 3.1.) The segmented circle and traffic pattern indicators consist of half-buried oil drums painted orange. From the air the segmented circle is difficult to see due to the faded orange paint and the weak color contrast with surrounding vegetation.

Runway 19R has a 4-box VASI light system. Runway 19L has displaced threshold markings and colored markers delineating the runway edge. The wind cone for 19L is located approximately 675 ft from the threshold, 75 ft to the left. According to DOT&PF leasing, the wind cone for 19L was placed there by ultra light vehicle operators and has not been approved by the FAA or the DOT&PF.

3.1.9 Fueling Facilities

Gas-N-Go is the only Fixed Base Operator (FBO) at the Birchwood Airport that sells aviation fuel to the general public. No aviation grade kerosene is available. No inadequacies with existing fuel services have been identified.

3.1.10 Circulation and Access

Birchwood Spur Road enters the airport property at the northeast corner, continues across the north runway protection zone, then turns south along the west side of the airport boundary. The lease lot driveways on the west side of the airport connect directly to Birchwood Spur Road. An access road follows the length of the east airport boundary to the southeast apron and connects to Birchwood Spur Road near the northeast corner. Both of these roads are paved with asphalt. A small gravel access road leaves Birchwood Spur Road, opposite the DOT&PF maintenance facility, to connect with the northeast apron.

There is no designated public vehicle parking area on the airport. Vehicles park on lease lots and on the aprons.

3.1.11 Helicopter Operations Areas

The 1990 Birchwood Airport Layout and Access Plan shows a helicopter practice landing area located within Runway 1R/19L about 375 ft from the threshold of Runway 19L. The September 2000 aerial photo does not show any markings for this practice landing area on Runway 19L. Helicopter are to land within Runway 1R/19L. They are not to land on the taxiway. The helicopter traffic pattern is roughly the same as the ultra light vehicle pattern; patterns are to be flown to the east of the runway.

The aerial photo does show two helicopter landing areas, identified by a large "H," at the middle of the east side of the northeast apron. These helipads are located on lots 19 & 20, block 100 and were placed there by a business that conducted helicopter flight instruction. This business closed down about five years ago; no business currently offers helicopter flight instruction on the airport.

Helicopter training activity was observed during a recent site reconnaissance (HDR August 2001); a Bell Jet Ranger was conducting touch and go landings on Runway 01R/19L.

3.1.12 Lease holders, Fixed Base Operators and General Aviation Services

Table 3-3 presents the leased lots reported within the Birchwood Airport property. There are 45 lease lots: 22 are used for aviation business operations and 23 are used to store the lessee's aircraft.

Table 3-3
Airport Tenants at the Birchwood Airport

Block	Lot	Lessee	Size	Term	Use
0100	001A	Derry Thompson, Elinor Jones-Elg, Rodney C. Elg, F. Leland Jones and Carolyn Jones	49,200	9/20/96-9/19/16	Construction and maintenance of two aircraft hangars; maintenance of a portion of the access road and taxiway adjacent to the premises; parking and maintenance of lessee's private aircraft only.
0100	002C 002C1	Debra J. Bartlett	14,250 15,000	10/1/98-9/30/15	Construction, operation, and maintenance of a hangar for aircraft maintenance, repair, and painting; aircraft parking; rental of aircraft tie-downs; and vehicle parking all in support of lessee's aviation business operations.
0100	002B 002B1 002B2	Eldridge, Walsh & Wilson	14,250 3,000 2,050	10/1/98-9/30/24	Construction and maintenance of a hangar for maintenance, storage, and parking of lessee's private aircraft only; vehicle parking; installation and maintenance of a well and septic system.
0100	003A 003A1	Marty List or John Emmi	29,000 4,000	12/15/98-12/14/33	Construction and maintenance of a hangar for maintenance, storage, and parking of lessee's private aircraft only; vehicle parking; installation and maintenance of a well and septic system.
0100	004A	Matthew Freeman, Jack Schommer & Steve Powell	13,390	8/17/98-8/16/18	Construction and maintenance of a hangar, well and septic system for lessee's private use only.
0100	017	Jack M. Laub	22,500	5/15/91-5/15/06	Construction, operation, and maintenance of an aircraft hangar for aircraft maintenance and repair; aircraft tie-down rentals, vehicle parking.
0100	023A	Birchwood Hangars Association	145,613	6/17/92-6/16/47	Construction, operation, maintenance, lease and sale of individual T-hangars for aircraft storage, aircraft and vehicle parking.
0100	023B	Birchwood Partners	52,489	7/25/91-7/25/16	Construction and maintenance of a hangar(s) for storage and maintenance of aircraft; vehicle and aircraft parking, in support of lessee's commercial aircraft maintenance operations.
0100	18, 19, 20, 21, 22a	Al Hand	116,856	7/1/71-7/1/05	The construction, operation, and maintenance of a two (2) bay hangar with offices for the repair and maintenance of aircraft; aircraft tie-down rentals; ground school and flight instruction; sale of aircraft and aircraft parts; storage and dispensing of aircraft fuel for lessee's use; aircraft and vehicle parking; in support of commercial aviation operations.
0500	001A	Kelly Vrem	61,580	1/1/99-12/31/18	Construction, operation, and maintenance of an aircraft hangar(s) for commercial aircraft maintenance and repair, air taxi operations, flight school, aircraft sales and tie-down rentals, vehicle parking, all in support of lessee's aviation business.
0500	002D	Harvey Dennis Harms	21,600	7/1/93-7/1/13	Construction and maintenance of an aircraft hangar for storage of lessee's private aircraft.
0500	002F	J&M Hangar LLC	28,890	4/15/98-4/14/27	The construction, operation and maintenance of an aircraft hangar. Parking, storage, maintenance and repair of lessee's private aircraft; vehicle

Block	Lot	Lessee	Size	Term	Use
					parking for lessee and lessee's guest and invitees.
0500	002B	Ken Kastner, Allan Wallinder, Ken Ashby, & David Erickson	60,475	8/3/94-8/3/24	Construction, operation and maintenance of a hangar, vehicle and aircraft parking, aircraft maintenance, in support of lessee's commercial aircraft operations.
0500	003	John Air Aviation, Inc.	70,950	9/1/82-9/1/02	Operation and maintenance of a hangar to perform commercial aviation.
0500	004	Terry C. Holliday dba Holliday Aircraft Services	86,277.50	9/28/83-9/28/18	Construction, operation and maintenance of a hangar/office facility. Operation of a commercial aviation business including aircraft maintenance; aircraft parking and tie-down. SC 12: In addition to authorized uses in BP 2, lessee is authorized to maintain temporary living quarters on the premises for security purposes only.
0500	005	Greiner Force, Inc.	92,375	2/19/97-2/18/27	Construction, maintenance and operation of a hangar with office and shop space, aircraft and vehicle parking, aircraft tie-downs and storage, all in support of lessee's commercial aircraft maintenance operation.
0500	006B	Cecil R. Shuman dba C-Air	40,872	1/27/97-1/26/17	Construction and maintenance of an aircraft hangar for aircraft storage and maintenance in support of lessee's air taxi operations; rental of aircraft tie-downs.
0500	006A	Joddy D. French	42,384	1/8/82-1/7/15	Operation and maintenance of a hangar to store and maintain lessee's private aircraft; aircraft tie-down rentals; and vehicle parking.
0500	007A	Patrick M. O'Hare	65,844	2/1/95-1/31/10	The placement, maintenance, and operation of an office; construction of an access road and installation of a gate on the premises; mobile fuel dispensing system for permittee's use only; aircraft and vehicle parking; aircraft tie-down rentals; all in support of permittee's flight school and flying club.
0500	008	Meyer's Aircraft Service	105,875	3/25/84-3/25/14	Construction and maintenance of a permanent aircraft hangar; parking and storage of aircraft; maintenance of aircraft; and vehicle parking in support of a commercial aviation business.
0500	009	Ronald L. Metcalf	52,700	3/15/96-3/14/16	Construction, operation and maintenance of AST fuel dispensing system, fuel sales, aircraft and vehicle parking; small office building.
0500	010 010A	Kenneth L. Knecht & Bob Adams	51,307 1,071	7/1/99-6/30/20	The construction, operation and maintenance of a hangar for use as an FAA certified aircraft repair and inspection station; engine and accessory shop; private aircraft storage; aircraft tie-down rentals; and air taxi operations.
0500	002E	Louise P. Pogany	27,830.50	9/25/93-9/25/23	Construction and maintenance of an aircraft hangar for storage of lessee's private aircraft, operation and parking of a fuel tanker truck for lessee's use only, vehicle parking.
0600	001C	Dennis Warth, William Clark, Eugene Morris & Arthur Haefliger	32,000	8/15/95-8/14/25	The construction, operations, and maintenance of an aircraft hangar for storage and maintenance of lessee's private aircraft.

Block	Lot	Lessee	Size	Term	Use
0600	001B	Herb & Melanie Hancock	30,000	9/27/94-9/27/14	Construction, operation and maintenance of a hangar, vehicle and aircraft parking, to store and maintain lessee's aircraft only.
0600	003A	Gary Wayne Quarles	22,500	9/15/93-9/15/08	Construction and maintenance of an aircraft hangar for storage of lessee's private aircraft.
0600	003B	Michael Petrie dba MLJ Aircraft Services	32,000	12/15/94-12/14/14	Construction, operation and maintenance of a hangar, vehicle and aircraft parking, aircraft maintenance, in support of lessee's commercial aircraft operations.
0600	004B	Alaska Wing Civil Air Patrol	93,050	6/9/83-6/9/18	Search and rescue activities of the lessee; fueling, parking, and maintenance of lessee owned or leased aircraft; fueling and parking of Civil Air Patrol member owned aircraft during search and rescue operations only; lessee membership meetings and training sessions; and the storage of lessee owned equipment and materials.
0700	001	Thomas J. Prunty	4,409	1/1/98-12/31/03	The continued operation and maintenance of a T-hangar to park and store permittee's private aircraft only; vehicle parking.
0700	002	Rodney M. Miland	3,960	1/1/98-12/31/03	The continued operation and maintenance of a T-hangar to park and store permittee's private aircraft only; vehicle parking.
0700	003	Theodore F. White	3,951	1/1/98-12/31/03	The continued operation and maintenance of a T-hangar to park and store permittee's private aircraft only; vehicle parking.
0700	004	Ashley Marquardt	3,942	1/1/98-12/31/03	The operation and maintenance of a covered A/C storage unit, commonly referred to as a T-hangar, to park and store lessee's private A/C only; vehicle parking.
0700	005	Lochner Family Trust, LTD. Partnership	4,048	1/1/98-12/31/03	The continued operation and maintenance of a T-hangar to park and store permittee's private aircraft only; vehicle parking.
0700	006	Lochner Family Trust, LTD. Partnership	4,048	1/1/98-12/31/03	The continued operation and maintenance of a T-hangar to park and store permittee's aircraft only; vehicle parking.
0700	007A	Eric E. Johnson	4,048	10/10/93-10/10/03	Construction and maintenance of a T-hangar for storage of permittee's private aircraft.
0700	008	James Lavery	4,048	10/10/98-10/09/03	The continued use and maintenance of a T-hangar for storage of permittee's private aircraft only.

Source: DOT&PF Land Occupancy Contract Records.

3.1.13 Utilities and Services

All lease lots have access to telephone, electric power, and natural gas. Some airport users have request electrical outlets at the tie-downs. A working public telephone is located on the north wall of the Arctic Sparrow building, Lot 19 Block 100. No water or sewer service is provided to the airport. The nearest sewer system network is in Eagle River 5 miles to the south. Septic systems, holding tanks, and portable outhouses handle the wastewater requirements. On-site wells supply all the water requirements. The main water trunk line from Eklutna Lake passes within 1.5 miles of the airport, but no branch line services this area.

Matanuska Electric Association (MEA) supplies electrical power to the airport. Matanuska Telephone Association (MTA) supplies telephone service to the airport. Enstar natural gas lines follow both the east and west airport access roads. Freedom Refuse supplies some lessees with dumpsters; other lessees haul the solid waste themselves. Waste oil is taken by the individual lessees to the Anchorage Landfill.

3.1.14 Airport Maintenance

Maintenance at the Birchwood Airport is provided by the State of Alaska. The DOT&PF maintenance building is located north of the northeast apron. This facility is used to store state maintenance and is shared with the Chugiak Fire Department. A sand storage building is located just south of the maintenance building. The airport staffs no maintenance personnel on site during the summer but staffs one person during the winter.

The DOT&PF maintenance personnel plows and maintains the paved surfaces and unpaved safety areas. Airport personnel also perform routine maintenance on the airport property. Maintenance vehicles include one front-end loader with a plow attachment, one snow blower, and one grader.

3.2 Airspace and Air Traffic Control

The Birchwood Airport does not have a control tower, a flight service station, or any ground based air navigation facilities. The airport does have an Automated Weather Observing System (AWOS) located near the southern end of the west apron, Lot 4B Block 500. (See Figure 3.1.)

U.S. Airspace has varying degrees of control to make sure aircraft separation is safe with respect to the types and volume of air traffic. FAA is responsible for managing and controlling airspace. FAA controls airspace through air route traffic control centers, terminal approach control facilities, and individual airport air traffic control towers. There are five alphabetic designations for controlled airspace (A, B, C, D, E). The letter G designates uncontrolled airspace. The FAA describes the categories of airspaces as follows (FAA No Date):

Class A (formerly PCA, Positive Control Area). Extends from 18,000 ft MSL up to and including flight level (FL) 600 (60,000 ft pressure altitude). Only instrument flight rules (IFR) operations are permitted.

Class B (formerly TCA, Terminal Control Area). Extends upward from the surface and outward at designated elevations, and located to include at least one primary airport. IFR and VFR operations are permitted. Class B airspace typically looks like an up-side down wedding cake and surrounds the nation's busiest airports.

Class C (formerly ARSA, Airport Radar Service Area). Extends from the surface to 4,000 ft above the airport elevation surrounding those airports that have an operational control tower, a radar approach control, and numerous IFR operations. IFR and VFR operations are permitted. The airspace around the Ted Stevens Anchorage International Airport is Class C.

Class D (formerly ATA, Airport Traffic Area, and CZ, Control Zone). Generally, that airspace from the surface to 2,500 ft above the airport elevation (charted in msl) surrounding those airports that have an operational control tower. Unless otherwise authorized, each person must establish two-way radio communications with the ATC facility providing air traffic services prior to entering the airspace and thereafter maintain those communications while in the airspace. The airspace around Merrill Field is Class D.

Class E (formerly General Controlled Airspace). Generally, if the airspace is not Class A, Class B, Class C, or Class D, and it is controlled airspace, it is Class E airspace. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. Also in this class are federal airways, airspace beginning at either 700 or 1,200 ft above ground level (AGL)[1]. Unless designated at a lower altitude, Class E airspace begins at 14,500 ft msl over the United States, including that airspace overlying the waters within 13.8 statute miles of the coast of the 48 contiguous States and Alaska, up to, but not including 18,000 ft msl, and the airspace above flight level (FL) 600.

Class G, Uncontrolled Airspace. Includes all airspace below 14,500 ft msl, except class A, B, C, D, and E airspace. FAA air traffic control has neither the authority nor the responsibility for exercising control over air traffic in Class G airspace. (FAA No Date)

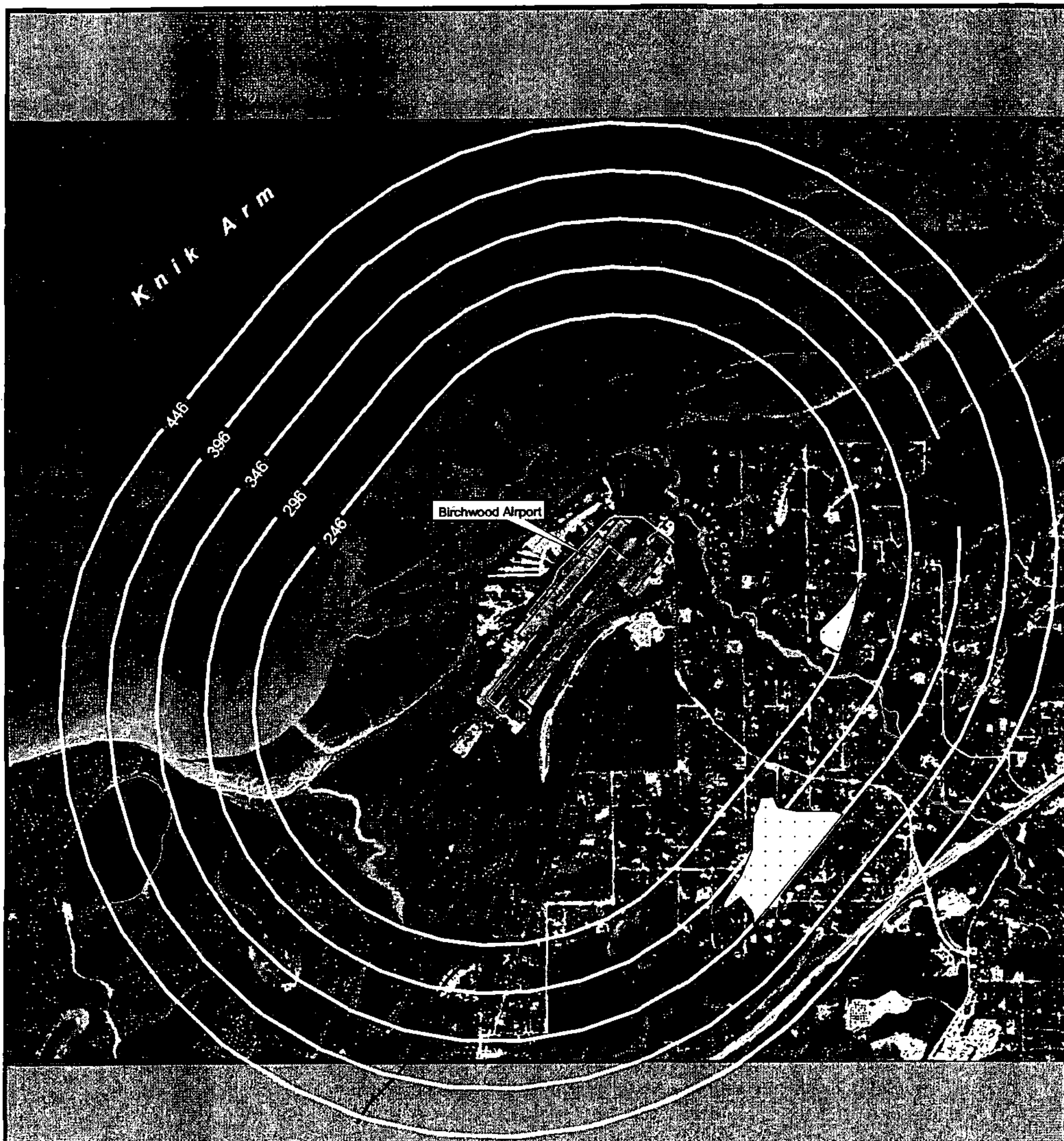
Birchwood Airport underlies Class E airspace. Class E airspace is controlled airspace with a floor set to 1,200 ft above the ground. The recommended pattern altitude is at 1,000 ft above sea level; the airport is 96 ft above sea level, so therefore, the pattern altitude is 904 ft above the ground. Thus, all operations at Birchwood Airport take place in uncontrolled, Class G airspace.

In Alaska, Anchorage Air Route Traffic Control Center (Anchorage Center) oversees operations in controlled airspace outside of areas served by or control towers. An air route traffic control center provides air traffic control service to aircraft operating on flight plans under instrument flight rules (IFR) within controlled airspace and principally during the en route phase of flight. When equipment capabilities and controller workload permit, certain advisory/assistance services may be provided to aircraft flying under visual flight rules (VFR).

3.2.1 Airspace Penetrations

Part 77 of the Federal Aviation Regulations (FAR) establishes standards for determining obstructions to air navigation. As this regulation states, obstructions are classified as existing and proposed manmade objects, objects of natural growth, and terrain. For airports with visual approaches like the Birchwood Airport, the outer edge of the Part 77 conical surface extends 1.7 miles (9,000 ft) from the centerline of the runway and to an elevation 350 ft above the airport elevation (in this case, 446 ft above sea level). As Figure 3.2 depicts, there are two small terrain penetrations and no structure penetrations to the Part 77 surfaces. A number of trees are believed

[1] Above ground level is the vertical distance between an aircraft or top of an obstruction and the ground directly below.



LEGEND

- Airport Features
- Airport Property Boundary
- Waterway
- Alaska Railroad Tracks
- Penetration
- Surface Contours

Runway 01L/19R: 4,010 X 100 ft, Asphalt, GA Operations.

Runway 01R/19L: 2,200 X 50 ft, Gravel, GA Operations with Tundra Tires or Skis and Ultralight Operations.

DATE: March 2002

1000 0 1000 2000 3000 4000 Feet

AIRSPACE PENETRATION

BIRCHWOOD AIRPORT MASTER PLAN

FIGURE 3.2

to be obstructions to the approach surfaces. DOT&PF has an avigation and hazard easement for routine removal of trees. There is no agreement between either Eklutna, Inc. or the MOA for the removal of trees beyond the approach end of Runway 01R/19L.

3.2.2 Airways

Currently no defined airways serve the Birchwood Airport. Defined airways are airways that provide safe, unobstructed flight paths between major en route radio navigational aids. The closest airway is V438-456, 15 miles to the west, between Anchorage VOR and Big Lake VORTAC. The term VOR is a general term covering very high frequency (VHF) omni directional range-bearing facilities. The VOR station provides navigational guidance by sending out VHF signals in the direction of each of the 360 degrees of the compass.

As indicated above, airspace in Alaska is controlled by Anchorage Center. Controllers guide aircraft toward the intended destination by way of vectors and/or airway assignments. These airways, known as Victor and Colored Low/Medium Frequency Airways, provide unobstructed flight paths between major en route radio navigational aids. The Victor Airways extend vertically from 1,200 ft above the terrain up to 18,000 ft msl and are 8 miles wide. Aircraft are also routed around weather and other traffic.

3.2.3 Radio Aids to Navigation

Radio aids to navigation are electronic devices and systems designed to assist with the navigation of aircraft and to determine their position in relation to known reference points on the surface of the earth. A VOR station (a general term denoting very high frequency, or VHF, omni directional range-bearing type facilities) provides navigational guidance by sending out VHF signals in the direction of each of the 360 degrees of the compass. Some VORs have Distance Measuring Equipment (DME) associated with them. The DME receiver in the aircraft will tell the pilot what the distance between the aircraft and the VOR station is.

Nondirectional beacons (NDBs) emit a low-frequency radio signal that provides pilots with a homing marker. By itself, it does not provide accurate directional positioning, but with an internal automatic directional finder on the plane, the pilot can determine the position of the plane relative to the non-directional beacon.

No radio navigation aids are located within the airport boundary. Four navigational aids outside airport property can be used to locate the Birchwood Airport. The following list highlights the airport's distance and directions from these navigational aids:

1. Big Lake VORTAC: 18.5 miles out on the 100-degree radial.
2. Anchorage VOR/DME: 29.6 miles out on the 027-degree radial.
3. Campbell Lake NDB: 24.6 miles out on a heading of 022 degrees.
4. Bruck NDB: 28.1 miles out on a heading of 027 degrees.

Table 3-4 provides an overview of radio aids to navigation that can be used to locate the Birchwood Airport.

Table 3-4
Birchwood Radio Aids to Navigation

	BIG LAKE VORTAC	ANCHORAGE VOR/DME	CAMPBELL LAKE NDB	BRUCK NDB
Description	**VOR Navigational Facility**	**VOR Navigational Facility with Distance Measuring Equipment**	**Nondirectional Radio Beacon**	**Nondirectional Radio Beacon**
Location	North of Big Lake	Fire Island	Near Pt. Campbell	Fire Island
Lat/Long	61-34-10.035N 149-58-01.72W	61-09-02.915N 150-12-23.696W	61-10-15.713N 150-02-51.773W	61-10-03.300N 150-10-37.200W
Elevation	160	280	--	279
Variation	25E (1985)	25E (1985)	25E (1985)	25E (1985)
Type	VORTAC	VOR/DME	NDB	NDB
Class	H-ABVORTACW	H-ABVORWDME	HW-SAB	MH-SAB
Frequency	112.50	114.30	338	387
TACAN Channel	072X	090X	-	-
Use at High Altitude	H (high)	H (high)	-	-
FSS hours of operation	24	24	24	24
Owner	Federal Aviation Administration	Federal Aviation Administration	Federal Aviation Administration	Federal Aviation Administration

Source: http://www.airnav.com/airports/

3.2.4 Airport Operating Conditions

On December 13, 2000, a document titled "Birchwood Airport General Aviation and Ultra light Air Vehicles Operating Rules and Procedures" was approved. This document establishes the unique operating procedures currently in place at the Birchwood Airport. These procedures are intended to separate GA aircraft operations from ultra light vehicle operations.

Instrument Approach and Departure Procedures

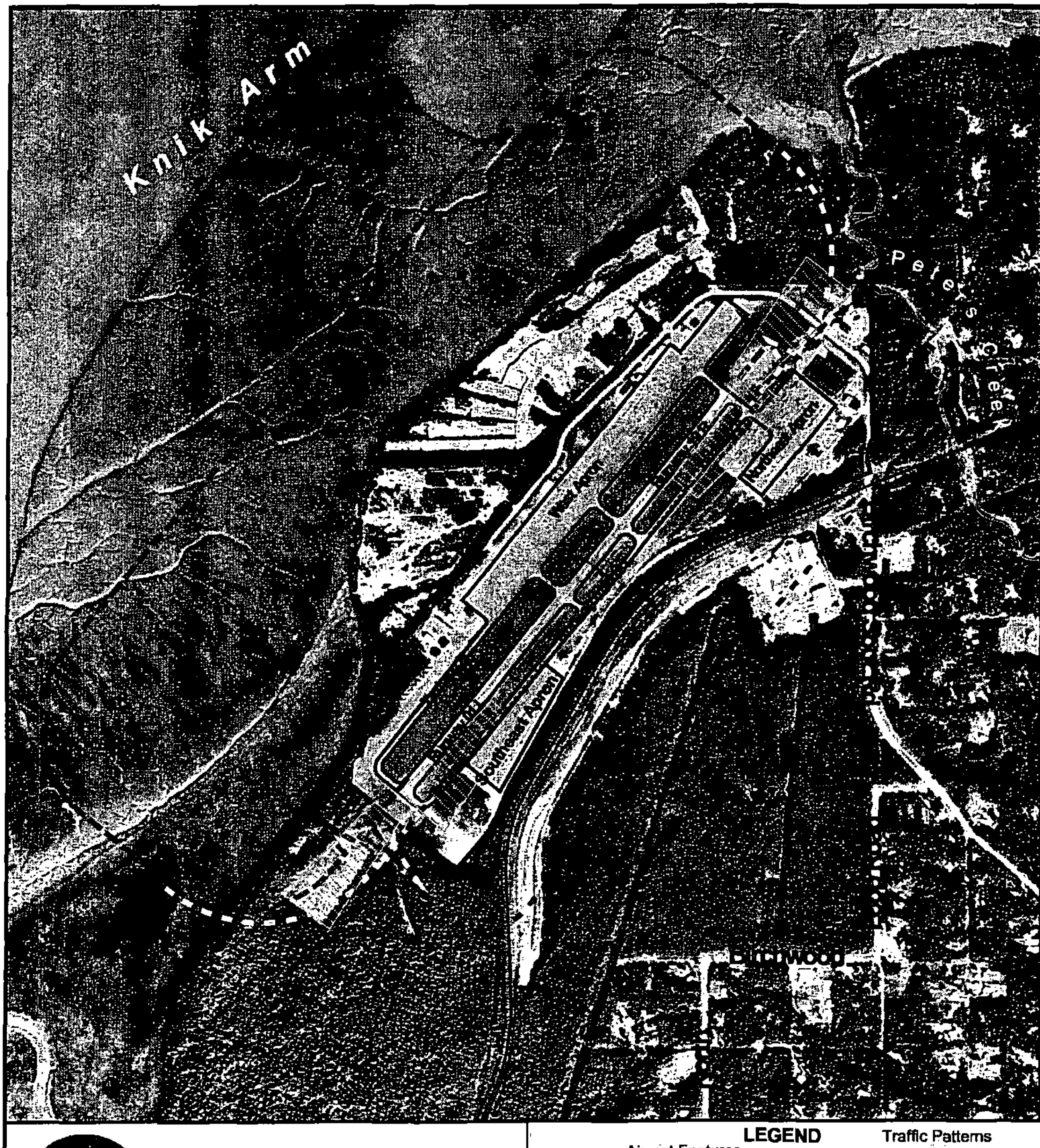
No instrument approach procedures are established for this airport. All aircraft operations are conducted under visual flight rules (VFR).

Visual Approach and Departure Procedures

A visual approach slope indicator (VASI) on Runway 19R provides obstruction clearance. This VASI establishes a 3.5-degree glide slope, which will place the aircraft 48 ft over the threshold of the runway. The VASI is pilot activated using the CTAF frequency 123.0.

Aircraft Traffic Patterns

For general aviation fixed wing aircraft, the recommended pattern altitude is 1,000 ft above sea level. The Runway 01L pattern has standard left-hand turns; Runway 19R has non-standard right hand turns. (See Figure 3.3.)



LEGEND

- Airport Features
- Airport Property Boundary
- Waterway
- Alaska Railroad Tracks
- Runway Protection Zone (RRZ)

Traffic Patterns

- Ultralights
- Ultralights (alt.)
- Main

Runway 01L/19R: 4,010 X 100 ft, Asphalt, GA Operations.
Runway 01R/19L: 2,200 X 50 ft, Gravel, GA Operations with Tundra Tires or Skis and Ultralight Operations.

FLIGHT PATTERNS

BIRCHWOOD AIRPORT MASTER PLAN

DATE: March 2002

1000 0 1000 Feet

FIGURE 3.3

Z:\07072 DOT&PF\204 Birchwood Airport Master Plan\CAD\Birchwood\Birchwood_airport2.apr

For ultra light vehicles, the recommended pattern altitude is 600 ft above sea level. Runway 01R has a right hand pattern and Runway 19L has a left hand pattern. As the yellow line on Figure 3.3 depicts, GA aircraft have an extended leg for use of Runway 1R/19L.

Arrival and Departure Routes

Aircraft arriving and departing the Birchwood Airport generally follow the same routes, as noted below.

- From Anchorage: Cruise at 1,500 to 2,000 ft between the Glenn Highway and the Chugach Mountains to Fire Lake to Chugiak High School. Head directly to the airfield to cross the runway, midfield, at 1,000 ft and enter either pattern depending on the wind.
- From Wasilla: Fly across Knik Arm from the west and make a standard 45-degree entry to either pattern. All this takes place over the water.
- From Palmer: Fly along the south shore of Knik Arm.

Airspace Conflicts and Constraints

Restricted area R-2203B overlying the training grounds of Fort Richardson Army Base is intended to exclude all aircraft not participating in military training exercises. Restricted area R-2203B is located 1.7 miles to the south of the Birchwood Airport and extends to 11,000 ft. Time in use is 0500 to 2400 Monday through Friday. The location of this restricted area forces aircraft to fly over Eagle River while going to and from Anchorage. When the restricted airspace is not in use, civilian GA aircraft and ultra light vehicles may pass through it. Pilots can contact Anchorage Approach Control to learn if the restricted airspace is "hot," or in use by the military. The combination of R-2203B and the Chugach Mountains, 3.5 miles to the east, will affect the design of a possible future instrument approach.

3.2.5 Aircraft Fleet Mix

The current fleet mix, as reported during observation and personal communication with airport tenants, is shown below in Table 3-5.

Table 3-5
Aircraft Fleet Mix Birchwood Airport

Multi-Engine	Single-Engine	Rotorcraft
	Piper Super Cub	
Beech 18	Cessna 172	Bell Jet Ranger
Piper Apache	Cessna 180	Hughes 500
Piper Aztec	DeHavilland Beaver	
Grumman Widgeon	Beechcraft Bonanza	
Cessna 310	Mooney	
	Lake Amphibian	

Source: HDR, 8-9-01 2001.

3.3 Airport Financial Data

Specific financial data and information necessary to provide adequate financial evaluation of any proposed development are identified in this section. Financial information has been collected from the Alaska DOT&PF, FAA, and other available sources.

3.3.1 Capital Improvement Projects

This section presents a summary of the historical capital improvements projects at the Birchwood Airport. By identifying past projects, current airport issues can be better resolved. Historically, a total of $3,828,384 in federal funds was spent on the improvement projects at the Birchwood Airport. The FAA Airport Improvement Program (AIP) provided funding for all three of the projects.

1. *Taxiway and Access Road Construction and Drainage*
The first project started construction in 1977 and was completed in 1979. The project's purpose was "land acquisition, site preparation, widen and improve existing runway (4,012' x 100'); construct two parallel taxiways (4,300' x 50' and 4,200' x 50') and connecting taxiways; construct three aprons; construct an access road (3,900' x 30'); and drainage."

2. *Runway, Taxiway, Apron, Access Road Paving*
The second project started construction in 1977 and was also completed in 1979 and its purpose was "site preparation; pave runway, one parallel taxiway, north portion of east taxiway, connecting taxiways, two aprons, and access road; crushed aggregate base course on south portion of east taxiway and connecting taxiways; marking; medium circle; beacon; perimeter fence; and erosion control."

3. *Pave, Mark, Light Apron*
The third project's purpose was to "expand, pave, mark apron; construct, pave, mark, light apron (249,800 sq ft); reconstruct, realign, pave access road; construct SRE building (40' x 70'); and land acquisition."

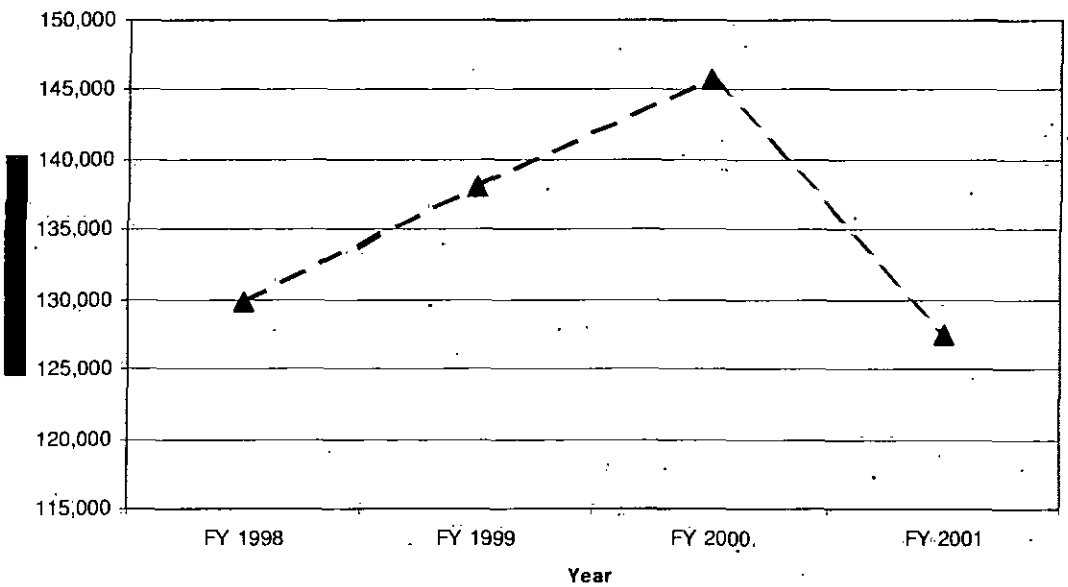
The Birchwood Airport has no capital improvement projects currently in progress or programmed in the current Airport Improvement Program (AIP).

3.3.2 Operational Costs and Revenue

The Birchwood Airport has three sources of revenue—leased tie-downs, land rents, and fuel flowage fees. Tie-down permits are $15/month for a ski plane and $20/month for a wheel plane—Birchwood currently has 144 tie-downs. Land rents are collected from tenants at the airport and currently cost $.069 per square foot. Fuel flowage revenues include $500/year for the fuel dispensing permit and $.02 per gallon sold fee.

Figure 3.4 illustrates the leasing revenues for fiscal years 1998 through 2001. The revenues collected in fiscal year 2001 decreased by 1.8% since fiscal year 1998 and decreased 12.5% from the previous year, 2000.

Figure 3.4. Birchwood Airport Revenues Collected, Fiscal Years 1998-2001



Source: DOTP&F Leasing

Table 3-6 presents the revenues collected for the Birchwood Airport for fiscal years 1998 through 2001.

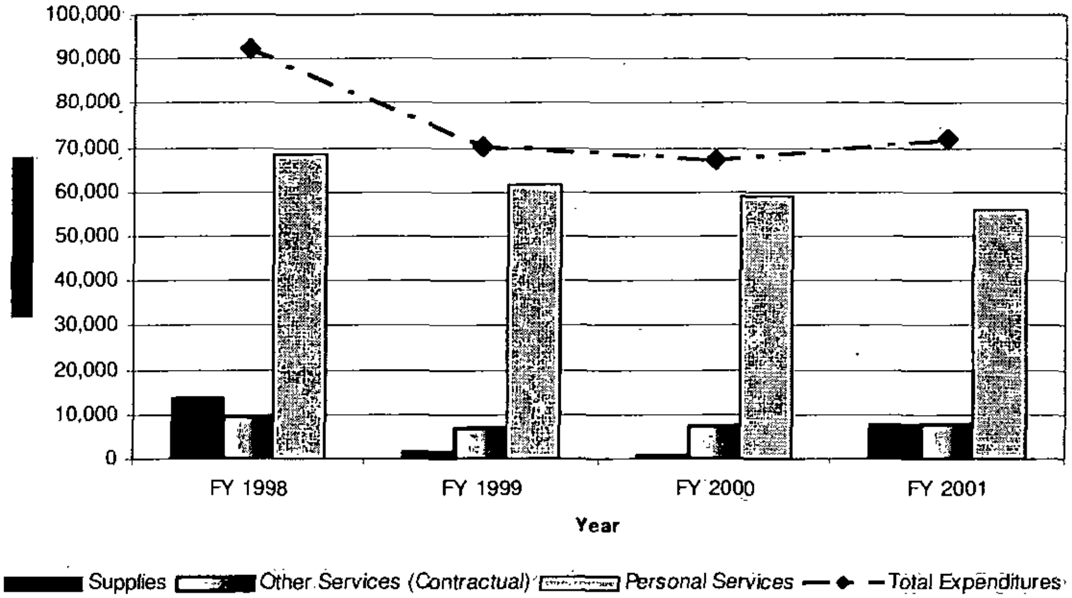
Table 3-6
Birchwood Airport Revenues Collected, Fiscal Years 1998-2001

	FY 1998	*FY 1999*	*FY 2000*	*FY 2001*
Revenue Collected ($)	129,853	138,084	145,797	127,552

Source: DOTP&F Leasing

Figure 3.5 illustrates the airport expenditures for fiscal years 1998 through 2001. The total expenditures in fiscal year 2001 are down 22.1% since fiscal year 1998 but increased 6.6% from the previous year. The Birchwood Airport has three categories of expenditures: personal services (employment), other services (contractor services), and supplies. On average, roughly 80% of expenditures in the last four years have been for personnel and employment.

Figure 3.5. Birchwood Airport Expenditures, Fiscal Years 1998-2001



Source: DOTP&F Leasing

Table 3-7 presents the expenditures dispensed for the Birchwood Airport for fiscal years 1998 through 2001.

Table 3-7
Birchwood Airport Expenditures, Fiscal Years 1998-2001

	FY 1998	*FY 1999*	*FY 2000*	*FY 2001*
Supplies ($)	13,989	1,844	1,015	7,854
Other Services (Contractual) ($)	9,606	7,037	7,165	7,826
Personal Services ($)	68,527	61,525	59,182	56,096
Total Expenditures ($)	**92,122**	**70,406**	**67,362**	**71,776**

Source: DOTP&F Leasing

4.0 Air Traffic Forecasts

The proposed methodology for the Birchwood Airport air traffic forecast is based on the process recommended in FAA AC 150/5070-6A, *Airport Master Plans* and updated in *Forecasting Aviation Activity by Airport* (FAA, July 2001). These documents provide national guidance for the preparation of airport master plans and are recommended for use in preparing individual airport master plan forecasts. The advisory circular has been the primary guidance in the preparation of master plans since enactment of the Airport and Airways Development Act of 1970 and has been recently updated with a seven-step process for the development of aviation forecasts. The recommended steps are:

Step 1. Identify aviation activity parameters and measures to forecast
Step 2. Collect and review previous airport forecasts
Step 3. Gather historical data
Step 4. Select forecast methods
Step 5. Apply forecast methods and evaluate results
Step 6. Summarize and document results
Step 7. Compare airport planning forecast results with the Terminal Area Forecast

4.1 Step 1. Identify Aviation Activity Parameters and Measures to Forecast

4.1.1 Identified Parameters to Forecast

The level and type of aviation activity anticipated at an airport as well as the nature of the planning to be done determines the parameters to be forecast. Generally, the most important activity forecast for airfield planning is the level and type of aviation demand generated at the airport. It is this demand that defines the runway and taxiway requirements.

Some aviation planning is conducted on a regional basis and would include both regional demand and distribution of demand among airports in a region. Other planning efforts, such as this master plan, are conducted on an airport specific basis and require detailed analysis of activity at the airport being studied.

The DOT&PF is currently preparing the Anchorage Area General Aviation System Plan (AAGASP). The system plan will forecast general aviation (GA) activity and identify future needs for GA facilities and services in the Anchorage area. The outcome of this system plan will determine the level and type of regional demand to be accommodated at the Birchwood Airport and will in turn help define the size and type of facilities needed at the airport.

As indicated in *Forecasting Aviation Activity by Airport* (FAA 2001), practical considerations dictate the level of detail and effort that should go into airport planning forecast. The Alaska Aviation System Plan (AASP) currently categorizes Birchwood Airport as a Local Airport that includes recreational and emergency airstrips and that serve as secondary access to communities. Air traffic activity at the Birchwood Airport is comprised of single and twin-engine GA aircraft, ultra light vehicles, gliders, and other experimental aircraft. Passenger and cargo enplanements have not historically comprised a significant percentage of the total annual activity and are not predicted to do so in the future. As a GA airport, passenger and cargo enplanements are not called for as a role to be served by Birchwood in the AASP or AAGASP and are not predicted to place a significant demand on the airport facilities and are therefore not presented in the forecast.

As a general rule, GA airports require aircraft operations and based aircraft forecasts. The forecast of air traffic at Birchwood Airport will concentrate on aircraft operations and GA fleet characteristics.

4.2 Step 2. Collect and Review Previous Airport Forecasts

This step recommends acquiring existing FAA and other related forecasts for the area and airport served. The relevant forecasts for Birchwood Airport include the FAA Terminal Area Forecast (TAF), the Alaska Aviation System Plan (AASP), the Birchwood Airport Master Plan, Anchorage Area General Aviation System Plan (AAGASP), and the September 2000 Birchwood Airport Layout Plan (ALP) Narrative Report.

4.2.1 Federal Aviation Administration, Terminal Area Forecast

The FAA TAF (Table 4-1) for Birchwood Airport contains the air traffic forecast for fiscal years 2000 – 2015. The TAF reports passenger enplanements, aircraft operations, and based aircraft for four major users of the Birchwood Airport: air carriers, air taxi and commuters, general aviation, and the military. A further division is made between local and itinerant aircraft operations.

Table 4-1
Air Traffic Forecast, Birchwood Airport
Federal Aviation Administration, Terminal Area Forecast (2000 – 2015)

	Passenger Enplanements			Itinerant Aircraft Operations					Local Operations			
Year	AC	Commuter	Total	Air Carrier	Air Taxi	GA	Military	Total	GA	Total	Total Operations	Based Aircraft
2000	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2001	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2002	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2003	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2004	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2005	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2006	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2007	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2008	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2009	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2010	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2011	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2012	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2013	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2014	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170
2015	0	0	0	0	1,500	4,500	50		50,000	50,000	56,050	170

GA = general aviation

The TAF forecasts an annual average growth rate of 0%. The assumption behind this forecast could be that if no additional facilities are developed at the Birchwood Airport that there will be no additional based aircraft and hence little to no growth in activity (all lease lots and tie-downs are currently at capacity). Under these circumstances few factors remain that could influence additional activity at the airport.

4.2.2 Alaska Aviation System Plan

Table 4-2 presents the air traffic forecasts for Birchwood Airport reported in the 1996 AASP. The AASP forecast is important because it reflects local conditions and policy considerations at a state level.

Table 4-2
Air Traffic Forecast, Birchwood Airport
Alaska Aviation System Plan Update

Operations	**Base (1992)**	**1995**	**2000**	**2005**	**2010**
Air Carrier	0	0	0	0	0
Air Taxi	1,500	1,500	1,500	1,500	1,500
-GA Local	50,000	54,310	63,760	72,390	82,200
-GA Itinerant	4,500	4,890	5,740	6,510	7,400
GA Total	54,500	59,200	69,500	78,900	89,600
Total	***56,000***	***60,700***	***71,000***	***80,400***	***91,100***

Fleet Mix	**Base (1990)**	**1995**	**2000**	**2005**	**2010**
Single Engine	158	186	210	235	258
Multi Engine	2	2	3	3	3
Jet	0	0	0	0	0
Rotorcraft	3	4	4	5	5
Other	7	8	9	10	11
Total	***170***	***200***	***226***	***253***	***278***

Source: 1996, Alaska Aviation System Plan

The annual average rate of growth used to forecast was 2.5% for both aircraft operations and based aircraft. This forecast presents a reasonable estimate and comes closest to matching the base year estimate developed by HDR Alaska, Inc. in Section 3.10.

4.2.3 Birchwood Airport Master Plan

Table 4-3 presents the 20-year air traffic forecast for Birchwood Airport as developed in the 1990 Birchwood Airport Master Plan (AMP).

Table 4-3
Air Traffic Forecast, Birchwood Airport
Birchwood Airport Master Plan 1990

Year	Single-Engine	Multi-Engine	Turbo Prop	Jet	Rotorcraft	Glider	Total	Peak Hour Ultra light Vehicles	Ski-Equipped
1985	263	3	0	0	3	2	271	40	53
1990	324	4	0	0	3	2	333	55	65
1995	376	5	1	0	4	3	389	60	75
2005	517	6	3	2	5	3	536	84	103

Year	T&G*	Local	Itinerant	Total Ops	Total Annual Ultra light Vehicle Ops	Air Taxi Operations
1985	50,925	67,900	29,100	97,000	15,000	1,000
1990	59,119	82,110	36,890	119,000	20,000	1,389
1995	66,164	95,520	44,480	139,000	22,000	1,525
2005	80,698	124,150	66,850	191,000	31,000	2,104

* Touch and goes

Year	Single-Engine	Multi-Engine	Turbo Prop	Jet	Rotorcraft	Glider	Total	General Aviation Pilots and Passengers	Air Taxi Enplaned Passengers
1985	92,250	2,100	1,000	0	1,100	550	97,000	48,379	1,400
1990	113,060	2,800	1,500	0	1,100	550	119,000	62,875	1,946
1995	131,280	3,500	2,000	20	1,400	800	139,000	76,478	2,136
2005	181,900	4,200	2,500	200	1,400	800	191,000	115,817	2,946

Source: Birchwood Airport Master Plan, October 1990

The annual average rate of growth used to forecast operations was 3.5% and based aircraft was 3.4%. The AMP forecasts the most aggressive rate of growth for both based aircraft and operations of all the air traffic forecasts examined.

4.2.4 Anchorage Area General Aviation System Plan

The Anchorage Area General Aviation System Plan (AAGASP) provides a 20-year aviation demand forecast for the estimated GA and air taxi activity in the Anchorage area (see Table 4-4). The forecast is not airport specific and, therefore, does not forecast based aircraft or operations for Birchwood Airport specifically. It provides a gross volume for airports in the Anchorage area and does not provide a useful means of comparison for the preparation of the forecast for Birchwood Airport. The annual average rate of growth used to forecast aircraft operations in the Municipality of Anchorage is 1.5% and based aircraft is 1.1%.

Table 4-4
Aviation Demand Forecast
Anchorage Area General Aviation System Plan 2000-2020

AIRCRAFT	Base Year 2000	Forecasts 2005	2010	2015	2020
REGISTERED AIRCRAFT					
Registered Aircraft per 1,000 Population	4,027	4,224	4,327	4,601	4,985
BASED AIRCRAFT DEMAND	2,925	3,170	3,245	3,450	3,740
Wheeled Aircraft	2,224	2,395	2,435	2,570	2,770
Percent of Total	76	75.5	75	74.5	74
Annual Operations	180	185	190	195	200
Floatplanes	701	775	810	880	970
Percent of Total	24	24.5	25	25.5	26
Annual Operations per Aircraft	120	123	126	129	132
AIR TAXI					
Passengers (Enplaned and Deplaned)	136,000	144,400	148,000	158,000	171,000
Cargo and Mail (tons)	2,150	2,380	2,620	2,900	3,200
AIRCRAFT OPERATIONS					
Air Taxi	40,445	42,300	44,700	47,300	50,100
General Aviation					
Local	186,683	205,880	213,204	229,785	252,776
Itinerant	256,894	290,220	306,806	337,585	379,164
Subtotal	443,577	496,100	520,010	567,370	631,940
TOTAL	484,022	538,400	564,710	614,670	682,040
AIRCRAFT OPERATIONS					
Wheeled	400,320	443,075	462,650	501,150	554,000
Floatplanes	83,702	95,325	102,060	113,520	128,040
TOTAL	484,022	538,400	564,710	614,670	682,040

Source: AAGASP, June 2002.

4.2.5 Birchwood Airport Layout Plan Narrative Report

The September 2000 ALP presents a recalculated forecast based on the 1990 master plan air traffic forecast. The base year (2000) estimate for based aircraft was estimated at 386. Table 4-5 presents the forecast as presented in the ALP Narrative Report. The annual average rate of growth used to forecast operations is 0.19% and based aircraft is 0.26%. This forecast appears high, not because of a high growth rate but because it is based on an extremely high base year estimate (which is not reported). The report does not explain the forecast methodology nor does it provide any justification other than noting that aircraft parking and lease space is nearing capacity.

Table 4-5
DOT&PF ALP Narrative Report
Birchwood Airport

Year	Based Aircraft	Annual Itinerant Operations	Total Annual Operations
2002-2005	390	45,000	135,000
2006-2010	400	47,000	138,000
2010-2020	410	49,000	140,000

Source: DOT&PF

4.3 Step 3. Gather Data

As a non-towered airport with no local FSS, records of air traffic at the Birchwood Airport are not maintained onsite. Historical air traffic data for the Birchwood Airport was acquired from FAA's Form 5010 Airport Master Record, the TAF for Birchwood Airport, the *General Aviation and Air Taxi Activity* Survey (March 2001), and onsite counts performed for a total of 75 hours over ten days. Data was also acquired from the Alaska Department of Transportation and Public Facility's AASP, the AAGASP, the Birchwood Airport ALP Narrative Report, and leasing information.

In addition, HDR mailed a survey requesting annual aircraft operations, annual touch and go operations, annual passenger enplanements, and annual freight tonnage to all Birchwood Airport tenants; and in an effort to supplement and validate FAA and DOT&PF data, HDR collected onsite counts of aircraft operations for seven days from July to September of 2001.

Base year air traffic estimates presented in the FAA's TAF and the DOT&PF's AASP and AAGASP are identical or very similar. There are only two years (1998 and 1999) of historical data presented in the TAF for Birchwood Airport. This data was likely extrapolated from estimates made during the most recent airport inspection conducted in May of 1996. Estimates presented in the AASP and the AAGASP appear to have been based on the TAF. Relying on the two years of TAF data, which are based on five-year-old estimates, puts into question the accuracy of the base year air traffic estimates reported in the TAF, AASP, and AAGASP.

Data presented in FAA's *General Aviation and Air Taxi Activity Survey* (March 2001) and DOT&PF's ALP *Narrative Report* and lease lot reports provides more current data that better reflects current activity levels. Recent data collection efforts performed between 2000 and 2001 include onsite counts, surveys, aerial photo reviews, and airport user counts and provide current data that is more accurate than the estimates made during the last airport inspection.

4.3.1 Federal Aviation Administration Air Traffic Data

The following sections present air traffic data as reported by the FAA and includes the FAA Form 5010 Airport Master Record; the FAA TAF, the General Aviation and Air Taxi Activity

Survey (March 2001), and the results from a traffic count survey at Birchwood Airport performed by the FAA Air Traffic Division from May through September of 2000.

Form 5010 Airport Master Record

Table 4-6 presents aircraft operations data as reported on the FAA's Form 5010 *Airport Master Record* for Birchwood Airport. Form 5010 reports basic airport identifying information plus manager and owner name, address, and phone number in addition to runway and taxiway information and air traffic activity estimates. The operations data reported for Birchwood Airport reflects an estimate made during an airport inspection during May 21, 1996. During the airport inspection, the inspector estimates the number of operations and based aircraft with assistance of airport personnel. In some cases, this data is supplemented with data from the airport master plan.

Table 4-6
Federal Aviation Administration, Airport Master Record (Form 5010)
Birchwood Airport

Local General Aviation	49,702
Transient General Aviation	4,467
Military	<1% of total
Air Taxi	1,675
Annual Aircraft operations (avg. 153/day x 365 days)	55,845

Source: Compiled by HDR Alaska, Inc., January 2001.

As shown in Table 4-6, Form 5010 reports an average of 153 operations per day resulting in a total of 55,845 annual aircraft operations for Birchwood Airport. Of these annual aircraft operations 89% were attributed to local GA operators, 8% were attributed to transient GA operators, and 3% were attributed to air taxi operators. Form 5010 also reports less than 1% of these operations attributed to military operations. In addition to the estimated activity data, Form 5010 estimates a total of 170 based aircraft at the airfield comprised of the following mix of aircraft:

- 158 single engine airplanes
- 2 multi engine airplanes
- 3 helicopters
- 2 gliders
- 5 ultra light vehicles

Terminal Area Forecast

Table 4-7 presents historical air traffic data as presented in the FAA Terminal Area Forecast (TAF) for Birchwood Airport. According to FAA personnel, for non-towered airports with no local FSS, data reported in the TAF are extrapolated from estimates recorded on FAA's form 5010 Airport Master Record during routine airport inspections.

Table 4-7
Historical Passenger Enplanements and Aircraft Operations, TAF (1990-1999)
Birchwood Airport

	Passenger Enplanements			Aircraft Operations					
Year	Air Carrier	Commuter	Total	Itinerant Air Carrier	Commuter Air Taxi[1]	Military	Transit GA	Local GA	Total
1990	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	1,500	50	4,500	50,000	56,050
1999	0	0	0	0	1,500	50	4,500	50,000	56,050

[1] Estimates Reported on the FAA, TAF, and FAA Airport Master Record Form 5010; GA = general aviation
Source: U.S. DOT, Bureau of Transportation Statistics, Office of Airline Information.

Activity for commuter/air taxi and general aviation is a gross estimate of the volume of air traffic. Per communication with FAA personnel, air traffic data for non-towered airports, such as Birchwood, is only an estimate. As in form 5010, the TAF also reports 170 based single engine aircraft from 1998 to 2000. No data is reported for Birchwood Airport until 1998, two years after the most recent airport inspection. It should also be noted that no data is reported for passenger enplanements or operations for itinerant air carriers. Birchwood Airport is not certified to receive scheduled air carrier service.

General Aviation and Air Taxi Activity Survey (March 2001)

The General Aviation and Air Taxi Activity Survey is an annual sample based survey of registered civil aircraft, except for scheduled commercial air carriers that operate under Federal Aviation Regulation (FAR) Part 121, Operating Requirements and scheduled operations under Part 135. The survey provides estimates of the number of active aircraft, hours flown, primary use, and many other characteristics by aircraft type, by FAA region and state.

Table 4-8
General Aviation and Air Traffic Activity Survey
1999 General Aviation and Air Taxi Data for Alaska

Total Number of Active Aircraft	Total Number of Landings	Average number of Landings per Aircraft	Average number of operations per aircraft
6,122	1,260,735	206	412

Source: FAA, APO, March 2001 Table 2:3 and 2:4, Chapter Two, *General Aviation and Air Taxi Survey*.

Table 4-8 presents the estimated number of active aircraft and total number of landings for Alaska in 1999. As shown above, the total number of active aircraft in Alaska for 1999 was estimated at 6,122. Total number of landings in Alaska was estimated at 1,260,735. Dividing the total number of landings by the total number of aircraft resulted in the average number of landings per aircraft. Doubling the average number of landings resulted in the average operations per aircraft. Estimating the average operations per aircraft allows for comparison between the number of based aircraft and the relative activity at Birchwood Airport.

FAA Air Traffic Division, Air Traffic Count Survey

In response to some airport users' request for the establishment of an air traffic control tower (ATC) at Birchwood Airport, FAA personnel undertook a traffic count survey in 2000 (see Table 4-9). The survey consisted of ten days and a total of 75 hours of observation.

Table 4-9
FAA Traffic Count Survey (May-Sept. 2000)
Birchwood Airport

Date	Hours of Observation	Aircraft Operations
23-May	8	164
24-May	7	117
25-May	8	214
26-May	5	168
3-Jun	7	190
27-Jul	11	263
14-Aug	7	80
17-Aug	7	186
18-Aug	7.5	225
1-Sep	7.5	55
Total	75	1,662

Source: FAA, Air Traffic Division

4.3.2 Alaska Department of Transportation and Public Facilities Data

The DOT&PF has prepared several documents evaluating the air traffic activity at the Birchwood Airport. Prepared in March of 1996, the AASP is a comprehensive airport system plan that identifies the aviation facilities needed to meet air transportation needs and provides an air traffic forecast for Birchwood Airport.

The DOT&PF is currently preparing the AAGASP. This system plan forecasts GA activity and will identify future needs for GA facilities and services in the Anchorage Area. Alternatives will be developed and evaluated to handle the future GA needs, and a strategic implementation plan will identify how to fulfill those needs. Initiated in early 1998, the project began in June of 2000. A draft Technical Memorandum providing an inventory of GA airport facilities and an aviation demand forecast has been prepared.

The September 2000 ALP *Narrative Report* presents an up-to-date set of drawings and includes a basic air traffic forecast. The DOT&PF also maintains a database of leasing information for Birchwood Airport that identifies the number and type of lease lots and tie-downs currently leased.

Alaska Aviation System Plan

Appendix C of the Alaska Aviation System Plan Update (1996) reports based aircraft and aircraft operations for the Birchwood Airport for the base year 1990. According to the plan, a total of 170 aircraft were based at the airport; 158 single engine, 2 multi-engine, 0 jet aircraft, 3 rotorcraft, and 7 other aircraft. The plan reported a total of 56,000 aircraft operations, exactly the same as the number of GA and commuter aircraft operations combined and reported in the TAF for 1998 and 1999.

Anchorage Area General Aviation System Plan, Technical Memorandum I

Technical Memorandum I of the Anchorage Area General Aviation System Plan (AAGASP), presents an inventory of GA airport facilities and aviation demand forecast for GA activity at six publicly owned, public-use airports in the Anchorage area.

The memorandum reports based aircraft and annual operations for the Birchwood Airport for the calendar year 2000. The source of this data is indicated as the DOT&PF, airport site visits, and communication with persons knowledgeable of the airport. Table 4-10 presents this information.

Table 4-10
AAGASP, Technical Memorandum I
Based Aircraft, Birchwood Airport

Single Engine	Multi-Engine	Jet	Helicopter	Gliders	Military	Other	Total
381	4	0	0	0	0	53	438

Source: AAGASP, Technical Memorandum I, Table 5-4 (Calendar Year 2000)

As shown in Table 4-10 the AAGASP estimated a total of 438 (381 single, 4 multi- engine, and 53 other) based aircraft at the Birchwood Airport in the year 2000. The AAGASP does not specify the type of 53 'other' aircraft. These aircraft are probably ultra light vehicles.

Table 4-11 reports annual aircraft operations as estimated in the AAGASP. A total of 86,100 aircraft operations were estimated for the year 2000.

Table 4-11
AAGASP, Technical Memorandum I
Annual Aircraft Operations, Birchwood Airport

Itinerant					Local			
Air Carrier	Commuter/ Air Taxi	GA	Military	Subtotal	GA	Military	Subtotal	Total
0	2,200	27,900	100	30,200	55,900	0	55,900	86,100

Source: AAGASP, Technical Memorandum I, Table 5-4 (Calendar Year 2000)

Birchwood Airport Layout Plan Narrative Report

The most current Airport Layout Plan (ALP) dated September 2000 includes a narrative which estimates based aircraft and provides a forecast of air traffic activity through 2020. The narrative reports that aircraft parking and lease lots are nearly full and the primary factor driving the number of future operations will be how the based aircraft will operate, how the number of itinerant training aircraft will change, and how the ultra light vehicle operations will change. Table 4-12 presents based aircraft and operations information reported in the ALP.

Table 4-12
DOT&PF ALP Narrative Report
Birchwood Airport

Year	Based Aircraft	Annual Itinerant Operations	Total Annual Operations
2000-2005	390	45,000	135,000

Source: DOT&PF

Lease Lot Information

The DOT&PF lease lot information reports 40 lots and 128 tie-downs currently leased. The information does not reflect sub-leasing of lots or hangars and/or tie-downs. It should be assumed that some degree of sub-leasing does occur with lease lots and hangars and certainly occurs with tie-downs associated with lease lots. Therefore, these numbers do not accurately reflect the actual number of based aircraft or aircraft operators at the airfield. However, they do provide a good base level from which comparisons and assumptions can be made. Table 4-13 summarizes the lease lot information.

Table 4-13
DOT&PF Lease Lot Report
Birchwood Airport

Lease Lots	Tie-Downs
40	144

Source: DOT&PF, Leasing Information

Based Aircraft Counts

Ron Stroman of DOT&PF indicates that he counted based aircraft at the Birchwood Airport in the summer of 2001. Mr. Stroman counted 363 GA aircraft. He did not count ultra light vehicles.

Air Traffic Data collected by HDR Alaska, Inc.

In an effort to obtain the most accurate and current aircraft operation and passenger and cargo enplanements data since there is minimal and suspect historical data for Birchwood Airport, tenants at the Birchwood Airport were surveyed to obtain actual or estimated air traffic data for the year 2000. HDR also counted actual aircraft operations for a total of 41 hours from July to September of 2001. Year 2000 aerial photography was also used to obtain a based aircraft estimate.

Airport Tenant Survey Results

Table 4-14 presents the results from the air traffic survey performed by HDR for Birchwood Airport for 2000. These results reflect 2000 data provided directly from airport tenants. Of the 150 tenants surveyed, approximately one-third (45) responded.

Table 4-14
Air Traffic Survey Results, 2001
Birchwood Airport

Survey Respondents	Takeoffs and Landings	Touch and Go Operations	Passenger Enplanements	Based Aircraft
45	4,257*	1,590*	0*	77*

*Data reflect actual or estimated air traffic activity provided by pilots with aircraft based at Birchwood.
Source: HDR Alaska, Inc.

Actual Aircraft Counts and Based Aircraft Aerial Photo Review

HDR staff counted aircraft operations at the Birchwood Airport during a period of seven days for a total of 41 hours from July to September of 2001. The data presented in Table 4-15, reports the number and type of aircraft operations performed during the count.

Table 4-15
Counts of Aircraft Operations, 2001
Birchwood Airport

Date	Hours of Observation	Aircraft Operations	Type of Operations	Aircraft Types
July 5	2.5	19	1(TO), 11(L), 14(T&G)	3(SE), 40(UL)
July 18	2.8	32	16 (TO), 13(L), 6(T&G)	22(SE, 4(TE), 10(UL)
July 27	7.2	78	39(TO), 32(L), 14(T&G)	68(SE), 11(UL)
Aug. 14	8.2	57	24(TO), 13(L), 40(T&G)	51(SE), 4(UL), 4(G)
Aug. 16	6.1	56	27(TO), 22(L), 14(T&G)	37(SE), 19(UL)
Aug. 22	4.4	79	31(TO), 26(L), 44(T&G)	52(SE), 2(TE), 24(UL), 1(G)
Aug. 29	3.9	86	29(TO), 22(L), 70(T&G)	67(SE), 21(UL)
Sept. 4	6.0	38	10(TO), 17(L), 22(T&G)	37(SE), 1(TE)
Total	41.1	557	177(TO), 156(L), 224(T&G)	337(SE), 7(TE), 129 (UL), 5(G)
			TO = Take Off L = Landing T&G = Touch and Go	SE = Single Engine TE = Twin Engine UL = Ultra light G = Glider

Source: HDR Alaska, Inc.

Aerial photography dated September 2000 was used to estimate the average number of based aircraft on the airfield at Birchwood Airport. There are a total of 233 aircraft visible on the aerial photo. Of the 233 visible aircraft, 229 appeared to be single-engine and four appeared to be twin-engine fixed wing aircraft. No helicopters or ultra light vehicles were observed parked anywhere on the airfield.

Several private hangars as well as three banks of T-hangars are also clearly visible on the aerial photo. All the hangars appear in good condition and appear to have been in use at the time the photo was taken. Assuming all of the private hangars are in use and contain at least one aircraft, and assuming the T-hangars are completely full adds an additional 58 aircraft to the 233 visible on the photo. It is impossible to positively identify the type of aircraft in the private hangars from the photo. However, aircraft parked within the T-hangars are most likely single engine, fixed-wing aircraft and would increase the number of single engine aircraft by 32 to an estimated 261. Of the private hangars, seven appear large enough to contain twin-engine aircraft. Assuming these hangars do indeed contain twin-engine aircraft increases the estimated total number of based twin-engine aircraft to eleven. The remaining private hangars (19) appear suitable for single engine aircraft. Again, assuming that these hangars do indeed contain one single engine aircraft would result in an increase from 261 to 280 single engine aircraft. Two public helipads are also visible on the photo and provide some justification for the presence of one or two helicopters at the airport.

Though gliders or ultra light vehicles were not observed on the airfield, the counts of operations by these aircraft in Table 4-16 provide justification for their presence. It is assumed that gliders and ultra light vehicles are stored only inside private hangars and would not therefore be visible on the photo.

Table 4-16 presents the estimated based aircraft at Birchwood Airport.

Table 4-16
Based Aircraft, Aerial Photo Review (Sept. 2000)
Birchwood Airport

Single Engine	Multi-Engine	Helicopter	Ultra light	Glider	Total
280	11	2	30	2	325

Source: HDR Alaska, Inc.

Airport User Data

Table 4-17 presents the results of an independent count of based aircraft at the Birchwood Airport performed by Dick Lochner on Friday May 11, 2001. The count resulted in 349 aircraft occupying tie-down space with an additional 30 tie-down areas empty but in use. Mr. Lochner identified an additional 30 ultra light vehicles and 12 experimental aircraft for a total of 433 based aircraft at the Birchwood Airport.

Table 4-17
Based Aircraft Count. May 11, 2001
Birchwood Airport

Single Engine	Ultra light	Experimental	Total
379[1]	42[2]	12	433

[1]The overwhelming majority of aircraft are single engine. However, this estimate likely includes a few twin-engine aircraft.
[2] Mike Jacober, owner and operator of Arctic Sparrow Aircraft, Inc. indicates he has approximately 42 ultra light vehicles on his lease lot.
Source: Dick Lochner, May 11, 2001. Mike Jacober, February 19, 2002.

4.3.3 *Historical Air Traffic Summary*

Table 4-18 presents the air traffic data collected and summarized for purposes of comparison. It should be noted that not all data sets presented in Table 4-18 report data for each column heading. Additionally, some datasets either do not report data specific to the Birchwood Airport or had to be extrapolated to arrive at total annual values. Further discussion of the total annual estimates is presented in the notes following Table 4-18.

Table 4-18
Historical Air Traffic Data
Birchwood Airport

		Aircraft Operations		
	Based Aircraft	GA	Air Taxi	Total
FAA Form 5010	170	54,169	1,675	55,845
FAA TAF	170	54,500	1,500	56,050
Extrapolation of FAA GA Survey[1]	--	--	--	70,040
Extrapolation of FAA Traffic Count Survey[2]	--	--	--	100,429[1]
DOT&PF AASP	170	--	--	54,500
DOT&PF AAGASP	483	54,500	1,500	56,050
DOT&PF ALP Narrative	386	--	--	135,000
DOT&PF Leasing[3]	180	--	--	--
HDR Counts	325	--	--	61,419

-- = No Data Available or Not Reported
Notes:
[1]The FAA GA survey does not report activity specific to Birchwood Airport but rather reflects the average aircraft operations (412 ops/aircraft) by the estimated number of active aircraft for the entire state of Alaska. Assuming the based aircraft estimate (170) reported on the FAA TAF for Birchwood is indicative of the active aircraft at the airport, the total annual aircraft operations would be approximately 70,040. Considering the relatively high volume of aircraft activity and though the FAA GA Survey does not reflect specific existing conditions at the Birchwood Airport, this estimate is not considered grossly inaccurate.
[2]Annual data shown for the FAA Traffic Count survey was extrapolated by HDR from 75 hours of observation in 2000. The hourly average (22.16 ops/hour) was multiplied by the total annual daylight hours between civil twilight (4,532) to derive an estimate of annual operations. Based aircraft were not counted nor were aircraft operations categorized by type during the FAA Traffic Count survey.
[3]The DOT&PF leasing information only reflects current lease contracts and does not account for sub-lease agreements offered by airport tenants. The DOT&PF leasing information does not report aircraft operations. The estimate of based aircraft from DOT&PF leasing information reflects the current lease contracts maintained by DOT&PF.

4.3.4 Base Year (2001) Air Traffic Activity Estimate

Table 4-19, presents base year (2001) air traffic activity estimates generated by HDR. Activity estimates are derived from actual and estimated aircraft operations data provided by aircraft operators based at the Birchwood Airport as well as actual counts collected by the DOT&PF, FAA, and HDR personnel.

Table 4-19
Air Traffic Estimate, Base Year (2001)
Birchwood Airport

Based Aircraft	Military	Air Taxi/Commuter	General Aviation	Total Operations
423	100	2,200	83,808	86,108

Source: Compiled by HDR Alaska, Inc., November 2001.

Total aircraft operations estimated from actual aircraft counts performed by HDR and FAA were derived by dividing the total hours of observation by the number of aircraft operations recorded to arrive at an average number of hourly operations. The average hourly operations estimate was multiplied by the total annual daylight hours between civil twilight (approximately 4,532 hours) calculated for the Birchwood Airport. The hours between civil twilight most closely reflect the total annual hours of daylight during which the majority of operations are likely to occur.

A total of 86,108 aircraft operations are estimated for the year 2001. This estimate includes all aircraft: air carrier, military, air taxi/commercial, and general aviation. This estimate reflects total aircraft operations estimated from actual aircraft counts performed by HDR and FAA and a review of the trends in the aircraft activity data. During the counts, a total of 2,219 aircraft operations were recorded during 116 hours of observation. The average number of aircraft operations for slightly more than 50% of the observation hours was equal to or less than 19. During half of these hours the average aircraft operations per hour were less than 10. The average number of aircraft operations for approximately 38% of the total observation hours was between 20 and 30. During only 10% of the total observations hours were there more than 30 aircraft operations per hour. The peak number of operations per hour (33 ops/hr) occurred on Friday May 26, 2000 for a period of five hours. The fewest operations per hour (6 ops/hr) occurred on Tuesday September 4 for a period of six hours.

Based on the above analysis and a review of the trends in the aircraft activity data, the average number of aircraft operations per hour for 2001 was determined to be 19. This estimate was selected to represent the annual average aircraft operations. Use of the peak number of operations per hour to develop the base year estimate was not selected because it results in an exaggerated estimate, nearing 150,000 base year operations, far greater than any base year estimate reported in Table 4-19 above. Likewise, use of the fewest number of operations was not used since it also results in a grossly understated estimate of around 16,000 aircraft operations.

The average hourly operation estimate of 19 aircraft operations per hour was multiplied by the total annual daylight hours between civil twilight (approximately 4,532 hours) calculated for the Birchwood Airport. The hours between civil twilight most closely reflect the total annual hours of daylight during which the majority of operations are likely to occur. The base year estimate for annual aircraft operations is considered reasonable in that it falls in the middle of the range of base year estimates extrapolated from the air traffic data collected.

Table 4-20 presents the expected allocation of based aircraft by type at the Birchwood Airport. This estimate is based on the most current sources of documented information. It should be noted that some seasonal fluctuation of the total based aircraft may occur and that this estimate provides a reasonable average of the based aircraft at the airport.

Table 4-20
Based Aircraft, Base Year (2001)
Birchwood Airport

Single Engine	Multi-Engine	Helicopter	Ultra Light	Glider/Experimental	Total
367	12	2	342	12	435

Source: Compiled by HDR Alaska, Inc., November 2001.

4.4 Step 4. Select Forecasting Methods

As noted previously, the DOT&PF is currently preparing a GA system plan for the Anchorage area.

Per direction from FAA (June 2002), the forecast for Birchwood airport has been prepared prior to the completion of the AAGASP and based on the assumptions identified below. As of June 2002, Technical Memorandum 2 of the AAGASP identifies the following five potential alternatives to satisfy aviation demand in the Anchorage area:

Alternative 1 – Do Nothing – Use Existing Airports
Alternative 2 – Expansion of Existing Airports
Alternative 3 – Expand Existing Airports Plus One New Floatpond
Alternative 4 – Expand Existing Airport Plus Two New Floatponds
Alternative 5 – Expand Existing Airports Plus One New Floatpond and One New Paved/Gravel Runway Airport

Three forecast scenarios have been developed based on the following assumptions:

- *Alternative One, explained above, of the AAGASP will be forwarded into the final* system plan,
- No new floatplane facility will be developed at the Birchwood Airport in the next 20-years, and
- Birchwood Airport will continue as the sole ultra light vehicle facility in the Anchorage area.

Existing floatplane facilities within the Anchorage area are at maximum capacity. Based on current land status in the Anchorage area it does not appear reasonable to anticipate the development of new or additional floatplane facilities within the Anchorage area.

It should also be noted that FAA is currently proposing new certification requirements for light-sport aircraft and pilots. There are two parts to the sport pilot proposal. The first part would establish a new pilot certificate, sport pilot, created specifically for those who want to fly simple, lightweight, and diverse single- and two-seat aircraft for fun and recreation. The second part of the sport pilot proposal would define a new aircraft category, light-sport aircraft. This proposal could result in an increase of activity by lightweight aircraft at Birchwood airport.

There is insufficient accurate historical activity data for Birchwood airport to perform a regression analysis. The only historical data available is presented in the FAA TAF. This data is limited and is a gross level estimate that when compared to more recent estimates made from actual counts of based aircraft and aircraft operations appears to be low by approximately 30,000 operations. Forecasting this erroneous historical air traffic activity into the future would exacerbate this error and result in an inaccurate forecast of air traffic activity at Birchwood airport. The following three scenarios for future demand were developed using the base year estimates presented in Section 4.4.2 Base Year (2001) Air Traffic Activity Estimate (this document) and the forecast of overall Anchorage area future demand as presented in the draft AAGASP. These scenarios also reflect the bulleted assumptions above.

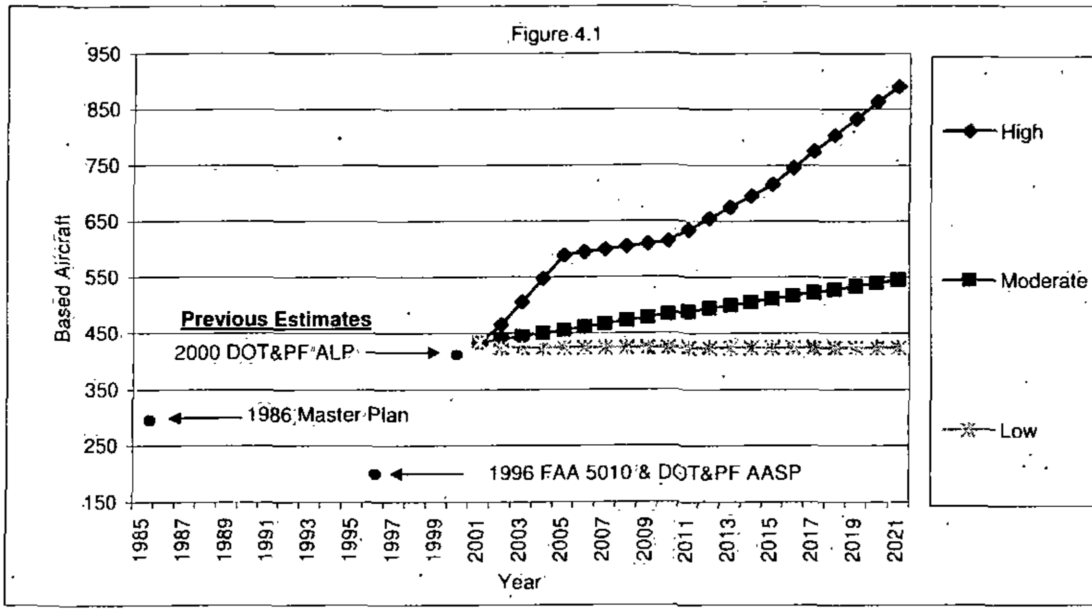
4.5 Step 5. Apply Forecast Methods and Evaluate Results

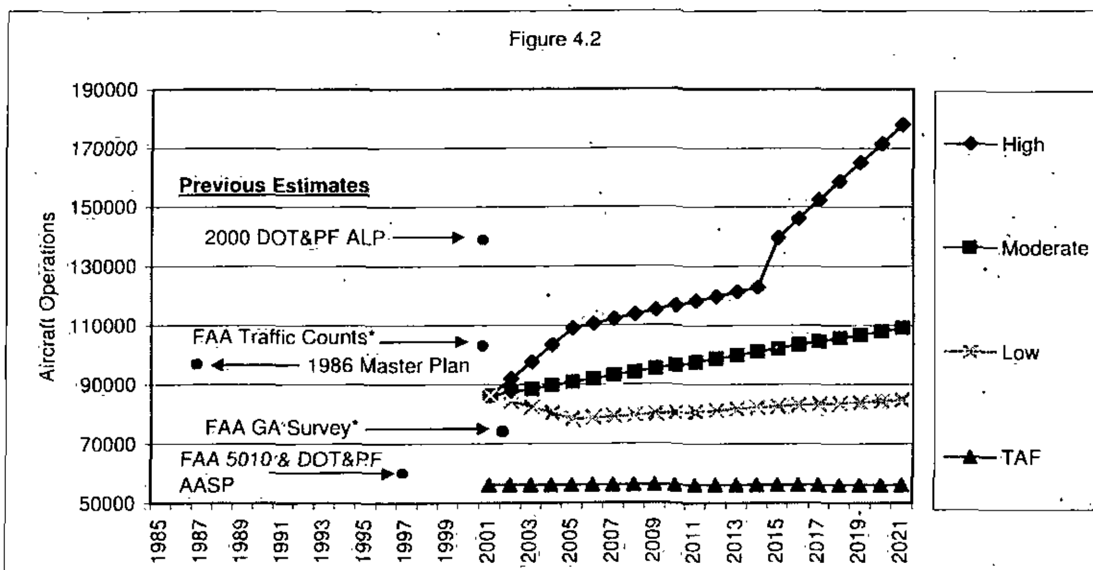
This section presents three scenarios of air traffic forecasts for based aircraft and aircraft operations for Birchwood Airport. Figure 4.1 graphically displays the three forecast scenarios using the base year estimate for based aircraft (423). Figure 4.2 presents the same forecast scenarios using the base year estimate for aircraft operations (86,108).

The low forecast scenario (0.0% growth rate) predicts 100% of the future demand forecast for the Anchorage area would be accommodated at a new GA facility in the Anchorage area. This scenario assumes that no additional demand would be accommodated at Birchwood Airport in the next 20 years. Additional capacity for aircraft operations or based aircraft would neither be planned nor developed. This scenario reflects the lowest potential rate of growth at Birchwood.

The moderate forecast (1.3% growth rate) scenario assumes future aviation demand in the Anchorage area will be distributed among all currently active Anchorage area airports based on the existing (2001) distribution of based aircraft. Under this scenario, Birchwood airport would continue to accommodate all ultra light vehicle traffic in the Anchorage Area. Growth under this scenario most closely corresponds with the annual average population growth (1.2%) for Birchwood during the last 15 years (1985-2000) and is also the growth rate used in the AAGASP forecasting. Floatplanes would not be accommodated at Birchwood Airport. Scenario two reflects a moderate level of potential growth.

The high scenario (3.8% growth rate) assumes 100% of the future GA demand (excluding floatplane traffic) would be accommodated at Birchwood airport. Under this scenario, Birchwood Airport would be the sole airport for future demand in the Anchorage area and would be expanded to accommodate all the forecast GA.





*Annual estimates made by HDR from FAA data.

Figures 4.1 and 4.2 Note: The forecast for the high scenario assumes 100% of future demand will be accommodated at Birchwood Airport and is based on the rate of growth as presented in the AAGASP forecast of air traffic activity. For an explanation of the variation in the growth rate over the twenty-year period shown for the High scenario please refer to the AAGASP.

4.6 Step 6. Summarize and Document Results

Table 4-21 presents the 20-year air traffic forecast for the Birchwood Airport and is based on the moderate scenario as described above. Average annual growth rates are presented for purposes of comparison.

Table 4-21
20-Year Comprehensive Forecast of Aviation Activity (2001-2021)
Birchwood Airport

	Forecast Levels, Base Year 2001					Average Annual Compound Growth Rates			
	Base Yr. Level	Base Yr. + 1yr.	Base Yr. + 5yrs.	Base Yr. + 10yrs.	Base Yr. + 20yrs.	Base yr. to +1	Base yr. to +5	Base yr. to +10	Base yr. to +20
Aircraft Operations									
Itinerant									
Total Commercial Operations	2,200	2,229	2,346	2,492	2,785	1.2%	1.2%	1.2%	1.2%
General aviation	27,900	28,271	29,754	31,609	35,317	1.2%	1.2%	1.2%	1.2%
Military	100	101	107	113	127	1.2%	1.2%	1.2%	1.2%
Local									
General aviation	55,908	56,651	59,624	63,340	70,771	1.2%	1.2%	1.2%	1.2%
Military	0	0	0	0	0	1.2%	1.2%	1.2%	1.2%
TOTAL	86,108	87,253	91,831	97,554	109,000	1.2%	1.2%	1.2%	1.2%
Peak Hour Operations	33	33	35	36	42	1.2%	1.2%	1.2%	1.2%
Based Aircraft									
Single Engine (Nonjet)	367	370	381	409	423	1.3%	1.3%	1.3%	1.3%
Multi Engine (Nonjet)	12	12	13	14	15	1.3%	1.3%	1.3%	1.3%
Helicopter	2	2	2	3	3	1.3%	1.3%	1.3%	1.3%
Ultra Light Vehicles	42	45	57	88	104	1.3%	1.3%	1.3%	1.3%
Other (Gliders, etc.)	12	12	13	14	15	1.3%	1.3%	1.3%	1.3%
TOTAL	435	441	466	528	560	1.3%	1.3%	1.3%	1.3%

Source: HDR Alaska, Inc., July 2002.

4.7 Step 7. Compare Forecasts with TAF

Table 4-22 presents a comparison between the updated air traffic forecast for Birchwood airport and the FAA TAF. Based on communication with FAA personnel, the FAA TAF is an estimate of air traffic activity and may not accurately reflect actual conditions at the Birchwood Airport. The updated forecast presented in this report is based on current actual data as described in Section 4.3 of this report and is more representative of actual air traffic at Birchwood Airport.

Table 4-22
Air Traffic Forecast Comparison, Birchwood Airport

	Year	Airport Forecast	TAF	Difference	AF/TAF (% Difference)
General Aviation Operations					
Base yr.	2001	83,808	54,500	29,308	35%
Base yr. + 5yrs.	2006	89,378	54,500	34,878	39%
Base yr. + 10yrs.	2011	94,948	54,500	40,448	43%
Base yr. + 15yrs.	2016	100,518	54,500[1]	46,018	46%
Base yr. + 20yrs.	2021	106,088	54,500[1]	51,588	49%
Total Operations					
Base yr.	2001	86,108	56,050	30,058	35%
Base yr. + 5yrs.	2006	91,831	56,050	35,781	39%
Base yr. + 10yrs.	2011	97,554	56,050	41,504	43%
Base yr. + 15yrs.	2016	103,277	56,050[1]	47,227	46%
Base yr. + 20yrs.	2021	109,000	56,050[1]	52,950	49%

[1] The TAF does not provide a forecast beyond 2015. TAF data shown for 2016 is actually 2015. TAF data for 2021 was extrapolated by HDR Alaska, Inc.
Note: TAF data is on a U.S. government fiscal year basis (October through September)

4.9 Design Criteria

FAA Advisory Circular 150/5300-13, *Airport Design*, establishes an airport reference code (ARC) to identify specific design criteria appropriate for the types of aircraft expected to be accommodated at a particular airport. The ARC is a coding system used by the FAA to relate airport design criteria to the operational and physical characteristics of the airplanes intended to regularly operate at the airport. Regular operation is defined as at least 250 operations per year. The ARC has two components (approach category and design group) relating to airport design aircraft. The first component, depicted by a letter code (A, B, C, or D), is the aircraft approach category and relates to an aircraft's approach speed. The second component, depicted by a Roman numeral (I, II, III, or IV), is the airplane's design group and relates to wingspan.

The category and group for airports classified as a Local Airport by the AASP is B-I; however, the 1990 Birchwood Airport Layout and Access Plan lists the airport reference code as B-II for

Runway 01L/19R and A-I for Runway 01R/19L. B-II aircraft have approach speeds between 91 and 121 knots and wingspans between 49 and 79 ft. A-I aircraft have approach speeds less than 91 knots and wingspans less than 49 ft.

The AASP recommends 2,000 ft. of runway length for A-I aircraft. FAA Advisory Circular 150/5325-4A, Runway Length Requirements for Airport Design, recommends 3,600 ft. of runway length for B-II aircraft with less than ten seats. FAA Advisory Circular 150/5325-4A runway length recommendation for ultra light vehicles is 300 ft.

The Birchwood Airport is currently used by small single and twin-engine aircraft, such as the Cessna 170-320, Piper Aztec, Piper Navajo, and Beech 18. These aircraft fit into approach categories A through B and design groups I through II. The airport is also used frequently by ultra light vehicles, gliders, and aircraft equipped with tundra tires during the summer and skis during the winter. Ultra light vehicles fall into approach category A and design group I. Aircraft equipped with tundra tires or skis at the Birchwood Airport include Piper PA-12s and PA-18s, which are categorized in approach category A and design group I.

The forecast fleet mix for the Birchwood airport will be comprised of A-I and B-II aircraft. Table 4-23 presents the most common aircraft forecast to operate at the Birchwood airport.

Table 4-23
Forecast Fleet Mix
Birchwood Airport

ARC A-I	ARC B-II
Cessna 172, 180, 210, 310-320 Beech 18 Piper PA-12, PA-18 Cessna Caravan, Stationair Ultra light vehicles	Piper Aztec Piper Navajo

Source: HDR Alaska, Inc., July 2002.

4.7.1 Runway 01L/19R

Wheeled aircraft (excluding ultra light vehicles and aircraft using tundra tires or skis) operate on Runway 01L/19R and are expected to continue to do so into the future. Of the aircraft forecast to regularly operate at the Birchwood Airport, the Piper Navajo requires the most runway length (2,700 ft.). The Navajo also requires at least 75 ft. of runway width.

Based on the anticipated fleet mix, the ARC applicable to Runway 01L/19R is B-II.

4.7.2 Runway 01R/19L

Runway 01R/19L (2,200 ft. long by 50 ft. wide) currently serves as the sole runway for ultra light vehicles and aircraft equipped with tundra tires or skis. Of the aircraft forecast to regularly operate on Runway 01R/19L, the Cessna 180 (ARC A-I) is the most demanding aircraft and requires 1,310 ft. of runway length. The minimum runway width for the FAA ARC A-I is 60 ft.

Based on the anticipated fleet mix, the ARC applicable to Runway 01R/19L is A-I.

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Appendix A
Public Involvement Plan

Birchwood Airport Master Plan

Public Involvement Plan

State Project No. 54741

Prepared for:

State of Alaska
Department of Transportation
and Public Facilities
4111 Aviation Drive
Anchorage AK, 99502

Prepared by:

HDR Alaska, Inc.
2525 C Street, Suite 305
Anchorage, Alaska 99503

August 2001
Revised March 2002

Table of Contents

Attachments

Introduction

The Birchwood Airport is a general aviation (GA) airport located approximately 20 miles north of Anchorage and west of the Glenn Highway along Peters Creek. The airport serves a regional role to the Anchorage, Eagle River, Palmer, and Wasilla GA community. The airport has one paved 4,010-foot-long runway, with full-length taxiways on each side. The Alaska Department of Transportation and Public Facilities (DOT&PF) has established a multi-stepped process to help the Department, the Federal Aviation Administration (FAA), and the community identify, evaluate, and plan airport improvements. The following list identifies the main project phases and tasks:

Phase I:
- Task 1.0: Project Administration
- Task 2.0: Ongoing Public Involvement
- Task 3.0: Conditions and Needs Assessment
- Task 4.0: Alternatives Development and Analysis

Phase II:
- Task 5.0: Draft Master Plan Development
- Task 6.0: Environmental Assessment and Permits

Phase III:
- Task 7.0: Final Master Plan Development

This document, the Public Involvement Plan (PIP) for the Birchwood Airport Master Plan, sets forth strategies for communicating with the public and other interested parties about the project. It defines the tools, timing, and strategies for obtaining public and agency input in each of the project's seven tasks. Major tasks identified as part of the project's approach are listed below followed by detailed descriptions of each public involvement component:

Task 1.0: Project Administration

This task represents activities associated with project startup. The primary public involvement effort under this task is to prepare a Public Involvement Plan (PIP). The PIP details proposed methods for notifying and soliciting information from agencies, organizations, and the public. This document represents the project's PIP.

Task 2.0: Ongoing Public Information

The goal of this task is to establish a framework for sharing information throughout the project. This framework is designed to ensure adequate coordination among team members and local residents, airport users, local government, Native organizations, and other interested parties. To successfully meet these goals, the project team will incorporate the following elements into the overall public participation process.

Public Meetings

The project team will hold public meetings at three key points in the project. The first meeting will be held to announce the project. This meeting will include a presentation to introduce the project and the project's team and to present information gathered to date. It will also provide an opportunity for people to ask questions about any aspect of the project. Those attending will be asked to comment on airport needs and issues and review material generated to date as part of the office study. The second meeting will occur at the end of Phase I in conjunction with environmental scoping. This meeting will solicit input on the issues and alternatives to be addressed in the environmental assessment (EA), which will be completed in Task 6.0 according to the National Environmental Policy Act (NEPA). The third public meeting will be either a public meeting or a more-formal public hearing (depending on need and requests) and will provide the public with an opportunity to comment on the draft environmental assessment. These meetings are discussed in more detail under "Task 3.0: Conditions and Needs Assessment," "Task 4.0: Alternatives Development and Analysis," and "Task 6.0: Environmental Assessment."

Potentially Affected Interest Identification and Project Mailing List

Another key element of the project's ongoing public involvement effort is the use of a project mailing list to identify and maintain contact with potentially affected interests. See Attachment A for the initial mailing list. This list will be used to distribute project information such as meeting notices and the availability of documents. It will be updated after each public meeting (using sign-in sheets) and upon receiving comments from the public.

Newsletters

At four key points in the project, the team will write and distribute newsletters to convey project information. Each newsletter will be double-sided and 8.5 by 11 inches in size. Each newsletter will be timed to notify people of the three public meetings and to announce the completion of the project. These newsletters will also be posted to the project website. These on-line newsletters will be available easily to people who want additional copies or who want a copy following the official publication date.

Website

A cornerstone of the project's public involvement approach is the use of a project website (www.birchwoodairport.com). The HDR team will design the site and provide DOT&PF with periodic updates to reflect project findings. All reports and newsletters will be posted to the website for the public's easy access. Pages within the website will include the following:

- Project Summary and Contact Information
- Schedule
- Meeting Updates
- Reports and Publications

Airport Advisory Committee

Another public involvement tool incorporated into this project to ensure meaningful dialogue between team members and potentially affected interests is an Airport Advisory Committee (AAC). This group will include representatives from a broad range of airport interest groups such as existing lease lot holders, airport users, community members, Municipality of Anchorage representatives, and FAA and DOT&PF representatives. We anticipate using the existing Birchwood Airport Association as the foundation of this committee. See Attachment B for a list of the proposed AAC. The function of this group is to act as a sounding board for issues and ideas, and to review draft documents before they are made available to the general public. Meeting dates and locations will remain flexible and will be scheduled to coincide with the review of project reports.

Anchorage Area General Aviation System Plan Advisory Committee Coordination

As part of another project, the DOT&PF has hired a consultant to prepare the Anchorage Area General Aviation System Plan (AAGASP) and has established the AAGASP advisory committee to guide the development of that plan. Because of the overlap of information between the Birchwood Airport Master Plan and the AAGASP, both projects will coordinate information with one another, as noted below:

- The AAGASP consultant and the Birchwood project team will share information; AAGASP, for example, will provide its aviation forecasts for the Anchorage area to the Birchwood team.
- Birchwood team members will attend up to four AAGASP advisory committee meetings.
- Birchwood team members will attend two AAGASP public meetings.
- AAGASP advisory committee members will be included on the Birchwood project mailing list.

Community Group Coordination

The team will also attend and present information at up to six other community or agency group meetings as needed throughout the project. Groups requesting such presentations could include Birchwood, Chugiak, and Eagle River Community Councils. The team will provide meeting material, such as presentation flip charts or display graphics, comment sheets, and sign-in sheets. The team will also prepare meeting notes to record issues discussed and will have them posted to the project website. The team will also respond to requests for information as needed throughout the duration of the project.

Task 3.0: Conditions and Needs Assessment

This task is intended to identify issues and alternatives to be addressed in project documents, determine the need for special studies, and identify sources of information. The public involvement focus, therefore, is to inform agencies, organizations, and the public about the project and to solicit their feedback on these issues. The team will use the following tools to solicit this information.

Kick-off Meeting with State and Federal Project Sponsors

This task involves meeting with DOT&PF and FAA representatives to identify state and federal concerns. This task has been completed and a summary of issues is included in the project files.

Public Meeting

Proposed for early-October (October 3, 2001), this meeting will provide an early opportunity to inform the public about the project and solicit concerns and perceptions regarding airport needs. The meeting, held in the Birchwood/Chugiak area, will include a presentation and a question and answer session. Meeting notes will be taken, and presentation materials and handouts will be prepared. This meeting will be advertised in the *Anchorage Daily News* and the *Eagle River*

Star, on posters distributed through the community, and in a project newsletter mailed one week prior to the meeting.

Kick-off Meeting with Agencies and Field Reconnaissance Opportunity
Prior to the public kick-off meeting, a special meeting will be held at the public meeting venue with agency representatives. The group will take a field trip to the airport and then return to discuss potential issues and to learn more about the project. Agency representatives will be encouraged to stay for the public meeting, which will follow the afternoon agency meeting. A letter and follow-up phone call will inform agency representatives of the meeting.

Interviews
In many cases, follow-up interviews will need to occur to better define issues. Part of the team's public involvement approach, therefore, is to document conversations with residents and airport users. A brief survey of airport users will also provide another means of collecting information.

Task 4.0: Alternatives Development and Analysis

This project task is devoted to developing and evaluating alternatives, with the goal of selecting a preferred alternative. The following sections discuss the public involvement work associated with this task.

Scoping Plan and Scoping Schedule
The project team will complete a scoping plan prior to beginning Task 4.0. This scoping plan will use the PIP as a framework, but will augment this approach with current information and knowledge of public and agency issues.

Public Scoping Meeting
The team will hold a public meeting in Birchwood/Chugiak as part of environmental scoping. This meeting will have a formal structure, with one team member acting as meeting facilitator, one team member making a presentation, and other team members on hand to answer questions. The meeting will have a set agenda, with time devoted to introductions, an overview of the project and project findings, questions to help clarify the material presented, and a question and answer session. The meeting will conclude with an overview of coming events. Project team members also will be available following the meeting to discuss the project informally and to answer any questions. Poster-sized displays set up around the room will foster dialogue. A blank "white board" and comment sheets will also be available for recording comments and issues. A comment period will occur for a minimum of 14 days following the public scoping meeting. Notices of the meeting will occur through newspaper display advertisements ("Notice of Intent to Conduct Scoping") and through the distribution of the second newsletter.

Agency Scoping Meeting
Coordination with agencies will occur throughout this project to ensure that the project identifies and responds to agency issues and concerns. Dialogue with agencies will occur during the scoping meeting scheduled as part of this task. Following this scoping meeting, communication with agencies will continue as needed via phone and e-mail as the project team develops information. A comment period will occur for a minimum of 14 days following the agency scoping meeting.

Scoping Summary Report

A scoping summary report will be prepared and placed on the website to document comments received during the scoping process.

Task 5.0: Draft Master Plan Development

This task begins Phase II of the project. It involves compiling information from the previous phase and developing the master plan document and airport layout plan. Public involvement work associated with this task is discussed below.

Draft Master Plan Review

Under this task, the project team will coordinate the review of the draft master plan with FAA, DOT&PF, agencies, and the public. This work will entail the following:

- Write a cover letter and provide mailing labels so that DOT&PF can note the availability of the draft report.
- Provide a draft report to DOT&PF for placement on the project website.

Task 6.0: Environmental Assessment

After FAA has reviewed the draft airport master plan, the team will prepare an EA according to NEPA. The EA will examine the potential impacts of airport alternatives to determine if any significant impacts will occur. Public involvement work involved in this phase is discussed below.

Formal or Informal Consultation During Document Preparation

The determination of impacts will in part result from formal or informal consultation with members of the public, agencies, Native organizations, and other potentially affected interests. All correspondence will be documented for the record.

Public and Agency Review of Draft Document

Once the draft EA is completed, the project team will prepare the draft document for reproduction and distribution by DOT&PF and make the document available for posting to the DOT&PF website. The team will also prepare and distribute the third newsletter to announce the availability of the document for review. Following a public and agency comment period, the project team will prepare and mail written responses to all public and agency representatives that made formal comment.

Public Meeting or Hearing

A minimum of 30 days after the distribution of the draft EA, the team will hold a public meeting (or hearing if requested) to take comment on the draft EA. A comment period of at least 15 days will follow a public hearing. Both the meeting date and the comment period will be advertised in the third project newsletter. Following this comment period, the project team will prepare and mail written responses to all public and agency representatives that made formal comment.

Final Document

The final EA will be placed on the project website and a notice of the document's availability will be mailed to those on the project mailing list. An e-mail announcement will be used for the majority of the list.

Task 7.0 Final Master Plan

This task represents the final phase of the project and it involves preparing the final master plan. Public involvement work associated with this task is outlined below.

Final Document Availability

Under this task the project team will provide a version of the document for DOT&PF to place on the website. The team will also provide notice of the completion of the document in the fourth and final newsletter.

Schedule

The following table contains the schedule of the project's public involvement and scoping activities. This schedule will be updated periodically to more precisely reflect anticipated completion dates of activities.

Schedule of Public Involvement and Scoping Activities

Completion Date	Activity	Sub Activity
	Task 1.0: Project Administration	
08-03-01		Establish Public Involvement Plan
	Task 2.0: Ongoing Public Involvement	
08-03-01		Identify potentially affected interests; create mailing list
Ongoing		Maintain mailing list
08-10-01		Design website
Ongoing		Update website
08-03-01		Identify Airport Advisory Committee (AAC) meeting. Hold AAC meetings, as noted below.
08-03-01		Identify Anchorage area General Aviation System Plan advisory committee members for mailing list. Attend AAGASP meeting (up to four meetings).
Ongoing		Present information to other groups as requested (up to six meetings). These will likely include presentations to the Birchwood, Chugiak, and Eagle River Community Councils.
Ongoing		Respond to requests for information as needed.
	Task 3.0: Conditions and Needs Assessment	
Summer 2001		Hold kick-off meeting with Alaska Department of Transportation and Public Facilities (DOT&PF) and Federal Aviation Administration (FAA).
09-14-01		Administer brief survey of airport users.
09-05-01		Write letters to identified AAC members (select Birchwood Airport Association members and other contacts) asking for their participation at upcoming meeting (10-03).
09-05-01		Reserve room for agency workshop (early afternoon), AAC meeting #1 (late afternoon, and public meeting (evening).
Draft 09-17 Mailed 9-24		Write and mail newsletter #1 to advertise public meeting.

Schedule of Public Involvement and Scoping Activities

Completion Date	Activity	Sub Activity
Published 09-26 and 10-03		Write and place advertisement in *Eagle River Star* and *Anchorage Daily News* for public meeting.
09-26-01		Create and distribute posters in community to advertise meeting.
09-19-01		Place notice of public meeting on the "What's Up" weekly e-mail service.
09-10-01		Write and distribute letter invitations to agencies to attend agency public meeting.
10-10-01		Hold AAC meeting #1 to introduce the project and explain the role of the AAC.
10-10-01		Hold public meeting.
10-10-01		Give presentation to the Birchwood Airport Association (community group meeting #1).
October		Interview members of the public and agencies if more information is needed following meetings.
March		Provide AAC with copies of the Draft Office Study Report #1 (one to two weeks in advance of meeting).
April		Hold AAC meeting #2 to gather comments on draft document.
April		Give presentation to the Birchwood Airport Association on draft document (community group meeting #2).
April		Finalize Office Study Report #1 and post to the project website.
	Task 4.0: Alternatives Development and Analysis	
Spring 2002		Prepare draft scoping plan and preliminary scoping schedule.
Spring 2002		Reserve room for public scoping meeting and AAC meeting #3.
Summer 2002		Write and mail newsletter #2 to advertise public meeting.
Summer 2002		Hold issues-based meeting with entire Birchwood Airport Association (community group meeting #3).
Summer 2002		Prepare and publish in *Anchorage Daily News* a combined "Notice of Intent to Conduct Environmental Studies" and "Notice of Wetlands Involvement" display advertisement.
Summer 2002		Create and distribute posters in community to advertise meeting.
Summer 2002		Place notice of public scoping meeting on the "What's Up" weekly e-mail service.
Summer 2002		Hold public scoping meeting and AAC meeting #3, including at least 14 day comment period.
Summer 2002		Reserve room for agency scoping meeting in Anchorage.
Summer 2002		Write and distribute letter invitations to agencies to attend agency scoping meeting including DOT&PF's "Agency Scoping Letter" questions. Also make reminder phone calls.
Summer 2002		Hold agency scoping meeting, with at least a 14-day comment period.
Summer 2002		Hold AAC meeting #4 to discuss selection of preferred alternative.
Summer 2002		Present alternatives to the Birchwood Airport Association (community group meeting #4).
	Task 5.0: Draft Master Plan Development	
Summer 2002		Write cover letter and provide mailing labels to DOT&PF so DOT&PF can mail letters to mailing list noting the availability of the draft report.
Summer 2002		Provide draft report to DOT&PF for placement on project website.
Summer 2002		Provide draft document to AAC for review and comment.
		Give presentation to Birchwood Airport Association (community group meeting #5).
	Task 6.0: Environmental Assessment	
Fall 2002		Coordinate information and evaluation with agency and public representatives.

Schedule of Public Involvement and Scoping Activities

Completion Date	Activity	Sub Activity
Fall 2002		Schedule and hold AAC meeting #4 to discuss EA findings.
Fall 2002		Post draft EA on project website and provide notice of availability.
		Give presentation to Birchwood Airport Association if needed (community group meeting #6).
Fall 2002		Reserve room for public meeting/hearing on draft EA
Fall 2002		Write and mail newsletter #3 to advertise public meeting and note availability of draft EA.
Fall 2002		Write and place a display advertisement in *Eagle River Star* and *Anchorage Daily News* for public meeting/hearing.
Fall 2002		Create and distribute posters in community to advertise meeting.
Fall 2002		Place notice of public scoping meeting on the "What's Up" weekly e-mail service.
Fall 2002		Hold public meeting/hearing.
Fall 2002		Hold at least 14-day comment period
Fall 2002		Prepare and mail written responses to all public and agency representatives that made formal comment.
Fall 2002		Post final EA on website, mail notices of availability.
	Task 7.0 Final Master Plan	
Winter 2002		Hold AAC meeting #5 to present final master plan information such as cost estimates, etc.
Winter 2002		Provide AAC with final document for review.
Winter 2002		Post final document on website.
Winter 2002		Write and distribute newsletter #4.
Winter 2002		Give presentation to Birchwood Airport Association (community group meeting #7).

Attachment A
Project Mailing List

Attachment B
Airport Advisory Committee Mailing List

Appendix B
Public Involvement Activities

Appendix C
Wind Analysis

Memorandum

To	07072-204-249
From	Josh Hedberg
Date	August 15, 2001
Subject	Birchwood Airport Wind Analysis

This memo presents an analysis of the wind speed and wind direction at Birchwood Airport, Alaska as it pertains to the existing runway alignment. A primary factor influencing runway orientation and number of runways is wind. Ideally a runway should be aligned with the prevailing wind and generally, the smaller the airplane, the more it is affected by wind, particularly crosswinds.

Wind data (speed and direction) for the Birchwood Airport was acquired for a period between July 1996 and December 1998 and used to compute wind coverage percentages. Wind data was analyzed using the FAA 4.2D version *Airport Design, Standard Wind Analysis* microcomputer program. A summary of wind coverage estimates is provided in the following table.

The crosswind component shown in the table below is the resultant vector which acts at a right angle to the specified runway. The Airport Reference Code refers to the aircraft's performance and wingspan dimensions; the letter corresponds to the aircraft's approach speed while the Roman numeral refers to the aircraft's wingspan dimensions. Wind coverage is the percent of time crosswind components are below the specified velocity for the specified runway.

Table 1
Birchwood Airport
Wind Coverage Analysis

Crosswind Component	Airport Reference Code	% Coverage Runway 1L-19R	Runway 1R-19L
10.5 Knots	A-I and B-I	99.65%	99.65%
13.0 Knots	A-II and B-II	99.81%	99.81%

FAA AC 150/5300-13 states that when a runway orientation provides less than 95 percent wind coverage for any aircraft forecasted to use the airport on a regular basis, a crosswind runway is recommended. As shown in the table above, the 95 percent wind coverage is computed on the basis of the crosswind not exceeding 10.5 knots for an ARC of A-I and B-I and 13 knots for an ARC of A-II and B-II.

Both runways have an orientation of approximately 39 degrees true north. The wind analysis indicates that both runways have wind coverage exceeding 95% for all small single engine aircraft with an ARC of A-I through B-II such as the Cessna 180 and Piper PA-208. The optimal runway orientation for maximum wind coverage ranges from 39.2 degrees to 48 degrees. The existing runways have sufficient wind coverage.

Figures 1 and 2 present wind roses graphically displaying the estimated wind coverage results as reported in Table 1.

Fig. 1

Birchwood Airport

Runway Orientation:	39.28	Degrees
Crosswind Component:	10.50	Knots
Tailwind Component:	60.00	Knots

Calculated Wind Coverage: *99.65%*

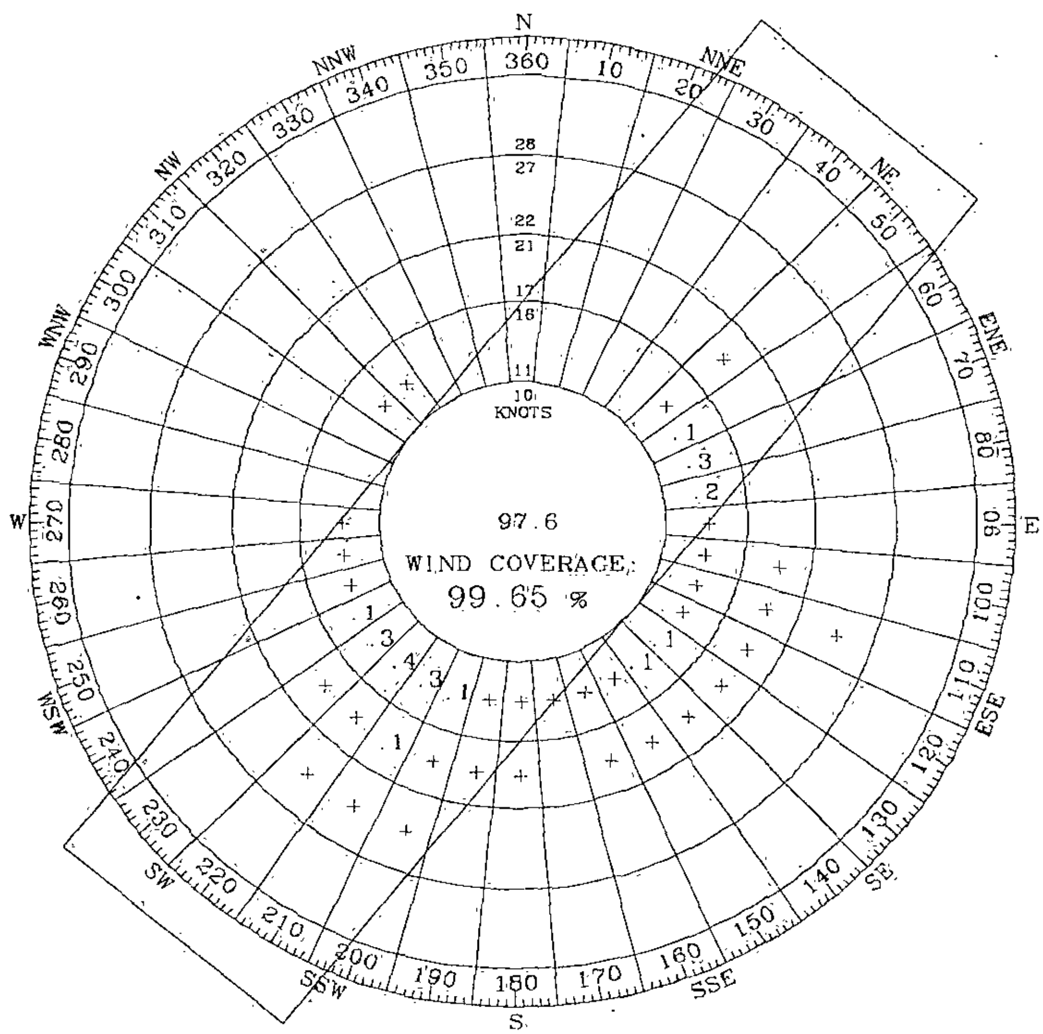
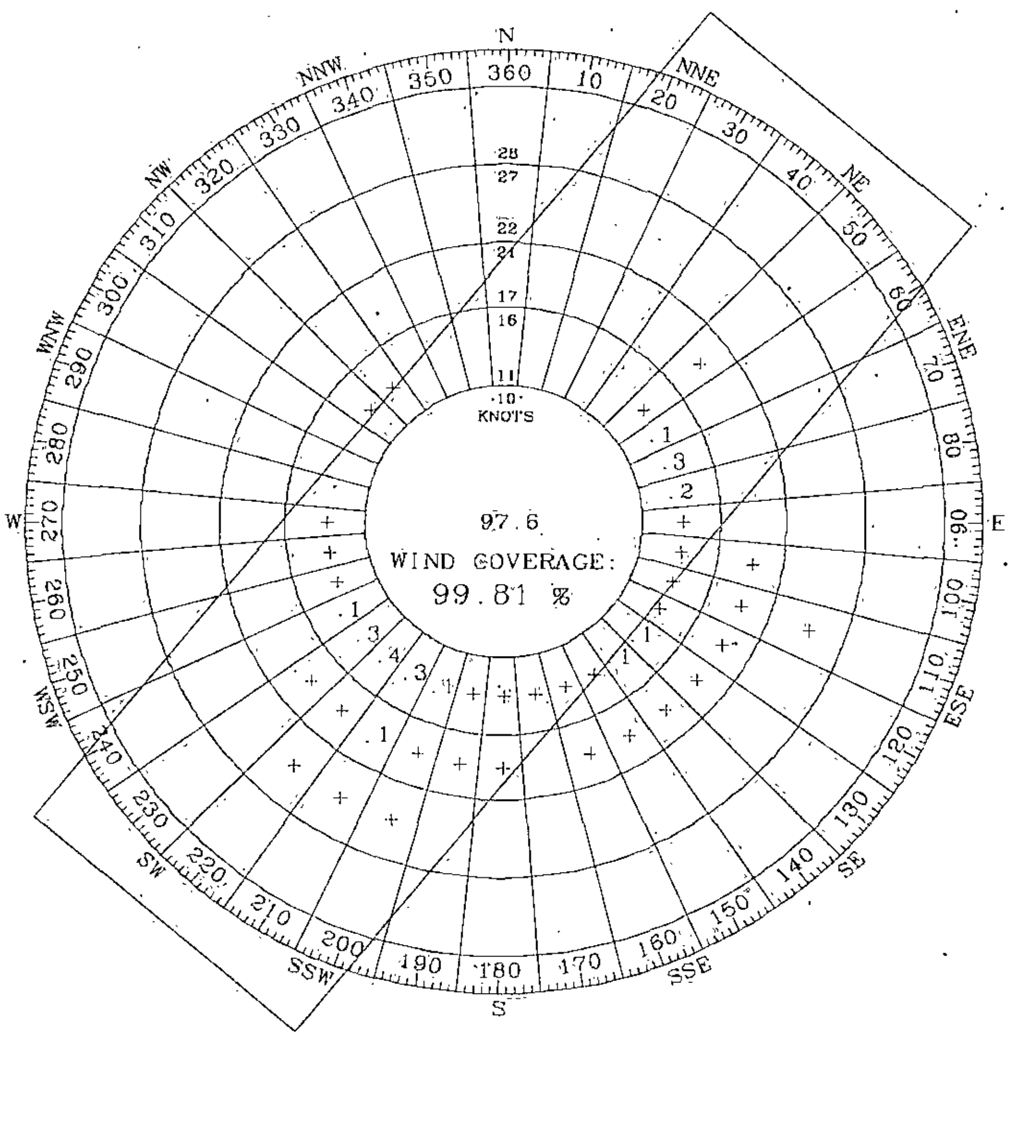


Fig. 2

Birchwood Airport

Runway Orientation:	39.28	Degrees
Crosswind Component:	13.00	Knots
Tailwind Component:	60.00	Knots

Calculated Wind Coverage: 99.81%



Appendix D
Pavement Conditions Report

BIRCHWOOD AIRPORT

Contents:

- A Pavement Strength Form showing project history, latest Pavement Condition Index (PCI) data, pavement strength ratings (if available) and other useful information
- A Pavement Condition Survey – PCI Sample Unit Layout Plan
- PCI maps showing as-measured and predicted pavement conditions
- Age map showing pavement age as of January 2003
- A Branch PCI Condition Report
- A Section PCI Condition Report

Airport Information:

- Location: Approximately 20 miles north of Anchorage and 2 miles west off the Glenn Highway on North Birchwood Loop Road and Birchwood Spur Road.
- District: Anchorage
- Airport Manager: Bill Mowl
- District Maintenance Manager: Bill Mowl
- Pavement Surface: Asphalt Concrete
- Last Pavement Construction: Southeast Apron in 1987, the rest in 1978
- Pavement layout: Runway 1-19, seven taxiways and three aprons
- Design Aircraft: Twin Otter
- 2000 Enplanements: 315
- Airport Class: Non-Primary
- Last pavement condition survey: 2002
- Next planned pavement condition survey: 2005
- 2001 reported pavement maintenance and/or changed conditions: Crack sealing
- Recommendations: See PCI maps

Date: 3 /23/2003

Section Condition Report

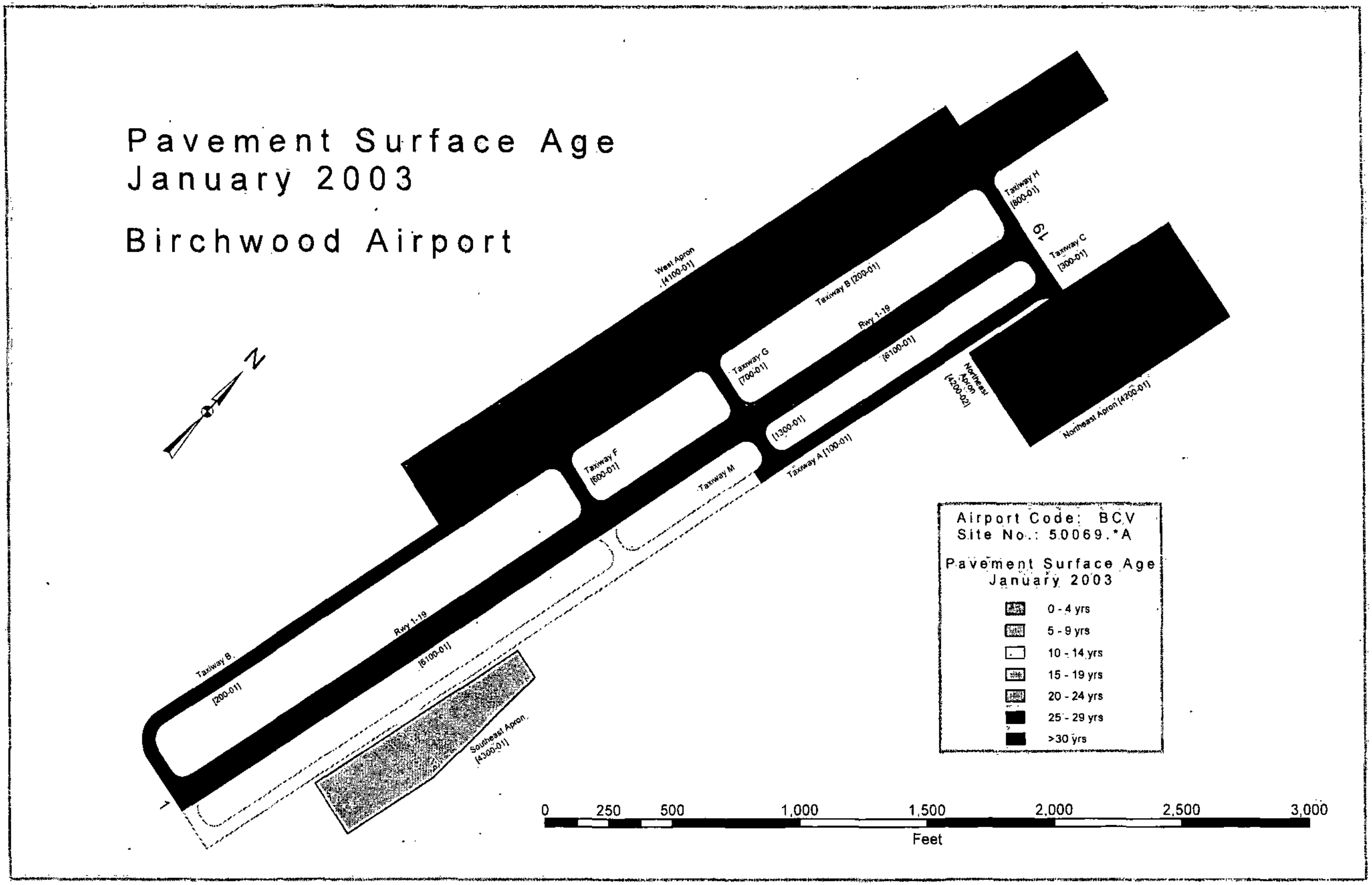
Pavement Database: *NetworkID: Birchwood*

Branch ID	Section ID	Last Const. Date	Surface	Use	Rank	Lanes	True Area (SqFt)	Last Inspection Date	Age At Inspection	PCI
100 (Taxiway A)	100-01	09/01/1978	AC	TAXIWAY	S	0	67,500.00	05/08/2002	24	59.00
1300 (Taxiway M)	1300-01	09/01/1978	AC	TAXIWAY	S	0	10,000.00	05/08/2002	24	57.00
200 (Taxiway B)	200-01	09/01/1978	AC	TAXIWAY	S	0	237,500.00	05/08/2002	24	70.00
300 (Taxiway C)	300-01	09/01/1978	AC	TAXIWAY	S	0	10,000.00	05/08/2002	24	67.00
4100 (WEST APRON)	4100-01	09/01/1978	AC	APRON	P	0	648,000.00	05/08/2002	24	62.00
4200 (Northeast Apron)	4200-01	09/01/1978	AC	APRON	S	0	80,000.00	05/08/2002	24	72.00
4200 (Northeast Apron)	4200-02	09/01/1978	AC	APRON	S	0	397,375.00	05/08/2002	24	64.00
4300 (Southeast Apron)	4300-01	06/08/1987	AC	APRON	T	0	235,000.00	05/08/2002	15	77.00
600 (Taxiway F)	600-01	09/01/1978	AC	TAXIWAY	S	0	11,250.00	05/08/2002	24	64.00
6100 (Runway 01/19)	6100-01	09/01/1978	AC	RUNWAY	P	0	400,000.00	05/09/2002	24	50.00
700 (TAXIWAY G)	700-01	09/01/1978	AC	TAXIWAY	S	0	11,250.00	05/08/2002	24	68.00
800 (Taxiway H)	800-01	09/01/1978	AC	TAXIWAY	S	0	11,250.00	05/08/2002	24	70.00

Section Condition Report

Pavement Database:.

Age Category	Average Age At Inspection	Total Area (SqFt)	Number of Sections	Arithmetic Average PCI	PCI Standard Deviation	Weighted Average PCI
11-15	15.00	235,000.00	1	77.00	0.00	77.00
21-25	24.00	1,884,125.01	11	63.91	6.29	61.30
All	23.25	2,119,125.01	12	65.00	7.02	63.04

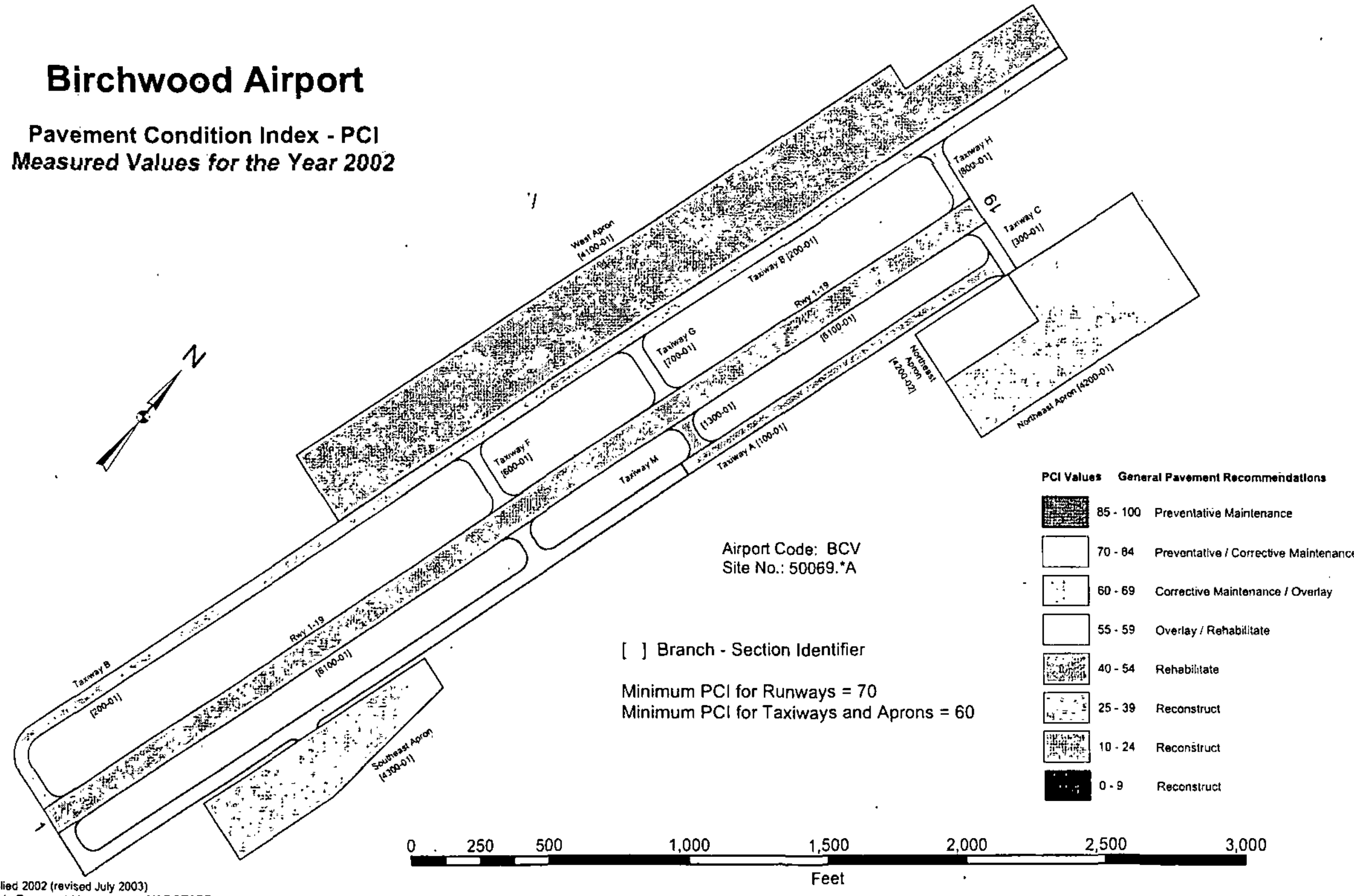


Pavement Surface Age
January 2003
Birchwood Airport
West Apron
[4100-01]
Taxiway H
[800-01]
19
Taxiway C
[300-01]
Taxiway B [200-01]
Rwy 1-19
[6100-01]
Taxiway G
[700-01]
Northeast Apron
[4200-02]
Northeast Apron [4200-01]
[1300-01]
Taxiway A [100-01]
Taxiway F
[600-01]
Taxiway M
Taxiway B
[200-01]
Rwy 1-19
[6100-01]
Southeast Apron
[4300-01]
1
Airport Code: BCV
Site No.: 50069.*A
Pavement Surface Age
January 2003
0 - 4 yrs
5 - 9 yrs
10 - 14 yrs
15 - 19 yrs
20 - 24 yrs
25 - 29 yrs
>30 yrs
0
250
500
1,000
1,500
2,000
2,500
3,000
Feet

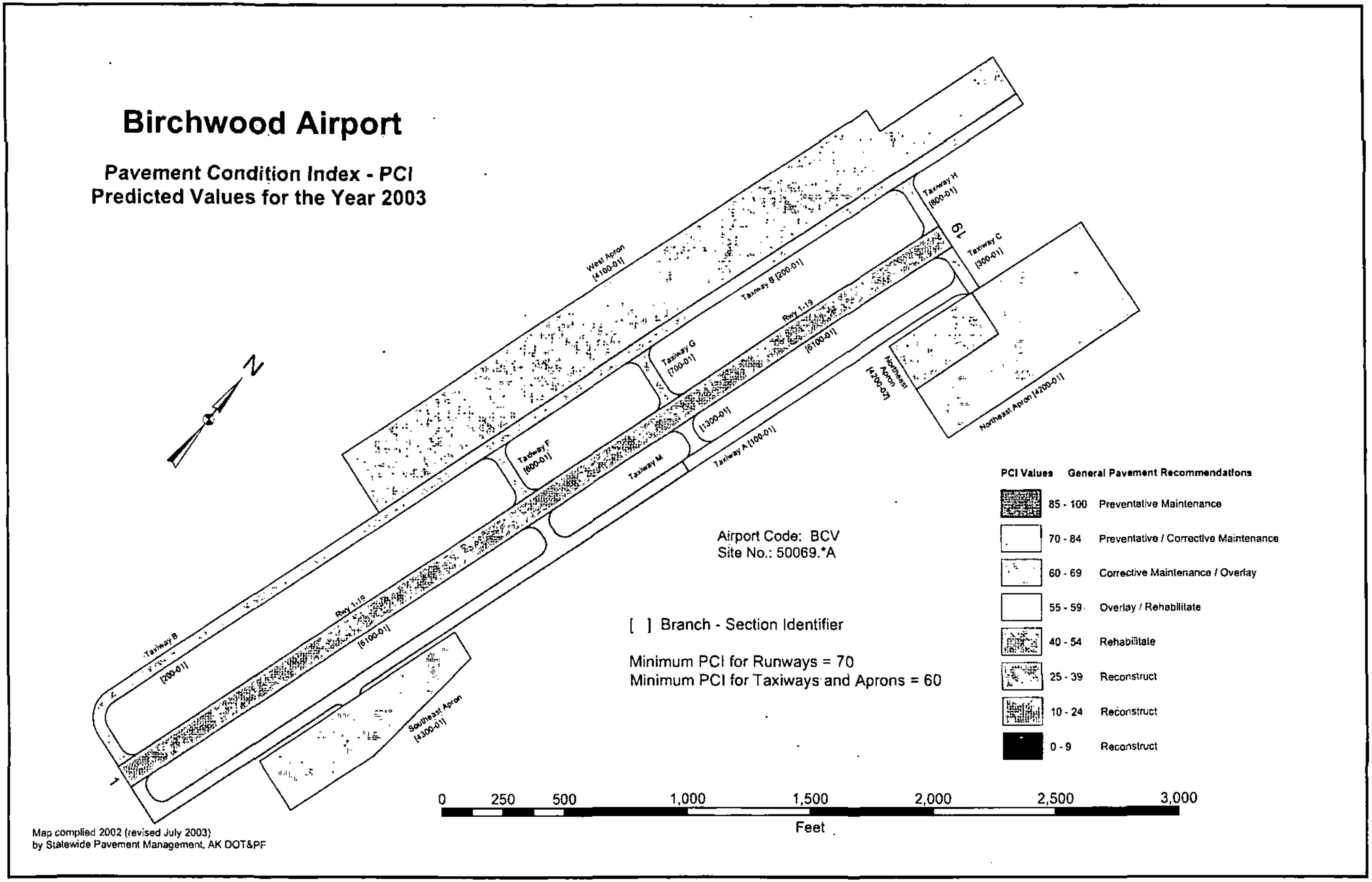
Birchwood Airport

Pavement Condition Index - PCI

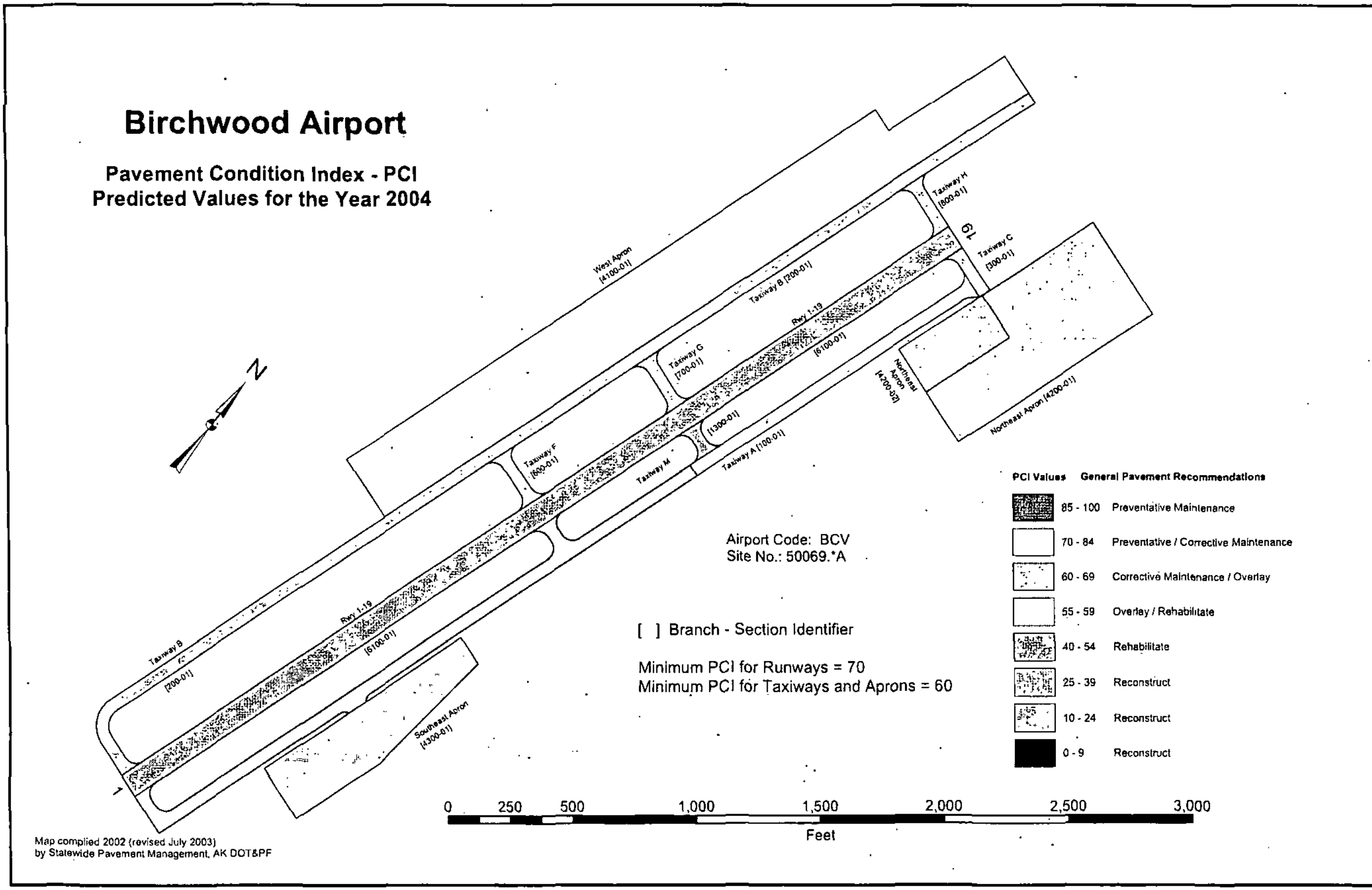
Measured Values for the Year 2002



Map compiled 2002 (revised July 2003)
by Statewide Pavement Management, AK DOT&PF



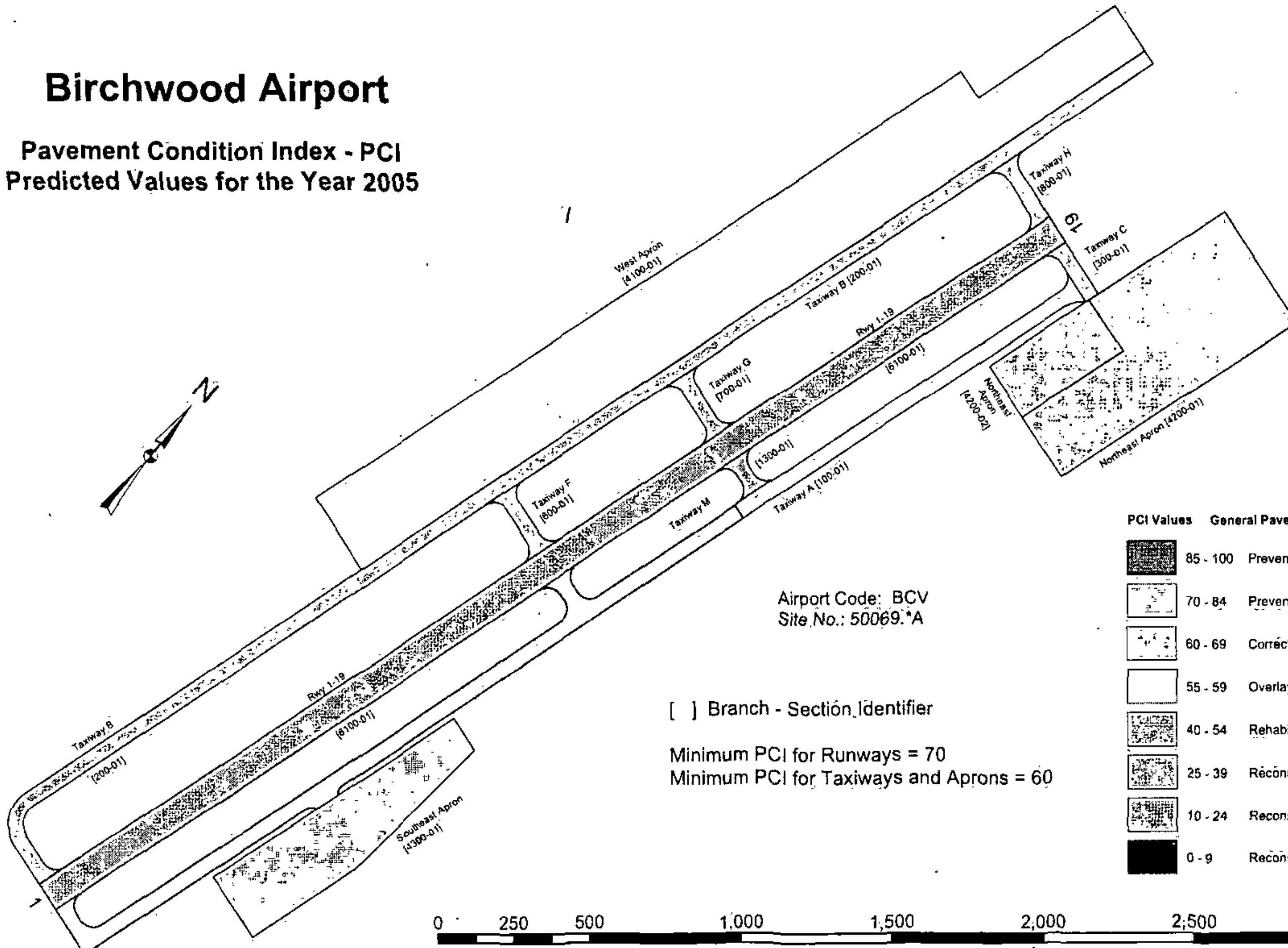
Birchwood Airport
Pavement Condition Index - PCI
Predicted Values for the Year 2003
N
West Apron [4100-01]
Taxiway B [200-01]
Taxiway H [800-01]
19
Taxiway C [300-01]
Rwy 1-19 [6100-01]
Taxiway G [700-01]
Taxiway F [600-01]
[1300-01]
Taxiway M
Taxiway A [100-01]
Northeast Apron [4200-02]
Northeast Apron [4200-01]
Southeast Apron [4300-01]
1
Airport Code: BCV
Site No.: 50069.*A
[ ] Branch - Section Identifier
Minimum PCI for Runways = 70
Minimum PCI for Taxiways and Aprons = 60
PCI Values General Pavement Recommendations
85 - 100 Preventative Maintenance
70 - 84 Preventative / Corrective Maintenance
60 - 69 Corrective Maintenance / Overlay
55 - 59 Overlay / Rehabilitate
40 - 54 Rehabilitate
25 - 39 Reconstruct
10 - 24 Reconstruct
0 - 9 Reconstruct
0 250 500 1,000 1,500 2,000 2,500 3,000
Feet
Map compiled 2002 (revised July 2003)
by Statewide Pavement Management, AK DOT&PF



Birchwood Airport
Pavement Condition Index - PCI
Predicted Values for the Year 2004
West Apron [4100-01]
Taxiway H [800-01]
Taxiway B [200-01]
Taxiway C [300-01]
Rwy 1-19 [6100-01]
Taxiway G [700-01]
Northeast Apron [4200-02]
Northeast Apron [4200-01]
Taxiway F [600-01]
[1300-01]
Taxiway M
Taxiway A [100-01]
Taxiway B [200-01]
Rwy 1-19 [6100-01]
Southeast Apron [4300-01]
N
1
19
Airport Code: BCV
Site No.: 50069.*A
[ ] Branch - Section Identifier
Minimum PCI for Runways = 70
Minimum PCI for Taxiways and Aprons = 60
PCI Values General Pavement Recommendations
85 - 100 Preventative Maintenance
70 - 84 Preventative / Corrective Maintenance
60 - 69 Corrective Maintenance / Overlay
55 - 59 Overlay / Rehabilitate
40 - 54 Rehabilitate
25 - 39 Reconstruct
10 - 24 Reconstruct
0 - 9 Reconstruct
0 250 500 1,000 1,500 2,000 2,500 3,000
Feet
Map compiled 2002 (revised July 2003)
by Statewide Pavement Management, AK DOT&PF

Birchwood Airport

Pavement Condition Index - PCI
Predicted Values for the Year 2005



Airport Code: BCV
*Site No.: 50069.*A*

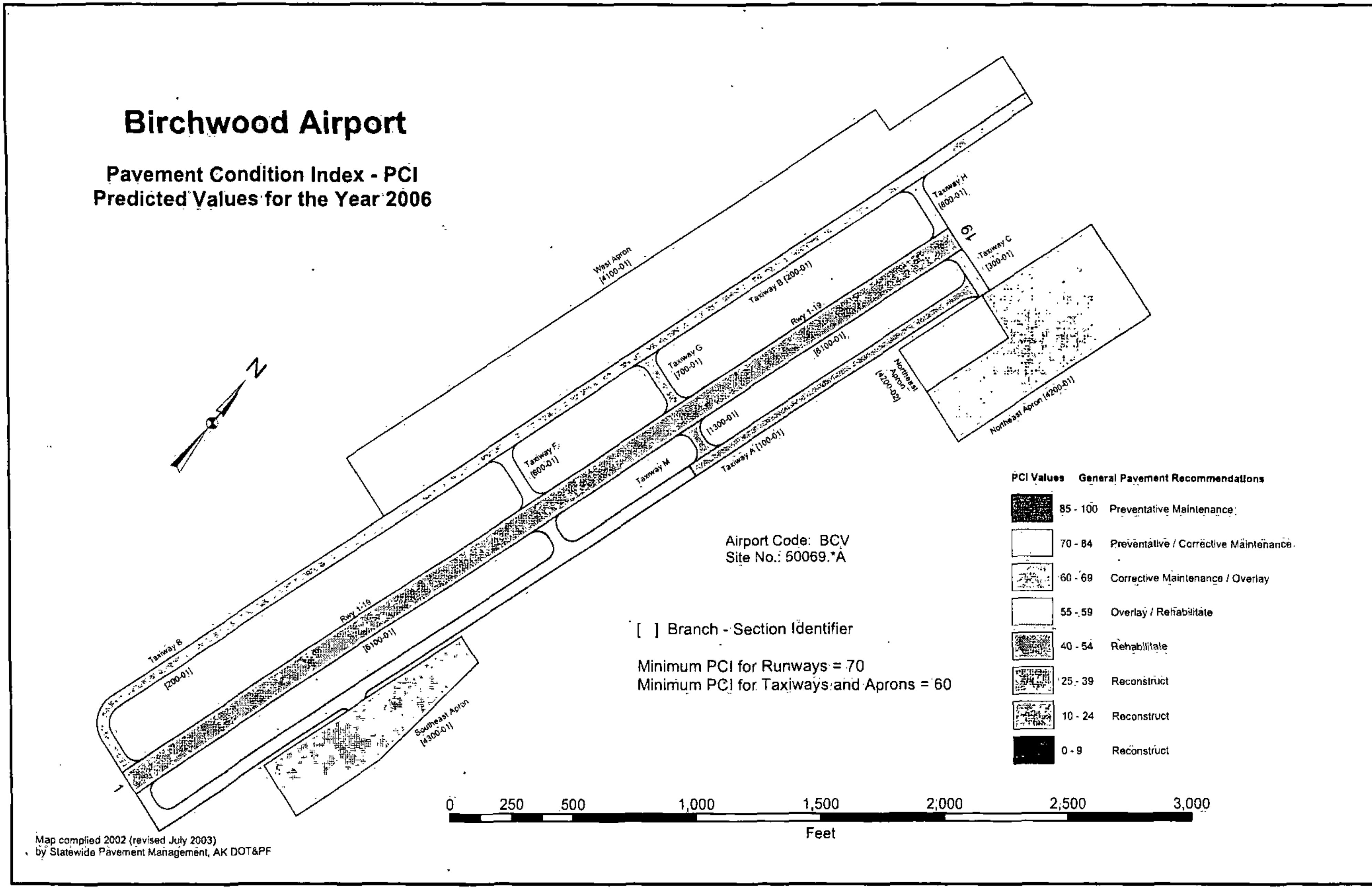
[ ] Branch - Section Identifier

Minimum PCI for Runways = 70
Minimum PCI for Taxiways and Aprons = 60

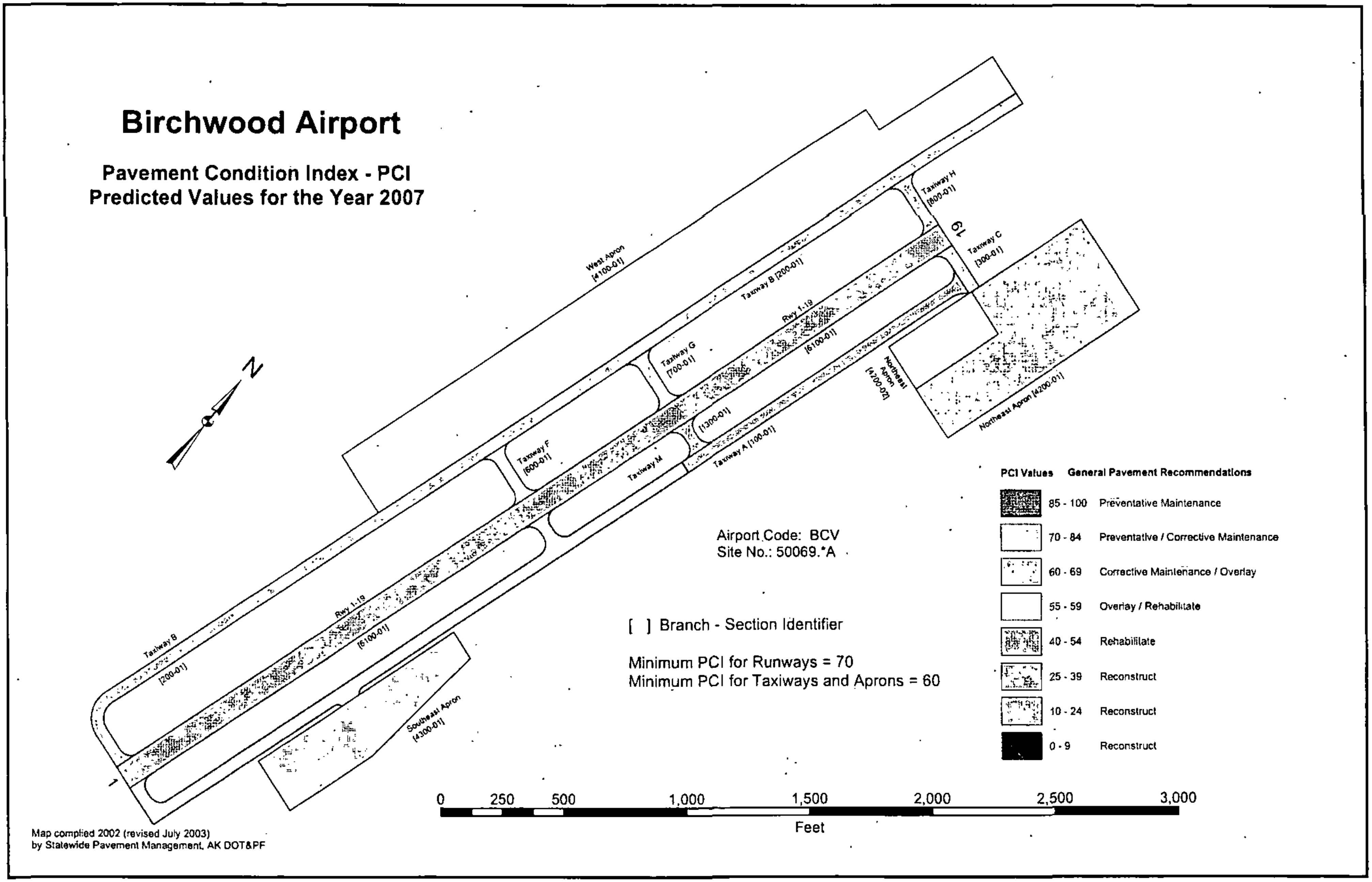
PCI Values	General Pavement Recommendations
85 - 100	Preventative Maintenance
70 - 84	Preventative / Corrective Maintenance
60 - 69	Corrective Maintenance / Overlay
55 - 59	Overlay / Rehabilitate
40 - 54	Rehabilitate
25 - 39	Reconstruct
10 - 24	Reconstruct
0 - 9	Reconstruct

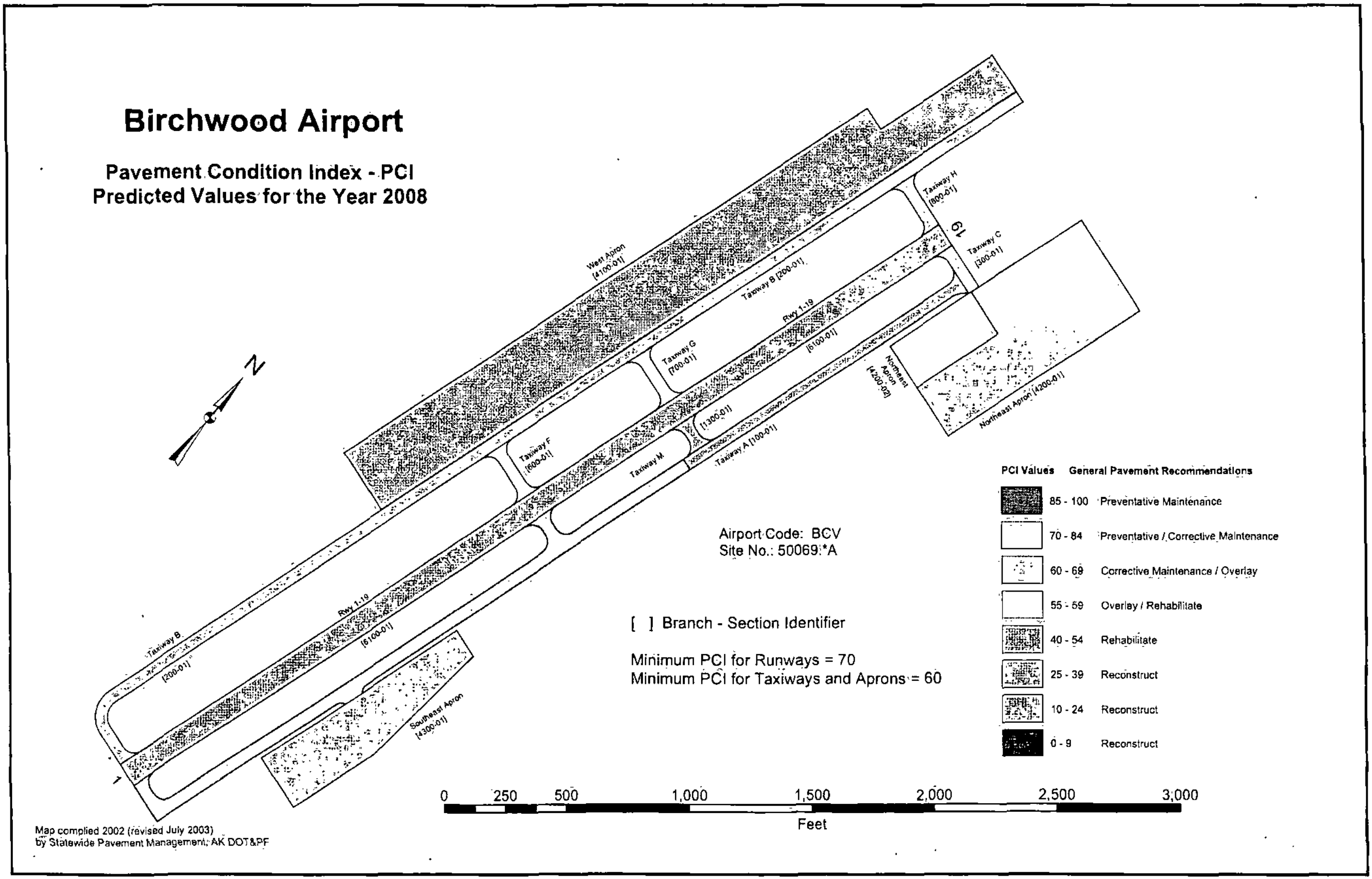
0 250 500 1,000 1,500 2,000 2,500 3,000
Feet

Map compiled 2002 (revised July 2003)
by Statewide Pavement Management, AK DOT&PF



Birchwood Airport
Pavement Condition Index - PCI
Predicted Values for the Year 2006
West Apron [4100-01]
Taxiway B [200-01]
Rwy 1-19 [6100-01]
Taxiway H [800-01]
Taxiway C [300-01]
Taxiway G [700-01]
Taxiway F [600-01]
Taxiway M
[1300-01]
Taxiway A [100-01]
Northeast Apron [4200-02]
Northeast Apron [4200-01]
Southeast Apron [4300-01]
1
19
N
PCI Values General Pavement Recommendations
85 - 100 Preventative Maintenance
70 - 84 Preventative / Corrective Maintenance
60 - 69 Corrective Maintenance / Overlay
55 - 59 Overlay / Rehabilitate
40 - 54 Rehabilitate
25 - 39 Reconstruct
10 - 24 Reconstruct
0 - 9 Reconstruct
Airport Code: BCV
Site No.: 50069.*A
[ ] Branch - Section Identifier
Minimum PCI for Runways = 70
Minimum PCI for Taxiways and Aprons = 60
0 250 500 1,000 1,500 2,000 2,500 3,000
Feet
Map compiled 2002 (revised July 2003)
by Statewide Pavement Management, AK DOT&PF


Birchwood Airport
Pavement Condition Index - PCI
Predicted Values for the Year 2007
West Apron [4100-01]
Taxiway B [200-01]
Taxiway H [800-01]
19
Taxiway C [300-01]
Taxiway G [700-01]
Rwy 1-19 [6100-01]
Northeast Apron [4200-02]
Northeast Apron [4200-01]
[1300-01]
Taxiway A [100-01]
Taxiway F [600-01]
Taxiway M
N
Airport Code: BCV
Site No.: 50069.*A
[ ] Branch - Section Identifier
Minimum PCI for Runways = 70
Minimum PCI for Taxiways and Aprons = 60
PCI Values General Pavement Recommendations
85 - 100 Preventative Maintenance
70 - 84 Preventative / Corrective Maintenance
60 - 69 Corrective Maintenance / Overlay
55 - 59 Overlay / Rehabilitate
40 - 54 Rehabilitate
25 - 39 Reconstruct
10 - 24 Reconstruct
0 - 9 Reconstruct
Taxiway B [200-01]
Rwy 1-19 [6100-01]
Southeast Apron [4300-01]
1
0 250 500 1,000 1,500 2,000 2,500 3,000
Feet
Map compiled 2002 (revised July 2003)
by Statewide Pavement Management, AK DOT&PF


Birchwood Airport
Pavement Condition Index - PCI
Predicted Values for the Year 2008
West Apron [4100-01]
Taxiway B [200-01]
Taxiway H [800-01]
Taxiway C [300-01]
Taxiway G [700-01]
Rwy 1-19 [6100-01]
Northeast Apron [4200-02]
Northeast Apron [4200-01]
Taxiway F [600-01]
[1300-01]
Taxiway A [100-01]
Taxiway M
Southeast Apron [4300-01]
19
1
N
PCI Values General Pavement Recommendations
85 - 100 Preventative Maintenance
70 - 84 Preventative / Corrective Maintenance
60 - 69 Corrective Maintenance / Overlay
55 - 59 Overlay / Rehabilitate
40 - 54 Rehabilitate
25 - 39 Reconstruct
10 - 24 Reconstruct
0 - 9 Reconstruct
Airport Code: BCV
Site No.: 50069.*A
[ ] Branch - Section Identifier
Minimum PCI for Runways = 70
Minimum PCI for Taxiways and Aprons = 60
0 250 500 1,000 1,500 2,000 2,500 3,000
Feet
Map compiled 2002 (revised July 2003)
by Statewide Pavement Management, AK DOT&PF

Archeological Literature Review and Site Visit,

Birchwood Airport Master Plan

Prepared by

Michael R. Yarborough and Jennifer N. Macy

For

HDR Alaska, Inc.

August 25, 2004

Cultural Resource Consultants LLC

Anchorage, Alaska

Introduction

Cultural resources are the physical manifestations of the past that are worthy of listing on the National Register of Historic Places. By passing the National Historic Preservation Act (NHPA) of 1966, the U.S. Congress declared that "the historical and cultural foundations of the Nation should be preserved..." and that "the preservation of this irreplaceable heritage is in the public interest...." The NHPA authorizes the Secretary of the Interior "to expand and maintain a National Register of districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, engineering, and culture" (36 CFR 60.1). A site's significance is evaluated according to criteria established by the Secretary of the Interior for use in determining the eligibility of properties for the National Register (36 CFR part 60). The NHPA defines "historic properties" as prehistoric and historic sites, buildings, structures, districts, and objects included in or eligible for inclusion in the National Register, as well as artifacts, records, and remains related to such properties.

Archeological and historic sites are extremely sensitive to physical disturbance and can be adversely affected by direct, indirect, or cumulative impacts associated with any proposed project. Section 106 of the NHPA requires that the possible effects of Federal undertakings on properties included in or eligible for the National Register be considered.

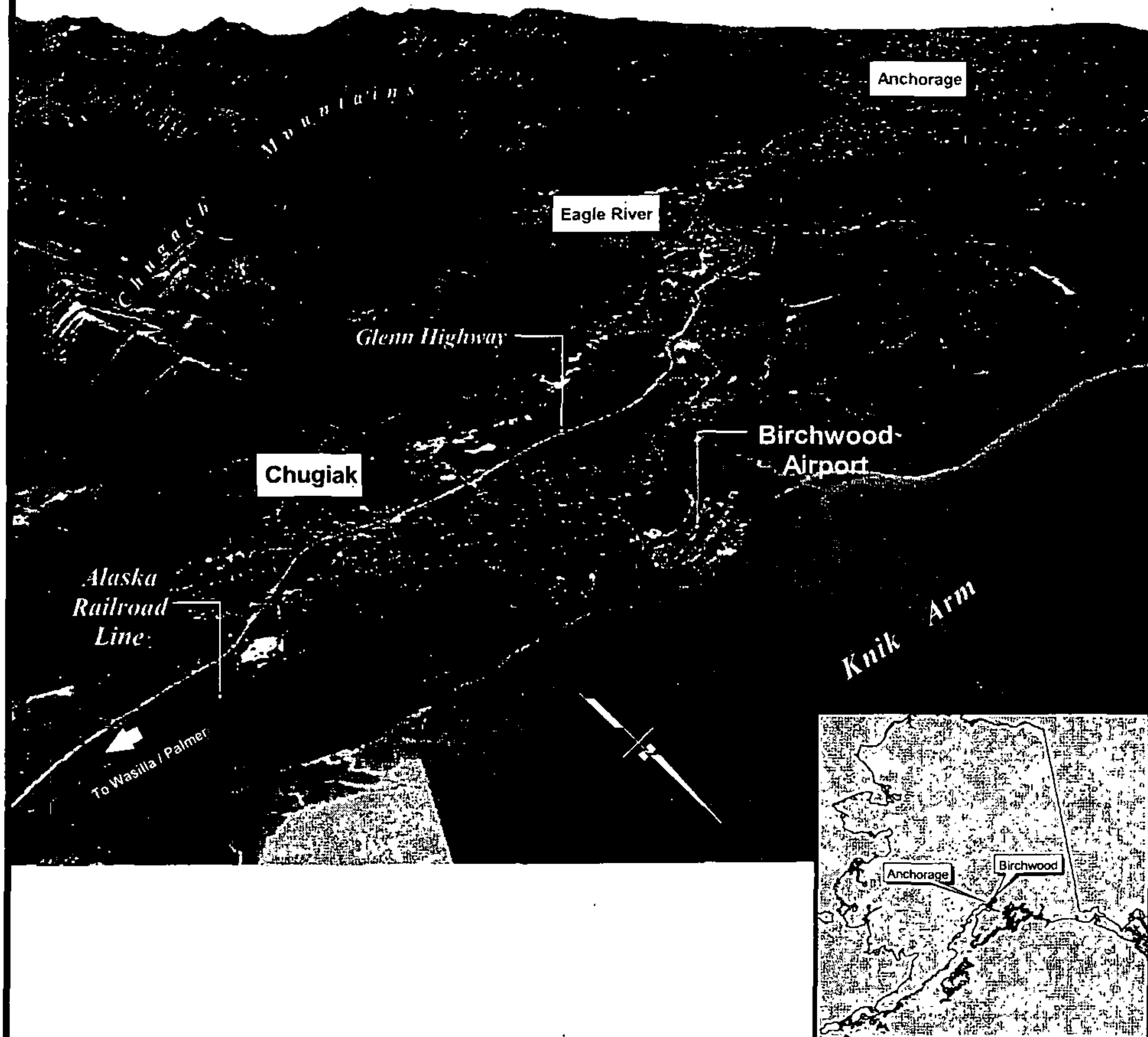
Project Description

The Alaska Department of Transportation and Public Facilities (DOT&PF) and its consultant HDR Alaska, Inc. are studying ways to improve the Birchwood Airport (Figure 1). The Birchwood Airport is a general aviation airport located approximately 20 miles north of Anchorage and west of the Glenn Highway along Knik Arm. It is on land owned by the State of Alaska, which also maintains the airport (HDR Alaska 2002).

DOT&PF is considering three airport improvement alternatives– a "no action" alternative and two "build" alternatives (Alternatives 1 and 3). Under the No Action Alternative, no improvements would be made to the airport. Under Alternative 1, an existing apron northeast of the airport would be expanded to accommodate additional tie-downs. A new ultra light runway would be built southeast of the existing runways, between Fire Creek and the Alaska Railroad tracks. This proposed runway, located 1,100 feet east of the main runway (Runway 01L/19R), would allow simultaneous operations of ultra light vehicles and general aviation aircraft. An apron and new lease lots would be constructed in association with the ultra light runway.

Alternative 1 also includes a new apron, expanded aircraft parking areas and lease lots, and T-hangar development west of the airport and south of the rifle range. A new lighted taxi lane would be constructed to provide access to these new facilities.

Alternative 3 would develop an ultra light runway 895 feet east of the existing ski/tundra tire runway. A 25-foot wide taxiway would be developed between the ultra light runway and the other operating areas at the airport. An exit/entry taxiway would be built near the approach end



BIRCHWOOD PROJECT VICINITY

BIRCHWOOD AIRPORT MASTER PLAN

DATE: October 2004

FIGURE 1

Z:\07072 DOT&PF\204 Birchwood Airport Master Plan\CAD\Birchwood\Birchwood_airport.apr - Project of Runway 01L. Two new taxiways would be constructed, connecting the east-side apron expansion to the runways. Additional hangar lots would be prepared adjacent to the existing T-hangars at the southwest end of the airport. Snow storage would be located adjacent to the proposed lease lots on the eastern side of the airport.

Study Methods

All available archeological literature and the records of the Alaska Heritage Resources Survey (AHRS) were reviewed to compile information about previously recorded sites in the general project area. Archeologist Jennifer Macy visited the Birchwood Siding area (see below) on July 21, 2004 to assess the archeological potential of this early

Background

Ethnography

At the time of Russian contact, Cook Inlet and its tributaries were inhabited by a subgroup of the Dena'ina (Osgood 1976:14). Unique among northern Athapaskans, the Dena'ina utilized both inland and marine resources. Although the Dena'ina of upper Cook Inlet and the Susitna River depended on the sea to a lesser degree than did the people on the Kenai Peninsula and around Kachemak Bay, they did hunt seals and beluga whales (Osgood 1976:37).

The Dena'ina occupied semisubterranean, split log houses from October to April. These houses had floors as deep as five feet below the natural surface of the ground. A Dena'ina house had walls of split logs and was roofed with moss, dirt and sod. An entranceway up to ten feet long extended from the door of the house. Each of the several families sharing the communal dwelling had a sleeping room that was attached to the main body of the house. Also adjoined to the house was usually one large room that served as a bathhouse and as the sleeping room for single males. During the summer, the Dena'ina lived in lightly constructed houses made of strips of bark laid over a framework of poles. These structures served both as dwellings and as smokehouses for the summer's salmon catch (Osgood 1976:55, 60, 62).

Dena'ina caches were placed some distance from the village and were built entirely below ground. The floors of the caches were covered with willow branches. According to Osgood's informants, an underground cache not only kept its contents dry and cold, but also served to hide the Dena'ina's possessions from raiding bands of Eskimos.

There are no known prehistoric or historic Native sites in the immediate project area. although several locales in the vicinity have Dena'ina place names. Peters Creek is called *Htestighitun Betnu*, "Creek Where Trail Goes over Hill" and Little Peters Creek is *Qintali Betnu*, "Wide Ridge Creek" (Kari and Fall 1987:286-287). A "point on the beach at Birchwood, between Fire Creek and Peters Creek," is known as *Tuq'eyghil'ut*, "Where Water Flows through Birch." Fire Creek is called *Ch'eneltash Betnu*, "Creek Where We Sleep" (Kari and Fall 1987:287).

Eklutna is the only remaining Dena'ina village on Knik Arm. De Laguna (1975:140) recorded that the old village was called Ikluat. Her informants claimed that it had a long history of occupation. De Laguna did find several house pits near the modern (in 1930) houses, but says they "did not seem to be very old" (de Laguna 1975:140). The best information on the establishment of the current village at Eklutna is found in the field notes of U.S. Survey 239, completed in August of 1904 by Albert Lascy, and in an earlier article by Fr. Ioann Bortnovsky, a Russian Orthodox missionary from Kenai. Both Lascy and Bortnovsky indicate that the modern village of Eklutna dates to 1897 (Yarborough 1996).

Exploration and Early Settlement

Captain James Cook was the first European explorer to sail the waters of Cook Inlet. In May, 1778, his two ships, the Resolution and the Discovery, entered the inlet in search of the Northwest Passage (Bancroft 1970:206). Although Cook ultimately recognized that he had not found a northern route to the Atlantic, he did not realize the extent of his discovery. He did, however, send boats to briefly explore Turnagain Arm and the mouth of the Knik River (Bancroft 1970:207). Captains Nathaniel Portlock (1789) and George Dixon (1968), both of whom were with Cook during his 1778 voyage, returned to Cook Inlet in July 1786.

Eight years later, in April 1794, Captain George Vancouver, on board the Discovery, and Lieutenant William Broughton, in command of the Chatham, reached the head of Cook Inlet (Vancouver 1967; Orth 1967:40). Vancouver corrected Cook's observations concerning the nature of Turnagain Arm and made many additions to Cook's charts. His party spent about a month in Cook Inlet mapping and describing the coast.

In contrast to the short visits of the English explorers, the Russians were very active in Cook Inlet during the eighteenth and nineteenth centuries. Their activities, however, were primarily limited to the coastal areas (Osgood 1966). Early contacts between Russian fur traders and the inhabitants of the Gulf of Alaska were brief and not always peaceful. Initial forays into Cook Inlet were made from Kodiak or the Aleutians.

The Iditarod Trail and the Alaska Railroad

The Iditarod Trail was very much a part of the history of the Cook Inlet area. Actually a series of trails, the Iditarod was first a route from Seward to Knik and the Willow Creek mining district. From Turnagain Arm, the trail crossed both Crow Creek and Indian Creek Passes to Eklutna, then ran along the upper end of Knik Arm to Knik. In 1908, a survey party for the Alaska Engineering Commission laid out a winter route that extended the trail to Nome. The discovery of gold in the Iditarod region in 1910 and the resulting rush of prospectors led to improvements in the trail and gave it its name. Following the founding of Anchorage, a spur of the trail developed which ran along Knik Arm and across what is now Elmendorf Air Force Base and Fort Richardson (Carberry 1979:105-107).

In 1913, Congress passed the Alaska Railroad Bill, which authorized the location, construction, and operation of a railroad linking the Pacific coast of Alaska with navigable waters in the interior. After 1915, work on the line progressed rapidly, and by September of 1918 Seward was connected by rail to the Matanuska coal fields (Reger and Antonson 1977:iv-8). The first Euro-Americans settled in the general project area in the early 1920s. The Palmer Highway (now known as the Old Glenn Highway), constructed in the mid-1930s, brought additional settlers to the area (Hanson 1999:7-8).

The original runway at the Birchwood Airport was constructed during World War II as an Army Air Corps auxiliary airfield (Cochrane 1982:121). The State of Alaska took over the ownership and operation of the facility in 1959 and has since made several periodic improvements. The airport was reconstructed in 1974, giving it the runway and taxiway configuration used today. A project to expand the aprons and airport access road was completed in 1987. A lighting replacement project along the runways and taxiways is scheduled for the summer of 2004.

Description of the Resource

Known Sites

There are four historic sites in the immediate project area listed in the AHRS: the Birchwood Railroad Siding (ANC-274), Peter's Creek Bridge (ANC-079), Eagle River Knik Trail (ANC-270), and Crow Pass Trail (ANC-214).

The Birchwood Siding (ANC-274) was originally located near the junction of Birchwood Spur Road and the Alaska Railroad, at railroad milepost (MP) 136.3. It consisted of seven structures, all in place by 1921. One of these, the two-story Birchwood Station, was constructed in 1916 and moved to Willow in 1931. In 1963, it was again moved, to its present location on the Parks Highway in Wasilla (Carberry and Lane 1986:119).

A 1917 plat map of the Birchwood Station shows the Birchwood Depot, "standard" handcar and section houses, a pump house, and a 20,000 gallon water tank (Figure 2). All of these buildings were located between Peters Creek and Birchwood Spur Road (added to the map at a later date). A 1921 station plan illustrates a 2,000 gallon standard tank and pump house between Peters Creek and Birchwood Spur Road; and a section house, coal house, mess hall, tool house, and small shed located west of the road (Figure 3). All of these buildings, which were south of the track, within the 100-foot-wide railroad right-of-way, were gone by the late 1950s or early 1960s when the railroad compiled a list of all extant railroad structures. This list—the Alaska Railroad Building Record—included only one structure near MP 136: a wooden telephone booth on the mainline.

The Peters Creek Bridge (ANC-079) is a 60-foot thru girder span railroad bridge over Peters Creek at railroad MP 137.4. The Alaska Engineering Commission (AEC) built the original timber trestle bridge in 1916 from standard plans using local timber. The AEC installed the current bridge in 1927.

The Eagle River-Knik Trail (ANC-270) was the primary route of the Iditarod National Historic Trail from Eagle River to Knik. In the Birchwood Airport area, the trail ran roughly north-

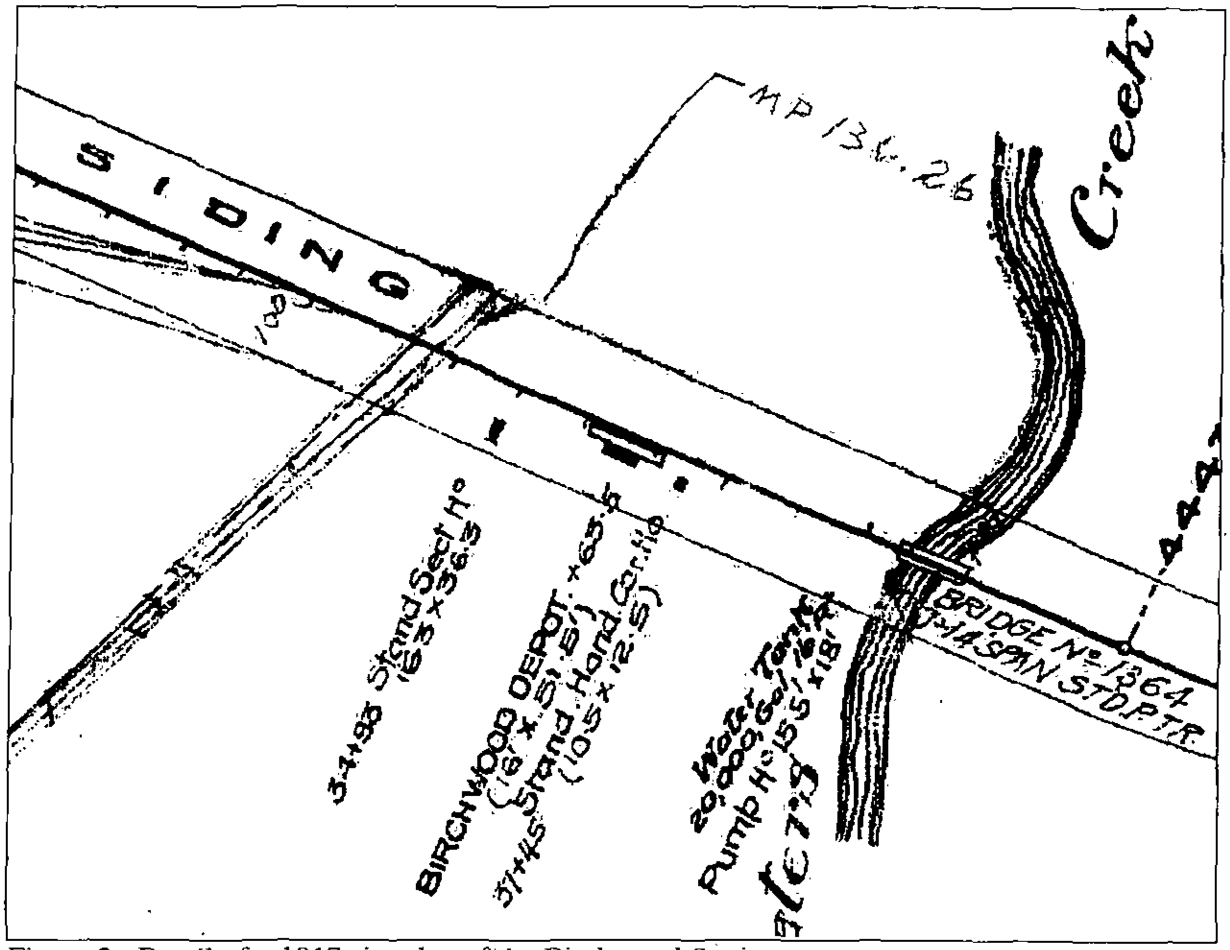


Figure 2. Detail of a 1917 site plan of the Birchwood Station.

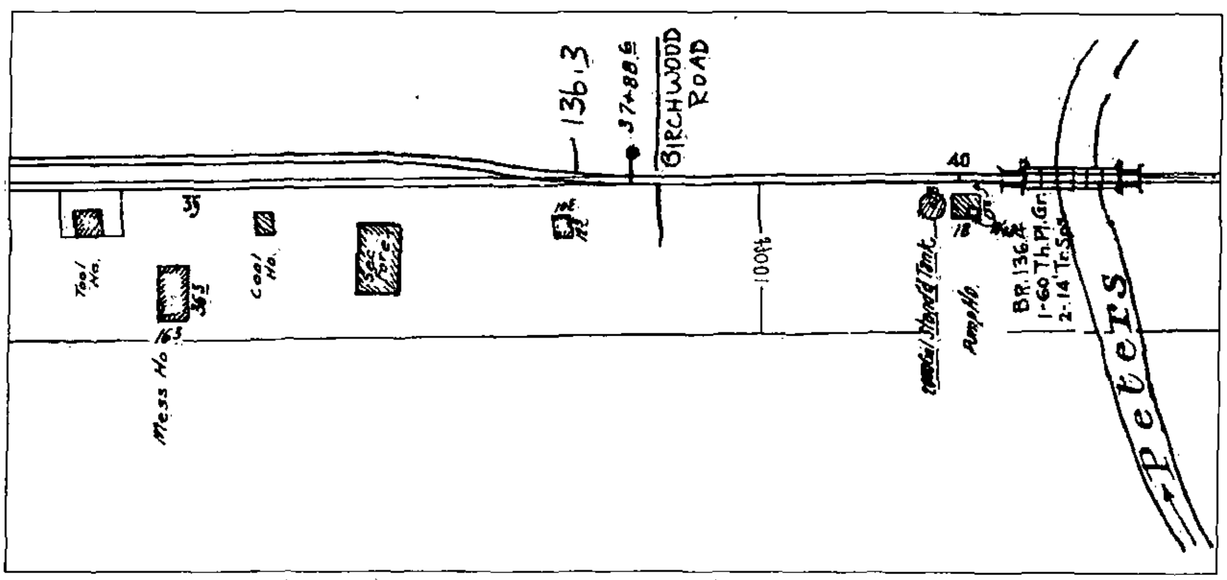


Figure 3. Detail of a 1921 site plan of the Birchwood Station.

south, past the northeastern end of the runway toward Cook Inlet (Figure 4). Its exact route is unknown, since no one has yet located any remaining physical evidence of the trail (cf. Hanson 1999).

The Cross Pass Trail (ANC-214) was a secondary route associated with the Iditarod Trail system. AHRS maps show an extension of this trail running along the coast west and northwest of the Birchwood Airport and connecting with the Eagle River-Knik Trail east of Peters Creek. This route, called the Anchorage to Eagle River connecting trail, is also illustrated on the Anchorage Quadrangle map in the Iditarod National Historic Trail resources inventory (Bureau of Land Management 1982). Ultimately, the source for both the AHRS and Iditarod Trail records was apparently a reference in Carberry (1979:107):

> With the creation of Anchorage, a branch of the "Seward-Iditarod" trail was linked to the town from the northeast. It ran parallel to Knik Arm before turning eastward by Tuomi Lake and Otter Lake...In the vicinity of Eagle River this trail met with a number of trails and wagon roads which were in existence by 1915.

However, it would appear that Carberry was referring to a trail that ended southwest of Birchwood, since U.S Surveyor General's Office maps of Township 15 North, Range 1 West from 1914 and 1917 shown no trail along Knik Arm between Fire and Peters Creeks (Figure 4).

Site Visit

Ms. Macy's examination of the Birchwood Siding included the 100-foot wide railroad right-of-way south of the tracks, from the Peters Creek Bridge west to approximately MP 135.8. There are no historic buildings remaining in this area, although a railroad sign just east of Birchwood Spur Road labeled "Birchwood" may mark the former location of the depot. West of the road, Ms. Macy found only debris from routine railroad maintenance, slash from recent brush clearing, and some old bridge timbers.

Environmental Consequences

The principal impact issue for cultural resources is the loss or degradation of prehistoric and historic sites, either through direct disturbance during construction or indirect disturbance due to changes in public accessibility. The principal measure to mitigate any possible impacts on cultural resources is a commitment to comply with Section 106 of the NHPA. Cultural resources will continue to be considered through all phases of the project.

As proposed, the project would not affect any of the known historic sites in the airport vicinity. However, if deemed necessary by the FAA official with jurisdiction over this undertaking, in consultation with the State Historic Preservation Officer, a field survey could be conducted to fully identify and evaluate any cultural resources within the project's area of effect. A DOT&PF official should also initiate formal contacts with the Native Village of Eklutna and other local tribal organizations for the purpose of requesting historical and cultural information about the Birchwood area. Again, if this research suggests the possibility of impacts to

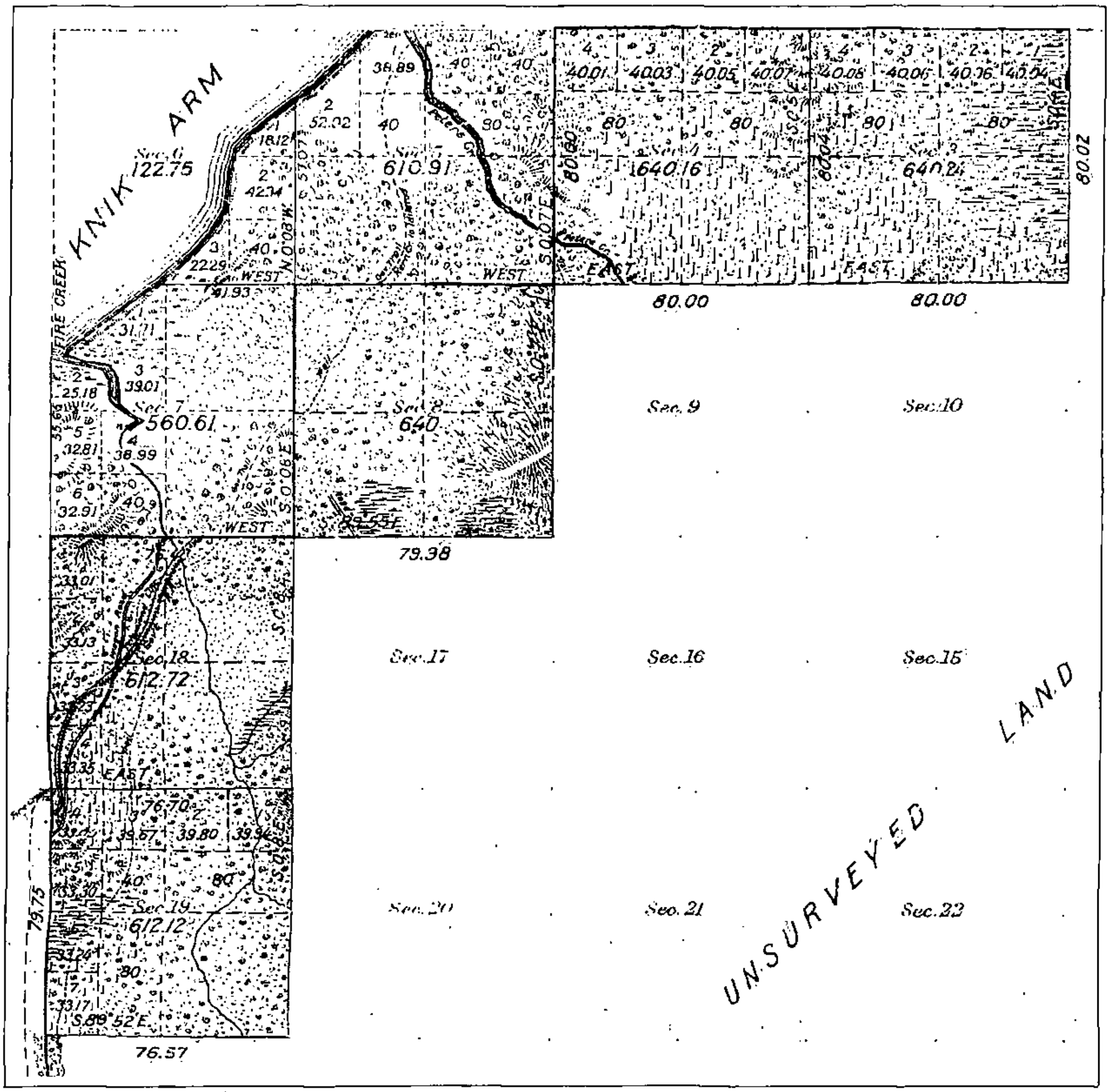


Figure 4. Combination of 1914 and 1917 U.S Surveyor General's Office maps of Township 15 North, Range 1 West showing trails along Knik Arm in the vicinity of Fire and Peters Creeks.

historical or traditional cultural properties, mitigation of projected impacts will be undertaken in compliance with Section 106 of the NHPA.

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Birchwood Airport Master Plan

Preliminary Jurisdictional Determination

April 2004

Prepared for:

Alaska Department of Transportation & Public Facilities

Prepared by:

**HDR Alaska, Inc.
2525 C Street, Suite 305
Anchorage, Alaska 99503**

1.0 INTRODUCTION AND PURPOSE

The Birchwood Airport is a general aviation (GA) airport located approximately 20 miles north of Anchorage and west of the Glenn Highway (T. 15N, R. 1W, S. 5 & 6, S.M.). The airport serves a regional role to the Anchorage, Eagle River, Palmer, and Wasilla GA community. The Birchwood Airport is estimated to have more than 56,000 operations per year by private GA aircraft based at the airport, transient GA aircraft, flight schools operating at the airport, and ultralight vehicles. The Alaska Department of Transportation and Public Facilities (ADOT&PF) and the Federal Aviation Administration (FAA) are evaluating the facilities of the Birchwood Airport to improve the runway, airspace, navigational aids, and other associated airport facilities. The need for improving the Birchwood Airport was driven by two overriding issues: (1) the need to provide safe separation of ultralight vehicle from the more conventional general aviation traffic, and (2) the need to develop apron and lease lot space to satisfy the 20-year demand forecast as defined by the Regional Airport System Plan.

The purpose of this document is to define the locations within the project area that are subject to the jurisdiction of the U.S. Army Corps of Engineers (USACOE) under authority of Section 404 of the Clean Water Act or under authority of Section 10 of the Rivers and Harbors Act of 1899. The USACOE has authority over certain work in "waters of the U.S.," including wetlands, and in "navigable" waters. The focus of this document is on delineation of wetlands; other waters of the U.S. and navigable waters are discussed in the conclusion.

2.0 METHODS

The jurisdictional determination for the Birchwood Airport was completed in three phases: office-based premapping, field delineation, and office-based GIS mapping and final delineation.

2.1 Office-Based Premapping

Initially scientists premapped wetlands and waters of the U.S. in an area around the Birchwood Airport that encompasses all the potential alternatives. This mapping entailed stereoscopic interpretation of aerial photos. Preliminary wetland boundaries were delineated based on vegetation characteristics (e.g., lower plant growth form and plant community type), hydrologic indicators (such as streams and ponding), and topographic clues (such as concave areas). Upland locations were delineated based on the presence of tall dense forests of deciduous tree species and lack of visible surface water. Other resources were also used to produce preliminary wetland boundaries:

- Aerial photographs from AeroMap U.S. (taken 5/24/90, scale 1" = 1000'; and taken 5/7/03, scale 1:8000), true color.
- National Wetlands Inventory (NWI) map for quadrangle Anchorage B-7.
- Anchorage Wetlands Management Plan (AWMP) – digital wetland boundaries (Municipality of Anchorage, 1996). See Figure 1.
- Soil Survey of the Anchorage Area, Alaska – digital soil mapping (USDA, Natural Resources Conservation Service, 2001). See Figure 2.

Preliminary wetland mapping was used to guide field efforts and to determine potential problem areas.

2.2 Field Delineation

A site visit was completed in September 2003 to verify preliminary mapping and collect specific data on soil conditions, hydrology, and plant communities. In the field, characteristic wetland and upland areas were studied using the USACOE's three-parameter method of determining an area's wetland status (USACOE, 1987). Standard Corps of Engineers data sheets were completed at various sites and are included in Appendix A. Detailed notes were taken at sites where data sheets were not completed. Each location visited during the field visit was logged into a handheld global positioning system (GPS) unit. Representative photographs and observational data were collected in conjunction with wetland delineation data form plots. Photographs of the data collection locations are included in Appendix A and field notes are included in Appendix B.

2.3 Office-Base GIS Mapping and Final Delineation

Upon return from the field, wetland scientists amended the office-delineated wetland boundaries. The wetland types were classified based on a review of field notes, data forms, and site photographs. Boundaries were digitized into a Geographic Information System (GIS) using existing spatially rectified base mapping and georeferenced aerial photographs. The final mapping was prepared for an area surrounding the Birchwood Airport. To aid in the final mapping, the following resources were used:

- Premapped wetland/upland boundaries
- Digital georeferenced aerial photograph mosaic
- Detailed field notes, data forms, and photographs
- GPS coordinates of field observation locations
- USACOE wetland data forms

3.0 RESULTS

Figure 3 shows the wetland, upland, and wetland type boundaries in addition to where data were collected. Figure 4 shows a portion of the project area in greater detail.

3.1 Vegetation

Dominant plant communities found in the project area include mixed paper birch-white spruce forest, mixed paper birch-black spruce forest, black spruce forest, a shrub-grass meadow, and disturbed shrub communities. Descriptions of each community type are as follows:

An open forest of mixed paper birch and white spruce is the dominant plant community located throughout the project area. Common plant species in this community include an overstory of paper birch (*Betula papyrifera* - FACU) and white spruce (*Picea glauca*- FACU) with an understory comprised of dwarf dogwood (*Cornus canadensis*-FACU), twin flower (*Linnaea borealis* - FACU), low bush cranberry (*Vaccinium vitis-idaea* - FAC), and prickly rose (*Rosa acicularis* – FACU). This plant community is not hydrophytic. A wetland delineation form was completed at site B08 and observations of this community type were noted at sites B01, B02, B09, B13, B17, and B18.

Also located within the project area is a paper birch-black spruce plant community. Common plant species in the community include paper birch, black spruce (*Picea mariana*-FACW), Labrador tea (*Ledum groenlandicum* – FACW) and low bush cranberry. This plant community is hydrophytic. Wetland delineation form B10 (located in Appendix A) and observation points B03, B07, and B12 describe species abundances found in this community type.

Black spruce forest is found along low-lying areas adjacent to Fire Creek and north of the existing Alaska Railroad tracks. Common plant species in this community include black spruce with an understory of Labrador tea, low bush cranberry, woodland horsetail (*Equisetum sylvaticum* – FACU) and meadow horsetail (*Equisetum pratense* – FACW). This plant community is hydrophytic. Wetland determination data forms (located in Appendix A) were completed at sites B05 and B06 and describe the species abundances found in this community type.

A shrub-grass meadow is located in a small pocket along the edge of the black spruce forest. Common plants include bluejoint reedgrass (*Calamagrostis canadensis* –FAC), dwarf birch (*Betula nana* – FAC), bog blueberry (*Vaccinium uliginosum* – FAC), and meadow horsetail. This plant community is hydrophytic. Wetland determination form B04 was completed and describes species abundance found in this community type.

Shrub dominated thickets were located in what appeared to be areas of past disturbance and fill. The shrub thickets are located immediately adjacent to the airport landing strip and existing railroad tracks and west of the airport adjacent to the firing range. Common plant species in the scrub thicket community include green alder (*Alnus crispa*- FAC) with scattered species of paper birch, bluejoint reedgrass, willow (*Salix sp.*), aspen (*Populus tremuloides* – FACU), fireweed (*Chamerion angustifolium* –FACU), and bluejoint reedgrass. These alder dominated scrub thicket plant communities are not hydrophytic. Sites B14, B15 and B16 were located in disturbed shrub thickets.

3.2 Soils

According to the Soil Survey of the Anchorage Area, 2001, soils within the immediate project area include a Jacobsen-Disappear-Doroshin complex, and a Kashwitna-Kichatna complex. The Jacobsen-Disappear-Doroshin complex is described as a very poorly drained hydric soil. This complex is present southwest of the airport adjacent to Fire Creek (see Figure 2). The black spruce forest and shrub-grass plant communities dominate this soil type. The soil map unit is mapped along drainages and in areas of depressions. The Kashwitna-Kichatna complex dominates a majority of the project area, extending along most of the airport's southern boundary. The complex is mapped on outwash plains and is described as a well-drained, non-hydric soil. Paper birch-white spruce and paper birch-black spruce are the common plant communities found on this soil map unit.

Black spruce forest communities (wetland delineation data form B06) exhibited hydric soil conditions. The soil within this plant community type had a thin hemic horizon (Oe) over an A horizon with mixed matrix colors. Oxidation was evident along root channels and exhibited colors of 7.5YR ¾. At approximately 9 inches the soil profile shows a C horizon with a matrix color of 2.5Y 3/1 with redoximorphic features (2.5Y 4/2). The C horizon was a very cobbley silt. The cobbles were round and indicate a relic stream bottom.

The shrub-grass meadow plant community, adjacent to the black spruce forest community, exhibited hydric soil conditions (wetland delineation form B04). A soil profile in the plant community yielded a thick hemic horizon (Oe) overlying a thick A horizon (5 to 12 inches). The A horizon had a very dark gray matrix color with small patches of dark organic stains (7.5YR 2.5/1) and oxidized root channels (7.5YR 3/2). Below the A horizon was a thick C horizon comprised of gray, gravelly sands (2.5Y 5/1) that had prominent redoximorphic features (10YR4/6).

Soils in the paper birch-black spruce forest did exhibit hydric soil conditions (wetland delineation form B10). The soil profile indicated a thin hemic horizon (Oe) overlying a thin A horizon. A C horizon continued between 4 and 18 inches. The C horizon had a matrix of gray to grayish brown (2.5Y 5/1). Redoximorphic features were present throughout the C horizon.

Soils in the paper birch-white spruce forest did not exhibit hydric soil conditions (wetland delineation form B08). These upland soils also had a thin hemic horizon (Oe) overlying a thin A horizon. A thin E horizon was located below the A horizon and had a color of 2.5Y 5/1. Between 5 and 20+ inches the soil profile yielded a B horizon with a dominant matrix of olive brown (2.5Y 2/6) and areas of streaking from the overlying horizon of dark yellowish brown (10YR 4/4). The soil profile was well drained and dry throughout.

3.3 Hydrology

Common wetland hydrology indicators seen in the project area include the site's location in drainage patterns, sediment deposits, FAC-Neutral tests, presence of oxidized root channels and local soil survey data.

Within the black spruce forest community, all sites exhibited wetland hydrology. These areas had sediment deposits, oxidized root channels and passed the FAC-Neutral test. Wetland hydrology in the shrub-grass meadow community was also indicated by sediment deposits, oxidized root channels, wetland drainage patterns, and these were supported by the local soil survey data and the FAC-Neutral test. The paper birch-white spruce and the paper birch-black spruce communities did not have wetland hydrology.

4.0 CONCLUSION

4.1 Wetlands

Wetland locations are based upon the dominance of hydrophytic vegetation, hydrologic indicators, and hydric soil indicators. The presence or absence of wetland indicators was generally visible and straightforward at many of the sites visited. No problem areas were encountered. Developed areas such as old fill pads were judged to be uplands.

Based on the findings above, we have determined that areas displayed as wetlands on Figures 3 and 4 meet the USACOE criteria for being classified as wetland. Wetlands are present south of the existing Birchwood airport. Our delineation generally supports the findings presented in the 1996 AWMP; however, our field-verified wetland boundaries are identified in greater detail and with better resolution. These areas are subject to jurisdiction under Section 404.

While it was not visited in the field, the mapping limits include some coastal marsh, labeled as E2EM1 on Figure 3. Aerial photograph interpretation indicates clearly that this is wetland based on its topographic location and vegetation type, and this is corroborated by NWI mapping. Because it is densely vegetated, that area is likely above mean high water and is not subject to Section 10 jurisdiction—just Section 404.

4.2 Water Bodies

Within the mapping area, the USACOE also has jurisdiction over the waters of Knik Arm. These are labeled as E2US3 on Figure 3. Based on the lack of vegetation, the mud flats of Knik Arm are below mean high water and are therefore subject to both Section 404 and Section 10.

5.0 DELINEATION MADE BY:

Amy Hansen
Biologist
HDR Alaska, Inc.
Date: October 2003

Jen Dillon Sivils
Biologist
HDR Alaska, Inc.
Date: October 2003

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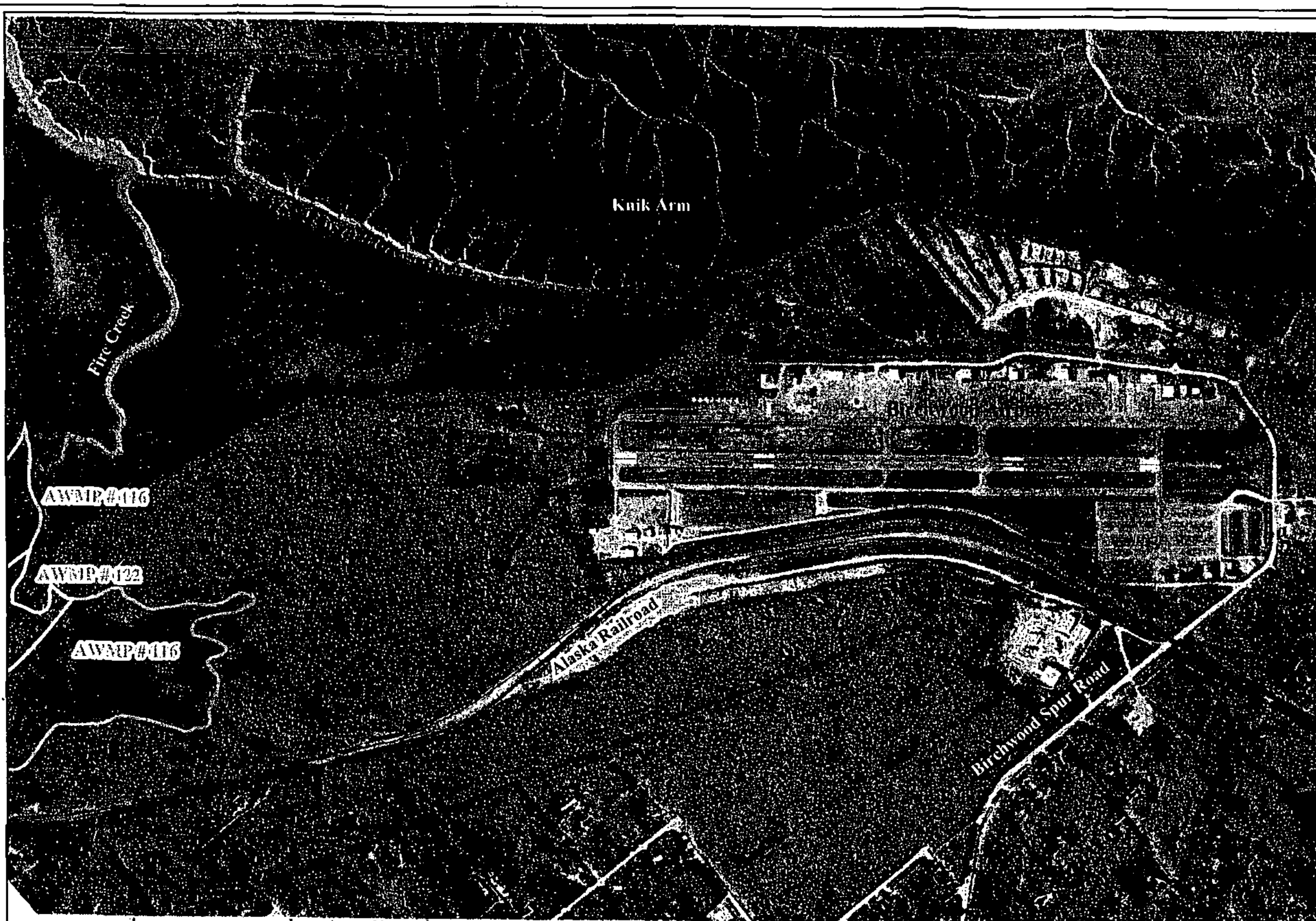

Legend

Anchorage Wetlands Management Plan Wetland Boundaries

CLASS

A

B

0 500 1,000 2,000 Feet

Preliminary Jurisdictional Determination
Birchwood Airport

Prepared for:
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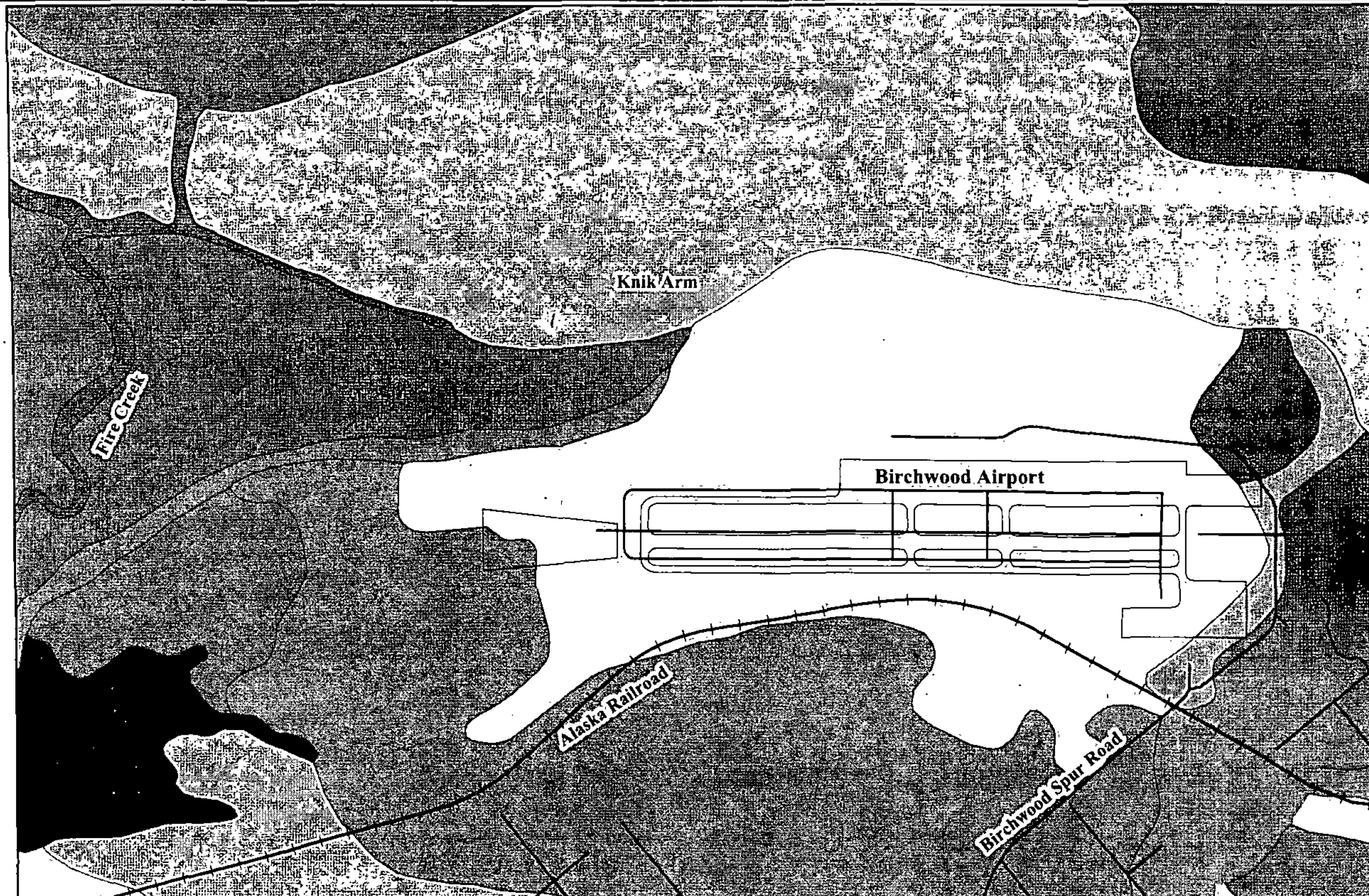
January 20, 2004
Prepared by: HDR Alaska, Inc.

AWMP
Wetland Boundaries
Figure 1



Legend

- Anchorpark loamy very fine sand
- Clam Gulch silt loam
- Cryosaprists
- Cryorthents and Urban land
- Deception-Estelle-Kichatna complex (12-20% slope)
- Deception-Estelle-Kichatna complex (undulating)
- Jacobsen-Disappear-Doroshin complex
- Kashwitna-Kichatna complex (flat slopes)
- Kashwitna-Kichatna complex (undulating)
- Moose River-Niklason complex
- Typic Cryaquent and Typic Cryaquept soils
- Water, saline

Source: NRCS, 2001

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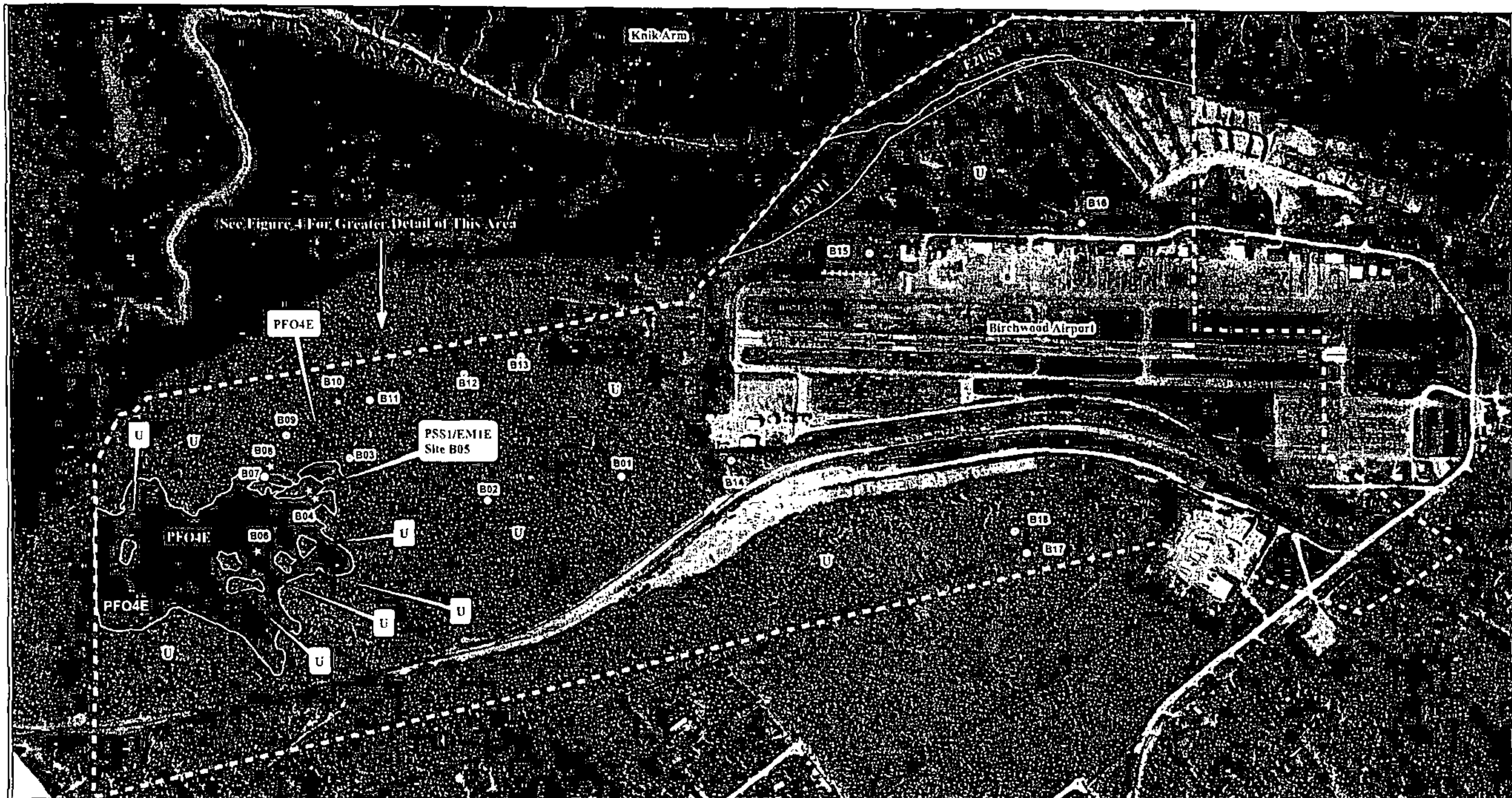
N

0 500 1,000 2,000 Feet

Soil Survey
Figure 2



Legend

☆ Wetland Delineation Form

○ Observation Point

Wetland Mapping Limits

Wetland, Upland, & Wetland Type Boundary

NWI Code Descriptions

E2EM1	Intertidal emergent wetland
E2US3	Intertidal unconsolidated shore wetland
PFO4E	Seasonally saturated needle-leaved evergreen forested wetland
PSS1\PEM1E	Scrub-shrub\emergent wetland
U	Upland

Preliminary Jurisdictional Determination
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0 250 500 1,000 1,500 2,000 Feet

N

Wetland Boundaries
Figure 3

Source: AeroMapUS, 1990 File: jds_wetlands.mxd

Legend

☆ Wetland Delineation Form

⊙ Observation Point

Wetland Mapping Limits

Wetland, Upland, & Wetland Type Boundary

NWI Code Descriptions

E2EM1	Intertidal emergent wetland
E2US3	Intertidal unconsolidated shore wetland
PFO4E	Seasonally saturated needle-leaved evergreen forested wetland
PSS1/PEM1E	Scrub-shrub/emergent wetland
U	Upland

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N

0 250 500 1,000 1,500 Feet

Wetland Boundaries
Figure 4

Source: McClintock Land Associates, 2003 File: jds_wet_zoom.mxd

Appendix A

WETLAND DETERMINATION FORMS AND SITE PHOTOGRAPHY

Birchwood Airport Master Plan
Preliminary Jurisdictional Determination

DATA FORM

ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Birchwood Airport		Date	9/26/03
Applicant / Owner: ADOT&PF		Borough	MOA
Investigators: JDS & AH		State	AK
Do Normal Circumstances exist on the site?	☒YES ☐NO	Community ID	Grass, shrub meadow
Is the site significantly disturbed (Atypical Situation)?	☐YES ☒NO	Transect ID	-
Is the area a potential Problem Area? (If needed, explain on reverse)	☐YES ☒NO	Plot ID	Plot B04

Describe Location:

VEGETATION

Plant Species	Stratum	%	Indicator	Plant Species	Stratum	%	Indicator
1. *Calamagrostis canadensis**	H	60	FAC	9. *Betula papyrifera*	T	tr	
2. *Betula nana**	S	10	FAC	10. *Rubus arcticus*	S	Tr	
3. *Vaccinium uliginosum**	S	15	FAC	11. *Salix spp.*	S	tr	
4. *Ledum groenlandicum*	S	5		12.			
5. *Chamaedaphne calyculata**	S	10	FACW	13.			
6. *Comarum palustre*	H	Tr		14.			
7. *Picea mariana*	T	Tr		15			
8. *Equisetum pratense**	H	20	FACW	16.			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) **100%**

Remarks :
* Indicates dominants using 50/20 method.

Describe Vegetation Type: Open grass, shrub meadow surrounded by black spruce bog

HYDROLOGY

☒ Recorded Data (Describe in Remarks)
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

FIELD OBSERVATIONS

Depth of Surface Water	n/a (in)
Depth to Free Water in Pit	n/a (in)
Depth to Saturated Soil	n/a (in)

WETLAND HYDROLOGY INDICATORS

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☒ Sediment Deposits (slight)
- ☒ Drainage Patterns in Wetlands (slight)

Secondary Indicators (2 or more Required):
- ☒ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☒ Local Soil Survey Data
- ☒ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks: top horizons are moist

SOILS

Map Unit Name (Series and Phase): Jacobsen – Disappear- Doroshin	Drainage Class: VPD
Taxonomy (Subgroup)	Field Observations Confirm Mapped Type? ☒ YES ☐ NO

PROFILE DESCRIPTION

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-5	Oe				
5-8	A1	7.5 YR 3/1	Patches of dark organic stains 7.5 YR 2.5/1	Faint, 7%, along root channels	Silt loam, 2% clay
8-12	A2	7.5 YR 3/1	7.5 YR 3/2	Faint, 7%, along root channels	Silt loam, 2% clay
12-18	C	2.5 Y 5/1	10 YR 4/6	7%, medium, prominent	Gravelly sand

HYDRIC SOIL INDICATORS:

- ☐ Histosol
- ☐ Histic Epipedon
- ☒ Sulfidic Odor (faint)
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☒ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☒ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: rounded gravels and rocks in C horizon

Major root zone: 6"

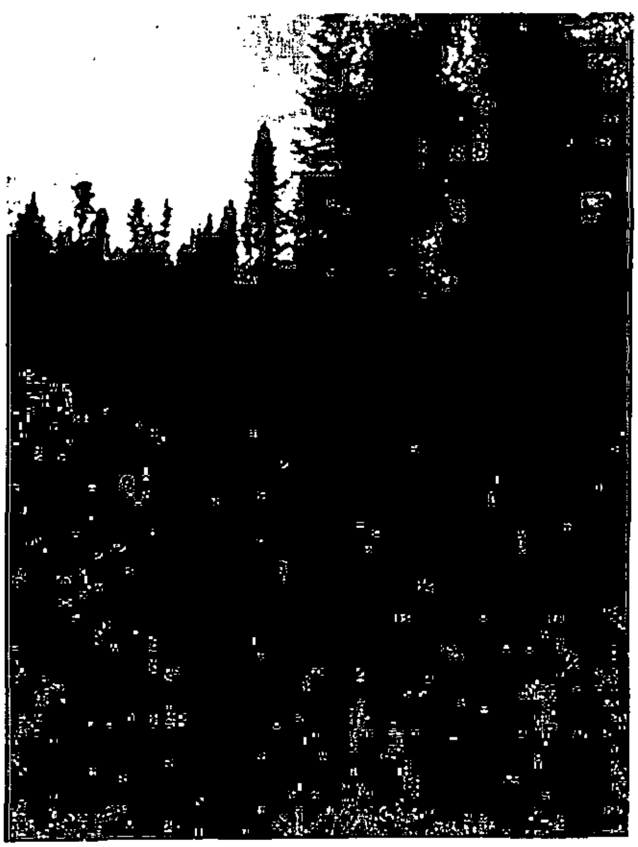
WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒ YES ☐ NO	Is this Sampling Point Within a Wetland? ☒ YES ☐ NO
Wetland Hydrology Present?	☒ YES ☐ NO	
Hydric Soils Present?	☒ YES ☐ NO	

Remarks:
Evidence of moose browse

GPS: yes
Topography: flat
NWI Class: PSS1/EM1E
HGM Type: flat
Photos: yes
Functions: moose habitat

Site: Plot B04 *Date*: 9/26/03 *NWI*: PSS1/EM1E



DATA FORM

ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Birchwood Airport		Date	9/26/03
Applicant / Owner: ADOT&PF		Borough	MOA
Investigators: JDS & AH		State	AK
Do Normal Circumstances exist on the site?	☒YES ☐NO	Community ID	Black spruce forest
Is the site significantly disturbed (Atypical Situation)?	☐YES ☒NO	Transect ID	-
Is the area a potential Problem Area? (If needed, explain on reverse)	☐YES ☒NO	Plot ID	Plot B05

Describe Location: in black spruce fringe near plot b04

VEGETATION

Plant Species	Stratum	%	Indicator	Plant Species	Stratum	%	Indicator
1. *Picea mariana**	T	30	FACW	9. *Equisetum sylvaticum*	H	tr	
2. *Ledum groenlandicum**	S	30	FACW	10. *Betula papyrifera*	T	tr	
3. *Vaccinium vitis-idaea**	S	12	FAC	11. *grass spp.*	H	tr	
4. *Vaccinium uliginosum*	S	tr		12. *Sphagnum moss*	B	50	
5. *Cornus canadensis*	H	tr		13. *Peltigera spp.*	B	tr	
6. *Salix spp.*	S	tr		14. *Rubus chaem.*	S	tr	
7. *Calamagrostis canadensis*	H	tr		15. *Salix spp.big*	S	tr	
8. *Spiraea stevenii*	S	5		16.			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) **100 %**

Remarks :
* Indicates dominants using 50/20 method.

Describe Vegetation Type: black spruce wetland

HYDROLOGY

☒ Recorded Data (Describe in Remarks)
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

FIELD OBSERVATIONS

Depth of Surface Water	n/a (in)
Depth to Free Water in Pit	n/a (in)
Depth to Saturated Soil	n/a (in)

WETLAND HYDROLOGY INDICATORS

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☒ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more Required):
- ☒ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☒ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name (Series and Phase): Kashwitna-Kichatna Complex	Drainage Class: WD
Taxonomy (Subgroup)	Field Observations Confirm Mapped Type? ☐ YES ☒ NO

PROFILE DESCRIPTION

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-5	Oe				
5-9	A	2.5 Y5/1 (20%) 10 YR 3/2 (80%)	streaking		Silt loam with organic streaking
9-15	B1	7.5YR 4/4 10YR 4/3	10YR 3/6	15 %, medium, prominent	Fine sand
15-20	B2	2.5 Y 4/1 (20%)			Silt loam with organic streaking
		2.5 Y 6/2 (7%)			
		7.5 YR ¾ (10) redox			
		7.5 YR 2.5/1 (10)			
		7.5 YR 3/1 (40)			

HYDRIC SOIL INDICATORS:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors in B2
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks:

Major root zone: 9"

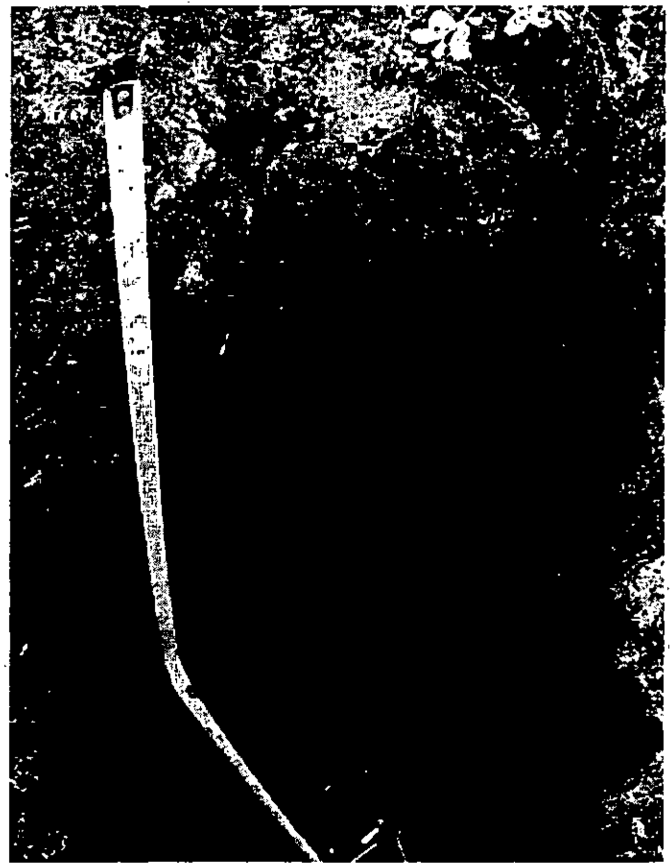
WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒ YES ☐ NO	Is this Sampling Point Within a Wetland? ☒ YES ☐ NO
Wetland Hydrology Present?	☒ YES ☐ NO	
Hydric Soils Present?	☒ YES ☐ NO	

Remarks:

GPS: yes
Topography: flat
NWI Class: PFO4E
HGM Type: flat
Photos: yes
Functions:

Site: Plot B05 *Date*: 9/26/03 *NWI*: PFO4E



DATA FORM

ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Birchwood Airport		Date	9/26/03
Applicant / Owner: ADOT&PF		Borough	MOA
Investigators: JDS & AH		State	AK
Do Normal Circumstances exist on the site?	☒YES ☐NO	Community ID	Black spruce bog
Is the site significantly disturbed (Atypical Situation)?	☐YES ☒NO	Transect ID	-
Is the area a potential Problem Area? (If needed, explain on reverse)	☐YES ☒NO	Plot ID	Plot B06

Describe Location: in large black spruce wetland

VEGETATION

Plant Species	Stratum	%	Indicator	Plant Species	Stratum	%	Indicator
1. *Picea mariana**	T	50	FACW	9. *Calamagrostis canadensis*	H	tr	
2. *Vaccinium vitis-idaea**	S	25	FAC	10. *grass spp. (small)*	H	tr	
3. *Ledum groenlandicum**	S	10	FACW	11. *Vaccinium uliginosum*	S	tr	
4. *Betula nana*	S	5		12. *Equisetum pratense**	H	10	FACW
5. *Equisetum sylvaticum**	H	10	FACU	13.			
6. *Rubus chamaemorus*	S	Tr		14.			
7. *Spiraea stevenii*	S	7		15. feather moss	B	70	
8. *Rosa acicularis*	S	5		16. *Sphagnum* moss	B	20	

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) **80%**

Remarks :
* Indicates dominants using 50/20 method.

Describe Vegetation Type: black spruce bog

HYDROLOGY

☒Recorded Data (Describe in Remarks)
- ☐Stream, Lake, or Tide Gauge
- ☒Aerial Photographs
- ☐Other

☐ No Recorded Data Available

FIELD OBSERVATIONS

Depth of Surface Water	N/a (in)
Depth to Free Water in Pit	N/a (in)
Depth to Saturated Soil	N/a (in)

WETLAND HYDROLOGY INDICATORS

Primary Indicators:
- ☐Inundated
- ☐Saturated in Upper 12 Inches
- ☐Water Marks
- ☐Drift Lines
- ☐Sediment Deposits
- ☒Drainage Patterns in Wetlands (stream channels)

Secondary Indicators (2 or more Required):
- ☒Oxidized Root Channels in Upper 12 Inches
- ☐Water-Stained Leaves
- ☒Local Soil Survey Data
- ☒FAC-Neutral Test
- ☐Other (Explain in Remarks)

Remarks: Soil pit is moist

SOILS

Map Unit Name (Series and Phase):): *Jacobsen – Disappear- Doroshin*	Drainage Class: *VPD*
Taxonomy (Subgroup)	Field Observations Confirm Mapped Type? ☒ YES ☐ NO

PROFILE DESCRIPTION

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-4	Oe				Mostly sphagnum moss;
4-9	A	10 YR 3/2			Silt loam
		2.5 Y 2.5/1	Along root channels 7.5 YR ¾ (organic stains)		
		2.5 Y 4/1			
9-13	C	2.5 Y 3/1	2.5 Y 4/2	5%, fine	Silt (very cobbley)

HYDRIC SOIL INDICATORS:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ *Aquic Moisture Regime*
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☒ *Listed on Local Hydric Soils List*
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks: *Stopped digging due to rocks ~ 60% cobbles. This area seems like old river channel.*

Major root zone: 4"

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒ YES ☐ NO	Is this Sampling Point Within a Wetland? ☒ YES ☐ NO
Wetland Hydrology Present?	☒ YES ☐ NO	
Hydric Soils Present?	☒ YES ☐ NO	

Remarks:

GPS: yes
Topography: flat
NWI Class: PEO4E
HGM Type: flat
Photos: yes
Functions:

Site: Plot B06 *Date*: 9/26/03 *NWI Class:* PFO4E

DATA FORM

ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Birchwood Airport		Date	9/26/03
Applicant / Owner: ADOT&PF		Borough	MOA
Investigators: JDS & AH		State	AK
Do Normal Circumstances exist on the site?	☒YES ☐NO	Community ID	Birch, white spruce forest
Is the site significantly disturbed (Atypical Situation)?	☐YES ☒NO	Transect ID	-
Is the area a potential Problem Area? (If needed, explain on reverse)	☐YES ☒NO	Plot ID	Plot B08

Describe Location:

VEGETATION

Plant Species	Stratum	%	Indicator	Plant Species	Stratum	%	Indicator
1. *Betula papyrifera**	T	45	FACU	9. *Lycopodium complanatum*	H	Tr	
2. *Picea glauca**	T	20	FACU	10. *Vaccinium vitis-idaea**	S	10	FAC
3. *Cornus canadensis**	H	15	FACU	11. *Calamagrostis canadensis*	H	Tr	
4. *Rosa acicularis*	S	Tr		12. *grass spp. small*	H	Tr	
5. *Linnaea borealis**	S	10	FACU	13. *Viburum edule*	S	tr	
6. *Lycopodium annotinum**	H	10	FAC	14.			
7. *Chamerion angustifolium*	H	5		15			
8. *Ledum groenlandicum*	S	tr		16.			

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) 33%

Remarks :
* Indicates dominants using 50/20 method.

Describe Vegetation Type: birch, white spruce forest

HYDROLOGY

☒ Recorded Data (Describe in Remarks)
- ☐ Stream, Lake, or Tide Gauge
- ☒ Aerial Photographs
- ☐ Other

☐ No Recorded Data Available

FIELD OBSERVATIONS

Depth of Surface Water	N/a (in)
Depth to Free Water in Pit	N/a (in)
Depth to Saturated Soil	N/a (in)

WETLAND HYDROLOGY INDICATORS

Primary Indicators:
- ☐ Inundated
- ☐ Saturated in Upper 12 Inches
- ☐ Water Marks
- ☐ Drift Lines
- ☐ Sediment Deposits
- ☐ Drainage Patterns in Wetlands

Secondary Indicators (2 or more Required):
- ☐ Oxidized Root Channels in Upper 12 Inches
- ☐ Water-Stained Leaves
- ☐ Local Soil Survey Data
- ☐ FAC-Neutral Test
- ☐ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name (Series and Phase): Kashwitna-Kichatna Complex	Drainage Class: WD
Taxonomy (Subgroup)	Field Observations Confirm Mapped Type? ☒ YES ☐ NO

PROFILE DESCRIPTION

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2	Oe				
2-4	A	2.5 Y 2.5/1			
4-5	E	2.5 Y 5/1			
5-8	B1	10YR 4/4			
8-15	B2	2.5 Y 4/6	10 YR 4/4 *see note	Dist, 7%, fine	Very fine sandy loam, weak SAB
15-20	B3 (cemented)	10YR 3/3			Fine sand, coarse SAB, very strong, cemented, sesquioxides?

HYDRIC SOIL INDICATORS:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☐ Gleyed or Low-Chroma Colors (see note)
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks:
Mottling in B2 is just streaking from B1 horizon.

Major root zone: 6"

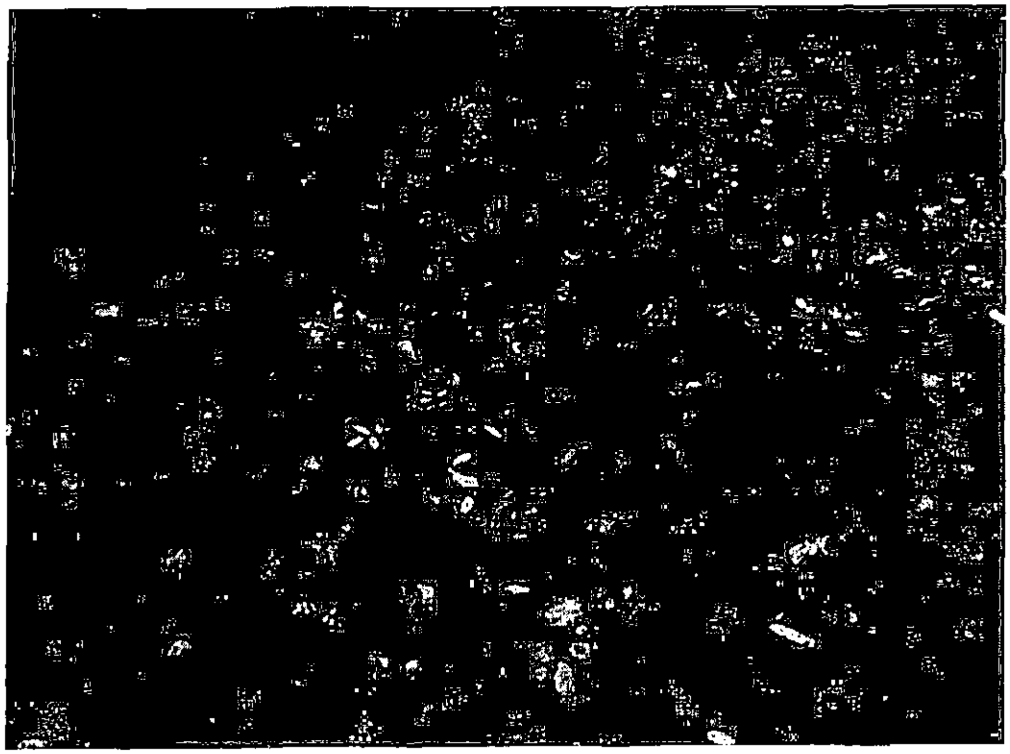
WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☐ YES ☒ NO	Is this Sampling Point Within a Wetland? ☐ YES ☒ NO
Wetland Hydrology Present?	☐ YES ☒ NO	
Hydric Soils Present?	☐ YES ☒ NO	

Remarks:

GPS: yes
Topography: flat
NWI Class: U
HGM Type: U
Photos: yes
Functions:

Site: Plot B08 *Date*: 9/26/03 *NWI Class*: U



DATA FORM

ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Birchwood Airport		Date	9/26/03
Applicant / Owner: ADOT&PF		Borough	MOA
Investigators: JDS & AH		State	AK
Do Normal Circumstances exist on the site?	☒YES ☐NO	Community ID	Birch, black spruce forest
Is the site significantly disturbed (Atypical Situation)?	☐YES ☒NO	Transect ID	-
Is the area a potential Problem Area? (If needed, explain on reverse)	☐YES ☒NO	Plot ID	Plot B10

Describe Location:

VEGETATION

Plant Species	Stratum	%	Indicator	Plant Species	Stratum	%	Indicator
1. *Betula papyrifera**	T	25	FACU	9.			
2. *Picea mariana**	T	25	FACW	10.			
3. *Ledum groenlandicum**	S	15	FACW	11.			
4. *Lycopodium annotinum**	H	5	FAC	12.			
5. *Vaccinium vitis-idaea**	S	15	FAC	13.			
6. *Cornus canadensis*	H	Tr		14.			
7. *Linnaea borealis*	H	Tr		15			
8. *Salix spp.*	S	tr		16. feather moss	B	70	

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-) 80%

Remarks :
* Indicates dominants using 50/20 method.

Describe Vegetation Type: Paper birch/ black spruce forest

HYDROLOGY

☒Recorded Data (Describe in Remarks)
- ☐Stream, Lake, or Tide Gauge
- ☒Aerial Photographs
- ☐Other

☐ No Recorded Data Available

FIELD OBSERVATIONS

Depth of Surface Water	N/a (in)
Depth to Free Water in Pit	N/a (in)
Depth to Saturated Soil	N/a (in)

WETLAND HYDROLOGY INDICATORS

Primary Indicators:
- ☐Inundated
- ☐Saturated in Upper 12 Inches
- ☐Water Marks
- ☐Drift Lines
- ☐Sediment Deposits
- ☐Drainage Patterns in Wetlands

Secondary Indicators (2 or more Required):
- ☐Oxidized Root Channels in Upper 12 Inches
- ☐Water-Stained Leaves
- ☐Local Soil Survey Data
- ☒FAC-Neutral Test
- ☐Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name (Series and Phase): Kashwitna-Kichatna Complex			Drainage Class: WD		
Taxonomy (Subgroup)		Field Observations Confirm Mapped Type? ☐ YES ☒ NO			
PROFILE DESCRIPTION					
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-2	Oe				
2-4	A	10 YR 3/2			Loam
4-9	C1	2.5 Y 5/1	2.5 Y 5/3 10 YR 4/4	Fine, 7% Fine, 7%	Very fine sandy loam
9-15	C2	2.5 Y 5/2	10 YR 4/4	Med, 10%	Silt loam, 15% large rounded gravels and cobbles.
15-18	C3	2.5 Y 5/2			Very gravelly

HYDRIC SOIL INDICATORS:

- ☐ Histosol
- ☐ Histic Epipedon
- ☐ Sulfidic Odor
- ☐ Aquic Moisture Regime
- ☐ Reducing Conditions
- ☒ Gleyed or Low-Chroma Colors
- ☐ Concretions
- ☐ High Organic Content in Surface Layer in Sandy Soils
- ☐ Organic Streaking in Sandy Soils
- ☐ Listed on Local Hydric Soils List
- ☐ Listed on National Hydric Soils List
- ☐ Other (Explain in Remarks)

Remarks:

Major root zone: 4"

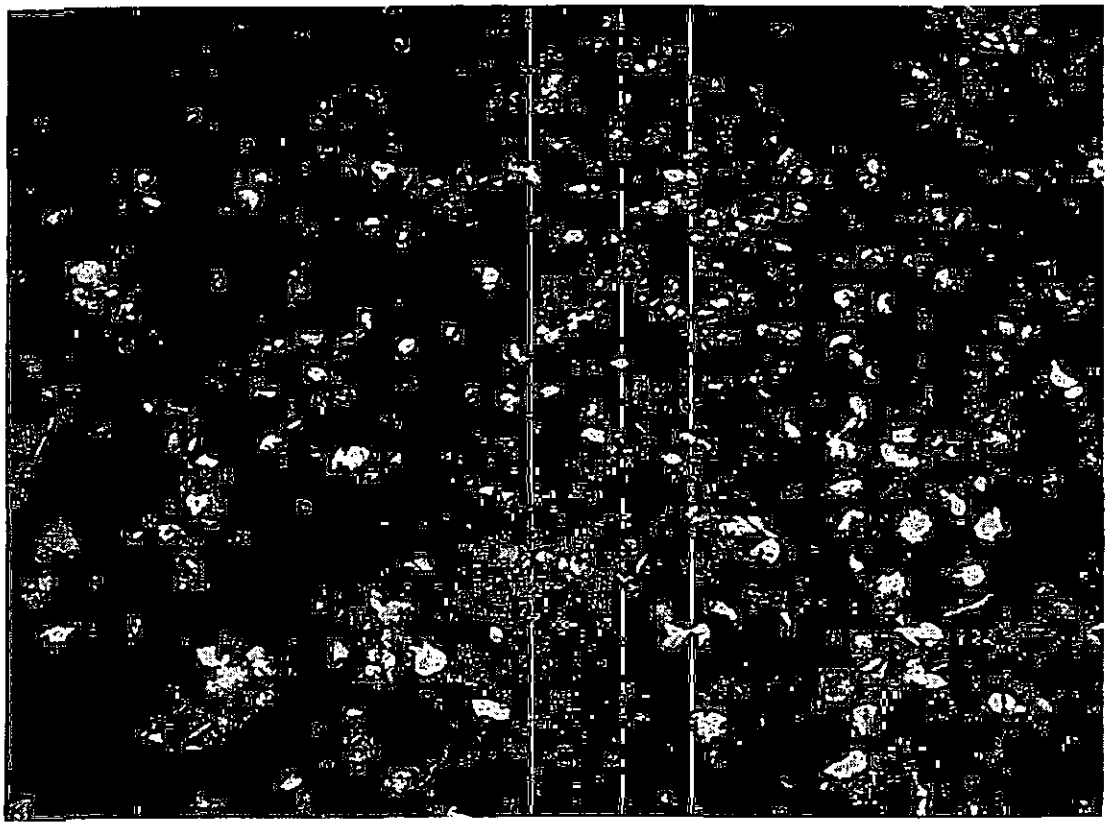
WETLAND DETERMINATION

Hydrophytic Vegetation Present?	☒ YES ☐ NO	Is this Sampling Point Within a Wetland? ☐ YES ☒ NO
Wetland Hydrology Present?	☐ YES ☒ NO	
Hydric Soils Present?	☒ YES ☐ NO	

Remarks:

GPS: yes
Topography: flat
NWI Class: U
HGM Type: U
Photos: yes
Functions:

Site: Plot B10 *Date*: 9/26/03 *NWI Class*: U



Appendix B

MISCELLANEOUS NOTES

Birchwood Airport Master Plan
Preliminary Jurisdictional Determination

Birchwood Airport
Wetland Delineation Field Notes
9/26/03

Site	Description
B01	Along dirt road at SE edge of runway safety zone. Vegetation dominated by paper birch, white spruce, alder. Understory comprised of lab tea (Greenland), fireweed, dwarf dogwood, low bush cranberry. Upland.
B02	In birch, white spruce forest. Understory comprised of lab tea, low bush cranberry, dwarf dogwood. Point near bearing tree (59 lks, South S 44 degrees E, 15N, sec 7). Upland
B03	In birch, black spruce forest. Understory is lab tea, low bush cranberry, dwarf dogwood, grass spp. Similar to site B10 – see form B10.
B04 (form)	In open wet area surrounded by forested black spruce wetlands. See form.
B05 (form)	In black spruce wetland surrounding site B04. See form.
B06 (form)	In black spruce wetland. See form.
B07	In birch, black spruce forest. Redox in soils. Vegetation dominated by black spruce, birch, lab tea (Greenland sp), low bush cranberry. Some dogwood and willow sp. Area is close to upland/wetland border.
B08 (form)	In forest near B07. Upland. Vegetation dominated by birch, white spruce, dogwood, rose, and twinflower. See form
B09 U	Upland. Birch, white spruce forest.
B10 (form)	In birch, black spruce forest. Area seems marginal, see form.
B11	In border between birch/black spruce and birch/wht spruce. Upland.
B12	Birch, black spruce, lab tea, leather leaf, spirea, low bush cranberry. Area is similar to site B10 – see form B10.
B13	In upland along road. Vegetation dominated by Paper birch and white spruce. Upland.
B14	In disturbed alder thicket. Soil is fill. Vegetation dominated by alder. Other species present include birch and blue joint reedgrass. Soil is not saturated. Disturbed upland.

B15	In disturbed area at other side of runway. Soil is fill. No wetland hydrology. Willow spp, aspen, and alder with sparse understory of rose, fireweed, and blue joint reedgrass.
B16	Near shooting range – disturbed site. Many roads, lots of shotgun shells. Soil is fill and vegetation is dominated by alder, birch and cottonwood saplings, and some fireweed. Disturbed upland.
B17	On road under power lines. Vegetation surrounding road is similar to vegetation in site B18.
B18	Between power lines and open, railroad disturbed area. In birch, white spruce forest. Understory is comprised of willow spp, high bush cranberry, lab tea, creeping jenny, low bush cranberry, alder, fireweed, and rose. Several birch have been cut down. Upland.

Birchwood Airport Master Plan

Alternatives Development and Evaluation

Office Study Technical Memorandum #2

AKSAS Project No. 54741

Draft

Prepared for:

Alaska Department of Transportation
and Public Facilities
Central Region

Prepared by:

HDR Alaska, Inc.
2525 C Street, Suite 305
Anchorage, Alaska 99503-2569

July 2003

Table of Contents

List of Tables

List of Figures

Appendices

1.0 Introduction

This report presents preliminary airport improvement alternatives for airport development at Birchwood Airport. The airport development alternatives show runway, taxiway, apron, lease lot, and access improvements needed to satisfy federal standards and state policies, reconcile problems, meet identified airport needs, and satisfy the forecast aviation demand for the 20-year planning period.

Section 2.0 summarizes the problems and needs identified in Chapters One through Four of the *Condition and Needs Assessment Report* (DOT&PF 2002). These problems and needs were based on DOT's assessment of the airport conditions and comments received through the public involvement process. The alternatives presented in this report attempt to resolve the identified problems and issues.

Section 3.0 presents a "Demand-Capacity" analysis of the airports' runway and taxiway facilities. Aircraft parking capacity is evaluated in Section 4.0. Based on the forecast of future aviation activity, the analysis in this section examines the annual and peak demands for runway access compared with the theoretical capacity of the runway and taxiway system currently in place at Birchwood. Unacceptable delays, as defined by the Federal Aviation Administration (FAA), are not anticipated. If unacceptable delays had been anticipated based on the analysis, capacity improvements would have been recommended.

Section 4.0 presents state and federal design standards required for safe and efficient airport operation and identifies elements of the airport that do not meet these minimum standards. Each of the alternatives proposed in Section 5.0 are designed to meet these standards and bring all airport facilities up to the identified standards.

Section 5.0 presents airport development alternatives. The three alternatives presented are designed to rectify problems and needs, bring the airport up to standard, and satisfy forecast demand for lease space and aircraft parking.

Section 6.0 presents an initial environmental analysis of the alternatives and compares the advantages and disadvantages of the alternatives under consideration.

2.0 Conditions and Needs Assessment Summary

This chapter presents a summary of the findings regarding conditions and needs at the Birchwood Airport. For more information on any element summarized in this chapter, the reader should consult the Condition and Needs Assessment Report for the Birchwood Airport (DOT&PF 2002). These problems and needs were based on an assessment of the airport conditions and comments received through the public involvement process. The alternatives posed in this report attempt to resolve the identified problems and issues.

The Birchwood Airport is a general aviation (GA) airport located approximately 20 miles north of Anchorage along Knik Arm. The airport serves a regional role for Anchorage, Eagle River, Chugiak, Palmer, and Wasilla GA communities. The airport has two runways. Runway 01L/19R is a paved runway that serves GA aircraft. It is 4,010 feet long and 100 feet wide, with taxiways on each side. Runway 01R/19L is 2,200 feet long (600 feet of pavement and 1,600 feet of gravel) and 50 feet wide and is intended for use by GA aircraft equipped with tundra tires or skis and by ultra light vehicles. Simultaneous operations on these parallel runways are not allowed. There are approximately 435-based aircraft at the airport. Approximately 85,000 aircraft operations are performed annually.

The airport is in a growing region of the Municipality of Anchorage. Birchwood has consistently made up about 8.5 percent of the Anchorage area's population over the last few years. Anchorage's population (260,283 in 2001) has increased a total of 15 percent since 1990, and the population of Eagle River (29,896 in 2001) and the surrounding area has increased 18 percent in the same time period. Since 1980 however, the population of the Eagle River area has more than doubled—it increased 133 percent from 1980 to 2000.

2.1 Identified Issues

During the first phase of the airport master plan (documented in *Office Study 1*), the main focus of public involvement efforts and field reconnaissance was to identify issues needing to be explored in the plan. This section summarizes major categories of issues identified. These comments are important for focusing the master planning effort. Some issues identified, however, extend beyond the purview of the DOT&PF. Others may or may not be supported by further analysis to be conducted as part of the airport master plan process. To the extent that they are within the State purview, the alternatives will attempt to resolve the issues.

2.1.1 General Mixed-Use Issues and Public Comments

The mixing of aircraft with widely varying performance capabilities is a safety issue. Better sequencing, communication, and safety practices are needed.

- Safety between ultra light and general aviation (GA) traffic is a top issue.
- More education and/or enforcement of existing airport operating procedures are needed.

- More information needs to be spread to GA pilots about ultra light vehicle and helicopter patterns.
- Two true parallel runways are needed.
- The two runways are too close together.
- Not enough real estate is available to accommodate the varied activities and traffic density.
- There is a need to buy additional land from Eklutna Inc. to separate ultra light and fixed wing operations. This separation would allow for simultaneous traffic patterns and approaches.
- Another option is to buy land in the area of the existing railroad tracks and locate an additional ultra light runway there.
- The existing Runway 19L/1R traffic pattern builds in conflict between ultra lights and GA aircraft.
- [SUGGESTED BY FAA AT AAC MEETING 11/03)Guidance signs should be installed at all taxiway/runway intersections.
- Threshold markers should be installed on Runway 1R.
- A new taxiway between the northeast and southeast apron should be constructed. This taxiway would be up tight against the access road and would keep pilots from using Runway 19L as a taxiway.
- The taxiways should be widened.

2.1.2 General Aviation Specific Issues and Comments

- The ends of the runways should be wider to allow airplanes to turn 360 degrees to check for other aircraft in the pattern.
- The runway should be extended.
- It is important to keep the ski strip (Runway 19L/1R) in future plans.
- A larger apron area for ski planes is needed.
- More tie-down space for ski planes should be provided.
- Pilots want electrical outlets at tie-downs.
- A dedicated gravel/ski strip is needed.
- There is a need to keep parking in the southeast ramp (ski/tundra tire) so an aircraft can taxi through the apron on skis.

2.1.3 Ultra Light Vehicle Specific Issues and Comments

- A taxiway for ultra light vehicles is needed.
- An ultra light-only runway is needed.
- Turnouts or elephant ears on the ultra light vehicle runway are needed to let ultra lights perform a 360-degree turn to check for approaching GA aircraft or to get out of the way.
- Taxiways should extend to both ends of the ultra light vehicle-landing zone.
- More space for ultra light vehicle operations is needed.
- There is a need to recognize that ultra light vehicle pilots have the right to use publicly funded/owned airports and facilities.

2.1.4 Glider Specific Issues and Comments

- Arrangements should be made to accommodate glider operations. Providing specific glider accommodations will help operations at the field airport more smoothly by reducing the time it takes for the gliders to takeoff and land.
- A glider staging area is needed.
- White runway lights and blue taxiway lights should be mounted flush to the ground to accommodate long wing gliders and snow plow operations.
- It would be difficult to keep lights mounted flush to the ground free of snow and ice.

2.1.5 Environmental Issues

- For the Chugiak-Eagle River area community, it is important that pilots are aware of traffic procedures for noise abatement, etc.
- A pilot noted that noise has only been an issue to the adjacent neighborhoods on a few occasions. Summer, with the long daylight hours, is really the only time when there is a potential for a problem, but such problems occur only occasionally.

2.1.6 Navigation

- The airport should have instrument and GPS approaches.
- *A hot-line telephone to the Flight Service Station (FSS) is needed.*

2.1.7 Airport Condition/Maintenance Issues

- Ownership and responsibility of the entire facility could be turned over to the Municipality of Anchorage.
- Security gates that allow card or code access are needed to reduce incidences of vandalism and theft.
- Airport maintenance is a key issue. A need exists to:
    - Overlay all asphalt concrete surfaces.
    - Install a complete new radio-controlled runway lighting system with the wires installed in conduit with junction boxes provided for maintenance access.
    - Purchase and install a new heated, insulated regulator shed.
    - Purchase and install a new upgraded beacon.
    - Purchase and install a new backup generator.
    - Purchase and install new perimeter fencing with automatic security gate openers.
    - Replace current snow blower with a new, upgraded unit.
    - Replace the push blade attachment for the front-end loader with a new, wider plow.
- Public restrooms are needed.
    - In general.
    - On the southern end.
    - On the northern end.

    - Mid-field.
    - As part of a DOT&PF facility.
    - As part of a private development on airport property.
- A pilot shack/lounge (with a telephone and a restroom) is needed. The FAA has recently allocated funds to develop these facilities.
- Public pay phones are needed. There is a working public pay phone on the north side of the Arctic Sparrow hangar, but this is not a convenient location for GA pilots.
- Telephones should be part of a private development only.
- A public-use hangar is needed to allow pilots to thaw aircraft in winter or to perform light maintenance.
- Public-use space for a café, snack bar, showers, etc, is needed.
- A fence is needed around Eklutna Inc. land to prevent shooting on it.
- An access road around the approach ends of Runway 1L and 1R is needed to minimize runway incursions.
- Access to and the cost of tie-downs and leases are issues.
- More lease lots should be added.
- More land for hangars is needed.
- The southwest corner behind the metal "T" hangars needs development. When those "T" hangars went in (circa 1987) the plan was to fill and level the low area behind them and put in more "T" hangars (from the existing eight to up to 60).
- The existing 100 yards of gravel road from Birchwood Loop to the northeast apron should be paved.
- There should be no "lottery" for parking spaces.
- Lighting should be added for the entire west ramp and especially for the transient parking area.
- Runway 01R is lower than Runway 01L/19L resulting in poor drainage and ponding of water.
- Snow storage and snow removal is an issue at the airport. Private snow removal from the lease lots has also been a problem and is a safety issue. Lessees should take care of their own snow removal. Lessees could haul their snow away or store it on their own lease lot. Another possibility is to allow the lessees to use the southwest, undeveloped area for snow storage.

2.1.8 Summary of Safety Issues

- Safety issues arise as a result of mixed operations of two different aircraft types (GA aircraft, ultra light vehicles, gliders, etc.) and the right-of-way rules for each.
    - The two runways are too close together.
    - Effective implementation of the Birchwood Airport Operating Rules and Procedures requires the full participation of all the pilots using the airport.
        - GA pilots have been observed to land short, land long, turn crosswind too soon, and at too low of an altitude. When traffic is heavy, these unexpected operations cause delay and frustration.
        - Ultra light vehicles are not allowed to fly over buildings, and therefore they fly a non-standard pattern.

        - Radio use at this airport is not mandatory, which complicates the issue of unexpected operations and non-standard patterns.
    - Operating procedures are now enforceable under both state statute and regulation.
    - There is a big difference in airspeed of a GA aircraft and ultra light vehicles.
    - Under normal operating procedures, ultra light vehicles must give way to all aircraft and gliders.
    - Any aircraft (including ultra light vehicles) has the right of way when an emergency is declared.
    - Ultra light vehicle pilots do not have right-of-way (except in an emergency) and simultaneous operations on the two runways are prohibited. A situation can occur, therefore, where the slower-flying ultra light vehicle can be on final for landing and have a faster GA airplane pass by to land slightly ahead of the ultra light vehicle. When this happens the ultra light vehicle pilot must abort his or her landing attempt and fly a full circle (fly a 360) to create time for the GA plane to taxi off the runway.
- The existing Runway 19L/1R traffic pattern builds in conflict.
- The gravel runway is too short.

2.1.9 Ideas for Alternatives

- Add a floatplane basin. A floatplane facility could be accommodated by shifting the railroad tracks east and locating the floatplane basin in the area of the existing tracks.
- Construct two true parallel runways.
- Separate the two runways by the required 700-foot spacing:
    - Buy additional land from Eklutna Inc. and relocate one runway.
    - Buy land in the area of the existing railroad tracks and relocate the ultra light vehicle runway there.
- Create a taxiway and runway only for ultra light vehicles.
- Construct turnouts or elephant ears on the ultra light vehicle runway to let ultra light vehicles perform a 360-degree turn to check for approaching GA aircraft or to get out of the way.
- Extend taxiways to both ends of the ultra light vehicle landing zone.
- Create a glider staging and landing area.
- Modify the infield between the runways to an open grass infield for alternate/emergency landings or staging for gliders. This would also require moving the existing windsock to the opposite side and mounting white runway lights and blue taxiway lights flush to the ground to accommodate long-wing gliders. This type of system is used successfully in Canada, but it may be problematic during snow removal.
- Install guidance signs at all taxiway/runway intersections.
- Install threshold markers on Runway 1R.
- Construct a new taxiway between the northeast and southeast apron, adjacent to the access road, to keep pilots from using Runway 19L as a taxiway.

- Create taxiway access with a hold point midway on Runway 19L/1R.
- Widen taxiways.
- Widen run-up areas to allow airplanes to turn 360 degrees to check for other aircraft in the pattern.
- Extend the primary runway.
- Create a larger ski area.
- Provide more tie-down space for ski planes.
- Construct a dedicated gravel/ski strip.

2.1.10 Other Comments

- Campbell Airstrip could be opened to relieve pressure at Birchwood.
- It is important for the Birchwood Airport to be a self-supporting facility.
- Use should be expanded for economic development.
- It could be useful to study the mixed-use issues in Soldotna (a contact is Doug Anderson) and in Fairbanks at Bradley Field, two airports with ultra light vehicle activity.
- Is there a need for the airport to be relocated within the 20-year planning horizon?
- Given that this is a 20-year planning process, it stands to reason that by the end of this planning period, every available area of land at the Birchwood Airport will be developed.
- The airport contributes to the state economy—many businesses are located at the airport.
- Providing a safe operating condition at the airport is the most important issue.

3.0 Demand-Capacity Analysis

The capacity and delay analysis provides a method for evaluating the capability of an existing airfield configuration to accommodate current and forecast levels of air traffic without resulting in unacceptable delay to airport users. By identifying the restrictive component(s) of an airfield's layout and configuration, capacity and efficiency improvements can be recommended to accommodate current and forecast levels of air traffic.

Annual capacity and delay where calculated in accordance with the methodology recommended in FAA advisory circular (AC) 150/5060-5, *Airport Capacity and Delay.*

3.1 Methodology

Current conditions, described below, were reviewed and compared to the findings reported in the 1990 airport master plan. Specific items requiring revision such as Annual Service Volume and Annual Delay were updated to reflect the updated air traffic forecast at Birchwood Airport presented in Chapter Three of the *Birchwood Airport Master Plan Conditions and Needs Assessment Report.* (March 2002).

Presented below is a discussion of each element reviewed in the evaluation.

Airfield Configuration. Airfield configuration relates to the number, location, and orientation of the aprons, taxiways, and runways. The airfield configuration at Birchwood consists of two runways orientated approximately north to south; three exit taxiways; and three aprons. A parallel taxiway is available on the west side of Runway 01L/19R; Runway 01R/19L also functions as a parallel taxiway to the east.

Meteorological Conditions. Meteorological conditions have remained unchanged since the 1990 airport master plan.

Runway Usage. Runway use is expressed as the direction and kind of operations performed on a runway. Simultaneous operations at Birchwood Airport are not allowed even though there are two runways. Based on the survey responses and actual counts of aircraft operations mentioned in previous chapters, the following table presents the use of each runway as a percentage of operations.

Table 3-1
Percentage of Annual Operations per Runway
Birchwood Airport

Runway 01L	Runway 19R	Runway 01R	Runway 19L
13%	44%	10%	33%

Source: HDR Alaska, Inc.
Note: Percentages are based on pilot survey responses and actual counts of aircraft operations mentioned in previous chapters.

Aircraft Mix. The aircraft category mix refers to the percentage of total operations by their specific aircraft approach category (AAC). As presented in Chapter Two, the AAC refers to the aircraft's approach speed. The percentage of operations by the airport reference code[1] (ARC) for the 20-year planning period is identified in Table 3-2.

Table 3-2
Percentage of Annual Operations by Approach Categories
Birchwood Airport

Category A	Category B	Category C	Category D
90%	10%	0%	0%
e.g. Cessna 170	e.g. Saab Metroliner	e.g. Boeing 737	e.g. C-130

Source: HDR Alaska, Inc.

Touch and Go Operations. Touch and go operations involve an aircraft making a landing and an immediate takeoff without coming to a full or complete stop or exiting the runway. Touch and go operations are estimated to comprise a considerable portion (40%) of total annual operations at Birchwood Airport due to the flight school activity at Birchwood and Merrill Field Airports.

Exit Taxiways. Birchwood Airport has three exit taxiways. The criteria used to determine the hourly runway capacity only considers exit taxiways "within appropriate exit range and which are separated by at least 750 feet. Only two of the exit taxiways at Birchwood Airport meet the preceding criteria; therefore the resulting "Exit Factor" used in calculating the hourly runway capacity is "2."

3.2 Annual Service Volume

The annual service volume (ASV) is a reasonable estimate of an airport's annual capacity. It accounts for differences in runway use, aircraft mix, and weather conditions that would be encountered over a year's time. It is important to note that calculation of the ASV is most useful in determining the annual delay. As operations approach capacity, delay increases and the annual service volume decreases. The ASV has been updated since the 1990 master plan as a result of the updated forecast presented in Chapter Three.

The ASV is calculated using the following formula:

ASV = C x D X H

[1] The ARC is a coding system used by the FAA to relate airport design criteria to the operational and physical characteristics of the airplanes intended to regularly operate at the airport. Regular operation is defined as at least 250 operations per year. The ARC has two components (approach category and design group) relating to airport design aircraft. The first component, depicted by a letter code (A, B, C, or D), is the aircraft approach category and relates to an aircraft's approach speed. The second component, depicted by a Roman numeral (I, II, III, or IV), is the airplane's design group and relates to wingspan.

where,

- C = the weighted hourly capacity;
- D = the ratio of annual demand to average daily peak demand during the peak month;
- H = the ratio of average daily demand to average peak-hour demand during the peak month

3.3 Weighted Hourly Runway Capacity

Hourly capacity is a measure of the maximum number of aircraft operations that can be accommodated by the airport in an hour. Hourly runway capacity estimates are based on the following assumptions:

- Birchwood Airport has a single runway (i.e. Runways 01R/19L and 01L/19R function as 1 runway for capacity purposes because simultaneous operations are not allowed).
- The percent of arrivals is approximately equal to the percent of departures.
- The percent of touch and go operations comprise a significant percentage (40%) of the total annual operations.
- Birchwood Airport has three exit taxiways. As stated previously, only two of the three taxiways meet the criteria used for calculating the weighted hourly runway capacity.

The elements described above indicate no significant change in the hourly runway capacity at Birchwood Airport since the 1990 airport master plan. Based on the above information, the existing weighted hourly capacity is estimated at 120 VFR operations per hour and 0 IFR operations per hour.

Table 3-3 presents the results of the ASV calculations for Birchwood Airport.

Table 3-3
Annual Service Volume, Birchwood Airport

Year	2000	2005	2010	2020
Annual Operations	86,108	87,253	91,831	109,000
Average Day Peak Month Ops.	472	472	501	601
Design Hour Ops.	33	33	35	42
Weighted Hourly Capacity = C	120	120	120	120
Ratio (Annual Ops./Avg. Day Peak Month Ops.) = D	182	185	189	181
Ratio (Avg. Day Peak Month/Avg. Day Peak-hour) = H	14	14	14	14
Annual Service Volume = (C*D*H)	313,120	317,284	314,849	311,429

Source: HDR Alaska, Inc.

As shown in Table 3-3, the annual service volume for Birchwood is estimated at an average of 314,000 operations. FAA recommends consideration of development improvements relative to insufficient capacity when annual operations reach 60 percent of the AVS. Annual operations forecast in Chapter Three only account for 35 percent of the estimated ASV. Airfield capacity will remain sufficient through the 20-year planning period.

3.4 Annual Delay

Annual delay refers to the total annual hours aircraft are delayed while attempting to perform landing or takeoff operations at an airport. As demand approaches capacity, individual aircraft delay is increased. Successive hourly demands exceeding the hourly capacity result in unacceptable delays.

The average delay per aircraft is estimated to be approximately 18 seconds. It should be noted however, that the formulas utilized to calculate delay do not account for unforeseeable peak activity and longer periods of delay may occur during peak periods. The results of the demand capacity analysis indicate that no additional facilities will be needed to increase capacity or reduce delay during the 20-year planning period.

4.0 Airport Facility Standards

This section identifies the geometric dimensions to which airfield, landside, and airspace/air traffic control facilities should be developed to meet existing and future demands at Birchwood Airport.

4.1 Airfield Facility Requirements

Identifying the appropriate design standards for the development of the airfield facilities is accomplished either by considering a family of airplanes having similar performance characteristics or considering a specific aircraft when the maximum gross weight of that aircraft is over 60,000 pounds. In either case, the choice should be based on the most demanding aircraft family or specific aircraft that is forecast to use the runway on a regular basis. FAA AC 150/5325-4A, *Runway Length Requirements for Airport Design*, defines the most demanding aircraft as the aircraft requiring the longest runway length for takeoff and landing operations. Regular use is defined as at least 250 operations per year.

FAA AC 150/5300-13, *Airport Design*, establishes an ARC to identify specific design criteria appropriate for the types of aircraft expected to be accommodated at a particular airport. The airport reference code for airports classified as a Local Airport by the Alaska Aviation System Plan (AASP) is B-I; however, the 1990 Birchwood Airport Layout and Access Plan lists the airport reference code as B-II for Runway 01L/19R and A-I for Runway 01R/19L. B-II aircraft have approach speeds between 91 and 121 knots and wingspans between 49 and 79 feet. A-I aircraft have approach speeds less than 91 knots and wingspans less than 49 feet.

Federal and State standards recommend 2,000 feet of runway length for A-I aircraft and 3,600 feet of runway length for B-II aircraft with less than ten seats. The FAA AC 150/5325-4A runway length recommends 800 feet for ultra light vehicles (for approach speeds between 30 and 50 knots).

The Birchwood Airport is currently used by small single and twin-engine aircraft, such as the Cessna C-170, C-320, Piper Aztec, Piper Navajo, and Beech 18. These aircraft fit into approach categories A through B and design groups I through II. The airport is also used frequently by ultra light vehicles, gliders, and aircraft equipped with tundra tires during the summer and skis during the winter. Ultra light vehicles fall into approach category A and design group I. Aircraft equipped with tundra tires or skis at the Birchwood Airport include Piper PA-12s and PA-18s, which are categorized in approach category A and design group I.

The forecast fleet mix for the Birchwood Airport will be comprised of A-I, A-II and B-I aircraft. The combination of the ARCs for these aircraft results in an overall ARC of B-II. Table 4-1 presents the most common aircraft forecast to operate at the Birchwood Airport.

Table 4-1
Forecast Fleet Mix
Birchwood Airport

A-I	A-II	B-I
Cessna 172, 180, 210, 310-320	Beech 18	Piper Aztec
	Twin Otter	Piper Navajo
Piper PA-12, PA-18		
Cessna Caravan, Stationair		
Ultra light vehicles (e.g. Antares)		

Note: The combination of ARC A-I, A-II, and B-I aircraft results in an overall ARC of B-II.
Source: HDR Alaska, Inc. July 2002.

4.1.1 Runway 01L/19R

Wheeled aircraft (excluding ultra light vehicles and aircraft using tundra tires or skis) operate on Runway 01L/19R (4,010 feet long by 100 feet wide) and are expected to continue to do so in the future. Of the aircraft forecast to regularly operate at the Birchwood Airport, the Piper Navajo requires the most runway length (2,700 feet) and at least 60 feet of runway width.

Based on the anticipated fleet mix, the ARC applicable to Runway 01L/19R is B-II.

4.1.2 Runway 01R/19L

Runway 01R/19L (2,200 feet long by 50 feet wide) currently serves as the sole runway for ultra light vehicles and aircraft equipped with tundra tires or skis. Of the aircraft forecast to regularly operate on Runway 01R/19L, the Cessna 180 (ARC A-I) is the most demanding aircraft and requires 1,310 feet of runway length. The minimum runway width for the ARC A-I is 60 feet.

Based on the anticipated fleet mix, the ARC applicable to Runway 01R/19L is A-I.

4.1.3 Runway Length

Based on the aircraft performance specifications for the design aircraft Runway 01L/19R has sufficient length (4,010 feet) to accommodate B-II aircraft and should be maintained at its full length. Runway 01R/19L has sufficient length to accommodate ultra light vehicles, ski planes, and tundra tire equipped aircraft in the A-I class and should be maintained at 2,200 feet.

4.1.4 Runway Width

FAA recommends a minimum runway width for an ARC of B-II to be 75 feet. For an ARC of A-I, the recommended width is 60 feet. Runway 01L/19R is currently 100 feet wide. Runway 01R/19L is 50 feet wide. Based on the forecast air traffic and the anticipated fleet mix, Runway 01L/19R will not require additional runway width to accommodate future demand or the critical aircraft. Runway 01R/19L should be widened an additional 10 feet to meet the standard of 60 feet.

4.1.5 Runway Shoulder Width

As defined in FAA AC 150/5300-13:

> "Runway shoulders should provide resistance to blast erosion and accommodate the passage of maintenance and emergency equipment and the occasional passage of an airplane veering from the runway."

FAA AC 150/5300-13 also recommends the surface of runway shoulders to be a natural surface (such as turf) that reduces the possibility of soil erosion and ingestion of foreign objects by aircraft engines or being thrown by propellers. Soils without turf or with potential for a debris-hazard should be stabilized or paved. For an ARC of A-I or B-II the recommended runway shoulder width is 10 feet wide. Elevation separation between the runway surface and the runway shoulders should be no more than three inches.

Runway shoulders for both runways are currently 10 feet and meet the recommended width and surface standards. No additional runway shoulder width will be required during the planning period. Where runway 01L/19R is widened, 10 feet of shoulder width should be maintained.

4.1.6 Runway Safety Area

The runway safety area (RSA) enhances the safety of airplanes that undershoot, overrun, or veer off the runway. It also provides greater accessibility for firefighting and rescue equipment during such incidents. The RSA width is measured from the runway centerline. The RSA length begins at each runway end. As prescribed in FAA AC 150/5300-13, the RSA shall be:

1. Cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations;

2. Drained by grading or storm sewers to prevent water accumulation;

3. Capable, under dry conditions, of supporting snow removal equipment, ARFF equipment, and the occasional passage of aircraft without causing structural damage to the aircraft; and

4. Free of objects, except for objects that need to be located in the RSA because of their function. Objects higher than 3 inches above grade should be constructed on low-impact-resistant supports of the lowest practical height with the frangible point no higher than 3 inches above grade. Other objects, such as manholes, should be constructed at grade. In no case should their heights exceed 3 inches above grade.

All runways at Birchwood Airport currently have sufficient RSA length and width and meet the above surface standards with the exception of the approach end of Runway 01L. The approach end of Runway 01L is deficient by 100 feet in length. Table 4-2 compares the existing RSA to the recommended standards.

Table 4-2
Runway Safety Area
Birchwood Airport

	ARC A-I Standard	Existing Runway 01R	Existing Runway 19L
Runway Safety Area Length	240 ft	240 ft	240 ft
Runway Safety Area Width	120 ft	120 ft	120 ft
	ARC B-II Standard	**Existing Runway 01L**	**Existing Runway 19R**
Runway Safety Area Length	300 ft	200 ft[1]	300 ft
Runway Safety Area Width	150 ft	150 ft	150 ft

[1] The RSA length beyond the approach end of Runway 01L is deficient by 100 ft.

4.1.7 Runway Protection Zone

The runway protection zone (RPZ) function is to enhance the protection of people and property on the ground. As recommended by FAA and where practical, airport owners should own the property under the runway approach and departure areas to at least the limits of the RPZ. The FAA also recommends that, where it is practical, to clear the entire RPZ of all above ground objects. When it is impractical, the RPZ should at least be cleared of all facilities supporting incompatible activities leading to the assembly of people.

The RPZ dimensions applicable to Birchwood Airport are for small aircraft exclusively (aircraft under 12,500 lbs. maximum gross take off weight) operating under visual approaches with visibility minimums not lower than 1 mile. Table 4-3 presents the applicable standards and compares them to the existing RPZ dimensions at Birchwood Airport.

Table 4-3
Runway Protection Zone
Birchwood Airport

	Length		Inner Width		Outer Width	
Approach End	Standard	Existing	Standard	Existing	Standard	Existing
Runway 01L	1,000 ft	1,000 ft	250 ft	250 ft	450 ft	450 ft
Runway 19R	1,000 ft	1,000 ft	250 ft	250 ft	450 ft	225 ft[1]
Runway 01R	1,000 ft	1,000 ft	250 ft	250 ft	450 ft	450 ft[2]
Runway 19L	1,000 ft	1,000 ft	250 ft	250 ft	450 ft	450 ft[2]

1. The northwest corner of the RPZ for the approach end of Runway 19R is not cleared of trees.
2. Aircraft parking and aircraft hangars exist within the RPZ at both ends for Runway 01R/19L.

Note: All dimensions are for small aircraft exclusively performing non-precision approaches with visibility minimums not lower than 1-mile.

The northwest corner of the RPZ for the approach end of Runway 19R is not cleared of trees. Trees should be cleared from the Runway 19R RPZ. Aircraft parking and aircraft hangars exist within the RPZ at both ends of Runway 01R/19L.

4.1.8 Runway Object Free Area

The Object Free Area (OFA) is centered on the runway centerline and requires the clearing of non-essential above ground objects protruding above the runway safety area edge elevation. It is acceptable to place objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes. Objects not essential to either of these functions are not to be placed in the OFA.

The recommended ROFA dimensions for ARC B-II aircraft is 300 feet beyond each runway end and 500 feet of width. The recommended ROFA dimensions for ARC A-I aircraft is 240 feet in length and 250 feet in length. A chain link security fence is located 200 feet south of the approach end of Runway 01L. This fence should be relocated an additional 100 feet to the south in order to clear the object free area for Runway 01L.

Runway 01L/19R currently has 300 feet in length and 500 feet of width of ROFA. Runway 01R/19L currently has 240 feet in length and 500 feet width of ROFA. The existing ROFA dimensions currently meet the recommended standard. No additional ROFA length or width will be required during the planning period.

4.1.9 Separation Standards

FAA AC 150/5300-13 recommends standard separations between runways, taxiways, aircraft parking areas, buildings, and helicopter operating areas for the safe operation of active aircraft and parked aircraft while on the airfield, and for the safety of landside terminal buildings.

Runway Centerline to Parallel Runway Centerline. For simultaneous landings and takeoffs using VFR, the minimum separation between centerlines of parallel runways is 700 feet. Birchwood Airport has two runways (01L/19R and 01R/19R). There is insufficient separation (approximately 210 feet) between the runway centerlines to allow simultaneous operations. Simultaneous operations are not allowed at Birchwood Airport.

An additional 490 feet of separation between the centerlines of Runways 01L/19R and 01R/19L would be required to accommodate simultaneous operations.

Of concern at Birchwood is the mix of aircraft. While simultaneous operations are not allowed, the mix of aircraft includes ultra light vehicles, which are slower and often operated without radios, and GA aircraft that have much greater cruise and approach speeds. Despite not allowing for simultaneous operations, the potential exists for ultra light vehicles to be overtaken while operating on 01R/19L by GA aircraft on 01L/19R. In effect creating the possibility for a simultaneous operation to occur. Without a control tower or full radio communications amongst all aircraft, FAA will not endorse such a situation. If the two runways met the minimum separation standard, the safety of the situation would be much improved, because there would be sufficient space to safely accommodate simultaneous operations.

Runway Centerline to Taxiway Centerline. The distance that applies in this category is the distance between the runway centerline and the taxiway centerline on the aprons. This distance is needed to satisfy the requirement that no part of the aircraft is within the RSA or penetrates the Obstacle Free Zone. The separation applicable to Runway 01L/19R is 240 feet and 150 feet for Runway 01R/19L.

The existing separation between the centerline of Runway 01L/19R and Taxiway A is 200 feet. An additional 40 feet of separation will be required to meet the recommended separation. The existing separation between Runway 01R/19L and the taxi lanes on the Northeast and Southeast apron also appears to be deficient. Neither the apron nor the runway is stripped in this area and so it is impossible to determine the exact centerline of the taxi lane and runway from aerial photography. There appears to be a separation of approximately 90 feet. An additional 60 feet of separation (for a total of 150 feet) will be required to satisfy the recommended criteria.

Aircraft Parking Area. This separation standard allows for clearance between active and parked aircraft. The recommended separation distance between parked aircraft is 250 feet from a runway centerline and 240 feet from a taxiway centerline.

The separation distance on the east side of Runway 01L/19R and the aircraft parking area is 350 feet. The separation on the west side is 400 feet. The separation distance between the centerline of Runway 01R/19L and the aircraft parking area is 140 feet on the east side and 1,150 feet on the west side.

The existing separation between the centerline of Runway 01L/19R and the aircraft parking area meets the recommended standards. The existing separation between Runway 01R/19L and the east aircraft parking areas is deficient by 110 feet. No additional separation will be required for Runway 01R/19L. An additional 140 feet of separation should be developed between Runway 01R/19L and the east side aircraft parking area.

Building Restriction Line. The Building Restriction Line (BRL) allows for safe separation between aircraft and immovable objects such as buildings, as well as providing for control over the line of sight for air traffic controllers and visibility for pilots on the airfield. FAA AC 150/5300-13 recommends a building restriction line that encompasses the runway protection zones (RPZs), the runway object free area (ROFA), the runway visibility zone, critical navigation aid areas, and airport traffic control, giving the tower a clear line of sight.

The existing BRL at Birchwood Airport ranges between 300 to 600 feet and provides adequate separation. There are no structures within the existing BRL. The existing BRL does not need to be modified.

Helicopter Pad. According to FAA AC 150/5390-2A, the area(s) designated for helicopter landings and takeoffs may be located anywhere on the airport as long as it provides ready access to the user's destination, meets the minimum separation distances between the runway centerline and the final approach and takeoff area (FATO) and unobstructed approach surfaces, and the location minimizes helicopter rotor wash to parked airplanes. The FAA recommends a minimum 300-foot separation between the runway centerline and the FATO at Birchwood Airport.

A helicopter practice landing area is located within Runway 1R/19L about 375 feet from the threshold of Runway 19L. Helicopters are to land within Runway 1R/19L. Two marked FATO are located on lots 19 and 20, block 100 approximately 750 feet, and 550 feet, respectively from Runways 01L/19R and 1R/19L.

The separation between the runways and the existing helipads//FATOs meets the minimum FAA standard. No additional separation will be necessary through the planning period.

4.1.10 Taxiways

Ten taxiways provide access to Birchwood's two runways; all are 50 feet wide and can support an aircraft with a maximum gross weight of 12,500 pounds. Two taxiways run parallel to Runway 01L/19R and eight short taxiways connect the parallel taxiways to the runway.

Table 4-4 presents the applicable standards for taxiways serving Runway 01L/19R (ARC B-II) and Runway 01R/19L (ARC A-I).

Table 4-4
Taxiway Dimensional Standards
Birchwood Airport

	Runway 01L/19R (ARC B-II)	Runway 01R/19L (ARC A-I)
Taxiway Width	35 ft	25 ft
Taxiway Shoulder Width	10 ft	10 ft
Taxiway Safety Area Width	79 ft	49 ft
Taxiway Object Free Area Width	131 ft	89 ft
Taxilane Object Free Area Width	115 ft	79 ft

Existing taxiways at the Birchwood Airport meet all applicable standards and will be sufficient through the planning period. One additional exit taxiway near the approach end of Runway 01L would reduce taxi time on the runway and increase the overall capacity of the airport in preparation for future development.

4.1.11 Aircraft Parking Positions

The Birchwood Airport provides three paved locations to accommodate aircraft parking and tie-downs. The southeast apron is associated with Runway 01R/19L and is intended for operations by aircraft equipped with tundra tires in the summer and skis in the winter. The northeast apron has the largest number of public tie-downs. The DOT&PF handles tie-down leasing and maintenance at the southeast and northeast aprons; both aprons are open to the public under a use permit. The west apron is comprised of 16 individual lease lots and a transient aircraft parking area (with space for approximately 10 aircraft) that together form the total apron. Each lease lot is typically associated with a building or hangar and provides space to park and store aircraft. At a commercial airport, the number of aircraft parking positions needed depends on the number of peak-hour operations, size of aircraft, and number of peak-hour enplaned passengers. Birchwood is a general aviation airport and therefore the number of aircraft parking positions needed directly corresponds with the forecast of based aircraft. There are currently 430 tie-downs at the Birchwood Airport. The air traffic forecast indicates a need to accommodate an additional 125 tie-down spaces by the end of the planning period.

Single and Multi-Engine Small Aircraft. The air traffic forecast indicates a need for an additional 60 spaces for single and multi-engine aircraft by the end of the 20-year planning period.

Ultra Light Vehicles. The air traffic forecast indicates a need for an additional 62 spaces for ultra light vehicles and sport aircraft by the end of the 20-year planning period.

Helicopters. FAA AC 150/5390-2A recommends a minimum parking area for helicopters that is equal to 1.5 times the overall length. The minimum spacing requirements recommend a safety area equal to one-third the rotor diameter.

Helicopters must land within Runway 01R/19L or on one of the two FATOs. The air traffic forecast indicates three helicopters could be based at Birchwood Airport for at least some time during the planning period. As at many airports, helicopter pilots operating at Birchwood Airport are likely to park on the apron space abutting their hangar building.

Based on the air traffic forecast and the current apron utilization trends for helicopter parking, no additional operating areas for helicopters will be required during the planning period at Birchwood Airport.

Other (Gliders, Experimental Aircraft, etc.) The air traffic forecast indicates a need for an additional 3 spaces for gliders and other experimental aircraft by the end of the 20-year planning period.

4.1.12 Airfield Pavement

The Birchwood Airport was originally paved in 1978. The southeast apron was paved in 1987. Since then, none of the paved surfaces have been repaved. A review of aerial photography and a site visit indicate that all paved runways and taxiways exhibit longitudinal and lateral cracking. The 2001 pavement conditions report, which is based on a survey performed in 1998, notes that there is medium and high severity cracking in some of the asphalt areas and that corrective maintenance or a pavement overlay will be required by 2006. Based on the recommendations in the 1998 Pavement Condition Report, the age of the pavement, and severity of cracking, all paved surfaces at

Birchwood Airport with exception of the southeast apron should be re-surfaced during the next five years. The pavement on the southeast apron should be resurfaced toward the end of the planning period.

4.2 Airspace and Air Traffic Facility Requirements

Airspace and air traffic facility requirements were evaluated based on the forecast demand and capacity analysis assumptions, and the identified need through the 20-year planning horizon.

4.2.1 Airspace

Birchwood Airport underlies Class E airspace. Class E airspace is controlled airspace with a floor set to 1,200 feet above the ground. The recommended pattern altitude is at 1,000 feet above sea level; the airport is 96 feet above sea level, so therefore, the pattern altitude is 904 feet above the ground. Thus, all operations at Birchwood Airport take place in uncontrolled, Class G airspace.

The mix of aircraft currently using and forecast to use the Birchwood Airport have widely varying performance capabilities. This disparity in aircraft performance in an uncontrolled airspace has at times resulted in a safety issue. General aviation aircraft initiating an approach or departure to or from Runway 01L/19R will occasionally overtake slower ultra light vehicles on approach or departure to or from Runway 01R/19L. Ultra light vehicles are required to abort their approach/departure if a faster aircraft overtakes them. This scenario sometimes results in simultaneous landings or take-off operations, which are not allowed at Birchwood Airport. It can also be difficult for pilots initiating an approach to determine if slower aircraft on one of the runways are taxiing or taking off. This problem is compounded when pilots do not or cannot monitor or announce their position and intentions over the Common Traffic Advisory Frequency (CTAF).

FAA further evaluated these airspace conflicts in September 2000. FAA undertook a traffic count survey of the Birchwood Airport to determine the need for an air traffic control tower. Based upon the traffic counts and the absence of scheduled commercial service, FAA determined that Birchwood Airport does not qualify for the establishment *of an air traffic control tower* by the FAA.

In order to reduce these conflicts separate facilities for ultra light vehicles should be provided.

As described previously in the *Birchwood Airport Master Plan, Office Study #1*, the airspace located 1.7 miles to the south of the Birchwood Airport and extending to 11,000 feet is restricted airspace for the Fort Richardson Army Base. It is intended to exclude all aircraft not participating in military training exercises from 0500 (5:00 a.m.) to 2400 (12:00 a.m.) Monday through Friday. The location of this restricted area forces aircraft to fly over Eagle River while going to and from Anchorage.

Airport users have requested the development of a GPS approach to the Birchwood Airport. The combination of R-2203B and the Chugach Mountains, 3.5 miles to the east, will affect the design of a possible future instrument approach.

There are two small terrain penetrations to the FAA Part 77 surfaces. A number of trees may also penetrate the approach surfaces. DOT&PF has an avigation and hazard easement for routine removal of trees. There is no agreement between DOT&PF and landowners for the removal of trees beyond the approach end of Runway 01R/19L. It is recommended that identified penetrations should be removed.

4.2.2 Navigational Aid Requirements

Airport and runway electronic navigational aid and visual approach aid requirements are based on FAA recommendations described in U.S. DOT/FAA Handbook 7031.2B, *Airway Planning Standard Number One*, FAA AC 150/5300-2D, *Airport Design Standards Site Requirements for Terminal Navigational Facilities*, and FAA Order 5090.3A, *Field Formulation of the National Airport System Plan.*

Electronic Aids. Electronic navigational aids provide two primary services: (1) precision electronic guidance to a specific runway end; and/or (2) non-precision electronic guidance to a runway or the airport itself. The distinction between precision and non-precision navigational aids is that the former provides electronic descent and alignment (course) guidance; the latter provides only alignment and position location information. Approach aids provide a visual reference to the airport and runway.

The installation of on-airport terminal air navigation facilities is generally predicated by FAA criteria established in U.S. DOT/FAA Handbook 7031.2B. The standards contained in this document use the existing or projected number of annual instrument approaches to determine an airport's qualification for or discontinuance of various airport terminal navigational aids.

Runway 01L/19R has non-precision instrument and visual approaches. Runway 01R/19L only has visual approaches. The existing electronic navigational aids available for non-precision approaches are a VOR and NDB. Visual Approach Slope Indicators (VASI) assist pilots with visual approaches to Runway 19R. As activity at Birchwood Airport increases during the planning period the VASI should be upgraded with Precisions Approach Path Indicators (PAPI).

Visual Aids. The installation of airport and runway visual aids is considered to be fundamental to airport development. These facilities are intended to provide visual cues to the pilot of an aircraft landing at night or during periods of reduced visibility.

Birchwood Airport is currently equipped with the following airport visual aids:

- **Identification Lighting:** Pilots can identify the geographical location of the Birchwood Airport at night by a green and white airport beacon. The beacon is located approximately 1,300 feet down Runway 19R and approximately 716 feet to the west between Birchwood Spur Road and the gun range, west of Lot 7A, Block 500.

- **Visual Approach Slope Indicator (VASI):** Visual approach slope indicators provide visual descent guidance and safe wheel clearance (eye-to-wheel height) over the runway threshold for visual approaches on Runway 19R. The Birchwood Airport has one 4-box VASI that can be remotely activated by pilots. Precision Approach Path Indicators should be placed at both ends of Runway 01L/19R to replace the VASI.

- **Medium Intensity Runway Lighting (MIRL):** Runway lighting provides positive delineation for the edge of usable runway. Runway 01L/19R is lighted with MIRL for its entire length.

- **Taxiway Lighting:** The portion of Taxiway Alpha that is not Runway 19L has blue taxiway lights along the west side. Taxiway Bravo has blue taxiway lights along the east side.

- **Wind Cone:** The windsock between Runway 19R and Taxiway Bravo is illuminated by four lights and has a segmented circle consisting of half-buried oil drums painted orange. From the air the segmented circle is difficult to see due to the faded orange paint and the weak color contrast with surrounding vegetation. Another wind cone for Runway 19L is located approximately 675 feet from the threshold, 75 feet to the east. According to DOT&PF leasing, the wind cone for 19L was placed there by ultra light vehicle operators and has not been approved by the FAA or the DOT&PF.

The existing visual aids are sufficient and will accommodate the forecast air traffic during the planning period. Based on input from airport users guidance signs should be installed at all taxiway/runway intersections and threshold markers should be installed on Runway 01R. Markers delineating the segmented circle should be replaced with markers that are more visible. The VASI should be replaced with PAPIs.

4.3 Landside Facility Requirements

Landside facilities evaluated in this section include hangars, fuel storage, vehicle parking, ground access, maintenance buildings, and Airport Rescue and Fire Fighting (ARFF) facilities. Utility requirements such as water, sewer, electrical, and communications are also identified.

4.3.1 Hangar Space

The FAA does not prescribe a specific methodology for estimating hangar space. Birchwood Airport currently has no public hangar or terminal facilities. Airport users and local residents have indicated a demand for additional lease lots to develop private hangar facilities at Birchwood Airport. Owners of based general aviation aircraft at the airport may also have an interest in the future of storing their aircraft in T-hangars.

The State of Alaska will not build or operate public hangars. Therefore, the future lease lot holder will ultimately determine the type and configuration of the facilities on these lease lots. Based on communication with the DOT leasing department, the existing ratio of based aircraft to tie-downs, and comments received during public meetings 15 new lease lots will be needed in the next five years for the development of private hangars and T-hangars. This estimate will accommodate current existing demand as well as projected demand. A mix of lease lot sizes should be provided. The assumed mix of lease lots in the alternatives is comprised of six ultralight and sport aircraft accessible lease lots, 10 fixed based operator-sized lease lots (150' x 150'), two T-hangar lease lots, and 12 smaller lease lots in the 100 feet by 100 to 150 feet size range.

4.3.2 Fueling Facilities

The FAA does not recommend capacity standards for fueling facilities at airports. FAA AC 150/5360-9 does recommend that aircraft fueling facilities be located in reasonable proximity to the terminal area in order to minimize the distance that tanker trucks must transport fuel.

Gas-N-Go is the only FBO at Birchwood Airport that sells aviation fuel to the general public. The fueling area can be congested and pilots experience delay during peak periods of activity. No inadequacies with the existing fuel services have been identified. Since there is only one public aviation fuel supplier it is, however, likely that additional fuel services will be in demand during the 20-year planning period. The development of at least one additional FBO providing fuel and/or fuel truck should be anticipated. Expanded fuel services should be allowed to develop.

4.3.3 Airport Maintenance Facilities

Maintenance at the Birchwood Airport is provided by the State of Alaska. The DOT&PF maintenance building is located north of the northeast apron. This facility is used to store state maintenance equipment and is shared with the Chugiak Fire Department. A sand storage building is located just south of the maintenance building. The airport staffs maintenance personnel on site only when there is work to be done in Eagle River/Chugiak.

The DOT&PF maintenance personnel plow and maintain the paved surfaces and unpaved safety areas. Airport personnel also perform routine maintenance on the airport property. Maintenance vehicles include one front-end loader with a plow attachment and one grader. Airport maintenance equipment should be replaced as needed and as part of routine maintenance to ensure adequate airport maintenance. Airport maintenance personnel also indicate the need for a snow blower, grader, loader, and a storage building for any new equipment. A snow blower used to be stationed at Birchwood Airport but was turned in due to budgetary cuts. A snow blower is transported from the Anchorage Station to the Birchwood Airport as needed. This method is costly and increases equipment maintenance. A snow blower should be stationed at Birchwood Airport to facilitate snow removal in a timely manner.

4.3.4 Aircraft Rescue and Fire Fighting

The ARFF index is a method used to determine the needed vehicles and equipment to provide rescue and fire fighting services at an airport with Federal Aviation Regulation (FAR) Part 139. FAR Part 139 prescribes rules governing the certification and operation of airports that provide any scheduled or unscheduled passenger operation of an air carrier conducted with an aircraft having a seating capacity of more than 30 passengers. Birchwood Airport does not have scheduled or unscheduled passenger service and therefore is not required to have ARFF equipment or service. Given an emergency situation, the Chugiak Volunteer Fire Department (VFD) can be called for emergency services.

Protocols and techniques for emergency services at the airport should be documented and distributed to the appropriate emergency service organizations (Chugiak VFD). The history of collaboration and cooperation between the operators at the Birchwood Airport and the local emergency services should be maintained to ensure effective future emergency services at the airport.

4.3.5 Vehicle Parking

There is no designated public vehicle parking at the Birchwood Airport. Vehicles are parked on private lease lots or on the apron. The development of additional lease lots and aircraft parking apron will accommodate the projected demand for vehicle parking. Vehicles occasionally drive onto the ski apron during winter and leave ruts in the surface. These ruts impede aircraft movement and create a safety hazard. A small public parking lot should be developed near the ski apron to accommodate pilots wishing to access the ski apron. No additional public vehicle parking will be necessary during the planning period.

4.4 Surface Access Facility Requirements

Birchwood Spur Road enters the airport property at the northeast corner, continues across the north runway protection zone, then turns south along the west side of the airport boundary. The lease lot driveways on the west side of the airport connect directly to Birchwood Spur Road. An access road follows the length of the east airport boundary to the southeast apron and connects to Birchwood Spur Road near the northeast corner. Both of these roads are paved with asphalt. A small gravel access road leaves Birchwood Spur Road, opposite the DOT&PF maintenance facility, to connect with the northeast apron. An unpaved access road runs through the south runway protection zone connecting the east and west lease lots. Airport users indicate that the south end of the west side road is in very poor condition. This section of road should be widened and paved to match the existing paved access road. The intersection between the east side airport access road and the Birchwood Spur road connects at a very poor angle. The intersection should either be modified with an island or re-aligned to intersect at right angles.

4.5 Utilities

FAA does not prescribe standards for utility services at airports. All lease lots have access to telephone, electric power, and natural gas. Some airport users have requested electrical outlets at the tie-downs. A working public telephone is located on the north wall of the Arctic Sparrow building. No public water or sewer service is provided to the airport. The nearest sewer system network is in Eagle River 5 miles to the south. Septic systems, holding tanks, and portable outhouses handle the wastewater requirements. On-site wells supply all the water requirements. The main water trunk line from Eklutna Lake passes within 1.5 miles of the airport, but no branch line services this area.

Matanuska Electric Association (MEA) supplies electrical power and Matanuska Telephone Association (MTA) supplies telephone service to the airport. Enstar natural gas lines follow both the east and west airport access roads. Freedom Refuse supplies some lessees with dumpsters; other lessees haul the solid waste themselves. The individual lessees take waste oil to the Anchorage Landfill.

Tenants have expressed interest in connecting to the municipal utility water and sewer service. The Northern Communities Wastewater Study: Addendum Number 2 to the 1995 Anchorage Wastewater Master Plan (HDR Alaska, 1998a) discusses capital improvement projects and priorities, and "did not find an immediate need to extend wastewater collection into the northern communities area...the area generally has adequately performing wastewater disposal systems." There is, however, a proposed regional wastewater plant located near the airport. The Northern Communities Water Study Addendum Number 1 to the 1995 Anchorage Water Master Plan (HDR Alaska, 1998b) indicates that a water transmission line is proposed right outside the airport area as well. Utilities should be extended as described in the Chugiak-Eagle River Comprehensive Plan and the Northern Communities Wastewater Study.

FAA has recently allocated funds to develop a pilot lounge with telephone and a restroom at the Birchwood Airport. It is recommended that this building be placed near the transient aircraft parking so that visiting pilots may easily access the facility.

The existing airport lighting system and regulator shed are in need of replacement. The existing system is direct buried and not in very good shape. Replacing electrical components takes considerable effort. The regulator shed was damaged some time ago and leaks moisture and dirt inside.

4.6 Airport Security

All airport facilities require security protection. To provide a measure of protection, unauthorized persons must be precluded from having access to navigation aids. Large animals and unauthorized persons should be kept off of active aircraft areas. Birchwood Airport is fenced along portions of its western and eastern perimeter. Several gates provide access to lease lots. Many of these gates are consistently left open and appear to be in a state of disrepair or do not function.

Perimeter fencing and working gates should be installed to preclude inadvertent entry of people or animals onto the airport. The situation whereby unauthorized individuals can easily gain access to the airport, of which, many areas are not lighted poses a security problem. To prevent unauthorized incursions onto the airport, security fencing should be extended to completely encompass the entire airport property. Existing fencing should be raised and barbed outriggers should be installed. All new fencing should be eight feet with barbed outriggers. Existing security gates should be replaced with automatic gates that cannot be left open and can be activated with a keypad or security card. Security lighting should also be added to the aprons.

5.0 Alternatives

This section presents three airport development alternatives for the Birchwood Airport over the next 20 years. The alternatives were developed to remedy identified safety and capacity problems and meet the needs of airport users. There are two primary development needs represented in the range of alternatives presented (1) the need for additional lease lot and aircraft parking and (2) providing a safe operating environment for the diverse mix of general aviation aircraft operating at the airport.

Each of the three alternatives recommends additional lease lots and aircraft tie-down aprons to meet future forecast need. During the first five years, 15 new lease lots will be developed. An additional 15 new lease lots for a total of 30 will be developed by 2021. It is recommended that 125 tie-down spaces be developed by 2021. In an effort to maximize utilization of the existing vacant space and meet the forecast demand, lots are not sized large enough to accommodate on-site utilities. Public utility service will be required. Tenants wishing utility service will be responsible for connection costs.

All alternatives assume that the existing lighting system and regulator shed would be replaced.

To safely accommodate the mixing of slower ultra-light vehicles and the faster general aviation aircraft, each alternative explores providing an ultra light vehicle operating area that includes a parallel runway with the required 700-foot separation from existing runways to allow ultra light vehicle and sport aircraft to operate simultaneous with other GA operations and allow for a safe traffic flow in the respective patterns. Runways 01L/19R and 01R/19L will function as one runway and share the same traffic pattern in each alternative. Simultaneous operations on Runways 01L/19R and 01R/19L will still be prohibited.

The proposed smaller runway should be designed to light-sport aircraft requirements[2]. Light-sport aircraft will require longer runway lengths than the ultra-light vehicles presently using Birchwood Airport. For now, the small proposed runway will be referred to as the ultra-light runway. FAA AC 150/5325-4A, Runway Length Requirements for Airport Design, recommends 800 feet of runway length for an aircraft with approach speeds less than 50 knots. Light-sport aircraft approach speed is 50.7 knots. (This is based on the accepted practice of using 1.3 times the stalling speed for the approach speed.) The Experimental Aircraft Association's AeroCrafter sourcebook indicates that the majority of aircraft that meet light-sport aircraft criteria will require takeoff and landing distances of 400 feet or less. For reference, Soldotna Airport's ultra-light runway is 1,500' x 50'. For initial planning and assessment the proposed runway length will be

[2] Currently there is a Notice of Proposed Rule Making (NPRM) to create a new pilots license called the Sport Pilot license. This license will require less instruction and training time than the Private Pilot license and qualify pilots to fly aircraft of limited weight and performance called light-sport aircraft. Light-sport aircraft have the following criteria: maximum takeoff weight = 1,232lbs, maximum stall speed = 39kts, maximum operating speed = 115kts, the aircraft can have a maximum of 2 seats, the pilot and one passenger.

1,000' x 60'. As more detailed analysis is conducted this runway length and width may vary between 800 feet and 1,200 feet.

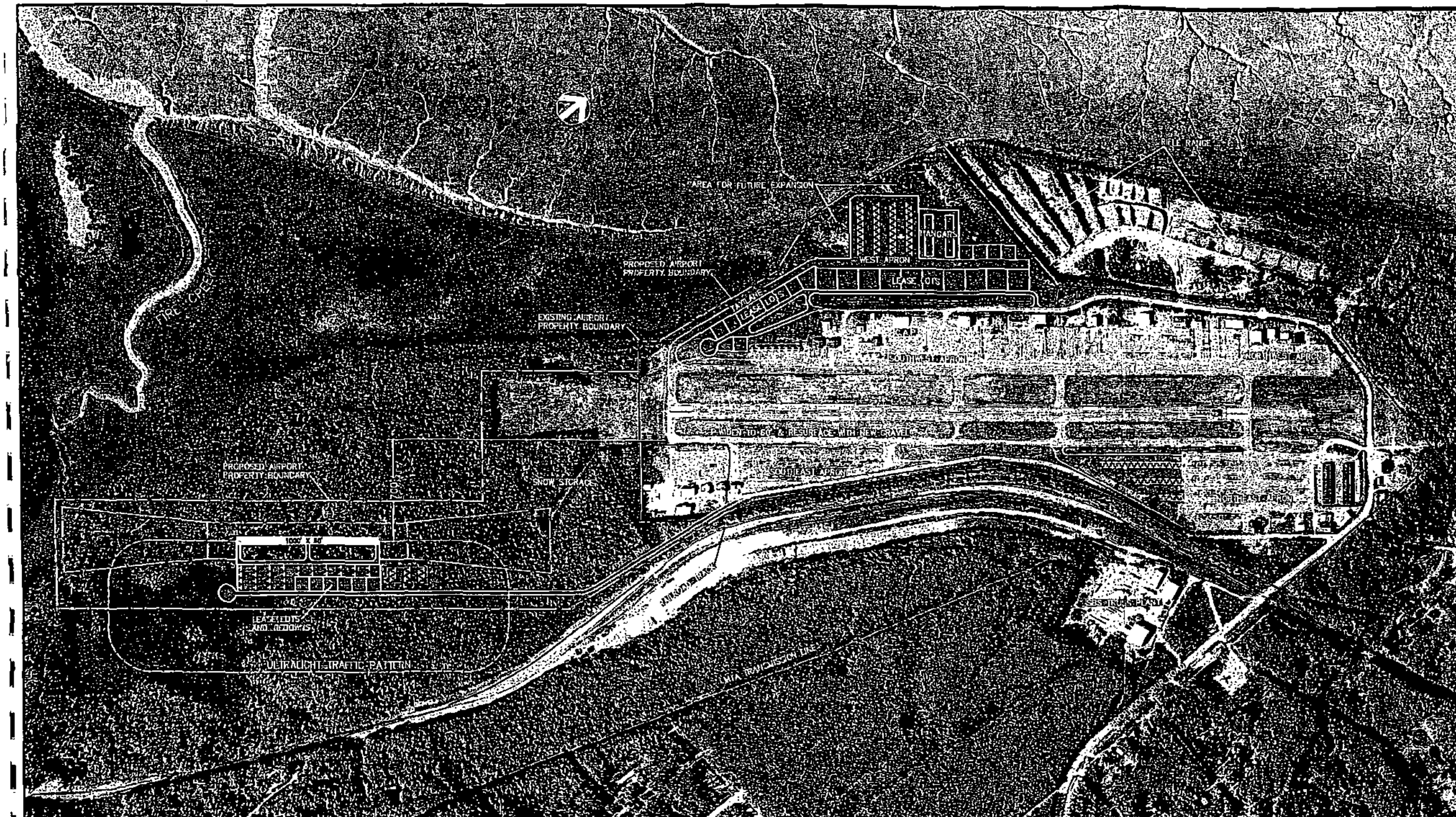
5.1 Alternative 1

Runways. This alternative would locate a new ultra-light runway (1,000 feet long by 60 feet wide) southeast of the existing runways between Fire Creek and the Alaska Railroad tracks (Figure 1). Ultra-light operations and storage will be close to but separate from the existing airport. The proposed runway will be lighted and offset 700 feet east of Runway 01L/19R to allow simultaneous operations for ultra-light vehicles and general aviation aircraft. The runway is positioned so that the ultra-light traffic pattern could be flown west of the railroad tracks. Runways 01L/19R and 01R/19L will function as one runway, sharing the same traffic pattern. Simultaneous operations on 01L/19R and 01R/19L would still be prohibited.

Taxiways. No taxiway would be constructed between the new ultra light facility and the existing airport. A new 50-foot by 1,100-foot lighted taxilane (B-II standards) would be constructed to access the expanded west-side apron/GA parking area. The taxilane would connect into the airport at the south end of Runway 01L/19R at Taxiway B. Another B-II standard entry/exit taxiway would be constructed on the east side to reduce taxi time to the runways from the northeast apron expansion area and to increase airport efficiency.

Apron and Lease Lot Development. Aircraft parking and lease lot development would be expanded on a new apron area on the west side of the airport on a vacant parcel south of the gun range. The area, which currently gradually slopes away from the airport, would be configured to accommodate lease lots, GA apron tie-downs, and T-hangar development. This area slopes away from the airport rather gradually and is not anticipated to be an issue during development. Taxiway and apron grades will meet FAA standards. Expansion of the NE apron area southward is also depicted. This expansion would accommodate approximately 64 additional tie-downs. There would also be ultra light apron and lease lot development constructed in association with the ultra light runway development. The assumed mix of lease lots in this alternatives is comprised of: six ultralight and sport aircraft accessible lease lots; 10 fixed based operator-sized lease lots (150' x 150') two t-hangar lease lots, and 12 smaller lease lots in the 100 feet by 100 to 150 feet size range.

Vehicle Parking and Circulation. The southeast apron access road would be extended approximately 4,000 feet to the southeast to provide access for this new ultra light runway; a cul-de-sac turnaround would be provided at the end of the road. This turnaround would be large enough to accommodate commercial trucks. A new loop access road would extend from the existing west side access road to new lease lots. The development of a loop road is shown in the figure because the grade difference may be



WHITE LINES ARE PROPOSED FEATURES
YELLOW LINE IS PROPOSED AIRPORT BOUNDARY
GREEN LINE IS EXISTING AIRPORT PROPERTY BOUNDARY

DRAWING NOT TO SCALE
1-27-03

ALTERNATIVE 1

DEVELOPED BY:
HDR ALASKA, INC.

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND
PUBLIC FACILITIES
BIRCHWOOD AIRPORT
MASTER PLAN
PROJECT No. 54741

FIGURE 1

too great to develop lease lots with access directly onto the adjacent existing road. If, during design, the elevation is found to be satisfactory or the lease area is raised, the existing road may suffice for providing direct access to the lease lots (just as it currently does on the east side of the road). An option with direct access to the lease lots is shown in Alternative 2. Utilities that supply the SE apron would be extended along the proposed access road to the new ultra light runway (see Figure 1).

5.2 Alternative 2

Runways. This alternative would relocate an ultralight lighted runway to the vacant parcel of land south of the gun range and west of the Civil Air Patrol building. There is enough space to place the 1,000-foot long by 60-foot wide runway and associated ~25 tie-downs and six lease lots. The proposed runway is offset 1,165 feet from Runway 01L/19R thus allowing simultaneous operations from on runways. The ultra light operations will take place over the shoreline and Knik Arm within the larger general aviation traffic pattern. Ultra-lights leaving the area would have to cross the general aviation traffic pattern. While there is room to position the runway here, ultra-light operating rules, FAR Part 103, prohibits ultra-light vehicles from flying over an open air assembly of persons which would include the gun range during shooting competitions. This alternative would require relocating the gun range somewhere else or reducing its size. Runways 01L/19R and 01R/19L would function as one runway, sharing the same traffic pattern. Simultaneous operations on Runways 01L/19R and 01R/19L will still be prohibited.

Taxiways. As in Alternative 1, a new 50-foot by 1,100-foot lighted taxilane (B-II standards) would be constructed to access west-side development. The primary difference would be that this taxilane would access the ultralight runway and apron area, allowing direct access by planes between the different operating areas (in Alternative 1 the ultralight operating areas was not tied into the other operating areas with a taxiway). Identical to Alternative 1, Alternative 2 has a new B-II standard entry/exit taxiway on the east side to reduce taxi time to the runways from the northeast apron expansion area.

Apron and Lease Lot Development. General aviation lease lots, and apron tie downs would be developed on the east side of the ultra light runway and the west side would be reserved for ultra light leases and apron development. To meet the remainder of the forecast, additional GA apron development is proposed on the south side of the northeast apron (as in Alternative 1) and south of the southeast apron. The assumed mix of lease lots in the alternatives is the same as in Alternative 1.

Part or all of the land currently occupied by the Izaak Walton League Recreational Facility (gun range) would need to be acquired to prevent stray bullets from striking ultra light vehicles. Snow would be stored at the newly acquired property from the gun range.

Vehicle Parking and Circulation. A new access road 2,000 feet long would connect the west side of the proposed ultra light runway to the existing airport perimeter road. This road will cross through the runway protection zone but remain clear of the runway object free area. The southwest end of the existing perimeter road will be extended 1,200 feet to give access to the east side lease lots and tie-down area. This alternative shows how the apron and lease lot access would look, if it is feasible to use the existing road alignment to access the proposed west-side development. A cul-de-sac turnaround will accommodate large commercial trucks. The southeast apron access road would be extended to access new lease lots and apron development on the expanded southeast apron (see Figure 2).

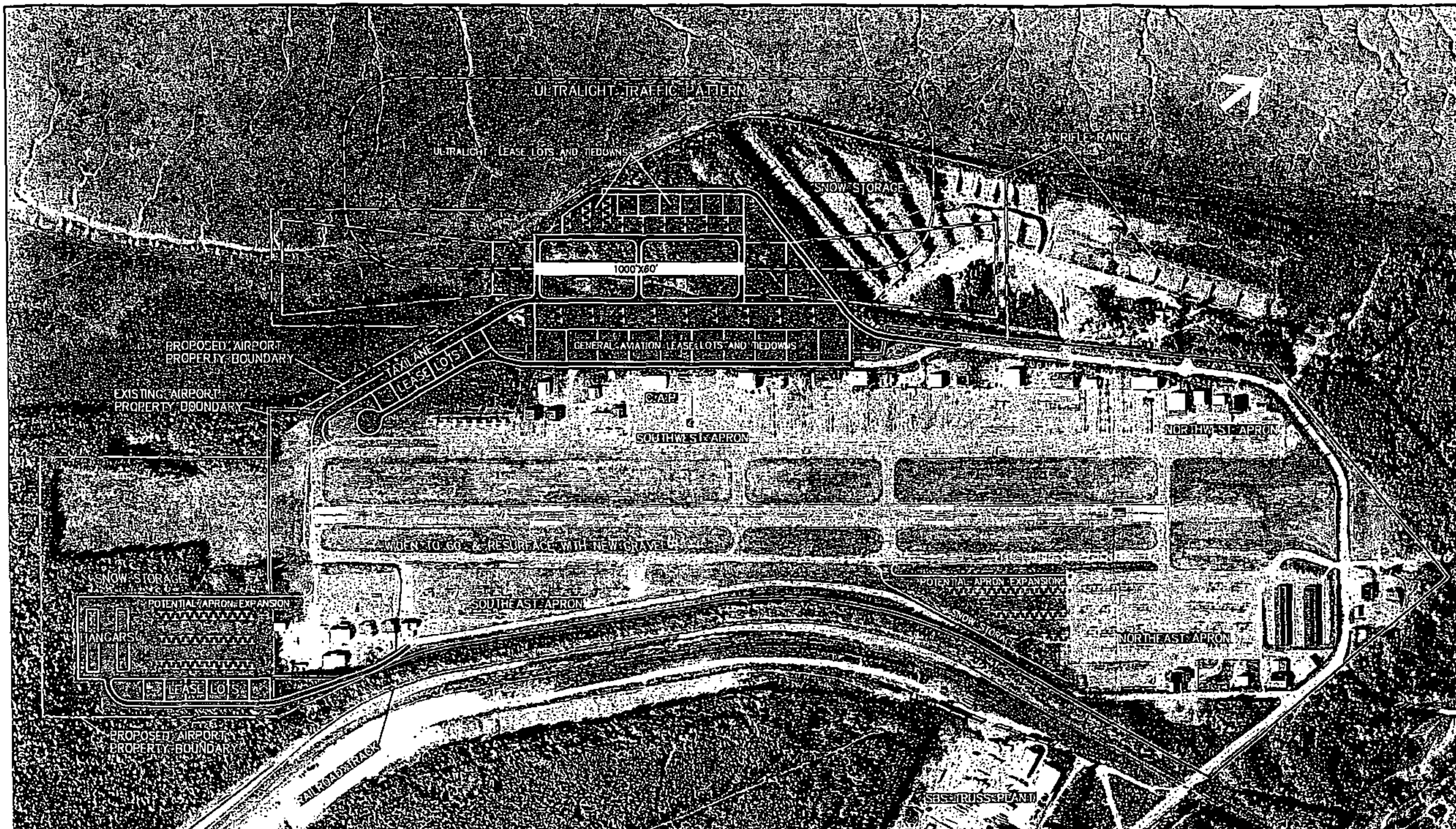
5.3 Alternative 3

Runways. This alternative would develop a lighted ultra light runway near the existing runways by offsetting it 895 feet to the east of Runway 01R/19L. Such a location would require relocating the Alaska Railroad Corporation's (ARRC's) mainline track, the Birchwood rail yard, and changing the layout of the Spenard Building Supply (SBS) truss assembly yard. The track alignment shown in Figure 3, maintains the existing road crossing at Birchwood Spur Road and misses the buildings associated with Spenard Builders Supply. The track relocation meets ARRC track speed and curvature criteria. See Appendix B for details on the railroad track alignments considered.

The ultra light traffic pattern for this alternative would cross the railroad tracks. Flights operating off this runway would have to be temporarily suspended while a train is passing through this area. There is an elevation difference between the airport and the railroad. Therefore, the area associated with the proposed runway may require excavation to lower it to allow an acceptable grade for the taxiway access. Lower the ultralight operating and lease lot area, to, the existing airport elevation, would allow the same access road to access lease lots on both sides of the road without unacceptable driveway grades. Runways 01L/19R and 01R/19L will function as one runway, sharing the same traffic pattern. Simultaneous operations on Runways 01L/19R and 01R/19L will still be prohibited.

Taxiways. As in Alternative 2, this alternative provides lighted taxiway access between the ultralight runway and the other operating areas at the airport. To provide the access between the ultra light facility and the existing airport, a 25-foot wide (A-I standard) taxiway would be developed at the south end of Runway 01R/19L. This taxiway would be developed for ultra light use only. It is not essential that the ultralight and other general aviation operating areas be connected by taxiway, but it does provide some advantages. For instance, lease lot owners anywhere on the airport (that may own and store a mix of planes in their hangers - including ultralights), would be able to taxi to the ultralight operating area. Ultralight leaseholders on the new facility would be able to taxi to access maintenance and other services that may not be available on the ultralight apron.

A new exit/entry taxiway (ARC B-II) would be developed near the approach end of Runway 01L, on both the east and west sides of the runway. These entry/exit taxiways would reduce taxi time and increase airport efficiency for approaches onto Runway 01L accessing the southeast or west aprons. In addition, two new (ARC B-II) taxiways connecting the east-side apron expansion to the runways would be developed to mirror the entry/exit taxiways on the west side of the airport.



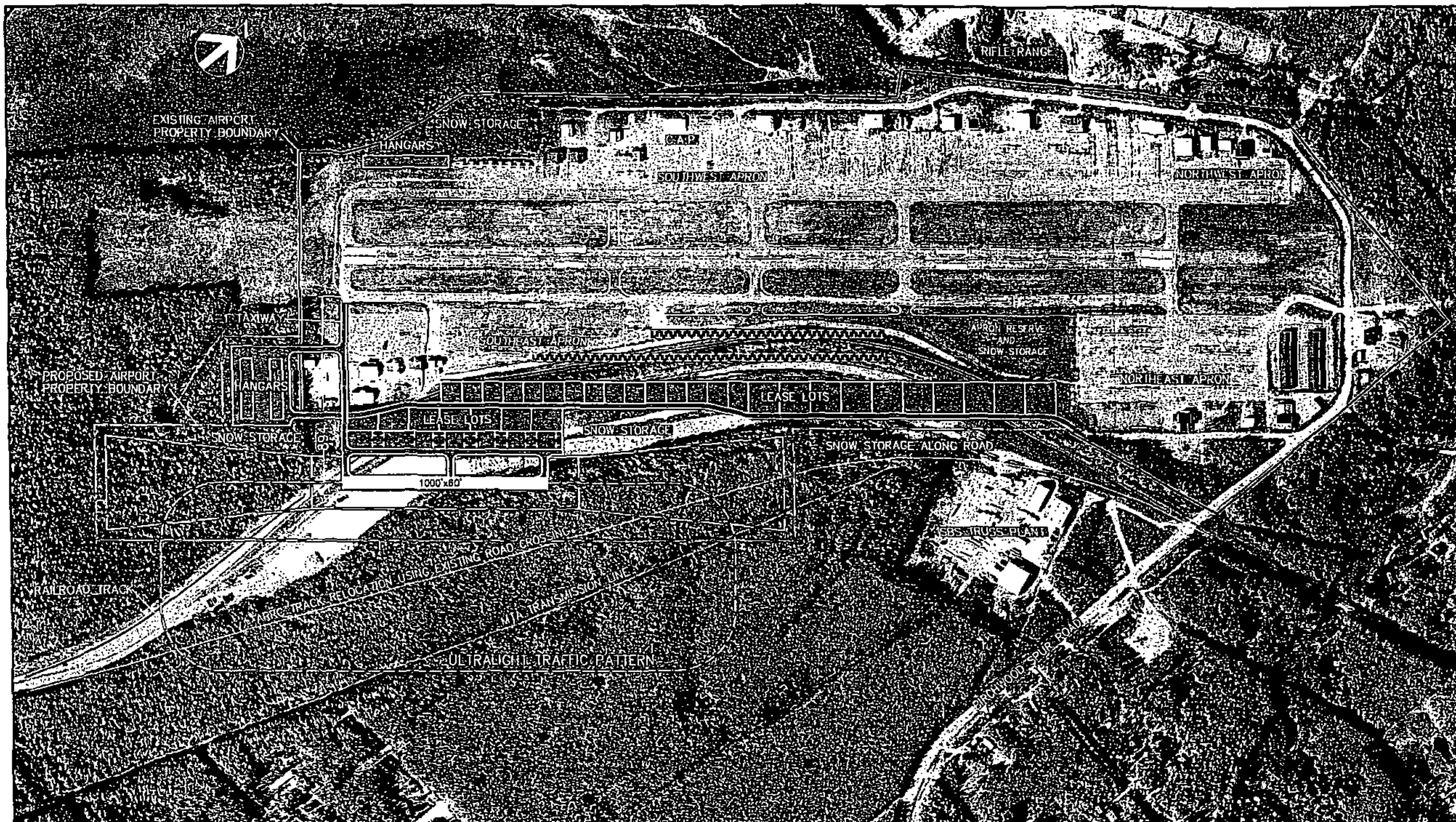
WHITE LINES ARE PROPOSED FEATURES
YELLOW LINE IS PROPOSED AIRPORT BOUNDARY
GREEN LINE IS EXISTING AIRPORT PROPERTY BOUNDARY

DRAWING NOT TO SCALE
1-27-03

ALTERNATIVE 2

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BIRCHWOOD AIRPORT
MASTER PLAN
PROJECT No. 54741

FIGURE 2



WHITE LINES ARE PROPOSED FEATURES
YELLOW LINE IS PROPOSED AIRPORT BOUNDARY
GREEN LINE IS EXISTING AIRPORT PROPERTY BOUNDARY

DRAWING NOT TO SCALE
1-27-03

ALTERNATIVE 3

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BIRCHWOOD AIRPORT
MASTER PLAN
PROJECT No. 54741

FIGURE 3

Apron and Lease Lot Development. Relocation of the ARRC tracks opens the entire east side of the airport for lease lot and apron development. Lease lots associated with the ultra light runway would be located on the east side of the access road and lease lots and tie-downs for larger general aviation aircraft would be located on the west side of the access road. The assumed mix of lease lots in the alternatives is the same as in Alternative 1. Four additional T-hangar lots would be prepared adjacent to the existing T-hangars at the southwest end of the airport. Snow would be stored at the existing location (Figure3 apron reserve). Additional snow storage would be located adjacent to the proposed lease lots shown on the east side of the airport (Figure 3).

Vehicle Parking and Circulation. The proposed 3,500-foot long access road, would run parallel to and be offset approximately 500 feet from the ski/tundra tire runway; in essence the proposed access road straightens out the existing access road through the area of relocated rail tracks. It would terminate at the southeast apron at a T-hanger expansion area after crossing the new ultra light acccss taxiway. The roadway crossing the taxiway is not ideal, but the level of airplane taxi activity at the crossing would be light. An automated gate or signal system could be installed if activity grew sufficiently to warrant such a system.

6.0 Alternatives Evaluation

Each of the three alternatives have been analyzed in the following sections with respect to the potential environmental, functional, social, and economic impacts based on the operational and functional criteria established by FAA and DOT and environmental criteria established in FAA Order 5050.4A.

6.1 Operational and Functional Evaluation

This first section presents an evaluation of the following operational and functional criteria:

- National Plan of Integrated Airport Systems Eligibility
- Design Standards
- FAR Part 77 Airspace Penetrations
- Wind Coverage
- Air Traffic Patterns
- Operations and Maintenance
- *Construction Costs*

6.2 National Plan of Integrated Airport Systems Eligibility

The National Plan of Integrated Airport Systems (NPIAS) identifies existing airports that are significant to national air transportation and, therefore, eligible to receive grants under the Airport Improvement Program (AIP). The NPIAS is comprised of all commercial service airports, all reliever airports, and selected general aviation airports meeting specific criteria detailed in the NPIAS report to Congress.

To be considered for inclusion into the NPIAS, an airport must have at least ten locally-owned based aircraft, be no closer than 20 miles from the nearest NPAIS airport, and must be located at a site that can be expanded and improved to provide safe and efficient airport facilities. The activity criteria may be relaxed for remote locations or other mitigating circumstances.

Birchwood Airport currently meets the preceding criteria and is included in the NPIAS. The improvements recommended in all of the three alternatives will improve airport facilities and ensure that the Birchwood Airport continues to be listed as a NPIAS airport and receive AIP funding.

6.3 Design Standards

Alternatives 1, 2, and 3 would fully comply with FAA and DOT design standards for runways, taxiways, apron and terminal areas. All sub-standard facilities identified in Chapter Four would be improved to comply with FAA and DOT standards. Runway separation would be increased to allow simultaneous aircraft and ultra light operations.

6.4 FAR Part 77 Airspace

The Federal Aviation Regulations (FAR) Part 77 establishes the airspace surfaces desired for safe operation of the airport that should be free from obstructions and establishes standards for determining obstructions to air navigation. The regulation applies to existing and proposed manmade objects and objects of natural growth and terrain.

Because the terrain in areas surrounding the airport is relatively level, none of the alternatives would have topographic FAR Part 77 airspace penetrations. To provide safe airspace however, a considerable number of trees would need to be removed in Alternatives 1 and 3. Alternative 2 is relatively free of trees. It is likely that the buildings associated with the gun range would need to be removed; particularly those within the runway protection zone.

6.5 Wind Coverage

FAA AC 150/5300-13, Airport Design, states that when a runway orientation provides less than 95 percent wind coverage for any aircraft forecasted to use the airport on a regular basis, a crosswind runway is recommended.

Wind data (speed and direction) for the Birchwood Airport was acquired for a period between July 1996 and December 1998 and used to compute wind coverage percentages for the existing runway alignments. Wind data was analyzed using the FAA 4.2D version *Airport Design, Standard Wind Analysis* microcomputer program.

As shown in Table 2-3 of Chapter Two in the *Birchwood Airport Master Plan, Office Study 1,* Runways 01L/19R and 01R/19L currently exceed 95 percent wind coverage. The new ultra light runway proposed in Alternatives 1, 2,and 3 would be aligned within the optimal range for wind coverage (39 degrees to 48 degrees true north).

6.6 Air Traffic Patterns

Birchwood Airport underlies Class E airspace. Class E airspace is controlled airspace with a floor set to 1,200 ft above the ground. The recommended pattern altitude is at 1,000 ft above sea level; the airport is 96 ft above sea level, so therefore, the pattern altitude is 904 ft above the ground. Thus, all operations at Birchwood Airport take place in uncontrolled, Class G airspace.

Aircraft activity related to the improvements proposed in Alternatives 1, 2, and 3 would continue to be performed in Class G airspace. No changes to the airspace are proposed. The traffic patterns proposed in Alternatives 1, 2, and 3 for ultra light aircraft meet FAA standards for unlicensed operators flying ultra light aircraft. These traffic patterns would not overlie populated areas.

6.7 Operations and Maintenance

Additional snowplowing and pavement maintenance would be required for all alternatives. Taxiway and apron lighting maintenance and costs would also increase. The relative additional maintenance burden can roughly be equated with the amount of paved surface and lighting added to the airport under each alternative.

Alternative 1, would add 869,700 square feet of paved surfaces to the existing maintenance efforts at the airport. Alternative 2, would add 792,400 square feet of paved surfaces to the existing maintenance efforts at the airport. Alternative 3, would add 729,100 square feet of paved surfaces to the existing maintenance efforts at the airport.

Table 6-1
Operations and Maintenance
Increased Asphalt Surface

	Alternative 1	Alternative 2	Alternative 3
Runway	60,000 ft^2	60,000 ft^2	60,000 ft^2
Taxiway	33,100 ft^2	93,800 ft^2	57,800 ft^2
Road	96,000 ft^2	76,800 ft^2	85,200 ft^2
Apron	680,600 ft^2	561,800 ft^2	526,100 ft^2
Total	*869,700 ft^2*	*792,400 ft^2*	*729,100 ft^2*

6.8 Construction Impacts

Construction impacts under Alternative 1 occur completely on the west side of the ARRC tracks. Apron/lease lot development on the west side of the airport would occur adjacent to Cook Inlet, generally away from current airport operations and leaseholders. Water quality impacts from erosion to adjacent tide flats during construction would be minimized by the use of Best Management Practices. Apron and lease lot construction on the extension to the northeast apron may require temporary displacement of adjacent tied down aircraft. Construction of the ultra light vehicle runway to the southeast would be in a vacant industrially zoned area. Water quality impacts to the adjacent wetlands and hydrology would be minimized by the use of Best Management Practices. Construction impacts would be temporary.

In Alternative 2, ultra light vehicle facilities and apron development occur to the west of the airport. As in Alternative 1, little affect to aviation users is anticipated during construction but concerns with erosion and sedimentation on adjacent tide flats would be minimized by the use best management practices. Expansion of the northeast and southeast aprons may require temporary displacement of adjacent tied down aircraft.

Alternative 3 would require relocation of the ARRC track and yard. During construction, temporary train delays and track shut downs would likely be required when tying the new track alignment into the ends of the existing track. Expansion of the northeast and southeast aprons may require temporary displacement of adjacent tied down aircraft.

6.9 Construction Costs

Preliminary cost estimates have been prepared that cover the costs associated with development of the alternatives depicted in Chapter 5.0. Costs include an estimate of the proposed ultralight and sport aircraft taxiway, access roads, and apron development. The estimates include a line item for miscellaneous items such as striping, fencing, signs, gates, and lighting that is assumed to be 25% of the construction cost. For Alternative 3, the costs of relocating the ARRC rail line and sidings are included. A 25% contingency has been added. Engineering costs are assumed to be 10% and construction administration is assumed to be 15%. The estimate assumes that no special subsurface work will be required. Land acquisition costs are estimated separately.

The preliminary construction cost estimates (in 2002 dollars) for the three alternatives are $4.6 million, $4.2 million, and $10.1 million for Alternatives 1, 2, and 3, respectively.

For details on the cost estimates see Appendix A. For details on the rail engineering feasibility and cost estimates, see Appendix B.

6.10 Environmental Evaluation

This section presents an evaluation of the three alternatives for improving the Birchwood Airport. Each alternative is evaluated against potential environmental, functional, social, and economic impacts in the form of an ***initial*** environmental assessment (IEA) based on criteria established in FAA Order 5050.4A:

- Noise
- Compatible Land Use
- Social and Induced Socioeconomic Impacts
- Air Quality
- Water Quality
- Hazardous Materials
- Section 4(f)
- Biotic Communities
- Endangered and Threatened Species
- Wetlands
- Coastal Zone Management
- Floodplains
- Coastal Barriers
- Wild and Scenic Rivers
- Farmland
- Energy Supply and Natural Resources
- Light Emissions
- Solid Waste Impacts
- Operations and Maintenance
- Construction Impacts

The IEA is an initial analysis based on professional judgment, with little or no public or agency scoping of issues, to identify the environmental consequences to result from the proposed alternatives. National Environmental Policy Act compliance will be completed during later phases of the master plan. The issues discussed here are intended to help frame the issues discussion during the formal environmental scoping process, reduce development options to those that are reasonable, and help DOT&PF and the public begin to identify a preferred development alternative.

Figures 4, 5, and 6 depict an overview of the three alternatives relative to environmental considerations discussed in Chapter 6.0.

6.11 Noise

Noise at levels that may be objectionable in terms of health or nuisance effects generally occur as a result of one of the following activities: construction, vehicle traffic, aircraft traffic, and population growth and urbanization. The concern about noise is directly related to its negative impacts upon human and animal health in terms of annoyance, permanent or temporary hearing loss, speech interference, sleep interference, and other related disturbances.

All of the proposed alternatives will require a noise analysis during the environmental assessment per FAA's Order 5050.4A which states,

> "No noise analysis is needed for proposals involving Design Group I and II airplanes on utility or transport type airport whose forecast operations in the period covered by the environmental assessment do not exceed 90,000 annual adjusted propeller operations or 700 annual adjusted jet operations."

All of the proposed alternatives will accommodate the forecast air traffic demand, which is predicted to be above 90,000 annual propeller operations by the end of the 20-year planning horizon. Because each of the alternatives accommodates the same level of demand, each alternative is likely to produce similar levels of noise. The distinguishing factors amongst the alternatives in regards to noise are the relocation of ultra light vehicle facilities and the potential re-alignment of the railroad closer to or further from existing noise receptors.

The improvements proposed in Alternative 1 will move ultra light vehicle facilities to the south of the approach end of Runway 01R. This moves ultra light vehicle facilities closer to existing residential noise receptors than is currently the case. Of the three alternatives, Alternatives 1 and 3 may produce a more noticeable increase in noise related disturbances from aircraft activity, as the approach patterns in these two alternatives are close to residential development.

The improvements proposed in Alternative 2 will move ultra light vehicle facilities adjacent to the tidal flats on the west side of the airport. In this location, ultra light vehicle facilities would be further away from noise receptors than is currently the case. Because Alternative 2 moves aircraft activities furthest from noise receptors, it would

LEGEND

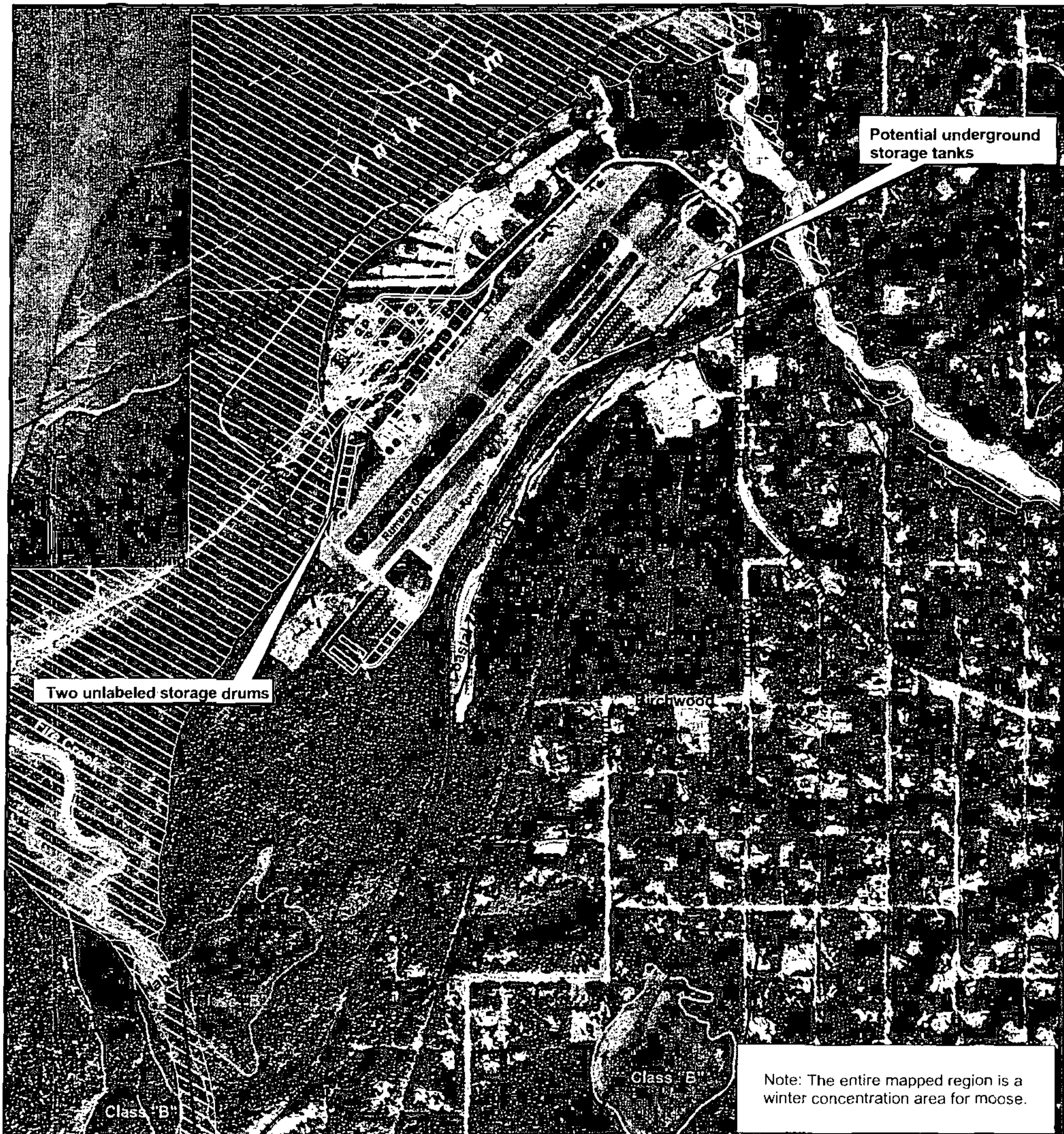
Alternative 1
Alaska Railroad Tracks
Coastal Zone Boundary
Critical Habitat
Wetlands
100-year floodplain
Floodway

Alternative 1
Environmental Considerations
BIRCHWOOD AIRPORT MASTER PLAN

DATE: November 2002 SOURCE: MOA, DGC

1000 0 1000 Feet

FIGURE 4



Alternative 2

Environmental Considerations

BIRCHWOOD AIRPORT MASTER PLAN

DATE: November 2002 SOURCE: MOA, DGC

FIGURE 5

LEGEND

Alternative 3
Alaska Railroad Tracks
Coastal Zone Boundary
Critical Habitat
100-year floodplain
Floodway

Alternative 3
Environmental Considerations
BIRCHWOOD AIRPORT MASTER PLAN

DATE: November 2002 SOURCE: MOA, DGC

1000 0 1000 Feet

FIGURE 6

likely produce the least increase in noise related disturbances. Moreover, Alternative 2 requires some acquisition of property from the gun range, likely reducing or eliminating that noise source.

Improvements proposed in Alternative 3 move ultra light vehicle facilities and railroad tracks closer to residential areas on the east side of the airport. Of the three alternatives, Alternative 3 may produce the greatest noise related disturbance; primarily resulting from the relocated rail operations, but also as a result of the ultralight and sport aircraft operating pattern moving closer to residential property.

6.12 Compatible Land Use

The existing airport property is owned by the State of Alaska and is bounded by land owned by the Alaska Railroad Corporation, Eklutna Incorporated, and privately owned parcels comprising the Izaak Walton League Recreational Facility (gun range).

Municipal zoning and platting ordinances do not apply to the Birchwood Airport because it is located on state property. The Municipality of Anchorage, however, does regulate the way in which the land surrounding the airport is developed. Municipal zoning ordinances are important for maintaining compatibility between adjacent land uses and the airport. Future development surrounding the Birchwood Airport would follow existing zoning patterns. The airport property is presently zoned for Light Industrial (I-1). The surrounding land is zoned for Light Industrial (I-1), Heavy Industrial (I-2), Public Lands and Institutions (PLI), and Suburban Residential (R-6) (large lot).

Alternative 1 would relocate the ultralight and sport aircraft vehicle operations to an area that is currently zoned R-6, which allows large lot residential development. There is no residential development on the west side of the railroad tracks. Given the industrial nature of the rail operations on the east side of the area and the airport and industrially zoned land to the north, introducing additional airport operations in this area would likely be compatible. As discussed in other sections, there would be minor noise and light effects to the residential properties east of the tracks. An earthen berm would need to be developed between the proposed west apron and the adjacent gun range in order to provide a sufficient buffer so that bullets would not stray into the airfield.

Alternative 2 relocates the ultralight and sport aircraft runway to an area zoned for light industrial uses. The area within the runway protection zone should not allow the congregation of people, which is likely the case during shooting tournaments. Moreover, the mix of ultralights and sport aircraft flying in a low-level pattern over an active shooting area would create an unsafe situation. As such, the ultralights sport aircraft flying over the gun range would not be a compatible land use and therefore the gun range would need to be relocated.

Alternative 3 relocates an ultralight and sport aircraft runway to heavy industrial property currently in use by the ARRC for a rail line and siding. The ultralight and sport aircraft runway area and relocated rail facilities would remain on industrially zoned land and would be compatible land uses. As discussed in other sections, there would be minor noise and light effects to the residential properties east of the tracks.

6.13 Social and Induced Socioeconomic Impacts

The principal social impacts to be considered are those associated with relocation or other community disruption that maybe caused by the proposal. Induced socioeconomic impacts include shifts in patterns of population movement and growth, public service demands, and changes in business and economic activity to the extent influenced by the airport development.

All three alternatives will accommodate the forecast air traffic demand and will therefore promote increased aviation activity and increase the number of people using the facility, roads to access the facility, and associated services and utilities. Improvements proposed in Alternative 1 may require an operational change or development of a physical barrier (to guard against stray bullets entering the proposed apron area) between the new GA apron and the Izaak Walton Recreational League's parcel. Improvements proposed in Alternative 2 will require the purchase of all or part of the Izaak Walton Recreation League's parcel. Use of that parcel would affect recreation users that use the gun range. Relocation of the facility could affect the accessibility of the facility and, depending on the location of the relocated facility, could cause noise or other impacts to adjacent land uses at the new location. Improvements proposed in Alternative 3 will not disrupt or displace any existing community or recreation facilities. The Anchorage Water and Wastewater Utility has a wastewater treatment plant planned for a location east of the ARRC tracks. The relocation of the tracks could affect that planned facility.

6.14 Air Quality

The National Ambient Air Quality Standards (NAAQS) established by the EPA focuses on six pollutants. These pollutants are known as criteria pollutants because a health-based air quality standard has been established for them. The six pollutants are carbon monoxide (CO), airborne particulates, airborne lead, sulfur dioxide (SO_2), ozone (O_3), and nitrogen dioxide (NO_2). Eagle River is currently designated as a non-attainment area for airborne particulate matter (PM_{10}).

The Birchwood Airport is outside the PM-10 Zone established by the EPA for the Chugiak-Eagle River area. Birchwood air quality is not monitored and is assumed to be generally good. None of the alternatives are anticipated to substantially impact air quality.

6.15 Water Quality

Under Section 303 (d) of the Clean Water Act, each state is responsible for submitting a list of waterbodies whose water quality is limited by point and/or non-point sources of pollution. The Alaska Department of Environmental Conservation maintains the list for Alaska. Neither Fire Creek nor Peter's Creek are on the current list, which was last updated in 1999 (www.state.ak.us/local/akpages/env.conserv/). The Alaska Department of Environmental Conservation is currently updating the list of impaired waterbodies but it is not anticipated that any waterbodies near the project area will be included on the updated list. With proper design, none of the alternatives are anticipated to result in a measurable or noticeable change in the local water quality.

6.16 Hazardous Materials

In 1998 the DOT&PF commissioned an environmental site assessment of the Birchwood Airport (Shannon and Wilson 1998). The purpose of the site assessment was to develop a professional opinion as to the potential presence of petroleum contaminants and/or hazardous substances on or near the airport that had an impact on the soils and groundwater at the site. Based on the historical document review, a visual inspection of the site and surrounding properties, and interviews, the assessment concluded that there is a "moderate to high potential that the subject site has been impacted by petroleum hydrocarbons and/or hazardous substances from on-site activities." The report also concludes, however, that there is a "low potential that petroleum hydrocarbon and hazardous substances from an off-site source have impacted the soil and groundwater" at the airport.

Most of the identified concerns occur on existing developed properties and would have no affect on the proposed alternatives. There were a couple of potential hazards identified, however that could be affected by the proposed alternatives. Under Alternatives 1 and 2, the taxiway leading to the proposed development on the west side of the airport would pass through an area where two unlabeled storage drums were located. On the same side of the airport, a pipe, which appeared to be tank piping and could be connected to an underground storage tank, is located in an area where the proposed roadway extension would be located. Alternative 3 would be located through an area currently used by the railroad. According to the report, in 1998 there were four aboveground propane tanks present on the railroad siding east of the airport. The ARRC property was not listed on any contaminated sites databases and ARRC personnel had no knowledge of any spills on the railroad tracks in the vicinity of the Birchwood Airport (Shannon and Wilson 1998). There were, however, rumored to be buried storage drums between the airport road and ARRC track, although no evidence of these drums was found during the investigation. The report recommends a geophysical survey and test pit excavations be conducted to ascertain the existence or absence of the drums. The Alaska Department of Environmental Conservation (ADEC) removed two underground storage tanks located on the Northeast Apron several years ago.

6.17 Section 4(f)

Section 4(f) states that special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites. Use of land subject to Section 4(f) management is not permitted unless there is no practical and feasible alternative to using that land; and the project includes all possible planning to minimize harm to the land proposed for use.

The Izaak Walton League Recreational Facility borders the airport's northwestern property boundary. The Izaak Walton League is on private property and, therefore, not subject to Section 4(f). An inventory of Anchorage's historic resources, including those in the

Chugiak-Eagle River area, was undertaken in the mid-1980s. Six structures were included in the inventory, none of which are in proximity to the Birchwood Airport. No Section 4(f) affects are anticipated.

6.18 Biotic Communities

Moose are known to concentrate along the Peters Creek drainage northwest of the airport. There are populations of smaller mammals such as beaver, muskrat, marten, mink, weasel, snowshoe hare, arctic ground squirrel, porcupine, hoary marmot, coyote, red fox, lynx, and squirrel and possibly land otter (MOA 1993). Common lake birds include common loons, mallards, red-necked grebes, goldeneyes, scaup and green-winged teal. Shovelers, pintails, widgeons and Canada geese also nest in the area. The deltas of Fire Creek and Eklutna River are important areas of bird concentrations during migrations (MOA 1993). The Chugiak-Eagle River Comprehensive Plan (MOA 1993) identifies a large area southwest of the airport (the Fire Creek delta) as bird habitat for bald eagle, northern harrier, hawk, owl, and willow ptarmigan. None of the alternatives will require acquisition of publicly owned wildlife or waterfowl refuges of local, state, of national significance. Alternative 3 proposes development within identified bird habitat, among the identified species are bald eagles. The United States Bald and Golden Eagle Protection Act protects bald eagles.

The 2000 Alaska Department of Fish and Game's (ADF&G) catalogue of anadromous fish streams identifies two anadromous fish streams in the project area; Peters Creek and Fire Creek. Peters Creek, located approximately 650 feet north of the Birchwood Spur Road, has been noted to provide habitat for king and pink salmon and rearing habitat for coho salmon. Fire Creek, located 4,500 feet south of the threshold for the approach end of Runway 01L, provides habitat for king salmon and rearing and spawning habitat for coho. None of the alternatives proposes development directly affecting the identified anadromous streams.

The National Marine Fisheries Service 2002 draft essential fish habitat data indicates that the tidal area adjacent to the Birchwood Airport provides habitat for a general distribution of adult to juvenile walleye Pollock, sculpin, and cod. None of the alternatives directly affects essential fish habitat.

6.19 Endangered and Threatened Species of Flora and Fauna

A review of available related literature and professional knowledge of the area indicates there are no endangered, threatened or critical species of flora or fauna in the project area. Agency scoping should be performed upon selection of the preferred alternative to validate the occurrence of endangered, threatened, or critical species of flora or fauna in the project area.

None of the alternatives are anticipated to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modifications of habitat of such species that is considered to be critical. Alternative 3 proposes development in bald eagle habitat and would require special coordination with the U.S. Fish and Wildlife Service.

6.20 Wetlands

The Municipality of Anchorage classified its wetlands in the Anchorage Wetlands Management Plan (1996). The designation of wetlands as "A", "B", or "C" wetlands was based on the functions each wetland is thought to perform, and the value of each of those functions within the context of the Anchorage Bowl. "A" wetlands are designated for preservation, and are to be maintained in their natural state to the maximum extent practicable. Minor encroachments for roads, utilities, and trails at these wetlands' fringes will be considered if no other alternatives exist. "B" wetlands are slated for retention of their functions, while also allowing for their economically viable use. Development in these wetlands is to be planned to preserve key functions. "C" wetlands are the least valuable of Anchorage wetlands. Development within them is to be allowed, as necessary, to allow for community expansion.

Although there are no wetlands immediately adjacent to the existing Birchwood Airport, there are mapped wetlands further to the east, west, and southwest of the airport. The largest, mapped wetland in the project vicinity is adjacent to Fire Creek and consists of "A" and "B" wetlands. Wetlands adjacent to creeks often serve important functions, including exporting organic matter and nutrients to the creek, providing fish and wildlife habitat, shading the creek, storing creek overflow during floods, and removing sediment from the creek. Other wetlands near the airport include wetlands adjacent to Peters Creek, and coastal/estuarine wetlands associated with Knik Arm and Fire Creek (located northwest and west of the existing airport). Coastal wetlands, although, not included in the Anchorage Wetlands Management Plan, perform a variety of functions including stabilizing the shoreline and providing habitat for fish, birds, and mammals.

Alternative 1 would require the placement of fill in approximately 0.6 acre of Class "B" palustrine wetlands adjacent to Fire Creek (Figure 4). The west runway protection zone of Alternative 1 would require removing the trees in approximately 0.7 acres of wetlands. A jurisdictional wetland determination would be required for Alternative 1, as the boundary of the Fire Creek wetlands may vary slightly from the boundaries shown in the AWMP. According to the AWMP, an individual Section 404 permit would be required for the placement of fill into the Fire Creek wetlands (Class A) and a setback of 25 feet would be required. It may be possible to shift the airport slightly to the north to reduce the affects on the wetlands.

Of the airport alternatives, Alternative 2 would be situated closest to the Knik Arm and adjacent coastal wetlands. Although the southwest runway protection zone would be located in coastal/estuarine wetlands, no impacts to these wetlands are anticipated. Alternative 2 takes advantage of previously disturbed areas adjacent to the existing airport and no wetland impacts are expected with this alternative.

Alternative 3 would be entirely located on uplands or already disturbed areas. This alternative would require the realignment of the railroad. This realignment would not impact wetlands or Peters Creek.

6.21 Coastal Zone Management Program

The Birchwood Airport is within the coastal management boundary of the Anchorage Coastal Management Plan. The area adjacent to Fire Creek is identified in the plan as part of the "preservation environment" as a "tidal creek and/or mudflat," "saltwater marsh," and "preservation freshwater wetlands." The preservation wetlands are classified in the Anchorage Wetland Management Plan as "Class B" wetlands. Class "B," are often termed Conservation Wetlands and indicate wetland that are of moderate to high values. Neither Alternative 2 nor 3 have a direct affect on any of these coastal management program areas. Alternative 1, as depicted, would require fill in a portion of the Class B wetlands. It is depicted in its current location to keep the ultra light vehicle flight path to the west of the ARRC tracks. In any event, a coastal consistency determination would be required for any of the alternatives.

6.22 Floodplains

An examination of Municipality of Anchorage geographic information system floodplain mapping indicates that none of the alternatives is within any mapped floodplain (100-year or 500-year). Alternative 1 is, however, located within an area of mapped wetlands that are a connected component of the Fire Creek stream system, although are not identified as within the mapped floodplain. It is possible that these wetlands function as flood storage for Fire Creek, or at a minimum work to slow the flow of water into the creek. Reduction in the potential flood storage capacity of the wetlands or increases in flow to Fire Creek due to reduction of the wetland area and an increase in impermeable surfaces (for lease buildings, access road, apron development, and runway-taxiway development) are likely to be issues that would require additional evaluation during the NEPA process.

6.23 Coastal Barriers

There are no coastal barriers in the project vicinity.

6.24 Wild and Scenic Rivers

There are no wild and scenic rivers in the project vicinity.

6.25 Farmland

There is no farmland in the project vicinity.

6.26 Energy Supply and Natural Resources

Each of the three alternatives would have approximately the same affects on the energy supplies. Each of the alternatives provides for increased apron and lease lot capacity to meet the demand for future general aviation activity at Birchwood Airport. These facilities would create an increased demand for energy to light the aprons and taxiways and for heat in lessee's buildings. None of the alternatives propose changes in facilities that would have major affects on local energy supplies.

Each of the alternatives creates roadway extensions and taxiways needed to access new apron and runway facilities. As such the alternatives involve the movement of air and ground vehicles. None of the alternatives, however, are anticipated to substantially increase consumption of fuel by aircraft or ground vehicles. Alternative 1, which spreads development the most by relocating ultra light vehicle activities to the southeast of the airport, likely results in slightly higher energy consumption demands.

No measurable change in natural resource consumption is anticipated.

6.27 Light Emissions

Each of the airport alternatives would include additional taxiway and apron lighting. Overhead security lights at aprons and parking areas is also proposed. The Birchwood Airport is located in an industrial area and is already lit. With any of the alternatives, vacant industrially zoned property would buffer the airport from nearby residential development. Introduction of additional lighting associated with the proposed alternatives would not likely create an annoyance among people in the vicinity of the installation. Alternative 1, which introduces ultra light vehicle facilities to the southeast, further removed in distance from existing airport lighting, is in a currently dark area, likely results in slightly greater light emissions effects.

6.28 Solid Waste Impacts

New lease lot areas may slightly increase the amount of solid waste generated. Each of the alternatives is designed to meet the forecast for future general aviation needs at the airport and would result in similar levels of solid waste generation. Solid waste disposal is handled at the Anchorage Regional Landfill located approximately 9.5 miles southwest of the Birchwood Airport on the west side of the Glenn Highway at the Hiland Road exit. No substantial affect to the landfill is anticipated.

It is reported that the Izaak Walton League Recreational Facility (gun range) has a permit and operates a refuse disposal site on their property. It is believed that only clean fill is allowed at the site but further investigation is warranted during the environmental assessment. Such a facility would be within 5,000 feet of any of the alternatives (including the no action alternative). The disposal site would, however, be aligned with the ultra light vehicle runway depicted in Alternative 2. Such an alignment would be of concern if the disposal site attracts any birds. There is a possibility that the disposal site would be purchased as part of the right-of-way acquisition for the new runway and runway protection zone.

7.0 References

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Appendix A
Cost Estimate Details

Cost Estimate Details and Issues

Existing Businesses. As of October 2001, both the Alaska Railroad Corporation and Eklutna Inc. own the property to the east of the existing tracks. Most of the Eklutna Inc. property is undeveloped. The ARRC property contains a small yard with two main yard tracks and a spur track. Three businesses currently lease sections of the yard from ARRC. A lumberyard leases land from Eklutna Inc. and has access to the spur track. The lumberyard is considering expanding its operation to include a truss manufacturing plant in this area. Another business uses the area to store propane. Both of these businesses are important customers to ARRC.

Land Ownership. A portion of the Eklutna Inc. land will be transferred to ARRC as part of another track realignment project. The exact extent of the transfer has yet to be determined.

Development Potential. The airport land and the land east of the railroad tracks is zoned I-2, heavy industrial. There are very few I-2 parcels with railroad access in the north part of the Municipality of Anchorage. This land is considered important and premium property by ARRC. Losing (not generating revenue from) this I-2 land is a concern for ARRC.

Relocation Impacts. Any track relocation to accommodate airport expansion would likely require the relocation of all the yard tracks and the relocation of all structures currently located on the I-2 parcels. A fiber optic cable located along the railroad alignment in the ballast would have to be moved to the new track location. Any change in the track alignment east of the airport would require relocation of approximately 3,700 feet of Matanuska Electric Association's 33-kilovolt transmission lines.

Appendix B
Rail Engineering Evaluation

To	File 07072-204-249
From	Dirk Greeley Paul Witt, PE
Date	December 6, 2001
Subject	Birchwood Airport Railroad Engineering Evaluation Task 3.2 j

Memorandum

Purpose

This analysis evaluates the Alaska Railroad Corporation (ARRC) Right-of-Way and rail line adjacent to the Birchwood Airport to identify opportunities and constraints to airport expansion. The feasibility of moving or straightening railroad tracks, bridging, etc through this segment is evaluated. The analysis was conducted as part of the Birchwood Airport Master Plan. The purpose of the Birchwood Airport Master Plan is to recommend actions at the Birchwood Airport to improve safety and capacity; identify facilities required to serve existing and future air traffic demand; and develop a phased implementation plan to meet forecasted aviation needs for the next 20 years.

Background

The Birchwood Airport is a general aviation (GA) airport located approximately 20 miles north of Anchorage and west of the Glenn Highway along Knik Arm. The airport serves a regional role to the Anchorage, Eagle River, Chugiak, Palmer, and Wasilla GA community. Official records estimate the Birchwood Airport to have approximately 56,050 operations per year by private general aviation aircraft based at the airport, transient GA aircraft, flight schools operating at the airport, and ultralights. HDR's masterplan puts the number of operations per year at closer to 80,000. Official numbers indicate that there are 170 aircraft based at the airport. The draft master planning estimates put that number at upwards of 421 aircraft. As a result of the heavy demand, all lease lot space and tie downs are in use and airspace issues have become a primary concern for airport users.

The airport has one paved runway 4,010 feet long and 100 feet wide, with full-length taxiways on each side. This runway, 01L/19R, serves GA aircraft. Runway 01R/19L is 2,200 feet long and 50 feet wide and is intended for use by GA aircraft equipped with tundra tires or skis and by ultralight aircraft. This runway is classified as a gravel runway, but the northern end consists of an approximately 700-foot long paved section. Currently, 200 feet separate the two runways at Birchwood Airport; this distance is 500 feet short of the 700-foot separation needed to allow simultaneous takeoffs and landings. If the separation distance were increased to 700 feet the operational efficiency of the airport would improve and airspace conflicts and safety concerns between users would decrease.

Among the potential solutions to the capacity and airspace issues are expansion to allow for proper separation distances for the two runways, increase apron and leasing space, and improve the operational safety of the airport. Birchwood Airport is situated on a narrow section of land bounded on the west by land owned by Eklutna Inc. and the Birchwood Recreation and Shooting Park. The east side is bounded by the tracks and right-of-way of the Alaska Railroad Corporation. One direction for expansion would be to the east toward the Alaska Railroad

Corporation right of way and Eklutna Inc. property. This memo explores options for relocating the Alaska Railroad tracks to create space for airport expansion.

Issues

Existing Businesses. As of October 2001, both the Alaska Railroad Corporation and Eklutna Inc. own the property to the east of the existing tracks. Most of the Eklutna Inc. property is undeveloped. The ARRC property contains a small yard with two main yard tracks and a spur track. Three businesses currently lease sections of the yard from ARRC. A lumberyard leases land from Eklutna Inc. and has access to the spur track. The lumberyard is considering expanding its operation to include a truss manufacturing plant in this area. Another business uses the area to store propane. Both of these businesses are important customers to ARRC.

Land Ownership. A portion of the Eklutna Inc. land will be transferred to ARRC as part of another track realignment project. The exact extent of the transfer has yet to be determined.

Development Potential. The airport land and the land east of the railroad tracks is zoned I-2, heavy industrial. There are very few I-2 parcels with railroad access in the north part of the Municipality of Anchorage. This land is considered important and premium property by ARRC. Losing (not generating revenue from) this I-2 land is a concern for ARRC.

Relocation Impacts. Any track relocation to accommodate airport expansion would likely require the relocation of all the yard tracks and the relocation of all structures currently located on the I-2 parcels. A fiber optic cable located along the railroad alignment in the ballast would have to be moved to the new track location. Any change in the track alignment east of the airport would require relocation of approximately 3,700 feet of Matanuska Electric Association's 33 kilovolt transmission line.

Airport Access Road. If an option is chosen that realigns the track at the Birchwood Spur Road crossing, it is desirable that the road be realigned to reduce the skewed angle it makes at the railroad tracks. This would increase the safety of the crossing for all users. For safety reasons, roads should cross perpendicular to railroads. As of October 2001 the amount of traffic on Birchwood Spur Road does not warrant a grade separated crossing.

ARRC Track Straightening Project. During the construction season of 2002, ARRC will make minor track realignments adjacent to the airport to allow train speeds of 60 mph. ARRC will also install railroad signals at the siding switches in this area. Eighty-foot rail lengths will be used to reduce the noise and vibration local residents experience. Any track relocation to accommodate airport expansion would require relocation of these improvements.

Elevation Differences. There is an elevation difference between the airport and the railroad tracks and I2 parcels. If the airport expands to the east at its existing elevation a considerable amount terrain would need to be removed. The material to be removed is primarily gravel. Selling this gravel could offset some of the costs of the track realignment. Birchwood Airport elevation is 96 feet above sea level. The railroad track elevation at the south end of the airport is approximately 109 feet above sea level, or 13 feet above the airport. The track elevation at the Birchwood Spur Road crossing is approximately 86 feet above sea level, or 10 feet below the airport. Some of the gravel from the high side will be needed to fill in the low side.

Options

Four possible track realignments were explored. The options were laid out to maintain a design speed through the area of 60mph. To maintain such a design speed, 2 degree curves with 210 foot spirals were used to layout the option locations.

Option 1

This option explored an alignment that maximizes the area for airport expansion and removes as many track curves as possible. It was laid out allowing for a new bridge across Peter's Creek as a variable. Option 1 extends from ARRC milepost 134.7 to 137.3 and would eliminate ARRC curves 135, 135A, 136 and 136A. It would create a new curve 134C. In doing so, a 36 degree skew is created with Birchwood Spur Road; the road would require realignment to create a crossing with less skew. In achieving this it would also require acquiring the most right of way, a new road crossing, and a new bridge over Peters Creek. A large number or residential lots would need to be acquired.

Option 2:

This alignment is intended to maximize the area for airport expansion and reduce the number of residential lots required for the realignment as compared to Option 1. Option 2 extends from ARRC milepost 135 to 136.6 and would eliminates ARRC curves 135A, 136 and reverses curve 135. It was laid out allowing for a new bridge across Peter's Creek as a variable. This Option would require a new railroad bridge at a new location and a new road crossing. Birchwood Spur Road would be realigned to reduce the skew.

Option 3:

This alignment was laid out to create as much airport expansion property as possible, while leaving the existing Peters Creek Railroad Bridge intact; therefore, all track realignment occurs south of Peters Creek Bridge. The crossing of the Birchwood Spur road was allowed to be a variable. Option 3 extends from ARRC milepost 135 to 136.4 and would eliminate ARRC curve 135A. The location of the road crossing is changed slightly. This alignment should allow the relocated Birchwood Rail Yard and yard tracks to remain close to their existing size.

Option 4:

This alignment was laid out to create as much expansion property as possible while leaving the existing Peters Creek Railroad Bridge and crossing of the Birchwood Spur road as is; therefore, all track realignment occurs south of Birchwood Spur Road. Option 4 extends from ARRC milepost 135 to 136.3 and would eliminate ARRC curve 135A. This Option causes the least change in size to the I-2 parcels and the rail yard.

Results

The following table contains comparisons of the four Options.

Comparison of Track Relocation Options

	Existing* Conditions	Option 1	Option 2	Option 3	Option 4
Track Length Realigned (ft)	0	11,570	8,310	6,510	5,770
Resulting Grade (%)	0.33	0.31	0.39	0.41	0.40
New RR Bridge	0	1	1	0	0
New Road Crossing	0	1	1	1	0
Area Made Available for Airport Expansion (acre)	0	131	130	77	48
Number of RR Curves Removed from the segment (milepost 134.7 to 137.3)	0	3	2	1	1
Resulting Travel Distance through the segment (milepost 134.7 to 137.3)	12,488	11,568	11,683	11,923	12,084
Resulting Travel Speed (mph) (milepost 134.7 to 137.3)	60	60	60	60	60
ARRC Travel Time through the segment (milepost 134.7 to 137.3) (sec)	142	131	133	135	137
Total Cost	$0	$12,700,000	$10,700,000	$7,500,000	$6,400,000

* The existing condition is based on the track alignment after the track straightening work to be completed during the 2002 construction season.

Generally, the grades that would result under any of the options are slightly steeper than the existing track grades because some curves were removed and the length of track shortened. The maximum grade increase was 0.08% on Option 3.

Birchwood Airport Master Plan
Birchwood Area Railroad Track Realignment Cost Estimate
RR Milepost 134.7 to 137.3
12/6/2001

	Option 1	Option 2	Option 3	Option 4
Unclassified excavation (yd^3)	859,896	804,120	532,833	369,908
Excavation cost =	*$2,579,688*	*$2,412,361*	*$1,598,500*	*$1,109,725*
New track length (ft)	11,570	8,310	6,510	5,770
New track cost =	$2,410,417	$1,731,250	$1,356,250	$1,202,083
Total siding length (ft)	13,775	13,775	13,775	13,775
Siding relocation cost =	$1,956,676	$1,956,676	$1,956,676	$1,956,676
Miscellaneous RR signals & RR equipment relocation =	$100,000	$100,000	$100,000	$100,000
New at-grade road crossing with signal =	$250,000	$250,000	$250,000	$0
Double Track Railroad bridge =	$500,000	$500,000	$0	$0
Relocate Existing Structures =	$500,000	$500,000	$500,000	$500,000
MEA Transmission Line Relocation length =	3,700	3,700	3,700	3,700
MEA Relocation Cost =	*$148,000*	*$148,000*	*$148,000*	*$148,000*
Fiber cable relocation =	*$92,560*	*$66,480*	*$52,080*	*$46,160*
Construction =	$8,541,040	$7,668,468	$5,965,206	$5,066,345
Engineering =	$1,281,156	$1,150,270	$894,781	$759,952
Miscellaneous =	$1,281,156	$1,150,270	$894,781	$759,952
Sub-Total =	$11,103,353	$9,969,008	$7,754,768	$6,586,248
Contingency =	$1,110,335	$996,901	$775,477	$658,625
Property Acquisition =	$1,888,800	$803,800	$0	$0
Total =	$14,100,000	$11,800,000	$8,500,000	$7,200,000
Amount of fill needed (yd^3)	398,934	439,542	213,112	105,184
Excess gravel to sell (yd^3)	460,962	364,579	319,722	264,724
Price received from gravel sales =	$1,382,887	$1,093,736	$959,165	$794,173
Project Total = (minus gravel sales)	**$12,700,000**	**$10,700,000**	**$7,500,000**	**$6,400,000**

Not included in this estimate is the costs associated with procuring land owned by Eklutna Inc. The Alaska Railroad Corporation and Eklutna Inc. are in the process of trading some land; the parcels east of Birchwood Airport are involved in this trade. At this time it is not known how much land and what portions of these parcels will be traded.

Unit Prices		
Excavation	$3	$/yd^3
Track installation	$1,100,000	$/mile
60' RR bridge	$275,000	each
Siding relocation labor & some replacement materials	$750,000	$/mile
MEA line relocation	$40	$/ft
Fiber cable relocation	8	$/ft
Engineering	15%	
Miscellaneous	15%	
Contingency	10%	
Gravel sales	$3	$/yd^3
	$1.53	$/ton

Birchwood Airport Master Plan
Birchwood Area Railroad Track Realignment: Train Travel Time Comparison
RR Milepost 134.7 to 137.3
12/6/2001

	Existing *Condition*	*Option 1*	*Option 2*	*Option 3*	*Option 4*
Distance between MP 134.7 & 137.3 (ft)	12,488	11,568	11,683	11,923	12,084
Distance shortened by Option (ft)	0	920	805	565	404
Travel time at 60 mph (sec)	142	131	133	135	137
Difference in time from existing length (sec)	0	10.5	9.1	6.4	4.6

Birchwood Airport Master Plan
Birchwood Area Railroad Track Realignment: Quantity Estimate
RR Milepost 134.7 to 137.3
12/6/2001

The ARRC land adjacent the airport descends from south to north. The south half of this land is higher than the airport reference point and the north half is lower than the airport reference point. Part of the high side volume is used to fill in the low side to bring it up to the airport reference point elevation.

The Airport Reference Point elevation is 95.93 or 96.00'
Birchwood Spur Road crosses the tracks at MP 136.30

ARRC Milepost	Elevation
135.10	108.89
135.37	102.50
135.72	96.00
136.30	85.75

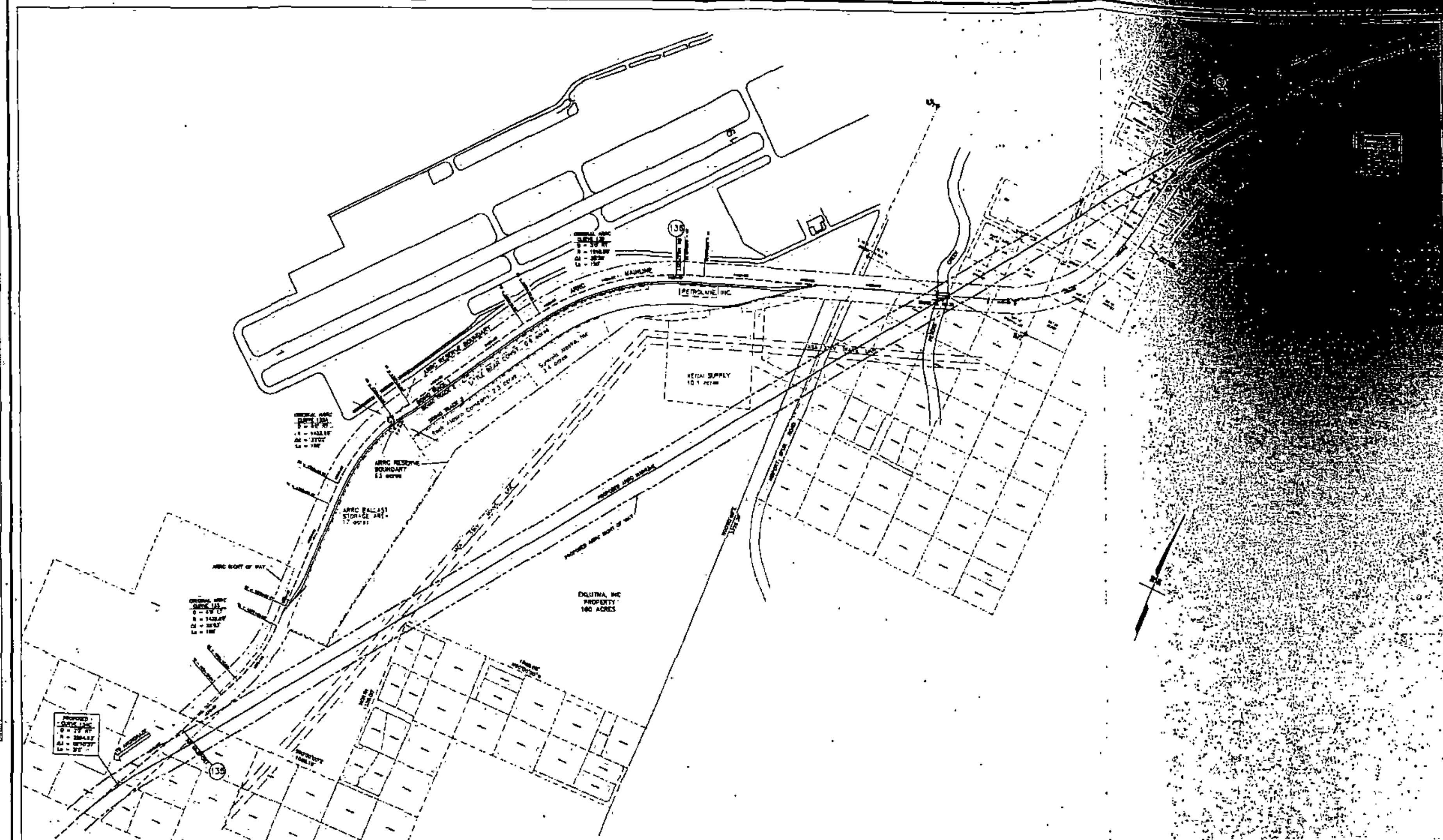
	Total Area ft^2	Total Area (acre)	Area High side ft^2	Area Low side ft^2	High side Volume yd^3	Low side Volume yd^3	Excess Volume yd^3	Excess Weight (ton)
Option 1	5,693,643	131	3,593,992	2,099,651	859,896	398,934	460,962	903,486
Option 2	5,674,253	130	3,360,875	2,313,378	804,120	439,542	364,579	714,574
Option 3	3,348,652	77	2,227,012	1,121,640	532,833	213,112	319,722	626,654
Option 4	2,099,658	48	1,546,057	553,601	369,908	105,184	264,724	518,860

Average height difference, high side =	6.46	ft
Average height difference, low side =	5.13	ft
Gravel weight =	1.96	ton/yd^3
Gravel excavation & sell cost =	3	\$/ton
Gravel =	3	\$/yd^3
	1.53	\$/ton

Birchwood Airport Master Plan
Birchwood Area Railroad Track Realignment: Land Acquisition Estimate
RR Milepost 134.7 to 137.3
12/6/2001

Option 1 parcel number	Assessed Value
5103205	$200,200
5103206	$0
5103214	$41,400
5103215	$20,000
5103216	$56,700
5103220	$56,800
5103222	$175,200
5103223	$154,400
5103226	$193,600
5103230	$203,000
5103232	$126,800
5103236	$0
5103237	$0
5103240	$0
5108101	$0
5108102	$0
5108115	$0
5108116	$205,700
5109331	$132,500
5109333	$172,000
5116101	$150,500
Total =	**$1,888,800**

Option 2 parcel number	Assessed Value
5103101	$0
5103102	$42,200
5108103	$32,600
5108104	$0
5108114	$0
5108115	$0
5108116	$205,700
5108117	$161,600
5108132	$57,200
5109331	$132,500
5109333	$172,000
Total =	**$803,800**



GRAPHIC SCALE

(IN FEET)
1 inch = 700 ft.

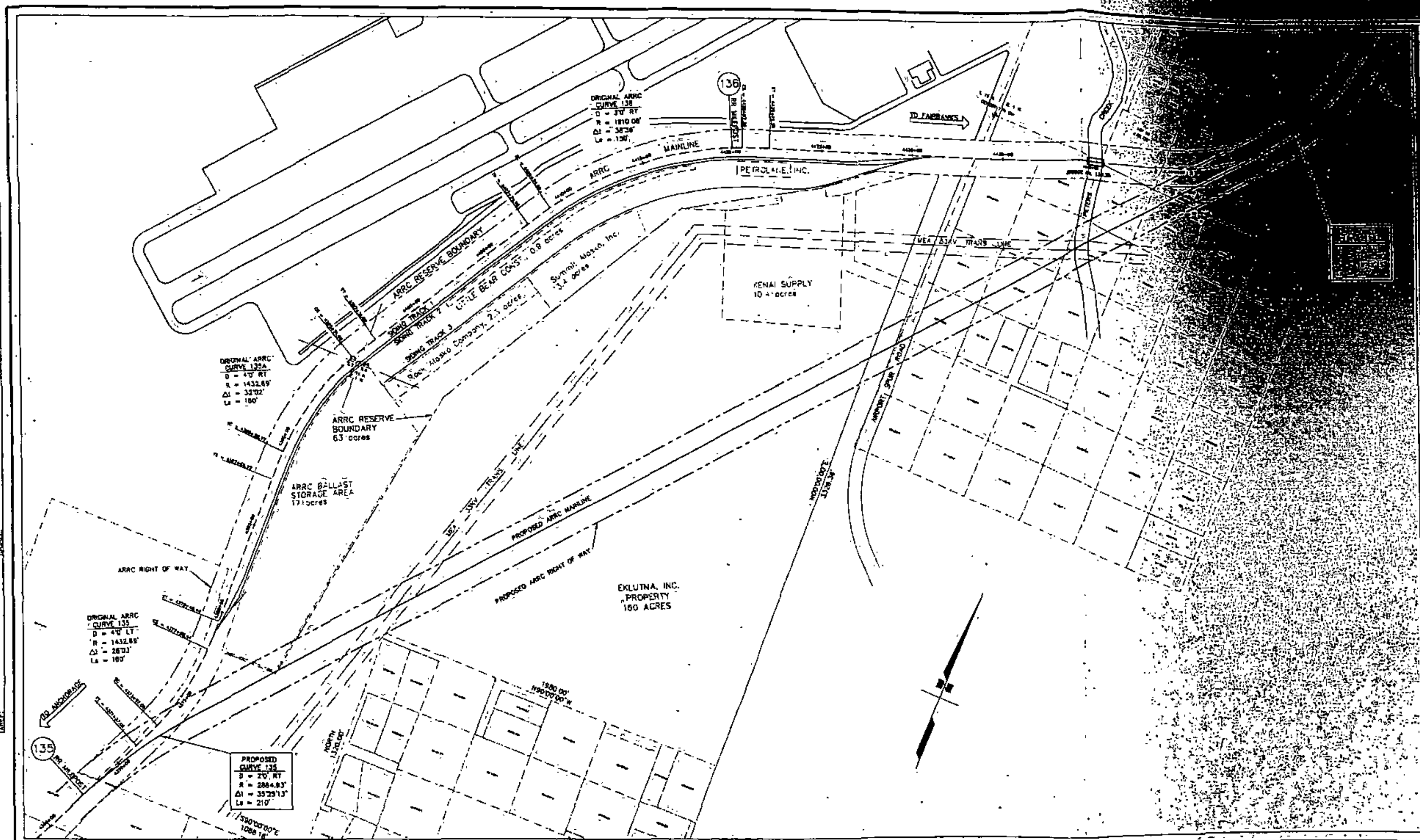
PROPOSED TRACK LENGTH = 11,570ft
PROPOSED GRADE = 0.31%
131 ACRES MADE AVAILABLE
FOR AIRPORT EXPANSION

TRACK RELOCATION
OPTION 1

STATE	PROJECT DESIGNATION	SCALE
ALASKA	AKSAS 54741	1" = 700'

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND
PUBLIC FACILITIES
BIRCHWOOD AIRPORT
MASTER PLAN
ALASKA RAILROAD CORP.
TRACK RELOCATION

DATE: 12-6-01 SHEET 1.

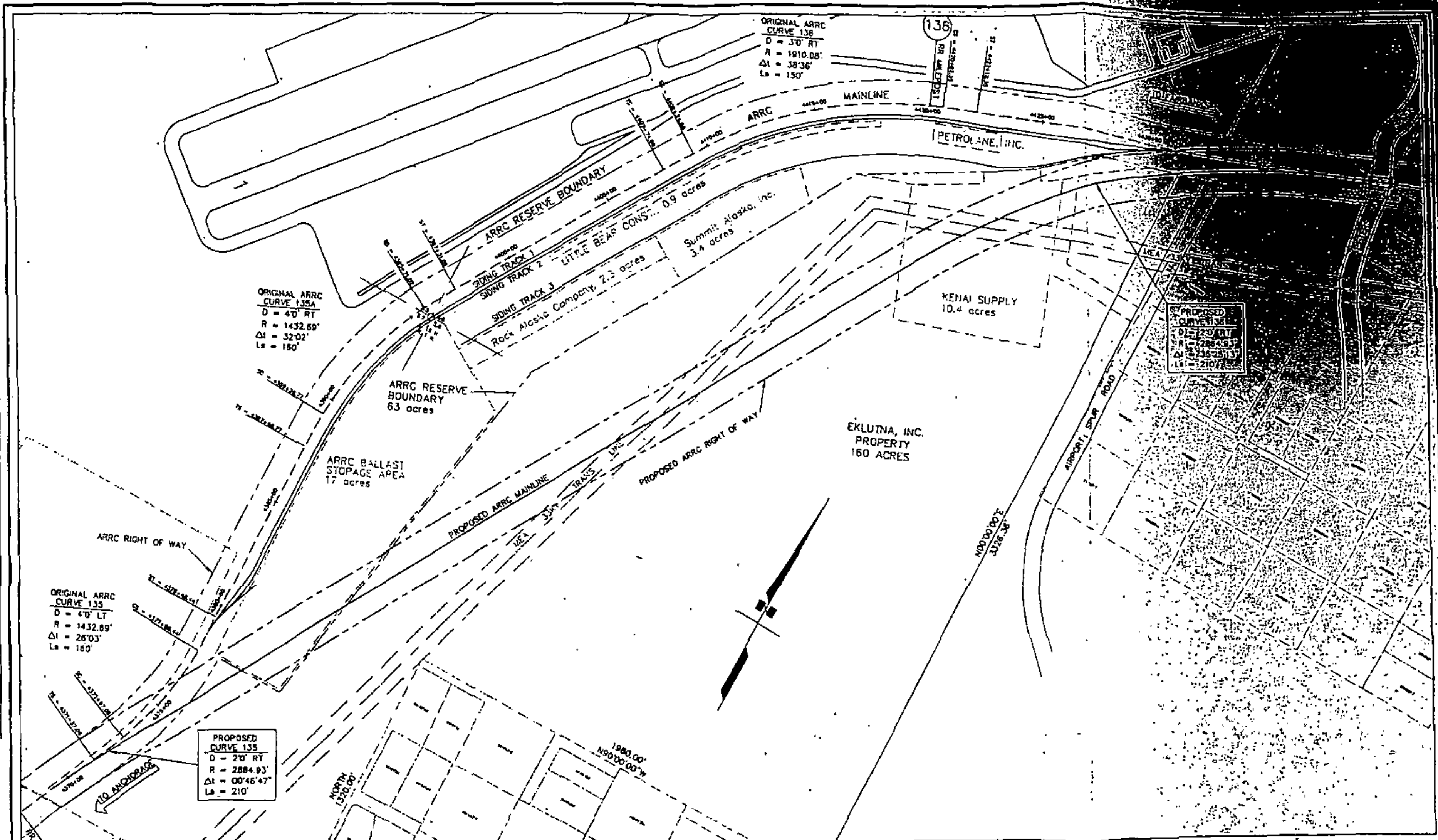


PROPOSED TRACK LENGTH = 8,310ft
PROPOSED GRADE = 0.39%
130 ACRES MADE AVAILABLE FOR AIRPORT EXPANSION

TRACK RELOCATION
OPTION 2

STATE	PROJECT DESIGNATION	SCALE
ALASKA	AKSAS 54741	1" = 500'

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BIRCHWOOD AIRPORT
MASTER PLAN
ALASKA RAILROAD CORP.
TRACK RELOCATION
DATE 12-6-01 SHEET 2



GRAPHIC SCALE

(IN FEET)
1 inch = 400 ft.

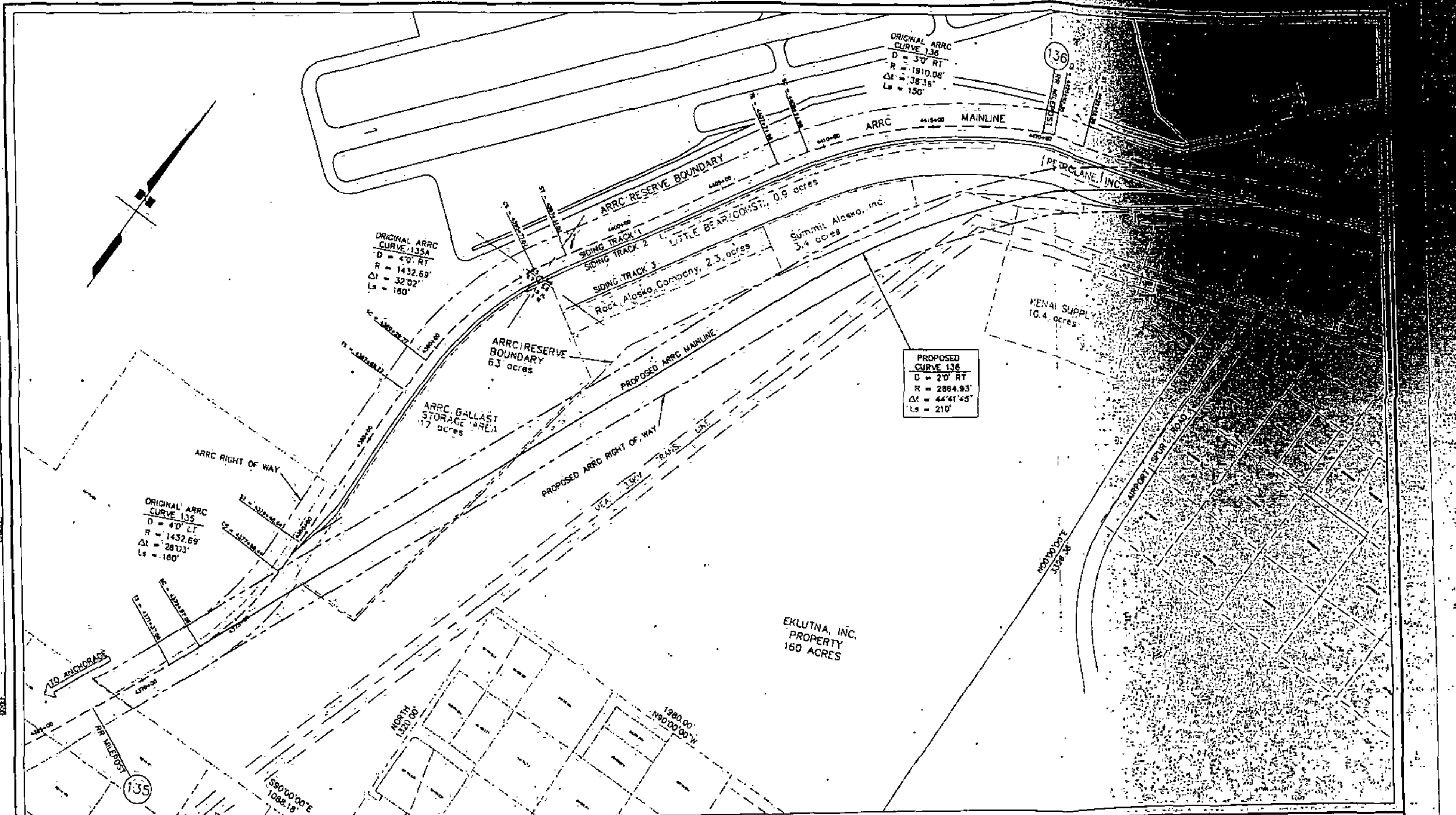
PROPOSED TRACK LENGTH = 6,510ft
PROPOSED GRADE = 0.41%
77 ACRES MADE AVAILABLE
FOR AIRPORT EXPANSION

TRACK RELOCATION
OPTION 3

STATE	PROJECT DESIGNATION	SCALE
ALASKA	AKSAS 54741	1" = 400'

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BIRCHWOOD AIRPORT
MASTER PLAN
ALASKA RAILROAD CORP.
TRACK RELOCATION

DATE: 12-6-01 SHEET 3



GRAPHIC SCALE

(IN FEET)
1 inch = 400 ft.

PROPOSED TRACK LENGTH = 5,770ft
PROPOSED GRADE = 0.40%
48 ACRES MADE AVAILABLE
FOR AIRPORT EXPANSION

TRACK RELOCATION
OPTION 4

STATE	PROJECT DESIGNATION	SCALE
ALASKA	AKSAS 54741	1" = 400'

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BIRCHWOOD AIRPORT
MASTER PLAN
ALASKA RAILROAD CORP.
TRACK RELOCATION

DATE: 12-6-01 SHEET 4