2 EXISTING CONDITIONS

2.1 Community Profile

2.1.1 Local/Regional Setting[1]

Kotzebue is located 26 miles above the Arctic Circle at approximately 66.9°N and 162.6°W, 549 air miles northwest of Anchorage. The city occupies a 3-mile-long spit at the end of Baldwin Peninsula extending into Kotzebue Sound, with a total of 27.0 sq. mi. of land and 1.7 sq. mi. of water within the city limits.

Kotzebue is the largest of the eleven communities in the Northwest Arctic Borough (NWAB). The Borough encompasses 36,000 sq. mi. along Kotzebue Sound and the Wullik, Noatak, Kobuk, Selawik, Buckland, and Kugruk Rivers and is bordered to the north by the North Slope Borough, to the east by the Yukon Koyukuk Census Area, to the south by the Nome Census Area, and to the west by the Chukchi Sea. The climate of the Borough is transitional, characterized by cool summers and long, cold winters; average temperatures range from lows of -12°F in January to highs of 58°F in July, with recorded extremes of -52°F and 85°F. Total precipitation averages 9 inches per year, with an average snowfall of 40 inches in Kotzebue and 47 inches throughout the Borough.

In 2005, the State demographer estimated Kotzebue's population at 3,120, almost 43 percent of the total estimated Borough population of 7,323 (DCCED). Since 1980, the population of Kotzebue has increased by about 1 percent per year, while the rest of the Borough has grown by about 1.6 percent per year (*Community Economic Profile, Kotzebue Airport*, June 2006, Northern Economics, Inc. [NEI]).

The 2000 U.S. Census reported 76.7 percent of Kotzebue residents and 85.8 percent of the Borough at large as Native or part Native, predominantly Inupiat Eskimo. Thus, subsistence activities are a vital part of the lifestyle. Major food sources include caribou, reindeer, beluga whale, birds, four species of seals, berries, greens, and fish.

Kotzebue Airport serves as the regional air transportation hub for the 10 other communities in the Northwest Arctic Borough (Ambler, Buckland, Deering, Kiana, Kivalina, Kobuk, Noatak, Noorvik, Selawik, and Shungnak) and to some extent for the Red Dog Mine 90 miles north of Kotzebue, as well as for the village of Point Hope further up the coast in the North Slope Borough. (*Northwest Arctic Transportation Plan,* 2004, DOT&PF)

2.1.2 Historical Background[1]

Inupiat Eskimos have inhabited this region for about 10,000 years. "Kikiktagruk," as the community was originally called, has long been a hub of arctic trading routes.

[1] Material in Sections 2.1.1 through 2.1.3 is from the Alaska Department of Commerce, Community and Economic Development (DCCED) Community Database Online, except where otherwise cited.

European contact began in 1818, when Kotzebue Sound was "discovered" by a Russian expedition led by German explorer Otto von Kotzebue (for whom the sound and the city were subsequently named). The development of most modern communities in the Borough generally began with supply stations for gold mining operations, with permanent settlement following as schools and churches were built.

In 1899 a U.S. post office was established in what had become the town of Kotzebue. Expansion of economic activities and services in Kotzebue since that time has led to relatively rapid development. The City of Kotzebue was incorporated in 1958, and an Air Force Base and a White Alice Communication System were built soon after.

The Ralph Wien Memorial Airport was constructed in 1950 (as the Civil Aeronautics Authority Strip) and paved in 1970 (*Kotzebue Airport Relocation Feasibility Land Status Report*, October 2006, McClintock Land Associates [MLA]).

2.1.3 Government Structure[1]

The City of Kotzebue was incorporated in 1958 as a Second-Class city with a mayor, a city manager, and a seven-member city council. Kotzebue also has a BIA-recognized tribal council, the Kotzebue IRA Council.

The Northwest Arctic Borough was established as a First-Class borough in 1986, but changed to a Home Rule borough the following year. The other communities within the Borough are also Second-Class cities, with the exception of Noatak, which is governed by a BIA-recognized village council (the Native Village of Noatak).

Kotzebue has its own village corporation, Kikiktagruk Inupiat Corporation (KIC). All of the other villages in the Borough chose to merge their original village corporations with NANA, the regional corporation for the entire Borough. (www.nana.com, accessed 11/28/06)

Point Hope, which is also served by the Kotzebue airport, is a Second-Class city in the North Slope Borough. The Native Village of Point Hope is a BIA-recognized IRA council. The Native corporations for Point Hope are Tigara Corporation (village) and Arctic Slope Regional Corporation (regional).

2.1.4 Economy[2]

Kotzebue is the service and transportation center for all the villages in the northwest region. It has a healthy cash economy, a growing private sector, and a stable public sector. Due to its location at the confluence of three river drainages, Kotzebue is the transfer point between ocean and inland shipping. It does not have a natural harbor (deep draft vessels must anchor 15 miles out), and is ice-free for only three months each year. The City wants to examine the feasibility of developing a deep water port at Cape Blossom Bay, since the cost of cargo delivery is high with the existing transportation systems.

[2] Information in this section was taken from the *Community Economic Profile, Kotzebue Airport* report prepared for this project by Northern Economics, Inc. (NEI) in June 2006. The full report is provided in the *Interim Resource Documents* binder.

Activities related to government, mining, health care, transportation, services, and construction contribute to the Borough's economy. The majority of income is directly or indirectly related to government employment, such as the School District, Maniilaq Association, the City and the Borough. Commercial fishing for chum salmon provides some seasonal employment, and 162 Borough residents hold commercial fishing permits. Most residents rely on subsistence to supplement income.

The Teck-Cominco Alaska Red Dog Mine, 90 miles north of Kotzebue, provides 370 direct year-round jobs and over a quarter of the Borough's wage and salary payroll. The ore is owned by NANA Regional Corporation and leased to Teck-Cominco, which owns and operates the mine. Ore is shipped out via the Delong Mountain Terminal Road and Port Facility; the shipping facilities are operated by Teck-Cominco and owned by the Alaska Industrial Development and Export Authority (AIDEA), which leases the land from NANA.

The residents of Kotzebue are primarily Inupiat Eskimos, and subsistence activities are an integral part of the lifestyle and the local economy. Each summer, the North Tent City fish camp is set up to dry and smoke the season's catch. The smaller communities rely on subsistence food-gathering and Native craft-making.

Employment and Income

In 2000, 2,427 residents were employed in the NWAB, with 1,255 of those employees in Kotzebue. The unemployment rate in the City was 9.8 percent, compared with 15.6 percent in the Borough. Employment in the NWAB is seasonal and varies from month to month, although there are no definite patterns in the seasonality. About 30 percent of the Kotzebue labor force and over 36 percent of the Borough labor force is neither employed nor looking for work. The percentages of self-employed workers in the Borough and Kotzebue are 3.3 percent and 4.5 percent, respectively, which is lower than the statewide average of 8 percent.

Major Industries: Across the NWAB, 41 percent of workers are government employees, and in the City of Kotzebue, government employment accounts for 37.9 percent of employment. The leading industry for employment in both the NWAB and Kotzebue is education, health, and personal services. In 1990, that industry was responsible for one-third of the Borough employment and 28 percent of Kotzebue's employment. By 2000, employment in the education, health, and social services industry had grown to over 38 percent of Kotzebue's employment.

Occupations: Management, professional, and related occupations account for most of the employment in the Borough and Kotzebue, with 33.9 and 39.3 percent of employment in each area, respectively.

Large Employers: The Borough's largest employers in 2004 were Maniilaq Association, the Northwest Arctic Borough School District, and Teck-Cominco Alaska. Those three employers accounted for 1,476 employees. Employment at Maniilaq Association, Inc. and the Northwest Arctic Borough School District has increased substantially since 1997.

Income: Per capita income in the NWAB has been much lower than the U.S., the State, or Anchorage except for 1973, 1981, and 1982. In recent years, it has been roughly 80 percent of the national average. The overall percent of individuals living under the poverty threshold went

up slightly between 1990 and 2000. At the time of Census 2000, 17.4 percent of the population of the Borough lived under the poverty threshold.

Industries

Seafood: The Northwest Arctic Borough is bordered by the frigid Chukchi Sea. The vast majority of the commercial fishing activity in the Borough occurs in the Kotzebue area gill net fishery. This fishery targets mainly chum salmon and has not exceeded earnings of $500,000 since the early 1990s. In recent years, annual earnings in this fishery have dropped to as low as $50,000. Participation by residents in other fisheries is so small that no earnings information is available. Resident ownership is minimal in other fisheries near Northwest Arctic. There is some involvement in herring. There is no reported direct ownership by residents in vessels participating in the Bering Sea groundfish and crab fisheries.

Oil and Gas: The Hope Basin, located offshore from the Borough in the Kotzebue Sound and the Bering Straits, has been modeled for economically recoverable oil and gas resources, with gas resources showing more favorable prospects. The federal Minerals Management Service has modeled the basin assuming export to Asian markets and is proposing to undertake additional analysis based on regional and local use of gas resources.

Teck-Cominco has obtained four leases near the Red Dog Mine site through the State's Shallow Gas Leasing program. Teck-Cominco is working jointly with the state Division of Geological and Geophysical Surveys and the federal Department of Energy to examine the feasibility of producing gas contained in shale beds for use in powering mining and milling operations.

Minerals: The Northwest Arctic Borough is very well endowed with metallic mineral resources. The Red Dog Mine, the largest zinc mine in the world with the largest zinc reserve in the world, should remain in production through 2045, with good potential for a longer mine-life through exploration and development activity. Expansion of the Red Dog Mine and satellite deposits is probable if the proposed expansion of the DeLong Mountain Terminal (DMT) near Kivalina proceeds to completion.

Other deposits which could be viable given access and power are the Bornite, Arctic, Sun, Smucker, Omar, and Frost prospects east of Kotzebue along the south flank of the Brooks Range in the Ambler Copper Belt. Coal resources at Chicago Creek on the Seward Peninsula could supplant oil-fired generation at Kotzebue, and a mine-mouth power plant at the Deadfall syncline just north of the Borough could service the Red Dog Mine and lay the groundwork for significant export. Increased export of mineral concentrates or coal through the Red Dog port is limited by the need for lightering from the present dock at DMT to deeper water.

Tourism: The primary tourism assets of the Borough include its national parklands, Native culture, adventure and ecotourism opportunities, as well as its "north of the Arctic Circle" allure.

More than half of all the land within the region is federally owned and protected as parks, preserves, and wildlife refuges. The federal lands include the Noatak National Preserve, Cape Krusenstern National Monument, Kobuk Valley National Park, and the Selawik National Wildlife Refuge. Additionally, the Bering Land Bridge National Preserve and the Gates of the Arctic National Park and Preserve are accessible from communities within the Borough. These

public lands offer visitors unparalleled opportunities for wildlife viewing, kayaking, rafting, sport fishing, and camping and feature a variety of unique archaeological sites.

In addition to the variety of recreational opportunities, the area has a number of cultural assets through its rich Inupiat Eskimo Native history. Most of the region's activities and products that appeal to the cultural tourist are concentrated in Kotzebue. The NANA Museum of the Arctic features Northwest Coast Inupiat cultural history displays, dioramas, and live performances that include Eskimo dancing and a blanket toss. The Inupiat Cultural Camp provides opportunities for village youth and elders to explain and demonstrate various aspects of the Inupiat lifestyle to visitors. Kiana is one of the region's few outlying communities that currently provides opportunities for the cultural tourist. Kiana offers walking tours and riverboat trips that feature the subsistence lifestyle of the residents and allow visitors to see traditional skills in use.

2.1.5 Community Facilities

General

Maniilaq Association operates health clinics in all eleven communities served by the Kotzebue Airport hub (including Point Hope), as well as the hospital-sized Maniilaq Health Center in Kotzebue. Medevac service is provided by the Maniilaq MedFlight plane. (www.maniilaq.org, accessed 12/6/06)

Except for Kobuk, all of the communities in the Borough have their own K-12 schools. Kobuk has a K-8 school, and then students attend high school in neighboring Shungnak. (DCCED) Schoolchildren frequently travel between communities for activities such as basketball games.

Utilities

Water and Sewer: Local village and governmental entities working in partnership with the Alaska Department of Environmental Conservation (ADEC) provide safe drinking water and sanitation services to the Borough residents. A wide range of water and sanitation strategies are in use, ranging from rural residents hauling well water and using outdoor privies to communities where almost every home is fully plumbed (NEI). In Kotzebue, the City's piped water and sewer system serves 521 homes, and around 80 percent of homes are fully plumbed (DCCED). Currently, all of the city's piped sewage is disposed of in treatment ponds to the west of Runway 17-35.

Solid Waste: A new solid waste transfer station and a Class 2 permitted landfill with balefill have recently been completed at Kotzebue. Recycling and hazardous waste disposal have also been improved. (DCCED)

Power: The electric utility cooperative, Kotzebue Electric Association, has a capacity of 20 MW. Electric power is mainly produced from diesel and natural gas, although Kotzebue uses ten 50-kilowatt wind turbines to supplement electricity. (DCCED)

Photo 2-1 Windmills

Telecommunications: Local telephone service is provided by OTZ Telephone Co-op, Inc., with long distance service available from OTZ, AT&T Alascom, and GCI. Internet is available through OTZ, GCI, and ACS. GCI provides cable TV services in Kotzebue, which also receives three broadcast TV stations (ARCS, KUAC, and KYAC) and one radio station (KOTZ-AM). (DCCED)

Fuel: Demand for heating oil and gasoline is rising due to the growing population, an increase in the number of new homes with oil stoves, and more motorized vehicles. In addition, the new water and sewer systems discussed above require additional power, which in turn requires more fuel. Over the past several years, the Alaska Village Electric Cooperative and the federally funded Denali Commission have spent a combined $9.3 million for nine rural tank farm projects in the Northwest Arctic Borough. There are 65 above ground tank farms in the Borough, 6 percent of statewide inventory. (NEI)

Diesel fuel typically arrives by ocean barge. Fuel for the communities in the Borough is initially stored at the 8.2 million gallon Crowley Marine tank farm in Kotzebue. Commercial mining operations at Red Dog Mine store bulk fuel supplies at DMT, with a fuel storage capacity of 20 million gallons. (NEI)

Transportation

Air: Kotzebue's airport supports daily jet service to Anchorage and several air taxis to the region's villages. Primary visitor access to the region is by daily commercial jet service from Anchorage to Kotzebue, with some flights routed through Nome. Smaller communities in the region are reached by scheduled and charter air taxi services based in Nome, Ambler, and Kiana. (NEI)

Water: Due to its location at the confluence of three river drainages, Kotzebue is the transfer point between ocean and inland shipping. It does not have a natural harbor, and is ice-free for only three months each year. The shipping season lasts 100 days, from early July to early October. River sediments deposited by the Noatak River 4 miles above Kotzebue keep the harbor shallow. Deep draft vessels must anchor 15 miles out, and cargo is lightered to shore and warehoused. Shallow draft barges deliver cargo to area communities. (NEI)

Ground: In and around Kotzebue, there are 26 miles of local gravel roads, used by cars, trucks, four-wheelers, and motorcycles during the summer. Snowmachines are preferred in winter for local transportation.

The only road leading directly south from town crosses the airport property west of the main runway, within the runway safety area. The road is used to access summer fish camps, the sanitary landfill, an Air Force radar site, the wind generators, and properties along the coast to the south toward Cape Blossom. However, public access through the restricted runway safety area presents a safety concern to aviation and the public, so FAA and DOT&PF would like to terminate this access.

In 1997 the Bureau of Indian Affairs (BIA) funded the construction of the Hillside Road, a new 3.7-mile road east of Kotzebue Lagoon, to divert traffic around the airport runway and to link the community to the new solid waste facility. The Hillside Road connects to Ted Stevens Way in the north and to the road through the airport to the south, providing access to the landfill, the wind generation site, and also to Cape Blossom and other popular recreation and subsistence gathering areas. Ted Stevens Way/Vortac Road is the sole road access to the City's water supply, cemetery,

and Very High Frequency Omni-directional Range Co-Located Tactical Air Navigation antenna (VORTAC) site.

Bison Street, Caribou Way, Ted Stevens Way, and Vortac Road were also upgraded between Third Avenue to Devils Lake, a distance of 2 miles. The upgrades included grade raising, widening, drainage, and surfacing, as well as minor erosion protection in the tidal area near town. (MLA)

Photo 2-2 Ted Stevens Way, Vortac Road, and Hillside Road

2.2 Aviation Facilities

2.2.1 History

Aviation in Kotzebue began in the late 1930's and early 1940's at a site developed by the Village of Kotzebue and known as the Kotzebue City Field. In 1950 construction of Ralph Wien Memorial Airport began about ¾ mile from City Field in response to increasing air traffic. The Ralph Wien Memorial Airport consisted of a new 3,750-foot by 150-foot east-west landing strip and an improved existing 3,525-foot by 150-foot north-south strip known as the Civil Aeronautics Authority strip. In 1958, the Kotzebue City Field was closed.

A list of significant developments at the Ralph Wien Memorial Airport follows. A complete timeline of developments and associated funding at the airport, accompanied by a history of recent M&O costs, is available in Appendix A.

1950 Initial construction of east-west primary runway and north-south crosswind runway
1957 Taxiway, aircraft parking apron and airport access road constructed
1961 Apron area enlarged
1963 Airport land acquisition; Runways 8-26 and 17-35 extended to 5,000 and 4,340 feet, respectively
1968 Runway 8-26 extended 900 feet into the lagoon for a total length of 5,900 feet
1969 Paving of Runway 8-26 (5,900 feet x 150 feet)
1973 Airport land acquisition
1979 Installation of HIRLS on Runway 8-26 and MIRLS on Runway 17-35
1982 Acquisition of 9.4 acres of land north of the existing terminal area
1983 Paving of terminal apron and construction of a partial parallel taxiway and Taxiways D and E connecting Runway 8-26 to the terminal apron
1986 Threshold of Runway 35 relocated by 540 feet for a usable runway length of 3,800 feet
1987 Construction of lease lot area Block 3, including general aviation (GA) tie-down area
2003 Construction for new ARFF/SREB facility begun
2004 Partial hillside obstruction removal off east end of Runway 8-26 begun
2005 Construction for additional Runway 8-26 safety area begun

2.2.2 Airside Facilities

The airport has two runways. Runway 8-26 is a paved 5,900-foot by 150-foot east-west runway, and Runway 17-35 is a gravel 3,800-foot by 90-foot north-south runway. Table 2-1 contains runway characteristics for the two runways.

Table 2-1 – Runway Characteristics

	Runway 8-26 (primary)	Runway 17-35 (crosswind)
Runway Dimensions	5,900'x150'	3,800'x90'
Runway Safety Area	6,300'x340'	4,340'x100'*
Runway Obstacle Free Area (ROFA)	7,900'x800'	4,400'x150'*
Runway Obstacle Free Zone (ROFZ)	6,300'x400'	4,200'x150'*
Surface Type	Asphalt	Gravel

*Limited by GA aircraft parking to west of runway

Primary Runway 8-26

Runway 8-26 straddles the Kotzebue spit and the lagoon separating the spit from the mainland. More than half of the runway length is constructed on fill in the lagoon. The portion of the runway located on the Kotzebue spit is underlain by polystyrene foam board to insulate the permafrost.

According to the Kotzebue FSS, approximately 75 percent of all operations at the Kotzebue Airport occur on Runway 8-26. Of these operations, 75 percent occur on Runway 8, the instrument runway.

Runway 8-26 has high-intensity runway lighting (HIRL), precision runway markings, and an instrument landing system (ILS). The instrument landing system consists of distance measuring equipment (DME), a direction finder (DF), a VHR Omnidirectional Range (VOR), a non-directional radio homing beacon (NDB), and a runway visual range (RVR). Runway 8-26 has two visual approach aids: visual approach slope indicators (VASI) and runway end identification lights (REIL). See "Instrument Approaches and Visibility Minimums" on page 2-11 for more approach information.

Crosswind Runway 17-35

The gravel surface length of Runway 17-35 is 4,340 feet. The usable length was reduced to 3,800 feet to meet FAA standards for safety area beyond the runway threshold. Currently, there is GA aircraft parking along the west side of Runway 17-35, which limits the width of the safety area, runway object free area, and runway object free zone. Runway 17-35 is a visual approach runway. It is lighted with medium-intensity runway lighting (MIRL) and does not have runway markings.

Taxiways

Runways 8-26 and 17-35 are served by seven taxiways (Figure 2-1 and Table 2-2). Runway 8-26 is connected to the apron by Taxiways C, D, and E, and there is an approximately 1,200-foot taxilane on the south edge of the apron. Taxiways A and B connect the apron to the lease lot areas. Taxiway F connects the north end of Runway 17-35 to the east end of Runway 8-26, and Taxiway G connects Runway 17-35 with the apron on Lease Block 6.

Table 2-2 – Taxiways

Taxiway	Taxiway Width (ft)	Safety Area Width (ft)	Condition
A	50	120	Paved, Lighted
B	50	120	Paved, Lighted
C	90	120	Paved, Lighted
D	90	120	Paved, Lighted
E	90	120	Paved, Lighted
F	50	100	Gravel, Unlighted
G	50	100	Paved, Unlighted

Apron Areas

The terminal area apron is a paved apron that measures 1,974 feet by 290 feet. The apron does not have its own lighting, but adjacent buildings have flood lights attached which light the apron area. The GA aircraft apron is north of the terminal apron and accessed by Taxiway B (Figure 2-1). This is a 220-foot by 270-foot unlighted gravel apron with 12 tie-downs.

A gravel area within the safety area on the west side of Runway 17-35 is also used for GA aircraft parking (Figure 2-1). This area encompasses approximately 3 acres (80-foot by 1600-foot) and contains approximately 40 tie-downs.

Floatplane Facilities

The Kotzebue Lagoon, to the east of Runway 17-35, is used as an unofficial floatplane landing area. Isaac Lake, to the west of Runway 17-35, was previously used by float planes, but at present it is dewatered periodically for gravel extraction.

Signage

Guidance signage at the Kotzebue Airport includes taxiway exit and distance-remaining signs located along Runway 8-26. This signage was installed during the 1993-1994 runway reconstruction project and meets current FAA standards.

Photo 2-3 Roadway Warning Sign at the Kotzebue Airport

Stop signs and warning signs with flashing red lights are located on the road that crosses through the safety area of Runway 8-26 to warn vehicular traffic of arriving and departing aircraft. The warning signs read "Warning | Arriving and Departing Aircraft | Look Both Ways Before Crossing."

Weather

A wind analysis for the Kotzebue airport was performed as part of this study, and can be found in the *Interim Resources Document* binder. The wind analysis incorporated 9 years of wind data (1996-2005) from the automated surface observing system (ASOS) at Kotzebue. The prevailing wind direction at the Kotzebue Airport is east-northeast to east-southeast. The wind speed is less than or equal to 10 knots 58 percent of the time, between 11 and 16 knots 24 percent of the time, between 17 and 21 knots 10 percent of the time, between 22 and 27 knots 5 percent of the time, and greater than 28 knots 3 percent of the time. Table 2-3 shows the percent wind coverage for the existing runways.

Table 2-3 – Existing Runway Wind Coverage

Existing Runway	**Orientation** (degrees)	**Percent Wind Coverage** (FAA 36 point analysis)			
		10.5 kt (12 mph) Crosswind Component	13 kt (15 mph) Crosswind Component	16 kt (18.5 mph) Crosswind Component	20 kt (23 mph) Crosswind Component
Primary Runway & Secondary Runway	13° & 102°	96.82%	98.73%	99.59%	99.93%

On average, the coldest month in Kotzebue is February, with a mean temperature of -4^{o}F, and the warmest month is July, with a mean temperature of 55^{o}F. Kotzebue receives an average annual precipitation of 10 inches, including an average annual snowfall of 40 inches. Kotzebue receives very little sunlight during the winter months and an abundance in the summer. On the shortest day of the year, the sun is up for less than 2 hours, while on the longest day of the year Kotzebue receives 24 hours of daylight.

Airspace Conflicts

Part 77 of the Federal Aviation Regulations (FAR) establishes standards for determining obstructions in navigable airspace, and provides for studies to determine their effect on the safe and efficient use of the airspace. Imaginary surfaces surrounding runways are established based on the type of facility; size of aircraft; type of approach; and for instrument approaches, the visibility minimums. Following is a discussion of the airspace at the existing airport, the deficiencies with respect to current FAA standards, and what would be needed to bring it up to FAA requirements.

Kotzebue's primary runway has a precision instrument approach on the west end (Runway 8) and a non-precision approach on the east end (Runway 26). The secondary runway has non-precision approaches on each end. The imaginary surfaces depicted in the current Airport Layout Plan (ALP) are tabled below.

Table 2-4 – Kotzebue Airport Imaginary Surfaces

Runway	Primary Surface Width (ft)	Approach Surface Slope Ratio	Transitional Surface Slope Ratio	Horizontal Surface Radius (ft)	Conical Surface Slope Ratio
Existing					
8/26	1,000	Runway 8: 50:1 Runway 26: 15.9:1*	7:1	10,000	20:1
17/35	500	Runway 17: 34:1 Runway 35: 34:1	7:1	5,000	20:1
Ultimate					
8/26	1,000	Runway 8: 50:1 Runway 26: 34:1	7:1	10,000	20:1
17/35	500	Runway 17: 34:1 Runway 35: 34:1	7:1	5,000	20:1

* The Kotzebue Eastside Obstruction Removal and Safety Area Expansion project, constructed in 2006, removed some of the terrain obstructions of the approach to Runway 26. Plans indicate terrain was removed to a 20:1 surface, flaring from 800 feet wide to 944 feet wide, beginning 200 feet beyond the threshold and extending to 2,200 feet beyond the threshold. Although an improvement, this project did not remove all the terrain penetrating the Part 77 approach surfaces.

To supply additional length required for the runway, runway safety area (RSA), and instrument approach lighting, the runway can be extended to the east. Terrain removal required to clear the Part 77 primary and transitional surfaces will be a major expense. The average ground elevation is approximately 70 feet higher than the current runway elevation. Terrain excavation is estimated to cost approximately $50,000 per foot of runway extension to the east. (This is based on the ALP's 10-foot contour mapping and only includes the cost to excavate the frozen ground; it does not include runway construction, lighting systems, or relocation costs for navigational aids or roads.) The terrain removal extents include the FAA VOR site and Kotzebue graveyard, and could possibly impact the community's watershed area. Depending on the length of the extension, Hillside Road may also have to be relocated.

Instrument Approaches and Visibility Minimums: There are currently eight published approaches for the Kotzebue airport in the Terminal Procedures booklet: four for Runway 26 and four for Runway 8. The published approaches include landing minimums as low as a 300-foot ceiling at ¾-mile visibility for Runway 8 and as low as a 500-foot ceiling at 1-mile visibility for Category A and B aircraft and 1¼-mile visibility for Category C and D aircraft for Runway 26.

2.2.3 Landside Facilities

Passenger, Cargo, and General Aviation Facilities

Kotzebue's airport does not have centralized passenger terminal facilities. Passengers and cargo are processed through the individual operator's facilities. Figures 2-2 and 2-3 show the layout of the operator and support facilities, and Table 2-5 lists the lease lot facilities by lessee, building size, and sub-lessee if applicable. These facilities are used by a variety of operators, such as scheduled carriers, air taxis, and cargo carriers, and airport support services, such as the flight service station and the aircraft rescue and firefighting building. For a complete list of improved and unimproved lease lots, approximate values of lease lot improvements, and draft land occupancy drawings, see Appendix A.

Support Facilities

Support facilities include those of aircraft rescue and firefighting, fuel storage and distribution, the FAA flight service station (FSS), the National Weather Service (NWS), FAA housing, DOT&PF maintenance buildings, and the U.S. Fish and Wildlife Service (USFWS) hangar.

ARFF/SREB: A new combined aircraft rescue and firefighting (ARFF) and snow removal equipment building (SREB) was recently constructed on Lot AAA of Block 1. This facility will accommodate airport fire fighting and snow removal equipment vehicle storage and maintenance, airport management, and FAA and NWS functions.

Fueling Services: A number of the operators in Kotzebue have buried or above ground storage tanks for fuel; however, Crowley Marine Services is the only fuel vendor (Chevron). Prior to 1998, they operated out of a fueling station on the south side of the terminal apron. The underground tanks and related dispensers were removed in 1998 because they violated the primary surface of Runway 8-26. Fuel is now distributed from trucks. Crowley Marine's aircraft refueling trucks are maintained and parked in a 30-foot by 40-foot steel-frame building on Lot M of Block 1.

Flight Service Station: Kotzebue is a non-towered airport. The FSS is located west of Runway 17-36 on FAA property, but there are plans to relocate it to the new ARFF/SREB. It is difficult to see the terminal apron and parts of Runway 8-26 from the station's present site, and its inconvenient location discourages pilots from attending briefings.

National Weather Service: The NWS office is located in the same building as the FSS, and will relocate with the FSS to the ARFF/SREB. The NWS office is currently attended 16 hours/day and has three employees. There is an automated surface observing system (ASOS) operating in Kotzebue. The weather information from the ASOS is distributed by the FSS to pilots.

DOT&PF Maintenance Facilities: DOT&PF has three maintenance and operations facilities: the ARFF/SREB discussed above; a new sand/de-icing chemical storage facility currently under construction on Parcel S; and a maintenance facility located on Lot 1B of Block 3. DOT&PF has also reserved the right to use Block 2, Lot 1B, which is needed to meet M&O's storage needs.

FAA: Several FAA buildings are located on a piece of FAA property located west of Runway 17-35. These include the FSS station and several buildings used for temporary housing. The housing provides temporary accommodations for FAA personnel rotating through Kotzebue to service navigation aids throughout the region.

FAA also leases 12 parcels of airport property for the placement of navigational aids. These sites include those for VASI, REIL, wind sensor, and RVR navigational aids.

U.S. Fish and Wildlife Service: The U.S. Fish and Wildlife service maintains a field office in Kotzebue to manage the Selawik National Wildlife Refuge. The USFWS leases Lots 1, 2, and 6 of Block 6 at the Kotzebue Airport. On Lot 1 they have a small hangar that can fit up to four small aircraft, and Lot 6 contains a small float plane pond. The USFWS has one based airplane that they fly with floats in the summer and skis in the winter. They make an effort to cooperate with and support other federal and state agencies with aircraft in Kotzebue, including the Alaska Department of Fish and Game, the National Park Service, and the State Public Safety/Fish and Wildlife Protection Officer, and these agencies have used USFWS hangar space to park their aircraft.

Table 2-5 – Lease Holder Facilities

Block	Lot	Lease Holder	Building Dimensions	Sublease Holder	Function
1	AAA	DOT&PF	80' x 170'		ARFF/SREB/FSS
1	B	BAKER AVIATION, INC.	40' x 60' & 30' x 60'	Arctic Transportation Services	Freight & Mail Carrier
1	CD	MARCIA L. FAIRBANKS DBA FBX	80' x 130'		Cargo Handling
1	EG	ALASKA AIRLINES, INC.	60' x 135'		Passenger, Freight, & Mail Carrier
1	HI	BERING AIR, INC.	60' x 100'	Baker Aviation, Inc.	Passenger, Freight, & Mail Carrier
1	K1	DRAKE INVESTMENTS LLC	40' x 60'		
1	L	ALASKA WING, CIVIL AIR PATROL	60' x 60'		Search & Rescue Operations
1	M	CROWLEY MARINE SERVICES INC.	30' x 40'		Fueling Service
2	1A	EXOUSIA, INC. DBA MAVRIK AIRE	CONNEX, SHED		Air Taxi & Transport Service
2	1B	DOT&PF	2 - CONNEX		Maintenance & Operations
2	4	NORTHWESTERN AVIATION	80' x 90'	Guardian Flight, Inc.	Medevac Flights
3	1A	HAGELAND AVIATION SERVICES, INC	60' x 85'		Passenger, Freight, & Mail Carrier
3	1B	DOT&PF	40' x 80'		Maintenance & Operations
3	3	BERING AIR, INC.	60' x 90'		Freight & Mail Carrier Arctic Blues Espresso And Gift
3	4	BAKER AVIATION, INC.	100' x 120'	Bering Air, Inc.	Freight & Mail Carrier
3	5	FRONTIER FLYING SERVICE, INC.	50' x 60'		Passenger, Freight, & Mail Carrier
6	1	U.S. DEPT OF THE INTERIOR, FWS	40' x 40'		US Fish & Wildlife Service
6	3	AK DMVA, NATIONAL GUARD	40' x 80'	Evergreen Helicopters	
11	9	US DOI/NPS	50' X 25'		US Dept of the Interior National Park Service
PARCEL	M	CITY OF KOTZEBUE	(BLDG Q) 20' X 70'		
PARCEL	S	DOT&PF	50' x 75'		Sand Storage Building

Note: Building dimensions are scaled from Land Occupancy drawings.

Access, Circulation, and Parking

Runway 8-26: Access to the airport is available via Third Avenue and Fifth Avenue. Third Avenue was paved in 1996, becoming the first paved road in Kotzebue. There are four access roads providing circulation within the lease lots and GA tie-down areas located off of the Runway 8-26 apron. These access roads are "AA," "BB," "DD," and "C/L" (see Figure 2-1). Parking for airport patrons and staff is provided by each individual operator within their lease lots.

Runway 17-35: Access to Runway 17-35 and the facilities associated with it, including the Flight Service Station, is provided by an access road off of the end of Third Avenue which crosses through the safety area of Runway 8-26 and Runway 17-35 (Figure 2-1). Installation of a gate to limit access to this road is being considered. This access road not only provides access to the airport facilities but continues beyond the airport property to summer fish camps, the sanitary landfill, an Air Force Radar site, and properties to the south of Kotzebue.

In 1997, the Bureau of Indian Affairs funded the construction of the Hillside Road to divert traffic around the airport and serve as an access to the new solid waste facility. The BIA Hillside Road connects to Ted Stevens Way in the north and to the road through the airport south of the airport. This road was intended to provide the opportunity to close the portion of the airport access road within the runways' safety areas. However, closure of the airport access road is viewed unfavorably by the public and consequently has not been completed.

Users of the aircraft tie-down area to the west of Runway 17-35 use the tie-down area for vehicle parking. This aircraft/vehicle parking area is within the runway obstacle free area.

Utilities

Utilities on the airport include water, sewer, telephone, electrical service, solid waste disposal, and storm drainage. The providers of the utility services are listed below.

Utility	*Provider*
Water	City of Kotzebue
Sewer	City of Kotzebue
Telephone	OTZ Telephone Cooperative, Inc.
Electric	Kotzebue Electric Association
Solid Waste Disposal	City of Kotzebue

Water: The city's primary source of drinking water is Devils Lake, located three miles from the city. Water is filtered and treated and then stored in a 1.5-million gallon insulated storage tank near the Vortac Reservoir. Demand for water continues to grow, and consequently, funds have been requested to construct a second 1.5-million gallon tank.

Water is heated using a waste heat recovery system at the local electric plant before piped distribution in circulation mains. The water distribution system in town was first developed in 1966. In 1999, a $1.6 million upgrade of the city's undersized and deteriorating water distribution mains was completed.

The airport lease lots on Block 1 and Block 3 are connected to the city's water service. Other lease areas are served by water and sewage trucks.

Sewer: The city's sewer system was constructed through the Indian Health Service in 1969. The City of Kotzebue now operates and maintains the system. A major expansion took place in 1976, and in 1999 two deteriorating lift stations were upgraded.

Sewage is treated in a 32-acre zero discharge facultative lagoon located to the west of Runway 17-35. Upgrades to Cells 1 and 2 were begun in 2002 and 2003, and a third cell was recently constructed just south of the airport.

The airport lease lots on Blocks 1 and 3 are served by the city's sewer system.

Telephone: The OTZ Telephone Cooperative provides telephone service to the community of Kotzebue and all facilities on the airport. The existing system was installed in 1977. Long distance communication is through the use of Alascom's satellite.

Power: The Kotzebue Electric Association power plant is located on Lagoon Street, near the airport. Kotzebue uses ten 40 kW wind turbines to supplement electricity. All airport facilities have electrical service; however, there is no standby service other than for the FAA facilities. FAA has a standby 75 kW power plant for communications and FAA-maintained navigation aids including the ILS, RVR, and VASI's. Services near the runways' primary surfaces are underground.

Solid Waste Disposal: In 1998, the City of Kotzebue completed the final phase of construction on a new waste baler facility. The new baler transfer facility and Class 2 permitted landfill with balefill minimizes refuse volume and extends landfill life, reduces litter problems, and improves handling of hazardous waste and recycling materials. The new site is located approximately one mile south of Runway 17-35. The previous landfill was located adjacent to the end of Runway 17-35.

Storm Drainage: The storm drainage system at the Kotzebue airport is minimal, primarily consisting of culverts under Taxiways D and E to direct the drainage from the terminal apron to the Kotzebue Lagoon.

2.3 Regional Transportation Facilities[3]

The Northwest Arctic Borough (NWAB) comprises 36,000 square miles and 11 communities. Inter-regional access only occurs by air or water. Severe seasonal weather conditions, inadequate marine facilities and few roads impede the movement of people and goods.

Within the region, there is no road access between communities. In the summer, rivers enable boat traffic between communities. In the winter, villagers travel by snowmachine and all-terrain vehicles using well-established trails.

Aviation is the principal means of transporting people to communities in the Borough. A lack of interconnected roads means lighter goods such as mail and perishable food typically move by air. Air service plays a major role in the movement of high value, time-sensitive items and serves

[3] Information in this section was taken from the June 2006 *Community Economic Profile, Kotzebue Airport* report prepared for this project by Northern Economics. The full report is provided in the *Interim Resource Documents* binder.

communities seasonally inaccessible by water. The U.S. Postal Service Bypass Mail program delivers a significant volume of this freight and passenger service.

Bulkier, heavier materials like dry goods, fuel, and building materials arrive by water, and the Northwest Arctic Borough communities depend on ports, harbors, and barge transfer sites for commercial freight purposes. A foremost consideration for improving transportation access to Borough communities involves high freight costs. Freight shipping costs impose significant constraints on the region's ability to develop and support a stable, diversified economic base. The relative scarcity of funding sources dedicated to building these facilities hinders economic development in the region.

A planning team led by DOT&PF recently completed a two-year planning process that investigated and compared various marine, air, road, and rail alternatives to existing area transportation systems. Using current and projected population figures for the next 20 years, the *Northwest Alaska Transportation Plan* established air and marine infrastructure requirements and potential highway and railroad connections.

Over the past seven years, the NWAB received $67.5 million for transportation-related capital improvement projects. Airports received about half of the total ($33.2 million), roads just over half ($34 million), and ports and harbors less than one percent ($26,000).

2.3.1 Air Transportation

Demand for better air connections, increased services, and safer travel between communities in the Northwest Arctic Borough reflects needs found throughout rural Alaska. A number of scheduled air carriers transport passengers to the region and between communities.

A complex federal funding formula for the nation's airports aids in the construction and maintenance of the country's aviation infrastructure. The federal Airport Improvement Program (AIP) has been the primary funding source for aviation infrastructure development in Alaska, providing approximately $1.2 billion in federal assistance from its inception in 1946 through 2000.

Passage of the federal Aviation Investment and Reform Act for the 21st Century in 2000 amended the Airport and Airway Improvement Act, changing the Airport Improvement Program's funding cycle from an annual to a multi-year budget cycle. Alaska's share of the nation's $3.6 billion program in 2006 amounted to $111 million. For complete discussions on this federal funding source, see the Federal Aviation Administration's Regional Airport Plan for Alaska.

2.3.2 Land Transportation

Regional Roads

Without long distance roads, or interregional roads connecting the Northwest Arctic Borough with other parts of the region, communities remain isolated from the rest of the state.

A reconnaissance study for a road from Kotzebue to Cape Blossom, 12 miles to the south, is about to begin. Cape Blossom is a potential site for a deepwater port. Construction of a road from Noatak to the Red Dog Mine Road has also been studied.

DeLong Mountain Transportation Road

The original DeLong Mountain Transportation Road was built to accommodate ore trucks hauling minerals from the Red Dog Mine to a port located on the Chukchi Sea. The original all weather haul road is 52 miles long and 30 feet wide. The Alaska Industrial Development and Export Authority (AIDEA) owns the road, but Teck-Cominco has a non-exclusive priority right to ship ore concentrate over the road for 50 years.

Local Roads

State transportation planners working with local communities continue to study the benefits and costs of new roads with other transportation needs in the Borough. While many in the Borough support surface infrastructure development, local people express concerns over the impacts of new roads on village substance lifestyles. Long-term transportation planning calls for local, state and federal transportation authorities to secure important surface transportation corridors to valuable mineral resources in the Borough.

Regional Rail

State planners and regional leaders in the Northwest Arctic Borough continue to examine the potential for rail access within and between the regions. The process involves identifying rail corridors in the Borough as well as overland corridors linking the region with the Alaska Highway System. When it comes to moving large volumes of freight, a railroad is especially appealing to many local residents who find it less expensive and more convenient than road, air, or seasonal barge service. A rail system also makes it easier to direct visitor movement patterns in the region—an important factor when mitigating user conflicts in a subsistence-based economy.

A rail system remains an attractive transportation option as long as it is able to demonstrate positive economic benefits for the region and the state. Considerable engineering, environmental, and social issues remain. These include surmounting vast distances over difficult terrain, the extreme climate, seasonal verses year-round operation, and subsistence concerns.

2.3.3 Water Transportation

Borough communities depend on serviceable barge facilities for commercial and transportation purposes. All marine freight in the Borough moves by private barge lines. Kotzebue operates as the principal transshipment hub for surrounding communities.

Ships and ocean barges account for nearly all the bulk freight and heating oil shipped to the Northwest Arctic Borough. Crowley Marine Services, a subsidiary of Crowley Maritime Corporation, supplies the majority of freight services to the Borough. Within the Borough, freight travels by shallow draft barges operated by Crowley Marine to upriver communities. Deliveries as often as four times a month continue throughout the summer and fall until freezing ocean and river conditions prevent any further shipping. Northland Services delivers freight to Kotzebue once each month from June through August.

Upgrade of existing marine facilities and building new facilities continues to improve water and land-related transportation activities in the Borough by increasing the frequency of trips in the region with vessels capable of handling more freight. For example, Kotzebue's shallow water port is less efficient than a deep-water port because freight moved through shallow water requires additional vessels, personnel, and handling. Plans call for dredging the harbor to a depth that will permit passage of deep draft vessels.

In 1986, the NANA Regional Corporation, Teck-Cominco, and AIDEA formed a partnership to develop lead and zinc deposits at the Red Dog Mine. In 2004, approximately 1,505,500 short wet tons of lead and zinc concentrates were exported through the DeLong Mountain Terminal (DMT) port. Success of the project and increasing ore output have led to upgrades and additions to the storage and handling facilities at the port.

AIDEA and the U.S. Army Corps of Engineers (USACE) investigated the feasibility of USACE participation in dredging and maintaining the DMT as a regional deep-water port. Estimates of the cost of the proposed DMT improvements were approximately $230 million. Investigations proceeded through preparation of a Draft Environmental Impact Statement (EIS), and in January 2006 DOT&PF joined with AIDEA to fund the completion of the EIS. In 2007, work on the EIS and feasibility study was suspended and the DOT&PF and USACE funding was redirected. This work may recommence after unified local project support is demonstrated and new funding is secured (AIDEA, 2007).

Ports and harbors do not have specific (dedicated) federal assistance programs similar to highways and airports. In order to qualify for federal funds, a project must satisfy national economic development criteria whose chief aim is to increase the national gross domestic product. Federal priorities include navigation channels and breakwaters. The lack of specific federal assistance programs for marine facilities similar to highways and airports is having a direct effect on the timing, type, and level of marine infrastructure being built in Alaska.

At the state level, Alaska relies on revenue generated from a marine fuel tax of five cents per gallon to address ports and harbor infrastructure needs. Although this tax generates an average of $8 million annually, the state spends only 37 cents for port and harbor improvements for every dollar of marine fuel tax it collects.

2.4 Land Status and Land Use Inventory

2.4.1 Existing Land Uses and Ownership[4]

The primary landowners in the relocation study area are Kikiktagruk Inupiat Corporation (KIC), NANA, and Native allotment owners (see Figure 2-4). KIC is in the process of conveying land to meet present and foreseeable public needs to the City of Kotzebue, primarily the sites of sanitation facilities, the watershed, the cemetery, easements for utilities, and road rights-of-way. DOT&PF owns the existing airport property and has easements for a number of road rights-of-way as well as an Avigation and Hazard Easement containing a reverter clause to KIC. FAA has

[4] Information in this section was taken from the *Kotzebue Airport Relocation Feasibility Land Status Report* prepared for this project by McClintock Land Associates, Inc. in October 2006. The full report is provided in the *Interim Resource Documents* binder.

a restrictive easement out to 2,000 feet around the VORTAC antenna, which is on the mainland across the Kotzebue Lagoon from the airport (Figure 2-5).

Kotzebue Airport

The Kotzebue Airport is located adjacent to and south of the City of Kotzebue, on an irregular-shaped parcel of 1,805 acres, of which 80 to 85 percent is water. Commercial aviation operations, the majority of general aviation tie-downs, and the associated paved apron area and taxiways are located in the northwest section of the airport property. The airport is on land (and water) owned by DOT&PF. Surrounding parcels are owned by KIC, Native allotment owners, and FAA. Land uses on airport property are described in more detail in Section 5, Aviation Facilities Inventory.

The airport's VORTAC antenna is on the mainland east of the lagoon, near the City's water treatment and storage facilities. The land surrounding the antenna appears to be a combination of KIC land, a Native allotment, and the State's Avigation and Hazard Easement. FAA has indicated the need for absolute control of the lands within a 1,000-foot radius of the VOR antenna and heavy restriction on the use of land between the 1,000-foot and 2,000-foot radius.

City of Kotzebue

Photo 2-4 City of Kotzebue

The incorporated limits of Kotzebue encompass 26.5 square miles, of which less than one square mile is located on the spit north of the airport. Most of the higher land on the spit is developed, with remaining areas in lowlands subject to flooding. Nearly all new development in Kotzebue requires that fill be placed to make the lots suitable for building. Development within Kotzebue blends residential housing with commercial use. The City's planning commission is developing a land use plan to maximize use of remaining land on the spit.

The majority of land within the City limits is on the mainland east of the Kotzebue Lagoon. This area is known locally as "The Hillside" where there is already one privately owned subdivision, with access roads and lots for sale. There have been several discussions concerning additional subdivisions in this area. A bridge connects the spit to the mainland, with a road approximately 3 miles long; access is provided to the City's water source at Devils Lake. The Devils Lake watershed and watershed corridors, cemetery site, and recreational site in this area will eventually be conveyed to the City of Kotzebue by KIC under the provisions of the Alaska Native Claims Settlement Act (ANCSA), Section 14(c)(3).

ANCSA 14(c) requires village corporations to convey the surface estate of certain land back to individuals, organizations, municipal governments, and airport operators. KIC and the City of Kotzebue signed an agreement on May 17, 1996, wherein KIC agreed to convey land to the City to meet present and foreseeable public needs, in complete satisfaction of KIC's ANCSA 14(c)(3) obligation. KIC has prepared a draft ANCSA 14(c) Map of Boundaries (MOB), but it has not

been submitted to the Bureau of Land Management (BLM). The 14(c)(3) agreement identifies the following land to be conveyed to the City of Kotzebue:

- A new landfill site (45 acres)
- Kotzebue wastewater treatment site (29.14 acres)
- Sewage lagoon parcel (13.25 acres)
- A watershed (350 acres)
- Two waterline utility easements (6.26 acres and 8.52 acres)
- A water utility line (2.85 acres)
- Vortac Lake Road right-of-way (10.90 acres)
- Cemetery Road right-of-way (1.52 acres)
- A recreation parcel (5.00 acres)
- The watershed/utility corridor (650 acres)

Potential Airport Relocation Areas

Throughout the overall relocation study area, beyond the boundaries of the City of Kotzebue the land is owned primarily by NANA (surface and subsurface) or KIC (surface, with NANA retaining subsurface rights), with a few Native allotments.

Because of the size of the overall area being investigated for potential airport relocation, for purposes of the relocation study this has been divided into three parts, called Area 1, Area 2, and Area 3 (shown on Figure 2-4). Land uses in each of these general areas that might conflict with airport use are listed below.

Area 1 (northern portion of overall study area; contains most of Kotzebue city limits and existing development):

- Subsistence picking of wild plants/berries
- Nesting areas of migratory birds/animal habitats
- Hunting
- Kotzebue water source
- Cemetery
- Current and future landfill
- Wastewater treatment facilities
- Watershed and corridors
- Private subdivisions – residential lots
- Native allotments
- ANCSA 14(c)(1) subsistence campsites
- ANCSA 17(b) 25-foot Noorvik Winter Trail easement (EIN 8, D12, D9)
- ANCSA 17(b) 2,000-foot Vortac Easement (granted to FAA)
- Recreational areas
- Windmill farm
- Access road to beach for gravel extraction
- Beach recreation[5]

Area 2 (central portion; includes Sadie Creek and southwest corner of city limits):

- Subsistence picking of wild plants/berries
- Nesting areas of migratory birds/animal habitats
- Caribou migration
- Hunting
- Watershed
- Increased noise may impact sea mammals and other wildlife
- Native allotments
- ANCSA 14(c)(1) subsistence campsites
- ANCSA 17(b) 25-foot winter trail easement (EIN 12, D1)

[5] Local people use the beach in the areas adjacent to the airport and south along the coast for recreational purposes. The construction of the Lagoon Road has reduced the need for access across the airport safety zone area. (MLA)

Area 3 (southern portion; includes Cape Blossom):

- Subsistence picking of wild plants/berries
- Nesting areas of migratory birds/animal habitats
- Kotzebue people frequent beaches in the area after storms, finding ancient mastodon and mammoth ivory
- Native allotments
- Caribou migration
- Hunting
- Old village sites in the area – may have archeological restrictions
- ANCSA 17(b) 25-foot winter trail easement (EIN 12, D1)
- Nimiuk Point Subdivision development

2.4.2 Current Plans

City of Kotzebue Comprehensive Plan

The *City of Kotzebue Comprehensive Plan* was adopted on December 7, 2000 (City of Kotzebue, 2000). This plan was the culmination of a planning effort that began in 1971 when Comprehensive Plan and Land Use designations and plans were developed but not implemented. Over the intervening years, several variations and updates of the plan were undertaken but never implemented. In 1999, a new City Council, City Manager, and City Planner Engineer reviewed previous planning efforts and held new visioning gatherings in 1999 to identify problems/needs/ issues of Kotzebue. Nine issues were identified: housing, land, gravel, freight, energy, enterprise development, safety, transportation, and infrastructure. The plan was given to the Borough in September 2000 and it was adopted on December 7. Of note is that the first identified goal on the list was "Move airport." (NEI)

Northwest Alaska Transportation Plan

A planning team led by DOT&PF recently completed a two-year planning process that investigated and compared various marine, air, road, and rail alternatives to existing area transportation systems. Using current and projected population figures for the next 20 years, the *Northwest Alaska Transportation Plan* established air and marine infrastructure requirements and potential highway and railroad connections.

Kotzebue Airport Master Plan Update

In 2005, DOT&PF obtained funds from FAA to conduct an Airport Master Plan update. The first phase of this update is an airport relocation feasibility study, of which this report forms a part.

2.4.3 Potential Development

ANILCA §1407 Shareholder Homesite Program

KIC plans to implement a shareholder homesite program near the community on unencumbered land located off of Ted Stevens Way. The homesite distribution allowed under ANILCA §1407 will accommodate 1,953 shareholders on parcels no larger than 1.5 acres each. The development will require survey, platting, and approval for multiple subdivisions, road access, and may require approximately 3,000 acres of unencumbered KIC land. This development will impact a large amount of land near Kotzebue and further congest the current airport property area.

Planning for the shareholder homesite subdivision is expected to take a minimum of two years. Many Alaska Native Corporations have initiated plans for shareholder homesite programs only to discover that the costs and land requirements are too great to be feasible. (MLA)

Port Development and Road to Cape Blossom

The City of Kotzebue investigated the feasibility of a deep water port in 1977 and in 1983 (MLA); the U.S. Army Corps of Engineers performed another study in 2004 (USACE). The studies concentrated on several sites up to 24 miles from Kotzebue. The first port project study, conducted by KPFF Architecture Engineering Planning, proposed the creation of a mooring facility for ocean going barges at one of three sites: Cape Blossom, Isthmus Point, and the present site in front of town. Cape Blossom is located 12 miles from Kotzebue and is owned by KIC, NANA, and several Native Allottees. (MLA)

Development of the port would require that a road be constructed from Kotzebue to Cape Blossom, where maintenance and storage buildings could also be constructed. Electricity lines and water and sewer systems would also need to be developed for infrastructure support. (MLA)

The City of Kotzebue has obtained two earmarks for a road to Cape Blossom. The first is a FFY05 $2 million National Corridor Planning and Development and Coordinated Border Infrastructure Discretionary Program earmark. The second is a $5 million Federal Highways Administration (FHWA) Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) High Priority Project earmark obtained in 2006.

Electric Power Intertie

Inter-village tie power lines have been identified as a means to address the high cost of energy in the region; it would be prudent for future power development to be coordinated with any airport development. (MLA)

2.5 Environmental Overview

2.5.1 Preliminary Research Results

Air Quality

Kotzebue is currently not located within an air quality non-attainment area. The use of an asphalt plant for paving of runways, parking areas, and/or roadways at a new airport location would require a New Source Performance Standards (NSPS) air quality permit under 18 AAC 50.502.

Like many rural villages in Alaska, Kotzebue suffers from seasonally high levels of dust during the summer months. Inhalable coarse dust particulate smaller than 10 microns in diameter (PM_{10}) is often the result of unpaved road use. Sierra Research, Inc. authored a report (*Alaska Rural Dust Control Alternatives*, Draft, February 2006) for ADEC that found that Kotzebue had exceeded the federal 24-hour PM_{10} ambient air quality standard of 150µg/m³ during monitoring which took place from 2002 to 2004. The exceedences occurred during the dry period of the year, between early May and late July.

According to the ADEC Division of Air Quality website, the State may recommend that the EPA designate areas violating the PM_{10} standards (including Kotzebue) as non-attainment areas, or the State and impacted communities may sign a Memorandum of Agreement with the EPA for a pollution reduction plan. The State is currently in the early stages of planning a strategy for compliance with EPA's PM_{10} standards. At this point the State does not know how Kotzebue will be designated, or what controls might be necessary. If Kotzebue is chosen as a non-attainment area for PM_{10}, it could take up to three years from submittal of the State recommendation before controls are put into place.

Coastal Resources

The Kotzebue airport and potential relocation areas are within the Coastal Zone. These areas are under the jurisdiction of the Northwest Arctic Borough Coastal Management District, and an Alaska Coastal Management Program (ACMP) review of any construction activities would be required.

Compatible Land Use

The State of Alaska (Department of Natural Resources [ADNR]) is a major land owner on the Baldwin Peninsula with land holdings south of Kotzebue. The primary private land holders in the area are NANA and Kikiktagruk Inupiat Corporation (KIC). KIC lands are primarily around the city of Kotzebue, while NANA lands are spread throughout the Northwest Arctic Borough and include lands near villages such as Kotzebue, as well as the subsurface estate of all KIC lands. Native allotments are interspersed throughout the area. Coordination with the State of Alaska, Native corporations, and Maniilaq Association will be necessary to determine compatible land use for a relocated airport.

Kotzebue is also adjacent to several federally protected areas including the Cape Krusenstern National Monument, Noatak National Park, Kobuk Valley National Park, Selawik National Wildlife Refuge, Bering Land Bridge National Preserve, and Alaska Maritime National Wildlife Refuge. Consultation with the National Park Service (NPS) – Western Arctic Parklands and the U.S. Fish and Wildlife Service (USFWS) will be necessary to determine compatible land use with these federally owned sanctuaries.

Potential land use conflicts common to all three relocation areas include subsistence gathering, hunting, native allotments, ANCSA 17(b) trail easements, and nesting and habitat areas for migratory birds and other animals. Additional potential conflicts in Area 1 include the current and future landfill, wastewater treatment facilities, windmill farm, cemetery, and city water source. Within Area 2, other potential conflicts include ANCSA 14(c) subsistence campsites. Within Area 3, additional potential conflicts include the Nimiuk Point Subdivision development, old village sites, and the gathering of mammoth ivory after storms by local people.

For further information on land status and land use, see Section 2.4 above.

Construction Impacts

The degree of construction impacts will be better known once an airport relocation area becomes more defined. It is reasonable to assume that some dust, noise, and temporary impacts to air and water quality would be experienced.

Section 4(f)

No publicly owned parks, recreation areas, wildlife or waterfowl refuges, or any publicly or privately owned historic sites are known to be in the areas under consideration for airport relocation. Areas with the highest potential of containing historic sites protected under 4(f) are described on page 2-26 under "Historic, Architectural, Archaeological, and Cultural Resources" and shown on Figure 2-6. Section 4(f) properties outside the project area but in the vicinity of Kotzebue are discussed in Section 2.5.1 under "Compatible Land Use."

Farmlands

There are no farmlands on the Baldwin Peninsula. Reindeer farming (herding) was introduced to the Kotzebue area in 1897; however, this limited form of agriculture factors very little into the current economy of Kotzebue.

Fish and Wildlife[6]

Wildlife issues relevant to relocation of the Kotzebue airport were determined through two interviews with James Dau, the Regional Wildlife Biologist for Kotzebue with the Alaska Department of Fish and Game [ADF&G] in December 2005 and October 2006, and through review of pertinent ADF&G reports and other references on wildlife resources and habitats on the Baldwin Peninsula and Kotzebue region. Mr. Dau identified caribou (and feral reindeer) as the primary species of concern because of their large numbers and their socioeconomic importance in the area. Large numbers (tens of thousands) of both Teshekpuk and Western Arctic caribou migrate onto the Baldwin Peninsula regularly during the winter, but few remain for any length of time, as evidenced by the lack of observations of satellite-collared caribou on the peninsula. Mr. Dau indicated that although airport relocation along with the new associated facilities and roadways could push caribou out of the immediate vicinity of Kotzebue and the new airport, the impacts were unlikely to have a long-term detrimental impact on caribou. Displacement of caribou would make it more difficult for subsistence hunters to access the herd but local hunters likely would adjust to find caribou in other areas. Although moose and brown bears are present on the Baldwin Peninsula, they occur too infrequently and in such low numbers (fewer than 30 moose) that they are unlikely to be major concerns.

Other consumptive and non-consumptive wildlife issues along the Baldwin Peninsula include gamebird hunting, recreational and subsistence activities (birding, egging, berry-picking), and trapping. Ptarmigan are frequently hunted in the brushy areas of the peninsula from Kotzebue south to Cape Blossom, which is a favorite area for locals to hunt birds. Waterfowl habitat is abundant in the study area (Sadie Creek area), and waterfowl hunting and egging are common activities for Kotzebue residents. Recreational birding, while not as active as it is in areas such as Nome, is gaining popularity in Kotzebue, and recreational birders (primarily tourists) often drive along the beach south of Kotzebue in search of birds. Trapping is also a common activity in the area, with red fox being the primary target species, although river otters are also taken.

Other species found on the Baldwin Peninsula and Kotzebue area include musk oxen, tundra hares, arctic ground squirrels, and numerous species of terrestrial and marine birds.

[6] Information in this section was taken from ABR Inc., Environmental Research and Services' *Fish and Wildlife Resources* report prepared for PDC in November 2006. The full report is available in the *Interim Resource Documents* binder.

According to the ADF&G Fish Distribution Database, there are no anadromous fish streams on the northern Baldwin Peninsula.

Threatened and Endangered Species: No terrestrial species of birds or mammals listed as threatened or endangered under the Endangered Species Act are likely to occur in the project area.

The Baldwin Peninsula is within the historic range of both the Steller's Eider (*Polysticta stelleri*) and the Spectacled Eider (*Somateria fischeri*), both of which are federally listed, threatened species. The two species are not known to commonly migrate through the Kotzebue area or use the Baldwin Peninsula. The current breeding range of the Spectacled Eider in Alaska is on the North Slope and the Yukon-Kuskokwim (Y-K) Delta, while the species' winter range is in the Bering Sea near St. Lawrence Island. The current range of the Steller's Eider in Alaska consists of breeding ranges on the North Slope and Y-K Delta and winter ranges in the Aleutian Islands and coastal areas of the Alaska Peninsula. During preparation of a project-specific Environmental Assessment or Environmental Impact Statement, the USFWS will be contacted for consultation concerning these species as required under the Endangered Species Act.

Marine species are unlikely to be affected as the proposed project is not likely to extend into the marine environment. The National Marine Fisheries Service (NMFS) website was reviewed to determine if any species under their jurisdiction might be affected by the proposed project. No threatened or endangered marine species occur in the areas likely to be affected by the proposed project.

Floodplains

Kotzebue participates in the National Flood Insurance Program, and Flood Insurance Rate Maps (FIRM) are available for the area. According to the USACE website, the 100-year flood was likely a coastal storm that occurred in August 1990. This flood did not reach the first floor of any major buildings. Kotzebue has had no other flooding reported by the USACE. The FIRM shows mostly areas of minimal flooding and areas between the limits of the 100-year and 500-year floods. During the 100-year flood event, the coastal area to the west of the airport is estimated to have a flood elevation of 10 feet and the lagoon side of the airport is estimated to have a flood elevation of 7 feet.

Residents and airport users have expressed concern about the effects of climate change and potential flooding of the community and the airport. Reportedly, during storm events the lagoon water rises to within a few feet of the runway embankment.

Hazardous Materials

An Environmental Data Resources (EDR) Datamap – Area Study was obtained in December 2005. The study area encompassed the existing airport and the western portion of the Baldwin Peninsula south to Cape Blossom. All sites identified at the airport were either small quantity generators with no violations found or underground storage tanks that are permanently out of use. The EDR Datamap identified no contaminated sites in the areas proposed for the airport relocation outside of Kotzebue.

A search of the ADEC contaminated sites (CS) and leaking underground storage tank (LUST) databases found several contaminated sites associated with the U.S. Air Force "White Alice" System. This long-range radar facility, which operated until 1984, is located near the coast approximately 3 miles south of Kotzebue, immediately south of the boundary between Areas 1 and 2. Although soil and groundwater contamination exist at the site, the ADEC staff manager for Kotzebue believes the contamination has not reached the airport. Known plumes have not moved off-site, and groundwater is believed to flow west toward the ocean.

Another site, known as City of Kotzebue (1987320134401), is located within Kotzebue. In 1980, up to 200,000 gallons of #1 diesel was discovered that had leaked or spilled from an unknown source and spread underground across up to 10 acres and onto the airport property, which is suspected to be heavily contaminated. ADEC believes the contamination resulted from overfills at multiple fuel tank farms. According to ADEC staff, contamination below cleanup levels is found from about 6 inches to 1 foot below ground surface (bgs), with contamination above cleanup levels usually found at 2 feet bgs. Groundwater near this site is not used for drinking, and remediation has recovered approximately 40,000 gallons of diesel. In 1988, a 435-foot barrier was installed along the beach to prevent migration of the contamination into Kotzebue Sound. DOT&PF has a Work Plan for construction at the airport to deal with contamination from the City of Kotzebue site. ADEC plans to drill 24 airport sites in Spring 2008 to determine the extents of contamination. ADEC has worked with DOT&PF in the past on projects at the Kotzebue Airport and is willing to do so again as needed.

Historic, Architectural, Archaeological, and Cultural Resources

A search of the National Register of Historic Places identified the nearest historic place as the Cape Krusenstern Archaeological District National Monument. This area is located several miles to the north of Kotzebue and to the west of the Noatak River. Because the Cape Krusenstern National Monument is not on the Baldwin Peninsula, it is not likely that the proposed project would impact the area.

Northern Land Use Research Report Summary: Northern Land Use Research (NLUR) completed a Cultural Resource Analysis for the airport relocation in October 2006. This analysis included research into archival information including the Alaska Heritage Resources Survey, as well as information derived from a helicopter over-flight of the Baldwin Peninsula that occurred on August 30, 2006.

The analysis performed by NLUR determined that the majority of the cultural resources present on the Baldwin Peninsula are located in and around present-day Kotzebue and the adjacent coastal regions within one half mile of the shoreline. The coastline of the Baldwin Peninsula is considered to have high to moderate archaeological and historic site potential, while the interior generally has lower site potential. Areas with the highest potential for containing cultural/ historic resources are shown on Figure 2-6.

Within Relocation Area 1 the largest concentration of historic resources are present near the town of Kotzebue. Kotzebue has been in use by various human inhabitants for thousands of years, and archaeological evidence of this is present in the form of house pits, grave sites, and other artifacts. The Kotzebue Archaeological District, which encompasses the whole spit and

existing airport, was deemed eligible for inclusion to the National Register of Historic Places by the State Historic Preservation Office (SHPO). However, the Kotzebue Archaeological District has not been formally placed on the National Register. The many historic sites in Kotzebue are not considered contributing elements to the archaeological district, but are rather considered part of Historic Kotzebue, which has not been evaluated or nominated as a district. (One section of Front Street has been evaluated and proposed as a historic district, but not formally nominated.) An active cemetery is located on the bluff east of Kotzebue and immediately north of the approach to the primary runway. Other potential historic features of Area 1 include a small cabin and a possible reindeer herding corral, which are both over one half mile from the coast.

Historic resources that have been identified within Relocation Area 2 are similar to those in Area 1 and are all located within a half mile of the coast. No sites were observed during the helicopter over-flight within the interior of Area 2. Sadie Creek is the only area further than a half mile inland that is considered to have high potential for cultural resources, due to subsistence resource gathering in the area and the use of the area as an access corridor to the interior of the peninsula.

As is the case in the previous two areas, potential historically significant resources in Area 3 are located within a half mile of the coast. NLUR considers the existence of significant cultural resources located more than a half mile from the coast unlikely.

Overall, NLUR believes that activities more than one half mile from the shore in Areas 2 and 3 would be unlikely to disturb historic resources. Within Area 1 the likelihood of impacting historic resources decreases significantly more than one half mile from the Kotzebue Bluff with the exception of the few isolated sites in the interior that may have historic significance. If impacts occur at the southern neck of the Baldwin Peninsula, it is the opinion of NLUR that further evaluation will be necessary.

Light Emissions and Visual Impacts

Because the proposed project seeks to move the airport farther away from Kotzebue than its current location, it is reasonable to assume that light emissions and visual impacts to residents would not be any greater than they are currently.

Natural Resources and Energy Supply

The Kotzebue Electric Association (KEA) currently uses diesel power generation as the primary source of electricity production. In addition, thirteen wind turbines supplement electricity with plans for three more to be constructed, which could lead to a maximum non-diesel generation potential of nearly 50 percent (1.5 million kilowatts). KEA's wind-energy project is the largest in the state of Alaska.

Noise

Because the proposed project seeks to move the airport farther away from Kotzebue than its current location, it is reasonable to assume that noise impacts to residents of the area would not be any greater than they are currently.

Secondary Induced Impacts

Secondary induced impacts will be addressed during the preparation of the environmental document.

Socioeconomic, Environmental Justice, and Children's Environmental Health and Safety Risks

Socioeconomics, environmental justice, and children's environmental health and safety risks will be addressed during the preparation of the environmental document.

Water Quality

The potential relocation areas include or are adjacent to Kotzebue Sound, Kotzebue Lagoon, Devil's Lake, June Creek, Sadie Creek, and numerous other small water bodies scattered across the northern Baldwin Peninsula. Kotzebue's potable water is supplied from Devils Lake, which is located 3 miles from the city.

Wetlands

Non-digital NWI Maps are available for the Baldwin Peninsula. Maps of Kotzebue D-1, D-2, and C-1 encompass the relocation areas.

ABR Report Summary: ABR Inc., Environmental Research and Services completed a wetlands assessment of the Baldwin Peninsula in November 2006 (full report included in the *Interim Resource Documents* binder). This assessment was based primarily on a helicopter over-flight survey conducted on August 28, 2006. Aerial photographs were taken during the over-flight to determine wetland communities. Previous reports of wetlands and their functional values, as well as soil survey information, were also utilized in the assessment.

The Baldwin Peninsula is underlain by permafrost and consists almost entirely of wetlands. Uplands do occur as small inclusions along the margins of drained lake basins, on ridges associated with hilly terrain northeast of Kotzebue, and along the coastal margins of the peninsula. They are probably dominated by low and tall (depending on wind exposure) shrubs and dwarf ericaceous shrubs. Moist Sedge Tundra (including Tussock Tundra) and Moist Sedge-Shrub Tundra are the dominant wetland communities in the potential Relocation Areas 1 and 2. Relocation Area 3 was found to have wetland types similar to the other two areas; however, Area 3 is wetter overall, with large expanses of Wet and Moist Sedge Tundra.

The highest value wetlands, in terms of habitat use, identified within Area 1 are in the vicinity of the current airport and include estuarine habitats associated with the Kotzebue Lagoon. The greatest proportion of high-value wetlands within Relocation Area 2 are a well developed wetland complex associated with Sadie Creek and several old lake basins. Within Relocation Area 3, the most notable wetland areas are two estuarine marsh and mudflat complexes associated with drainages intersecting the southern coast approximately 1.5 miles and 4.5 miles east of Cape Blossom. (See Figure 2-6.)

The primary function of wetlands in the relocation areas is in providing feeding, breeding, and staging habitats for migratory birds and large mammals including moose, caribou, and brown bear.

Wild and Scenic Rivers

The nearest Designated National Wild and Scenic River is the Noatak River, which is located to the north of the Baldwin Peninsula. The airport relocation would not have any direct impacts on the Noatak River.

2.5.2 Other Considerations

Bird Strike Information/Wildlife Hazards

The FAA does not segregate bird strike information based on the individual airport occurrences. The existing Kotzebue airport is located directly adjacent to the community wastewater treatment facility, which acts as an attractant for birds that could potentially become aircraft hazards. Relocating the airport to a location further from the wastewater treatment facility would most likely decrease bird hazards.

In addition, a Class 2 balefill/landfill is located south of the existing airport on the west side of the Air Force Road (Sec 21 and 22, T17N, R18W, KRM).

2.6 Geology and Soils / Potential Material Sites

The full soils report prepared by R&M Consultants in October 2007 is included in Appendix A.

2.6.1 Geology

The Baldwin Peninsula is a narrow land feature, of about 150 to 175 square miles, bounded on the west by Kotzebue Sound, off the Chukchi Sea, and on the east by Hotham Inlet. This peninsula is interpreted to be a terminal moraine, created at the end of a pre-Wisconsin glacial advance, but is not currently glaciated. The peninsula is situated in the *Kobuk-Selawik Lowlands* physiographic division, characterized by rolling, lake-dotted lowlands with gently sloping hills to about 350 feet in elevation, and surrounded by coastal, wave-cut bluffs and a narrow beach. Surface drainage from the peninsula generally flows to the west, into Kotzebue Sound, following June Creek, Sadie Creek, Riley Creek and two or more other unnamed courses east of Cape Blossom. The project area is generally covered with moist to wet tundra vegetation.

The surficial geology of the Upper Baldwin Peninsula is comprised of variable marine, estuarine, glaciomarine and glacial sediments, over Mid- to Late Tertiary sandstone, conglomerate and shale, early Tertiary volcanic rock, and Pre-Tertiary metamorphic rock. There are no bedrock outcrops on the peninsula, and the depth of unconsolidated surficial deposits is unknown. A test well drilled at Kotzebue in the early 1950s to a depth of 326 feet did not encounter bedrock, and an exploration well drilled (mid 1970s?) near Nimiuk Point, on the east side of the peninsula, found at least 190 feet of "sand, silt and clay."

The Upper Baldwin Peninsula is underlain by continuous permafrost, likely extending to depths of at least several hundred feet. The shallow permafrost is interpreted to contain significant volumes of ground ice, regardless of elevation or topography, based on a prevalence of thermokarst terrain (*e.g. thermokarst lakes, thaw sinks, thermo-erosional niches, beaded streams, thaw bulbs, and ice-wedge casts*), and massive ground ice forms indicated by polygon-patterned ground and visible in many of the coastal bluffs. The shallow permafrost also appears to be moderately warm (i.e., above about 28 to 30°F).

This region of Alaska is characterized by moderately-low seismicity. The closest mapped faults with interpreted Holocene age displacements are about 110 miles south of Kotzebue. Since 1898, 13 earthquakes with *Local Magnitude* (M_L) greater than or equal to 5.0 have been cataloged within about 150 miles of Kotzebue; the largest of these being events of M_L 6.5 (in 1950) about 130 miles to the south, and M_L 5.9 (in 1973) about 150 miles to the east.

2.6.2 General Soil Units

For the purpose of this study, the surficial soil deposits can be grounded into six general units:

- **Estuary deposits** consisting of the fine-grained silt and clays that eroded from the coastal bluffs, or were discharged from the Kobuk and Noatak Rivers. Around Kotzebue, such deposits have been described as loose to medium dense, silt and organic silt.
- **Beach deposits** of sand and fine, rounded to subrounded gravel have accumulated around portions of the Upper Peninsula, likely comprised of materials eroded from the glacial till and glaciofluvial units exposed in the coastal bluffs, and then transported by long shore currents (notable spits have formed around the Upper Peninsula at Kotzebue, Pipe Spit and Nimiuk Point). These coarse-grained deposits, where present, are typically narrow and thin; although similar coarse-grained materials have been reported more than one-half mile offshore of Sadie Creek and Cape Blossom.
- **Lagoon deposits** generally consisted of soft organic-rich silts and fine sands, situated between the beach and coastal bluff (e.g. along east side of the Kotzebue Airport).
- Away from the coast, the Upper Peninsula are likely mantled with very fine-grained, non- to moderately plastic silt **upland deposits** including eolian, colluvium and lake (lacustrine) deposits; locally up to 50 to 70 plus feet thick, and likely interspersed with amorphous and coarse organic matter (including buried layers of peat and wood from old forests). This general soil unit is likely ice-rich, and very unstable and susceptible to rapid erosion when unfrozen.
- Sporadic (discontinuous) and thin sections of coarse-grained **glaciofluvial materials** have been observed in the coastal bluff around the peninsula, sandwiched between the upland silt and glacial till units. From limited observation, this unit also appears to contain some cobble and boulder sized materials.
- The Upper Baldwin Peninsula is cored by a **glacial till**, described as a heterogeneous mix of non to moderately plastic fine-grained glacial and reworked marine deposits. Based on very limited information, the top of the glacial till near Kotzebue may be above sea-level, but may occur deeper, below sea-level, near Sadie Creek and along the coast on either side of Cape Blossom.

2.6.3 Material Sources

Based on conceptual estimates, upwards of three million cubic yards of borrow material may be required for construction of an entirely new airport, excluding the pavement section and access road to Kotzebue. Based on a literature search, there are two general areas of interest on the Upper Baldwin Peninsula which may contain coarse-grained material suitable for forming new embankments and possible aggregate for pavements, including beach (and offshore) deposits near Cape Blossom, and the buried glaciofluvial deposits along the eastern side of the peninsula. While no substantial explorations have yet been completed, the latter of these two areas may have the greatest potential for containing significant quantities of suitable borrow and aggregate anywhere on the Baldwin Peninsula; although, we do not consider there is much likelihood that a source of rock (e.g. for bank protection or air-convection embankment) could be found anywhere on the peninsula. However, there are other known, or previously considered (by others) sites around the Kotzebue Sound region, which could be developed to provide borrow, aggregate and/or rock materials. The following table summarizes seven potential areas which may be found, subject to field exploration, to contain such significant volumes of materials suitable for this project. Maps of these areas are provided in Appendix A.

Table 2-6 – Potential Material Source Areas, Kotzebue Sound Region

Areas of Interest		Type of Materials Likely Present	Potential to Produce Significant Quantities
Baldwin Peninsula			
1	Cape Blossom	Beach Deposits: Sand, gravel and silt	Poor to Moderate
2	Northeast Coast	Glaciofluvial: Sand, gravel and silt	Poor (to High?)
Other Kotzebue Sound Areas			
3	Lower Noatak River	Sand, gravel and bedrock	High
4	Deering-Candle	Bedrock	High
5	Candle-Buckland	Bedrock	Moderate to High
6	Noorvik-Kiana	Sand, gravel and bedrock	High
7	Lower Baldwin Peninsula	Sand and gravel	Poor to Moderate

2.6.4 Geotechnical Considerations

Airport Siting

Away from the coastal bluff and beaches, the foundation soils across the Upper Baldwin Peninsula are anticipated to be perennially frozen, rich with ground ice, extremely susceptible to thermal disturbance, and very easily eroded when unfrozen. In particular, the consequences of any thermal disturbance (i.e., thawing and or warming of the permafrost) could be expected to result in settlements (associated with thaw-consolidation, and/or secondary creep, especially in permafrost comprised of massive ice forms) that well exceed allowable surface tolerances; or bearing failures under the embankment (e.g., mass slope or lateral spreading movements). Therefore, conceptual planning should consider the following idealized criteria for selecting a potential site(s) for the new airport:

- The new airport should be situated as close as possible to Kotzebue to minimize costs associated with construction and long-term maintenance of the access road.
- The foundation soil conditions should be as uniform as possible, especially under the airport pavements with strict settlement tolerances.
- Areas containing massive ground ice (ice wedges and lenses) should be avoided (however, the absence of patterned ground or thermokarst features may not necessarily correlate directly with the absence of massive ground ice[7]).
- Cuts should be avoided, especially in ground adjoining the aircraft operating areas (including for drainage).
- Flat terrain is preferable to rolling terrain to minimize fill quantities and to maintain a uniform fill thickness, especially along the runway (i.e. to minimize quantities and differential settlements associated with secondary creep in the underlying permafrost).

[7] McCulloch and Hopkins (1966) observed ice wedges around the Upper Peninsula truncated below the current active layer (and not obvious at the surface), which they attributed to a period of much warmer climate conditions, between about 10,000 to 7,000 years ago, when the region was forested and experienced deeper seasonal thaw.

There is not sufficient information at this time to specifically evaluate the relative merits or concerns at any one site, or between alternate sites. However, based on the preliminary interpretation of the foundation soil conditions, there could be a higher likelihood of a new airport located near the north tip of the peninsula meeting or coming closer to these idealized criteria, relative to a site elsewhere. For example, the foundation soils at a new airport located in Alternate Area 1 would likely be more stable relative to sites in either of the other two areas: e.g., the magnitude of potential thaw and consolidation settlements is likely lowest in Area 1; the settlements would likely be more uniform in Area 1, and there could be less potential for lateral spreading or significant slope failures in the embankments in Area 1. Further, there is likely greater potential for massive ice formations and variable permafrost (i.e., abrupt or dramatic changes in the depth to permafrost) in Areas 2 and 3; and more variable terrain (i.e., abrupt and dramatic changes in fill thickness) in Area 2, versus in Area 1.

Embankment Sections

Further design of the airport and access road embankments will require extensive field investigation and engineering analysis to assure their thermal and physical stability, particularly to limit surface deformations and maintain sufficient foundation bearing capacity. However, until such time as the actual foundation conditions at a specific airport site(s) have been investigated, conceptual planning should consider that for airport surfaces sensitive to movements:

- The embankments should be formed with coarse-grained materials (rock, gravel and sand), reinforcement with multiple layers of very stiff, high-strength geosynthetics to assure physical stability relative to bearing, slope or lateral spreading failures;
- Embankment sections should incorporate rigid insulation and/or thick zones of poorly-graded stone to enhance cooling by natural convection {*air convection embankment*; Goering, 1996}, especially under the shoulders, to prevent thaw degradation and minimize warming in the shallow permafrost; and,
- The embankment section should be as thin as possible, or incorporate light-weight fill (e.g., blocks of expanded polystyrene) to reduce surface loading and thereby minimize the potential magnitude of settlements associated with creep in the underlying permafrost.

Based on these preliminary considerations, conceptual design of a new airport should consider that in Area 1 the primary embankments should be at least eight feet thick; about 50 percent of the embankments should be insulated to mitigate the rate of thermal disturbance; and about 25 percent of the in-situ materials recovered from cuts would be reusable as fill, at least in the safety areas and aviation support areas. In Area 2, the primary embankments should be at least 10 to 12 feet thick; all embankment comprised of less than 12 feet of fill should be insulated; and none of the in-situ materials recovered from cuts would be suitable for reuse as fill, at least prior to it being thawed and drained. And in Area 3, the primary embankments should be at least 10 to 12 feet thick; all embankment comprised of less than 12 feet of fill and situated over shallow permafrost should be insulated; embankments formed over thermokarst lakes (i.e. presumed very deep permafrost) should be surcharged to accelerate consolidation settlements in the foundation soils prior to constructing the pavement structure; and none of the in-situ materials recovered from cuts would be suitable for reuse as fill, at least prior to it being thawed and drained.

Material Source

Conceptual planning should consider the following assumptions; at least until such time as the specific airport site(s) and actual material needs have been determined:

- Due to the huge volume of material that will be needed, several material sources within the Kotzebue Sound region will have to be developed to provide the borrow, aggregate and stone necessary to construct the new airport.
- The movement of much, if not all coarse-grained borrow, aggregate and stone between the material source(s) and airport site will involve some transport by barge.
- Development of any material source will require significant infrastructure, including access roads and barge loading and unloading facilities.

Future Geotechnical Investigations

Further study of the feasibility of relocating the Kotzebue airport within the Upper Baldwin Peninsula would require thorough reconnaissance explorations at specific airport and material source sites, including: aerial-photography interpretation; topographic and bathymetric mapping; test borings supplemented with geophysical surveys to characterize the foundation and material conditions (e.g., soils, ground ice and temperature), and laboratory testing to characterize the general soil index and physical properties.

600 300 0 600 1200 1800
SCALE IN FEET

200 100 0 200 400 600
SCALE IN FEET

INSET A

200 100 0 200 400 600
SCALE IN FEET

INSET B

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CONSULTANT :

PREPARED BY:
PDC, INC.

PROJECT :
KOTZEBUE AIRPORT
RELOCATION FEASIBILITY STUDY
KOTZEBUE, ALASKA

SHEET TITLE :
EXISTING AIRPORT
FACILITIES

DESIGN	RAA
DRAWN	GCS
CHECKED	RLC
DATE	SEPT 2007
PROJECT No.	F05077
FIGURE	2-1

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KOTZEBUE AIRPORT TERMINAL AREA BUILDING OCCUPANTS:

1. ADOT&PF ARFF/SREB/FSS (UNDER CONSTRUCTION)
2. ARCTIC TRANSPORTATION SERVICES
3. FBX
4. ALASKA AIRLINES, INC.
5. BAKER AVIATION, INC.
6. DRAKE INVESTMENTS, LLC
7. ALASKA WING, CIVIL AIR PATROL
8. CROWLEY MARINE SERVICES, INC.
9. GUARDIAN FLIGHT, INC.
10. HAGELAND AVIATION SERVICES, INC.
11. ADOT&PF
12. BERING AIR, INC. AND ARCTIC BLUES ESPRESSO AND GIFT
13. BERING AIR, INC.
14. FRONTIER FLYING SERVICE, INC.

150 75 0 150 300 450
SCALE IN FEET

FIGURE 2-2

PROJ. No. F05077

SEPT. 2007

DESIGN: RAA
DRAWN: GDS
CHECK: RLC

KOTZEBUE AIRPORT RELOCATION FEASIBILITY STUDY
LEASE LOT FACILITIES - RUNWAY 8-26

KOTZEBUE, ALASKA

PREPARED BY:
PDC, INC.

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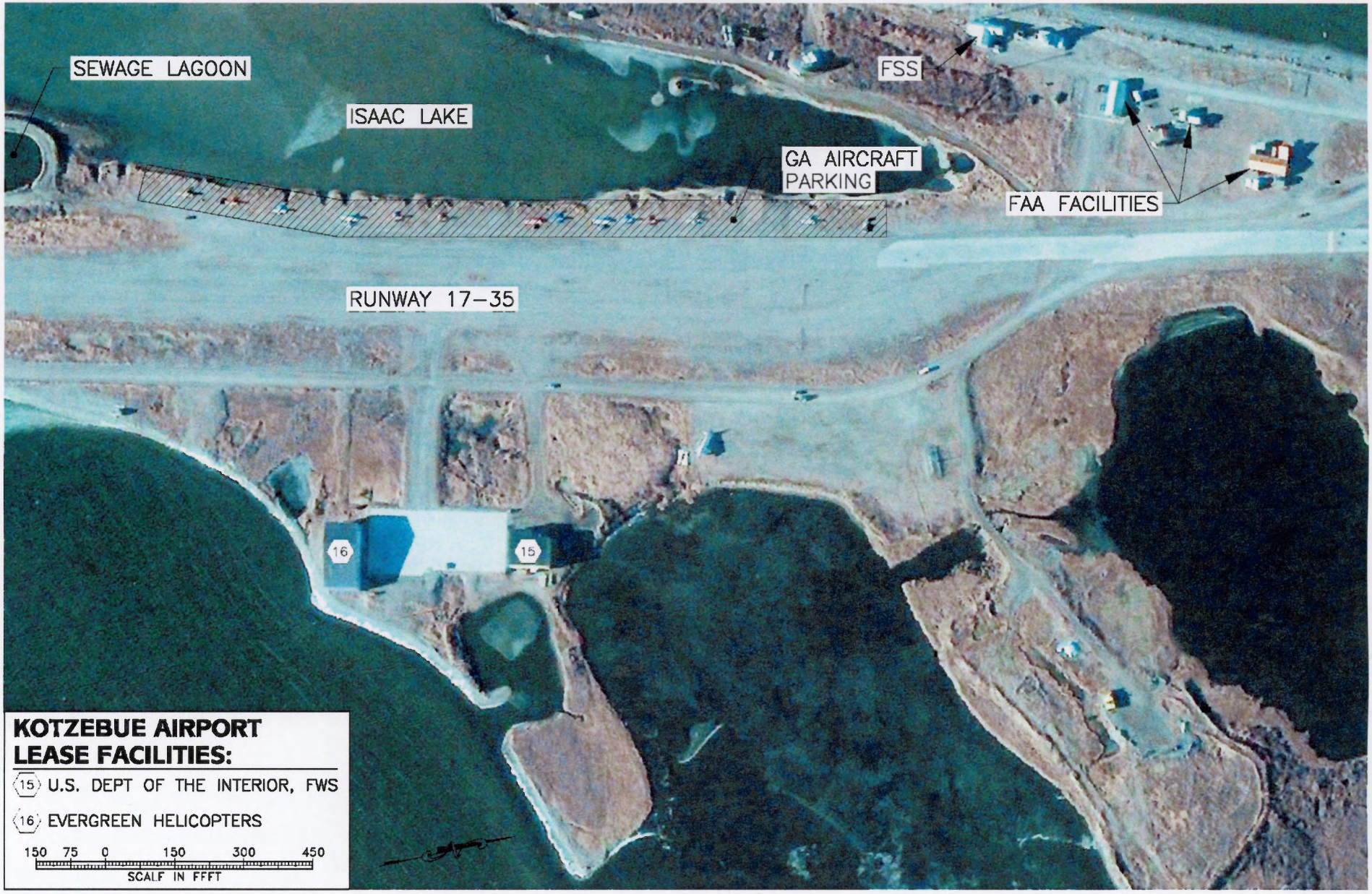


FIGURE 2-3

PROJ. No. F05077

SEPT 2007

DESIGN:	RAA
DRAWN:	GDS
CHECK:	RLC

KOTZEBUE AIRPORT RELOCATION FEASIBILITY STUDY
LEASE LOT FACILITIES - RUNWAY 17-35

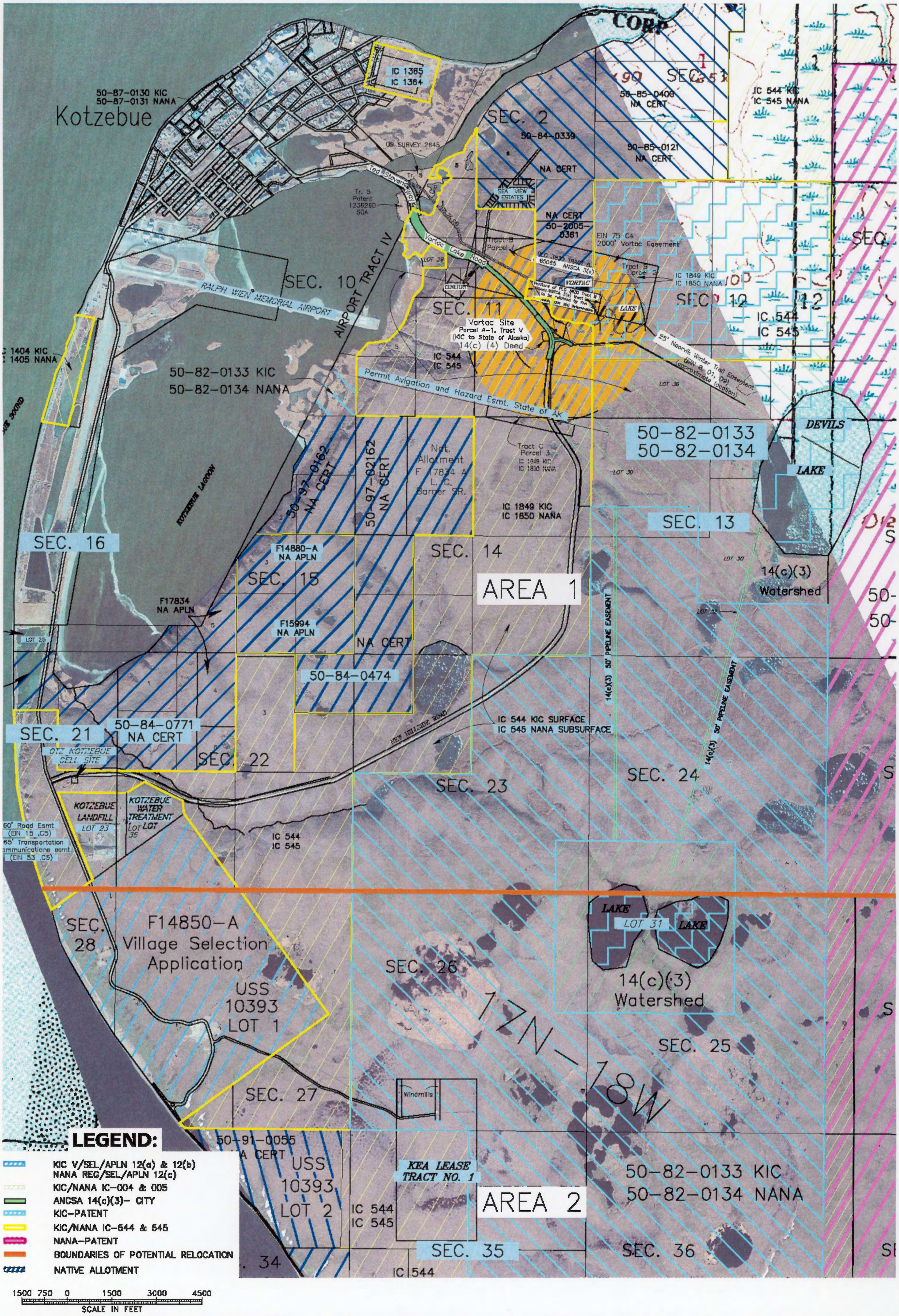
KOTZEBUE, ALASKA

PREPARED BY:
PDC, INC.

BALDWIN PENINSULA LAND STATUS MAP - FIGURE 2-4

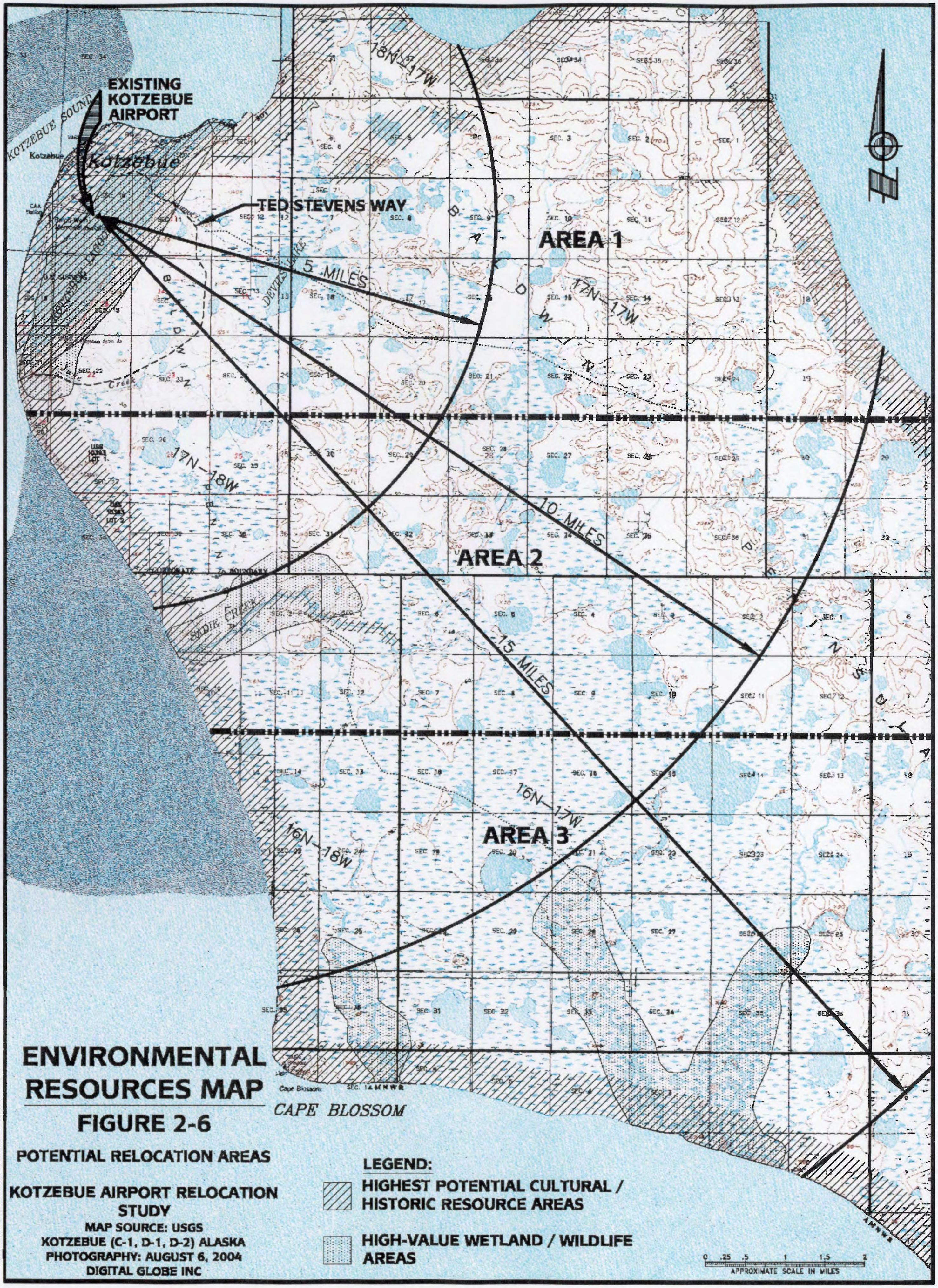
KIC V/SEL/APLN 12(a) & 12(b)
NANA REG/SEL/APLN 12(a)
KIC/NANA IC–004 & 005
ANCSA 14(c)(3)– CITY
KIC–PATENT
KIC/NANA IC–544 & 545
NANA–PATENT
BOUNDARIES OF POTENTIAL RELOCATION AREAS
NATIVE ALLOTMENT

KOTZEBUE SOUND
KOTZEBUE SOUND
AREA 1
AREA 2
AREA 3
15N–16W
16N–16W
16N–17W
15N–17W
17N–16W
17N–17W
18N–17W
15N–16W
HOTHAM INLET
(KOBUK LAKE)
HOTHAM INLET
NORTH



SHEET TITLE: KOTZEBUE LAND STATUS MAP	PROJECT: KOTZEBUE AIRPORT RELOCATION FEASIBILITY STUDY KOTZEBUE, ALASKA	PREPARED BY: McCLINTOCK LAND ASSOCIATES, INC.		CONSULTANT:

DESIGN	RAA
DRAWN	MLV/GPS
CHECKED	RLC
DATE	SEPT 2007
PROJECT No.	F05077
FIGURE	2-5



ENVIRONMENTAL RESOURCES MAP

FIGURE 2-6

POTENTIAL RELOCATION AREAS

KOTZEBUE AIRPORT RELOCATION STUDY

MAP SOURCE: USGS
KOTZEBUE (C-1, D-1, D-2) ALASKA
PHOTOGRAPHY: AUGUST 6, 2004
DIGITAL GLOBE INC

LEGEND:

HIGHEST POTENTIAL CULTURAL / HISTORIC RESOURCE AREAS

HIGH-VALUE WETLAND / WILDLIFE AREAS