APPENDIX C

NOATAK ROAD AND AIRPORT FEASIBILITY ANALYSIS

Page

Alaska Department of
Transportation & Public Facilities

Project Information
November, 2004

Noatak Road and Airport

Project Description

The Alaska Department of Transportation and Public Facilities is currently performing a preliminary engineering and economic study to evaluate the feasibility of these two transportation projects. The study area is between the Village of Noatak, and the existing Red Dog Mine Road.

This information booklet contains a variety of maps and data produced and collected for this project. All data should be considered preliminary, as no detailed design or environmental work has been performed.

The road and airport projects evaluated in this study include:

- Constructing a road to connect the Village of Noatak with the Red Dog Mine Road

- Constructing a new airport in the vicinity of the Village of Noatak

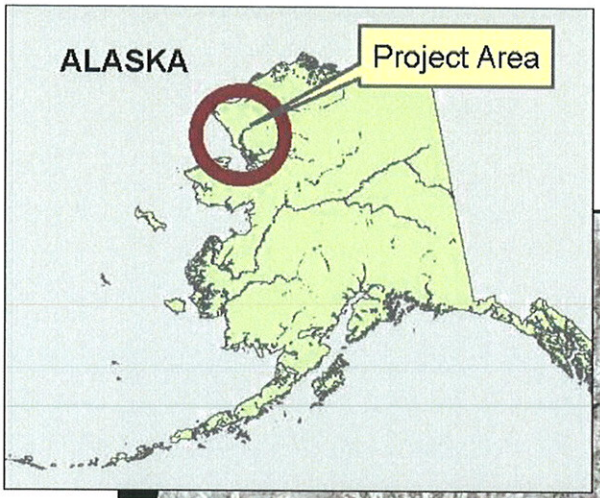
Project Contacts are:

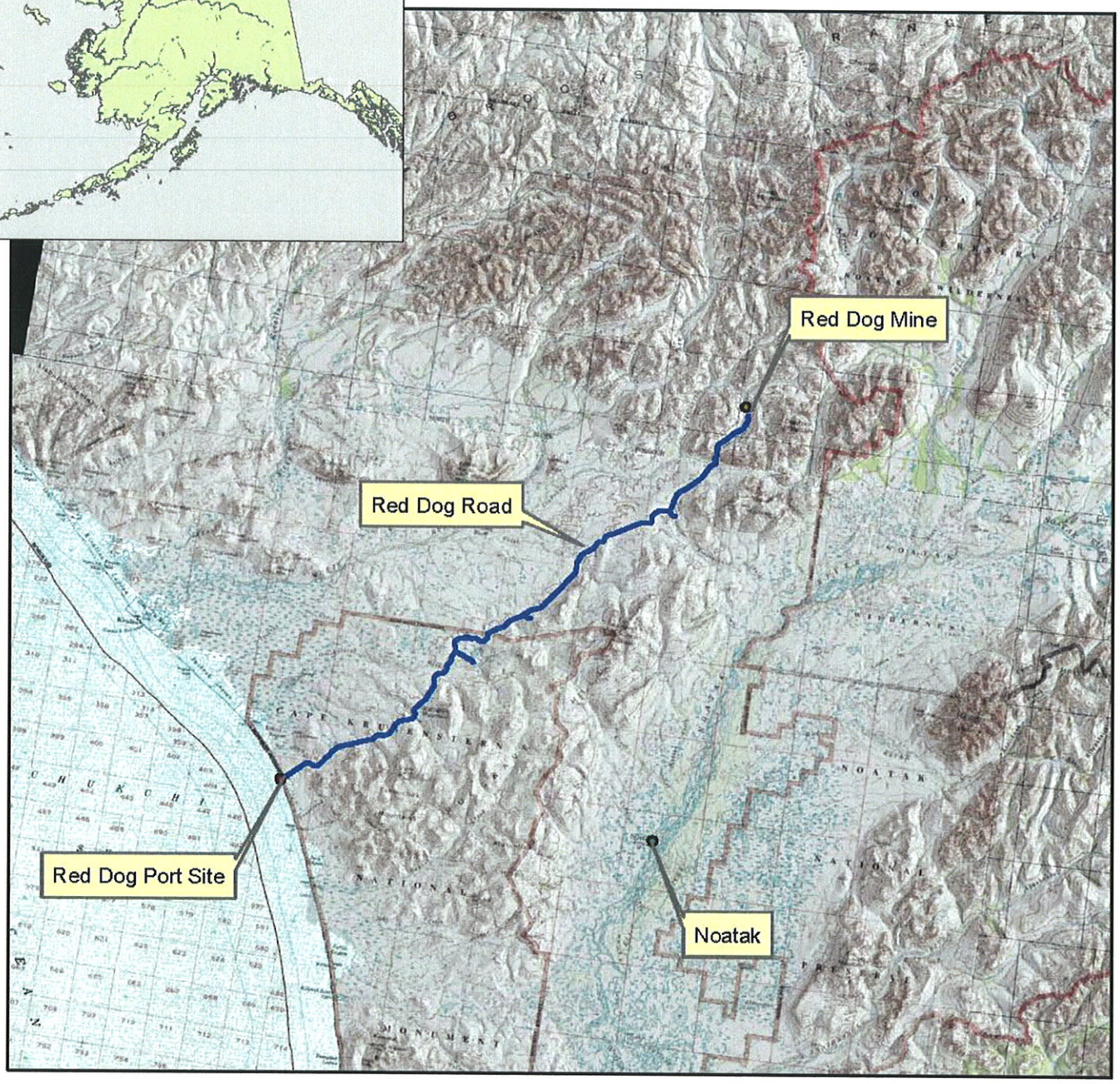
Ryan Anderson, P.E.	Ryan_anderson@dot.state.ak.us	907-451-5377
Patricia D. Miller, P.E.	Patty_miller@dot.state.ak.us	907-451-2275
Mike McKinnon	Mike_mcKinnon@dot.state.ak.us	907-465-4069

Alaska Department of Transportation and Public Facilities

Noatak Road and Airport

Vicinity Map





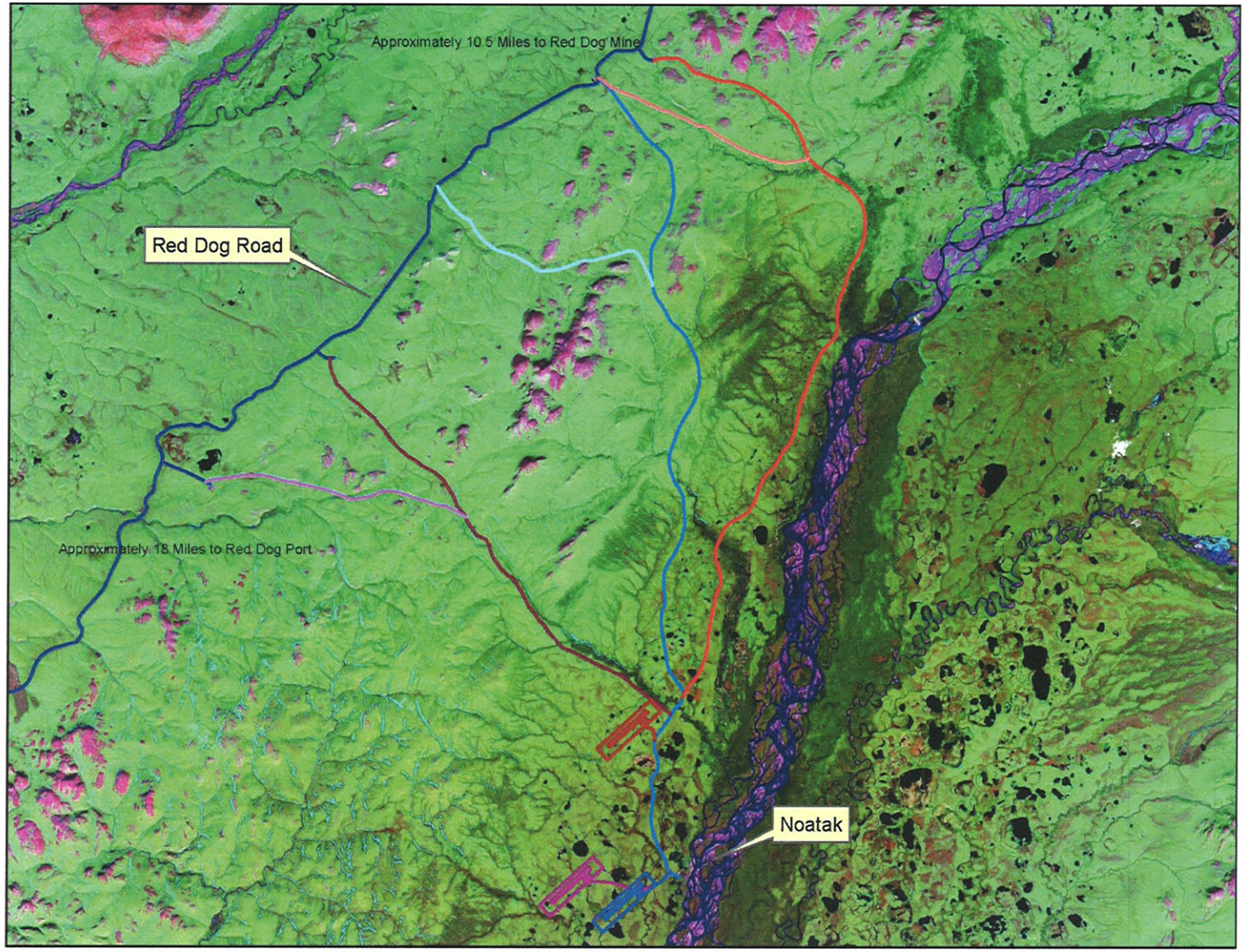
0 3.757.5 15 22.5 30

Miles

Alaska Department of Transportation and Public Facilities

Noatak Road and Airport

Overview



Road Options

- R1
- R1a
- R2
- R2a
- R3
- R3a

Airport Options

- A1
- A2
- A3

Source of Data: 2000 Landsat Imagery (NASA)

N W E S

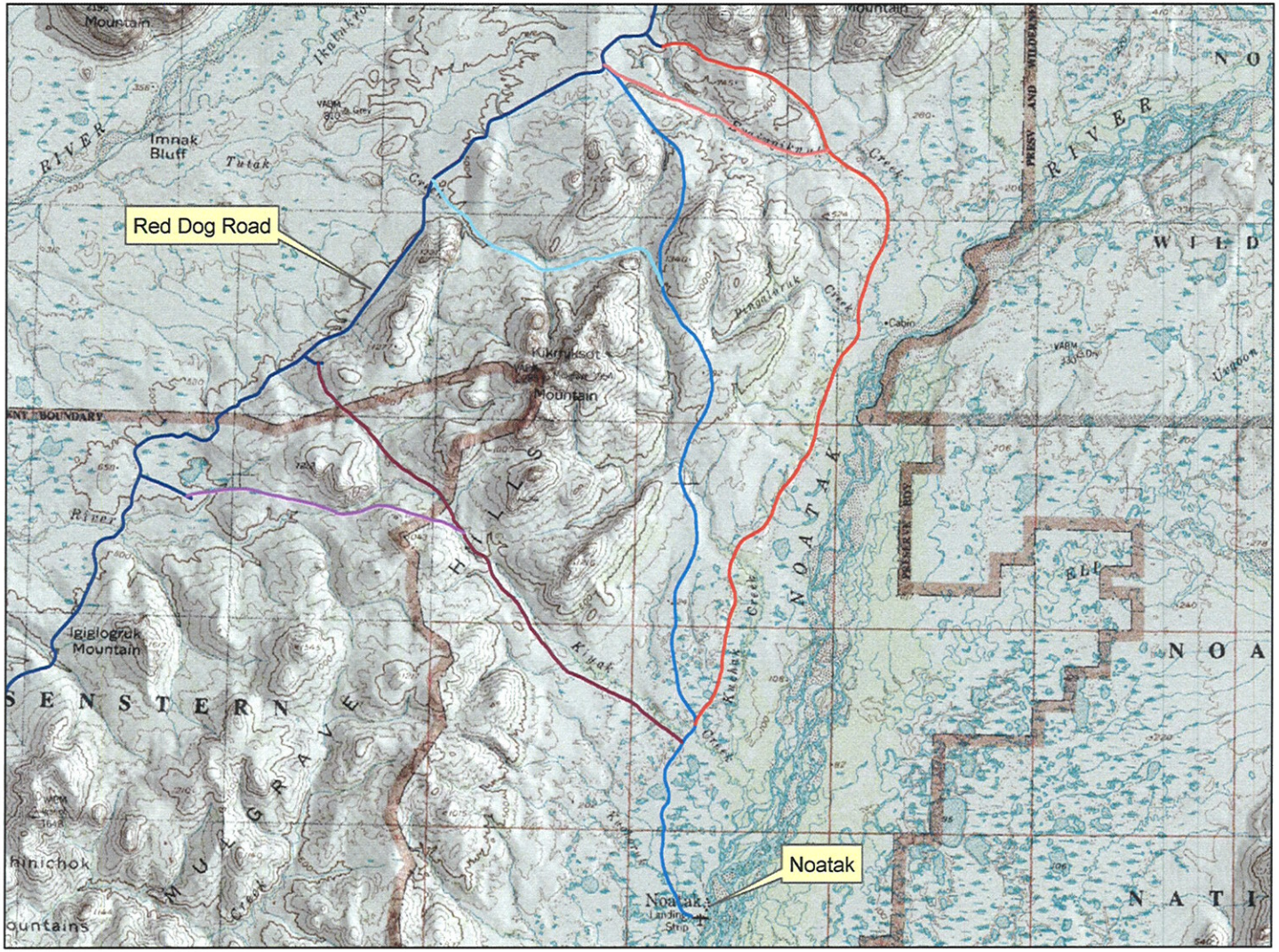
0 1.25 2.5 5 7.5 10 Miles

Road Options

Alaska Department of Transportation and Public Facilities

Noatak Road and Airport

Preliminary Road Corridor Overview



Road Options

- R1
- R1a
- R2
- R2a
- R3
- R3a

N
W E
S

0 1.25 2.5 5 7.5 10 Miles

Preliminary Road Options Comparison Matrix

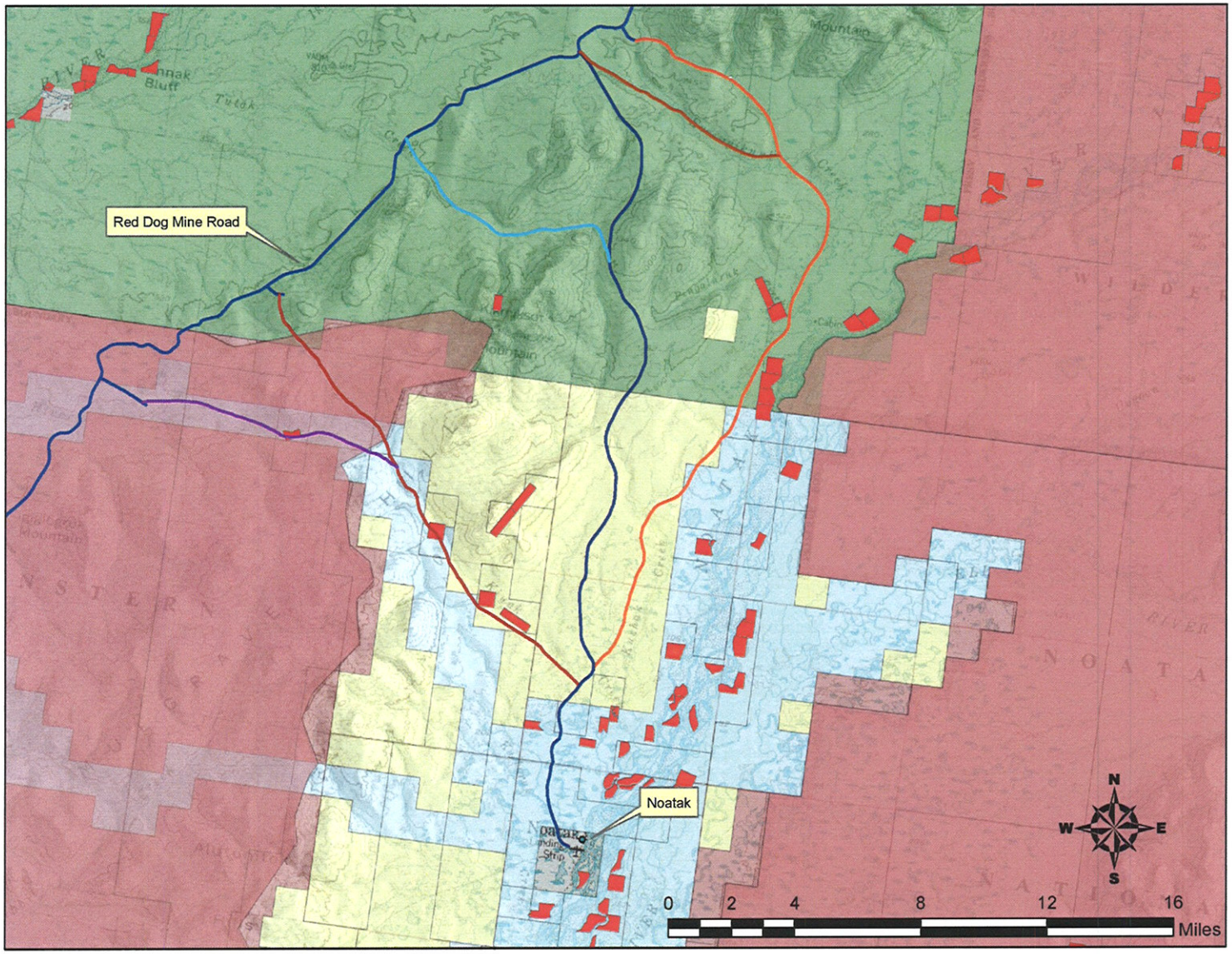
		R1	R1a	R2	R2a	R3	R3a
Road Length	Miles	21.6	23.3	31.8	33.1	27.8	28.8
Starting Elevation[1]	Feet (MSL)	70	70	70	70	70	70
Ending Elevation[1]	Feet (MSL)	760	570	500	610	610	1000
Highest Pass Elevation[1]	Feet (MSL)	860	790	590	610	1050	1040
Maximum Grade[1]		8.0%	8.0%	6.0%	8.0%	8.0%	8.0%
Length of Road Above 400' Elevation (MSL)[1]	Miles	9.8	9.8	5	6.3	12.75	13.75
Turnouts		22	23	32	33	28	29
Major Water Crossings[2]		2	2	7	6	5	3
Minor Water Crossings[2]		15	20	21	24	6	14
Icing Hazards Along Route[3]		Mile 6 to Mile 11	Mile 6 to Mile 11	Mile 24 to Mile 30	Mile 24 to Mile 28	Mile 14 to 15	Mile 14 to 15
Preliminary Estimated Construction Cost[4]	Dollars per Mile	$1,600,000	$1,600,000	$1,750,000	$1,730,000	$1,770,000	$1,680,000

1) All elevation and grade data is preliminary - based on USGS maps.
2) Major and minor water crossings are based on USGS maps and guidance. Major water crossings assume bridges are needed, minor water crossings assume pipes are needed.
3) Icing data was collected from past field surveys done by the Alaska Division of Geological and Geophysical Surveys.
4) Road Template is 24' wide, 8' deep at centerline, and has 2:1 slopes, with 12" crushed surfacing. Environmental, Design, ROW, Construction Engineering, and administrative costs are not included.

Alaska Department of Transportation and Public Facilities

Noatak Road and Airport

Preliminary Land Status



Legend

Land Status

- Cape Krusenstern National Monument
- Noatak National Preserve
- Native Selected (BLM)
- Native Interim Conveyed
- State Tentatively Approved
- Native Allottment

Road Options

- R1
- R1a
- R2
- R2a
- R3
- R3a

Sources of Data:
Alaska Department of Natural Resources,
Land Records Information Section
"General Land Status Clipped to 1 to 63,360 Coastline"

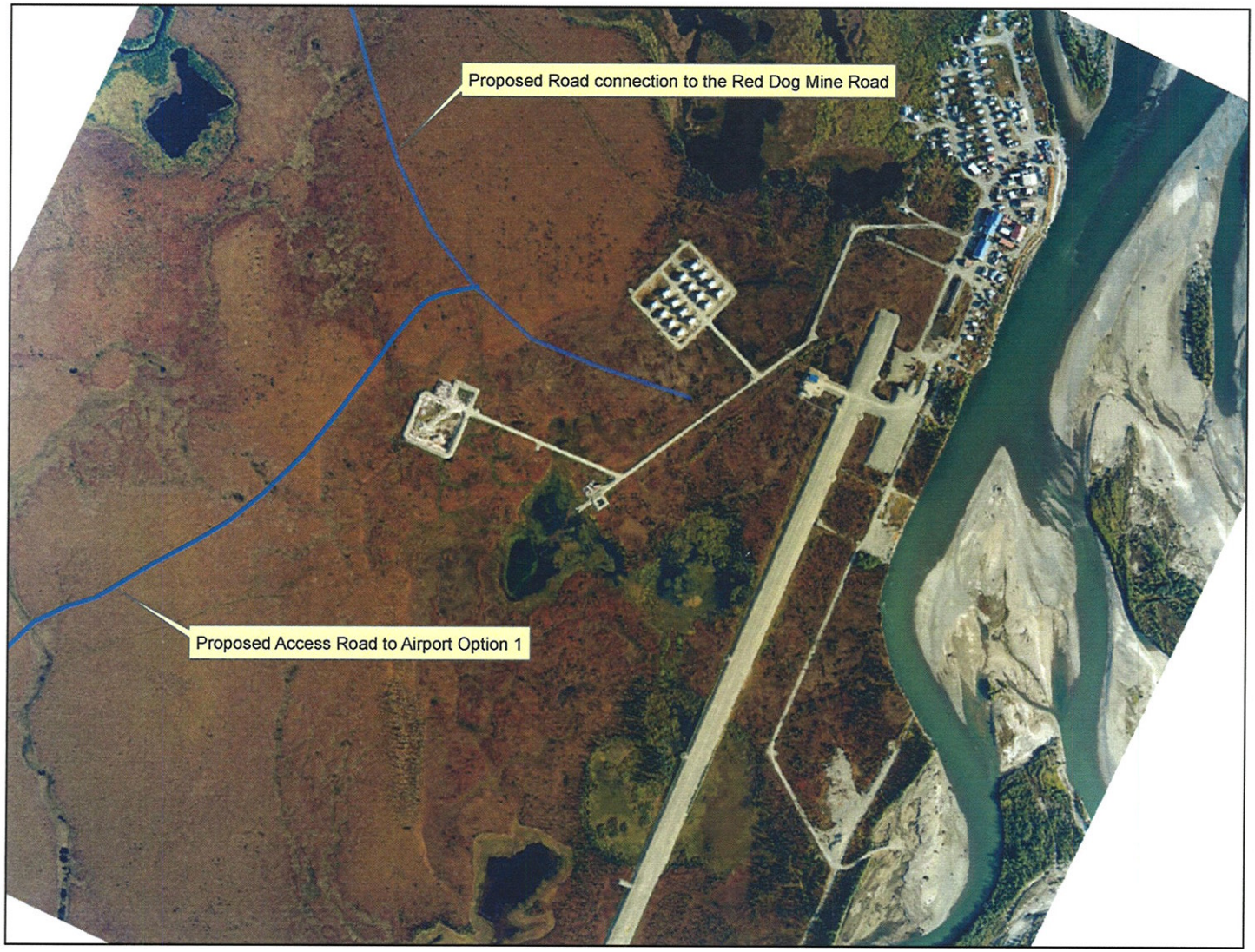
Preliminary Land Status Comparison Matrix - Road Options

	R 1		R 1a		R2		R2a		R3		R3a	
	miles	%	miles	%	miles	%	miles	%	miles	%	miles	%
Native Interim Conveyed	9	42%	9	39%	7.2	23%	7.2	22%	4.8	17%	4.8	17%
Native Selected	6.1	28%	6.2	27%	9.1	29%	9.1	27%	10.7	38%	10.7	37%
State Tentatively Approved	1.4	6%	0	0%	15.5	49%	16.8	51%	12.3	44%	13.3	46%
Cape Krusenstern National Monument Lands	4.5	21%	7	30%	0	0%	0	0%	0	0%	0	0%
Native Allottments	0.6	3%	1.1	5%	0	0%	0	0%	0	0%	0	0%
Total Miles	21.6		23.3		31.8		33.1		27.8		28.8	

Alaska Department of Transportation and Public Facilities

Noatak Road and Airport

Proposed Connection



Where is the best place to tie into the community?

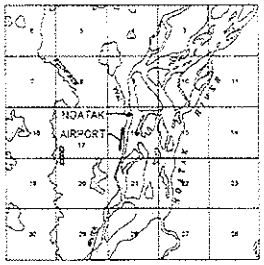
Source of Data: 2000 AeroMap Photography

N
W E
S

0 0.05 0.1 0.2 0.3 0.4 Miles

Airport Options

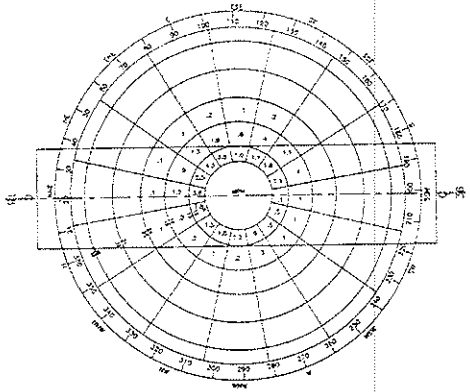
LOCATION MAP
NO SCALE

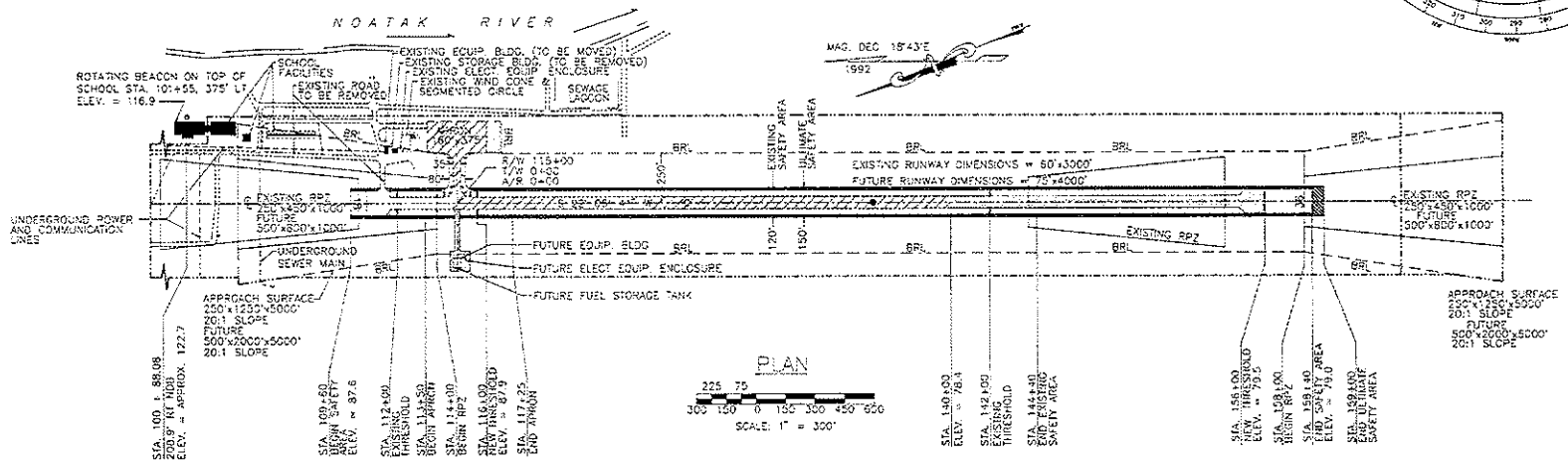


VICINITY MAP
NO SCALE
USGS NOATAK (C-2)
T 25 N, R 6 E, 19W
KATEEL RIVER MERIDIAN, ALASKA

WIND ROSE
10.5 KNOTS

WIND DATA
95.5% WIND COVERAGE
RUNWAY 18/36
WIND DATA PERIOD:
August 1985 - September 1986
University of Alaska
Arctic Environmental
Information & Data Center





PLAN
225 75
300 150 0 150 300 450 600
SCALE: 1" = 300'

RUNWAY DATA

	RUNWAY 18 / 36		RUNWAY	
	EXISTING	FUTURE	EXISTING	FUTURE
EFFECTIVE GRADIENT	0.32%	0.32%		
% WIND COVERAGE	95.5%	95.5%		
PAVEMENT SURFACE	GRAVEL	GRAVEL		
PAVEMENT STRENGTH	N/A	N/A		
APPROACH SURFACES	20:1	20:1		
RUNWAY LIGHTING	MIRL	MIRL		
RUNWAY MARKING	NONE	NONE		
NAVIGATION AIDS	NDB	NDB		
RUNWAY SAFETY AREA	120'x480'	150'x840'		
RUNWAY DIMENSION	60'x3000'	75'x4000'		
TAXIWAY	35'x220'	35'x220'		

AIRPORT DATA

	EXISTING	FUTURE
AIRPORT ELEVATION (M.S.L.)	65	86
AIRPORT LOCATION POINT (A.L.P.)		
MEAN TEMP. HOTTEST MONTH (DAILY MAX.)	59°	59°
TAXIWAY LIGHTING	MIRL	MIRL
RAMP LIGHTING	NONE	NONE
* AIRPORT REFERENCE POINT (A.R.P.)	LAT. 67 33.9'N / LONG. 162 58.6'W	LAT. 67 33.9'N / LONG. 162 58.7'W
AIRPORT AND TERMINAL BEACONS	NDB	NDB
AIRPORT REFERENCE CODE	B-II	B-II
* RUNWAY 18 THRESHOLD	LAT. 67 33.1'N / LONG. 162 58.4'W	LAT. 67 33.1'N / LONG. 162 58.4'W
* RUNWAY 36 THRESHOLD	LAT. 67 33.5'N / LONG. 162 50.0'W	LAT. 67 33.5'N / LONG. 162 50.0'W

* NOTE: HORIZONTAL CONTROL BASED ON NAD 1927

LEGEND

	EXISTING	FUTURE
OBJ R.O.W.		
BUILDING RESTRICTION LINE (B.R.L.)	BRL	BRL
AIRPORT REFERENCE POINT		
ROTATING BEACON		
BUILDINGS		
ROADWAYS		
RIVER BANK		
THRESHOLD LIGHTING		
WIND CONE (LIGHTED)		
RUNWAY/TAXIWAYS/APRON		
SAFETY AREA/ULTIMATE DEVELOPMENT		
OFA BEYOND THRESHOLD		

DEVIATION FROM DESIGN STANDARDS

ITEM	STANDARD	EXISTING	FUTURE

BUILDING TABLE

BUILDING NAME	ELEVATION
EXISTING EQUIPMENT BUILDING (TO BE MOVED)	100.7
EXISTING STORAGE BUILDING (TO BE REMOVED)	95.9
EXISTING ELECTRICAL EQUIPMENT ENCLOSURE	99.7
EXISTING WIND CONE	102.9
EXISTING SCHOOL FACILITIES	112.5
EXISTING SCHOOL FACILITIES	101.2
EXISTING FUEL STORAGE TANKS (SCHOOL FACILITIES)	97.3
FUTURE EQUIPMENT BUILDING	
FUTURE ELECTRICAL EQUIPMENT ENCLOSURE	
FUTURE FUEL STORAGE TANKS	

ELEVATIONS ARE GIVEN IN FEET.

DESIGN G.B.
DRAWN C.A.B.
CHECKED D.H.

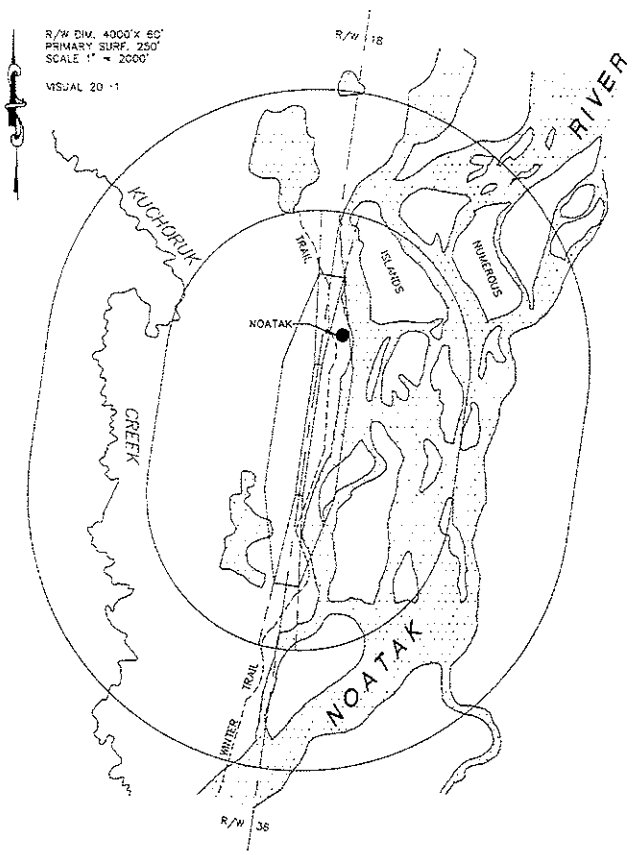
BY	DATE	REVISIONS
	8/1/95	FAA APPROVED

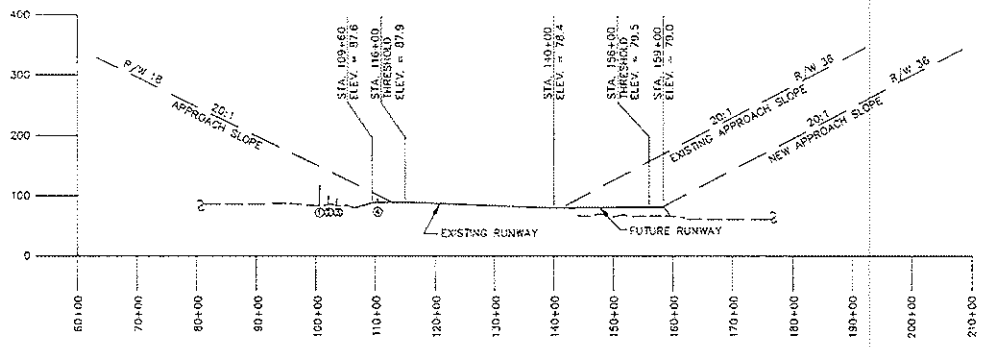
STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
NORTHERN REGION-WESTERN DISTRICT-DESIGN & CONSTRUCTION-AVIATION
APPROVED Daniel D. Urbach DATE 3-3-94
DANIEL D. URBACH, P.E. AIRPORT DESIGN GROUP CHIEF

THIS DRAWING SUPERCEDES ALP DATED 7/24/86

NOATAK AIRPORT
AIRPORT LAYOUT PLAN

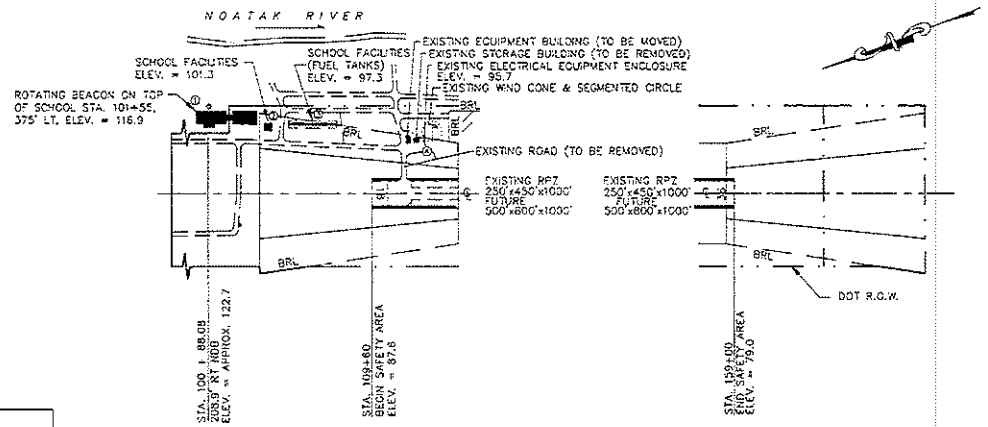
SHEET 1 OF 3





RUNWAYS 18 & 36 APPROACH SLOPES

SCALE: HORZ. 1"= 1000'
VERT. 1"= 100'



PLAN VIEW OF RPZ'S

SCALE: 1"=300'

FAR PART 77 PENETRATIONS

NO.	STRUCTURE	R/W LOCATION	ELEV.	PENETRATIONS

DEVIATIONS FROM STANDARD

ITEM	STANDARD	EXISTING	ULTIMATE

* NOTE: HORIZONTAL CONTROL BASED ON NAD 1927.

DESIGN G.R.
DRAWN D.A.B.
CHECKED D.H.

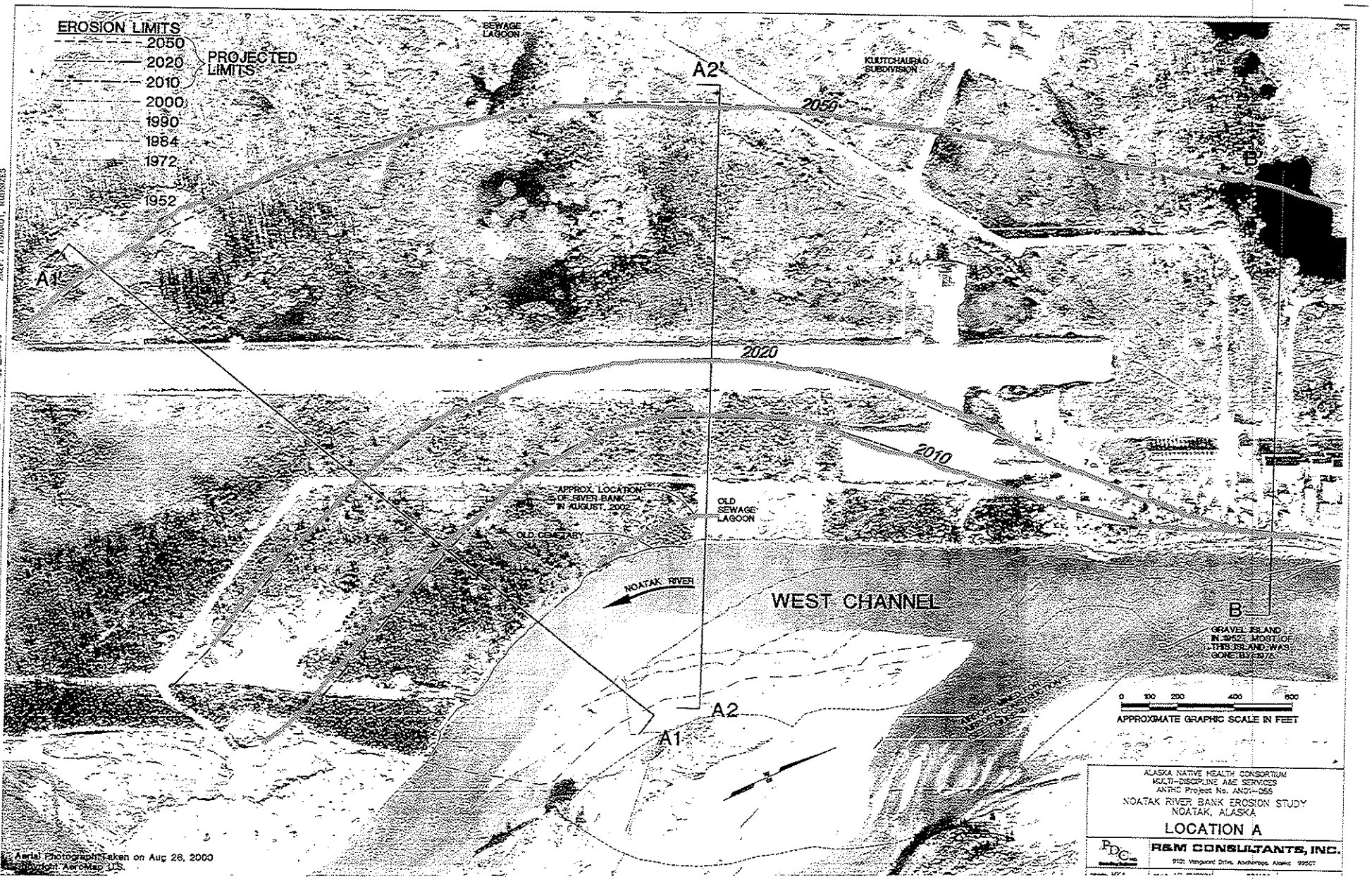
BY	DATE	REVISIONS
	5/31/95	FAA APPROVED

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
NORTHERN REGION-WESTERN DISTRICT-DESIGN & CONSTRUCTION-AVIATION
APPROVED Daniel D. Urbach DATE 5-3-95
DANIEL D. URBACH, P.E. AIRPORT DESIGN GROUP CHIEF

NOATAK AIRPORT

OBSTRUCTIONS & AIRPORT AIRSPACE

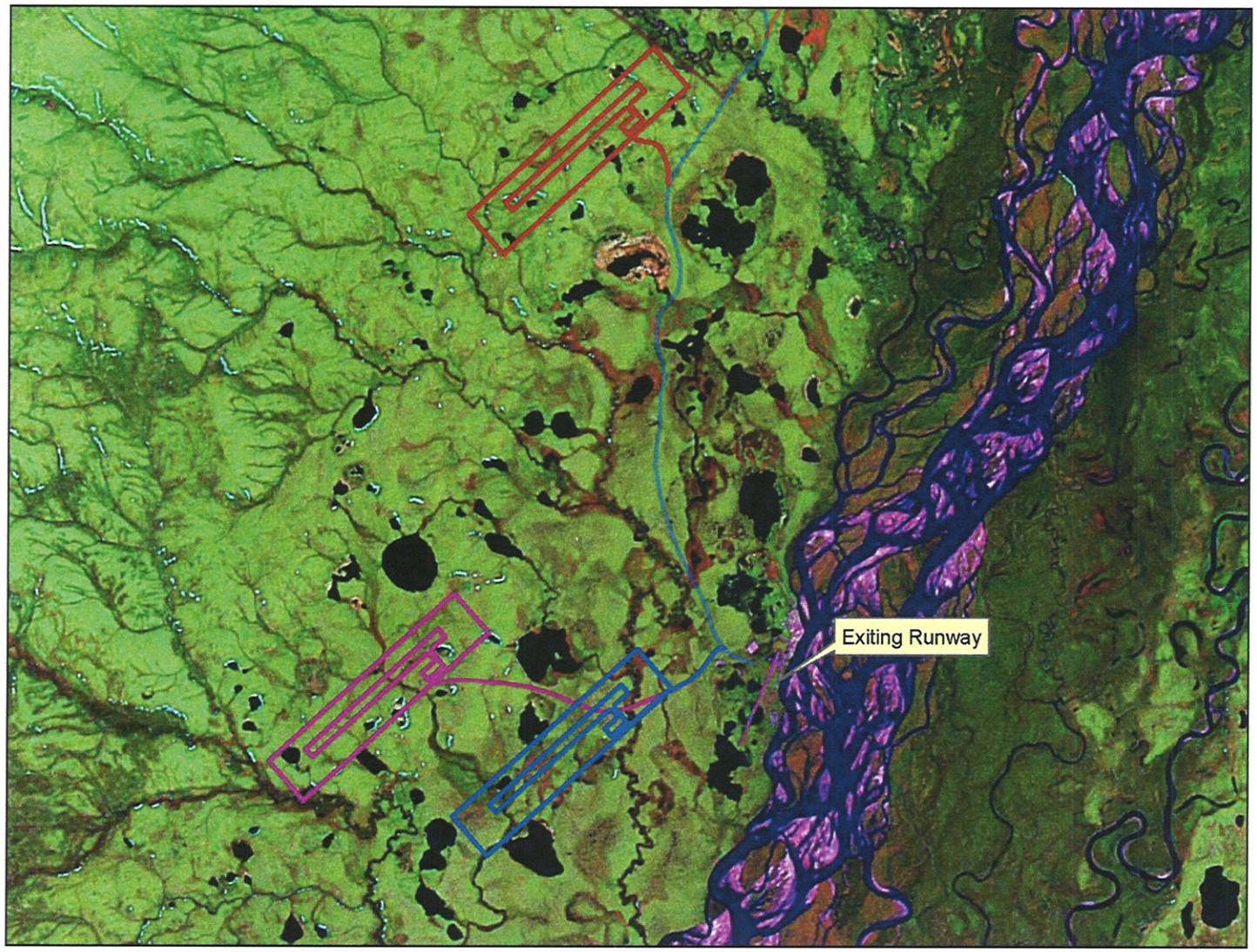
SHEET 2 OF 3



Alaska Department of Transportation and Public Facilities

Noatak Road and Airport

Preliminary Airport Options



Airport Options

A1

A2

A3

Source of Data: 2000 Landsat Imagery (NASA)

All Runway Alignments are preliminary - based on 1986 wind data. Recent wind data has been collected and archived by the National Climate Data Center since 1998. DOT&PF is currently acquiring this data. The recent data will be used in determining the best alignment for the proposed runway.

N W E S

Miles

0 0.3 0.6 1.2 1.8 2.4

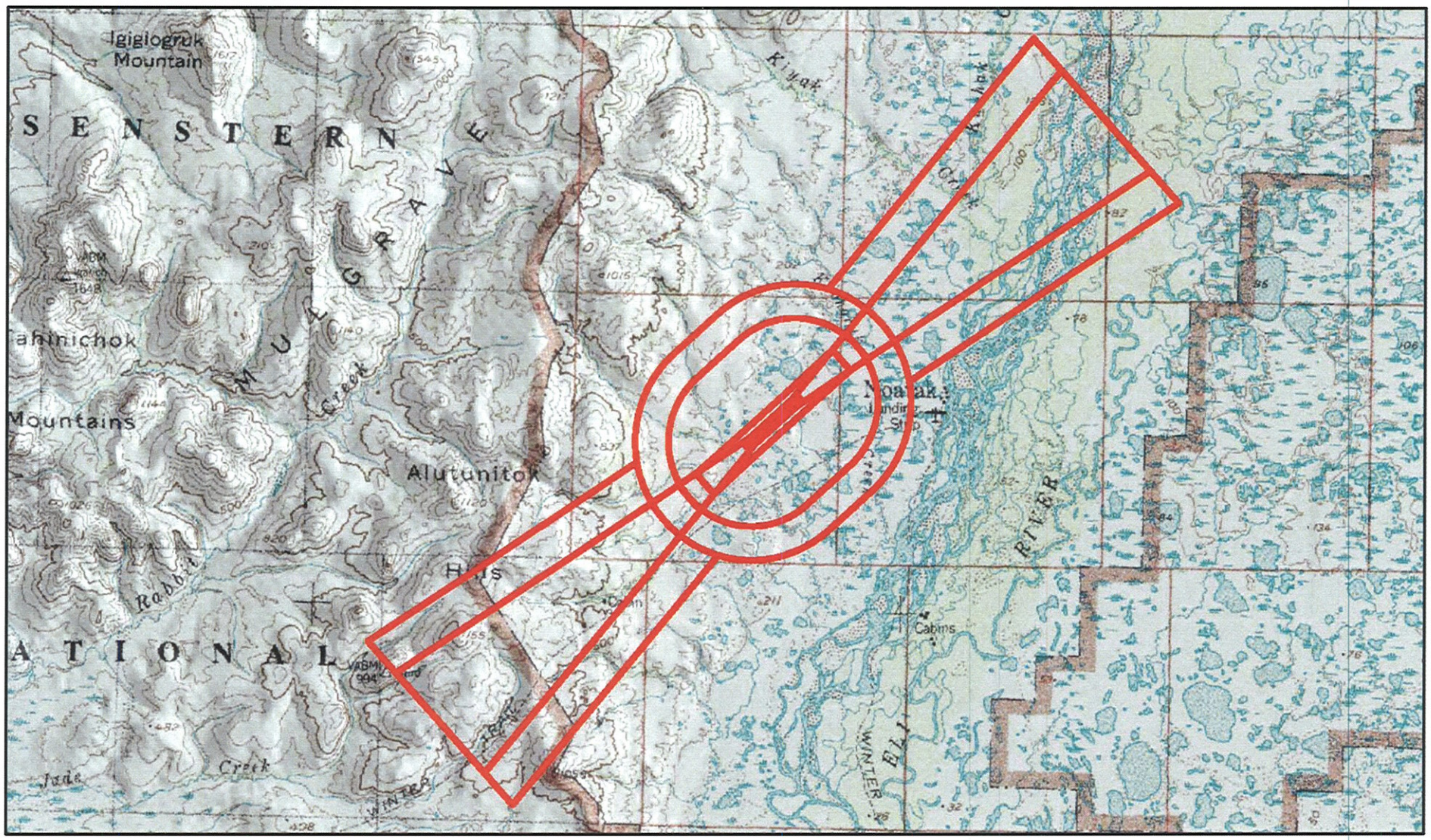
Airport Comparison Matrix

	Existing Runway	Red Dog Mine Runway	Option 1	Option 2	Option 3
Airport Class	B-I		C-IV (Ultimate)	C-IV (Ultimate)	C-IV (Ultimate)
Ultimate Runway Dimensions	4000' x 60' (Gravel)	5,753 x 120' (Gravel)	Paved 6500' x 150'	Paved 6500' x 150'	Paved 6500' x 150'
Ultimate Safety Area Dimensions	4880' x 120'		8500' x 500'	8500' x 500'	8500' x 500'
Approximate Airport Elevation	88' (MSL)	974' (MSL)	175' (MSL)	175' (MSL)	95' (MSL)
Obstructions to Airspace	No	Yes	No	No	No
Lowest Visibility Approach[1]	Visual Runway		Precision < 3/4 mile	Precision < 3/4 mile	Precision < 3/4 mile
Access Road Length from Noatak to Apron	1/4 Mile	N/A	3.5 Miles	5.4 Miles	1.7 Miles
Distance from C/L of Approach to Noatak at closest point	North Approach over Village	N/A	2.1 Miles	4.7 Miles	0.5 Miles
Minimum Embankment Height	10'		14'	14'	14'
Land Status	State Owned and Operated	Owned by NANA - Operated by TeckCominco	Interim Conveyed/Native Selected	Interim Conveyed/Native Selected	Interim Conveyed/Native Selected
Wind Coverage[2]	Meets FAA Criteria		Meets FAA Criteria	Meets FAA Criteria	Meets FAA Criteria
Floodplain Impact	In the Floodplain	None	Needs Further Study	Needs Further Study	Needs Further Study
Footprint			170 Acres	150 Acres	140 Acres
Property	126 Acres		Approx. 700 Acres	Approx. 700 Acres	Approx. 700 Acres

1) Precision approaches assume FAA Navaid installation, and airspace protection requirements acceptable to FAA.
2) Wind Coverage has been determined using 1986 wind data. A wind study will be performed using current data, and alignments may change.

All data is preliminary - based on quad map level studies.

Preliminary Airspace
Option 1

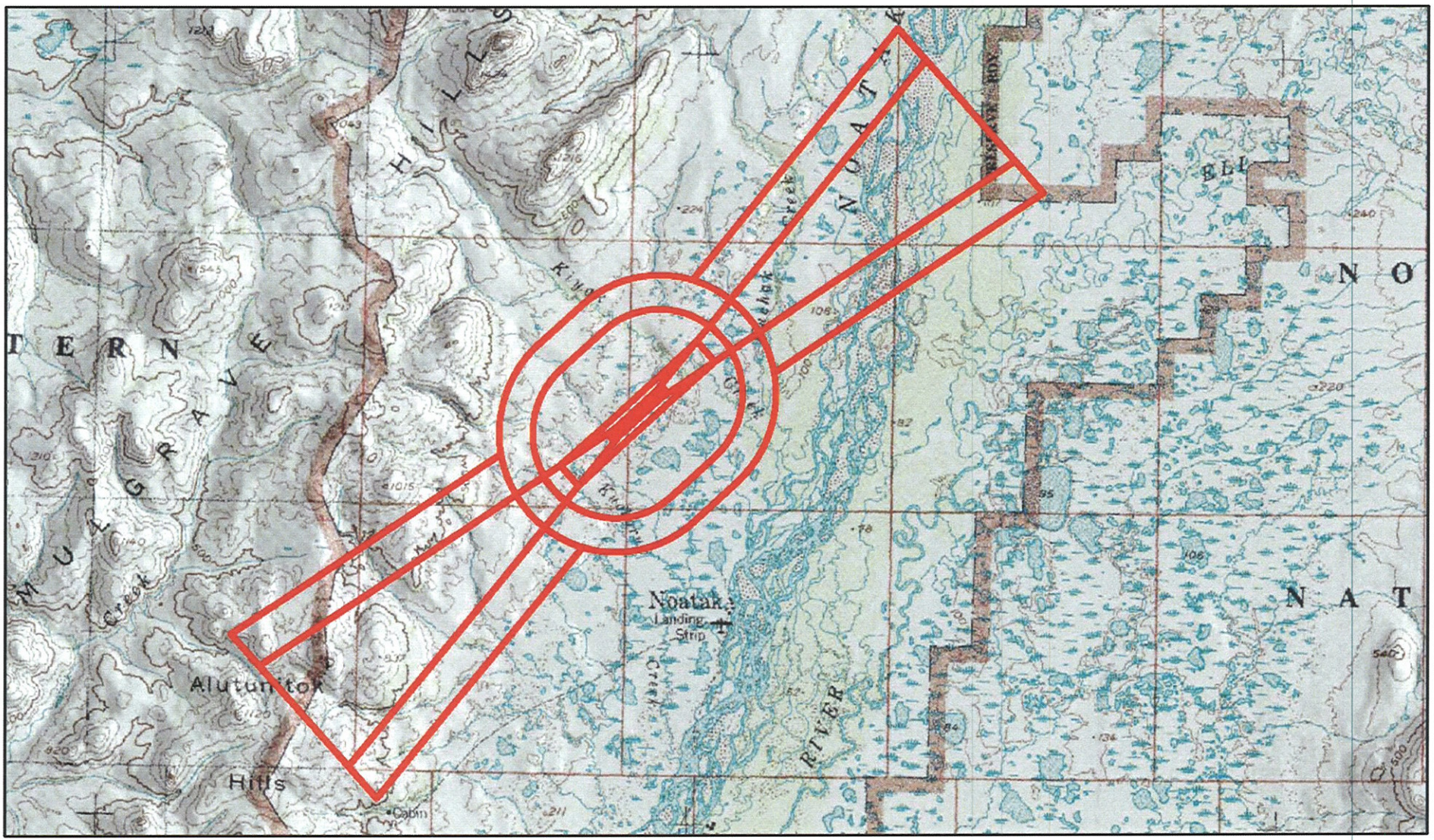


Note:
This drawing details the FAR Part 77 Airspace surfaces required for the proposed option. These surfaces are based on Quad-Map level data, and should be considered preliminary.

0 1 2 4 6 8 Miles

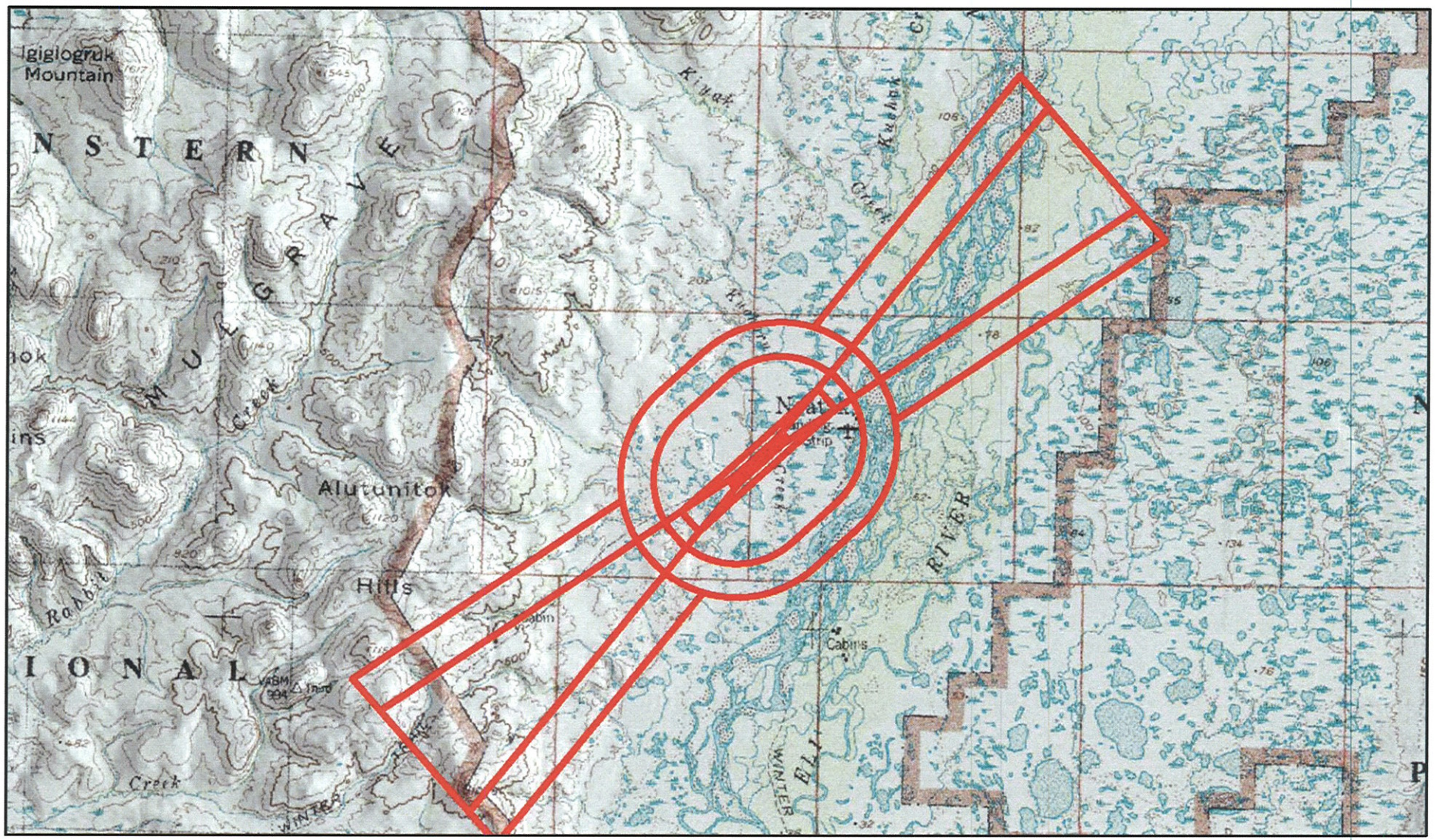
N
W E
S

Preliminary Airspace
Option 2



Note:
This drawing details the FAR Part 77 Airspace surfaces required for the proposed option. These surfaces are based on Quad-Map level data, and should be considered preliminary.

Preliminary Airspace
Option 3



Note:
This drawing details the FAR Part 77 Airspace surfaces required for the proposed option. These surfaces are based on Quad-Map level data, and should be considered preliminary.

THE STATE of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Transportation and Public Facilities

NORTHERN REGION
Design, Engineering, & Construction

2301 Peger Road
Fairbanks, AK 99709-5316
Main: 907-451-2200
TTY: 711 or 1-800-770-8973
dot.alaska.gov

October 6, 2023

Peter Mamrol, Project Manager
Airports Division, Alaska Region
Federal Aviation Administration
222 W. 7th Avenue, Box 14
Anchorage, Alaska 99513-7587

RE: Noatak Airport Relocation – Airport Site Selection
AIP 3-02-0198 (TBD)/Z614780000

Dear. Mr. Mamrol:

The Department of Transportation and Public Facilities (DOT&PF) is seeking Federal Aviation Administration (FAA) concurrence on the site selection process for the Noatak Airport Relocation project. Proposed airport sites are shown in the attached Figure 1 Noatak Airport Site Selection Alternatives. DOT&PF has studied and refined these sites to identify the most appropriate location for the new airport.

Numerous studies have been conducted regarding siting criteria for the proposed Noatak Airport Relocation. This includes:

- Noatak Airport Improvements Environmental Assessment (DOT&PF; May 1992)
- Noatak Riverbank Erosion Study (ANTHC; February 2003)
- Noatak Road and Airport Preliminary Engineering and Economic Study (DOT&PF; November 2004)
- Alaska Baseline Erosion Assessment; Noatak, Alaska (USACE; September 2007)
- Wetlands Determination and Habitat Assessment for proposed material site, Noatak, Alaska (DOT&PF; April 2007)
- Noatak Airport Relocation Archaeological Survey (Mobley, Charles; 2007)
- Preliminary Kuchoruk Creek Hydraulic and Hydrology Report (HDL; February 2008)
- Noatak Airport Relocation Geotechnical Report (DOT&PF; February 2008)
- Noatak Riverbank Erosion Assessment (USKH; February 2013)

At the request of the FAA Alaska Airports District Office (ADO), DOT&PF prepared a hydraulic engineering review memorandum in December 2022 on the practicability of countermeasure options against the ongoing erosional threat to the community. The ADO concurred with this review and the relocation efforts underway at Noatak.

Currently, the FAA is requesting a review of the criteria that was considered during site selection analysis, considering the guidance of FAA AC 5070-6 Appendix E (Airport Site Selection). This memorandum was prepared to present a compiled summary of prior studies and elucidate the location which DOT&PF has determined the most appropriate for the relocated airport.

Preliminary Site Identification:

To site the new Noatak Airport, DOT&PF reviewed available wind data to determine the expected runway alignment and reviewed existing topographical mapping and imagery to site alternatives for a runway. To be a feasible alternative, each site needed to facilitate an airport designed to FAA standards. This was an iterative process over a period of several years as DOT&PF analyzed existing available data and collected new data.

In 2004, after conducting an initial wind analysis and screening locations based on available mapping, DOT&PF identified three site alternatives for the proposed airport relocation, Sites 1, 2, and 3, as meeting wind coverage and where a sufficient length runway embankment could be placed uninterrupted by water features or terrain. From 2005 to 2015, DOT&PF gathered additional data and conducted field studies needed to complete site selection and environmental analysis. During this period, the proposed runway alignment was revised based on wind data and two additional site alternatives were identified for analysis, Sites 4 and 5.

Major Factors for site selection:

Wind Analysis. Analysis for the new airport alignment is based on wind data from the Automated Weather Observing System (AWOS) at the existing Noatak Airport. The 2004 site selection effort was based on 1986 wind data. Interim analyses in 2005 and 2015 based on additional wind data refined the runway alignment. An analysis in 2017 reviewed wind data from 2007 through 2016 and provided the current proposed alignment of S 9.03° W, true mean bearing, which has a 96.50% wind coverage.

Geotechnical and Drainage Considerations. DOT&PF conducted geotechnical subsurface investigations to evaluate the subsurface within Site 3, to evaluate subsurface conditions along the proposed access road, and to look for potential material sources. The results were that entire Site 3 and surrounding areas have underlying highly thaw unstable permafrost, with the main geotechnical objectives from the 2008 Noatak Airport Relocation Geotechnical Report being “to limit thaw settlement to the extent practical and minimize thaw settlement beneath structural section of embankments.” Specific recommendations to achieve this are to avoid siting facilities in natural drainages or ponds and to avoid cutting into the subgrade.

While not all sites were investigated to the same degree, based on geomorphology, all are expected to have subgrade with thaw unstable permafrost, so these recommendations apply to all site alternatives. These geotechnical recommendations meant site analysis focused on avoiding drainages.

Proximity to Noatak. An airport closer to the community will minimize additional travel requirements for passengers, cargo, and fuel from the airport. While gravel fill would vary at each site, a shorter airport access road would likely result in lower construction costs and

environmental impacts from disturbed ground. A shorter airport access road would require less maintenance over the life of the airport.

Compatible Land use. Any site to the east of Kuchoruk Creek would be within 5000 feet of the community land fill, which does not meet separation distances from wildlife attractants per AC 150/5200-33C. All sites are located in wetlands with sporadic ponds, which also create potential bird hazards. All sites west of Kuchoruk Creek are similar with respect to surrounding wetlands so this factor was not evaluated in detail, as it was not likely to be a deciding factor.

Land Ownership was not a deciding factor between sites. The land for all sites evaluated is interim conveyed and Selected by NANA Regional Corporation. There are no Native allotments which affect airport site selection. The land status was reviewed in 2023 and confirmed no land transfers have occurred that would impact the site selection.

Approach and Part 77 Obstructions was not a deciding factor between sites. The orientation of the runway due to the predominant wind directions is parallel to the Noatak River valley. No sites are far enough west that the Mulgrave Hills create an obstruction. The final selected site will be submitted for FAA airspace analysis to ensure feasibility.

Development Costs were considered as part of site selection. The differentiating factor related to cost is primarily dependent upon if the project requires a bridge on the access road, the quantity of borrow required, and the haul distance from material sources. Bridge costs were not a deciding factor because the site alternative not requiring a bridge are not feasible. Investigation of possible material sites revealed that the only suitable material sources are adjacent or within the Noatak River. Site selection focused on finding sites that have generally flat and consistent grades, minimizing fill imported to level grades, and considering sites closer to the Noatak River to reduce haul distance.

Environmental Consequences. Comparative impacts to environmental resources were considered in site selection. All sites will affect wetlands and biological resources, primarily based on the distrusted ground within the embankment footprint. Any site requiring a stream crossing could have impacts to fish; however, all feasible sites require stream crossing so this was not a deciding factor. Site selection focused on length of access road as a distinguishing factor. The selected site will be subject to review of alternatives as required under NEPA.

Site Alternative Discussion:

Site 1 is located 4 miles west of Noatak. This site was initially proposed when early wind data supported a more east-bearing runway alignment. The revised runway alignment after later wind analysis indicated this site is less practical due to concerns with drainage and topography that will require substantially more fill material and have a larger embankment footprint than the original alignment.

Site 2 is located 5 miles northwest of Noatak. This site was included as an alternative in 2004 as it is along a possible road alignment to Red Dog Mine. However, that road is no longer a consideration related to siting the Noatak Airport and early analysis revealed no meaningful benefits of this site over Site 1 and 3. This site would likely cause a higher construction cost, travel distance, and direct environmental impacts associated with the longer access road.

Site 3 is located 2 miles west of Noatak. **DOT&PF selected this site.** An airport can be constructed meeting the 95% wind coverage without significant concerns from surrounding drainages. It is situated along a relatively consistent ridge line which will minimize deeper fill to reach runway grade. This site would require an estimated 2-mile access road, including a bridge across Kuchoruk Creek. This location provides adequate separation from the community landfill per AC 150/5200-33C.

Site 4 is located on the east side of Kuchoruk Creek. This site is favorable due to the shorter access road and no bridge required over Kuchoruk Creek, which reduces cost and direct environmental impacts. However, the geotechnical investigation indicates higher degrees of ice rich permafrost than the surrounding areas. The close proximity to Kuchoruk Creek is likely to cause an increased risk of thaw-instability in the embankment. The site is further constrained to the east, which would require the apron and taxiway be built on fill over existing drainage. This site is within 5000 feet of the community land fill, which does not meet separation distances from wildlife attractants per AC 150/5200-33C.

Site 5 is located approximately 1 mile west of Site 3 along a ridgeline. This site overlaps with one the 2006 geotechnical investigation as a potential material source, however the investigation showed thaw unstable permafrost. The topography of this site has more variation, which would require substantially more fill material, or cutting into existing ground (which increases the risk of causing thaw-unstable conditions in the embankment). This site is also farther from the community requiring in a longer access road, resulting in greater direct environmental impacts and greater logistical burden on the community to transport passengers, fuel, and cargo to and from the airport.

Site Alternative Comparison:

DOT&PF's comparison of the site alternatives is summarized in Table 1: Site Alternative Comparison. For each site alternative, the selection factors with major concerns compared to the other alternatives, as described above, are annotated.

Site	Wind	Drainage/ Geotech	Proximity	Compatible Land Use	Land Ownership	Airspace	Cost	Environmental Impacts	Conclusion
1	CONCERN	CONCERN	CONCERN				CONCERN	CONCERN	Feasible
2	CONCERN		CONCERN				CONCERN	CONCERN	Feasible
3									Preferred
4		CONCERN		CONCERN					Not Feasible
5		CONCERN	CONCERN				CONCERN	CONCERN	Not Feasible

Table 1: Site Alternative Comparison

Sincerely,

Christopher F. Johnston, P.E.
Engineering Manager

CFJ/las

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cc: Albert Beck, P.E., Project Delivery Lead
Brett Nelson, Planning Chief, Fairbanks Field Office

N
W
E
S

2

5

1

3

4

Existing Runway

Earthstar Geographics

Site Alternative 1

Site Alternative 2

Site Alternative 3

Site Alternative 4

Site Alternative 5

0 0.5 1 2 3 4 Miles

STATE OF ALASKA

Department of Transportation and Public Facilities
2301 Peger Road Fairbanks, AK 99709

Date: October 2023

Figure 1

Noatak Airport Site Selection Alternatives
Noatak Alaska

Document Path: C:\Users\rlparks\Documents\ArcGIS\Projects\Figure 1 Noatak Airport Site Selection Alternatives\Figure 1 Noatak Airport Site Selection Alternatives.aprx