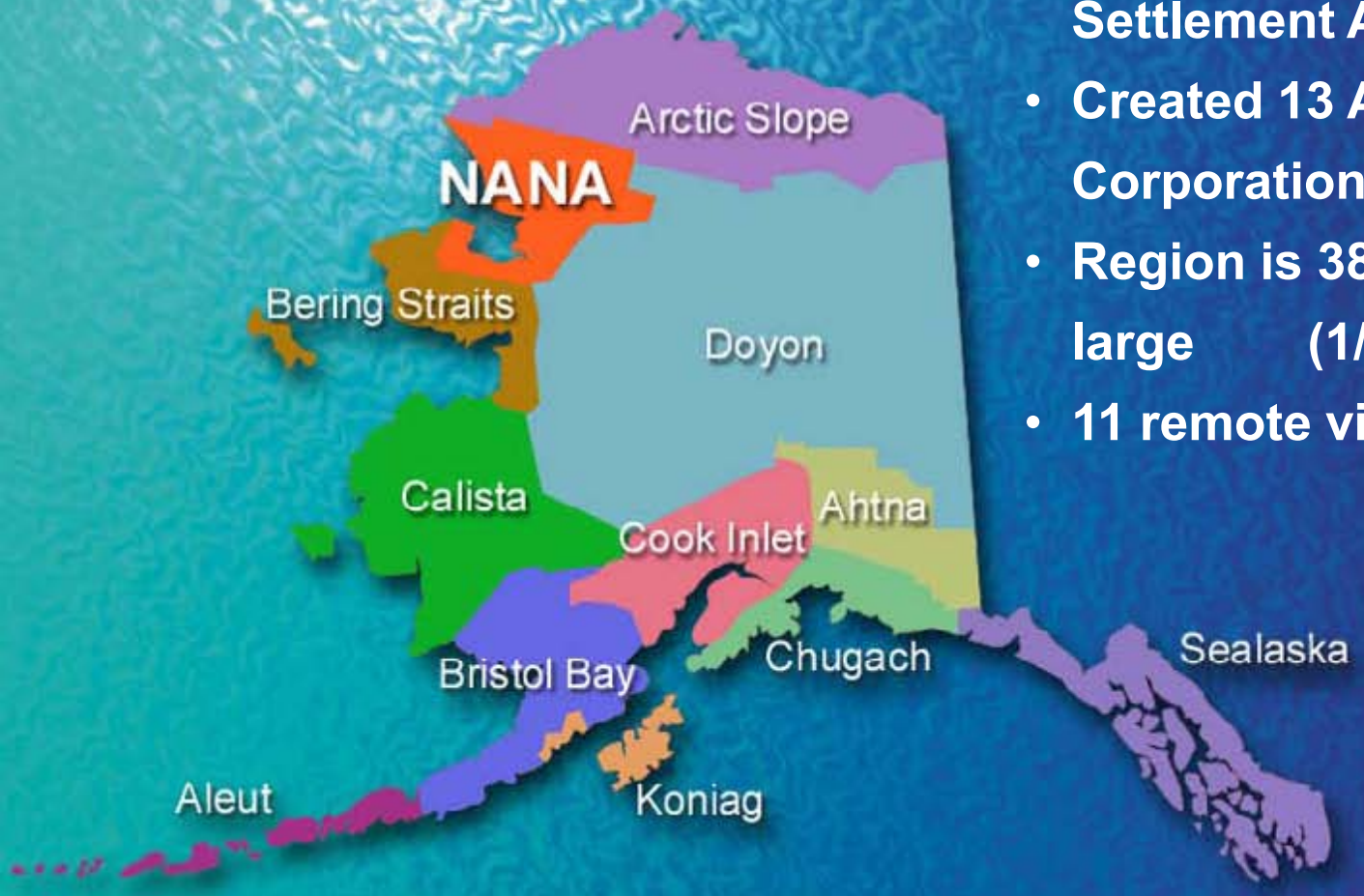
THIS IS

NANA

Formation of NANA



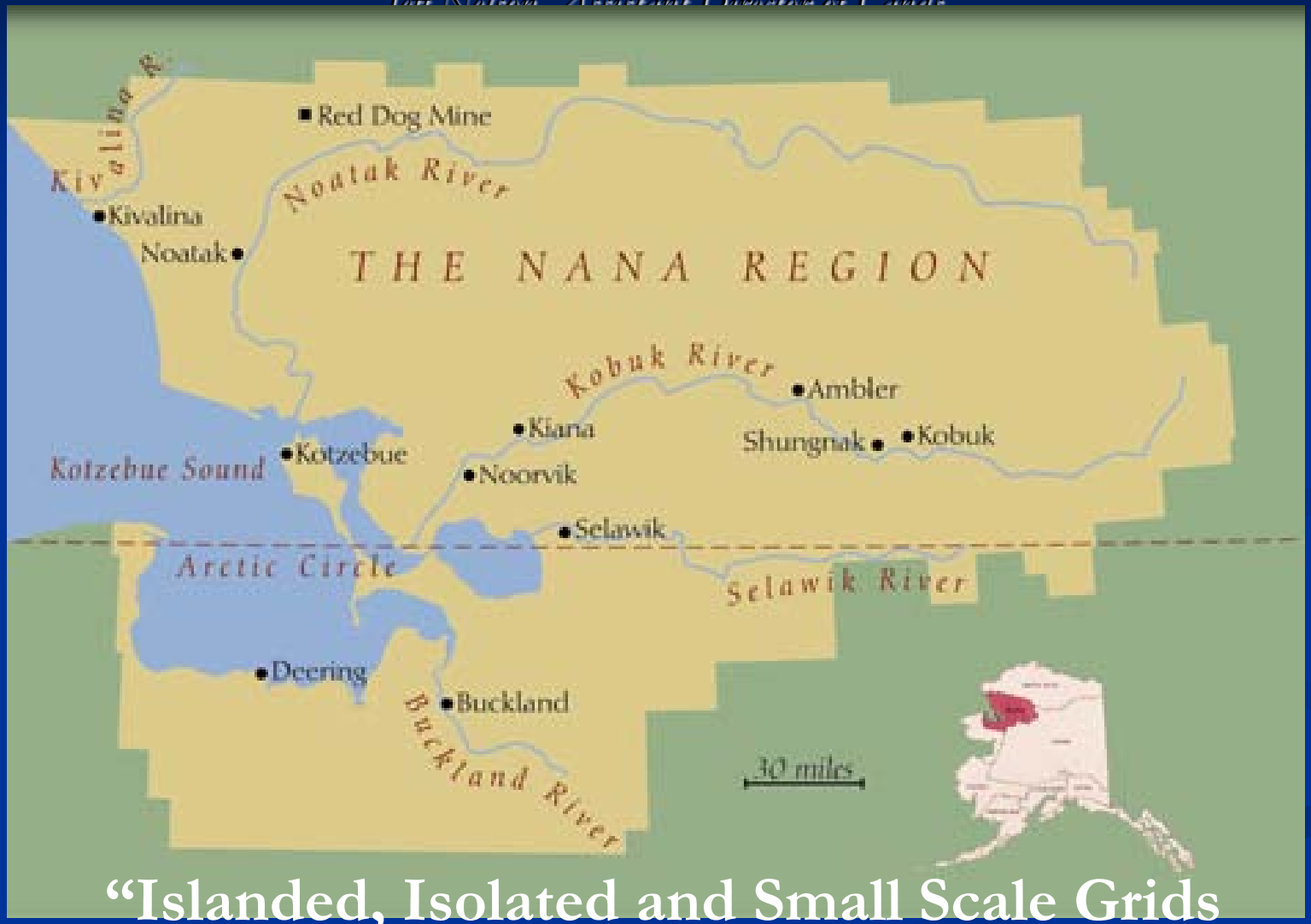
- 1971 Alaska Native Claim Settlement Act (ANCSA)
- Created 13 Alaska Native Corporations (ANCs)
- Region is 38,000 square large (1/3 of Colorado)
- 11 remote villages

Owners of NANA

- 4,800 shareholders in 1971
- Shareholders live:
  - The region
  - Elsewhere in Alaska
  - Outside of Alaska
- 11,400 shareholders today

"The economic future of the NANA region is directly tied to restructuring current energy options and looking towards alternative & renewable sources."

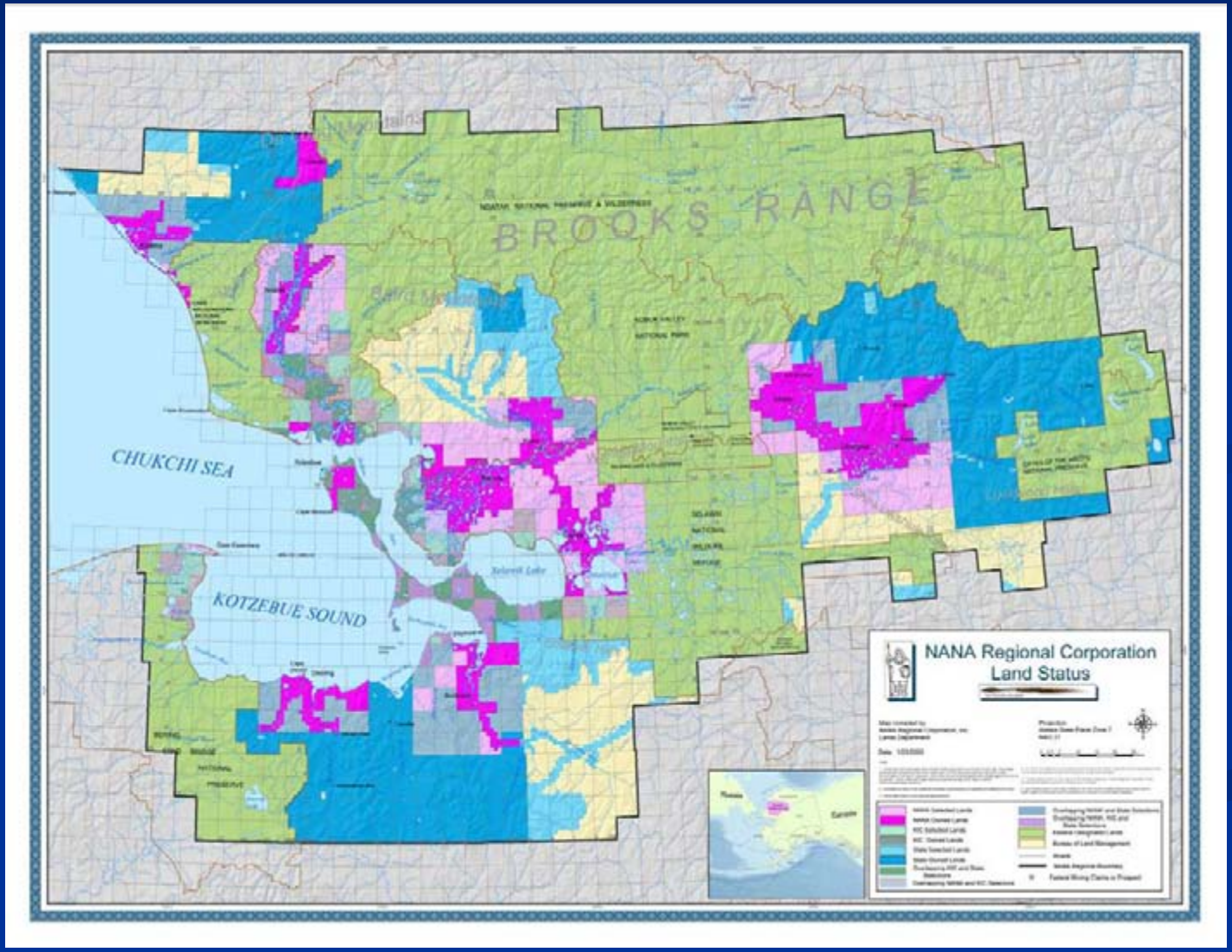
Jeff Nelson, Assistant Director of Lands



"Islanded, Isolated and Small Scale Grids

Use of Diesel-Home heating"

NANA Region Land Status



NANA's Mission

To be an Inupiaq corporation that enables our people to continue living productively in traditional and modern worlds.

Principles & Values

Committed to:

- Human resource management
- Leadership
- Profitability and job opportunities

Inupiaq principles of:

- Honesty and integrity govern our activities
- Commitments made will be fulfilled
- All individuals are treated with dignity and respect

Structure – NANA Regional

NANA Regional Corporation

- One of the 13 ANCs created by ANSCA
- Lands management and protection
- Cultural preservation
- Based in Kotzebue

This is NANA

A Native corporation
owned by the
Inupiat people
of the Northwest
Arctic region
of Alaska.

THIS IS

NANA

NANA Energy Security: Strategic Energy Plan

- *SO 1:*Increased collaboration between NANA Region stakeholders on energy policy, program, infrastructure, and increased capacity of tribal entities for the region.
- *SO 2:*Increased understanding of energy options available to NANA Region energy stakeholders for improved energy decision making.
- *SO 3:*Increased awareness and understanding of NANA Region energy needs on the part of external stakeholders.

Northern Lights, Noorvik AK

Energy Vision: Regionally Independent

- **Vision:** 75% reliant on regionally available energy resources for heating and generation purposes by the year 2025.
- "25 in 5" 25% reduction in fossil fuel use adopted by region's utility.
- **Transportation:** Decrease the need for transportation fuel imported into the region by 50% by the year 2030.
- Fossil fuels would remain as emergency/back-up fuel only.
- Incremental Approach

Regional Energy Vision "Pulling together"

- Regional Energy Summit
- Strategic Energy Plan
- Regional Energy Survey
- Energy Options Analysis
- Creation of Sub-Regional Action Teams:
  - Sub-Region 1: Kivalina/Noatak/Red Dog Mine
  - Sub-Region 2: Deering & Buckland
  - Sub-Region 3: Noorvik, Selawik and Kiana
  - Sub-Region 4: Upper Kobuk
  - Kotzebue

"I don't know which I should worry about more, getting flooded out of my home.or if I'm going to be able to heat it." - Elder Summit Participant

Northwest Alaska Energy Summit

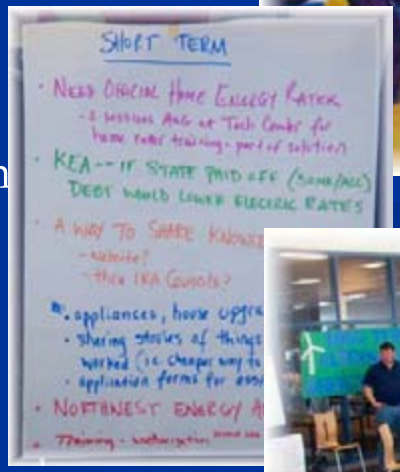
"…The outputs greatly surpassed my expectations from over a year ago when this was first conceptualized. The people I spoke with all had positive reviews and commentary on the summit." -Summit Presenter

"The summit was excellent …I am hopeful that there will be follow up on moving our region to the next level of energy usage. It has become difficult for our residents to reside in a very expensive place to live." - Summit Participant

Stakeholders and contributors

Summit Sponsors $80,000 cash contribution

- Alaska Housing Finance Corporation (AHFC)
- Alaska Village Electric Cooperative
- Denali Commission
- Maniilaq Association
- NANA Regional Corporation
- Northwest Arctic Borough
- NOVA Gold
- Shell Exploration
- Teck
- U.S. Department of Agriculture (USDA)



Community Views & Relevant Statistics of Energy Alternatives in the Northwest Arctic

Regional Energy Survey

Why?

- Community Beliefs
- Explore energy solutions. Identify community preferences
- Contribute to the NW Alaska Regional Energy Plan.
- Support grant applications.
- Consistency of data.
- Integrate perceptions about energy options for all NANA communities at the Energy Summit.

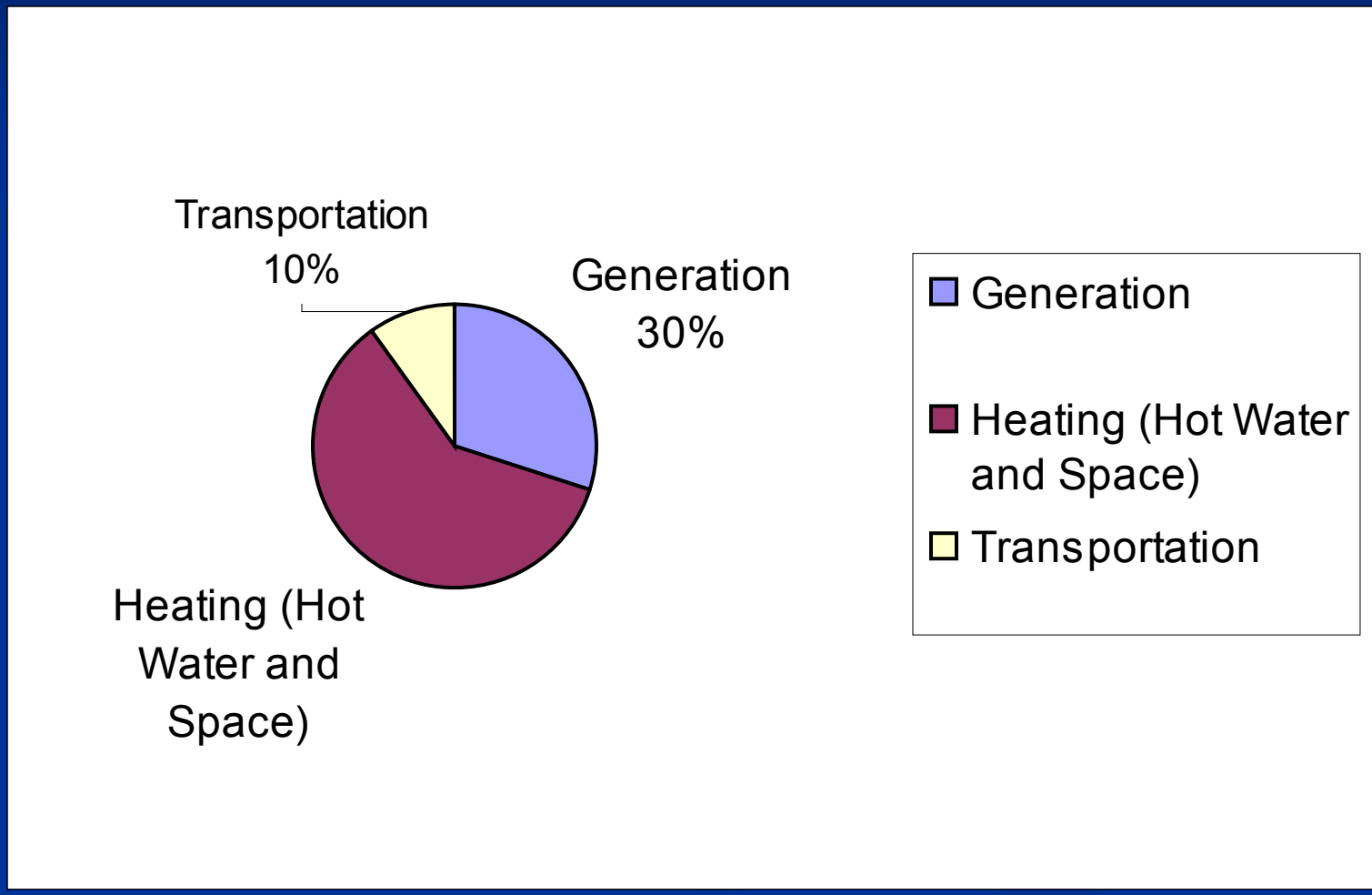
Who responded?

- All region Communities
- 134 households surveyed representing over 650 people
- 31 (30%) Elders

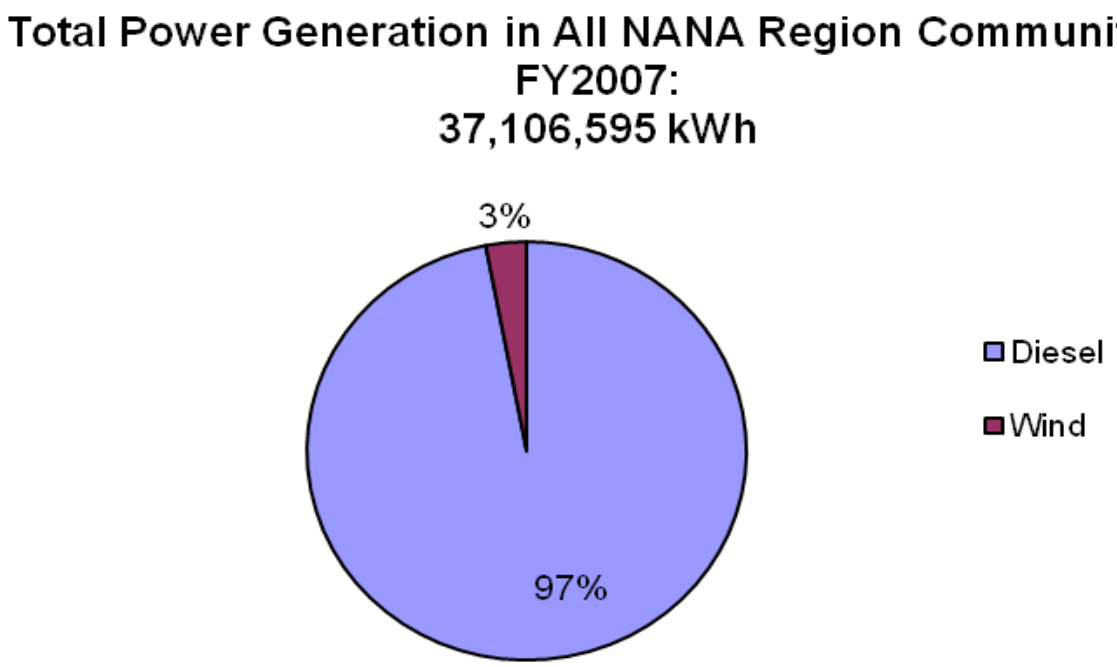
kWh Generated

Village	2002	2003	2004	2005	2006	2007
Ambler	1,180,518	1,308,917	1,425,464	1,295,166	1,315,042	1,374,285
Kiana	1,502,196	1,722,908	1,602,725	1,511,650	1,502,891	1,627,613
Kivalina	1,174,062	1,196,195	1,213,291	1,188,204	1,265,119	1,275,477
Noatak	1,471,258	1,470,960	1,526,439	1,488,886	1,487,584	1,486,154
Noorvik	2,130,094	2,067,229	1,990,683	1,817,235	1,978,674	2,008,285
Selawik	2,520,511	2,676,680	2,644,409	2,692,996	2,695,019	2,803,273
Shungnak	1,469,372	1,544,918	1,516,360	1,458,706	1,558,367	1,492,632
	11,448,011	11,987,807	11,919,371	11,452,843	11,802,696	#########

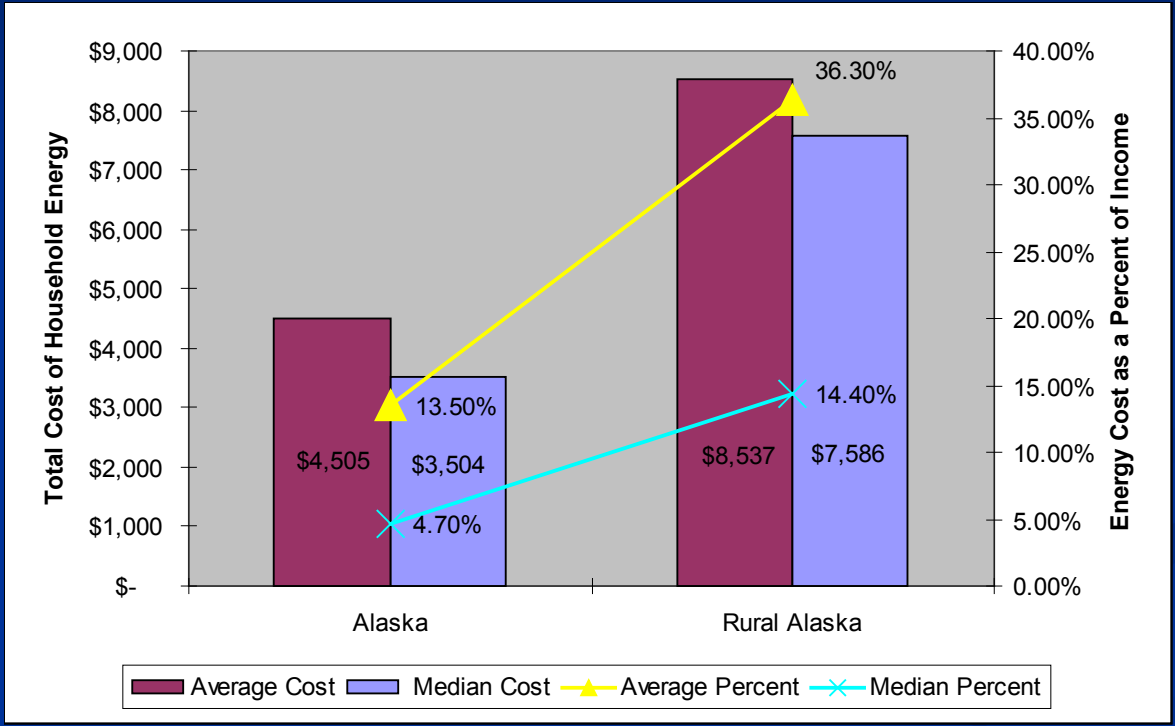
Approximate Fossil Fuel Use



Total Renewable vs Fossil Fuel Use



Energy costs are much higher in Rural Alaska



- Median (middle) data is a better measure than the average.
- Median household energy costs in rural Alaska are over double statewide estimates.
- Rural Alaskans spend over three times as much of their household income on energy as statewide data.

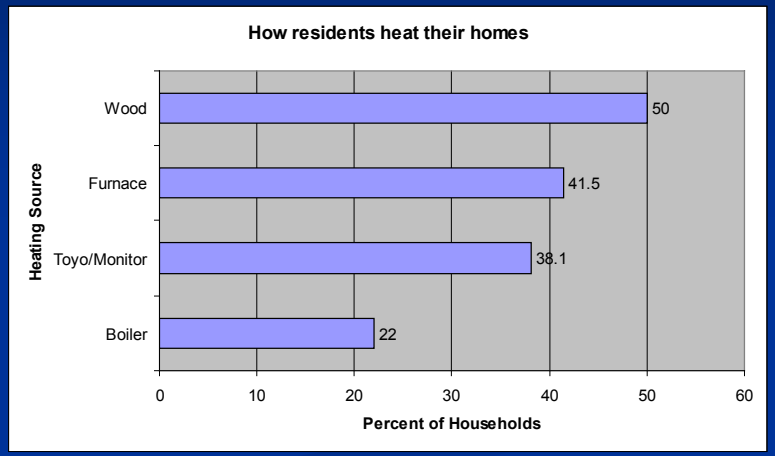
Data from recent ISER studies (Saylor, B., Haley, S. "Effects of Rising Utility Costs on Household Budgets, 2000-2006, March 2007; Haley, S., Saylor, B., Szymoniak, N., "Estimated Household Costs for Energy Use, May, 2008).

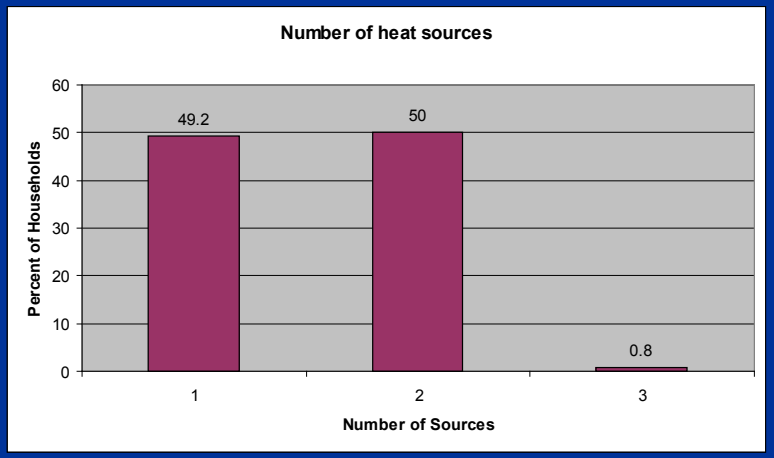
What kind of houses do people live in?

- Average family size is 5.04 (largest is 15).
- Average size was 3 bedrooms.
- Average year built was 1983, oldest was 1930.
- 61% are HUD homes, mostly beginning in late 1970s, surge in 1981.

How do people heat their homes?

Almost half of use wood to heat their homes (during the day during the cold winter) .





Over half of all households use more than one heat source.

Energy costs vary by community.

Community	Cost of gas per gallon			Cost of stove oil per gallon			Monthly electric bill	
	Average	Middle	City	Average	Middle	City	Average	Middle
Ambler	$8.18	$8.24	$8.24	$5.78	$4.62	$7.85	$347.85	$305.00
Buckland	$5.71	$5.75	&7.00	$9.77	$9.79	$7.00	$187.00	$200.00
Deering	$5.17	$5.15	$3.86	$3.95	$3.86	$12.15	$292.54	$230.00
Kivalina	$5.29	$5.25	$5.85	$4.85	$4.85	$4.85	$291.54	$250.00
Kobuk	$7.25	$7.25	$	$7.06	$7.00	$	$215.00	$200.00
Noatak	$9.44	$9.29	$	$8.13	$7.95	$	$406.73	$430.00
Selawik	$5.19	$5.19	$5.19	$4.61	$4.61	$4.61	$209.75	$155.00
Shungnak	$	$	$7.99	$5.23	$4.79	$8.09	$	$

- Average and middle (50th percentile) was calculated from survey data.
- "City" reflects the single price in each community.
- Gasoline and electricity costs (survey) are highest in Noatak.
- Stove oil is highest in Buckland.

How much do families spend on energy?

Energy Source	Average	Middle	High
Gasoline (per gallon)	$6.68	$5.75	$9.97
Stove oil (per gallon)	$6.15	$4.85	$9.96
Stove oil used (gal/winter month)	118	106	600
Total stove oil cost ($/winter month)	$630.34	$533.50	$4,372.50
Wood (per month)	$118.57	$60.00	$400.00
Electricity (per month)	$294.69	$250.00	$900.00

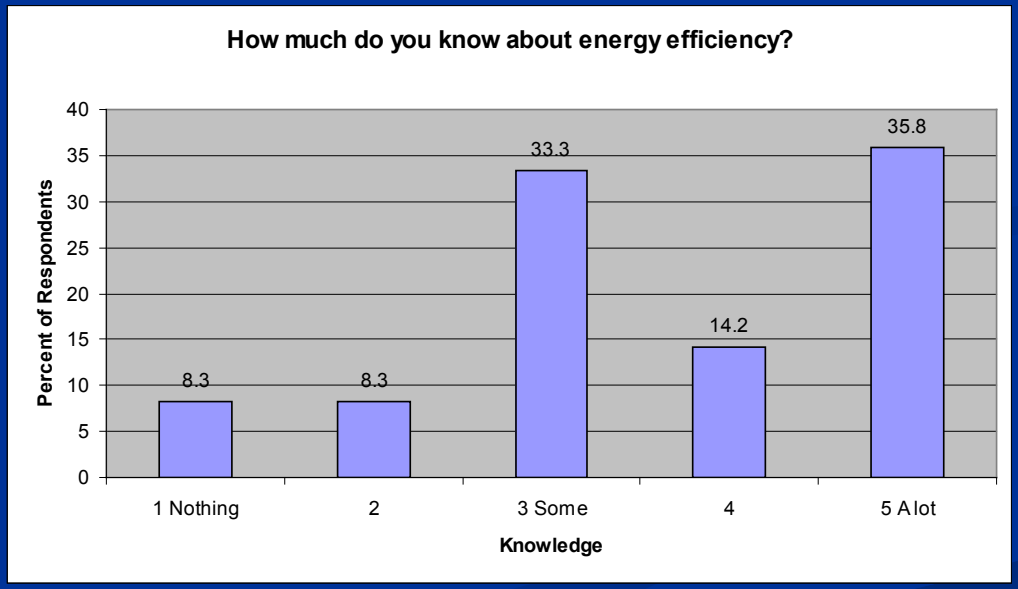
55.4% of households get Energy Assistance

How people improve home energy efficiency

How people reduce energy use.

- Ways of reducing electricity use
  - Turn off or unplug appliances: 71.8%.
  - Use less energy: 10.9%.
  - Get more energy efficient appliances: 55.2%.
- Ways of reducing stove oil use
  - Supplement with wood: 43.1%.
  - Lower home temperature: 27.5%.

More information about home energy efficiency could be valuable.



What about the cost of transportation?

- 81.3% see the changes in the cost of transportation.
- 81.6% say it has reduced subsistence activities.
- 80.8% say it has reduced travel to other communities.
- 72.4% say it has changed the amount of time spent in camp.

Long-term Energy Regional Preferences Options Summary

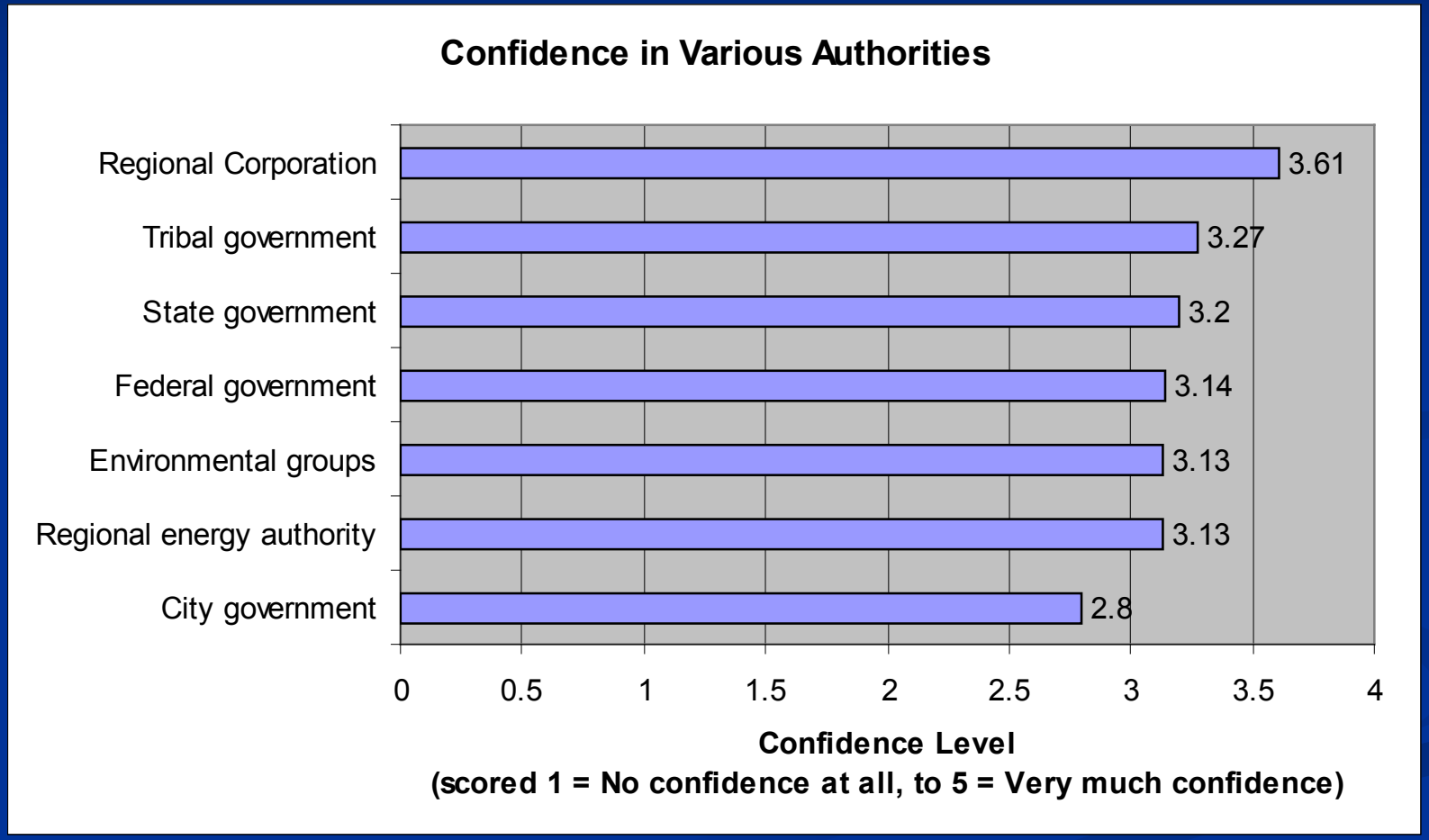
Alternative Energy Source	Average Score	Rank
Combined heat and power systems	3.73	3
Wind energy systems	4.16	1
Hydroelectric energy	2.94	7
Solar energy	3.78	2
Geothermal energy	3.18	5
Interties and tielines	3.02	6
District energy distribution systems	2.89	8
Natural gas	3.37	4

Differences in Community Opinions about Energy Preferences

Community	Energy Preference		
	First Choice	Second Choice	Third Choice
Ambler	Wind	Combined heat and power/Natural gas	Geothermal
Buckland	Combined heat and power	Wind	Geothermal
Deering	Wind	Combined heat and power	Geothermal
Kivalina	Wind	Natural gas/ Combined heat and power	Solar
Kobuk	Interties	Wind	Solar
Noatak	Wind	Combined heat and power	Interties/ Natural gas
Selawik	Wind/Natural gas	Hydroelectricity/ Combined heat and power	Hydroelectricity
Shungnak	Wind	Solar	Combined heat and power

- Respondents may not be aware of existing energy infrastructure or project feasibility.
- Wind energy is the first choice of many communities.
- Communities appear to be aware of locally available energy sources.

Choosing an entity to manage energy initiatives



Wind Energy in NW AK/NANA Region

Contributors:

- KEA
- AVEC
- AEA- 3 met towers ($30,000 in-kind support)
- Tribal Councils
- V3 Energy
- Northern Power
- NW Arctic Borough
- Teck
- NOVA Gold- Logistical Support with Helicopters- $2-3,000

Existing Wind Power in NANA Region

Need to improve penetration level

- Kotzebue – Utility, KEA
  - Class 4 to 5 wind resource
  - Ten AOC 15/50 (65 kW) wind turbines
  - One NW100 (100 kW) wind turbine
  - One Vestas V15 (65 kW) wind turbine
  - Since 1997
- Selawik – Utility, AVEC
  - Class 2 to 3 wind resource
  - Four AOC 15/50 (65 kW)
  - wind turbines
  - Since 2001

Predicted Wind Resource in NANA Region Villages (excl. Kotz and Selawik)

- Buckland
  - Excellent (new wind site);
  - Marginal (old wind site)
- Deering – Good to excellent
- Kivalina – Good to excellent
- Noorvik – Fair
- Kiana – Fair
- Ambler/Kobuk/Shungnak Community Marginal to fair
  W/NOVA Gold- Good to excellent
- Noatak – Poor to marginal

Wind-Diesel Hybrid Systems

- Deering- Current Wind Monitoring Program- submitted a pre-construction proposal to AEA
- Buckland- Current wind monitoring program in place
- Kiana/Noorvik /Selawik (connected via tieline)
- Red Dog Mine Port Corridor/ Kivalina- Utility Scale Development (PPP)
- Upper Kobuk Sites-about 6 miles from Kobuk/ (PPP)
- Kotzebue Wind Farm- Additional Investments

Regional Wind Resource Assessments

Existing Met Towers-Installed with program resources

- Buckland
- Noorvik
- Deering

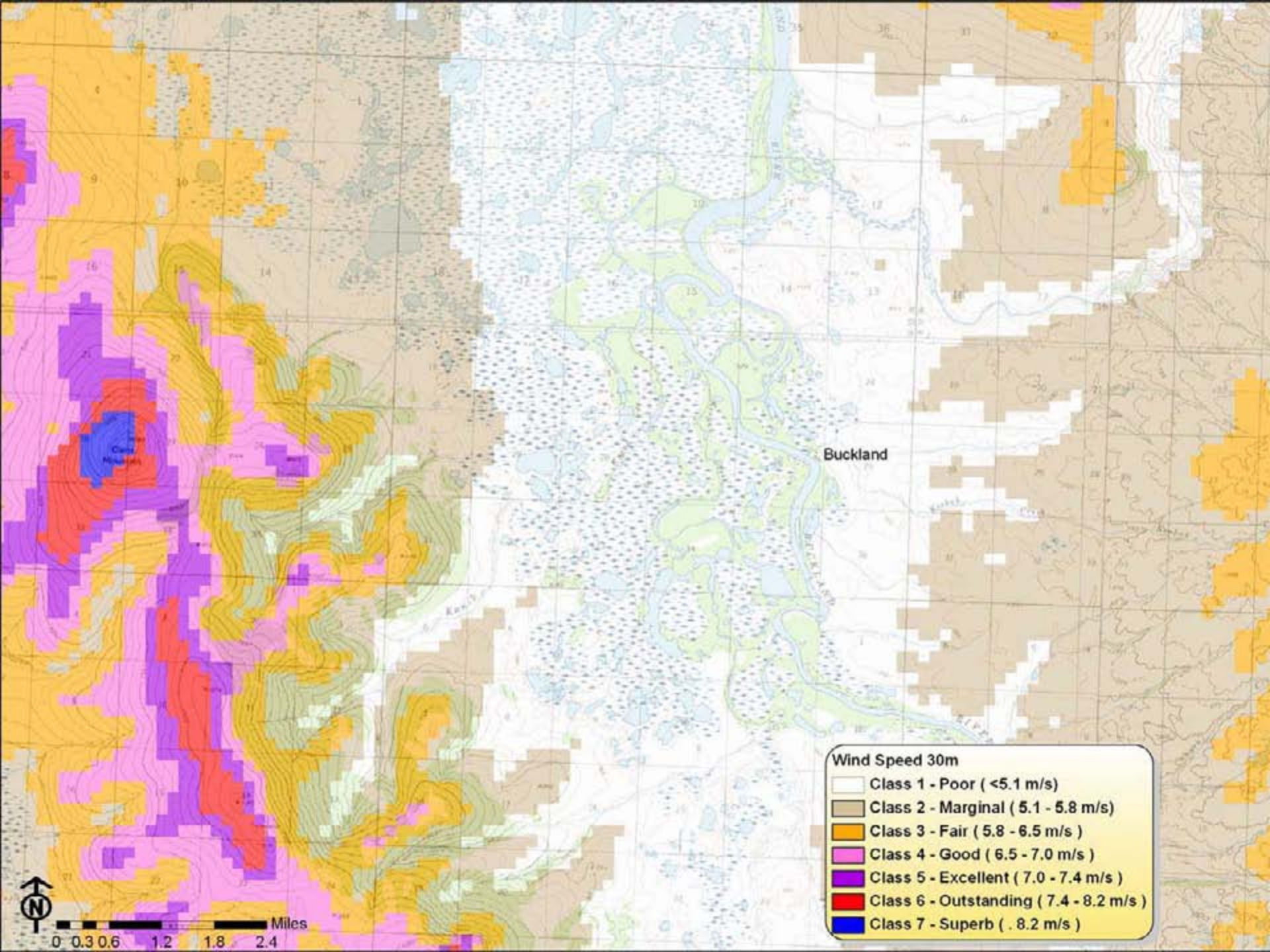
Red Dog Mine- Data could benefit communities.

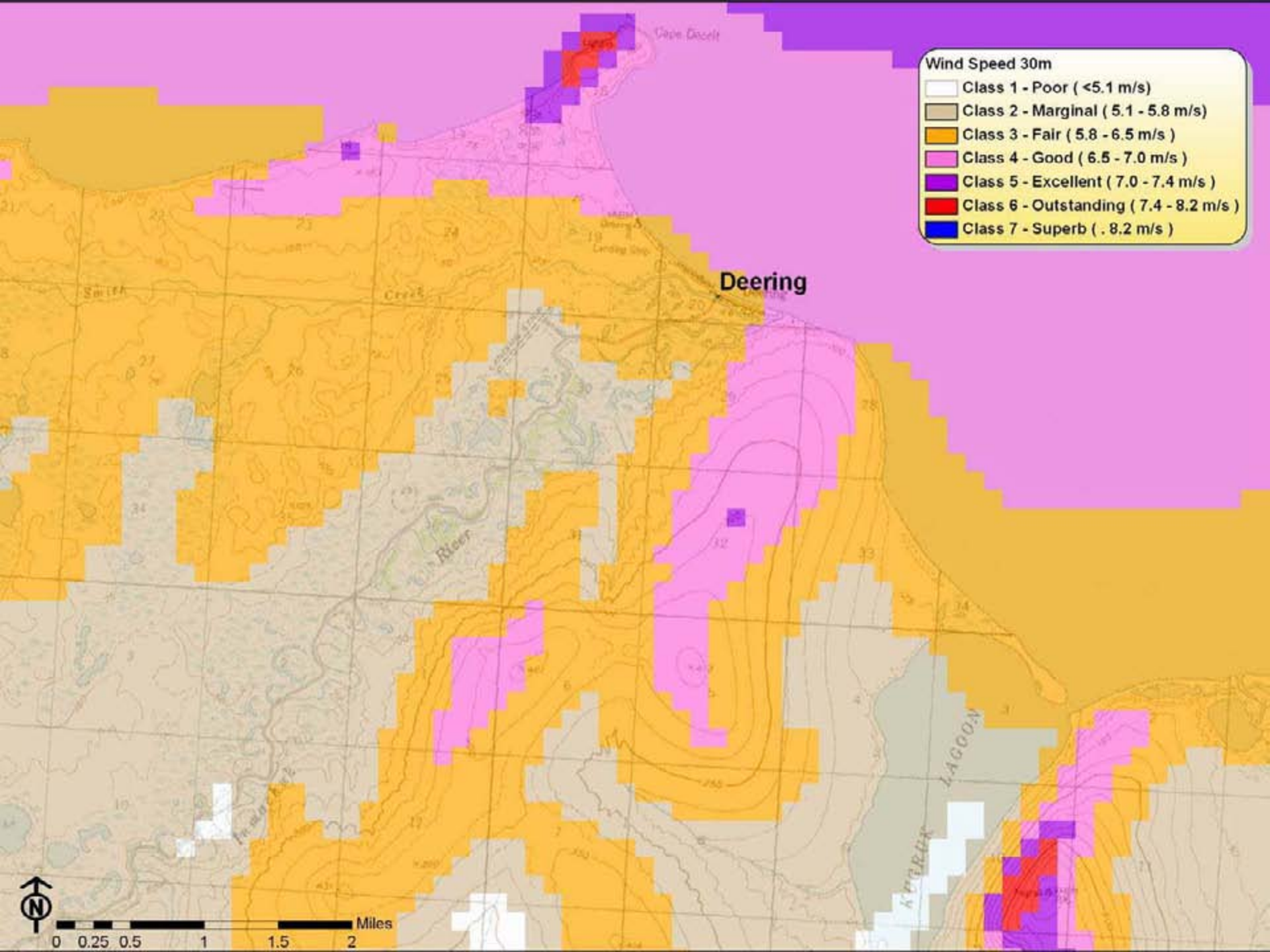
Under Consideration

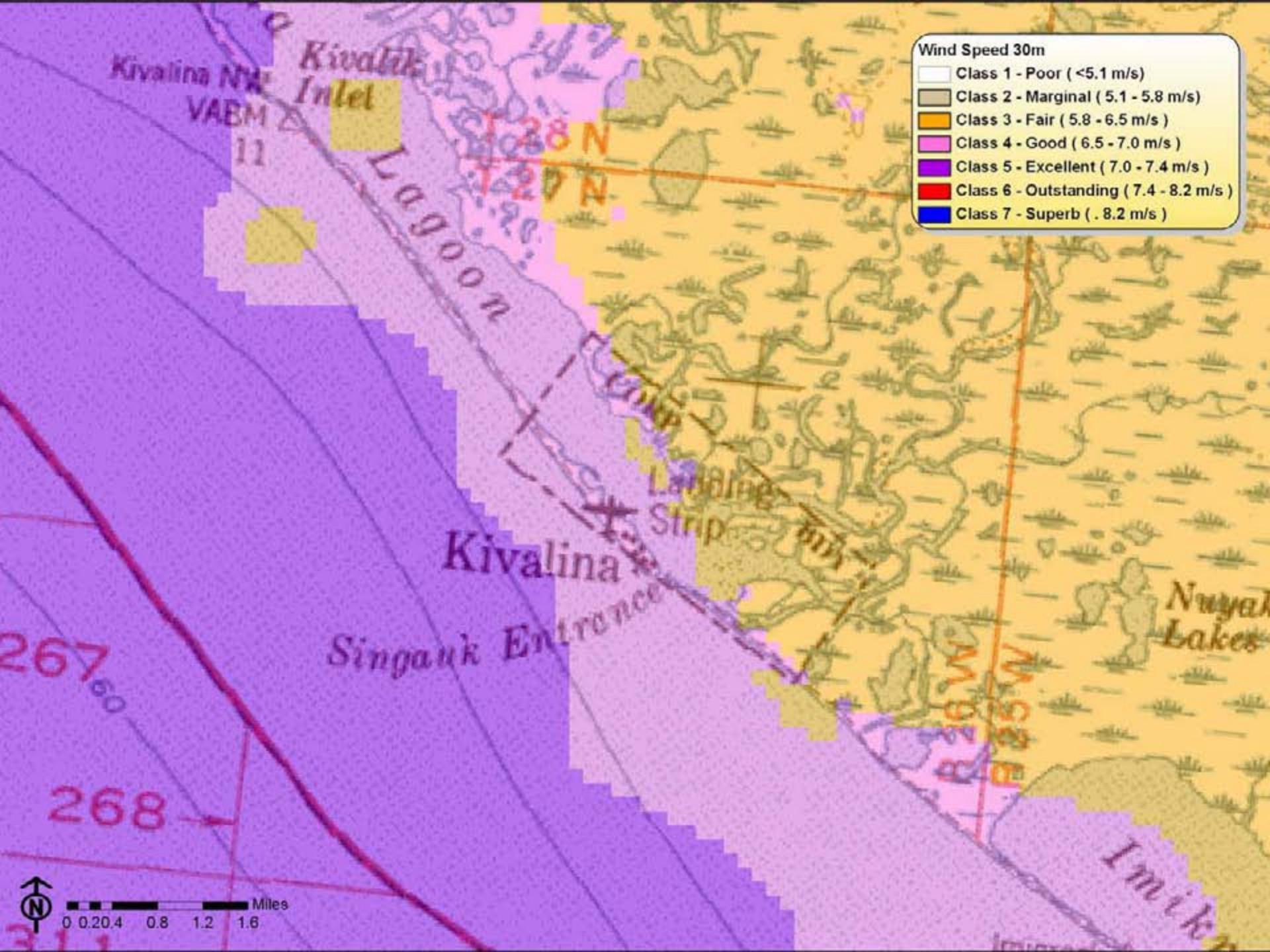
- Ambler
- Kiana
- Bornite/NOVA Gold- could benefit Upper Kobuk

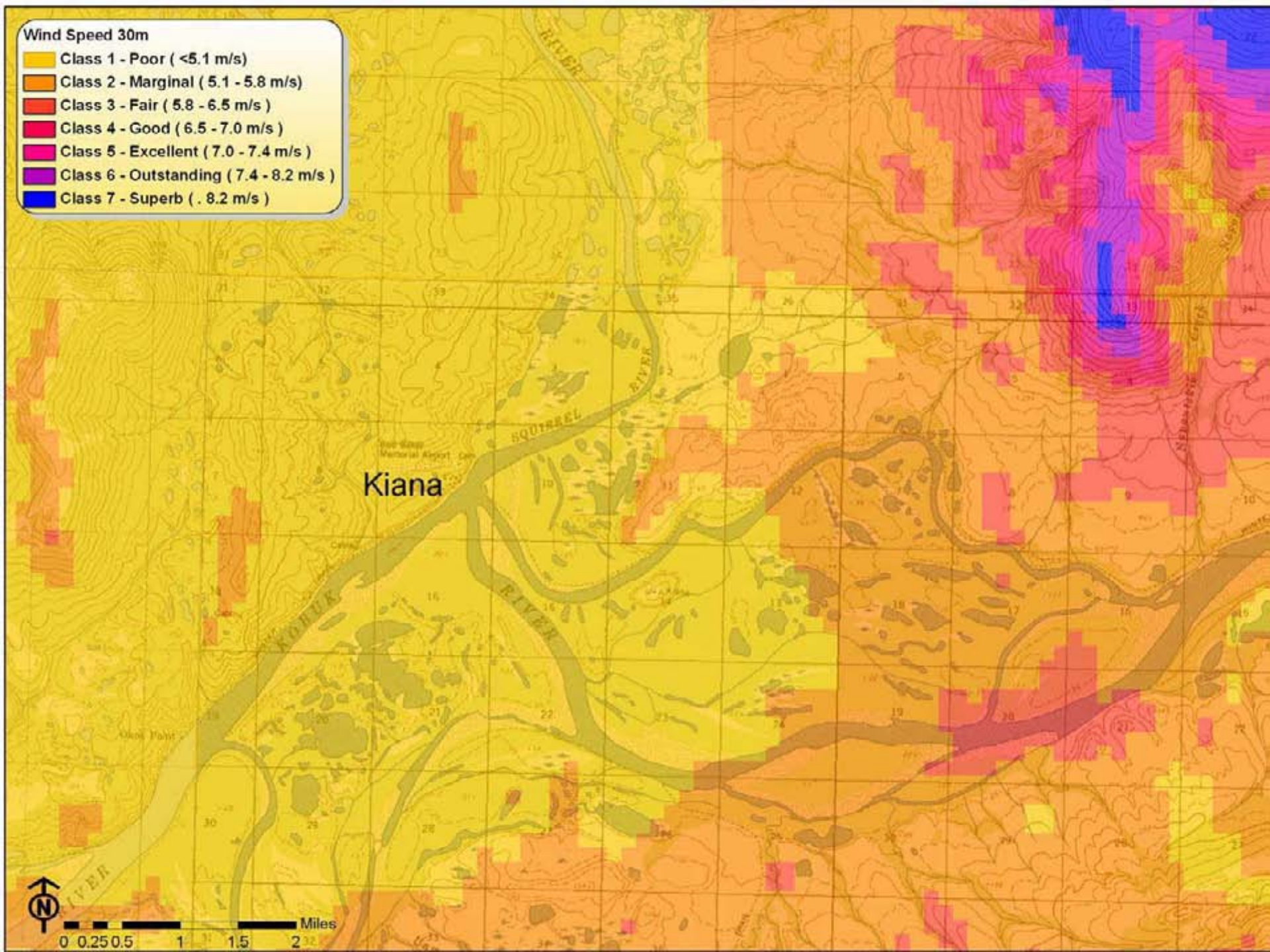
Red Dog Mine- Installed with Teck's resources- could benefit Kivalina.

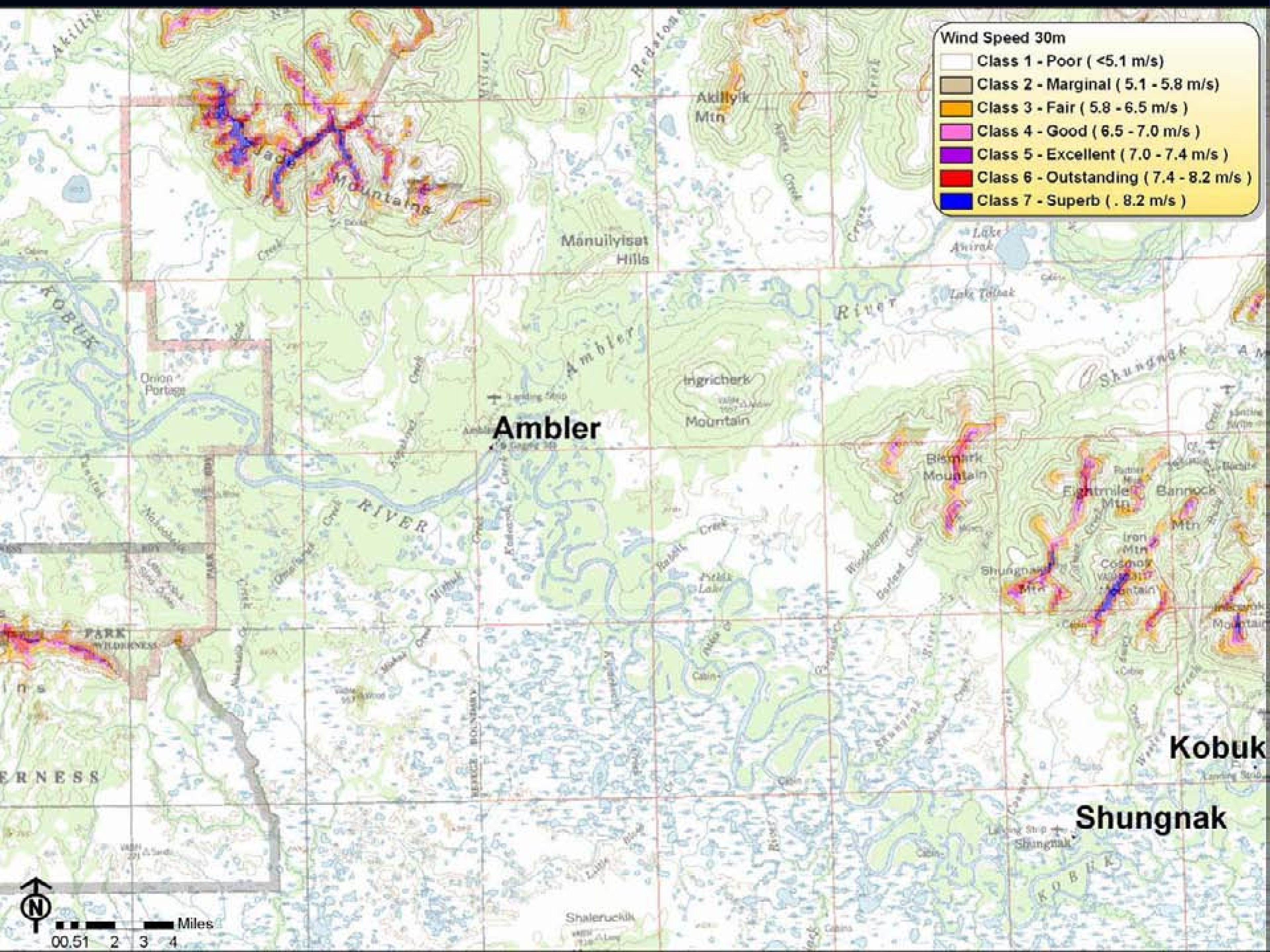
Buckland wind testing (old site and new site)


Buckland
Wind Speed 30m
Class 1 - Poor (<5.1 m/s)
Class 2 - Marginal (5.1 - 5.8 m/s)
Class 3 - Fair (5.8 - 6.5 m/s)
Class 4 - Good (6.5 - 7.0 m/s)
Class 5 - Excellent (7.0 - 7.4 m/s)
Class 6 - Outstanding (7.4 - 8.2 m/s)
Class 7 - Superb (. 8.2 m/s)
N
Miles
0 0.3 0.6 1.2 1.8 2.4

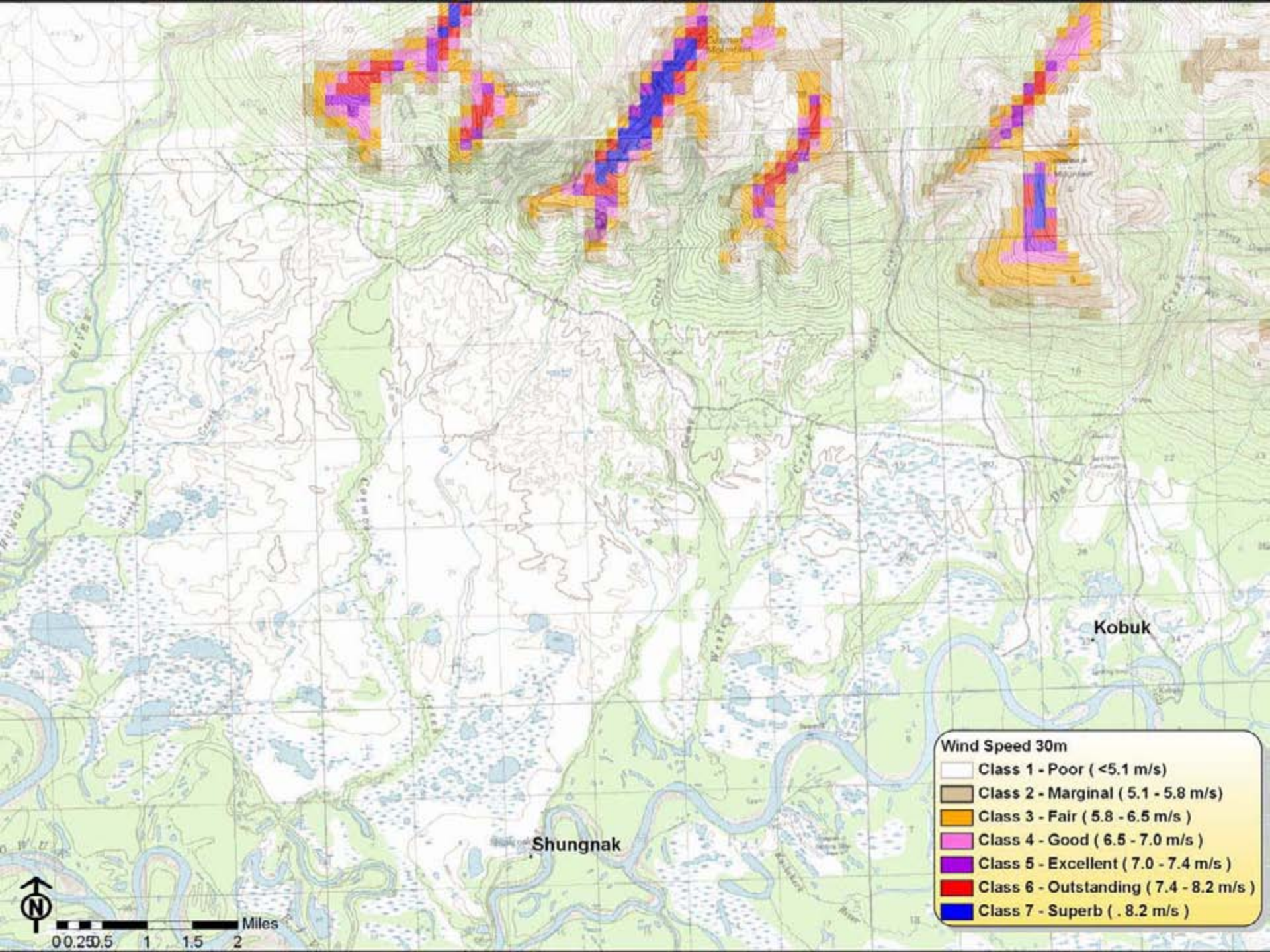

Wind Speed 30m
Class 1 - Poor (<5.1 m/s)
Class 2 - Marginal (5.1 - 5.8 m/s)
Class 3 - Fair (5.8 - 6.5 m/s)
Class 4 - Good (6.5 - 7.0 m/s)
Class 5 - Excellent (7.0 - 7.4 m/s)
Class 6 - Outstanding (7.4 - 8.2 m/s)
Class 7 - Superb (. 8.2 m/s)
Deering
Miles
0 0.25 0.5 1 1.5 2

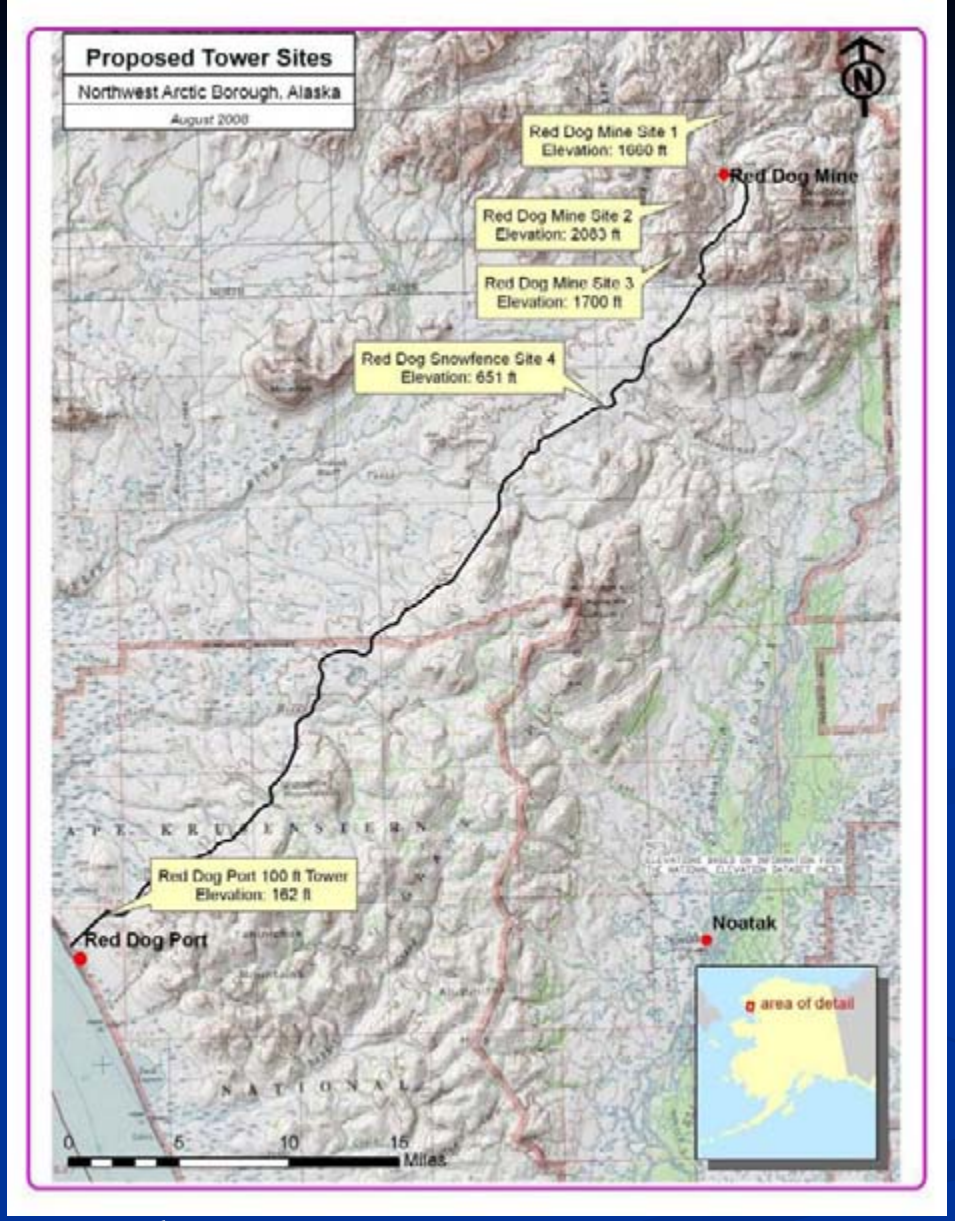

Wind Speed 30m
Class 1 - Poor (<5.1 m/s)
Class 2 - Marginal (5.1 - 5.8 m/s)
Class 3 - Fair (5.8 - 6.5 m/s)
Class 4 - Good (6.5 - 7.0 m/s)
Class 5 - Excellent (7.0 - 7.4 m/s)
Class 6 - Outstanding (7.4 - 8.2 m/s)
Class 7 - Superb (. 8.2 m/s)
Kivalina NW
VABM
11
Kivalik
Inlet
Lagoon
T 28 N
T 27 N
Landing
Strip
Kivalina
Singauk Entrance
Nuyak
Lakes
267
60
268
R 26 W
R 25 W
Miles
0 0.20.4 0.8 1.2 1.6


Wind Speed 30m
Class 1 - Poor (<5.1 m/s)
Class 2 - Marginal (5.1 - 5.8 m/s)
Class 3 - Fair (5.8 - 6.5 m/s)
Class 4 - Good (6.5 - 7.0 m/s)
Class 5 - Excellent (7.0 - 7.4 m/s)
Class 6 - Outstanding (7.4 - 8.2 m/s)
Class 7 - Superb (. 8.2 m/s)
Kiana
SQUIRREL RIVER
KOBUK RIVER
N
0 0.25 0.5 1 1.5 2
Miles



Wind Speed 30m
Class 1 - Poor (<5.1 m/s)
Class 2 - Marginal (5.1 - 5.8 m/s)
Class 3 - Fair (5.8 - 6.5 m/s)
Class 4 - Good (6.5 - 7.0 m/s)
Class 5 - Excellent (7.0 - 7.4 m/s)
Class 6 - Outstanding (7.4 - 8.2 m/s)
Class 7 - Superb (. 8.2 m/s)
Ambler
Kobuk
Shungnak
Manuilyisat Hills
Akillyik Mtn
Onion Portage
Ingricherk Mountain
Bismark Mountain
Eightmile Mtn
Bannock Mtn
Iron Mtn
Cosmos Mountain
Shungnak Mtn
Shalerueklik
Miles
00.51 2 3 4


Kobuk
Shungnak
Wind Speed 30m
Class 1 - Poor (<5.1 m/s)
Class 2 - Marginal (5.1 - 5.8 m/s)
Class 3 - Fair (5.8 - 6.5 m/s)
Class 4 - Good (6.5 - 7.0 m/s)
Class 5 - Excellent (7.0 - 7.4 m/s)
Class 6 - Outstanding (7.4 - 8.2 m/s)
Class 7 - Superb (. 8.2 m/s)
Miles
0 0.25 0.5 1 1.5 2

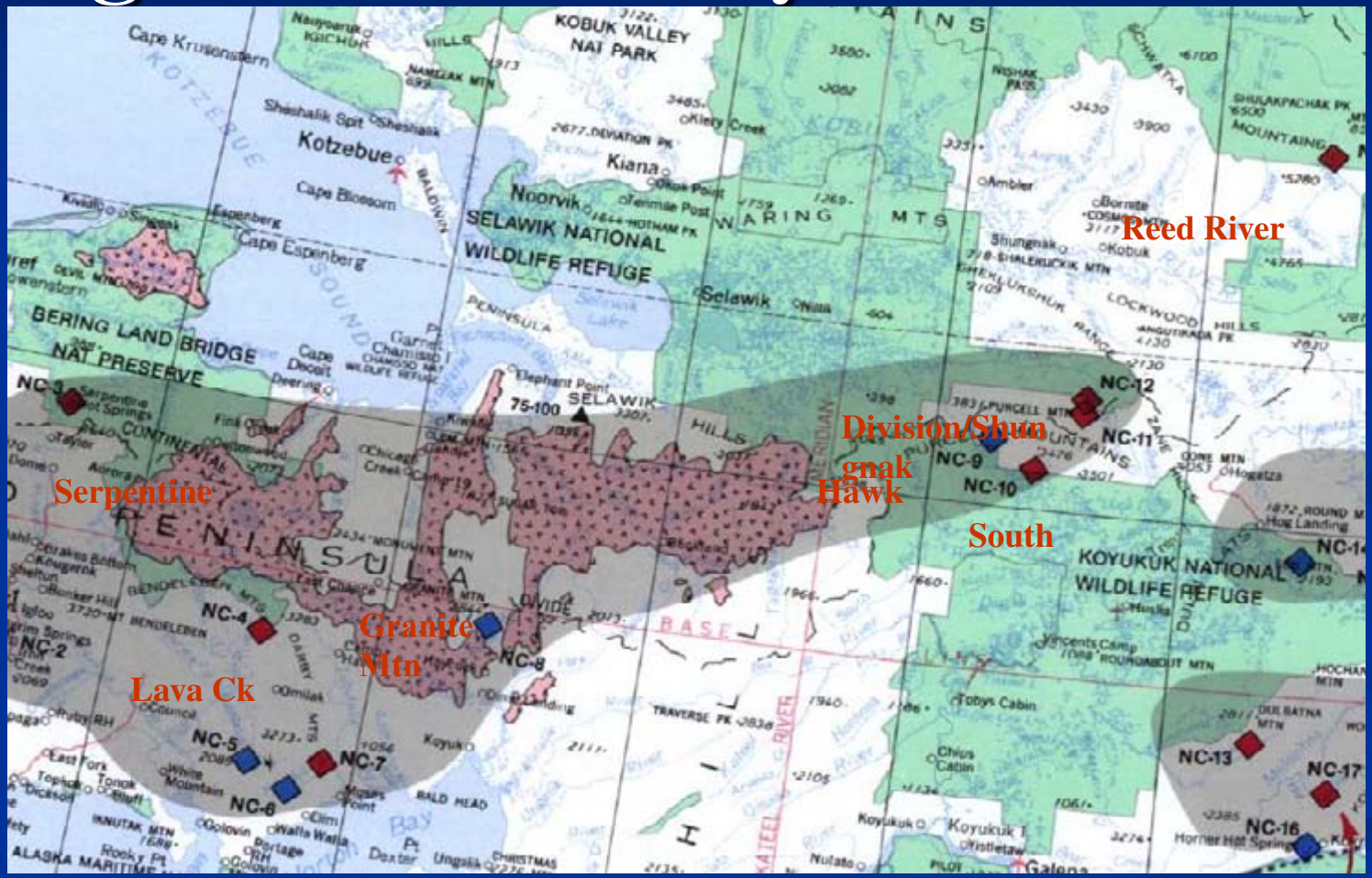


Industry Partnerships

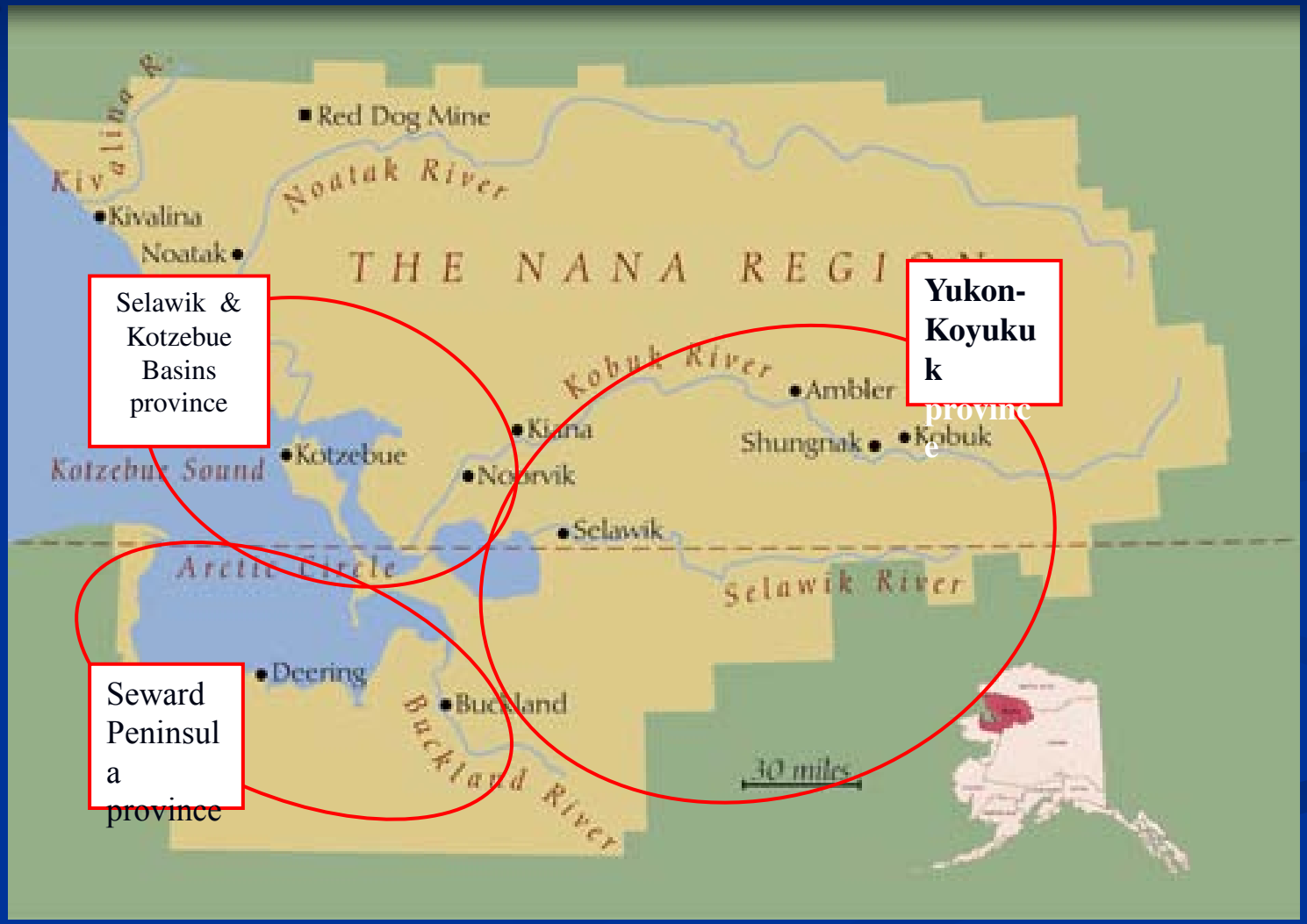
Teck and NOVA Gold

Geothermal Resources in NW Alaska

Geothermal & Organic Rank In Cycle Assessment

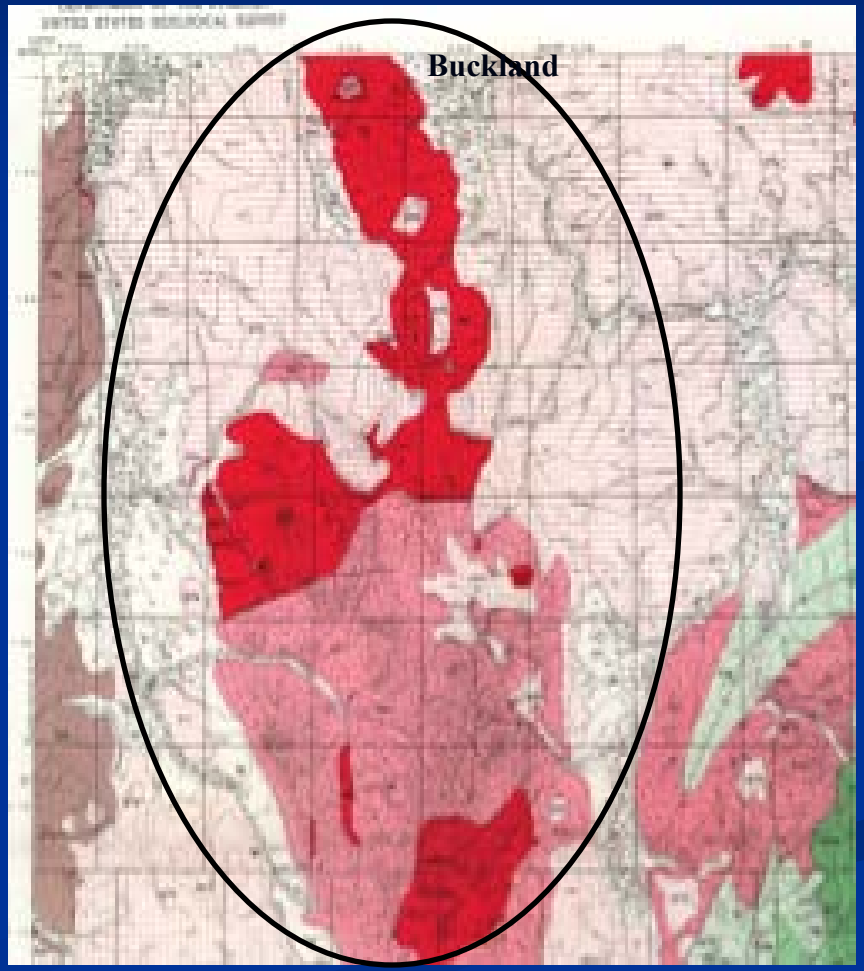


. Rough Outline of geologic provinces in southern NANA lands



Geologic map of the Buckland region

- Buckland/Deering Geologic map
  - Red = granitic rocks, which are favorable host rocks for geothermal resources;
  - Strong Possibility that geothermal resources could extend northward as well. Geothermal exploration should focus on the circled area.



Organic Rankine Cycle/ Biomass Assessment

- Analysis based on application of the Chena Hot Spring Chena Chiller for Biomass
- Regional Biomass Sufficient for Heating and Generation?
  - Heating-Yes
  - Generation-Uncertain
- Organic Rankine Cycle applicable for Generation?
  - Limited to waste-heat from a process or geothermal

Geothermal Assessment- Next Steps

Collaborate with complementary initiatives on the Seward Peninsula.

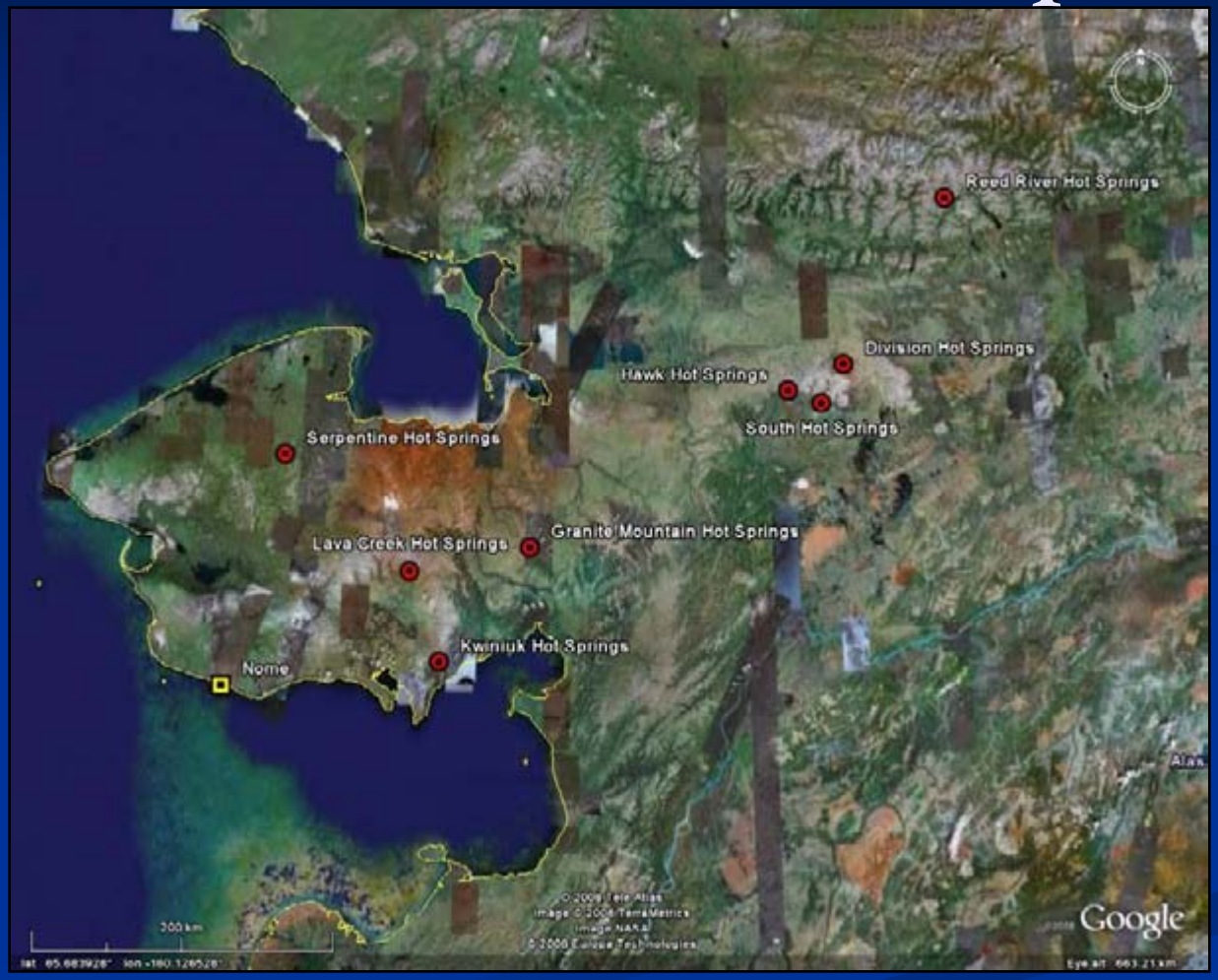
Phase 2.

Exploration recommendations:

1. Remote sensing study.
2. Soil geochemical surveys
3. Ground-based geophysical surveys

Phase 3.

1. Advanced exploration recommendations
2. Thermal gradient / exploratory drilling (shallow holes)
3. Technical and economic feasibility studies.



Energy Plan Initiatives

Short, Medium, and Long Term

Energy Regional Policy Planning

- Conservation, energy efficiency, and energy security as a policy.
- Integrated planning.
- Partnerships and Collaboration
- Assure regional involvement in energy assistance programs (LIHEAP, PCE, etc)
- Coordinate purchasing and diesel fuel to the extent practical- Bulk Fuel Cooperatives
- Develop a regional "Rural Energy Center"

Energy Critical Infrastructure Protection and Development

Regional Bulk & Diesel Fuel Upgrades

- Kotzebue Bulk Fuel Improvements
- Sub-Region-Bulk Fuel Improved Logistics/
- Storage in Kiana & Noorvik to enable surface transportation to Upper Kobuk
- Transportation corridor development- (Noatak to Red Dog Mine Road)
- Bulk Fuel and Rural Power Systems Upgrades

Conservation and Community End-Use Energy Efficiency

"100 percent coverage"

- Households, weatherization, and energy efficiency
- Water and Sewer Systems.
- ANTHC/VSW Outreach
- Promote LEED Standard
- Recovered Heat Systems
- Improved diesel efficiency
  - Using low loss transforme
    - Using recovered heat
    - Renovations needed
    - Kiana, Ambler
    - Kivalina
    - Being done in Selawik

Improved Fuel Storage and Transport

- Look at options for road access to Noatak
  - Could store fuel at Red Dog port and transport by truck

Noatak – aerial view

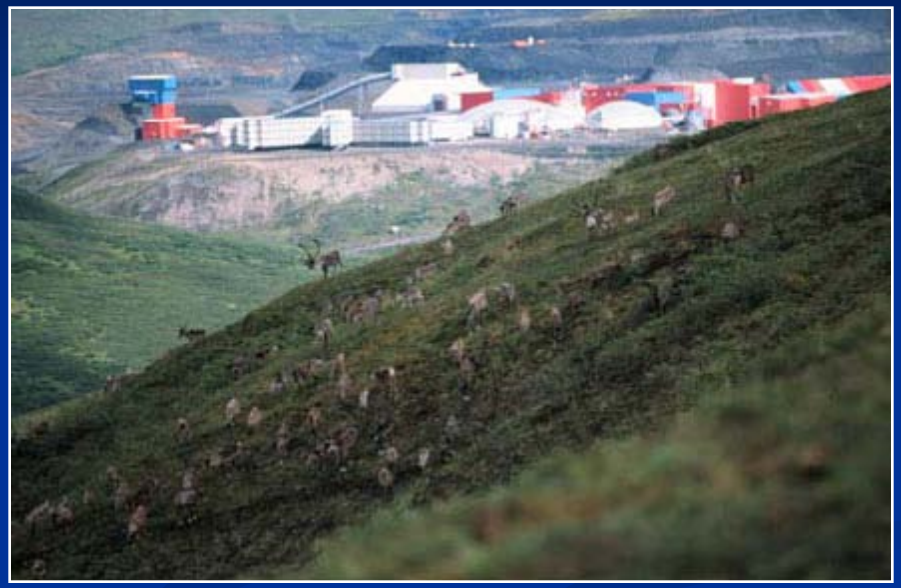
- Options for fuel storage on the Kobuk near Noorvik or Kiana to better serve Ambler and Shungnak/Kobuk

Feasibility Studies, Training, and Improved O&M

- Training and Workforce Development
  - Training of qualified operators
  - Youth Mentoring program
- Operations and Maintenance
- Need to better understand our resources through feasibility studies and analysis

Other Regional Energy Alternatives

- Northwest Arctic Coal- Deadfall Sincline Coal Deposit, Chicago Creek, and others w
- Coal-Bed Methane w/BLM rural energy program
- Natural Gas Exploration
- Mining and Economic Development
  - Public Private Partnership



Energy Plan Roles and Responsibilities

Energy Initiative	Who is responsible
Power generation and distribution	Utility, borough, city and tribal councils
Bulk fuel storage	Utility, school district, village corporations
Transportation infrastructure development	Borough, city and tribal councils
Home energy efficiency	Housing authority, city and tribal councils.
School energy efficiency	School district and borough
Commercial building energy efficiency	Private sector, city and tribal councils
Workforce development	University and school district

Regional Hydroelectric

- Run-of-river hydroelectric plants
- Upper Kobuk Valley area (Ambler, Shungnak and Kobuk).
- Upper Kobuk Valley: Jade Creek, Dahl Creek, Cosmos Creek, Shungnak River, and Kobuk River, and the Kogoluktuk River.
- 1.2 mega-watt (MW) to jointly serve to communities of Ambler, Shungnak. Kobuk., and potential mining interests
- Detailed study of hydropower resources in the Upper Kobuk Valley submitted for funding

Biomass

- Heat appears sustainable
- Electrical Power may not be sustainable Electrical sustainable
- Harvest Economies Suggest a Regional Harvest model
- Develop one harvest and management plan across the region
- Opportunities between NANA, State, and BLM lands

Shungnak Biomass Opportunties

- Excellent District Heating Opportunities
- Village Land locked in Summer —Winter only wood delivery
- Wood Resource is distant from village

Renewable Energy Possibilities

Solar Power

- 50 kW solar PV for Noatak, Ambler, Shungnak and Selawik
- Goal – can we put in enough PV to displace station service and line losses and thereby increase diesel efficiency?
- Solar thermal hot water heating

Mini-Grids Transmission

- Red Dog Mine Port- Kivalina- 15 miles
- Ambler-Shungnak 25 miles (potential mining interests)
- Selawik-Kiana- Noorvik 50 Miles total between the three communities
- Deering Buckland & the Seward Peninsula

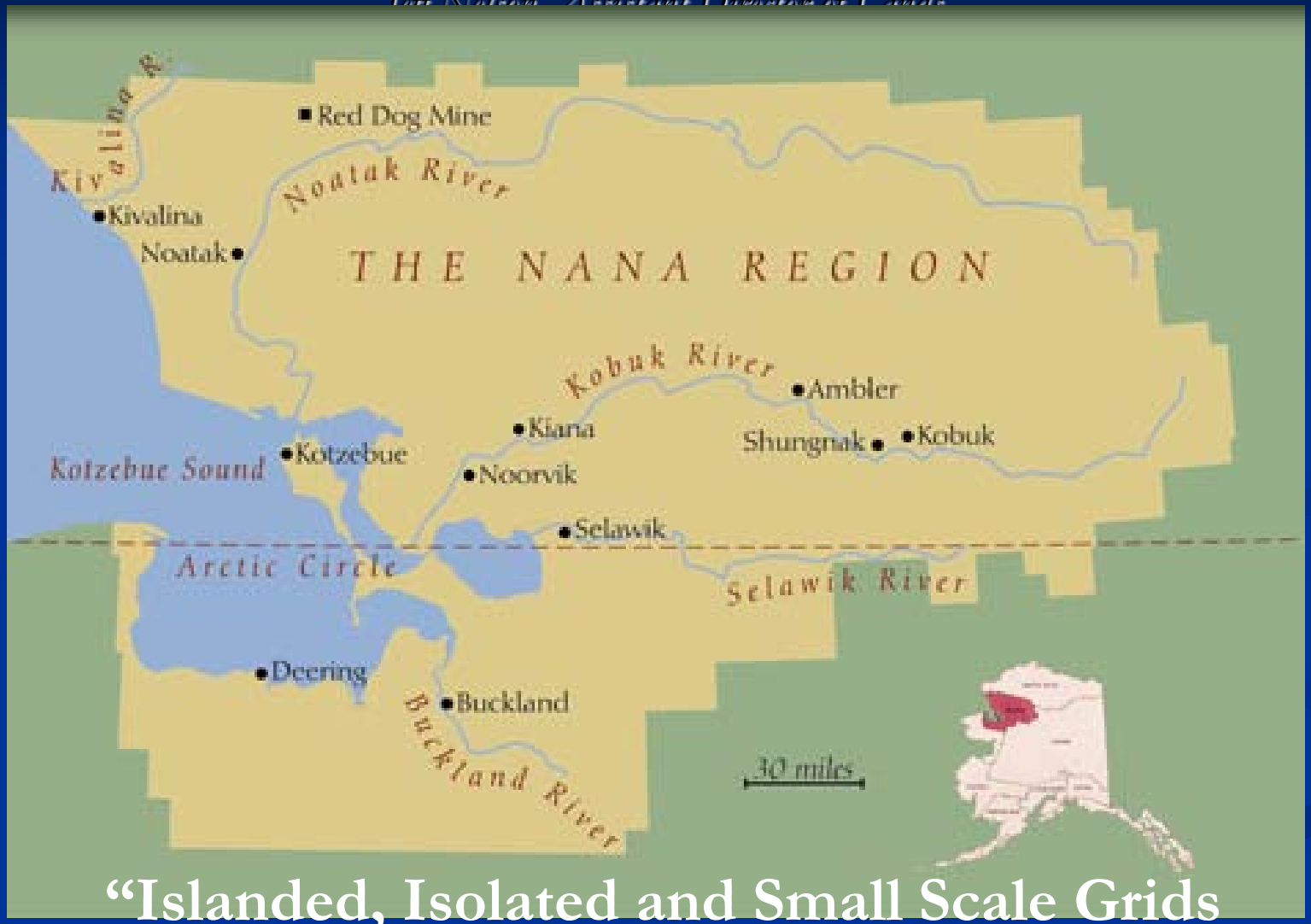
Monitor current research in transmission

Benefits

Energy Options Analysis- By Sub-Region

"The economic future of the NANA region is directly tied to restructuring current energy options and looking towards alternative & renewable sources."

Jeff Nelson, Assistant Director of Lands



"Islanded, Isolated and Small Scale Grids

Use of Diesel-Home heating"

Sub-Region 2: Buckland/Deering

- Wind Resource Development
- Geothermal Exploration
- Recovered Heat.
- Coordinate an End-Use Energy Efficiency Feasibility Study. Recommendations
- Research Additional Home Heating Energy Options

Sub-Region 1: Noatak/Red Dog Mine/Noatak

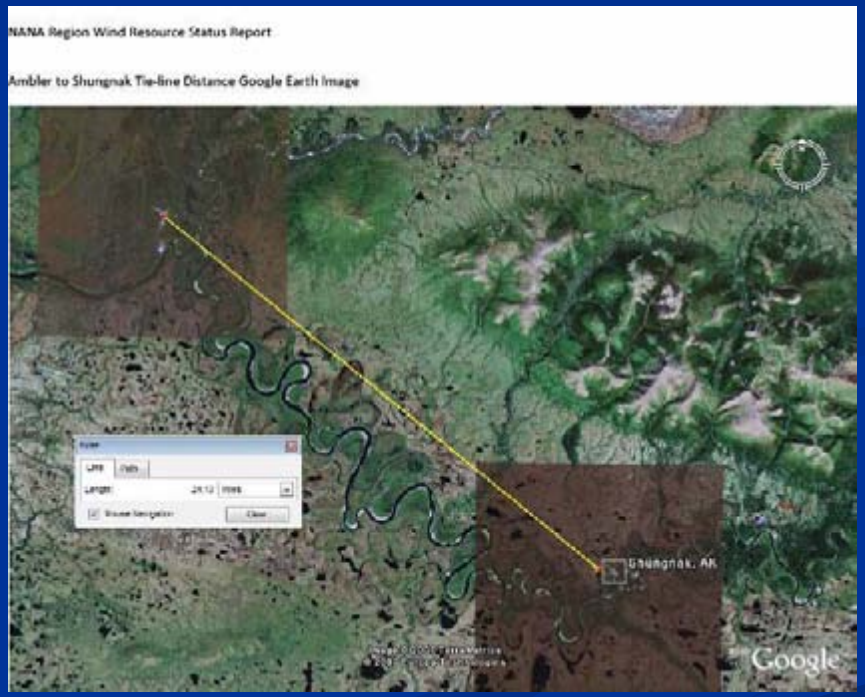
- **Wind Energy Development**
  - *Noatak Wind Energy in conjunction with proposed road*
  - *Road to avoid air delivery*
- **Transmission development**
- **Recovered Heat**
- **Weatherization & End-Use Energy Efficiency**
- **Solar Thermal Heating**
- **Improved Infrastructure**

Sub-Region 3
Kiana/Selawik/Noorvik Energy

- Recovered heat
- End-Use Energy Efficiency
- Wind Diesel Hybrid Local Hydroelectric Options.
- Improve penetration of existing wind-diesel system
- Electrical Inter-tie
- Improved wind penetration- Selawik

Sub-region 4
Kobuk/Shungnak/Ambler/NOVA Gold

- Recovered Heat
- End-use energy efficiency
- Wind-Diesel Hybrid
- Home Heating Fuel diversification
- Bio-mass
- Hydropower
- Wind-Diesel Hybrid (with an intertie)



Project Plans & White Papers

Solar Thermal	All communities- feasible concept 9 months out of the year
Wind Diesel	Deering, Noorvik, and Buckland; Utility Scale concepts for Kotzebue
Upper Kobuk Biomass	Hybrid with the Kogoluktuk
Upper Kobuk Hydroelectric	Ambler, Shungnak, Kiana, and Kobuk
50 KW Solar Photovoltaic	All communities- emphasize Noatak & Kivalina
Seward Peninsula Geothermal	Seward Peninsula Communities
Recovered Heat	

Energy Communication Plan

WALSH | SHEPPARD
Strategy + Communications

CREATIVE BRIEF

Energy Awareness Campaign
NANA 9914

May 26, 2008

PURPOSE
Educate about:

- The state of the current energy crisis
- Energy conservation practices
- The importance of taking responsibility and participating
- The purpose of a strategic energy grant
- The plan to face the crisis in the region, short term and long term goals
- NANA's role as a leader in facing the crisis
- NANA's partners
- Alternative energy sources in the region
- Energy assistance options
- The importance of new technology

TARGET AUDIENCE

NANA shareholders and region residents

OVERVIEW

- NANA is planning a long-term pursuit of funding and seeking partners to help face the crisis.
- There are many actions people can take, today, to conserve energy.
- All villages in the region have potential to implement at least one alternative way of generating energy. (wind – Kivalina, Kotzebue, Selawik, Noorvik; biomass – Kobuk, Selawik; hydro – Kobuk, Ambler, Shungnak, Noorvik, maybe Noatak; geothermal – Kotzebue, Buckland, maybe Deering; and solar – all villages)
- NANA is a leader in facing the energy crisis but they can't do it alone. Everyone needs to participate.

Walsh | Sheppard • 111 West 9th Avenue, Anchorage, AK 99501 • T: 907.338.3567 • F: 907.338.3857

- Now that the world is facing this crisis, more and more technological solutions are being developed. Residents need to embrace this technology. It doesn't mean a loss of jobs, it means becoming self-sustaining.

ADVERTISING OBJECTIVES

- Increase awareness about the importance of achieving energy security
- Increase participation from residents, working together
- Increase awareness about the effort for the region to utilize other energy sources and displacing diesel fuel

ACTION

- Get educated about the energy crisis and what it means to you.
- Take responsibility and participate in efforts to make the region self-reliant by developing alternative energy sources.

COMPONENTS

- Brochure
- Radio PSA's current events, conservation tips, and technology updates
- Web site current events, conservation tips, and technology updates
- *The Hunter* newsletter conservation tips, success stories, technology updates

MUST HAVES

- NANA Regional Corporation, Inc. logo
- NANA Pacific Logo
- Contact information

Walsh | Sheppard • 111 West 9th Avenue, Anchorage, AK 99501 • T: 907.338.3567 • F: 907.338.3857

Lessons Learned

- Energy Security is multifaceted

- Collaboration between communities and across regions
- Prepare for increasing high costs
- Realistic perception of renewable energy- hybrid systems that include fossil fuels
- Displacement vs Replacement
- Diesel fuel will remain a component of the energy supply

Next steps

- Finalize Strategic Energy & Energy Options Plan Report- GIS & Mapping
- Prepare for follow-on projects
- Develop project concepts and white papers
- Continue regional, state, and federal collaborations
- Analyze existing wind data
- Identify Alternative Wind Sites and technologies
- Develop smaller scale wind deployment strategies

Bottom Line: Future Orientation