City of Napakiak
P.O. Box 34009
Napakiak, Alaska 99634
Phone (907) 589-2611 Fax (907) 589-2612
cityofnapakiak@hotmail.com

2018 5 Year Plan & City/Corporation 14 (c) 3
March 8, 2018
1 P.M.

A. Call to order by:

B. Roll Call:

City Council: Joann Slats ___ George Berry ___ Sally Billy ___ Michael Black ___ Molly Black ___ Walter Nelson ___ Nicholas Paul ___

Establishment of Quorum: ___ Present ___ Absent ___ Excused ___

Tribal Council: Jacob Black ___ Susan Aluskak ___ Melvin T. Andrew ___ Susan A. Charlie ___ Carl Motgin ___ Ralph Nelson ___ 1 Vacant

Establishment of Quorum: ___ Present ___ Absent ___ Excused ___

Napakiak Corporation: Carl Motgin ___ Oscar Alexie ___ Moses Aluskak ___ Norman Black ___ Minnie Joekay ___ Richard Jung ___ Walter Nelson ___

*Corporation Planning Committee-Sally Billy, Carl Motgin, Walter Nelson, Nicholas Paul

Establishment of Quorum: ___ Present ___ Absent ___ Excused

C. Invocation by:

D. Approval of Agenda:

E. New Business:

1. 2018 5 Year Plan & City/Corporation 14 (c) 3

F. Adjournment:

City of Napakiak
P.O. Box 34009
Napakiak, Alaska 99634
Phone (907) 589-2611 Fax (907) 589-2612
cityofnapakiak@hotmail.com

2018 Hazard Mitigation Planning Committee
April 23, 2018

A. Call to order by: Nicholas Paul 1:31

B. Roll Call:

Jacob Black P Susan Aluskak P Joann Slats P Sally Billy P
Walter Nelson P Nicholas Paul P Gordon Nelson P Michael Black EX
Establishment of Quorum: 6 Present ___ Absent 1 Excused

Susan Aluskak came in 2:03 pm

C. Invocation by: Sally Billy

D. Approval of Agenda: Sally Billy / Joann Slats

E. Old Business:

1. Review 2018 Hazard Mitigation Plan

Sally Excepts Hazard mitigation planning Committee second by Susan 2018-02

Walter nelson makes a motion 2018-01 second by Joann Slats

F. Adjournment:

Appendix 3 – Plan Approval Resolution

CITY OF NAPAKIAK, ALASKA
ADOPTION RESOLUTION
Resolution # 2018-01

Adopting the Napakiak Local Hazard Mitigation Plan

City of Napakiak
City Council
P.O. Box 34009
Napakiak, Alaska 99634

RESOLUTION

WHEREAS, the City of Napakiak, with the assistance from Ecology and Environment, Inc., has gathered information and prepared the Napakiak Local Hazard Mitigation Plan;

WHEREAS, the Napakiak Local Hazard Mitigation Plan has been prepared in accordance with the Disaster Mitigation Act of 2000; and

WHEREAS, the City of Napakiak is a local unit of government that has afforded the citizens an opportunity to comment and provide input in the Plan and the actions in the Plan; and

WHEREAS, the City of Napakiak has reviewed the Plan and affirms that the Plan will be updated no less than every five years;

NOW THEREFORE, BE IT RESOLVED by the City Council that the City of Napakiak adopts the Napakiak Local Hazard Mitigation Plan as this jurisdiction's Natural Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 23 day of April 20 18 at the meeting of the City Council.

Joann Slats
Mayor Joann Slats

Katrina Andrew
City Clerk Katrina Andrew

August 2, 2018

Mr. Brent Nichols
State Hazard Mitigation Officer
Alaska Division of Homeland Security and Emergency Management
P.O. Box 5750
Fort Richardson, Alaska 99505-5750 Dear Mr. Nichols:

U.S. Department of Homeland Security
FEMA Region 10
130 – 228th Street, SW Bothell, Washington 98021

As requested, on August 2, 2018, the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA), Region 10, completed a pre-adoption review of the *Napakiak, Alaska Local Hazard Mitigation Plan*. This letter serves as Region 10's commitment to approve the plan upon receiving documentation of its adoption by the community. The plan successfully contains the required criteria, excluding the adoption, for hazard mitigation plans, as outlined in Code of Federal Regulation Title 44 Part 201.

Once FEMA approves the plan, the community is eligible for mitigation project grants.

Please contact our Regional Mitigation Planning Program Manager, Amanda Siok, at (425) 487-4626 with any questions.

Sincerely,

X

Tamra Biasco
Chief, Risk Analysis Branch
Mitigation Division

AS:vl

August 14, 2018

U.S. Department of Homeland Security
FEMA Region 10
130 -228'h Street, SW
BotJ1cll, Washington 98021-8627

FEMA

The Honorable Joann Slats
Mayor, City of Napakiak
City Council
P.O. Box 34009
Napakiak, Alaska 99634

Dear Mayor Slats:

On August 13, 2018, the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) Region I0, approved the *Napakiak Local Hazard Mitigation Plan* as a local plan as outlined in Code of Federal Regulations Title 44 Part 20I. This approval provides the jurisdiction eligibility to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's, Hazard Mitigation Assistance (HMA) grants projects through August 12, 2023, through your state.

FEMA individually evaluates all application requests for funding according to the specific eligibility requirements of the applicable program. Though a specific mitigation activity or project identified in the plan may meet the eligibility requirements, it may not automatically receive approval for FEMA funding under any of the aforementioned programs.

Over the next five years, we encourage your communities to follow the plan's schedule for monitoring and updating, and to develop further mitigation actions. To continue eligibility, jurisdictions must review, revise as appropriate, and resubmit the plan within five years of the original approval date.

If you have questions regarding your plan's approval or FEMA's mitigation grant programs, please contact Mike Johnson, Emergency Management Specialist with Alaska Division of Homeland Security and Emergency Management, at (907) 428-7055, who locally coordinates and administers these efforts.

Mark Carey, Director
Mitigation Division

cc: Brent Nichols, Alaska Division of Homeland Security and Emergency Management

Enclosure

KS:vl

APPENDIX A:
LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction: City of Napakiak	**Title of Plan:** Local Hazard Mitigation Plan	**Date of Plan:** 2018
Local Point of Contact: Katrina Andrew	**Address:** PO Box 34009 Napakiak, AK 99634	
Title: City Clerk		
Agency: City of Napakiak		
Phone Number: (907) 589-2611	**E-Mail:** cityofnapakiak@hotmail.com	

State Reviewer: Mike Johnson	**Title:** Hazard Mitigation Planner	**Date:** 18 MAY 2018

FEMA Reviewer: Amanda Siok Amanda.Siok@fema.dh	**Title:** Mitigation Planner	**Date:** June 14, 2018
Date Received in FEMA Region 10	May 18, 2018; July 10, 2018	
Plan Not Approved		
Plan Approvable Pending Adoption	August 8, 2018	
Plan Approved	August 13, 2018	

SECTION 1:
REGULATION CHECKLIST

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	PDF 9-11	X	
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	PDF 9-11	X	
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	PDF 11-12	X	
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	See section 2.4 PDF 13	X	
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Section 7.4 PDF 61	X	
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	See section 7.2 PDF 59	X	
ELEMENT A: REQUIRED REVISIONS			

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	See section 4.3 (Page 4-4) PDF 25-40	X	
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Sections 4.3.1 thru 4.3.7, beginning on Page 4-4 PDF 26	X	

B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Sections 4.3.1 thru 4.3.7, beginning on Page 4-4 PDF 21-40	X	
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	PDF 8	X	

ELEMENT B: REQUIRED REVISIONS

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan** (section and/or page number)	**Met**	**Not Met**
ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	See section 5, Table 5-1, 5-2, 5-3 (Page 5-1 and 2) PDF 41	X	
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	The City of Napakiak does not participate in the NFIP. PDF 8	N/A	

C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	See section 6.1, 6.1.2 (Page 6-1) PDF 45	X	
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	See Table 6-2 (Page 6-3) 49-54	X	
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	See Table 6-3 (Page 6-7)	X	
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	See section 7.3 (Page 7-6) PDF 60	X	
ELEMENT C: REQUIRED REVISIONS			
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	See section 3.7 (Page 3-3)	X	
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	See Section 7.2 (Page 7-1), Table 7-1 (Page 7-2) PDF 56	X	
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	See Section 7.2 (Page 7-1), Table 7-1 (Page 7-4)	X	
ELEMENT D: REQUIRED REVISIONS			

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan** (section and/or page number)	**Met**	**Not Met**
ELEMENT E. PLAN ADOPTION			
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	See Appendix 3 (Dependent upon FEMA APA Letter)		X
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	This is a single jurisdictional HMP	N/A	

ELEMENT E: REQUIRED REVISIONS			
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)			
F1.			
F2.			
ELEMENT F: REQUIRED REVISIONS			

SECTION 2:
PLAN ASSESSMENT

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

Element A: Planning Process

Plan Strengths

- DHS- Looking over the meeting minutes it appeared as the leadership and community supported the engagement. City, tribe, and Corp have an MOA for joining and cooperative planning efforts. Plan has been accepted and should have no issues getting adopted.
- Diverse planning team and stakeholders including: YK Health Cooperation, AK State Trooper, Rural Community Action Program, Village Electric, Denali Commission. To improve: Show how these organizations helped to support the planning process and/or develop mitigation actions
- Notes are provided of planning team meetings and coordination with the contractor.
- The public meeting was announced on local radio, and with flyers at post office, City office, and general store. The first meeting was used to identify which hazards were prioritized and 23 residents attended.
- The second public meeting was focused on the mitigation action plan and 16 residents attended.

Opportunities for Improvement:

- Consider showing how the various organizations on the planning team helped to support the planning process and/or develop mitigation actions.
- Appendix 1 is missing from the submission however, PDF 59 is descriptive enough that it isn't needed prior to APA. It is suggested that all documents/appendices be combined into 1 final document for ease of use by the city.

Element B: Hazard Identification and Risk Assessment

Plan Strengths

- DHS- Using quotes from residents in the text adds a layer of ownership to the plan. As elected officials and residents look at the plan they can relate
- Climate change is assessed based on its relationship to erosion and severe weather hazards. This demonstrates forward thinking and commitment to Napakiak's long-term resilience.
- Good use of oral history to describe historical impacts of storms where traditional data was not available.
- Great section on cascading impacts on permafrost as a result of erosion. Forward thinking, thorough analysis of the erosion hazard and its impacts.

    - Table 4-9 includes a history of major flood events but also describes the impacts of the associated losses. This information helps to paint a picture of vulnerabilities and lay the groundwork for developing problem statements and turning them into mitigation actions.

Opportunities for Improvement:

- Consider mapping out the homes that despite being 2' elevated have received flooding.

- The severe storm section overlaps with the flood hazard, consider combining the two sections or address storm-related flooding in the flood hazard section.
- Specific impacts from severe weather are limited. Consider identifying specific structures with known poor construction to high wind, fuel congealing, heavy snow loads, and permafrost degradation.

Element C: Mitigation Strategy

Plan Strengths

- DHS- Good documentation of past mitigation efforts and stressing the importance of village relocation. Village relocation is not unique to Napakiak and the results of other villages in peril will be tracked to see what other options work
- DHS – Strategies revolve around village expose to hazards and getting that word out
- Excellent job developing problem statements for vulnerable infrastructure and hazard-related impacts.

Opportunities for Improvement:

- Consider adding links to the existing community plans and ordinances referenced in Table 5-1.
- The planning team should make it a priority to explore access and eligibility to "unknown" financial resources listed in table 5-3.
- Section 6.1 Developing Mitigation Goals states that 10 goals were developed; however, section 6.1.2 only identifies four goals. Revise section 6.1 to reflect the correct number of goals.
- Section 6.2 is missing part of its title. Check to see if this was mistakenly deleted.
- This plan integration section is very weak. The capability assessment in section 5 should be improved to allow for better integration and implementation of the hazard mitigation plan.

Element D: Plan Update, Evaluation, and Implementation (*Plan Updates Only*)

Plan Strengths

- DHS- Using quotes from residents in the text adds a layer of ownership to the plan. As elected officials and residents look at the plan they can relate

- The plan clearly shows the status of mitigation actions from the previous plan and how progress is being made.

Opportunities for Improvement:

- Consider color-coding or adding another column to the mitigation action plan to more clearly show which actions were newly developed and which are carried over from the previous plan.

B. Resources for Implementing Your Approved Plan

The **Region 10 Integrating Natural Hazard Mitigation into Comprehensive Planning** is a resource specific to Region 10 states and provides examples of how communities are integrating natural hazard mitigation strategies into comprehensive planning. You can find it in the FEMA Library at http://www.fema.gov/media-library/assets/documents/89725.

The **Integrating Hazard Mitigation Into Local Planning: Case Studies and Tools for Community Officials** resource provides practical guidance on how to incorporate risk reduction strategies into existing local plans, policies, codes, and programs that guide community development or redevelopment patterns. It includes recommended steps and tools to assist with local integration efforts, along with ideas for overcoming possible

impediments, and presents a series of case studies to demonstrate successful integration in practice. You can find it in the FEMA Library at http://www.fema.gov/library/viewRecord.do?id=7130.

The **Mitigation Ideas: A Resource for Reducing Risk from Natural Hazards** resource presents ideas for how to mitigate the impacts of different natural hazards, from drought and sea level rise, to severe winter weather and wildfire. The document also includes ideas for actions that communities can take to reduce risk to multiple hazards, such as incorporating a hazard risk assessment into the local development review process. You can find it in the FEMA Library at http://www.fema.gov/library/viewRecord.do?id=6938.

The **Local Mitigation Planning Handbook** provides guidance to local governments on developing or updating hazard mitigation plans to meet and go above the requirements. You can find it in the FEMA Library at http://www.fema.gov/library/viewRecord.do?id=7209.

The **Integration Hazard Mitigation and Climate Adaptation Planning: Case Studies and Lessons Learned** resource is a 2014 ICLEI publication for San Diego with a clear methodology that could assist in next steps for integration impacts of climate change throughout mitigation actions. http://icleiusa.org/wp-content/uploads/2015/08/Integrating-Hazard-Mitigation-and-Climate-Adaptation-Planning.pdf

The **Local Mitigation Plan Review Guide and Tool** resource is available through FEMA's Library and should be referred to for the next plan update. http://www.fema.gov/library/viewRecord.do?id=4859

The **Tribal Multi-Hazard Mitigation Planning Guidance:** This resource is specific to tribal governments developing or updating tribal mitigation plans. It covers all aspects of tribal planning requirements and the steps to developing tribal mitigation plans. You can find the document in the FEMA Library at http://www.fema.gov/media-library/assets/documents/18355

National Fire Adapted Communities Learning Network

Volcanic Eruption Mitigation Measures: For information on Mitigation Actions for Volcanic Eruptions that would satisfy the C4 requirement, please visit: http://earthzine.org/2011/03/21/volcanic-crisis-management-and-mitigation-strategies-a-multi-risk-framework-case-study/ and http://www.gvess.org/publ.html.

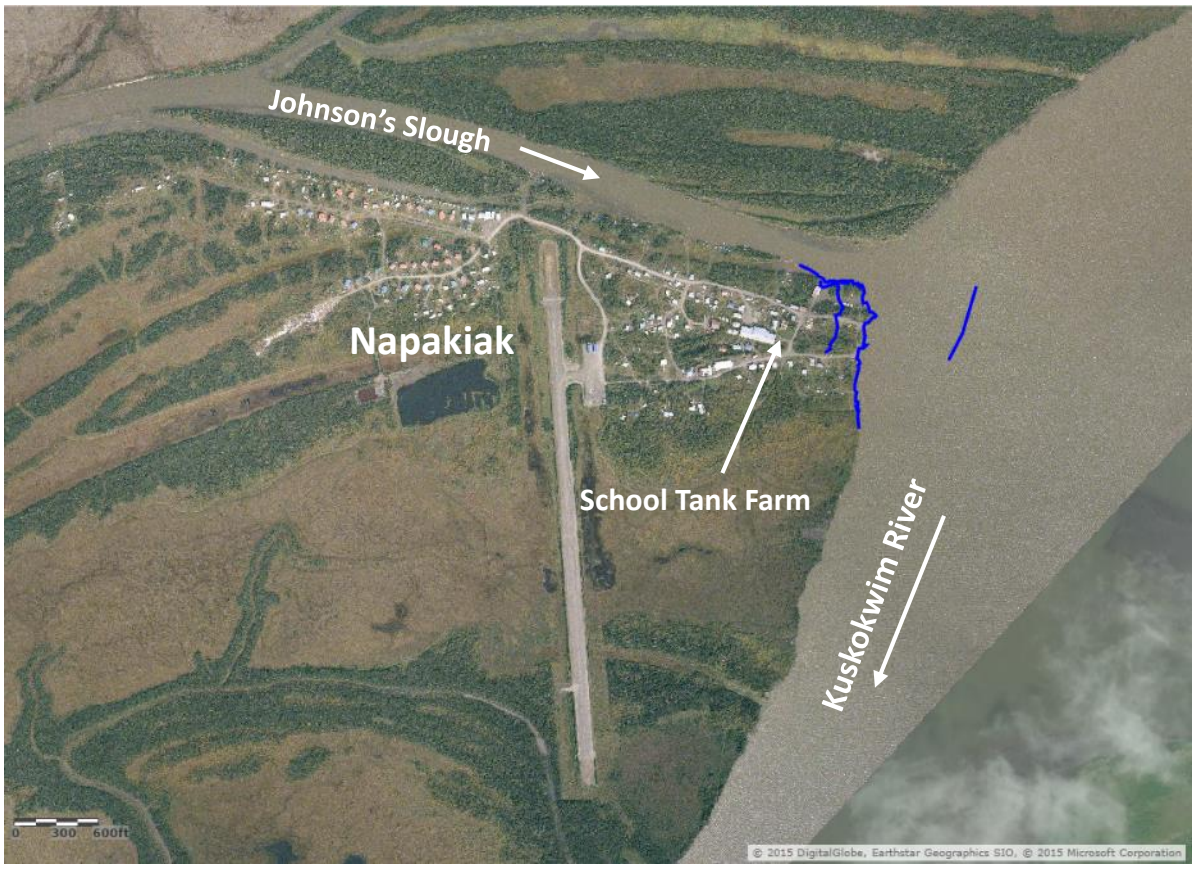
The FEMA Region 10 **Risk Mapping, Analysis, and Planning program (Risk MAP)** releases a monthly newsletter that includes information about upcoming events and training opportunities, as well as hazard and risk related news from around the Region. Past newsletters can be viewed at http://www.starr-team.com/starr/RegionalWorkspaces/RegionX/Pages/default.aspx. If you would like to receive future newsletters, email rxnewsletter@starr-team.com and ask to be included.

The mitigation strategy may include eligible projects to be funded through FEMA's hazard mitigation grant programs (Pre-Disaster Mitigation, Hazard Mitigation Grant Program, Flood Mitigation Assistance). Contact your State Hazard Mitigation Officer, Brent Nichols at Brent.Nichols@alaska.gov for more information.

Appendix 4 – Alaska Departmetn of Environmental Conservation, Waste Erosion Assessment Reports (WEAR)

DETAILED ACTION PLAN
NAPAKIAK SCHOOL TANK FARM
WASTE EROSION ASSESSMENT & REVIEW (WEAR)
MAY 2015

The **Napakiak School Tank Farm** is located on school grounds near the northeast corner of the school at latitude 60.694257 and longitude -161.969985 and was inspected for the Waste Erosion Assessment and Review (WEAR) project on June 21, 2013. The tank farm is owned and operated by the Lower Kuskokwim School District (LKSD), but the landowner is unknown.



Imagery Dated 2007. Note eroding shoreline in blue, from left to right: 2013, 2007, and 1991.

Community* – NAPAKIAK – Napakiak (population 387) is located on the north bank of the Kuskokwim River, 15 miles southwest of Bethel. It is located on an island between the Kuskokwim River and Johnson's Slough. Napakiak is influenced by storms in the Bering Sea and also by inland continental weather. The Kuskokwim River is typically ice-free from June through October. Napakiak is predominantly Yup'ik Eskimos who maintain a fishing and subsistence lifestyle. The city's primary priority in 2009 was to relocate all public facilities and homes to a bluff across Johnson's Slough, as the sandbar on which the city was built is severely eroding.

CONTAMINANT RISK

The Napakiak School Tank Farm consists of 10 yellow single-walled vertical tanks, owned and operated by the LKSD. It serves as the fuel source for the school and has been in use since the 1970s. The tanks rest on a sturdy timber foundation inside a fenced area and use a lined timber dike impoundment for secondary containment. The total capacity of the tank farm is approximately 140,000 gallons of diesel. The site also contains two disconnected vertical tanks, owned by the Napakiak Corporation. These two tanks have not been in use since the new Corporation Tank Farm was constructed in 2010.

Possible contamination at the School Tank Farm is limited to diesel fuels. Contaminants associated with fuels include volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs). These contaminants are known to cause cancer and other chronic diseases. Contamination could have a serious impact on nearby soil, water, and subsistence resources. During the 2013 inspection, no stressed vegetation was found nearby. The nearest residence is located 250 feet away. This site is within the drinking water source protection zones for two community water sources and one transient water source. According to the Alaska Department of Environmental Conservation's (ADEC), Drinking Water Watch database, the community sources are monitored for a group of VOCs related to fuel products. Although no VOCs have been detected over the drinking water standards, chloroform has been consistently detected at concentrations above the detection limit.

School Tank Farm and Napakiak Corp. Tanks (ADEC 2013)

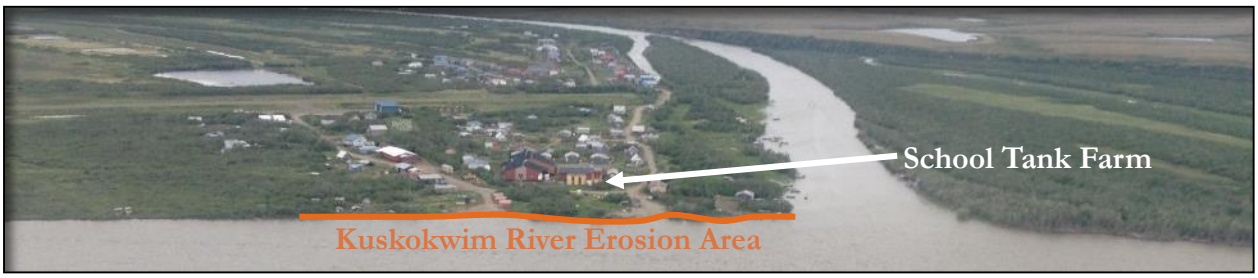
School Tank Farm (ADEC 2013)

Fuel Lines and Timber Supports (ADEC 2013)

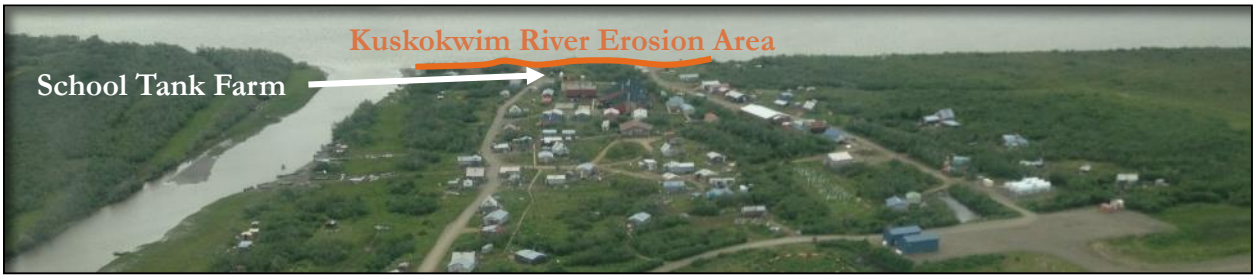
EROSION RISK

Napakiak is experiencing severe erosion along the western banks of the Kuskokwim River. By comparing the Division of Community and Regional Affairs (DCRA) maps from 1991 and GPS points taken during the 2013 visit, it was found that Napakiak lost over 800 feet of shoreline in that 22-year period. This was consistent with the Army Corps of Engineers' 2009 study, *Alaska Baseline Erosion Assessment* (BEA), in which the erosion rate was calculated to be 35 feet per year. This extreme rate of erosion is due to several contributing factors. Napakiak is located on a silt-sand bar, a soil type that is very easily eroded by the Kuskokwim's river currents. Ice gouging, floods, and unstable river banks exacerbate the issue.

During the 2013 visit, concern was expressed by residents for the safety of the school, which at that time was only 400 feet away from the active erosion source, the Kuskokwim River. The School Tank Farm was even closer, lying 350 feet away from the Kuskokwim. Using the BEA calculated erosion rate, it is estimated that this site will be impacted by erosion by 2023.



Aerial Photo Looking West (ADEC 2013)



Aerial Photo Looking East (ADEC 2013)

Kuskokwim River Undercutting (ADEC 2013) | Kuskokwim River Erosion (ADEC 2013)

MITIGATION

According to information in the DCRA community database, as of 2009, the community's priority was relocating Napakiak's public facilities and homes to a nearby, stable bluff where erosion will not be a threat. The 2013 visit found no evidence that relocation has begun.

Mitigation Options

A. **No Action** – If no action is taken to control erosion or remove the structures, the eroding shoreline will impact the school tank farm around 2023. The school tank farm is a vital part of Napakiak's infrastructure, providing the sole source of fuel for the school. Additionally, if the site erodes, significant contamination would result from the release of petroleum products into the river. This would have severe consequences, as Napakiak's nearby drinking water source and subsistence areas would be contaminated.

B. **Remove Site** – Removing or relocating the school tank farm and any associated contaminated soil will mitigate the contaminant risk for the site. As the school's fuel source, this action should be considered in conjunction with removing the school itself. This action will require planning and a significant amount of money.

C. **Erosion Mitigation** – Currents are the primary cause of erosion on this riverbank. The DCRA handbook, *Understanding and Evaluating Erosion Problems,* suggests the best methods for protecting against erosion caused by currents are spur dikes, revetments, seawalls, vegetation, groins, beach fill, or relocation. The full list of suggested methods is provided in the document in Table 2 which is online at http://commerce.state.ak.us/dnn/dcra/PlanningLandManagement.aspx. With the extreme rate of erosion, though, erosion mitigation would be expensive and success would not be guaranteed.

SUMMARY

The Napakiak School Tank Farm poses a contaminant risk from its potential for fuel contamination, close proximity to residences, and location within drinking water protection zones. The tank farm poses an erosion risk as the Kuskokwim River is actively eroding Napakiak's shoreline, and erosion is estimated to impact the tank farm by 2023. There are no mitigation measures in place.

RECOMMENDATIONS

As the community is planning to move critical infrastructure and homes to a safer location, it is recommended to monitor erosion rates and distance to the Kuskokwim riverbank until this site and any associated contaminated soil can be removed in conjunction with the community relocation. Continued drinking water monitoring is also recommended.

The School Tank Farm provides essential fuel storage, but it is estimated to be impacted by erosion by 2023. It is necessary to begin planning for and finding ways to fund the removal of the tank farm. The school and other infrastructure are also estimated to be impacted by erosion during this timeframe.

Imagery Dated 2007. WEAR Map at http://dec.alaska.gov/eh/sw/wear.html

*Community Database Online, Division of Community and Regional Affairs, Department of Commerce, Community and Economic Development

This document is funded in part with qualified outer continental shelf oil and gas revenues by the Coastal Impact Assistance Program within the Department of the Interior's U.S. Fish and Wildlife Service.

2016 RurAL CAP Weatherization Program

RurAL CAP provides weatherization services to homes in northern and western Alaska, Juneau and Anchorage. Weatherization is the Division's longest-standing program. The focus of weatherization is to increase the energy-efficiency, safety, comfort and life expectancy of the homes. A customized assessment is made of each home to determine what improvements will best meet these goals.

Typical improvements include the caulking and sealing of windows and doors, adding insulation to walls, floors and ceilings, and improving the efficiency of heating systems. By making homes more energy-efficient, families spend less for heating, freeing up more household income for other basic necessities.

2015 Results

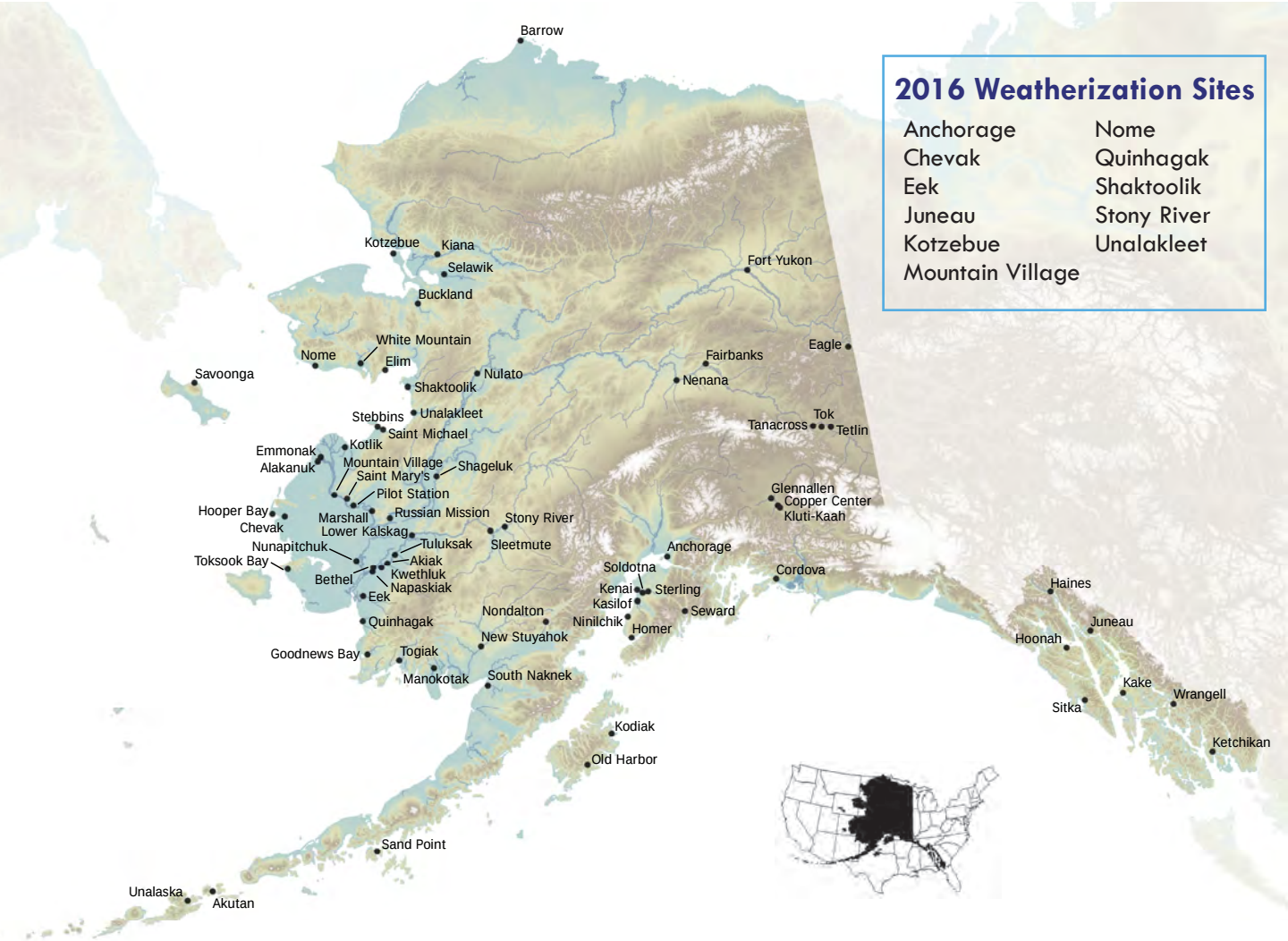
- Weatherized 496 homes in 8 communities
  - 154 homes weatherized in 6 rural communities
  - 58 units weatherized in Juneau
  - 284 units weatherized in Anchorage
- 288 homes served by the weatherization program increased their energy rating by at least two stars.
- 496 weatherization customers received client education on energy conservation, awareness of energy-wasters in the home.
- 68 seniors and Alaskans who experience disabilities were assisted through the Senior Access and the DHSS Home Modifications programs.
- Due to the rapidly-growing proportion of seniors in Alaska, coupled with deteriorating housing conditions in rural communities, RurAL CAP has layered four separate programs – Weatherization, Senior Access, Home Modifications and USDA 504 grants – in communities where Weatherization services were already underway.

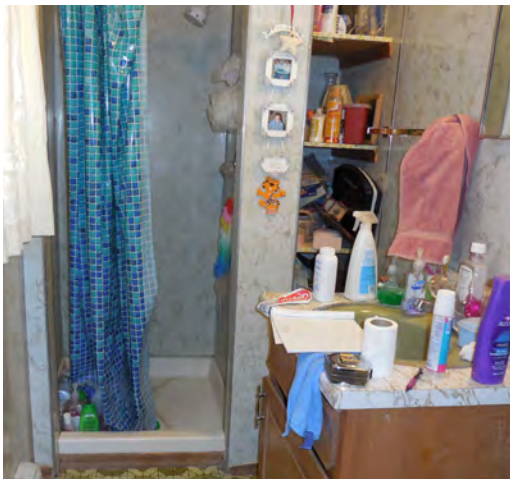
A home in Quinhagak is weatherized. Before at left and after is at right.

RurAL CAP Vision: Healthy People, Sustainable Communities, Vibrant Cultures

Making a Difference Statewide

2016 Site Map



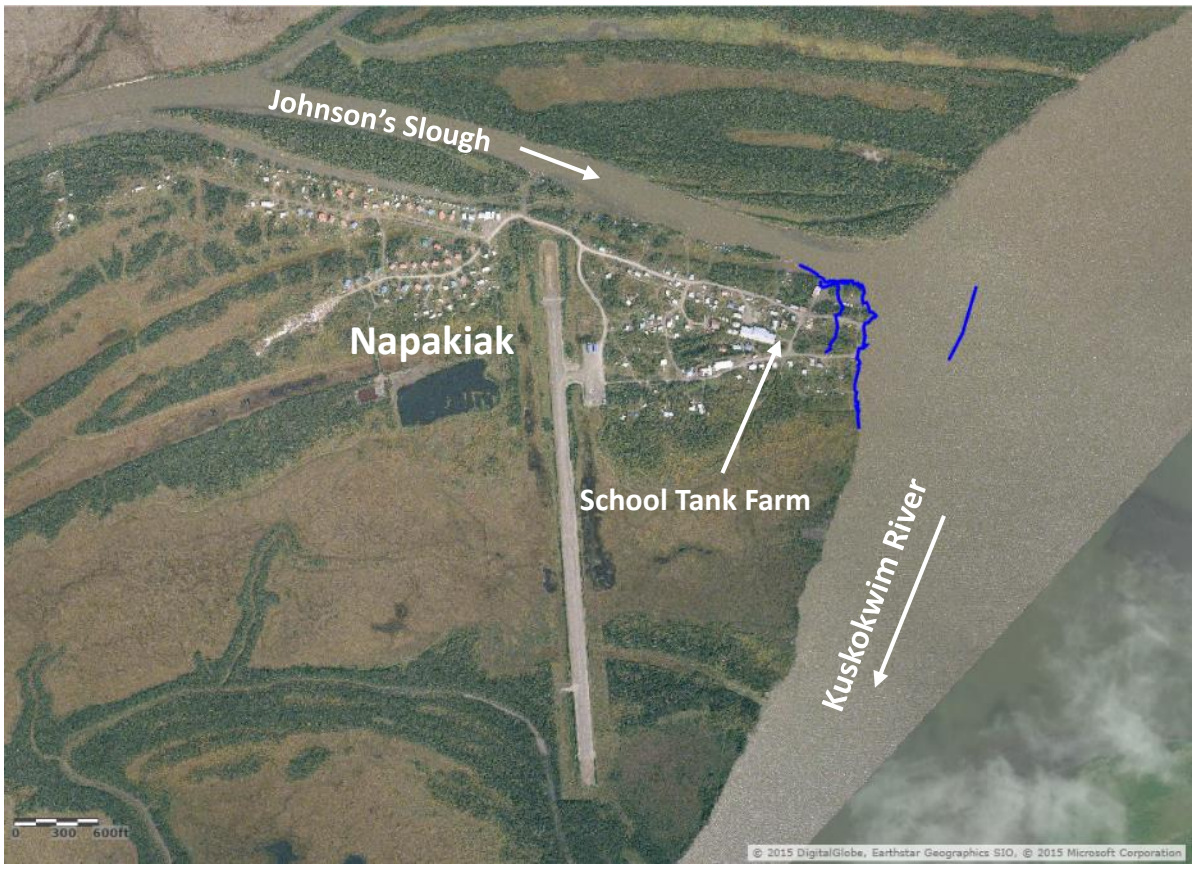


A handicapped-accessible shower was installed in Kotzebue through the Home Modification Program. This program works in conjunction with the Weatherization Program.

Rural Alaska Community Action Program, Inc. | Mitzi Barker, Planning & Contstruction Division Director
731 East 8th Avenue | Anchorage, AK 99501 | Phone (907) 279-2511 | www.ruralcap.com

DETAILED ACTION PLAN
NAPAKIAK SCHOOL TANK FARM
WASTE EROSION ASSESSMENT & REVIEW (WEAR)
MAY 2015

The **Napakiak School Tank Farm** is located on school grounds near the northeast corner of the school at latitude 60.694257 and longitude -161.969985 and was inspected for the Waste Erosion Assessment and Review (WEAR) project on June 21, 2013. The tank farm is owned and operated by the Lower Kuskokwim School District (LKSD), but the landowner is unknown.



Imagery Dated 2007. Note eroding shoreline in blue, from left to right: 2013, 2007, and 1991.

Community* – NAPAKIAK – Napakiak (population 387) is located on the north bank of the Kuskokwim River, 15 miles southwest of Bethel. It is located on an island between the Kuskokwim River and Johnson's Slough. Napakiak is influenced by storms in the Bering Sea and also by inland continental weather. The Kuskokwim River is typically ice-free from June through October. Napakiak is predominantly Yup'ik Eskimos who maintain a fishing and subsistence lifestyle. The city's primary priority in 2009 was to relocate all public facilities and homes to a bluff across Johnson's Slough, as the sandbar on which the city was built is severely eroding.

CONTAMINANT RISK

The Napakiak School Tank Farm consists of 10 yellow single-walled vertical tanks, owned and operated by the LKSD. It serves as the fuel source for the school and has been in use since the 1970s. The tanks rest on a sturdy timber foundation inside a fenced area and use a lined timber dike impoundment for secondary containment. The total capacity of the tank farm is approximately 140,000 gallons of diesel. The site also contains two disconnected vertical tanks, owned by the Napakiak Corporation. These two tanks have not been in use since the new Corporation Tank Farm was constructed in 2010.

Possible contamination at the School Tank Farm is limited to diesel fuels. Contaminants associated with fuels include volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs). These contaminants are known to cause cancer and other chronic diseases. Contamination could have a serious impact on nearby soil, water, and subsistence resources. During the 2013 inspection, no stressed vegetation was found nearby. The nearest residence is located 250 feet away. This site is within the drinking water source protection zones for two community water sources and one transient water source. According to the Alaska Department of Environmental Conservation's (ADEC), Drinking Water Watch database, the community sources are monitored for a group of VOCs related to fuel products. Although no VOCs have been detected over the drinking water standards, chloroform has been consistently detected at concentrations above the detection limit.

School Tank Farm and Napakiak Corp. Tanks (ADEC 2013)

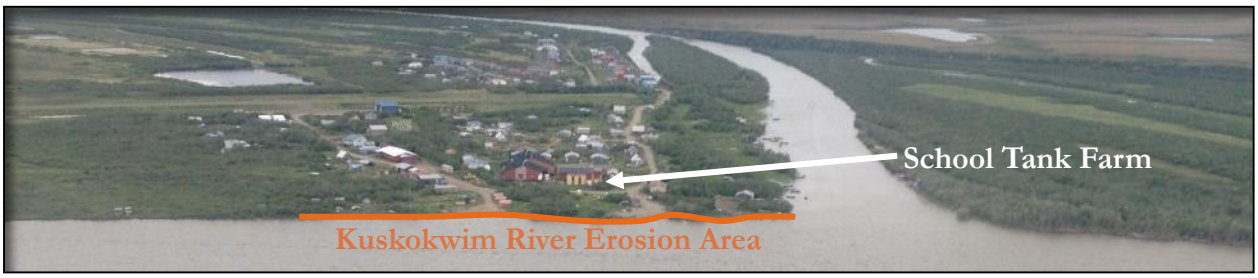
School Tank Farm (ADEC 2013)

Fuel Lines and Timber Supports (ADEC 2013)

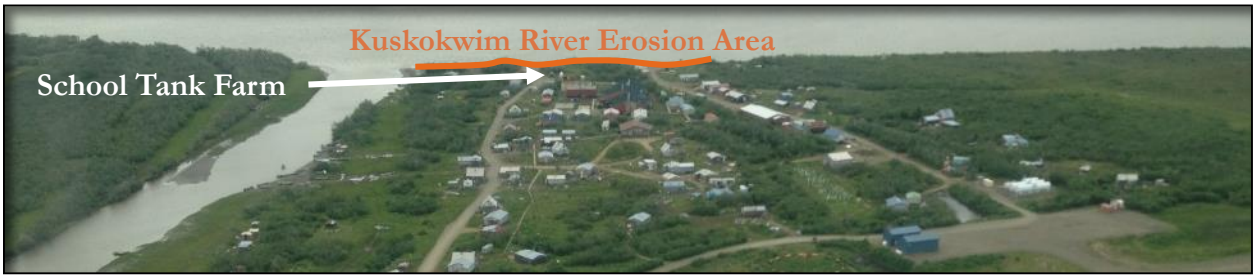
EROSION RISK

Napakiak is experiencing severe erosion along the western banks of the Kuskokwim River. By comparing the Division of Community and Regional Affairs (DCRA) maps from 1991 and GPS points taken during the 2013 visit, it was found that Napakiak lost over 800 feet of shoreline in that 22-year period. This was consistent with the Army Corps of Engineers' 2009 study, *Alaska Baseline Erosion Assessment* (BEA), in which the erosion rate was calculated to be 35 feet per year. This extreme rate of erosion is due to several contributing factors. Napakiak is located on a silt-sand bar, a soil type that is very easily eroded by the Kuskokwim's river currents. Ice gouging, floods, and unstable river banks exacerbate the issue.

During the 2013 visit, concern was expressed by residents for the safety of the school, which at that time was only 400 feet away from the active erosion source, the Kuskokwim River. The School Tank Farm was even closer, lying 350 feet away from the Kuskokwim. Using the BEA calculated erosion rate, it is estimated that this site will be impacted by erosion by 2023.



Aerial Photo Looking West (ADEC 2013)



Aerial Photo Looking East (ADEC 2013)

Kuskokwim River Undercutting (ADEC 2013) | Kuskokwim River Erosion (ADEC 2013)

MITIGATION

According to information in the DCRA community database, as of 2009, the community's priority was relocating Napakiak's public facilities and homes to a nearby, stable bluff where erosion will not be a threat. The 2013 visit found no evidence that relocation has begun.

Mitigation Options

A. **No Action** – If no action is taken to control erosion or remove the structures, the eroding shoreline will impact the school tank farm around 2023. The school tank farm is a vital part of Napakiak's infrastructure, providing the sole source of fuel for the school. Additionally, if the site erodes, significant contamination would result from the release of petroleum products into the river. This would have severe consequences, as Napakiak's nearby drinking water source and subsistence areas would be contaminated.

B. **Remove Site** – Removing or relocating the school tank farm and any associated contaminated soil will mitigate the contaminant risk for the site. As the school's fuel source, this action should be considered in conjunction with removing the school itself. This action will require planning and a significant amount of money.

C. **Erosion Mitigation** – Currents are the primary cause of erosion on this riverbank. The DCRA handbook, *Understanding and Evaluating Erosion Problems,* suggests the best methods for protecting against erosion caused by currents are spur dikes, revetments, seawalls, vegetation, groins, beach fill, or relocation. The full list of suggested methods is provided in the document in Table 2 which is online at http://commerce.state.ak.us/dnn/dcra/PlanningLandManagement.aspx. With the extreme rate of erosion, though, erosion mitigation would be expensive and success would not be guaranteed.

SUMMARY

The Napakiak School Tank Farm poses a contaminant risk from its potential for fuel contamination, close proximity to residences, and location within drinking water protection zones. The tank farm poses an erosion risk as the Kuskokwim River is actively eroding Napakiak's shoreline, and erosion is estimated to impact the tank farm by 2023. There are no mitigation measures in place.

RECOMMENDATIONS

As the community is planning to move critical infrastructure and homes to a safer location, it is recommended to monitor erosion rates and distance to the Kuskokwim riverbank until this site and any associated contaminated soil can be removed in conjunction with the community relocation. Continued drinking water monitoring is also recommended.

The School Tank Farm provides essential fuel storage, but it is estimated to be impacted by erosion by 2023. It is necessary to begin planning for and finding ways to fund the removal of the tank farm. The school and other infrastructure are also estimated to be impacted by erosion during this timeframe.

Imagery Dated 2007. WEAR Map at http://dec.alaska.gov/eh/sw/wear.html

*Community Database Online, Division of Community and Regional Affairs, Department of Commerce, Community and Economic Development

This document is funded in part with qualified outer continental shelf oil and gas revenues by the Coastal Impact Assistance Program within the Department of the Interior's U.S. Fish and Wildlife Service.

Date: July 2012
Division: Pacific Ocean
District: Alaska

SECTION 14 PRELIMINARY CAP FACT SHEET

1. Project. Napakiak Streambank Erosion Protection

2. Location of Project/Congressional District. Napakiak is on the west bank of the Kuskokwim River, 15 miles southwest of Bethel. It is located on an island between the Kuskokwim River and Johnson Slough. It lies 407 miles west of Anchorage. It lies at approximately 60.69 North Latitude and -161.95 West Longitude. (Sec. 17, T007N, R072W, Seward Meridian.) Napakiak is located in the Bethel Recording District. The area encompasses 4.7 sq. miles of land and 0.3 sq. miles of water.

The study area is located in the Alaska Congressional District. The Congressional delegation is composed of:

Senator Lisa Murkowski (R-AK)
Senator Mark Begich (D-AK)
Representative Don Young (R-AK, At-Large)

3. Study Authority. Section 14, Flood Control Act of 1946 (PL 79-526), as amended for emergency streambank and shoreline protection for public facilities and services.

4. Study Purpose. The purpose of this study is to identify problems and opportunities for providing streambank protection at Napakiak, Alaska and to determine if there is a federal interest in implementing an emergency streambank or shoreline protection project.

5. Discussion of Prior Studies, Reports and Existing Water Projects.

a. Prior Studies and Reports

"Alaska Baseline Erosion Study" – In this 2009 study Napakiak was listed as a "Priority Action Community". A community was listed as a "Priority Action Community" if it was determined that: "Erosion is threatening the viability of the community, significant resources are being expended to minimize such threats, or both conditions are present." The information paper for Napakiak listed vulnerable facilities.

b. Existing Water Projects.

None Noted.

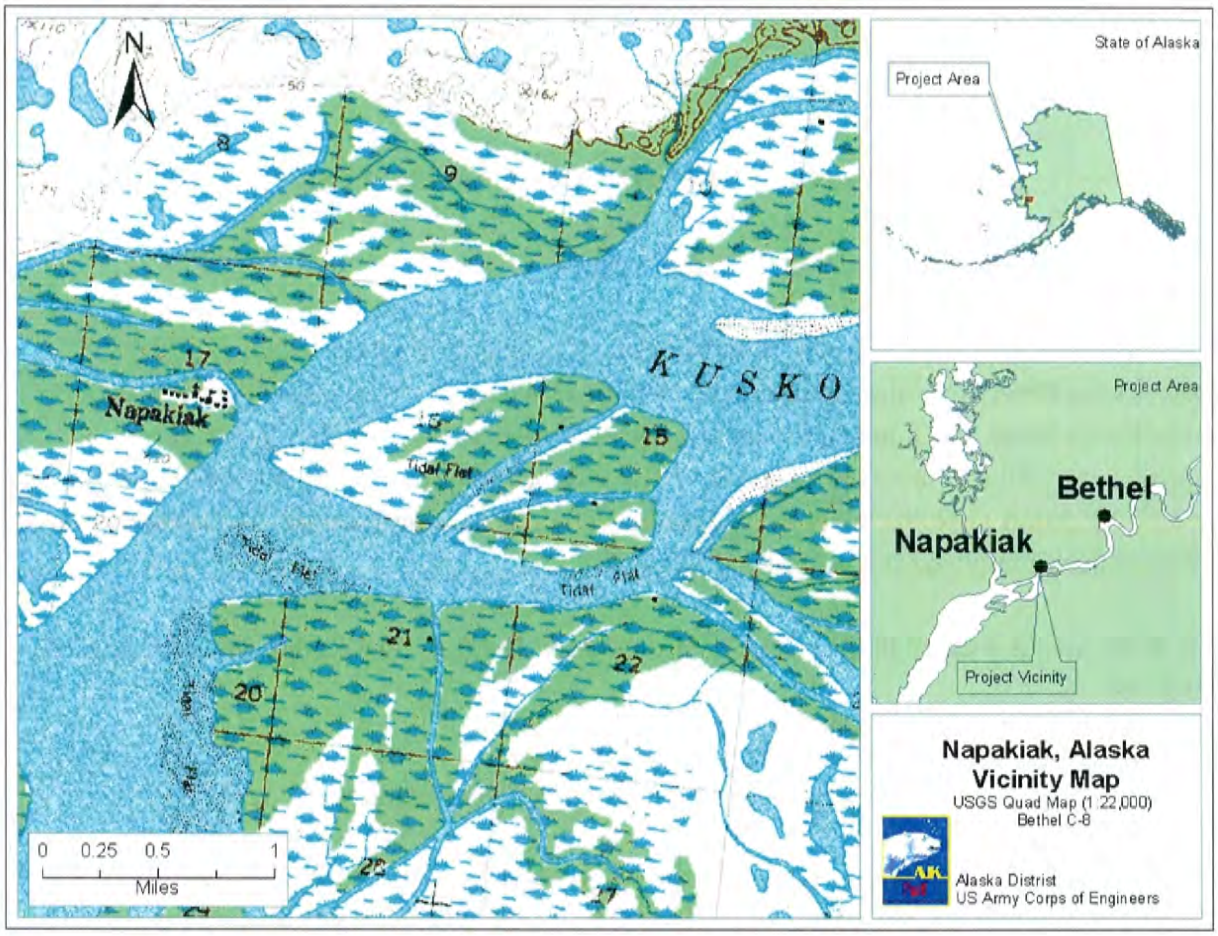


Figure 1. Location of Napakiak

6. Plan Formulation.

a. Identified Problems and Opportunities

Problems:

- Napakiak is experiencing a loss of land due to erosion of the west bank of the Kuskokwim River.
- Napakiak incurs significant expense from relocating buildings that would be lost to erosion.

(1) Existing Conditions: Napakiak is located on the outside edge of a bend in the Kuskokwim River. In this area, the fastest current and deepest part of the river is along this outside edge of the bend. These extreme river forces act upon the fine sands and silts of the river bank, causing significant erosion.

In 2009, the Alaska District published the Alaska Baseline Erosion Study which included a detailed erosion assessment of Napakiak. This assessment included measurements taken during a 2007 site visit. During the 2007 site visit, three measurements were taken from various buildings to the top of bank. The estimated rate of erosion at Napakiak at that time was 35 feet per year. One of the measurements taken in 2007 was repeated during this site visit. The buildings used for the other two measurements have been relocated to prevent them from damage due to advancing erosion. The single measurement revealed that the top of bank shifted 162 feet from its 2007 position, an average rate of 40 feet per year.

According to local accounts, storms coming in from the Bering Sea also cause erosion. Southerly storm-driven winds generate waves on the river that can erode the upper bank. These waves are influenced by the direction of the tidal current. When the tide is rising, waves can reach 3 feet in height. When the tide is falling, waves can be as high as 8 feet. Erosion estimates of top of bank movement at Napakiak range from 35 to 40 feet per year.

An island upstream of Napakiak separates the Kuskokwim River into two channels, referred to here as "North Channel" and "South Channel" (Figure 2). These channels divide the flow of the Kuskokwim. During a 2011 site visit, the river was surveyed in order to locate the exact location of the North Channel, which was approximately 100 feet from the bank. This indicates the river is migrating westward over a length of 12,000 feet where the river turns to the south (Figure 3). Currently, the North Channel passes a much larger volume of water than the South Channel. A sand bar just downstream of the island separates the two channels. From community accounts, it appears that the South Channel is capturing an increasing percentage of the Kuskokwim River's total flow over time. As the flow shifts to the South Channel the river will likely erode through the sand bar, directing the majority of the river's flow toward the bank at Napakiak, possibly increasing the erosion rate.

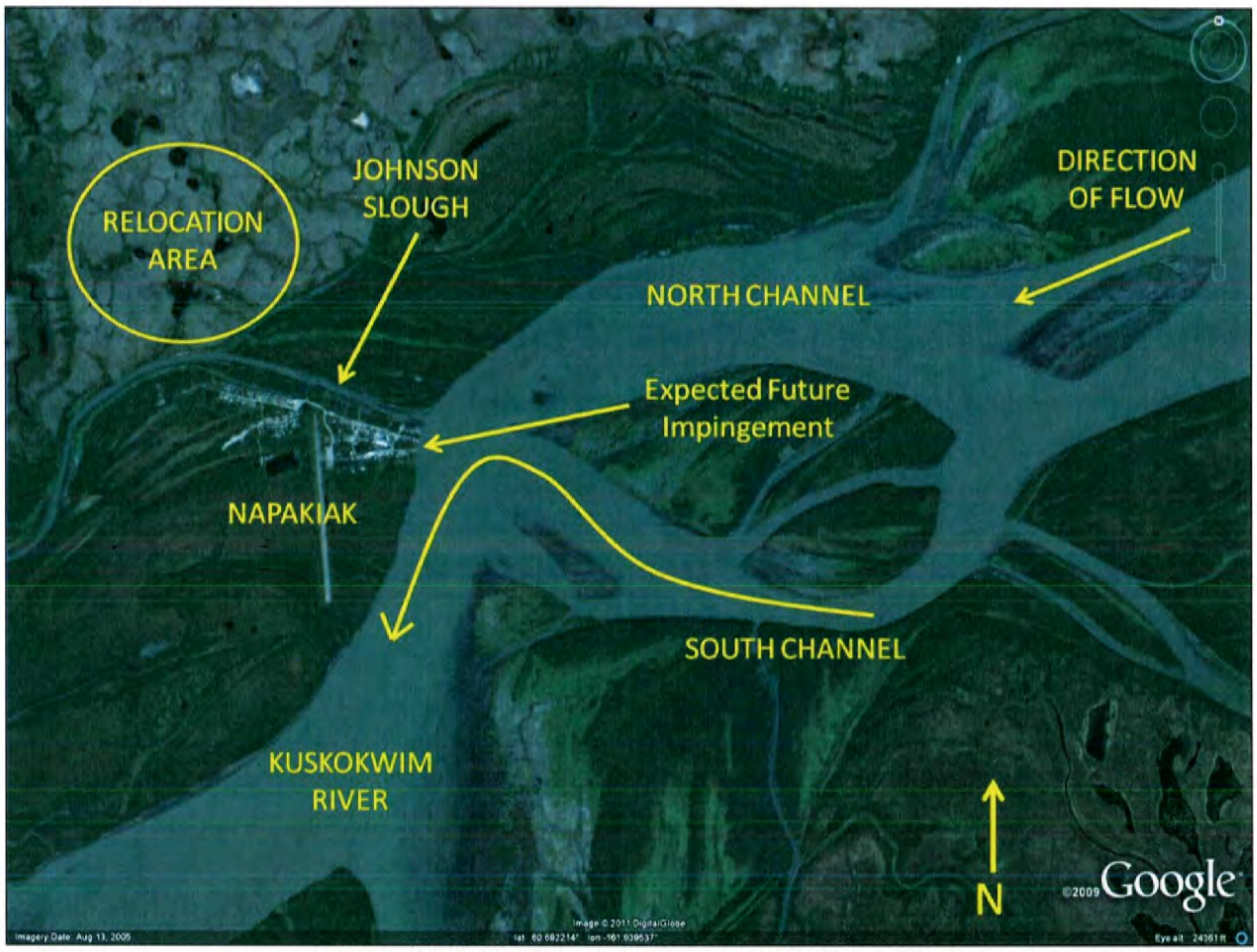


Figure 2. Overview of Napakiak and surrounding area.
Source: Google Earth imagery with USACE annotations

Where the bank was not used for boat launch and recovery or cargo transfer operations, the upper bank was a steep cut with a narrow beach in the tidal zone. The cut face is protected with natural organic debris, mainly brush and root structures. The beach is approximately 100 feet wide. This is the result of accelerated erosion due to lack of natural protection from vegetation. When the fall storm impacts the bare banks, there is no root structure to hold the fine soils in place, so rapid erosion of the upper bank occurs.

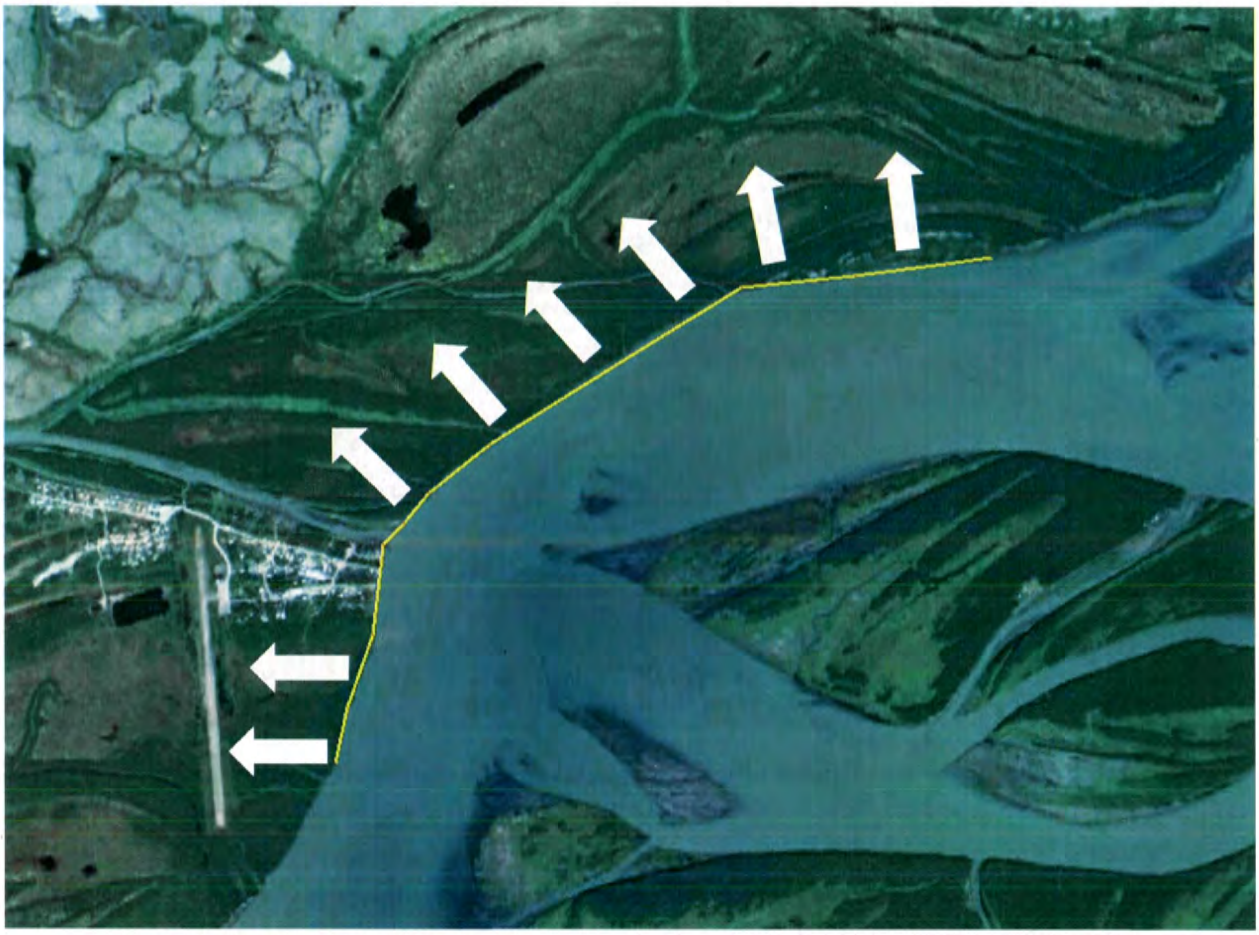


Figure 3. Bank Erosion Near Napakiak (*Source:* Google Earth with USACE amendments)

The current community response is to move threatened buildings away from the threatened streambank to the west side of the runway (Figure 4). This current strategy is limited to buildings that can be moved via trailer and can be accommodated by the village's narrow road system. Larger community buildings such as the school and store will not fit within these constraints. A further constraint is the availability of dry land on which to relocate buildings as there is a shortage of dry land on the west side of the runway. Relocations are subject to available funding to set up a new site and perform the move.

Figure 4. Front End Loader Relocating House (Top). Trailer Used For Relocations (Bottom).

It is estimated that the school will be threatened by erosion in approximately seven years. The community stated that Lower Kuskokwim School District (LKSD) has begun to study replacement of the building, as it is nearing the end of its useful life. The community would prefer to see the new school building located on the north side of Johnson Slough to act as an anchor to draw the community to the new site.

(2) Expected Future Conditions: It is postulated that the Kuskokwim River will continue to migrate westward. If the South Channel captures a greater portion of the Kuskokwim's flow, it may overtake the buffering flow from the North Channel and aim directly at the bank fronting the community. If the South Channel captures a greater amount of the total flow, it will erode the buffering sand bar and eventually impinge directly upon the bank, increasing the erosion rate.

If the erosion rate increases, buildings will need to be moved more frequently. The community stated that there is a finite and inadequate amount of dry land on the west side of the airport. Thus relocation to sites located on the island will continue to increase in costs as future sites will require a greater amount of fill to prepare site on which structures will be placed. Given local topography, importing fill will likely be costly and inefficient.

Various local documents provided by the community include a plan to relocate the community to the north side of Johnson Slough. There is a bluff on the north side of the slough that would give the community protection from flooding events and would be less likely to erode in the future than the land the village is currently situated on. Relocation of the community to this area would require a crossing over Johnson Slough. The crossing would need to be of sufficient strength

and width to support and accommodate the combined weight of heavy equipment and structures being relocated.

Figure 5. Bluff north of Johnson Slough as viewed from current runway.

The land north of Johnson Slough is owned by Napakiak Corporation, the local ANCSA native corporation. An agreement in principle exists between the Napakiak Corporation and the City of Napakiak to transfer the land to the City for the purpose of relocating the community. The City has plans in place to survey and subdivide the land upon transfer in order to facilitate relocation. Part of the relocation strategy includes a 10-mile connecting road to Bethel. The road has been previously studied by the State of Alaska and would likely follow the current utility right-of-way if constructed.

(3) Planning Constraints & Planning Objectives:

Objectives:

- Any project should seek to halt or substantially reduce the rate of erosion currently occurring at Napakiak.

Constraints:

- Current Section 14 policy does not allow for assistance in relocation activities.

(4) Concise statement of specific problems & opportunities with emphasis on problems warranting Federal participation: Erosion at Napakiak is causing considerable loss of land.

Section 14 provides for the emergency protection of streambanks and would allow the halting or a reduction in the rate of erosion.

b. Alternative Plans: Several ideas have been explored to mitigate erosion at Napakiak including seawalls, revetments, channelization, and log booms. An additional plan to assist the community implement non-structural measures by moving away from the erosion risk area is also considered.

(1) Seawall or Revetment: Seawalls and revetments are hard structural solutions which potentially could eliminate erosion at Napakiak. At Napakiak, the eroding bank is approximately 12,000 feet long and 50 feet deep requiring massive structures of this type to have any long term effect. To protect Napakiak, this entire length would need to be armored; to armor only a portion of this length would allow erosion to unravel the structure as material behind the structure is lost.

(2) Diversion Channel: Creating a diversion channel at Napakiak would impact navigation to Bethel which is the only deep water port within 150 miles and serves as the main freight distribution hub for the Yukon-Kuskokwim Delta region. A navigation channel could direct flow away from the community, but this would create a maintenance dredging situation with associated annual costs to maintain navigation to Bethel.

(3) Relocation: The community has a detailed plan in place to relocate to a site on the north bank of Johnson Slough. They are prepared to enact this plan upon construction of a crossing of Johnson Slough.

c. Preliminary Evaluation of Alternatives:

Constructing a seawall or revetment at Napakiak would quickly exceed both the federal expenditure limit of $1.5 million and the cost of relocating threatened structures. While these structures could be effective solutions to the erosion issues at Napakiak they are not implementable within the bounds of this authority as it currently exists.

Engaging in modified channelization of the Kuskokwim River has the potential to direct flow away from Napakiak but may have unintended effects on shipping in and out of the Port Of Bethel, the major port for the region. In addition, there would likely be ongoing maintenance and operation costs associated with this alternative. Because of the unknown nature of the long term effectiveness and costs of this alternative it is not feasible to pursue at this time.

Relocation appears to be the best long term solution. However, Section 14 does not allow for relocation assistance.

7. Federal Interest. There is an erosion issue at Napakiak, however, the size and scale of any protection effort would quickly exceed the federal limit of $1.5 million. Therefore there is no Federal interest in continuing investigations of erosion issues at Napakiak under the Section 14 program.

8. Study Phase Schedule. Not applicable.

9. Recommendations. Recommend terminating the Napakiak Section 14 Study.

10. Views of the Sponsor. The sponsor understands the limits of the Section 14 program and remains committed to finding a program that will address their issues.

11. Views of Other Resource Agencies. Not Applicable.

12. Project Area Map. See Figure 1.

13. Supplemental Information.

It appears that an effective long term solution for this community is to continue their efforts in relocating across Johnson Slough. Community relocation would require a crossing that can accommodate the loads imposed by heavy equipment in the act of relocating structures as shown in Figure 4 and Figure 6.

Figure 6. Current relocation equipment

The crossing could take many forms, however the most cost effective design is likely a fill causeway with culverts installed to allow for water and fish passage. This concept is illustrated in Figure 7 & Figure 8. The concept includes 2,700 feet of new road over Johnson Slough with six large culverts to pass the tidal flow under the road. This concept is estimated to cost $2.0-$3.0 million. Further site investigations and engineering are required to validate this concept and cost.

The community could feasibly request assistance from the Corps of Engineers through either a specifically authorized project or under the authority granted by Section 116 of the Energy and Water Development and Related Agencies Appropriations Act of 2010 (PL 111-85). This authority allows for assistance in relocation efforts. Given Napakiak's location in the Bethel Census Area, it is eligible to seek a reduction in its cost share under Section 116's ability-to-pay provision.

In addition to the aforementioned options, the community could seek assistance from state and other federal agencies. The National Resource Conservation Service has recently constructed rock revetment structures at McGrath (420 river miles away) and Kongiganak (90 river and marine miles away).

In addition, various state and federal agencies have the programmatic authority and capacity to construct roads and bridges including: the State of Alaska Department of Transportation and Public Facilities, the Denali Commission (Transportation Program), the Bureau of Indian Affairs (Indian Reservations Roads Program), and the Federal Highway Administration (Western Federal Lands Highway Division).

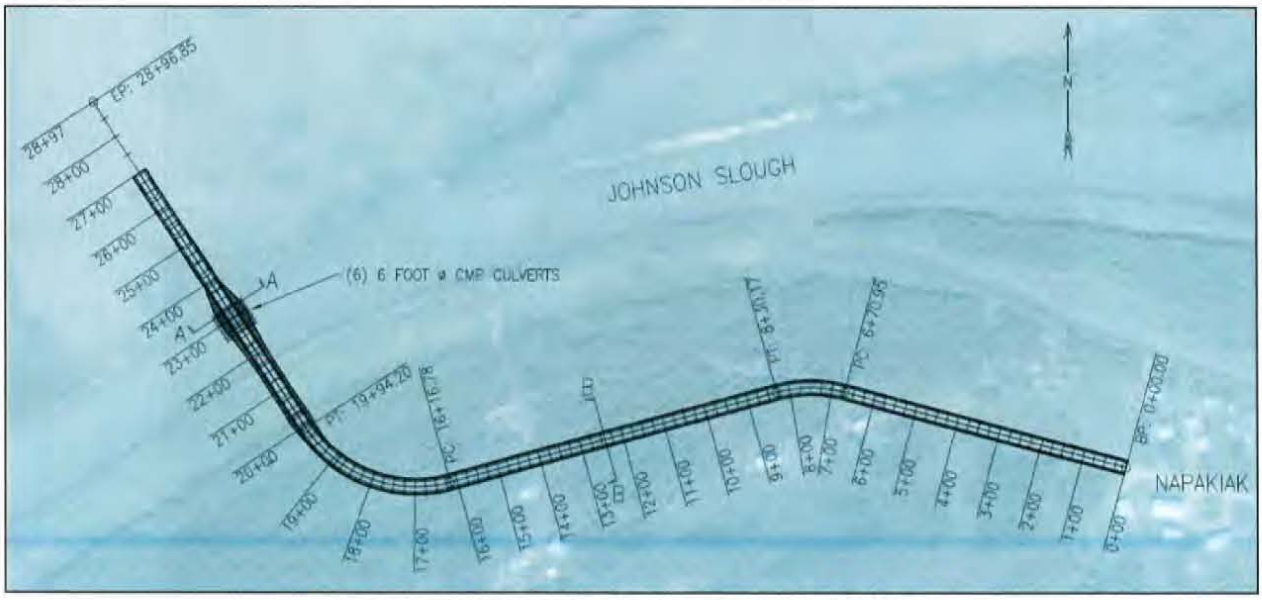


Figure 7. Johnson Slough crossing concept sketch.

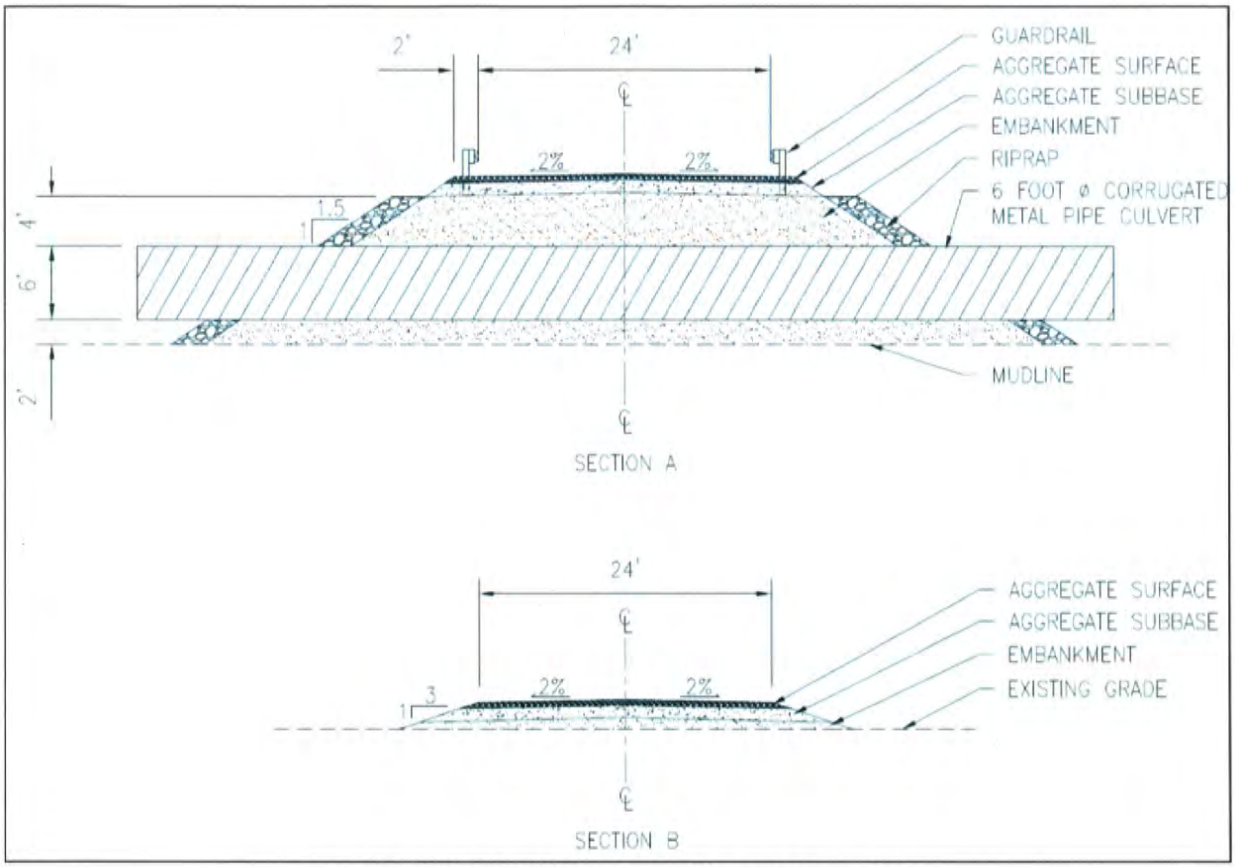


Figure 8. Johnson Slough crossing concept sections.

14. Feasibility Phase Study Cost Estimate. Not applicable.

Community Erosion Assessment
Napakiak, Alaska
15 January 2008

1. Community: Napakiak, Alaska

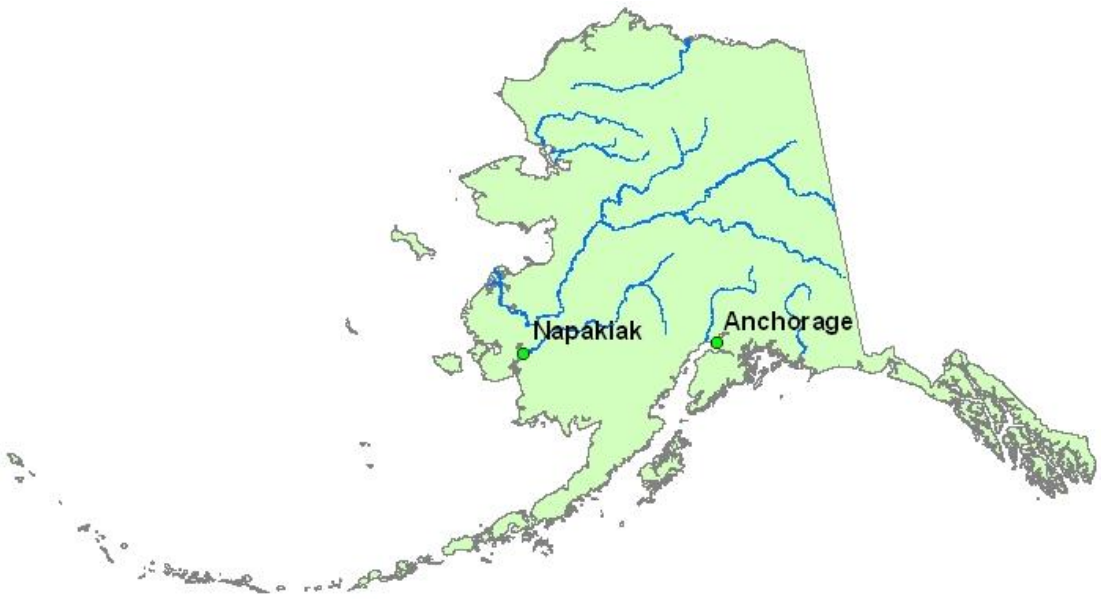


Figure 1: Napakiak Location & Vicinity Map

2. Community Profile Summary:

Napakiak is a 2nd class city of 378 people in the Bethel Recording District of the Unorganized Borough. It is 15 miles southwest of Bethel on the north bank between the Kuskokwim River and Johnson's Slough. Napakiak is influenced by storms in the Bering Sea and also by inland continental weather. Average annual precipitation is 16 inches, with 50 inches of snowfall. The Kuskokwim River is typically ice-free from June through October. The city's population is predominantly Yup'ik Eskimos who live a fishing and subsistence lifestyle. Napakiak is a dry community which means the sale or importation of alcohol is banned.

3. Concise Description of Erosion Problem:

Erosion rates along the Kuskokwim River measured in the 1960's and 1970's show the river bank eroding at approximately 40 feet per year. Erosion rates for the next 50 years are estimated to continue at a rate of 25 to 50 feet per year. This will impact most of the community of Napakiak within the next 50 years. The soil is fine sand and silt allowing the river to easily undercut the riverbank. The loss of material causes a slope stability failure above the waterline in the riverbanks 3 foot vertical face. The sand and silt is also susceptible to pore pressure failure. The resulting saturation of the soil decreases its

strength below the waterline. With load above the waterline, the saturated soil is no longer able to support bank material causing bank failure similar to undercutting.

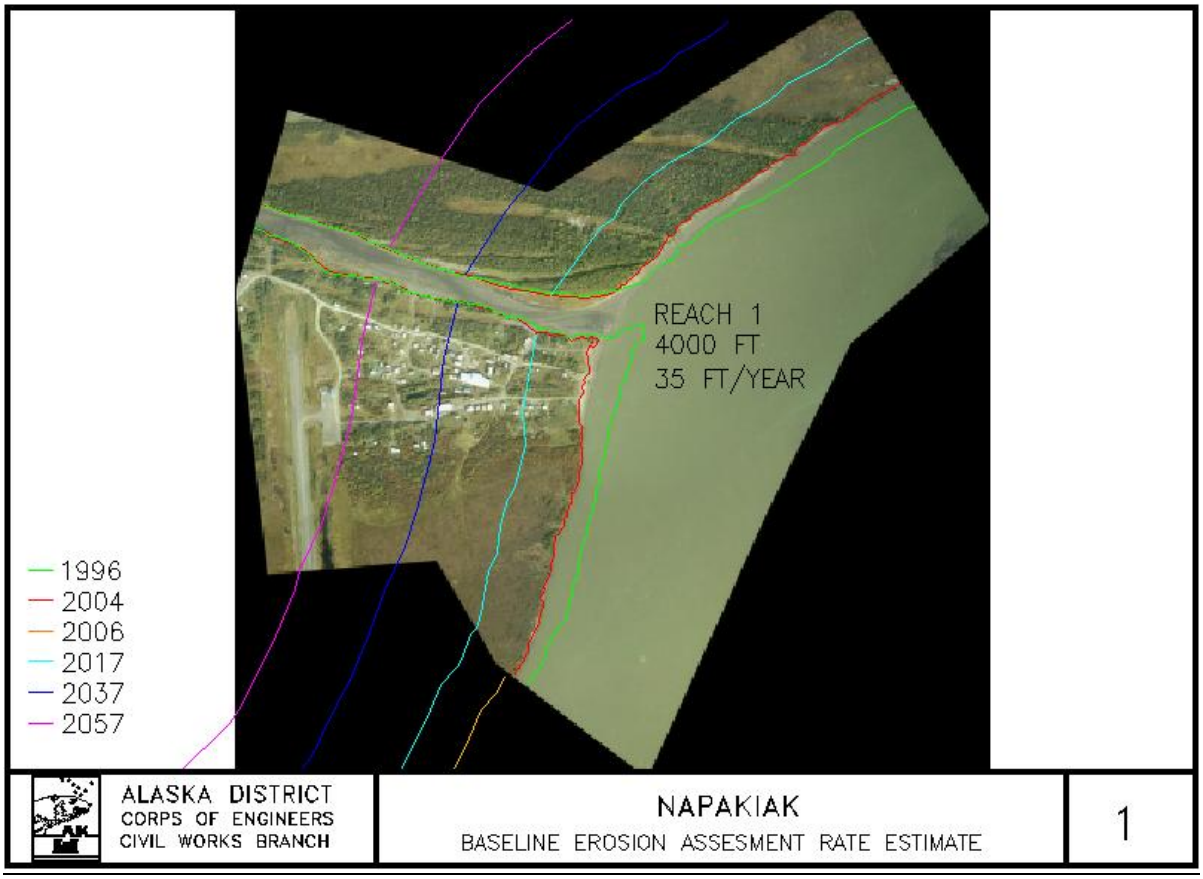


Figure 2. Napakiak Erosion Map

4. Potential Erosion Damages

Using the projected erosion interval lines on the aerial photograph, the economic damages were developed for the 50 year period of analysis and broken down into the sub-intervals of 0-10 years, 11-30 years and 31-50 years. Breaking down the economic damages into these sub-intervals allows us to determine when the greatest economic impact is expected to occur. Determining when the greatest economic impact could occur is important so that timely decisions can be made when an erosion retarding measure needs to be taken. For the purposes of this report, damages were assessed by time interval rather than attempting to estimate the exact year that the damage occurs. The analysis was completed in this manner to try and account for two types of uncertainty:

1. That which is associated with predicting erosion which is progressing at varying rates over time (including episodic events); and
2. That which exists when performing a surface analysis as opposed to doing an in depth investigation such as soils exploration and expensive modeling efforts.

Damage Categories

The approach used to determine potential erosion damages is based on several assumptions as they pertain to the damage categories of residential, commercial, public infrastructure, and land values. This evaluation relies on previous reports and information gathered during site visits to determine appropriate values where data was unavailable. Assumptions used for the various damage categories are described more fully in the following discussion of future damages.

Damages caused by erosion in Napakiak fall into seven damage categories: land, residential structures, commercial structures, public structures, infrastructure, cemeteries, and environmental hazards. Approximately 8 percent of erosion damages in Napakiak are expected to occur in the first 10 years of the examined period.

Expected Damages

The period of analysis for this evaluation is 50 years and all damage categories have net present values calculated based on the federal fiscal year 2009 discount rate of 4 5/8 percent. The sections below detail expected losses with a summary provided in Table 1.

Napakiak is losing approximately 140,000 square feet of land per year (35 acres). It is expected that 164 acres will be lost over the 50-year period of analysis with a corresponding value of $1.6 million and a net present value of $655,000.

Expected residential damages in Napakiak are widely dispersed throughout the community. At-risk structures include 45 outbuildings (fish camps and related structures) and 41 residences. Each of the outbuildings is valued at $1,000 and each residence is valued at $205,000.

Eight commercial buildings are estimated to be subject to damages including: two retail stores and an associated outbuilding and warehouse; the village power plant, the marina, a Quonset hut, and one unidentified commercial structure. These buildings are expected to be lost in years 11 to 50. Our estimates likely understate the commercial damages. Were these structures to be lost, it would compromise the income earning opportunities for the businesses and the residents they employ and relocation efforts would impact these facilities as well. In addition, communications for the community would be lost.

Twenty-eight public buildings are at risk in Napakiak including various buildings associated with: the National Guard Armory, school, fire station, water treatment plant, city offices, city garage, teacher housing, washateria, IRA council building, and various outbuildings.

Expected structural damages in Napakiak are $30 million with a net present value of $10.5 million.

Infrastructure that lies within the 50-year erosion profile includes: 5,390 feet of roads, 7,500 feet of boardwalks, 2 wells, 4,110 feet of water lines, 750 feet of sewer lines, 2 fuel

headers, various bulk fuel tanks with approximately 310,000 gallons of capacity, 37 utility poles and related wiring, the sewage lagoon, and the airstrip.

Total infrastructure damages in Napakiak are $44.8 million with a net present value of $12 million.

Environmental concerns in Napakiak are: the old fuel farm, the sewage lagoon, and erosion of grave sites. Decommission and closure of the fuel farm will be essential to avoid harmful environmental effects. Based on our above assumptions, this will be necessary within the 0 to 10 year time frame. This process has a cost of $2.8 million with a net present value of $1.6 million. Decommission of the sewage lagoon has a cost of $650,000 with a net present value of $142,000. Estimates anticipate that 100 graves will need to be relocated over the 50-year period of analysis with a cost of $750,000, and a net present value of $91,000.

Environmental damages, environmental remediation, and grave relocation costs are estimated to be in excess of $4.2 million with a net present value in excess of $1.8 million and an average annual cost in excess of $93,800.

Summary

Total erosion damages in Napakiak over the 50-year period of analysis are $80.6 million with a net present value of $24.9 million and an average annual value of $1.3 million. Table 1summarizes the expected damages by category.

Table 1: Total Expected Damages.

Damage Category	Quantity	Time Span (Years)			Total value (50 years)	Net Present Value	Average Annual Value
		0-10	11-30	31-50			
Land (acres)	163.91	$354,000	$643,000	$643,000	$1,639,000	$655,000	$33,800
Residential	41	1,301,000	1,237,000	5,607,000	8,146,000	2,334,000	120,500
Commercial	8	--	4,160,000	1,024,000	5,184,000	1,947,000	100,500
Public buildings	28	--	15,165,000	1,495,000	16,660,000	6,186,000	319,400
Infrastructure	--	3,842,000	10,377,000	30,543,000	44,762,000	12,000,000	619,600
Cemetery relocation	100	--	--	750,000	750,000	91,000	4,900
Environmental hazards	--	903,000	1,936,000	650,000	3,490,000	1,722,000	88,900
Total Damages	--	**$6,400,000**	**$33,518,000**	**$40,712,000**	**$80,631,000**	**$24,935,000**	**$1,287,600**

5. Potential Solutions:

Non-structural solutions include relocating structures away from the riverbank and constructing a road from Napakiak to Bethel. A road would provide ready access to the high ground on the north side of Johnson Slough and assist the community in relocating structures to areas not threatened by the Kuskokwim River. Constructing a road requires a planning process to determine a useable alignment with reasonable grades. A survey of potential alignments and subsurface investigation is needed to determine the required

amount of fill to protect the tundra from permafrost thaw. The road and bridge are estimated to cost $63.6 million.

A revetment could be constructed to protect Napakiak from the Kuskokwim River. The revetment would be 10,000 feet long and 45 feet wide. Three feet of B rock would be placed over filter fabric to armor the river bank. The revetment cost is estimated at $89.4 million which is roughly $8,940 per linear foot of revetment.

6. Conclusion:

Napakiak has a definite erosion problem that is affecting the community over the next 50 years. The community has the potential to have approximately $80.6 million in damages.

Napakiak will require some sort of assistance to stop the erosion from causing significant damages as they are unable to solve their own erosion problems due to limited financial resources.

7. Community Photos:

Photo 1: Erosion along the bank of the Kuskokwim River.

Photo 2: Looking at the bank at what 50 feet of erosion looks like.

Photo 3: More bank erosion in Napakiak.

Photo 4: The bank eroding and being carried away by the Kuskokwim River. Erosion Rate Diagram

8. Additional Information:

This assessment, as well as those for other communities, can be accessed on the internet at *www.AlaskaErosion.com*. The web site also contains additional information on addressing erosion issues, educational materials, and contact information.

Alaska District
Corps of Engineers
Civil Works Branch

Predicted and Historical Shorelines

Legend
1996
2017
2057
2004
2037

0 215 430 860 Feet
0 50 100 200 Meters
1 inch equals 400 feet
Image dated 2004

N

Alaska Baseline Erosion

Napakiak, Alaska

Appendix 5 – RurAL CAP Weatherization Program Sheet

RurAL CAP

Weatherization Program

RurAL CAP provides weatherization services to homes in northern and western Alaska, Juneau and Anchorage. Weatherization is the Division's longest-standing program. The focus of weatherization is to increase the energy-efficiency, safety, comfort and life expectancy of the homes. A customized assessment is made of each home to determine what improvements will best meet these goals.

Typical improvements include the caulking and sealing of windows and doors, adding insulation to walls, floors and ceilings, and improving the efficiency of heating systems. By making homes more energy-efficient, families spend less for heating, freeing up more household income for other basic necessities.

2016

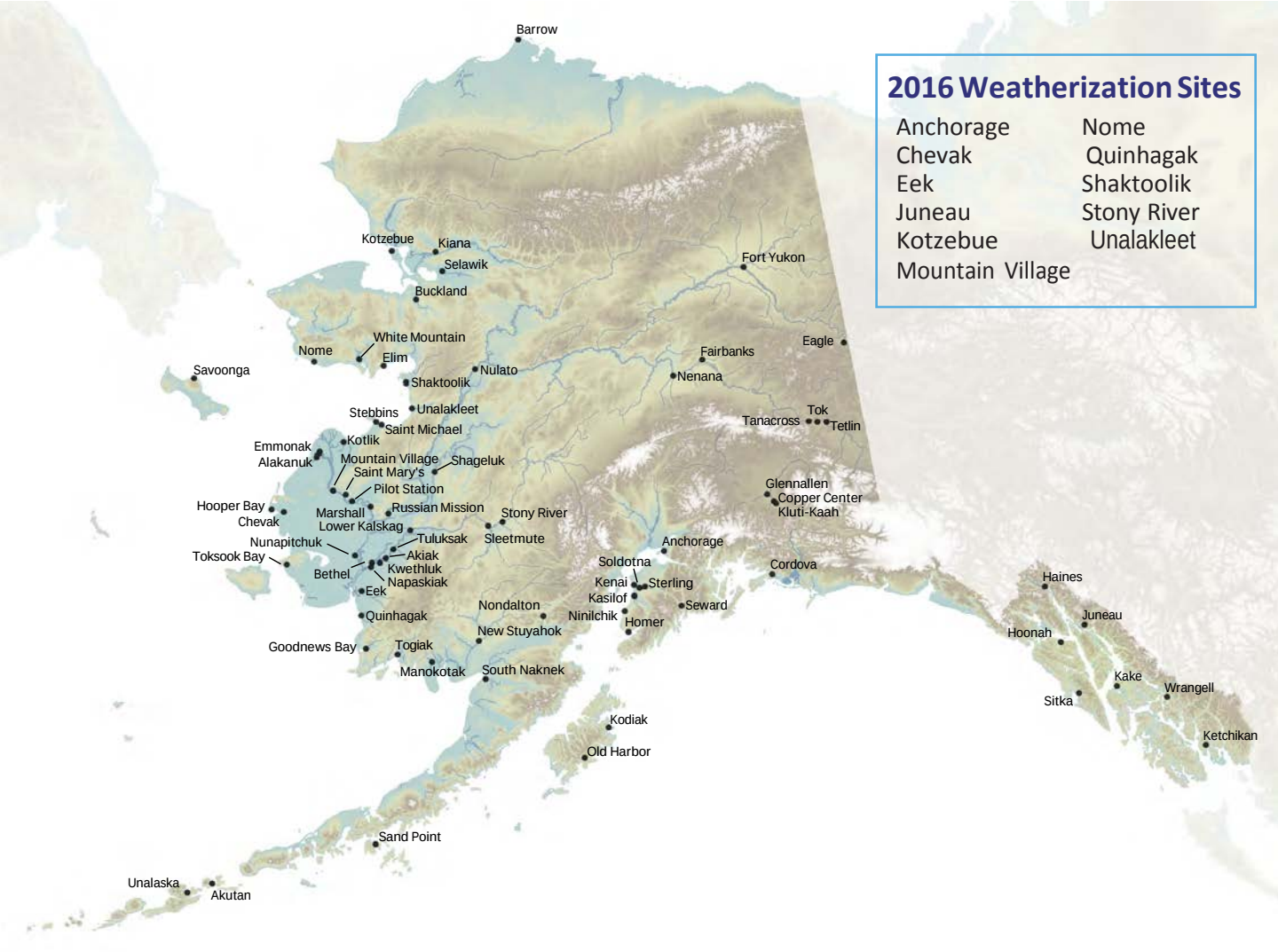
2015 Results

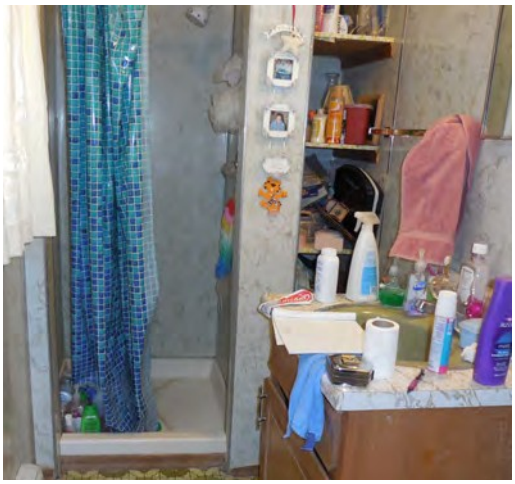
- Weatherized 496 homes in 8 communities
  - 154 homes weatherized in 6 rural communities
  - 58 units weatherized in Juneau
  - 284 units weatherized in Anchorage
- 288 homes served by the weatherization program increased their energy rating by at least two stars.
- 496 weatherization customers received client education on energy conservation, awareness of energy-wasters in the home.
- 68 seniors and Alaskans who experience disabilities were assisted through the Senior Access and the DHSS Home Modifications programs.
- Due to the rapidly-growing proportion of seniors in Alaska, coupled with deteriorating housing conditions in rural communities, RurAL CAP has layered four separate programs – Weatherization, Senior Access, Home Modifications and USDA 504 grants – in communities where Weatherization services were already underway.

A home in Quinhagak is weatherized. Before at left and after is at right.

RurAL CAP Vision: Healthy People, Sustainable Communities, Vibrant Cultures

Making a Difference Statewide 2016 Site Map





A handicapped-accessible shower was installed in Kotzebue through the Home Modification Program. This program works in conjunction with the Weatherization Program.

Rural Alaska Community Action Program, Inc. l Mitzi Barker, Planning & Contstruction Division Director
731 East 8th Avenue l Anchorage, AK 99501 l Phone (907) 279-2511 l www.ruralcap.com

Appendix 6 – U.S. Army Corps of Engineers Reports

ALASKA DISTRICT CORPS OF ENGINEERS
FLOOD PLAIN MANAGEMENT SERVICES

HIGH WATER ELEVATION IDENTIFICATION

Community: **NAPAKIAK**

Date of Visit: 6 September 1990

General Observations/Comments:

The community is located on the right bank of the Kuskokwim River approximately 10 miles southwest of Bethel.

The topographic relief in Napakiak is very low.

Historical Record of High Water:

The highest flood of memory was caused by a combination of high tide and wind driven waves that occurred in August of 1990.

Actions Taken:

High Water Elevation (HWE) signs were placed at three locations with the sign's water symbol at the level of the 1990 flood.

HWE sign #1 is located on the northeast corner of the water treatment plant approximately 2 feet above ground level.

HWE sign #2 is located on a power pole approximately 400 yards east of the water treatment plant and education complex, approximately 2.5 feet above ground level.

HWE sign #3 is located on the southeast corner of the school generator building.

Miscellaneous:

The entire community of Napakiak and the surrounding area are within the flood plain of the Kuskokwim River delta. There is no high ground in the immediate vicinity.

The estimated zero damage flood elevation is approximately 3 feet below the HWE signs.

The recommended minimum building elevation is 2 feet above the 1990 flood elevation, or 2 feet above the HWE signs.

A flood gauge was placed in the community so that flood levels can be easily monitored. The HWE signs correspond to 0.4 feet on the flood gauge.

HWE sign #1 is located on the northeast corner of the water treatment plant approximately 2 feet above ground level.