SHISHMAREF RELOCATION PLAN UPDATE

FINAL

Shishmaref, Alaska

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ACRONYMS AND ABBREVIATIONS

AVEC	Alaska Village Electric Cooperative
Bristol	Bristol Environmental & Engineering Services Corporation
Coalition	Shishmaref Erosion and Relocation Coalition
Community	Community of Shishmaref
DOT&PF	Alaska Department of Transportation & Public Facilities
EO	Executive Order
EPA	U.S. Environmental Protection Agency
FAA	Federal Aviation Administration
NRCS	Natural Resources Conservation Service
USACE	U.S. Army Corps of Engineers

EXECUTIVE SUMMARY

The Community of Shishmaref (Community), a Native Alaskan Community located on Sarichef Island, is facing ongoing threats of seaward erosion, causing increasing safety hazards, security and physical integrity of Shishmaref. The Shishmaref Erosion and Relocation Coalition (Coalition) has determined that keeping the Community in the current location, with continued danger posed from excessively erosive storms, is unacceptable. Relocation of the Community to a new mainland site to ensure the safety and security of Shishmaref's citizens, with the ability to preserve the culture and integrity of the Community's subsistence lifestyle, has been determined to be the preferred option of the citizens through multiple Community meetings. The purpose of this report was to provide updates to the Coalition's Relocation Plan. The relocation update includes:

- Detailed summaries of previously evaluated relocation sites,
- Reviews of future evaluations and required studies for potential relocation sites,
- Reviews of future infrastructure development including,
  - Cost estimates for basic infrastructure and potential funding sources
  - Procedure recommendations
  - Schedule and implementation plan time line.

The most important focus of the update is to provide the Coalition and the Shishmaref community with the best recommendations for progression, in terms of relocation, no relocation and collocation options. This report does not recommend or identify a final Shishmaref relocation site. Additional studies and preliminary investigations are required.

Currently, the Shishmaref Erosion and Relocation Coalition has identified three potential relocation sites; West Nunatuq, Tin Creek, West Tin Creek Hills and Old Pond Site (See Figures 1 and 2). Due to the majority of community members being unfamiliar with the proposed relocation sites, summer photos of the proposed relocation sites will better acquaint the Shishmaref citizens with the proposed sites. It is the Community's preference that relocation sites not be located any further inland than the proposed Tin Creek site. The National Preserve is the final inland boundary for relocation sites (See Figure 2).

1.0 BACKGROUND

Shishmaref is located approximately 30 miles south of the Arctic Circle, and 50 miles northeast of the Bering Straits. The Community of Shishmaref (Community) is home to approximately 600 people, mostly consisting of Native Inupiaq Eskimos, and is situated on a barrier island approximately one-fourth-mile wide and approximately 3 miles long. The local economy is subsistence based, and supplemented by part-time wage earnings and local sales of arts and crafts. Although 600 people live in Shishmaref, a noticeable number of individuals have relocated to other parts of Alaska. This is due to the fact that the island can no longer expand services needed for increased development of new homes and related infrastructure. The lack of roads, high costs of fresh foods, inadequate fuel storage for home heating and transportation, and exorbitant cost of basic services, is a burden on the entire Community (Shishmaref Erosion and Relocation Coalition [Coalition], 2002).

The barrier island, where Shishmaref is located, is comprised primarily of fine sand deposits and permafrost that makes it extremely vulnerable to erosion from tidal high water, combined with intense wave action of the Chukchi Sea. During October 1997, a severe storm eroded over 30 feet of the north shore, requiring relocation of 14 homes and the National Guard Armory. Five additional homes were relocated in 2002. Other storms have continued to erode the shoreline, an average of 3 to 5 feet per year on the north shore. In July 2002, residents voted to relocate the community (Alaska Department of Commerce, Community, and Economic Development, 2009).

2.0 INTRODUCTION

Bristol Environmental & Engineering Services Corporation (Bristol) is under contract to Kawerak Inc., on behalf of the Shishmaref Erosion and Relocation Coalition, to update current plans that identify and evaluate potential relocation sites for the Community of Shishmaref and develop a baseline for future studies. The Relocation Plan Update will act as a guideline to assist the Community with an organized relocation, through the identification of relocation site characteristics, required evaluations and studies, essential infrastructure development and other basic community infrastructure needs, identification of salvageable and moveable infrastructure facilities, time line for infrastructure development, and potential resource identification (Appendices A, B & C).

The loss of land through erosive action and increasing risk to property and lives has caused a dangerous situation for the Community. The Community has determined that staying on the island to face the ever-present threat from ocean-based storms is unacceptable. The only viable solution is to relocate the Community off the island to a nearby mainland location, which is accessible to the sea, suitable for their subsistence lifestyle, and preserves the culture and integrity of the Community (Shishmaref Erosion and Relocation Coalition, 2002).

Information provided in this report was gathered from two on-site meetings with the Shishmaref Erosion and Relocation Coalition, community members, and agency representatives. Additional review and input was provided by DCCED-Division of Community & Regional Affairs.

2.1 RELOCATION

There are limited options for the Community regarding a future location. The City of Shishmaref needs sufficient developable land area to provide for the existing land uses involving both private and public elements. Additionally, the Community desires to have sufficient reserves of developable land to expand, grow, and develop. Suitable site access via barge, in addition to adequate access to water for subsistence purposes is a necessity. Of the proposed options presented, the preference of the citizen has continued to be relocation of the Community to a new mainland site, as opposed to collocation or no relocation.

The boundaries of possible relocation from the current village site needs to be determined. Based on public meetings that Bristol attended, providing adequate access to the water and subsistence areas was of great importance. A village consensus on an acceptable distance from water and subsistence areas was determined to be located no further inland than the preserve boundary (See Figure 2). Based on previous geo-technical studies and new information collected by ADOT, a suitable site, in terms of soil conditions, may be located in the proximity of Ear Mountain, located 10 miles from Shishmaref Inlet.

According to the *Shishmaref Site Analysis for Potential Emergency Evacuation and Permanent Relocation Sites*, by the Natural Resources Conservation Service (NRCS), relocation sites should be evaluated on the following parameters:

1. Site Layout
2. Development Potential
3. Natural Resources
4. Infrastructure
5. Human Factors

Bristol concurs with the NRCS criteria listed above. Continued and constant community input into the listed NRCS criteria is a vital. Further examination of the listed NRCA criteria continues below. In addition to the criteria determined by the NRCS, it is critical for the final relocation site to provide Community access to water, in order to maintain and preserve their subsistence based lifestyle. Also, proper subsurface geo-technical examination of all potential relocation sites will ensure development on quality soil, which will aid in keeping construction costs as low as possible.

2.1.1 Site Layout

Prior to determining and evaluating potential relocation sites, the overall relocation area required must be determined. Potential relocation sites must be able to adequately encompass the current Shishmaref town site, in addition to providing sufficient area to accommodate future infrastructure development.

2.1.2 Development Potential

The development potential of a proposed site is based upon the following:

- The measurement of the average slope of the proposed site. A moderately sloped site at 2-6% is preferred to a flat slope, or a steep slope.
- The soil quality will be evaluated through geotechnical studies. Coarse soil with a deeper permafrost level will be preferred to finer grained soils with a shallow depth to permafrost.
- The proposed sites will be evaluated for the proximity to sand, gravel, and rock material sources.

2.1.3 Natural Resources

The proposed relocation sites will be evaluated based upon natural resource advantages and disadvantages. The following natural resources will be examined based on proximity to the proposed sites:

- Fresh water sources will be examined and categorized by the following types: lakes, springs, rivers, and potential groundwater sources. Proposed sites with multiple natural resource possibilities will be preferred.
- Sites will be evaluated for erosion and flooding potential.
- The availability and proximity of subsistence gathering, and hunting and fishing areas will be discussed with input gathered from the Community.

2.1.4 Infrastructure

Potential infrastructure development at each proposed site will be evaluated for:

- Locations for a sewage lagoon, landfill, and a variety of access roads will be examined for each proposed site. Considerations for each site include: proximity to the fresh water supply, land slope, and distance to village site.
- Potential airport sites will be examined. Sites which are relatively flat, and could support a primary runway and a cross-wind runway of approximately 5,000 feet, will be preferred. Site proximity to the proposed village site will also be evaluated.
- Proposed sites will also be evaluated on potential for development of a small boat harbor and marina. Space, water depth, access from village site and cost estimate will be assessed for each site. The ability of each site to handle large barge traffic will be evaluated. Factors will include depth of approach channel, location of unlading facilities, and proximity to the town site. Most importantly, barge access to the final relocation site

is one of the most critical elements for the development and long term success of a relocation site.

2.1.5 Human Factors

The Community of Shishmaref has indicated, during two community meetings that Bristol attended, the need and desire of the Community to maintain their subsistence culture and way of life. To ensure the preservation of their subsistence culture, potential relocation sites must occur in relatively close proximity and access to water, along with adequate subsistence hunting and gathering areas.

Additionally, the Community of Shishmaref desires that final relocation site selection be based on a Community-wide election once the potential relocation sites have been narrowed.

Human factors discussed with the Community include the impact of development of each proposed site to Native allotments, and potential impact to cultural resource sites, as well as aspect and aesthetics.

2.2 NO RELOCATION

If the Community were to remain in its present location on Sarichef Island, discussion would be necessary regarding measures needed to maintain the current location. The following relevant information regarding the "No Relocation Alternative" would need to be addressed (U.S. Army Corps of Engineers [USACE], 2004).

- Erosion control measures to ensure ongoing safety and integrity of the Shishmaref Community and the costs associated with these measures and any physical Community needs of Shishmaref.
- A discussion of relevant existing conditions, constraints, assumptions, and any identified Community and agency plans.
- A compiled list of agencies that would typically provide funding and other assistance in meeting any Community needs.
- Infrastructure updates regarding the refurbishment of Community facilities.

3.0 IDENTIFICATION OF SITES

Many studies will be necessary in determining a site suitable for relocation. Once potential sites have been identified, they can be narrowed down to a list of two or three and the appropriate studies will need to be expanded to allow for more in-depth analysis of the possible relocation sites. Once a proposed site has been selected as the preferred relocation area, site studies can be focused into preliminary research and scoping to determine appropriate permit applications, which will be required under the National Environment Policy Act (NEPA Process).

Potential relocation sites will need to be examined through preliminary studies and research, and then screened to identify the following: soil quality to support infrastructure requirements; size minimums to address community growth; subsistence; and most importantly proper access by land, air and water. The potential sites will need to be further examined to determine required evaluations and studies, permitting, geotechnical studies, and hydrologic studies. Five or more years could potentially be required for the Community to complete the planning necessary; prepare designs; coordinate with the array of relevant local, state, and federal agencies; obtain necessary permits; establish a plan for funding through programs, grants, and other fiscal opportunities available. This time period would be followed by a five-year relocation period (USACE, 2004).

The scope of studies and research will be expanded to include, but not limited to, evaluation of the following:

3.1.1 Hydrology, Soils, and Geology

Preferred sites should be located in upland locations with adequate drainage and a deep soil horizon above permafrost comprised of coarse soils, which will assist in future development and growth of the Community. The Community must next expand upon the studies already performed through more detailed geotechnical and hydrological studies, which will better determine a proposed site's ability to support the Community's needs. Additionally, potential material sources must be identified which can be used for infrastructure construction. A suitable material source site has been identified at Ear Mountain in the *Shishmaref Relocation Road Reconnaissance Study*, through the Alaska Department of Transportation & Public Facilities (DOT&PF).

3.1.2 Fish and Wildlife

The Community is a traditional Inupiaq Eskimo village reliant upon subsistence lifestyle activities, which also support the local economy. The final relocation site will be evaluated to ensure that subsistence needs, such as hunting and gathering activities, will adequately support the needs of Shishmaref citizens. Current fish and wildlife habitats in proximity to proposed relocation sites will be examined and evaluated through agency databases, and consultation with the Alaska Department of Natural Resources and U.S. Fish and Wildlife Service to ensure that site development will not negatively impact fish and wildlife populations.

3.1.3 Wetlands

U.S. Fish and Wildlife Service's National Wetlands Inventory data, if available, will be consulted for verification of any mapped wetlands near or within any proposed relocation sites. If the proposed relocation area has not been previously mapped, possible wetland impacts to proposed relocation sites will be evaluated through on-site wetland analysis and fieldwork to complete a Wetland Delineation Report for submittal to the USACE for review and concurrence. A USACE Section 404 Permit Application will be submitted to the USACE along with proposed mitigation to any project imposed wetland impacts.

3.1.4 Floodplain and Flood Hazard

Federal Emergency Management Agency floodplain maps will be consulted, via desktop research, for proposed relocation sites for verification of whether the proposed site occurs near or within any mapped-designated floodplain areas. Flooding risks within the proposed project sites can most likely be attributed to tidal storm surges off the Bering Sea and Kotzebue Sound, which can cause destructive storm-induced erosion of coastal areas. Additionally, the USACE flood hazard maps, where available, will be reviewed to verify the location of any marked flood hazard zone boundaries. All proposed relocation sites were selected at adequate elevations to reduce the risk of flood hazards.

3.1.5 Water Source and Quality

The preferred relocation site will be evaluated for proximity to projected freshwater sources and the ability of the available sources to adequately supply the Community with potable water.

Potential negative effects and contamination to freshwater sources due to proposed site locations and projected infrastructure development will be evaluated and examined.

3.1.6 Cultural Resources

The State Historical Preservation Office will be consulted for review and approval of appropriate archaeological and historical research, in accordance with Section 106 of the National Historic Preservation Act. The Section 106 Review will determine if any archaeological, historical, or cultural properties will be impacted by any development that will occur through the relocation of the Shishmaref Community. On-site research will need to be performed by an archaeologist for any potential project impacts to any archaeological, historical, or cultural properties; in addition, a report will need to be submitted for review and concurrence by the State Historical Preservation Office.

3.1.7 Socioeconomics

Proposed relocation sites will be evaluated for potential adverse human health or environmental impacts to the minority or low-income populations within Shishmaref, through desktop research. Proposed relocation sites will be examined to ensure that the lifestyles, cultural values, attitudes, and expectations of the Community will be maintained, through collaboration with the Shishmaref citizens. The Shishmaref citizens will ultimately determine whether a relocation site is suitable to maintain the cultural values, lifestyle, and attitudes of the Community.

3.2 PREVIOUS STUDIES

Potential relocation sites were evaluated from a physiographic, infrastructure, natural resources, development, and social perspective by the NRCS. Potential relocation sites were assessed in terms of soil quality, and water and plant resources.

According to the 2005 *Shishmaref Site Analysis for Potential Emergency Evacuation and Permanent Relocation Sites* reconnaissance report, potential relocation sites were selected under the following basic criteria (NRCS, 2005):

- Greater than 50 feet above sea level in order to limit storm surge flooding.
- Flatter than 10% slope to facilitate development.

- Contiguous area of more than 100 acres that meets the first two criteria.

In addition to the criteria listed above, barge access and subsurface quality will be the initial criteria for potential site selection.

Six potential relocation sites were previously identified and evaluated by the Natural Resources Conservation Service, in cooperation with the Coalition (see Figure 1 and Appendix C), most of which were deemed infeasible for relocation.

Figure 1 NRCS-Identified Relocation Sites

3.3 PREVIOUS NRCS EVALUATED RELOCATION SITES

The following sites were previously identified and evaluated by the NRCS. Each of the sites was determined as unsuitable relocation sites at a public meeting on March 18, 2010, which Bristol attended (See Figure 2). The sites were eliminated primarily due to poor barge access potential, maintaining subsistence areas, or the presence of ice rich soils.

3.3.1 East Nunatuq

East Nunatuq is approximately 6.4 miles east by southeast of Shishmaref, with direct access to the Shishmaref Inlet. The proposed site has gently rolling hills with perennial streams and lakes in close proximity, and an average elevation of 75 feet above sea level. Soils are 6 to 12 inches of vegetative mat, followed by 12-16 inches of gray silt, then to ice at maximum thaw (NRCS, 2005).

The site was rated poor for overall layout potential, poor development and infrastructure potential, along with bluff erosion potential by the NRCS. The proposed site was determined to be infeasible as a relocation site for the Shishmaref Community.

3.3.2 Arctic

The Arctic site is accessed via boat, approximately two miles up the Arctic River. The site is located approximately 16.4 miles southeast of Shishmaref, and is bounded by the Sanaguich and Arctic rivers. The terrain is nearly flat to gently sloping. Underneath a foot of vegetative mat, soils are gray silt and 12 to 16 inches deep to permafrost. The harbor area is shallow and requires careful navigation to find the entrance to the Arctic River, which may not provide enough space for a potential small boat harbor. If the Shishmaref Inlet would be used for a harbor, an access road would be needed from the proposed town site (NRCS, 2005).

The proposed site is difficult to access, the proximity of a material source site and development potential is rated as poor. Therefore, the Arctic site was deemed infeasible as a potential relocation site for the Community of Shishmaref.

3.3.3 Igloot

The Igloot site is located approximately 15.9 miles from Shishmaref, near the Serpentine River, and offers fairly direct access to Shishmaref Inlet. The proposed site is in proximity to several fish camp cabins and archaeological sites. Igloot is surrounded by rolling terrain with moderate slopes. Compared to other sites, the soils are slightly deeper (approximately 24 inches). Coarser soils are exhibited, comprised of fine sands as compared to silt at other sites (NRCS, 2005).

The Igloot site was rated poor for potential material sources, infrastructure development potential, and erosion potential by the NRCS. Additionally, the Igloot site has major historical

significance as a subsistence use area for the Community, which could be negatively impacted by development. Therefore, the proposed site was determined to be infeasible as a relocation option for the Shishmaref Community.

3.3.4 Tin Creek

The Tin Creek site is located approximately 11.6 miles from Shishmaref. The proposed site is long and narrow, and dissected by several drainages. The Tin Creek site is accessed via the south branch of Tin Creek, and is bounded on the east by Goose Creek. The construction of a 2-mile access road would be required to reach the Shishmaref Inlet, where a small boat harbor and barge access would be located. The site soils are 12 to 16 inches of gray silt down to permafrost, and is the closest of the proposed sites to the borrow source is located at Ear Mountain (NRCS, 2005).

According to DOT&PF, drilling indicated that multiple ice-rich hills exist in and around the Tin Creek site. The overall site location and potential layout is poor, as well as infrastructure development potential due to the abundance of ice-rich soils. The site was also deemed vulnerable to potential stream bank erosion.

3.3.5 West Tin Creek Hills

The West Tin Creek Hills site is located approximately 2 miles up the main stem of Tin Creek. The proposed site has flat to gently rolling terrain, with 12 to 16 inches of gray silt soil down to permafrost. The site is accessed via boat up the main stem of Tin Creek, and like the proposed Tin Creek site, would require the development of an access road to the Shishmaref Inlet, where a small boat harbor and barge landing would be located (NRCS, 2005).

The site was rated as fair for development potential by the NRCS, with stream bank erosion potential and poor infrastructure development potential. According to the DOT&PF, an abundance of ice-rich hills exist around the West Tin Creek Hills relocation site which will cause development costs to increase significantly.

3.3.6 West Tin Creek Flats

This proposed site is located adjacent to Shishmaref Inlet, on very flat terrain. The site soils are comprised of gray silt 8 to 12 inches to permafrost. West Tin Creek Flats would be easy to

develop due to the flat topography, but site drainage remains a concern with indicators of massive ice formations on site, such as solifluction and polygons (NRCS, 2005).

Although West Tin Creek Flats rated high for potential layout by the NRCS, it consisted of poor soils, drainage, infrastructure development potential, and high erosion potential. The site is also vulnerable to flooding. The site was determined to be infeasible as a Shishmaref relocation site.

3.4 CURRENT SITE SELECTION

During a public meeting on December 12, 2007, the Community ratified Tin Creek as the preferred Shishmaref relocation site. No formal election was held. Although the Tin Creek site was ratified at that time, it is no longer considered the preferred relocation site. According to the March 18, 2010 Community meeting, which Bristol attended, the Tin Creek and West Tin Creek Hills sites were no longer considered viable options as relocation sites due to the abundance of ice-rich soils at both sites. During the Community meeting held on March 30, 2010 which a Kawerak Transportation Planner attended, the Community indicated the desire for Tin Creek and West Tin Creek Hills to remain as potential relocation sites. At both March meetings, many Community members mentioned the West Nunataq site as a possible relocation site (See Figure 2). A Community meeting held on June 3, 2010 indicated potential relocated sites included; West Nunatuq, Tin Creek, West Tin Creek Hills as well as a new potential site called Old Pond Site (See Figure 2), located west of the proposed Ear Mountain access road. West Nunatuq was listed by ADOT&PF as a potential barge landing site to access the potential Ear Mountain material source. No additional studies or information exists for West Nunataq. It is Bristol's recommendation that the potential relocation site search be expanded to included areas along the proposed Ear Mountain Road, which provide areas free of ice-rich soils (See Figure 2). Community members expressed that the relocation site must be located north of the National Preserve boundary.

The DOT&PF is currently preparing a reconnaissance study, evaluating Ear Mountain as a possible material source site for the future Shishmaref relocation site. Ear Mountain is located on the southwest side of Shishmaref Inlet, and could potentially provide convenient access to construction material for the West Nunataq site and other potential sites along the proposed access road. The study is also evaluating an access road to run from the Shishmaref Inlet to the

proposed material source. With site access being a major factor in determining a possible relocation site, selection of a site in proximity to the Ear Mountain access road could be a major benefit to the Community (See Figure 2). According to the DOT&PF, the evaluation is based upon community input, topography, soil conditions, hydrology, snow and icing problems, development potential wetlands, and wildlife issues, along with many others.

According to the 2009 DOT&PF reconnaissance study, Ear Mountain, as a material source, has the potential to provide an estimated 100 million cubic yards of durable porphyritic granite, which is suitable material for Shishmaref community-based projects. The study also states that other potential material sources have proven unrealistic due to high volumes of ice and silt material. In addition to the potential material source, the study also evaluated two potential barge landing sites, which will require additional studies. Construction of an ice road to haul borrow material from an outside source was also examined. However, the exorbitant costs of preparing and mobilizing equipment for an ice road would ultimately be balanced out by the development of a local material source at Ear Mountain (DOT&PF, 2009).

In addition, the ADOT&PF report indicated the proposed Ear Mountain access road would facilitate safer and more efficient access to gathering, hunting and fishing use areas, and may also result in an increase of subsistence activities on potentially more accessible lands. Development of a relocation site in proximity to the proposed access road would provide the Shishmaref Community access to adequate subsistence use areas to maintain their subsistence lifestyle.

3.4.1 Collocation

In addition to the proposed relocation sites, possible collocation options have been acknowledged, although the citizens of Shishmaref have identified relocation to a new mainland site as the preferred option. The following collocation options exhibit the required capabilities and needed infrastructure to efficiently absorb the Community (USACE, 2004):

- Collocating to Nome
- Collocating to Kotzebue

Collocation to Nome offers the most cost effective alternative for the Community, according to the cost analysis study presented by the USACE.

3.5 NO RELOCATION

If the Community were to remain on Sharichef Island, and not relocate or collocate, the installation and periodic refurbishment of physical measures would be required to halt the seaward erosion which is threatening the safety and integrity of the Community. In addition, the following considerations would need to be evaluated according to the USACE's *Shishmaref relocation and collocation study*:

- Inventory of the condition and remaining life expectancy of existing infrastructure; homes; community, business, industrial, and other structures; as well as the constraints to and opportunities for further development or expansion.
- Determine the capital requirements necessary for meeting the physical needs of the Community, with focus on the timelines for replacing, refurbishing, and upgrading Community infrastructure and facilities in the foreseeable future.
- Develop infrastructure, such as fully plumbed community
- Determine and rank needs of the Community.

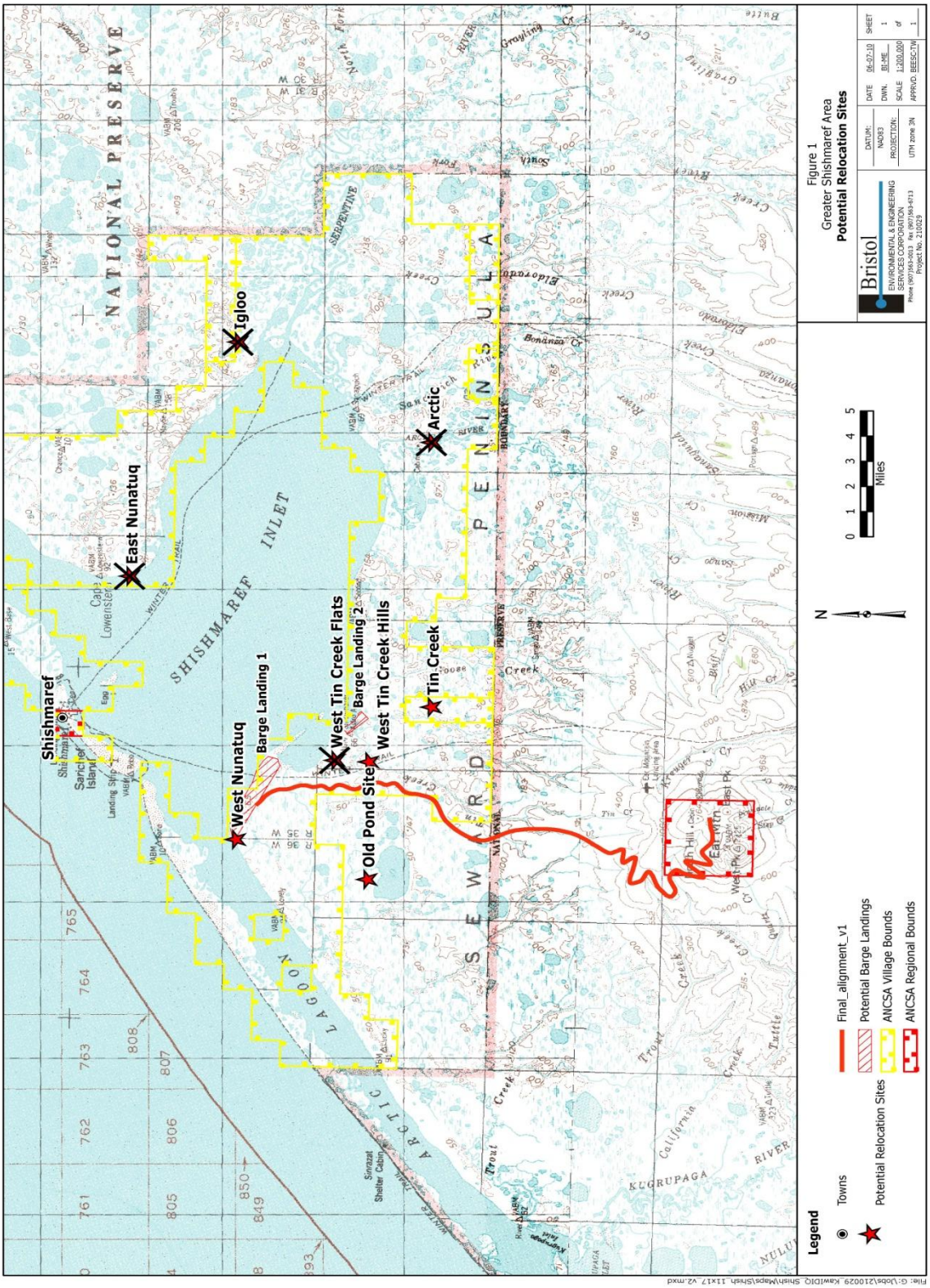

Figure 2: Potential Relocation Sites

4.0 INFRASTRUCTURE DEVELOPMENT

The Community must identify infrastructure development needed to improve the quality of life for citizens, whether through development of a new village site or through maintaining the current town site. To successfully relocate, basic infrastructure needs will need to be identified and prioritized before being expanded to encompass more detailed infrastructure projects. The Community will need to focus on the basic needs for development to create a solid base for future development; this will ensure the ability to customize the development of their site to best suit the needs of the Community.

4.1 RELOCATION

The most basic element for infrastructure development is satisfying the need of three criteria;

- Suitable barge access,
- Adequate water supply, and
- Sewage disposal.

Once these criteria have been met, the relocation process can begin and the new town site can be developed from that point forward. An engineering feasibility study would need to be performed that would cover each of these needs in detail. Prior to the engineering study, detailed survey and aerial mapping information must be obtained for the relocation site.

The following sections expand upon required studies for future site development. The expanded studies will commence upon completion of the three basic criteria mentioned above.

4.1.1 Water, Sewer, and Solid Waste Engineering Study

The following steps would occur for the water and sewer engineering study:

1. Review existing water and wastewater utilities to determine existing demands.
2. Identify potential drinking water sources. Identification and selection will be based on the following factors:
    a. Seasonal availability (winter versus summer).
    b. Locate surface water source that can be used/accessed in the winter.
    c. Water quality (testing will be required).

d. Distance to proposed community site (for both winter and summer supplies).
e. Surface water sources versus groundwater or surface influenced groundwaters.
f. Need for catchment basin.

3. Provide a conceptual layout or design for proposed infrastructure for water treatment facility. Evaluations will include pump requirements, heat add, available waste heat (power plant). A pilot testing program should be assumed for treatment recommendations.
4. Provide a conceptual design for a proposed water distribution system. The following items should be considered:
    a. System type (buried circulating, above ground utilidor, etc.)
    b. System layout versus cost of freeze prevention requirements (heat add and pumping costs).
    c. Affect of disinfection by-products on proposed distribution system.
    d. Need for washeteria and/or central watering point.
    e. Ease of operation.
5. Identify storage requirements, including tank size, tank type, baffling requirements, heat add requirements, location, salvagability of existing water tanks.
6. Provide recommendations for wastewater collection (community collection system, individual or cluster on-site systems, etc.)
7. Wastewater treatment recommendations (lagoon, permitting requirements, discharge).
8. Provide preliminary cost estimates that will serve as the basis for funding and implementation.
9. Develop a phased construction plan that will fit into manageable blocks of funding.
10. Discuss utility management needs and required revenues for sustainable operations.
11. Water Quality Standards are set forth in 18 AAC 70
12. Wastewater disposal standards are set forth in 18 AAC 72.
13. Drinking water standards are set forth 18AAC 80.

4.1.2 Solid Waste Engineering Study (Landfill)

The following steps would occur for the solid waste engineering study:

1. Conduct a geotechnical investigation of potential landfill sites that will include:

a. Subsurface soil conditions.
b. Extent of permafrost or groundwater.
c. Distance to surface water sources.
d. Borrow material availability for berm construction and cover material.

2. Identify potential Class 3 landfill site in accordance with 18 AAC 60.
    a. Location must meet FAA airport separation distances and other requirements, such as wildlife hazard mitigation.
    b. Typically, the bottom of the cell shall be located a minimum of 10 feet from groundwater unless the landfill is constructed two feet or more above ground surface.
3. Determine current and future amount of generated solid waste.
4. Estimate parcel of land needed for landfill use (initial and future cells).
5. Prepare conceptual design of new cell, salvage area, access road, and burn box.
6. Affect of permafrost (freezeback design, burn box design and operation, etc).
7. Evaluate haul requirements (self haul, community haul from dumpsters, curbside pickup, etc).
8. Discuss utility management needs and required revenues for sustainable operations.

4.1.3 Energy Feasibility Study

The energy feasibility study would consist of evaluation the combination of using diesel and wind generation to provide electrical power. The following steps would occur for the energy feasibility study:

1. Determine fuel consumption (current and future)
2. Determine fuel storage needs (current and future)
3. Evaluate fuel delivery.
4. Select a fuel tank site so that tanks could be consolidated to reduce construction costs and streamline fuel delivery and handling
5. Site tanks above storm tide/flood level (Analyze flood data).
6. Site tanks that provide year round access.
7. Determine location of marine header.
8. Collect wind data to determine if wind generation is feasible.

9. Conduct pilot wind generation study.
10. Develop conceptual fuel tank farm and power plant design.
11. Develop preliminary cost estimate and phasing plan.

4.1.4 Transportation Feasibility Study

The transportation study would encompass travel by land, sea, and air. The study would evaluate barge landing/dock, airport, and roads both within and exterior to the community. The following areas would be covered under this study:

1) Develop airport master plan
    a. Prepare conceptual design and layout.
2) Develop Long Range Transportation Plan
    a. Identify short, medium, and long range plans
    b. Work with local and state agencies and planners.
3) Evaluate barge landing area and boat ramp
    a. Determine type of dock
        i. Open cell
        ii. Close face
        iii. Beach landing
    b. Collect water depth and tide data
    c. Determine size of vessel and mooring capacity
    d. Determine size of barging area
    e. Develop conceptual plan and cost estimate.
4) Collect geotechnical data

4.1.5 Facilities Development Study

In order to determine the amount of infrastructure development needed at the new site, a detailed inventory of the Community would need to occur in order to evaluate what existing infrastructure would be salvageable. The relocation of existing infrastructure will pose certain difficulties, because the existing location has to maintain operations while a new location is developed, essentially requiring the operation of two town sites simultaneously.

The list of salvageable, moveable infrastructure facilities will be generated in addition to the following facilities, identified by the Coalition (Shishmaref Erosion and Relocation Coalition, 2002):

- Alaska Village Electric Cooperative (AVEC) Power Plant and bulk tanks
- City buildings and bulk tanks
- Shishmaref Native Store, warehouses, and bulk fuel tanks
- Nayokpuk General Store, warehouses, and bulk tanks
- Clinic building
- Tannery Buildings (4)
- Shishmaref Lutheran Church/Parsonage building, and bulk tank
- City water tanks (2)
- National Guard facilities

A structural engineer will be required to assess the structural integrity of all buildings and determine if the structure is relocatable, or if the building can be demolished and the materials salvaged. Fuel tanks and water tanks shall be inspected by a qualified tank inspector and it must be determined if the tanks are usable and relocatable.

4.2 NO RELOCATION

According to the *Shishmaref Relocation and Collocation Study,* prepared by the USACE in 2004, a base for Community needs was established through the examination of existing facilities, services, structures, and current desires of Shishmaref for upgraded service. All existing and future infrastructure development must be evaluated and approved if Shishmaref were not to relocate. The following physical needs were identified within the report prepared by the USACE:

4.2.1 Defined Village Site

Currently, there is minimal land available on Sarichef Island for housing, infrastructure, and facility expansion and growth. The land use constraints will continue to increase due to the vulnerability to flooding and storm surges. These physical limitations have historically and will continue to make it difficult for the Community to expand and grow in the current location (USACE, 2004).

4.2.2 Housing

Currently, there are an estimated 153 occupied homes within the Community, with an average of four members per household. According to the *Shishmaref Relocation and Collocation Study*, housing in the community is repaired, renovated, expanded, and replaced, based on the financial ability of homeowners, labor, and availability of appropriate funding for qualifying homes, through Bering Straits Housing Authority, Housing and Urban Development, and other applicable housing programs.

4.2.3 Commercial and Industrial Buildings

The existing Community includes three commercial buildings and one industrial building, which includes: the Native store, trading post, washeteria, and tannery. All four buildings are in fair to good conditions. The Native store and washeteria are in fair condition, with an approximate 10-year life span remaining. According to the USACE the trading post has approximately 15 years of useful life remaining. The tannery is estimated to have at least 40 years of useful life remaining, as reported by the USACE (USACE, 2004).

4.2.4 Public/Community Buildings

The existing Community contains the following public, community, and storage buildings: Health Clinic; School: City Hall/Post Office; Armory; Fire/Rescue Station and City Shop; Church; Library; Community Hall; Friendship Center; and 20 storage buildings.

The Community Health Clinic is currently below regional health standards, and in need of upgrading and refurbishment. Possible upgrades have been placed on hold because of possible relocation. Additionally, the City Hall building is nearing the end of its life span, and considered to be a fire hazard by many. The Fire/Rescue Building, Church, and Community Hall are all nearing the end of useful service, and are considered to be unsafe by Community members (USACE, 2004).

4.2.5 Freshwater Supply, Treatment Facility, and Distribution System

The Community needs an adequate, reliable, and safe supply of freshwater for the current population and anticipated future growth. Currently, the Community's water supply, treatment, and distribution systems serving the Community are inadequate, unsafe, and below regional

standards. Additionally, the water supply serving the existing Community is limited and does not provide for the current population.

Shishmaref's current water catchment area can collect up to 3 million gallons per year, but the storage facilities the Community has in place provides inadequate storage. The catchment facility pipes the water to supply and treatment facilities, which are outdated and do not meet either U.S. Environmental Protection Agency's (EPA's) Surface Water Treatment Rule, or EPA's Disinfection Byproducts Rule. If the Community elected not to relocate, it would be necessary to upgrade the catchment area, construct a new water treatment plant, and several new water storage tanks would be required (USACE, 2004).

4.2.6 Sanitary Waste Collection, Treatment/Disposal System

The Community needs to develop adequate systems and facilities to collect, treat, and dispose of sanitary waste to promote and maintain a safe environment for its residents. Existing facilities and system for collection and treating/disposing of sanitary wastes are inadequate, below regional standards, and do not conform to applicable public health and safety regulations.

Currently, the Community operates an unpermitted landfill/waste lagoon pit, which violates FAA regulations for being too close to an airfield. There are no plans for upgrades to the current landfill. If the Community were to remain in its present location, an approved and permitted landfill area would be required, but the land required for expansion is limited.

4.2.7 Solid Waste Collection System and Landfill

Shishmaref needs to have an adequate collection system and facilities, which meet applicable health and safety standards and regulations, to collect and dispose of solid wastes generated in the Community to support a safe environment for all residents. The existing landfill facility is below regional standards and does not conform to applicable public health and safety regulations.

4.2.8 Electrical Generation Facility and Distribution System

Currently, the AVEC provides adequate electricity to the Community, through the use of three diesel generators and a network of overhead distribution lines. An adequate, reliable, and

sufficient source of electrical power needs to be maintained, which allows for a safe and vibrant Community.

4.2.9 Bulk Fuel Storage

A sufficient and reliable supply of diesel and gasoline fuels for heating, power generation, vehicles, and equipment, is essential because of the remote location of Shishmaref. Currently, a joint effort is underway to develop a new upgraded tank farm in Shishmaref.

4.2.10 Road Infrastructure

A quality network of internal and service roads to connect the various elements comprising a city is needed. The existing internal roadways are narrow and covered with up to several inches of sand/silt, and contain no gravel. Currently, the only gravel road in the Community is the 1.2-mile-long, single land road to the landfill.

4.2.11 Airfield

An essential element of Shishmaref that helps ensure the safety and well-being of all citizens is a properly functioning and serviceable air field and associated facilities. The current air field has an estimated 5-8 years of serviceable life remaining.

4.2.12 Barge Landing Facility

The continued well-being and existence of Shishmaref greatly depends on the constant inflow of the items and various materials required for daily living. An adequate landing area for supply barges to deliver goods to Shishmaref is essential.

4.2.13 Harbor and Boat Storage Facility

Small boat usage is essential for transportation needs, and to maintain the subsistence lifestyle of the Community.

4.2.14 Communication Facilities

The satellite communication, television, and telephone facilities and services, currently used by the Community, provide an essential link between its remote location and the rest of the world.

4.2.15 Summer Camps

The numerous shore-side privately-owned lots, located along the northern and southern perimeter of Sarichef Island, are used by members of the Community for summer drying of subsistence foods; boat building, repair, and maintenance; and a variety of other work activities.

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5.0 IDENTIFICATION OF RESOURCES

Funding and technical assistance resources will be essential for the Community in terms of community planning and infrastructure planning and development, including:

- Federal Agencies
- State Agencies
- Statewide Organizations
- Regional Organizations

For both the relocation and the no relocation options, a summary matrix of funding and technical assistance resources has been provided, which indicates the primary federal agencies, state agencies, statewide organizations, and regional organizations that could provide either funding or technical assistance by specific areas of interest, including:

- Air Fields
- Barge Landing Facility
- Bulk Fuel Storage
- Commercial and Industrial Buildings
- Community Planning
- Emergency - Disaster Planning
- Erosion Protection
- Health Facilities
- Housing
- Permitting
- Power Generation and Distribution
- Public Community Buildings
- Roads
- School Facilities
- Small Boat Harbor and Storage
- Solid Waste Collection & Disposal
- Teacher Housing
- Water and Wastewater

In general terms, sources of funding are indicated with a "$" and sources of technical assistance are indicated with an "x". However, many funding sources also will provide technical assistance and many technical assistance sources will have valuable information on current funding opportunities. Therefore, it will be important for the Shishmaref planning group to contact both potential funding and technical sources to learn about the most current assistance available.

Appendix A provides a narrative description for each agency/organization and includes contact information, general descriptions of the type of funding or technical assistance available, and areas of agency/organizational interest. (This section of the plan was prepared by Aurora Consulting)

5.1 RELOCATION

Prepared by Aurora Consulting.

AGENCY	AREAS OF INTEREST																		
	Airfields	Barge Landing Facility	Bulk Fuel Storage	Commercial & Industrial Buildings	Community Planning	Emergency - Disaster Planning	Erosion Protection	Health Facilities	Housing	Land Issues	Permitting	Power Generation & Distribution	Public Community Buildings	Roads	School Facilities	Small Boat Harbor and Storage	Solid Waste Collection & Disposal	Teacher Housing	Water & Wastewater
FEDERAL AGENCIES																			
BIA					$									$					
DC			$		$			$				$	$	$		$	$	$	$
NPS										x									
NRCS							x												
EDA				$	$											$			
EPA											x						$		$
FAA	x																		
FEMA						$													
FHWA														x					
F&WS											x								
HUD				$					$				$	$					
USACE		x					$									x			
USDA-RD									$				$				$		$
STATE AGENCIES																			
AEA			$									$							
AHFC									$										
DCCED					$		x												
DEC											x								$
DEED															x				
DHSEM						$													
DHSS								x											
DOT&PF	$	$												$		$			
DCOM					$		$				x								
OHA											x								
OPMP											x								
STATEWIDE ORGANIZATIONS																			
ANTHC																	$		$
AVEC			x									x							
RurAL CAP									x								x		
REGIONAL ORGANIZATIONS																			
BSSD															x			x	
BSRHA									x										
Kawerak	x	x			x	x			x					x		x			
NSHC								x											

BIA	U.S. Department of the Interior, Bureau of Indian Affairs
DC	Denali Commission
NRCS	U.S. Department of Agriculture/National Resources Conservation Service
EDA	U.S. Department of Commerce, Economic Development Administration
FAA	U.S. Department of Transportation/Federal Aviation Administration
FEMA	U.S. Department of Homeland Security/Federal Emergency Management Agency
FHWA	U.S. Department of Transportation/Federal Highway Administration
F&WS	U.S. Department of Interior/Fish and Wildlife Service
HUD	U.S. Department of Housing and Urban Development
USACE	U.S. Army Corps of Engineers
USDA-RD	U.S. Department of Agriculture/Rural Development
AEA	Alaska Energy Authority
AHFC	Alaska Housing Finance Corporation
DCCED	Alaska Department of Community, Commerce & Economic Development
DEED	Alaska Department of Education & Early Development
DHSEM	Alaska Department of Military & Veterans Affairs, Division of Homeland Security & Emergency Management
DHSS	Alaska Department of Health & Social Services
DOT&PF	Alaska Department of Transportation & Public Facilities
DCOM	Alaska Department of Natural Resources, Division of Coastal and Ocean Management
OHA	Alaska Department of Natural Resources, Office of History & Archeology
OPMP	Alaska Department of Natural Resources, Office of Project Management and Permitting
ANTHC	Alaska Native Tribal Health Consortium, Division of Environmental Health & Engineering
AVEC	Alaska Village Electric Corporation, Inc.
RurAL CAP	Alaska Rural Community Action Program
BSSD	Bering Strait School District
BSRHA	Bering Straits Regional Housing Authority
Kawerak	Kawerak, Inc.
NSHC	Norton Sound Health Corporation

5.2 NO RELOCATION

Prepared by Aurora Consulting.

AGENCY	AREAS OF INTEREST																	
	Airfields	Barge Landing Facility	Bulk Fuel Storage	Commercial & Industrial Buildings	Community Planning	Emergency - Disaster Planning	Erosion Protection	Health Facilities	Housing	Permitting	Power Generation & Distribution	Public Community Buildings	Roads	School Facilities	Small Boat Harbor and Storage	Solid Waste Collection & Disposal	Teacher Housing	Water & Wastewater
FEDERAL AGENCIES																		
BIA					$								$					
DC			$		$			$			$	$	$		$	$	$	$
NRCS							x											
EDA				$	$										$			
FAA	x																	
FEMA						$												
HUD				$					$			$	$					
USACE		x					$								x			
USDA-RD									$			$				$		$
STATE AGENCIES																		
DCCED					$		x											
DHSEM						$												
DOT&PF	$	$											$		$			
DCOM					$		$			x								
STATEWIDE ORGANIZATIONS																		
ANTHC																$		$
AVEC			x								x							
RurAL CAP									x							x		
REGIONAL ORGANIZATIONS																		
BSSD														x			x	
BSRHA									x									
Kawerak	x	x			x	x			x				x		x			
NSHC								x										

BIA	U.S. Department of the Interior, Bureau of Indian Affairs
DC	Denali Commission
NRCS	U.S. Department of Agriculture/National Resources Conservation Service
EDA	U.S. Department of Commerce, Economic Development Administration
FAA	U.S. Department of Transportation/Federal Aviation Administration
FEMA	U.S. Department of Homeland Security/Federal Emergency Management Agency
FHWA	U.S. Department of Transportation/Federal Highway Administration
HUD	U.S. Department of Housing and Urban Development
USACE	U.S. Army Corps of Engineers
USDA-RD	U.S. Department of Agriculture/Rural Development
DCCED	Alaska Department of Community, Commerce & Economic Development
DHSEM	Alaska Department of Military & Veterans Affairs, Division of Homeland Security & Emergency Management
DOT&PF	Alaska Department of Transportation & Public Facilities
DCOM	Alaska Department of Natural Resources, Division of Coastal and Ocean Management
ANTHC	Alaska Native Tribal Health Consortium, Division of Environmental Health & Engineering
AVEC	Alaska Village Electric Corporation, Inc.
RurAL CAP	Alaska Rural Community Action Program
BSSD	Bering Strait School District
BSRHA	Bering Straits Regional Housing Authority
Kawerak	Kawerak, Inc.
NSHC	Norton Sound Health Corporation

6.0 COST

Identification of preliminary costs associated with the relocation and no relocation alternatives were previously compiled by the USACE in 2004. Information was gathered to identify the basic needs of the Community, and the capital requirements associated with meeting the physical needs of the Community for both alternatives. It is Bristol's recommendation that new cost analysis studies be performed to re-evaluate costs prior to selecting a final relocation site. The information provided within the report is provided to help the Coalition determine the next step forward in deciding which alternative best suits the needs of the Community, from a preliminary costs perspective. According to the USACE, preliminary costs were compiled based on the following:

- The basic physical needs of the Community
- Development constraints and opportunities associated with each alternative
- Capital requirements associated with meeting the physical needs of the Community, identified by each alternative

The cost study performed by the USACE only addressed the physical needs of the Community, and did not address social, cultural, and economic needs (Shishmaref Relocation and Collocation Study, 2004). The USACE relocation cost alternative breaks down the first 5 years individually, then summarizes the costs associated with years 5+. The USACE no relocation cost alternative is divided into three time horizons: near term (1-5 years); intermediate term (5 to 15 years); and long-term (15+ years) (USACE, 2004).

According to the Newtok Planning Group, efficient cost-cutting measures would include incorporating local-labor on development/infrastructure projects, in addition to the use of pre-fabricated buildings to help alleviate design and construction costs.

6.1 RELOCATION

The preliminary costs and capital requirements associated with the relocation alternative are based on the physical needs of the Community (USACE, 2004). Agencies with capabilities of assisting with the capital requirements associated with this project can be found in Section 5.1 of this report. The total anticipated costs associated with relocation have been adjusted for inflation

from the 2004 report by an increase of 3%. The adjustment brings the total anticipated cost for relocation to $214,118,055 over a projected 15+ year time frame.

The preliminary cost, capital requirements associated with relocation and the physical needs of Shishmaref are examined in Table 1. According to the USACE, the following assumptions were made in determining capital costs associated with the relocation alternative:

- The physical Shishmaref relocation would occur over a five-year period.
- Prior to the five-year relocation period, up to five years will be required for the completion of all necessary planning; site design; local, state and federal agency coordination; permitting; establishing real estate and securing easements; and establishing a plan for needed funding.
- The costs are associated with only the physical needs of the Community, which include the preliminary estimate for decommissioning, closure, and cleanup that might be required on Sarichef Island.

The anticipated relocation costs can be significantly lowered through the use of local labor, pre-fabricated buildings and developing on a site free of ice-rich soils.

Table 1 Capital Requirements and Preliminary Costs – Relocation

Near Term (Year 1)		
Physical Community Needs	**Capital Requirements**	**Preliminary Cost**
Erosion Protection Measures	Sarichef Island erosion protection - Capital cost	$3,356,480
Physical Area for Community	Real Estate	Unknown
Barge Landing Facility	Construct barge landing - Capital cost plus 1 years of maintenance	$3,695,920
Roads	Construct road system phase I (25%) and bridge	$7,000,000
Sanitary Waste Collection and Treatment	Construct sewage lagoon	$3,500,000
Solid Waste Collection and Disposal	Construct solid waste landfill	$3,700,000
Public/Community Buildings	Construct the community hall building as a multipurpose complex	$1,385,000
	Contingency (25%)	***$5,659,350***
	TOTAL COST (Year 1)	**$28,296,750**
Near Term (Year 2)		
Physical Community Needs	**Capital Requirements**	**Preliminary Cost**
Roads	Construct road system phase II (25%)	$5,500,000
Bulk Fuel Storage	Construct fuel tank farm	$2,126,000
Electric Utility	Construct power generation facilities phase I (50%)	$2,740,000
Water supply and treatment facilities	Develop water source and construct water treatment plant	$4,875,000
	Contingency (25%)	***$3,810,250***
	TOTAL COST (Year 2)	**$19,051,250**

Table 1 Capital Requirements and Preliminary Costs – Relocation (continued)

Near Term (Year 3)		
Physical Community Needs	**Capital Requirements**	**Preliminary Cost**
Roads	Construct road system phase III (25%)	$5,500,000
Electric Utility	Construct power generation facilities phase II (50%)	$2,740,000
Water supply and treatment facilities	Construct water storage tanks	$4,400,000
Homes and Personal Storage Buildings	Relocate/construct homes and storage phase I (20%)	$3,866,000
Commercial and Industrial Buildings	Construct Native Store, Trading Post and Washeteria	$4,725,000
Public/Community Buildings	Construct Health Clinic	$875,000
	Contingency (25%)	***$5,526,500***
	TOTAL COST (Year 3)	**$27,632,500**
Near Term (Year 4)		
Physical Community Needs	**Capital Requirements**	**Preliminary Cost**
Roads	Construct road system phase IV (25%)	$5,500,000
Homes and Personal Storage Buildings	Relocate/construct homes and storage phase II (60%)	$11,598,000
Public/Community Buildings	Construct City Hall/Post Office, Fire/Rescue Station and City Shop	$3,705,000
Communication Facilities	Construct communication facilities	$1,778,000
	Contingency (25%)	***$5,645,250***
	TOTAL COST (Year 4)	**$28,226,250**

Table 1 Capital Requirements and Preliminary Costs – Relocation (continued)

Near Term (Year 5)		
Physical Community Needs	**Capital Requirements**	**Preliminary Cost**
Homes and Personal Storage Buildings	Relocate/construct homes and storage phase III (20%)	$3,866,000
Commercial and Industrial Buildings	Construct Tannery	$275,000
Public/Community Buildings	Construct Church, Library, storage and Friendship Center and relocate Armory	$4,175,000
Sanitary Waste Collection and Treatment	Install indoor plumbing and flush and haul systems to unequipped homes	$7,900,000
	Contingency (25%)	***$4,054,000***
	TOTAL COST (Year 5)	**$20,270,000**
Beyond Year 5		
Physical Community Needs	**Capital Requirements**	**Preliminary Cost**
Air Field	Construct airport facilities	$25,000,000
Public/Community Buildings	Construct school and teacher housing	$15,855,000
Decommissioning and Closure	Decommissioning, closure, and cleanup activities	$3,820,000
	Contingency (25%)	***$11,168,750***
	TOTAL COST (Beyond Year 5)	**$55,843,750**
	TOTAL COST (Relocating to a New Mainland Site, 2004 Study)	**$179,320,500**
	TOTAL COST (+3% Per Year Inflation)	**$214,118,055**

(Shishmaref Relocation and Collocation Study, Preliminary Costs of Alternatives, 2004)

6.2 NO RELOCATION

The no relocation alternative is based on the premise that the seaward erosion that is threatening the safety and integrity of the Community can be stopped. Infrastructure development and facility refurbishment associated with the physical needs of the Community are included in the calculated capital requirements. Adjusted for 3% inflation, the projected preliminary costs total approximately $112,595,068 for the Community to remain in the current location. Potential

agencies able to assist with the capital requirements associated with no relocation can be found in Section 5.2 of this report. Table 6 summarizes the anticipated preliminary costs calculated by the USACE.

Table 2 Capital Requirements and Preliminary Costs – No Relocation

Near Term (1-5 years)		
Physical Community Needs	**Capital Requirements**	**Preliminary Cost**
Erosion Protection Measures	Sarichef Island erosion protection - Capital cost	$4,234,480
Public/Community Buildings	Replace City Hall/Post Office, Fire/Rescue Station, and construct a new City Shop	$3,600,000
Water Supply and Treament Facilities	Upgrade water catchment area and water treatment plant	$15,000,000
Sanitary Waste Collection and Treatment	Upgrade remaining homes with indoor plumbing and flush-haul system	$8,830,000
Electric Utility	Construct new power plant and bulk fuel tank farm	$2,980,000
Bulk Fuel Storage	Construct new fuel tank farm	$2,126,000
	Contingency (25%)	***$9,192,620***
	TOTAL COST (1-5 years)	**$45,963,100**
Intermediate Term (5-15 years)		
Physical Community Needs	**Capital Requirements**	**Preliminary Cost**
Commercial and Industrial Buildings	Replace Native Store, Trading Post, and Washeteria	$4,620,000
Public/Community Buildings	Replace Health Clinic, Church, Community Hall and Friendship Center	$4,890,000
Water Supply and Treatment Facilities	Upgrade water storage system	$16,412,000
Sanitary Waste Collection and Treatment	Upgrade sewer lagoon system	$3,000,000
Roads	Upgrade landfill road	$2,400,000
Air Field	Repaving and Surface Rehabilitation	$2,500,000
	Contingency (25%)	***$8,455,500***
	TOTAL COST (5-15 years)	**$42,277,500**

Table 2 Capital Requirements and Preliminary Costs – No Relocation (continued)

Long Term (15+ years)		
Physical Community Needs	**Capital Requirements**	**Preliminary Cost**
Commercial and Industrial Buildings	Replace Tannery	$1,500,000
Public/Community Buildings	Replace School	$15,360,000
	Contingency (25%)	***$4,215,000***
	TOTAL COST (15+ years)	**$21,075,000**
	TOTAL COST (No Relocation, 2004 Study)	**$109,315,600**
	TOTAL COST (+3% Per Year Inflation)	**$130,528,543**
	Annual Erosion Protection O&M Cost (Not Included in Total Cost)	***$2,544,696***

(Shishmaref Relocation and Collocation Study, Preliminary Costs of Alternatives 2004)

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7.0 SCHEDULE AND IMPLEMENTATION PLAN

A schedule and implementation plan will be the first order of business upon deciding upon either a final relocation site or no relocation. The schedule and implementation plan will list the required development and put forth a time frame for completion. The relocation and no relocation time lines are addressed below. The USACE formulated a detailed time frame for completion with the costs associated with each developmental phase in the Shishmaref Relocation and Collocation Study.

A preliminary schedule and implementation plan for relocation and no relocation are listed below.

7.1 RELOCATION

The Shishmaref Relocation Plan Timeline, prepared by Bristol, has been separated into four time blocks - Critical Initiators, Years 1 - 5, Years 6 – 10, and Years 10+. See Shishmaref Relocation Planning Timeline in Appendix A.

7.1.1 Critical Initiators

Critical initiators include three functions that should be accomplished prior to embarking on relocation action planning, infrastructure development, and/or project funding. The three functions are:

- Form a planning team –The Shishmaref Erosion and Relocation Coalition, consisting of the City Council of Shishmaref, IRA Council and the Shishmaref Native Corporation Board of Directors, was formed in 2001.
- Commit to a firm relocation site - The community of Shishmaref should commit to a firm relocation site, with alternatives.
- Develop an initial site plan and community layout - An initial site plan and community layout should be developed that shows the relocation of the new community, as well as the community's vision for the layout of critical infrastructure, including roads, housing, community buildings, utilities, schools, local businesses, and other important infrastructure.

7.1.2 Years 1- 5

Relocation activities that should be accomplished during Years 1 - 5 include:

- Establish erosion control measures to ensure safety of the new relocation site
- Finalize the physical relocation area, begin establishing real estate
- Begin construction on the road system
- Development of sanitary and sold waste collection, disposal, storage and treatment facilities should begin
- Bulk fuel facilities, electrical utilities, and water supply and treatment facilities development
- Relocation and construction of personal, commercial, industrial, public and community buildings should begin.

7.1.3 Years 6-10

Relocation activities that should be accomplished during Years 6 – 10 include:

- The relocation and construction of buildings should progress to the 60% level.
- Continue construction and development of Community road system
- Begin development of communication facilities
- Begin indoor plumbing and sanitary waste collection

7.1.4 Years 10+

Relocation activities that should be accomplished during Years 10+ include:

- Begin the construction and development of airport facilities
- Continue development of community buildings – school, teacher housing
- Decommissioning and closure of old town site
- Finalize water distribution and piping throughout Community
- Finalize sewer collection and piping throughout Community

7.2 NO RELOCATION

If the Community decides not to relocate, a preliminary time line is as follows. The format is the same as the relocation time line, and has been separated into the same four time blocks - Critical Initiators, Years 1 - 5, Years 6 – 10, and Years 10+.

7.2.1 Critical Initiators

Critical initiators include three functions that should be accomplished prior to embarking on no relocation action planning, erosion control measures, infrastructure development, and/or facility repair funding. The three functions are:

- Form a planning team - The Shishmaref Erosion and Relocation Coalition, consisting of the City Council of Shishmaref, IRA Council and the Shishmaref Native Corporation Board of Directors, was formed in 2001.
- Develop an initial site plan and community layout - An initial site plan and community layout should be developed that shows the community's vision for the layout of critical infrastructure, including erosion control, roads, housing, community buildings, utilities, schools, local businesses, and other important infrastructure that need to be repaired, refurbished, or replaced within the Community. In addition, future development of the Shishmaref Community, were applicable, will need to be addressed to improve the quality of living within the existing Shishmaref Community.

7.2.2 Years 1- 5

Relocation activities that should be accomplished during Years 1 - 5 include:

- Establish erosion control measures to ensure safety of the Shishmaref Community
- Replace/Repair/Constructed public/community buildings
- Upgrade Community water supply and treatment facilities with new catchment area and treatment plant.

7.2.3 Years 6 -10

Relocation activities that should be accomplished during Years 6 – 10 include:

- Upgrade sanitary and solid waste collection and treatment facilities. Install indoor plumbing systems in all public/community/personal buildings.
- Improve road systems within Shishmaref
- Upgrade electric utilities through construction of new power plant and bulk fuel tank farm

7.2.4 Years 10+

Relocation activities that should be accomplished during Years 10+ include:

- Continue road upgrades throughout the Community
- Repave/surface rehabilitation of the current air field
- Replace/Upgrade Community/Industrial Buildings
- Maintenance of erosion control measures

8.0 REFERENCES

Alaska Department of Commerce, Community, and Economic Development, 2009. *Alaska Community Database website, Community Profiles Online: Shishmaref*, Website: http://www.commerce.state.ak.us/dca/commdb/CF_BLOCK.cfm. Accessed January 26, 2010.

Shishmaref Erosion and Relocation Coalition, 2002. *Shishmaref Relocation Strategic Plan, January, 2002*.

State of Alaska Department of Transportation & Public Facilities Northern Region, 2009. *Preliminary Draft: Shishmaref Relocation Road Reconnaissance Study. State Project No.*76776. July 2009.

Natural Resources Conservation Service, 2005. *Shishmaref Site Analysis for Potential Emergency Evacuation and Permanent Relocation Sites*. Completed in cooperation with the Shishmaref Erosion and Relocation Coalition.

U.S. Army Corps of Engineers, 2004. *Shishmaref Partnership: Shishmaref Relocation and Collocation Study. Shishmaref, Alaska*. Prepared by Tetra Tech, Inc., Seattle Washington.

APPENDIX A

FEDERAL AND STATE AGENCIES

Federal Agencies:

Denali Commission
U.S. Army Corps of Engineers (USACE)
U.S. Department of Agriculture/National Resources Conservation Service (NRCS)
U.S. Department of Agriculture/Rural Development (USDA-RD)
U.S. Department of Commerce, Economic Development Administration (EDA)
U.S. Department of Environmental Protection (EPA)
U.S. Department of Homeland Security/Federal Emergency Management Agency (FEMA)
U.S. Department of Housing and Urban Development (HUD)
U.S. Department of Interior/Fish and Wildlife Service (F&WS)
U.S. Department of the Interior, Bureau of Indian Affairs (BIA)
U.S. Department of the Interior, National Park Service (NPS)
U.S. Department of Transportation/Federal Aviation Administration (FAA)
U.S. Department of Transportation/Federal Highway Administration (FHWA)

Denali Commission	
Address/Contact Denali Commission 510 L St. Ste 410 Peterson Tower Anchorage, AK 99501 Joel Neimeyer, Federal Co-Chair Phone: (907) 271-1426 Krag Johnsen, Chief Operating Officer Tel: (907) 271-1413	**Assistance** • Project funding • Technical assistance
Areas of Interest: • Community Planning • Community Power Generation & Distribution • Bulk Fuel Storage • Renewable and Alternative Energy • Solid Waste Equipment & Facilities • Health Facilities • Roads and Boardwalks • Regional Ports and Small Boat Harbors • Teacher Housing	

U.S. Army Corps of Engineers (USACE)	
Address/Contact US Army Corps of Engineers PO Box 6898 Elmendorf AFB, AK 99506 Brenda Kerr Phone: (907) 753-5537 Brenda.M.Kerr@poa.02.usace.army.mil Bruce Sexauer, Study Manager Alaska District Phone: (907) 753-5619 Bruce.R.Sexauer@usace.army.mil	**Assistance** • Continuing Authorities Program (CAP) • Design and construct revetment • Water quality testing • Perform wildlife, archeological surveys • Construction for erosion protection, flood damage reduction measures
Eligibility Requirements • 35 percent of the total project costs. • All lands, easements, rights of way, relocations, and dredged material placement areas (LERRD) necessary for construction of the project in cash a minimum of 5 percent of the total project costs for structural solutions. • Formal assurance of local cooperation • During the planning phase, the sponsor will be required to demonstrate financial capability to fulfill all items of local cooperation.	
Areas of Interest: • Erosion protection • Small boat harbor and storage facility • Barge landing facility	

U.S. Department of Agriculture/National Resources Conservation Service (NRCS)	
Address/Contact Alaska State Office USDA - Natural Resources Conservation Service 800 W. Evergreen Avenue, Suite 100 Palmer, AK 99645 State Conservationist: Robert N. Jones Phone: (907) 761-7760 Fax: (907) 761-7790 **Nome Field Office** 240 Front Street, Room 107A P.O. Box 1009 Nome, AK 99762-1009 Phone: (907) 443-6096 Fax: (907) 443-6098	**Assistance** Conservation Technical Assistance Program: • Provides technical assistance to communities to solve natural resource problems including reducing erosion, improving air and water quality, maintaining or restoring wetlands and habitat • Provides information on watershed planning and flood control
Eligibility Requirements • Individuals • Indian Tribes • Units of a State governments • Non-governmental organizations	
Areas of Interest: • Erosion protection	

U.S. Department of Agriculture/Rural Development (USDA-RD)	
Address/Contact USDA Rural Development, Alaska State Office 880 W. Evergreen, Suite 201 Palmer, AK 99645 Deborah Davis, Director Rural Housing Programs Dean Steward, Director of Business Programs Merlaine Kruse, Director of Cooperative Programs Phone: (907) 761-7705 Fax: (907) 761-7783 Nome Field Office P.O. Box 1569 Nome, Alaska 99762 Area Director Phone: (907) 479-4362	**Assistance** • Guarantee, loan and grant programs o Water and sewer systems o Housing o Health clinics o Emergency service facilities o Electric and telephone service. • Economic development o Guarantee loans to businesses through qualified lenders. • Renewable energy and energy efficiency projects o Wind o Geothermal, o Hydro o Biodiesel • Technical assistance and information o Cooperative startups o Rural Economic Development Loan and Grant program
Areas of Interest: • Public/Community buildings • Water supply & treatment facilities • Solid waste collection & disposal facilities • Power generation & distribution • Housing	

U.S. Department of Commerce, Economic Development Administration (EDA)	
Address/Contact Seattle Regional Office Jackson Federal Building, Room 1890 915 Second Avenue Seattle, WA 98174-1001 A. Leonard Smith, Regional Director Phone: (206) 220-7660 Fax: (206) 220-7669 lsmith7@eda.doc.gov Alaska Office 510 'L' Street, Suite 444 Anchorage, AK 99501 Bernhard Richert Phone: (907) 271-2272 brichert@eda.doc.gov	**Assistance** • Economic Adjustment Program builds erosion or flood-control structures in order to protect commercial village structures such as canneries. • Economic development projects. • Infrastructure development.
Eligibility Requirements • City or other political subdivision of a State. • Indian Tribe or a consortium of Indian Tribes.	
Notes: EDA Investments generally take the form of Grants to or Cooperative Agreements with Eligible Recipients. Additional information at www.eda.gov	
Areas of Interest: • Community planning • Commercial & industrial buildings • Small boat harbor and storage	

U.S. Environmental Protection Agency (EPA)	
Address/Contact U.S. Environmental Protection Agency Alaska Operations Office 222 West 7th Ave, #19 Anchorage, AK 99513-5083 Marcia Combes, AOO Director Phone: (907) 271-6555 Combes.Marcia@epa.gov	**Assistance** • Tribal Project funding • Technical assistance • Planning • Permitting/Compliance
Areas of Interest: • Tribal Water and Solid Waste Projects • Project Permitting • Regulatory Compliance • Climate Change Assessment	

U.S. Department of Homeland Security/Federal Emergency Management Agency (FEMA)	
Address/Contact FEMA Regional Office 1501 4th Ave., Suite 1400 Seattle, WA 98101 Phone: (206) 438-2607 Fax: (206) 438-2699 Cell: 425.417.3159 mlujan@ostglobal.com Mitigation Division Chief Bothell WA Debbie Key, Bob Cook Phone: (425) 487-4717	**Assistance** • Supplemental federal grant assistance for repair, replacement, restoration of disaster-damaged, publicly- owned facilities and facilities • Pre-disaster mitigation (PDM) program to implement mitigation projects prior to a disaster event • Makes flood insurance available
Eligibility Requirements • State agency • Tribal government • Local government	
Areas of Interest: • Disaster planning	
Notes: Some programs are "direct assist" programs, not monetary awards. Availability of funds changes throughout the year and application periods differ by program. Refer to: www.fema.gov/government/grant.index.shtm www.fema.gov/government/mitigation.shtm www.fema.gov/government/tribal/index.shtm	

U.S. Department of Housing and Urban Development (HUD)	
Address/Contact HUD Office of Native American Programs (ONAP)Anchorage Field Office 3000 C St. Ste 401 Anchorage, AK 99503 Wayne Mundy, Administrator Office of Native American Programs Phone: (907) 677-9860 wayne_mundy@hud.gov David Vought, Native American Program Specialist Phone: (907) 677-9862 david_vought@hud.gov Bering Straits Housing Authority PO 995 Nome, Alaska 99762 Robert Mocan, President & CEO Phone: (907) 443-5256 bmocan@bsrha.org Fax: (907) 443-8652	**Assistance** • Indian Community Development Block Grants ($500,000 per community/year) • Rural housing & Economic Development Grants ($25 million/nationwide/year) • 1996 Native American Housing Assistance Self-Determination Act (NAHASDA) provides grants and technical assistance to Alaska Native Villages to develop affordable housing and to move homes threatened by flooding and erosion • Imminent Threats Grants Program provides funding to alleviate or remove imminent threats to health or safety including threats posed by flooding or erosion
Eligibility Requirements • Any Indian tribe, band, group, or nation(including Alaska Indians, Aleut, and Eskimos) or Alaska Native village which has established a relationship to the Federal government as defined in the program regulations; • Tribal organizations may be eligible to apply.	
Areas of Interest: • Housing - rehabilitation, land acquisition to support new housing construction, and under limited circumstances, new housing construction. • Community Facilities - infrastructure construction, e.g., roads, water and sewer facilities; and, single or multipurpose community buildings. • Economic Development - wide variety of commercial, industrial, agricultural projects which may be recipient owned and operated or which may be owned and/or operated by a third party.	

U.S. Department of Interior/ U.S. Fish and Wildlife Service (F&WS)	
Address/Contact Native American Liaison 1011 East Tudor Road Anchorage, AK 99503-6199 Sue Detwiler Phone: (907) 786-3868 Fax: (907) 786-3495 Anchorage Field Office 605 W 4th Ave. Room G-61 Anchorage, AK 99501 Greg Risdahl Phone: (907) 271-2807 Greg_Risdahl@fws.gov	**Assistance** • Surveys for wildlife presence
Areas of Interest: • Wildlife issues, concerns.	

U.S. Department of the Interior, Bureau of Indian Affairs (BIA)

Address/Contact

Alaska Regional Office
Bureau of Indian Affairs
PO Box 25520
709 West 9th St.
Juneau, AK 99802

Phone: (800) 645-8397
Fax: (907) 856-7252

Niles Cesar, Regional Director
Charles Bunch, Deputy Regional Director, Trust Services

Assistance

- Indian Reservations Roads (IRR) program

Eligibility Requirements

Indian Reservations Roads (IRR) projects are selected by Tribal governments and approved by the BIA and the Federal Highway Administration (FHWA). Each project must be listed in the Tribal Transportation Improvement Program (TIP), which is submitted by the BIA to the FHWA for approval and then forwarded to the respective State for inclusion in the Metropolitan Planning Organization (MPO) TIP and State Transportation Improvement Program (STIP). Approved IRR projects may be subject to metropolitan and statewide planning requirements and guidelines.

Areas of Interest:

- Roads
- Physical area for community

Notes:

Twelve regional offices with a Regional Director, Deputy Regional Director for Trust Services and Deputy Regional Director for Indian Services.

U.S. Department of the Interior, National Park Service (NPS)	
Address/Contact U.S. Department of the Interior Alaska Regional Office 240 West 5th Avenue Anchorage, AK 01 Sue Masica, Regional Director (907) 644-3510 Jeannette Pomrenke, Park Superintendent Bering Straits National Park 214 E Front St. P.O. Box 220 Nome, AK 99672 Tel: (907) 443-2522	**Assistance** • Land Issues • Cultural Preservation
Areas of Interest: • Land Issues • Cultural Preservation	

U.S. Department of Transportation/Federal Aviation Administration (FAA)	
Address/Contact FAA Anchorage 222 W 7th Ave. PO Box 14 Anchorage, AK 99513 Robert Van Haastert Phone: (907) 271-5863 Robert.van_haastert@faa.gov John Lovett Phone: (907) 271-5446 John.Lovett@faa.gov Mark Mayo Phone: (907) 269-0519	**Assistance** • Airport planning through the Alaska Department of Transportation and Public Facilities (DOTP&F) • Improve airport infrastructure
Eligibility Requirements If awarded airport financial assistance, the Alaska Department of Transportation and Public Facilities (DOTP&F) would have to be involved in the airport planning.	
Areas of Interest: • Airfields	

U.S. Department of Transportation/Federal Highway Administration (FHWA)	
Address/Contact FHWA Alaska Division P.O. Box 21648 709 West 9th Street, Room 851 Juneau, AK 99802-1648 Phone: (907) 586-7418 Fax: (907)-586-7420	**Assistance** • For study to construct road
Areas of Interest: • Roads	

State Agencies:

Alaska Department of Transportation and Public Facilities (DOT&PF)
Alaska Energy Authority (AEA)
Alaska Housing Finance Corporation (AHFC)
Alaska Department of Commerce, Community and Economic Development (DCCED)
Alaska Department of Education and Early Development (DEED)
Alaska Department of Military & Veterans Affairs, Division of Homeland Security & Emergency Management (DHSEM)
Alaska Department of Health and Social Services (DHSS)U.S. Department of Alaska Department of Natural Resources (DNR) Division of Coastal and Ocean Management (DCOM)
Alaska Department of Natural Resources Office of History and Archeology (OHA)
Alaska Department of Natural Resources Office of Project Management and Permitting (OPMP)

<table>
<tr><th colspan="2">Alaska Department of Transportation and Public Facilities (DOT&PF)</th></tr>
<tr><td>Address/Contact

AKDOTP&F
Northern Region Planning
2301 Peger Road
Fairbanks, AK 99709 - 5316
Mail Stop 2550/(907) 451-2380

Alexa Greene
Northern Area Planner
Phone: (907) 451-2388</td><td>Assistance

• Transportation infrastructure development
• Village airstrip erosion protection
• Work with USACE, community, DCCED to design and develop shoreline protection measures</td></tr>
<tr><td colspan="2">Areas of Interest:
• Roads
• Airfield
• Barge landing facility</td></tr>
</table>

Alaska Energy Authority (AEA)	
Address/Contact Alaska Energy Authority 813 W Northern Lights Blvd. Anchorage, AK 99503 Bruce Chertkow, Loan Officer Phone: (907) 771-3037 bchertkow@aidea.org	**Assistance** • Power Project Loan Fund • Bulk Fuel Revolving Loan Fund
Eligibility Requirements • Electric Utility, City or Village Council, Regional or Village Corporation	
Areas of Interest: • Project planning • Power generation and distribution • Bulk fuel storage	

Alaska Housing Finance Corporation (AHFC)	
Address/Contact Alaska Housing Finance Corporation 4300 Boniface Parkway 99504 PO Box 101020 Anchorage, AK 99510-1020 (907) 338-6100 (800) 478- 2432 Fax: (90)-338-9218 Esther Combs, Supplemental Housing Development Grant Program Manager Phone: (907)-330-8129 ecombs@ahfc.state.ak.us	**Assistance** • program provides loans or grants to persons in imminent danger of losing their homes • Community Development Block Grants (CDBG) can be used for community site planning, one-time basis, maximum $850,000
Eligibility Requirements • Must be a recognized housing authority (BSRHA, AVCP), local government or non-profit organization.	
Notes: *Elder housing program w/Denali Commission* – provides federal funds to plan, construct and rehabilitate housing in rural Alaska *Supplemental housing development grant program* – provides funding to **regional housing authorities** to supplement housing projects approved under HUD's housing development programs. The funds can be used only for the cost of on-site water and sewer facilities, road construction to project sites, electrical distribution facilities and energy-efficient design features in the homes.	
Areas of Interest: • Housing	

Alaska Department of Commerce, Community and Economic Development (DCCED)	
Address/Contact Division of Community & Regional Affairs 550 W 7th Ave. Ste 1770 Anchorage, AK 99501 Tara Jollie, Director Phone: (907) 269-4580 Tara.Jollie@alaska.gov Leroy Seppilu Local Government Specialist, Nome Regional Office Phone: (907) 443-5457 Leroy.Seppilu@alaska.gov	**Assistance** • Community planning • Local government assistance • Hazard mitigation plans • Floodplain management • Community Development Block Grants • Grants Database
Eligibility Requirements • For floodplain management program must be identified as a community of significant risk where a phased and coordinated approach to project development is needed to ensure infrastructure and community-wide safety	
Areas of Interest: • Erosion protection and floodplain management • Community Planning • Local government assistance • Community infrastructure development	

Alaska Department of Education and Early Development (DEED)	
Address/Contact Department of Education and Early Development 801 West 10th Street, Ste 200 PO Box 110500 Juneau, AK 99811-0500 Phone: (907) 465-2800 Fax: (907) 465-4156 Phyllis Carlson, Director of Rural Education Phone: (907) 465-2800 phyllis.carlson@alaska.gov	**Assistance** • School facilities, planning and funding • Teaching and learning support
Areas of Interest: • School facilities • Teaching	

Alaska Department of Military & Veterans Affairs, Division of Homeland Security & Emergency Management (DHSEM)	
Address/Contact Division of Homeland Security & Emergency Management PO Box 5800 Fort Richardson, AK 99505 John Madden, Director Phone: (907) 428-7062 john.madden@alaska.gov	**Assistance** • develop emergency plan for emergency operations, community evacuation, hazard mitigation • helps communities recover from the effects of disasters and emergencies • provide information on grants
Areas of Interest: • Planning, Analysis & Mitigation • Emergency preparedness	

Alaska Department of Health and Social Services (DHSS)	
Address/Contact Department of Health and Social Services 350 Main Street, Room 404 PO Box 110601 Juneau, AK 99811-0601 Phone: (907) 465-3030 Fax: (907) 465-3068 Bill Hogan, Commissioner bill.hogan@alaska.gov	**Assistance** • Planning
Areas of Interest: • Health Care Services and Facilities • Public Health	

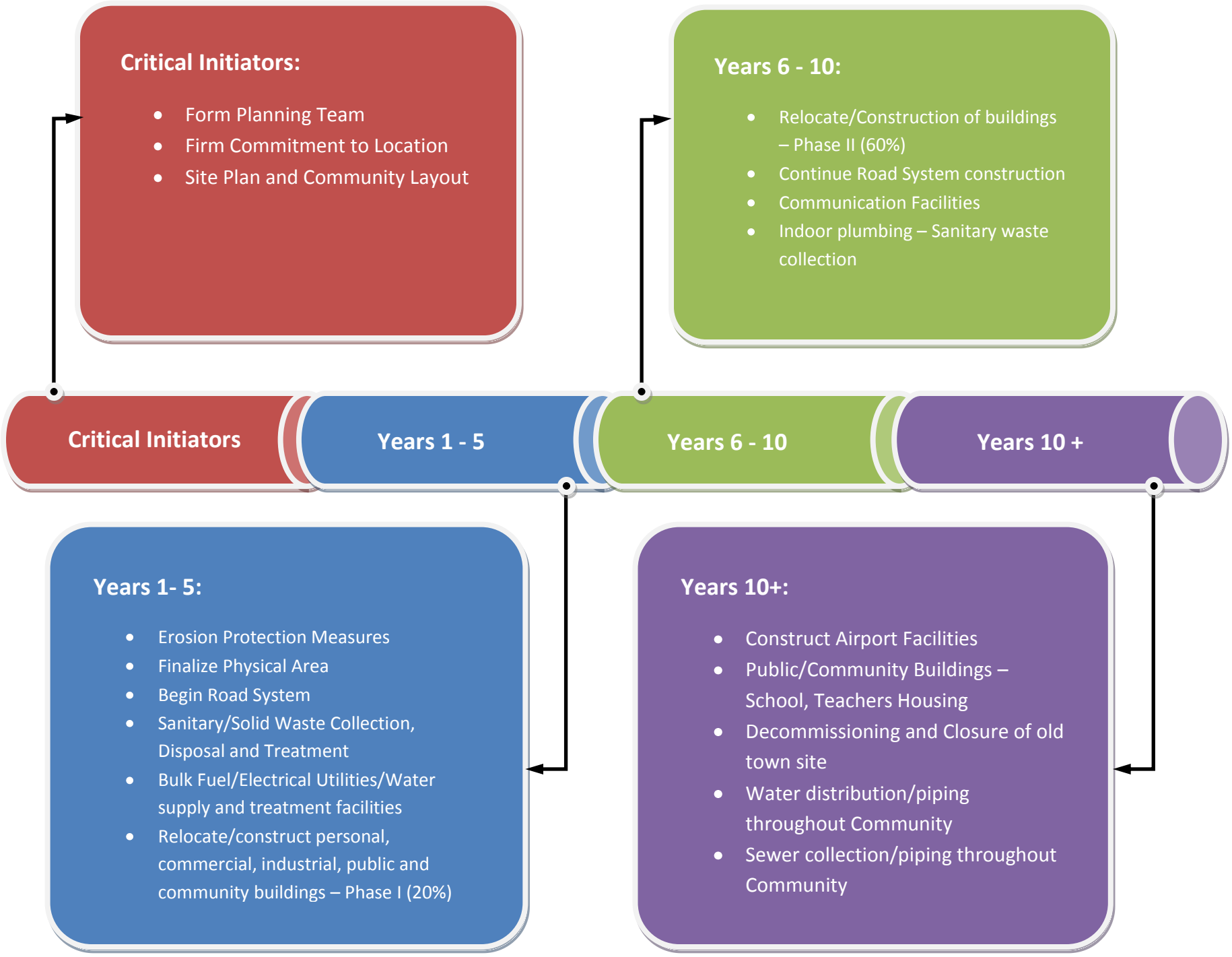
Alaska Department of Natural Resources (DNR) Division of Coastal and Ocean Management (DCOM)	
Address/Contact Division of Coastal and Ocean Management 302 Gold St. Ste 202 PO Box 111030 Juneau, AK 99811 MS 1030/JNU Sylvia Kreel, Project Coordinator/CIAP Phone: (907) 465- 3177 Fax: (907) 465-3075 Sylvia.Kreel@alaska.gov David Gann, District Planning Specialist-DCOM Phone: (907) 465-3529 David.Gann@alaska.gov	**Assistance** • Alaska Coastal Management Program provides information on available grants, educational opportunities relating to coastal issues and management, policies • U.S. Minerals Management Service - Coast Impact Assistant Program - Funding available for the purpose of conservation, protection, or restoration of coastal areas including wetlands; mitigation of damage to fish, wildlife, or natural resources; planning assistance and the administrative costs of complying with these objectives; implementation of a federally-approved marine, coastal, or comprehensive conservation management plan; and, mitigation of the impact of Outer Continental Shelf activities through funding of onshore infrastructure projects and public service needs.
Eligibility: • Shishmaref is included in the Bering Straits coastal resource service area, which is part of the northwest coastal district.	
Areas of Interest: • Community/Waterfront Planning • Site Inventory & Assessments	

Alaska Department of Natural Resources Office of History and Archeology (OHA)	
Address/Contact Office of History & Archaeology Division of Parks and Outdoor Recreation 550 W 7th Ave. Ste 1310 Anchorage, AK 99501 Dave McMahan, Deputy SHPO/State Archaeologist Phone: (907) 269-8723 Fax: (907) 269-8908 e-mail: dave.mcmahan@alaska.gov	**Assistance** • provides regulations, instructions on permits for investigations on state land • information on historic preservations, cultural assessment • work with federal and state agencies during the early stages of project planning to protect cultural resources
Areas of Interest: • Historic/cultural preservation • Permitting for investigations on state lands • Review of federal, state and local undertakings that may affect historic properties	

Alaska Department of Natural Resources Office of Project Management and Permitting (OPMP)	
Address/Contact Office of Project Management & Permitting 550 W 7th Ave Ste 1660 Anchorage, AK 99501 Ed Fogels, Director Phone: (907) 269-8431	**Assistance** • Review of large scale projects • Interagency coordination

APPENDIX B

SHISHMAREF RELOCATION PLANNING TIMELINE



Shishmaref Relocation Planning Timeline

APPENDIX C

NRCS SITE EVALUATION RESULTS

NRCS Site Evaluation Results:

NCRS evaluated potential relocation sites based on five parameters, which include: site layout, development potential, natural resources, infrastructure, and social and cultural considerations. The site evaluations were performed by the NRCS, which ranked the proposed sites qualitatively. However, NRCS did not factor in, or account for, a review or opinion of the Shishmaref Community.

Table 1 Site Layout Data

Site	Area (acres)	Elevation (feet)	Contiguous Ground
East Nunatuq	520	75	Low
Arctic	340	100	Medium
Igloot	450	75	Medium
Tin Creek	390	50	Low
West Tin Creek Hills	160	50	Medium
West Tin Creek Flats	640	25	High

Note: (Shishmaref Site Analysis for Potential Emergency Evacuation and Permanent Relocation Sites, 2005)

West Tin Creek Flats had the largest potential development area, as well as the largest contiguous area of acceptable ground and best combination of shape, elevation and area. It also had the lowest elevation of all the proposed sites. West Tin Creek Flats was followed closely by Igloot and Arctic in the site layout rankings (See Table 1 above).

Table 2 Development Potential

				Material Sources		
Site	**Slope (percent)**	**Soils**	**Drainage**	**sand**	**gravel**	**rock**
East Nunatuq	6	Fair	Fair	Poor	Poor	Poor
Arctic	2	Fair	Fair	Poor	Poor	Poor
Igloot	4	Good	Good	Poor	Poor	Poor
Tin Creek	6	Fair	Fair	Fair	Fair	Fair
West Tin Creek Hills	4	Good	Fair	Fair	Fair	Fair
West Tin Creek Flats	1	Poor	Poor	Good	Fair	Fair

Note: (Shishmaref Site Analysis for Potential Emergency Evacuation and Permanent Relocation Sites, 2005)

According to the NRCS, the majority of the proposed relocation sites are located similar distances from building material sources. Proposed sites located on the southwest side of the Shishmaref Inlet are closer in proximity to Ear Mountain (a rock and gravel source), which gives those sites an advantage. Deep thawed layers were discovered at Igloot and West Tin Creek Hills; this provides better soil and depth for infrastructure development potential (see Table 2 above). Each site was soil probed to determine soil quality for the proposed area. The preferred relocation site will require further soil testing and evaluation, through detailed geotechnical investigations.

Table 3 Natural Resources Attributes

Site	Fresh Water*	Erosion
East Nunatuq	L	Low-Medium**
Arctic	S,L,G	Low-Medium**
Igloot	R,L,S,G	Low-Medium***
Tin Creek	R,L,S,G	Low-Medium***
West Tin Creek Hills	S,L,G	Low-Medium***
West Tin Creek Flats	S,L,G	Medium-High**

Notes: (Shishmaref Site Analysis for Potential Emergency Evacuation and Permanent Relocation Sites, 2005)

*S=Spring, L=Lake, R=River, G=Suspected Groundwater

**Bluff erosion potential

***Streambank erosion potential

Potential relocation sites were evaluated based on proximity to natural resources. None of the proposed sites are subject to flooding hazards, or to some degree, erosion, because initial site selection criteria were for sites located away from the ocean. Streambank erosion will be a concern at Igloot, Tin Creek, and West Tin Creek Hills, due to forecasted boat traffic on streams located in close proximity to the proposed town sites. Igloot and Tin Creek had the highest overall rating due to site proximity to potential freshwater sources. Site erosion potentials were evaluated through examining site proximity to streams, potential boat traffic, and flooding potential.

Table 4 Infrastructure Development Data

						Access Road	
Site	**Airport**	**Small Boat Harbor**	**Barge Access**	**Sewage Lagoon**	**Landfill**	**Local**	**Service**
East Nunatuq	Fair	Poor[1]	Poor	Fair	Fair	Fair	.75 mi
Arctic	Fair	Fair[2]	Poor[3]	Fair	Fair	Fair	2.5 mi[5]
Igloot	Poor	Poor[1]	Fair	Fair	Fair	Fair	1 mi
Tin Creek	Fair-Good	Fair[2]	Fair[4]	Poor	Fair	Fair	2 mi
West Tin Creek Hills	Fair	Fair[2]	Fair[4]	Poor	Fair	Fair	1.5 mi[5]
West Tin Creek Flats	Good	Fair-Good	Fair[4]	Poor	Poor	Poor	0 mi

Notes: (Shishmaref Site Analysis for Potential Emergency Evacuation and Permanent Relocation Sites, 2005)

[1]A constructed breakwater will be required.

[2]A constructed port and marina will be required.

[3]This site will need a long jetty and constant dredging.

[4]These ports are well sheltered. A jetty will be required.

[5]Bridges will be needed on the road to the harbor.

mi = mile

Proposed relocation site selection criteria, requiring a gentle terrain, created a good base for infrastructure development evaluation. All proposed relocation sites will require development of access roads throughout town to connect proposed development areas, such as the airport and marina. Additional infrastructure would include development of a landfill and a sewer lagoon. Table 4 shows how the NRCS evaluated the infrastructure potential of each proposed relocation site.

Table 5 Cultural and Social Considerations

Site	Cultural Sites	Native Allotments	Team Consensus
East Nunatuq	*	*	Low
Arctic	*	*	Medium
Igloot	*	*	Medium
Tin Creek	*	*	High
West Tin Creek Hills	*	*	High
West Tin Creek Flats	*	*	Low

Notes: (Shishmaref Site Analysis for Potential Emergency Evacuation and Permanent Relocation Sites, 2005)
*Not evaluated by NRCS

The social and cultural consideration for the proposed relocations sites was left to "gut feeling" by the NRCS (See Table 5 above). The social and cultural aspect was felt to be better left to the local Community for their evaluation.

The NRCS delivered a final consensus by equally weighing each of the categories listed above in order summarize which potential relocation sites would best serve the interests of the Community. The NRCS determined that the Igloot relocation site was the most desirable after weighing all attributes evenly. Igloot was followed closely by West Tin Creek Hills and Tin Creek (NRCS, 2005).