

# SOLE SOURCE AQUIFERS



**U.S. Department of Housing and Urban Development**  
Region X – Anchorage Field Office  
**Alaska Office of Native American Programs**  
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**Memorandum to File**

**Sole Source Aquifers**

**Environmental Record Determination**

There are no EPA designated Sole Source Aquifers located in Alaska.

**Source Documentation**

- US Environmental Protection Agency Sole Source Aquifer Program



## Region 10: the Pacific Northwest

You are here: [EPA Home](#) [Region 10](#)URL: <https://yosemite.epa.gov/r10/water.nsf/Sole+Source+Aquifers/SSA>  
Last updated on 9/13/2016

## Sole Source Aquifer Program

As of December, 1997, EPA has designated 69 sole source aquifers nationwide. Fifteen of these are in Region 10 (which consists of Alaska, Idaho, Oregon, and Washington). **There are currently NO sole source aquifers designated in Alaska.**

### Recent Progress:

EPA Region 10 signed a new [Memorandum of Understanding \(PDF\)](#) (8 pp, 621K) (MOU) with Federal Highway Administration (FHWA) Washington Division and the Washington State Department of Transportation (WSDOT) on Sept 25, 2014. The MOU expands the list of types of projects which do not have the potential to contaminate a SSA and therefore do not require EPA review. The MOU also includes additional information about the suite of regulations and policies that govern WSDOT and FHWA's protection of water quality.

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### Designated Aquifers in the Pacific Northwest

Sole Source Aquifer Name	State	FR Vol/No/Pg	FR Date
Spokane Valley-Rathdrum Prairie Aquifer	WA/ID	43/28/5566	02-09-78
<a href="#">Camano Island Aquifer</a>	WA	47/66/14779	04-06-82
Whidbey Island Aquifer	WA	47/66/14779	04-06-82
<a href="#">Cross Valley Aquifer</a>	WA	52/95/18606	05-18-87
Newberg Area Aquifer	WA	52/191/37215 52/214/42474	10-05-87 11-05-87
North Florence Dunal Aquifer	OR	52/194/37519	10-07-87
Cedar Valley Aquifer	WA	53/191/38779	10-03-88
Lewiston Basin Aquifer	WA/ID	53/191/38782	10-03-88
Eastern Snake River Plain Aquifer	ID/WY	56/194/50634	10-07-91
<a href="#">Central Pierce County Aquifer System</a>	WA	59/1/224	01-03-94
<a href="#">Marrowstone Island Aquifer System</a>	WA	59/105/28752	06-02-94
<a href="#">Vashon-Maury Island Aquifer System</a>	WA	59/127/34468	07-05-94
<a href="#">Guemes Island Aquifer System</a>	WA	62/230/63545	12-01-97
<a href="#">Troutdale Aquifer System</a>	WA	E6-14710	10-05-06
<a href="#">Bainbridge Island Aquifer System</a>	WA	78/07409/19262	03-29-13

**Note:** Designation of the Eastern Columbia Plateau Aquifer System has been suspended indefinitely.

### Background

The Sole Source Aquifer (SSA) Protection Program is authorized by Section 1424(e) of the Safe Drinking Water Act of 1974 (Public Law 93-523, 42 U.S.C. 300 et. seq), which states:

"If the Administrator determines, on his own initiative or upon petition, that an area has an aquifer which is the sole or principal drinking water source for the area and which, if contaminated, would create a significant hazard to public health, he shall publish notice of that determination in the Federal Register. After the publication of any such notice, no commitment for federal financial assistance (through a grant, contract, loan guarantee, or otherwise) may be entered into for any project which the Administrator determines may contaminate such aquifer through a recharge zone so as to create a significant hazard to public health, but a commitment for federal assistance may, if authorized under another provision of law, be entered into to plan or design the project to assure that it will not so contaminate the aquifer."

The Environmental Protection Agency (EPA) defines a sole or principal source aquifer as one which supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. EPA guidelines also stipulate that these areas can have no alternative drinking water source(s) which could physically, legally, and economically supply all those who depend upon the aquifer for drinking water. For convenience, all designated sole or principal source aquifers are usually referred to simply as "sole source aquifers."

### Petition for Designation

Although the agency has statutory authority to initiate SSA designations, EPA has a longstanding policy of only responding to petitions. Any person may apply for SSA designation. A "person" is any individual, corporation, company, association, partnership, state, municipality, or federal agency. A petitioner is responsible for providing EPA with hydrogeologic and drinking water usage data, and other technical and administrative information required for assessing designation criteria.

In 1987, EPA published the [Sole Source Aquifer Designation Petitioner Guidance](#) to assist those interested in preparing and submitting petitions to EPA regional offices. The document provides procedures and criteria for proposing aquifer boundaries, determining whether an aquifer is the sole or

### Sole Source Aquifer Protection Program Resources

- [Commonly Asked Questions and Answers](#)
- [Project Review - Areas of Concern](#)
- [Memorandum of Understanding with other Federal Agencies](#)
- [Petitioners' Guidance](#)

### SSA Maps

Downloadable maps of Region 10 Sole Source Aquifers



### Downloadable GIS-Format data of Region 10 Sole Source Aquifers

- [Geographic Information System \(GIS\) Format Map Data for Region 10 Sole Source Aquifers \(ArcGIS 10.0 File Geodatabase format, compressed in a .zip file\)](#)
- [Metadata for GIS-Format Map Data for Region 10 Sole Source Aquifers \(zipped XML\)](#)

### EPA Contact

Susan Eastman  
(206) 553-6249  
[eastman.susan@epa.gov](mailto:eastman.susan@epa.gov)

principal source of drinking water, and for evaluating alternative sources of drinking water.

In general, the designation decision process takes a minimum of six months from the time that the petitioner submits a *complete* petition to EPA. The process may take considerably longer, depending on the technical complexity of the petition, and on the number of petitions that may be undergoing review within the EPA regional office at a particular time.

## Project Review Authority and Coordination

If an SSA designation is approved, proposed federal financially-assisted projects which have the potential to contaminate the aquifer are subject to EPA review. Proposed projects that are funded entirely by state, local, or private concerns are not subject to EPA review. Examples of federally funded projects which have been reviewed by EPA under the SSA protection program include:

- highway improvements and new road construction
- public water supply wells and transmission lines
- wastewater treatment facilities
- construction projects that involve disposal of storm water
- agricultural projects that involve management of animal waste
- projects funded through Community Development Block Grants

EPA has developed Memorandums of Understanding (MOU) with federal funding agencies to establish review responsibilities under the SSA protection program and to list categories of projects which should or should not be referred to EPA for review. MOUs help ensure that projects which pose serious threats to ground water quality "so as to create a significant hazard to public health" are referred to EPA. Region 10 has developed MOUs with a number of federal funding agencies including the Federal Highway Administration, the Department of Housing and Urban Development, and the U.S. Department of Agriculture - Rural Development. We are currently updating and renegotiating these MOUs and, as they are signed, they will be made available. ~~We are currently updating and renegotiating these MOUs, all current information can be found on the Groundwater Protection Unit Homepage.~~

Most projects referred to EPA for review meet all federal, state, and local ground water protection standards and are approved without any additional conditions being imposed. Occasionally, site or project-specific concerns for ground water quality protection lead to specific recommendations or additional pollution prevention requirements as a condition of funding. In rare cases, federal funding has been denied when the applicant has been either unwilling or unable to modify the project.

Whenever feasible, EPA coordinates the review of proposed projects with other offices within EPA and with various federal, state, or local agencies that have a responsibility for ground water quality protection. Relevant information from these sources is given full consideration in the sole source aquifer review process and helps EPA to understand local hydrogeologic conditions and specific project design concerns. Project review coordination also helps ensure that SSA protection measures support or enhance existing ground water protection efforts, rather than duplicate them.

To have a project reviewed by us ensure your project meets two criteria:

1. Be in the review area of the SSA. The review area consists of both the aquifer boundary AND the source area of the SSA as delineated in the GIS maps on this website.
2. The project receives federal funding. The SSA program has no statutory authority to review a project unless it is receiving federal funding.

If your project meets these criteria please submit a completed Region 10 SSA check list (RTF) (2 pp, 69K) by email to Susan Eastman (Eastman.Susan@epa.gov). Projects submitted without a checklist or via hardcopy may have a delayed review time

## Public Awareness and Participation

SSA designations help increase public awareness on the nature and value of local ground water resources by demonstrating the link between an aquifer and a community's drinking water supply. Often, the realization that an area's drinking water originates from a vulnerable underground supply can lead to an increased willingness to protect it. The public also has an opportunity to participate in the SSA designation process by providing written comments to EPA or by participating in an EPA-sponsored public hearing prior to a designation decision.

## Resource Characterization

Important information on the boundaries, hydrogeologic materials, and water use patterns of an area's aquifer must be documented by a petitioner seeking SSA designation. Following EPA's technical review of a petition, this information is summarized by the Agency in a technical support document that is made available for public review. Following designation, a Federal Register (FR) notice is published to announce and summarize the basis for EPA's decision.

## Limitations of the Program

Sole source aquifer designation provides only limited federal protection of ground water resources which serve as drinking water supplies. It is *not* a comprehensive ground water protection program. Protection of ground water resources can best be achieved through an integrated and coordinated combination of federal, state, and local efforts such as called for under the Comprehensive State Ground Water Protection Program (CSGWPPP) approach. For example, local wellhead protection programs designed to protect the recharge areas of public water supply wells should work in concert with contaminant source control and pollution prevention efforts being managed at various levels of government. This coordination ensures that all ground water activities meet the same protection goal without duplication of time, effort, and resources.

Although designated aquifers have been determined to be the "sole or principal" source of drinking water for an area, this does not imply that they are more or less valuable or vulnerable to contamination than other aquifers which have not been designated by EPA. Many valuable and sensitive aquifers have not been designated simply because nobody has petitioned EPA for such status or because they did not qualify for designation due to drinking water consumption patterns over the entire aquifer area. Furthermore, ground water value and vulnerability can vary considerably both between and within designated aquifers. As a result, EPA does not endorse using SSA status as the sole or determining factor in making land use decisions that may impact ground water quality. Rather, site-specific hydrogeological assessments should be considered along with other factors such as project design, construction practices, and long-term management of the site.

## Contact Us

For more information on the Sole Source Aquifer Program in Region 10, contact:

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206-553-6249

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Call toll-free from AK, ID, OR, and WA at 1-800-424-4EPA

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COASTAL ZONE  
MANAGEMENT ACT



**U.S. Department of Housing and Urban Development**  
Region X – Anchorage Field Office  
**Alaska Office of Native American Programs**  
3000 C Street, Suite 401  
Anchorage, AK 99503-3914  
[www.hud.gov/local/anc](http://www.hud.gov/local/anc)

**Memorandum to File**

**Coastal Zone Management Act of 1972**

**Environmental Record Determination**

**Currently the State of Alaska does not have a Coastal Zone Management Plan.**

**Source Documentation**

- Alaska Dept. of Natural Resources/State Pipeline Coordinators Office

# Alaska Coastal Management Program

<http://dnr.alaska.gov/commis/pco/dcom.htm>

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## Department of Natural Resources - Division of Coastal and Ocean Management

The [Alaska Coastal Management Program \(ACMP\)](#) is scheduled to sunset at 12:01 AM, Alaska Standard Time, on July 1, 2011, per AS 44.66.030. The Legislature adjourned two special legislative sessions without passing legislation required to extend the Alaska Coastal Management Program (ACMP). The [ACMP webpage](#) will be viewable for reference purposes through June 30, 2012. It will then be archived within the Department of Natural Resources. Beginning on July 1, 2011, the website will remain static and there will be no further updates to the content of the former ACMP website. If you have any questions, please contact the DNR's Commissioner's Office at 907-269-8400.

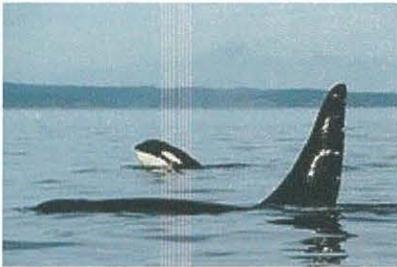
More information about agency liaisons is available in the [2013 SPCO Annual Report](#).

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# Alaska Coastal Management Program



The federal Coastal Zone Management Act (CZMA) of 1972 created the federal Coastal Zone Management Program (CZMP). The CZMP strives to protect, develop, and restore the natural and cultural resources of coastal areas by balancing competing uses of and impacts to these resources. The Office of Ocean and Coastal Resource Management (OCRM), which is part of National Oceanic Atmospheric Administration (NOAA), implements the CZMP by providing approval, oversight and funding to state programs. One of the primary objectives of the OCRM is to use a comprehensive approach on an ecosystem scale to coastal zone management that works through key partnerships to address the complex management issues facing the U.S. coasts and oceans.

On June 4, 1977 the Alaska Legislature enacted the Alaska Coastal Management Act (ACMA), which established the Alaska Coastal Management Program (ACMP). The ACMP is composed of 33 coastal resource districts which develop and implement their own programs and enforceable policies for the roughly 44,500 miles of Alaska coastline, which has national and international significance for its healthy and diverse ecosystems. The intent of the ACMP is to provide stewardship for Alaska's rich and diverse coastal resources to ensure a healthy and vibrant coast that efficiently sustains long-term economic and environmental productivity. It was also intended to provide a forum for local community involvement in the preservation and development of our coastal areas through the participation of the district programs.



Project proposals that trigger a review under the ACMP must be consistent with both the statewide standards of the ACMP, as set forth in 11 AAC 110, 112 and 114, and the enforceable policies of the coastal district where the project will occur. This requirement gives the state and coastal districts a powerful tool to: ensure conservation and protection of the habitats and wildlife populations of Alaska's coastal environments; influence federal decision making; and affect the design and approval of projects and lands in the coastal zone. However, the power of this tool is dependent on the quality of our State standards and the ability of the districts to implement effective programs and enforceable policies.

On March 12, 2003, at the request of Governor Frank Murkowski, the Alaska State Legislature mandated the reform of the ACMP that included revising statutes, regulations, district coastal management plans, and other ACMP processes. The Murkowski-era language of the state standards, particularly the Habitat Standards found in 11 AAC 112.300, "revised" the standards to such an extent that no conservation or protection of wildlife habitats can occur, minimized local participation by marginalizing district programs, and eliminated the districts' ability to draft enforceable policies and standards. This ultimately has resulted in the institutional and policy failure of the ACMP.

Periodically, the OCRM reviews state's coastal management programs, and in June of 2008, OCRM published it's findings regarding Alaska's Coastal Management Program.

[Click here to download OCRM's Evaluation and Findings of Alaska's Coastal Management Program.](#)



On July 1st, 2008, the Alaska Department of Natural Resources (DNR) initiated a "re-evaluation" of the ACMP laws. The DNR will prepare a statutory proposal for consideration during the 2009 Alaska Legislative Session and a subsequent regulatory package for implementing the changes. All Alaskans including conservationists, natives and other stakeholders have a chance to re-enter a partnership to address the complex management issues facing Alaska's coastal zones.

[Click here to download the initial proposed changes to the ACMP Habitat Regulations.](#)

The Northern Alaska Environmental Center got involved in the re-evaluation process to ensure that our values of ecosystem and cultural preservation were protected, and to push for meaningful local involvement by coastal communities.

[Click here to download NAEC's August 15, 2008 comments.](#)



Click here to download NAEC's December 23, 2008 comments.



It is unclear what is happening with this revision process at the present time. As of September 2009, it appears that DNR is continuing to move forward with revisions to 11 AAC 110 (the administration and implementation regulations) but is not actively working to revise 11 AAC 112, which includes resource and habitat standards. NAEC continues to look for ways to push for reform of these regulations.

# PART B: ENVIRONMENTAL PROGRAM FACTORS

### Environmental Assessment Checklist

[Environmental Review Guide HUD CPD 782, 24 CFR 58.40; Ref. 40 CFR 1508.8 & 1508.27]

Evaluate the significance of the effects of the proposal on the character, features and resources of the project area. Enter relevant base data and verifiable source documentation to support the finding. Then enter the appropriate impact code from the following list to make a determination of impact. **Impact Codes:** (1) - No impact anticipated; (2) - Potentially beneficial; (3) - Potentially adverse; (4) - Requires mitigation; (5) - Requires project modification. Note names, dates of contact, telephone numbers and page references. Attach additional material as appropriate. Note conditions or mitigation measures required.

Code	Source or Documentation
<b>Land Development</b>	
1	<p>Conformance with Comprehensive Plans and Zoning</p> <p>Although a comprehensive plan has not been developed for the Mertarvik site, a Community Layout Plan was developed and approved by the Newtok Planning Council and is considered the guiding document for development (attached).</p> <p>No current zoning applies to this project. It has not been determined if this project will result in zoning regulations.</p>
1	<p>Compatibility and Urban Impact</p> <p>The proposed one-story, single-family units are compatible with the proposed village layout and are typical of village housing units. The project is not sited within an urban environment and will not result in an urban environment.</p>
1	<p>Slope</p> <p>The project is located on a fairly flat slope, with the site map showing a relatively consistent upgradient trend to the south at an approximately 5% slope. There is no history of slope failure in the project area or physical evidence of slides or slumps in the project area.</p> <p>The project will contain gravel road that will mitigate stormwater flows by allowing sheet flow to percolate to the subsurface. Drainage culverts would be installed as needed to maintain natural drainage patterns. Houses and other structures will be built above the ground surface, either on 'stilts' or piling. No drainage improvements or stormwater infrastructure are currently proposed.</p> <p>Source (Site Visit August 2016)</p>
1	<p>Erosion</p> <p>The project area does not have any indications of erosion problems. (Cite field visit photos).</p>
1	<p>Soil Suitability</p> <p>Surface rock in the vicinity of the project site is vascular basalt. The soil in most areas is basalt weathered to sand and gravel. The surface of the unweathered basalt ranged from 7 to more than 31.5 feet below the ground surface. The ground surface has a layer of organics that varies in depth, but is generally 1 to 2 feet thick. There is discontinuous permafrost on the island. The depth to permafrost in most areas is probably about 18 to 24 inches. The permafrost is ice rich and has moisture content (on the basis of weight) of 20 to 30 percent. There is surface evidence that ice wedges are present in the area, although none was observed. There is bedrock between 6' and 25' throughout the site; a rare resource in western Alaska.</p> <p>Housing foundations will be site-specific. Buildings will either have adjustable foundations (stilts) or be constructed on piling. Typical road construction/arctic engineering practices will be used for construction of roads to insulate against permafrost degradation.</p>
1	<p>Hazards and Nuisances including Site Safety</p> <p>Nelson Island is in Seismic zone A, the lowest zone in the state in terms of required design standards.</p>

		<p>No natural hazards have been identified at the project site. A hazard mitigation plan for Newtok was updated in 2015 and evaluated hazards at Mertarvik. At 600 feet above sea level, the project site is not subject to flooding or erosion. The project site also shares the following hazard type with Newtok: earthquake, ground failure, severe weather, and tundra fire. The Newtok Village Council supports projects that provide mitigation measures from natural hazards of earthquake, ground failure, severe weather, and tundra fire at the current as well as the new Mertarvik Village site (2015 Newtok HMP).</p> <p>For safety, residents will likely move back to Newtok during the spring and fall when movement back and forth from Newtok to Mertarvik would be too risky (from 2012 SMP background report) due to freezing and thawing conditions.</p> <p>Housing will be constructed above ground either on stilts or piling. During the initial phase, cell phone service will be intermittent and slightly unreliable at Mertarvik. In the case of injuries, a Mash Unit (Pioneer Mertarvik Clinic) will be established that will use boats as its primary mode of transportation back to Newtok.</p> <p>To facilitate emergency landings by planes, a portion of the Quarry Road may serve as an emergency runway.</p>
Energy Consumption	1	<p>The average modern home in Newtok uses 300 gallons of heating fuel every 1-2 weeks. In light of this, housing in Phase I will be 6-star rated homes.</p> <p>Heat will be provided to Phase 1 residents through wood stoves with individual generators providing electricity. Energy consumption by residents in Phase II has not been established. The first homes will have their own generators that feed into battery banks and are solar/wind ready as well as ready to plug into a conventional grid. Current design is focused on self-contained pioneer units that can tie into an electrical grid when a grid is created.</p> <p>Current plans exceed property and energy-efficiency standards currently established in Alaska. The home is modeled to use approximately 250-300 gallons of heating oil annually. Currently, the average usage in the region is around 800gallons annually.</p> <p>There are currently three storage containers for heating oil and gasoline (two near the barge landing and another one up near the MEC). A 350kw generator will be used to operate the rock crusher and electricity from it will be provided to residents and other buildings during the initial phase using a 480V line. A #2 diesel tank will be used to store diesel for heavy equipment use and for heating.</p> <p>After the initial phase, a fuel tank farm and power plant will be constructed.</p>
Noise – Contribution to Community Noise Levels	1	<p>The project construction will produce negligible levels of noise. No noise ordinances currently apply and not anticipated to be developed.</p>

<p><b>Air Quality</b> Effects of Ambient Air Quality on Project and Contribution to Community Pollution Levels</p>	<p>1</p>	<p>According to Alaska Administrative Code (AAC) 18 AAC 50.15, all geographic areas in the state are designated by the federal administrator as "attainment," "non-attainment," or "unclassifiable." There is insufficient information in the project area's air quality, and the site is designated as unclassifiable.</p> <p>Although there is a lack of monitoring data in this area, DEC and EPA have identified dust in villages as a potential problem. According to the EPA, road dust consists mainly of coarse particles that become airborne by tire friction that in some cases may be contaminated with man-made and naturally-occurring pollutants. This dust becomes airborne during dry and windy conditions, particularly when the dust is disturbed by four wheelers and other vehicles.</p> <p>Newtok is not on the list of communities reported by the DEC to be highly affected by dust. Impacts to air quality as a result of the project are anticipated to be temporary and occur during construction. Although no dust abatement measures are required, a water truck is planned for the site to keep dust level minimal.</p>
<p><b>Environmental Design</b> Visual Quality – Coherence, Diversity, Compatible Use and Scale</p>	<p>1</p>	<p>The mass and scale of the project is consistent with other village community development projects.</p>
<p><b>Socioeconomic</b></p>		
<p>Demographic Character Changes</p>	<p>1</p>	<p>No demographic data for the project site exists. The project would not change the demographics of the area. An Elder Housing Model is being developed to accommodate the needs of elderly residents.</p>
<p>Displacement</p>	<p>1</p>	<p>The eventual relocation of all of the residents of Newtok to the new site in Metarvik will result in zero displacement. As additional housing units are constructed, families from Newtok will relocate to Metarvik; activities will be done in accordance with the Uniform Relocation Act to ensure issues are addressed. (AKONAP HUD)</p>
<p>Employment and Income Patterns</p>	<p>1</p>	<p>The school, clinic, village services and commercial fishing provide employment. Subsistence activities and trapping supplement income. In 2009, 17 residents held commercial fishing permits. The project is not anticipated to affect employment or income patterns.</p>
<p><b>Community Facilities and Services</b></p>		
<p>Educational Facilities</p>	<p>1</p>	<p>An Education Action Plan was developed to make sure sufficient educational opportunities for school-age children prior to school construction. Children will be home-schooled and if needed, a temporary teaching facility could be built.</p> <p>After the initial phase, a school and teacher housing will be constructed.</p>
<p>Commercial Facilities</p>	<p>1</p>	<p>All goods and services will be obtained in Newtok. After the initial phase, a store will be constructed</p>
<p>Health Care</p>	<p>1</p>	<p>A MASH unit will provide first aid and limited health care services; Health care will be accessed in Newtok.</p> <p>After the initial phase, a clinic will be constructed</p>
<p>Social Services</p>	<p>1</p>	<p>Social services will be accessed in Newtok during the initial phase.</p>
<p>Solid Waste</p>	<p>1</p>	<p>A burn unit will be available to manage solid waste during the initial phase. A 'mini-dump' is being proposed.</p>

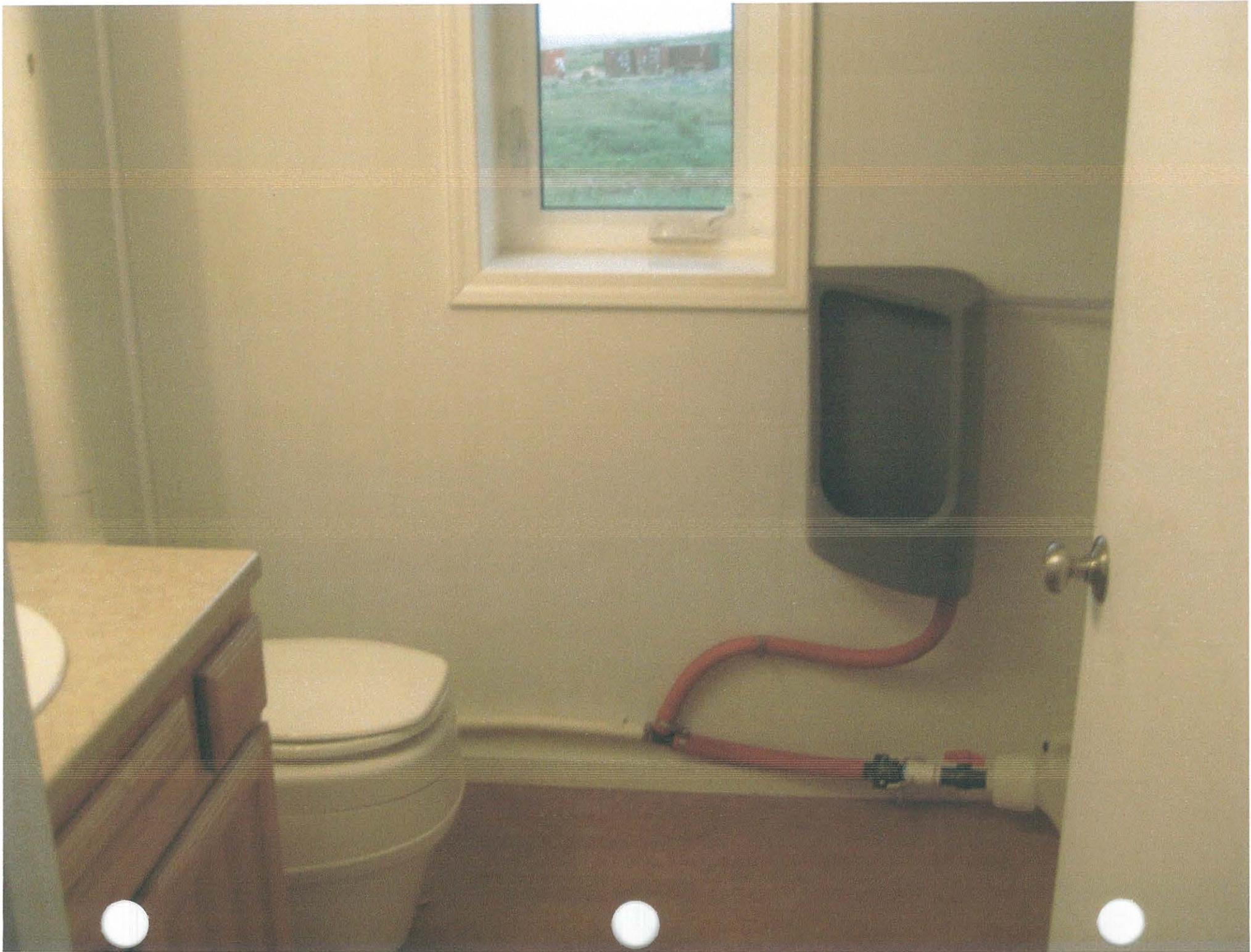
Waste Water	1	The first phase of housing would use the existing septic field that has already been constructed at the MEC Site. As of yet, the interface point between the haul-distribution point and this septic system has not been designed. The draft housing plan will focus on a community-wide waste system.
Storm Water	1	No stormwater systems are currently planned; however cross-drainage culverts will be installed as needed to facilitate drainage under roads.
Water Supply	1	Water is currently available through access to a local spring, a well, or through rainwater catchment. Residents will select their source and then point-source water treatment plants will treat water in homes.  After the initial phase, a washeteria/water plant will be constructed
Public Safety		
- Police	1	During the initial phase, services will be in Newtok. After the initial phase, a public safety building will be constructed
- Fire	1	Fire services will be handled in Newtok
- Emergency Medical	1	During the initial phase emergency services will be available in Newtok or in a nearby community such as Bethel.
Open Space and Recreation	1	Due to the remote location, open space and outdoor recreational facilities are not currently planned.
- Open Space	1	No organized recreational opportunities will exist for the initial phase. After the initial phase, a multi-purpose building and/or community gym will be constructed.
- Recreation	1	No organized recreational opportunities will exist for the initial phase. After the initial phase, a multi-purpose building/or and community gym will be constructed.
- Cultural Facilities	1	The Mertarvik Evacuation Center will serve as a community space and would host a variety of cultural events, such be also be Traditional Eskimo Dance, Community meetings and other activities.  After the initial phase, a tribal hall, library, and church will be constructed
Transportation	1	A Long Range Transportation Plan (LRTP) developed in accordance with 25 C.F.R. Part 170 for the Newtok Traditional Council will guide transportation-related decisions. All transportation off-site is currently by boat. Travel within the project site is by 4-wheeler or by foot. An airport serving future residents is anticipated but has not yet been designed.

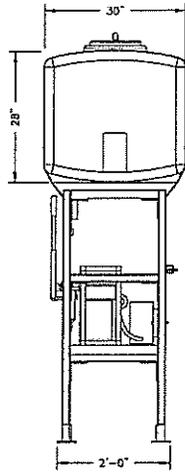
Water Resources	1	Baird Inlet lies approximately ¼ mile to the north and a small drainage with intermittent flow lies east of the access road alignment. No other rivers, creeks or open bodies of water are near the project area. Source: 2008 EA
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Surface Water	1	The project site is nearly free of surface water. The project lies on high ground with no prominent drainage paths to creeks or ponds. Sources: Site Trip August 2016; Bing Aerial Photos, 2008 EA
Unique Natural Features and Agricultural Lands	1	No agricultural lands are present within the project site. No unique natural features are present. Source: 2008 EA
Vegetation and Wildlife	1	<p>The site is dominated by wetlands with vegetation typical of western Alaska and the lowlands of the Yukon-Kuskokwim Delta. Upgradient of the project site, the vegetation changes to heath tundra, a complex of vegetative associations that vary according to small differences in exposure, drainage, and disturbance. Heath tundra is characterized by a moss and lichen mat on which other plants grow. Sedges and grasses are abundant. In drier areas, woody plants consisting primarily of prostrate or low-growing shrubs are common.</p> <p>In 2005 the Corps of Engineers refined the delineation of wetland and vegetation types around the project site.</p> <p>Wetland vegetation at the project site is composed mostly of palustrine emergent persistent/scrub-shrub evergreen/moss and palustrine emergent persistent/scrub-shrub broad-leaved deciduous wetland. Vegetation types are mostly mesic shrub-birch ericaceous and tussock tundra interspersed with low, open willow shrub and blue joint herb shrub complex patches. These wetland and vegetation types are typical and widespread throughout higher ground on Nelson Island and are not unique to the project site.</p> <p>A Section 404 permit will be obtained prior to construction to comply with the Clean Water Act. Mitigation may be required, based on project design and will not be determined until a permit is submitted. It is anticipated that the project will be eligible for general permit 2007-541-M1.</p> <p>Small mammals, including voles, shrews, lemmings, short-tailed weasels, and mink, range across much of Nelson Island and could be present throughout the project area.</p> <p>Fish and Wildlife Service biologists noted an abundance of voles and lemmings during an August 2006 field study of the area (USFWS 2006). Reindeer were introduced to Nelson Island in 1934, but there are no reindeer on the island today. There are also no caribou on Nelson Island. Caribou range to north, east, and southeast of Nelson Island, but their range does not extend to the island. The Mulchatna herd, which ranges south of the Kuskokwim River, possibly comes closest to Nelson Island.</p> <p>The Yukon-Kuskokwim Delta is rich in bird species diversity, especially during the summer when the delta hosts large numbers of nesting waterfowl. It is one of the most productive areas in the world for geese. Baird Inlet Island, about 5 miles southwest of Newtok and 4 miles north of the project site, is home to a colony of about 4,500 to 10,122 nesting pairs of Pacific black brant. The sea bird colony closest to the project site is on the outer coast of Nelson Island, approximately 40 miles from the site.</p> <p>Source: 2008 EA</p>

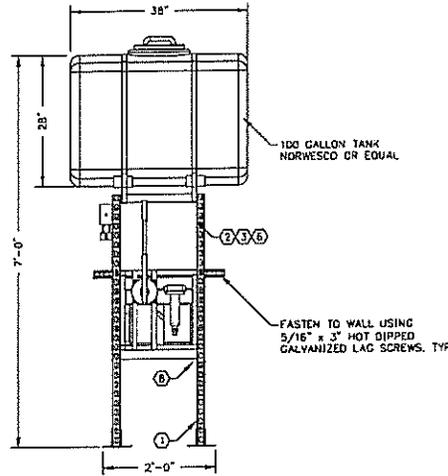
Flood Disaster Protection Act [Flood Insurance] [§58.6(a)]	1	<p>The Federal Emergency Management Agency (FEMA) has not mapped flood hazards for the project site. Although the USACE and State of Alaska Division of Community and Regional Affairs (DCRA) maintain limited flood records and community maps for many areas in Alaska, data related to Mertarvik does not exist pertaining to flood boundaries and hazards.</p> <p>However, due to the distance from the coastline and elevation, the project site is not anticipated to be within a 100-year floodplain</p> <p>Source: FEMA, USACE floodplain websites and DCRA.</p>
Coastal Barrier Resources Act/ Coastal Barrier Improvement Act [§58.6(c)]	1	<p>A review of the U.S. Fish and Wildlife Service website indicated that there are no lands included in the Coastal Barriers Resources Act system located within Alaska.</p> <p>Source: USFWS</p>
Airport Runway Clear Zone or Clear Zone Disclosure [§58.6(d)]	1	<p>No runway yet exists at the site. The FAA will evaluate runway clear zones during final planning and design.</p>
Other Factors	1	<p>The project is unique for two reasons:</p> <ul style="list-style-type: none"> <li>(1) The construction of houses and public facilities outlined in this project occurs in a community that has been taking shape over the last several years. As a result, the initial population living in Mertarvik will be present prior to final build-out of all facilities.</li> <li>(2) The project is urgent due to the expected loss of more homes each year from flooding/erosion.</li> </ul>



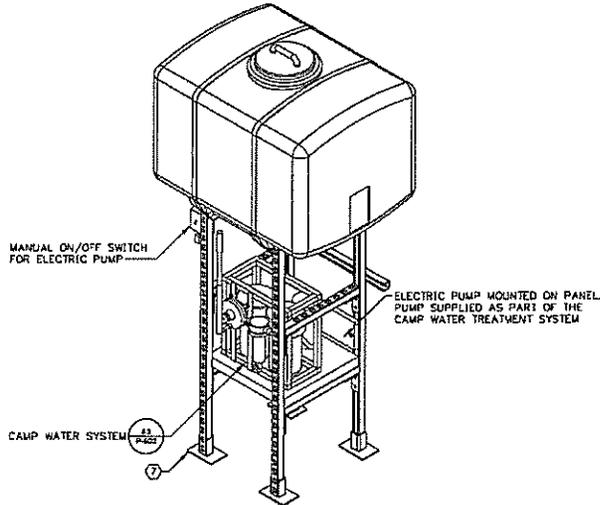




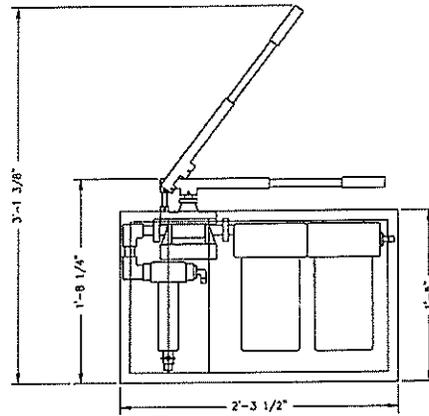
**C1** WATER TANK AND STAND - FRONT VIEW  
1" = 1'-0"



**C3** WATER TANK AND STAND - SIDE VIEW  
1" = 1'-4"



**A1** WATER TANK AND STAND - ISOMETRIC  
N/A



**A3** CAMP WATER SYSTEM MODEL HPFZ W/ ELECTRIC AND HAND PUMP  
N/A

**NOTES:**

1. TOP OF TANK WILL VARY DEPENDING ON CEILING HEIGHT OF HOME.
2. TANK STAND WILL BE PRE-MANUFACTURED PRIOR TO SHIPMENT.
3. CAMPWATER SYSTEM AND TANK NSF 61.
4. LATEROALLY RESTRAIN TANK USING A MINIMUM OF 2 EACH GALVANIZED STEEL STRAPS.

MATERIAL LIST		
	DESCRIPTION	QTY
①	1 5/8" UNISTRUT 12 GA. PER FT	60
②	3/8" -16 x 1" BOLT (25/BOX)	3
③	3/8" NUT W/ SPRING EA	64
④	3/8" LOCK WASHER (100/BOX)	1
⑤	3/8" WASHER (100/BOX)	1
⑥	2" x 2" HOLE 90 BRACKET	8
⑦	POST BRACKET P2842	4
⑧	L BRACKET P1068	8
⑨	DRIF PAN 48" x 120"	1
⑩	3/4" MIP TO 1/2 SHARKSITE	2
⑪	1/2" SHARK BALL	1
⑫	1/2" SHARK TEE	1
⑬	1/2" SHARK TO 1/2" FEMALE	1
⑭	1/2" HOSE BIB	1
⑮	3/8" x 1 1/2" CARRIAGE BOLT (BOX 25)	1
⑯	3/8" SS FENDER WASHER	4
⑰	3/8" GALV. NUT	20
⑱	1/4" x 2 1/2" SS BOLT (BAG 2)	2
⑲	1/4" SS WING NUT	4
⑳	1/4" SS WASHER (BAG 6)	1
㉑	1" x 1/16" GALVANIZED STEEL STRAP, 2 EACH FASTENED TO STAND USING 1/4" x 2 1/2" HOT DIPPED GALVANIZED WITH WASHERS MINIMUM OF 2 EACH PER STRAPS 120 GAL	2
㉒	1/4" FENDER WASHER	
㉓	1/4" STRUT SPRING NUT	2
㉔	1/4" x 1" BOLT	5
㉕	1/4" LOCK WASHER	5
㉖	3/4" MIP TO 3/4" MH BRASS	1
㉗	3/4" MIP TO 5/8" BARB PLASTIC	2
㉘	3/4" FH TO 3/4" FIP SWIVEL	1
㉙	2/8" HOSE CLAMP	3
㉚	5/8" ID VINYL REINFORCED TUBE	1
㉛	5/4" MIP TO 5/8" BARB BRASS	
㉜	3/4" STREET 90 BRZ NPT	

**General Notes**

DESIGNED BY:	ENC
DRAWN BY:	As
No.	Flow/Issue
	9/8/15

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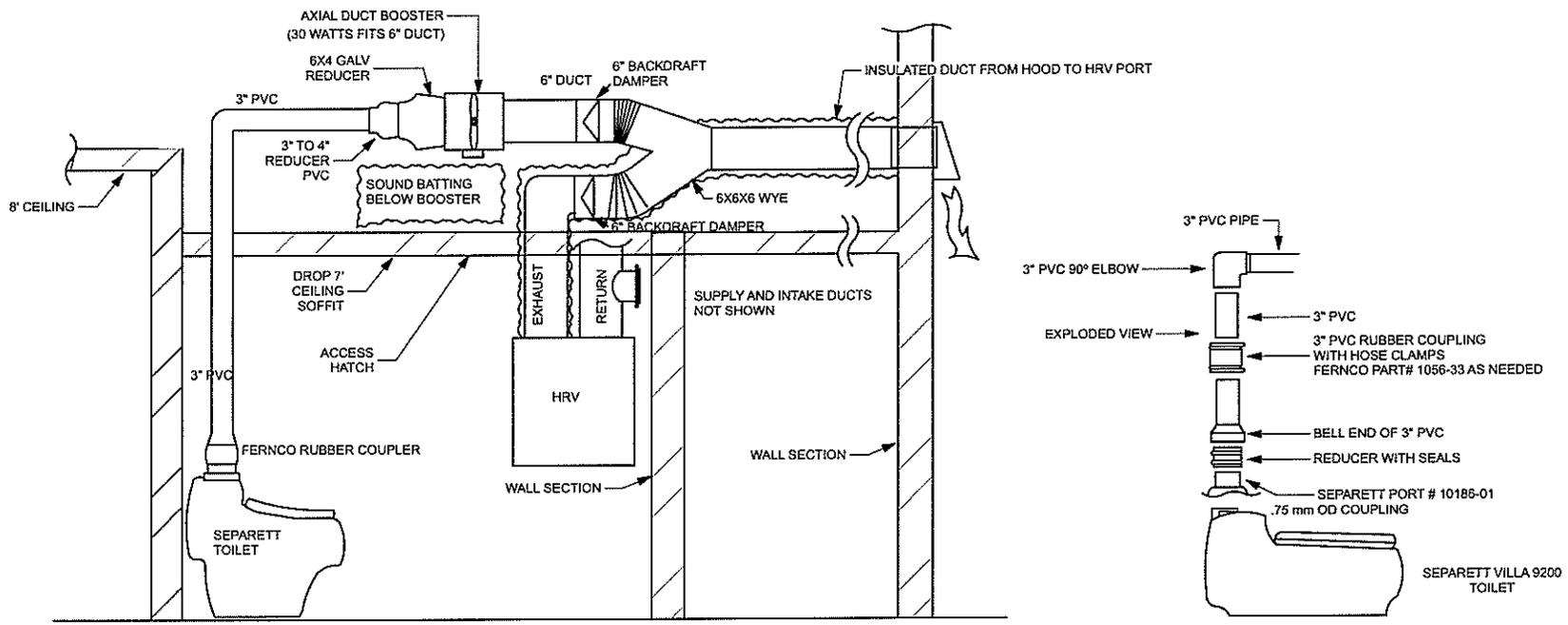
PROJECT: NEWTOK DEMONSTRATION HOME  
FOR THE COMMUNITY OF NEWTOK  
NEWTOK, ALASKA  
START: 10/16/14  
CONSTRUCTION DOCUMENTS

WATER SYSTEM  
**M1.2**  
SHEET 9

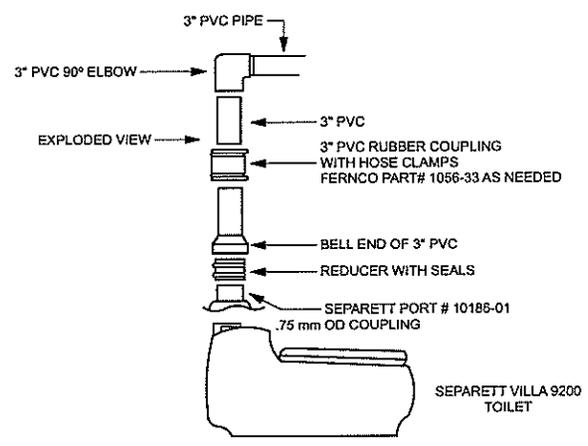
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1/8/15

ARON LOOSE



① SEPARETT TOILET SYSTEM



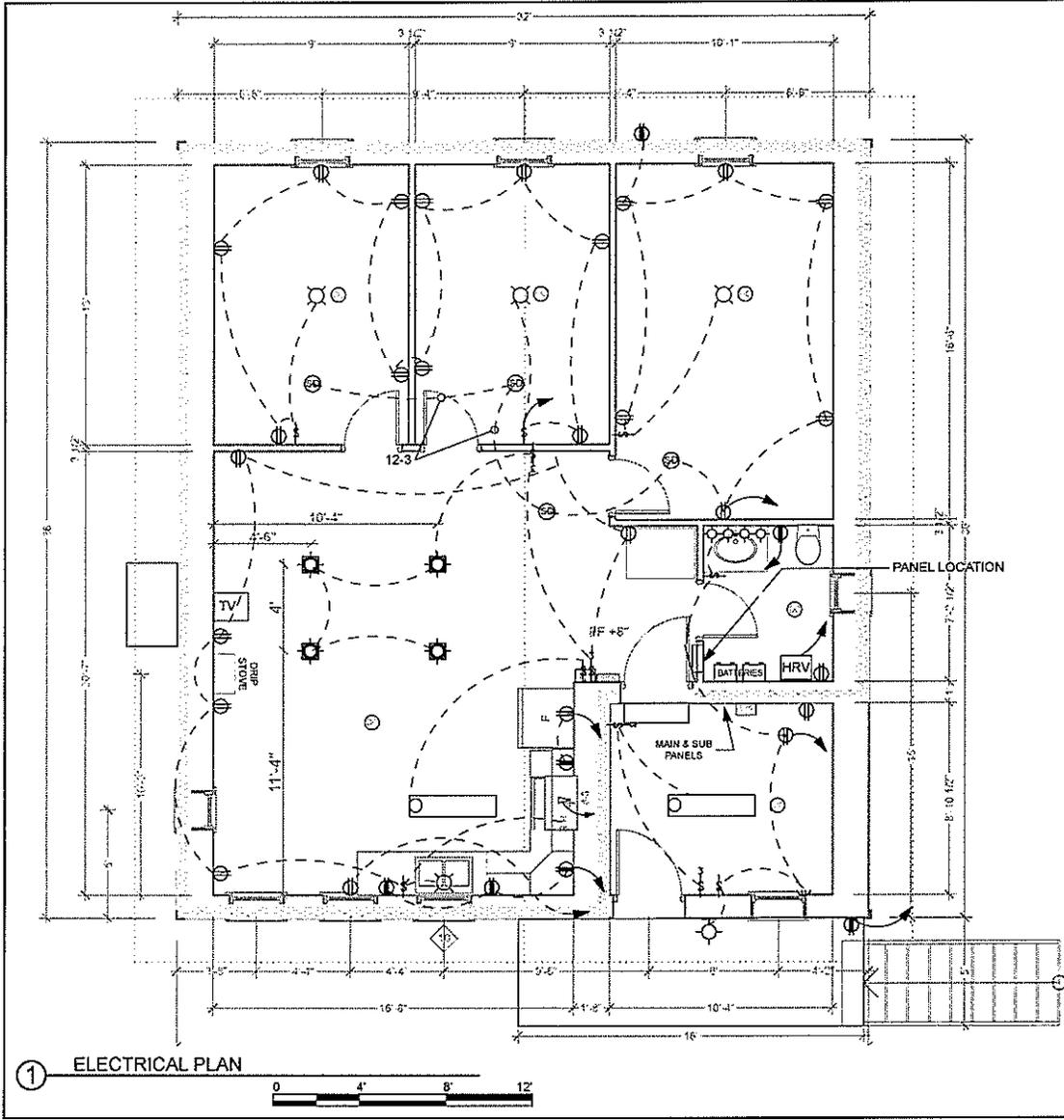
General Notes		
DESIGNED BY:	SHC	
DRAWN BY:	As	
No.	Revision	Date
		07/15

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PROJECT  
**NEWTOK DEMONSTRATION HOME**  
 FOR THE COMMUNITY OF NEWTOK  
 NEWTOK, ALASKA  
 SCALE: 1/8" = 1'-0"  
 CONSTRUCTION DOCUMENTS

MECHANICAL SECTION
<b>M1.1</b>
SHEET OF



**KEY**

	RECEPTACLE
	GFI RECEPTACLE
	SWITCH
	3-WAY SWITCH
	SMOKE DETECTOR
	TELEVISION
	TELEPHONE
	OUTDOOR LIGHT
	SCONCE LIGHT
	DOORBELL
	T8 FIXTURE
	CAN LIGHT
	HRV CONTROL PANEL
	INVERTER CONTROLLER
	GENERATOR TRANSFER SWITCH

**NOTES**

SERVICE METER LOCATION WILL VARY ACCORDING TO SPECIFIC SITING. TO BE DETERMINED BY ELECTRICAL ADMINISTRATOR

AC BOOSTER FAN TO BE DUCTED IN CEILING ABOVE TOILET AND TIED INTO HRV (SEE SHEET M1.1)

MAIN POWER, SUB PANEL, AND TRANSFER SWITCH TO BE LOCATED MINIMUM 40" ABOVE FF IN ELATURAQ ENTRY

**PANEL 1 - SMALL LOADS SUB PANEL**

1* BR 1 RECEPTACLES & LIGHTS	SMOKE DETECTOR 2
3* BR 2 & 3 RECEPTACLES & LIGHTS	BOOSTER FAN / HRV 4
5* LIVING ROOM RECEPTACLES & LIGHTS	ENTRANCE REC & LIGHTS 6
7 KITCHEN (SMALL LOAD)	OUTDOOR LIGHTS 8
9 ELATURAQ RECEPTACLE - 20A	10

**PANEL 2 - MAIN PANEL**

1* KITCHEN RECEPTACLES - 20A	INVERTER / BATTERY CHARGING 2
3* KITCHEN RECEPTACLES - 20A	CIRCUIT (110 VAC) - 15A
5* RANGE - 30A	ELATURAQ RECEPTACLE - 20A 4
7 RANGE - 30A	ELATURAQ RECEPTACLE - 20A 6
	OUTSIDE RECEPTACLES - 15A 8

**General Notes**

DESIGNED BY	SNC	
DRAWN BY	Heley Nelson	
No.	Rev/Issue	8/7/18

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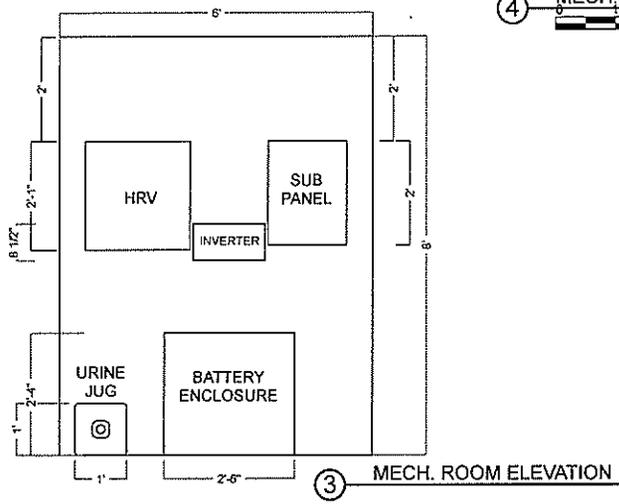
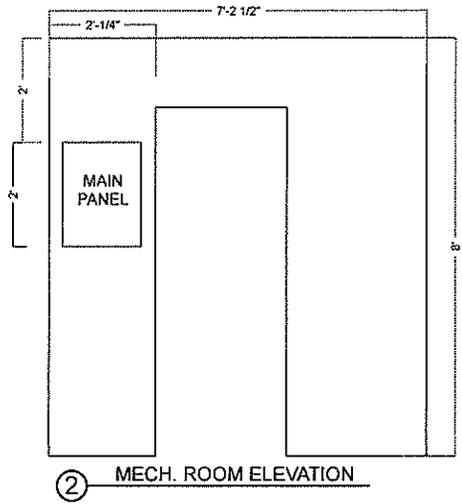
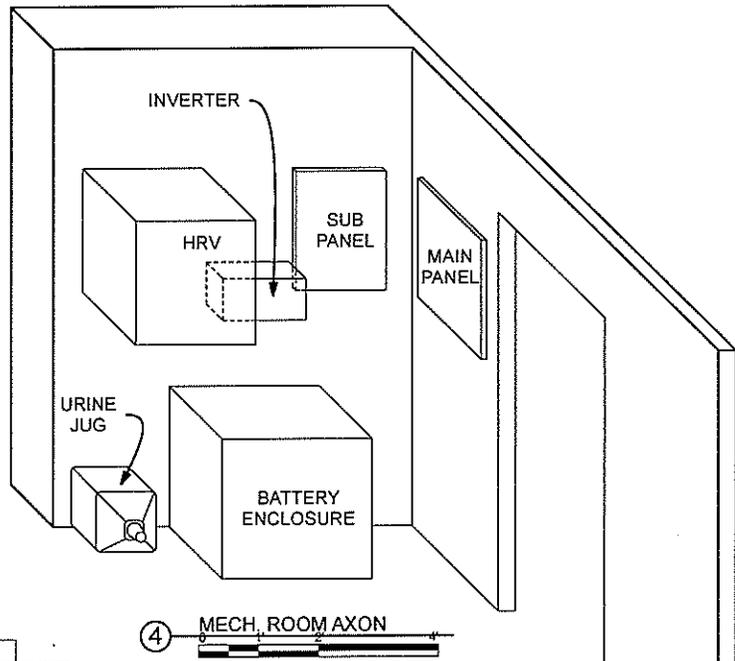
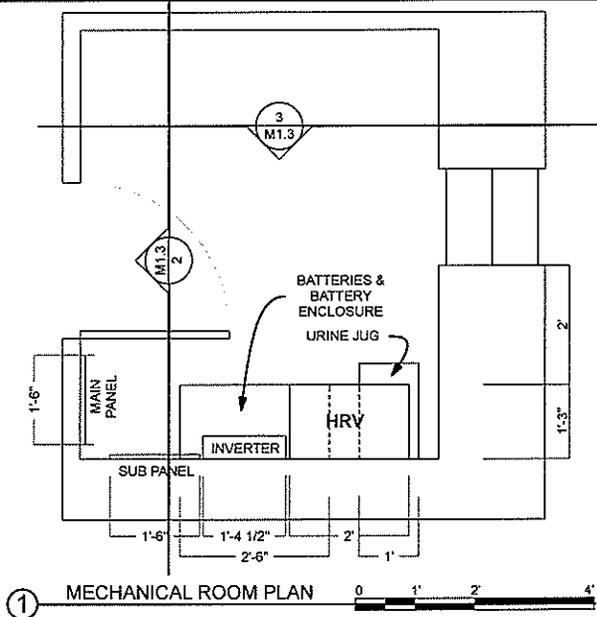
PROJECT: NEWTOK DEMONSTRATION HOME  
 FOR THE COMMUNITY OF NEWTOK  
 NEWTOK, ALASKA  
 DATE: FEBRUARY 2015  
 RECORD DRAWING

**ELECTRICAL LIGHTING LAYOUT**

**E1.0**

SHEET 9





**General Notes**

DESIGNED BY: SNC  
 DRAWN BY: Haley Nelson

No	Rev/Issue	Date
		9/7/16

PROJECT: NEWTOK DEMONSTRATION HOME  
 FOR THE COMMUNITY OF NEWTOK  
 NEWTOK, ALASKA  
 2nd September 2015  
 RECORD DRAWINGS

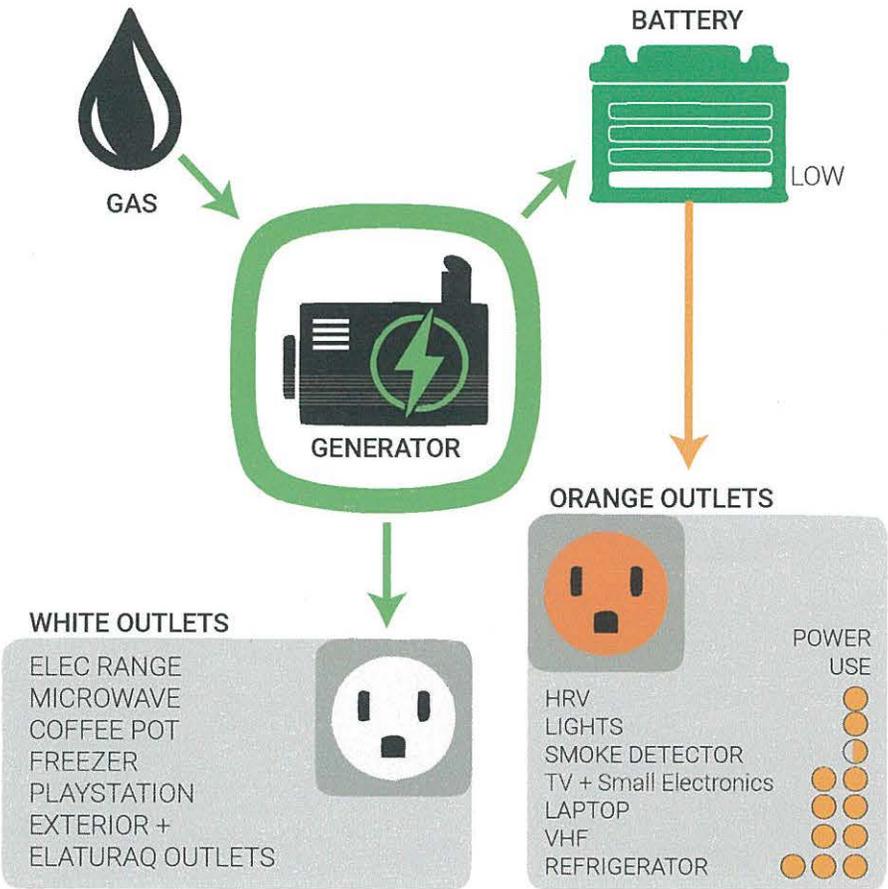
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**M1.3**

SHEET OF

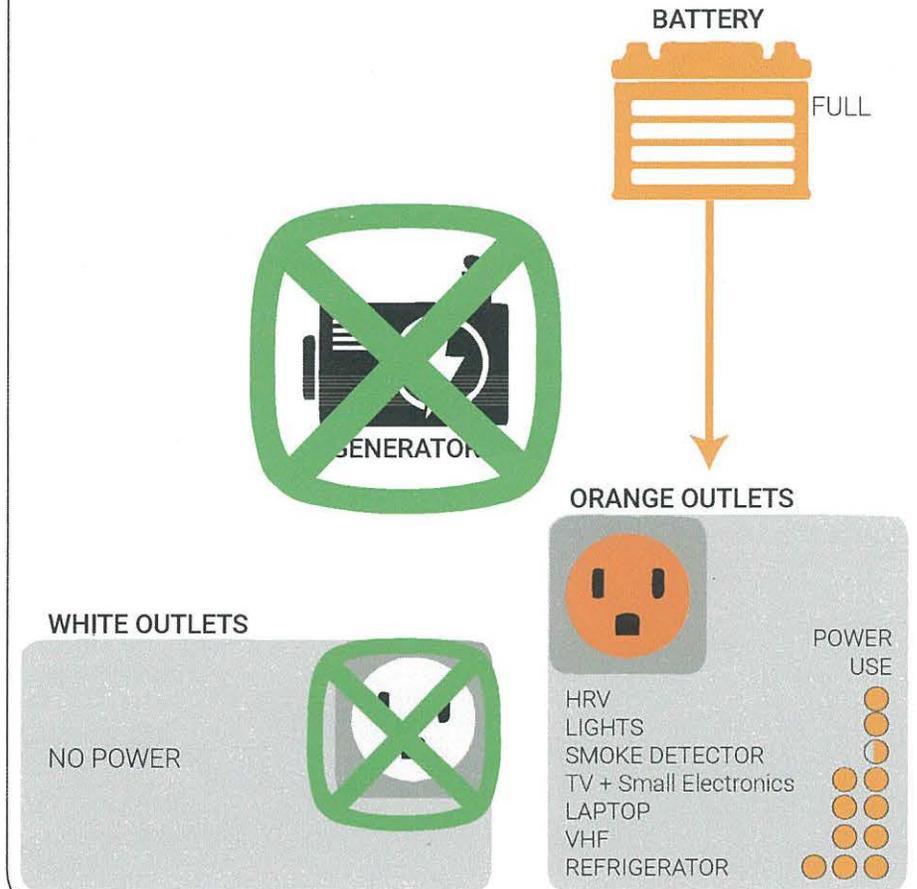
## POWER MODE

When the generator is **RUNNING** it is using **GAS** and charging the **BATTERY**. **ORANGE** and **WHITE** outlets have **POWER**



## QUIET MODE

When the generator is **NOT RUNNING** the **BATTERY** is giving **POWER** to the **ORANGE** outlets only



# METARVIK HOME POWER SYSTEM. 2016

## ECO MODE

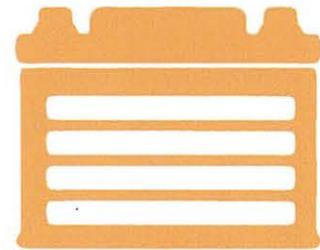
RENEWABLE sources of energy, like WIND and SOLAR, provide power to charge the **BATTERY** system giving POWER to the ORANGE outlets only



RENEWABLES



BATTERY

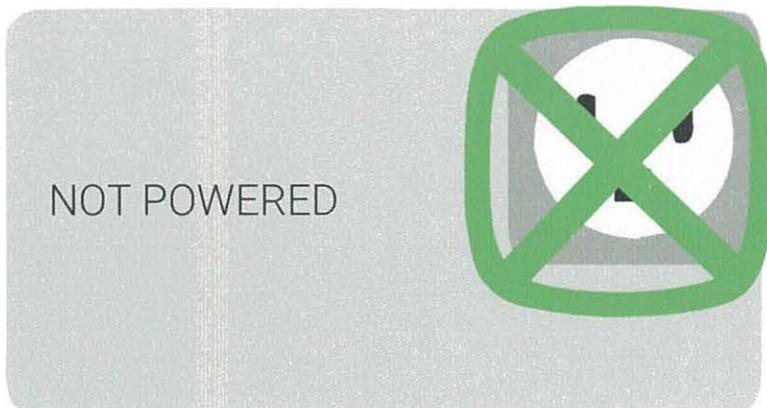


ORANGE OUTLETS



- HRV
- LIGHTS
- SMOKE DETECTOR
- TV + Small Electronics
- LAPTOP
- VHF
- REFRIGERATOR

WHITE OUTLETS

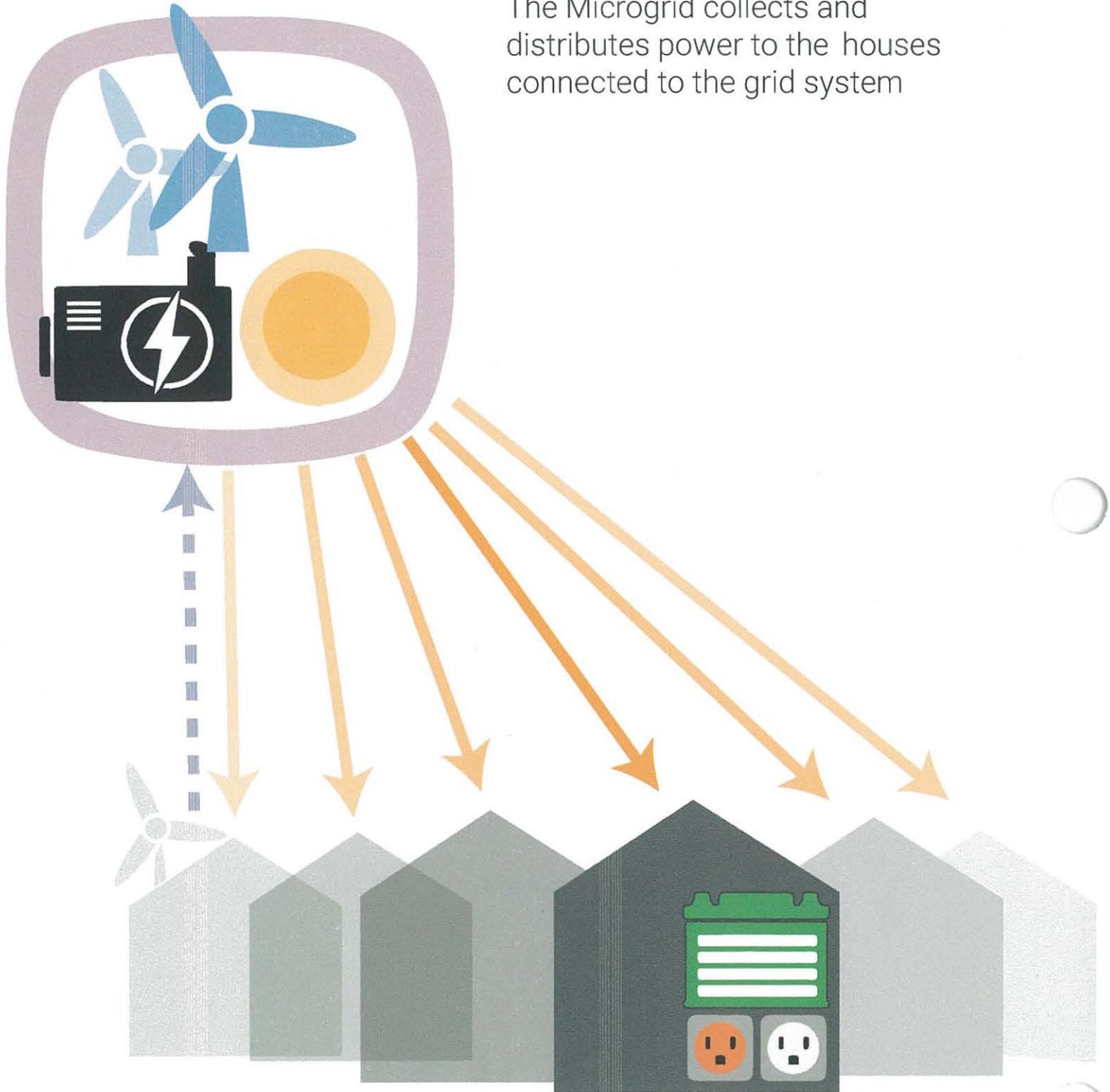


NOT POWERED

# METARVIK HOME POWER SYSTEM. 2016

## MICRO GRID MODE

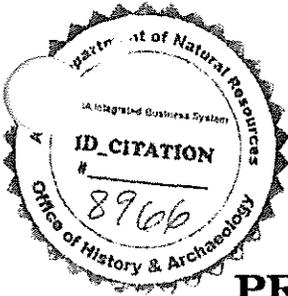
The Microgrid collects and distributes power to the houses connected to the grid system



XBI 07  
08

SITES IN APE:  
XBI-183

SITES OUTSIDE  
APE:  
XBI-156-8



# ARCHAEOLOGICAL EVALUATION OF CULTURAL RESOURCES AROUND MERTARVIK, ALASKA:

NHPA w/  
STIPS

## PROPOSED RELOCATION SITE FOR NEWTOK

3130-12 COE/ENVIR (267)  
3330-6 XBI-183  
5008N087W01-4

09-10  
5009N087W  
34-6



US Army Corps  
of Engineers



Alaska District

Margan Allyn Grover  
US Army Corps of Engineers, Alaska District  
March 2007

Handwritten scribbles at the bottom of the page.

**ARCHAEOLOGICAL EVALUATION OF  
CULTURAL RESOURCES AROUND  
MERTARVIK, ALASKA:  
PROPOSED RELOCATION SITE FOR NEWTOK**

Margan Allyn Grover  
US Army Corps of Engineers, Alaska District  
April 2007

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## Introduction

Newtok is a community of approximately 325 residents in the Yukon-Kuskokwim Delta, situated between the Newtok and Ninglick rivers (figure 1). In 1954, the Ninglick River was about 4,000 feet south of the community, but by 2006, the river had moved to within 800 feet of the nearest structures. Over the last 50 years, the erosion problem has been addressed unsuccessfully in many ways. Relocating the community has been proposed as the best solution to the problem. The Newtok Traditional Council (the federally recognized tribe) evaluated six relocation sites through polls of residents in 1996, 2001, and 2003, and the preferred location was Mertarvik on Nelson Island (92% for Mertarvik, 3% for other locations, 5% for other solutions, no votes for relocating to one of the other area communities). Congress approved a land exchange between the Newtok Village Corporation and the U.S. Fish and Wildlife Service in 2003, under the Alaskan Native Village and the Interior Department Land Exchange Act of November 17, 2003 (Public Law 108-129, 117 Stat. 1358). The Department of Interior conveyed 10,943 acres at Mertarvik to the Newtok Village Corporation on April 28, 2004.

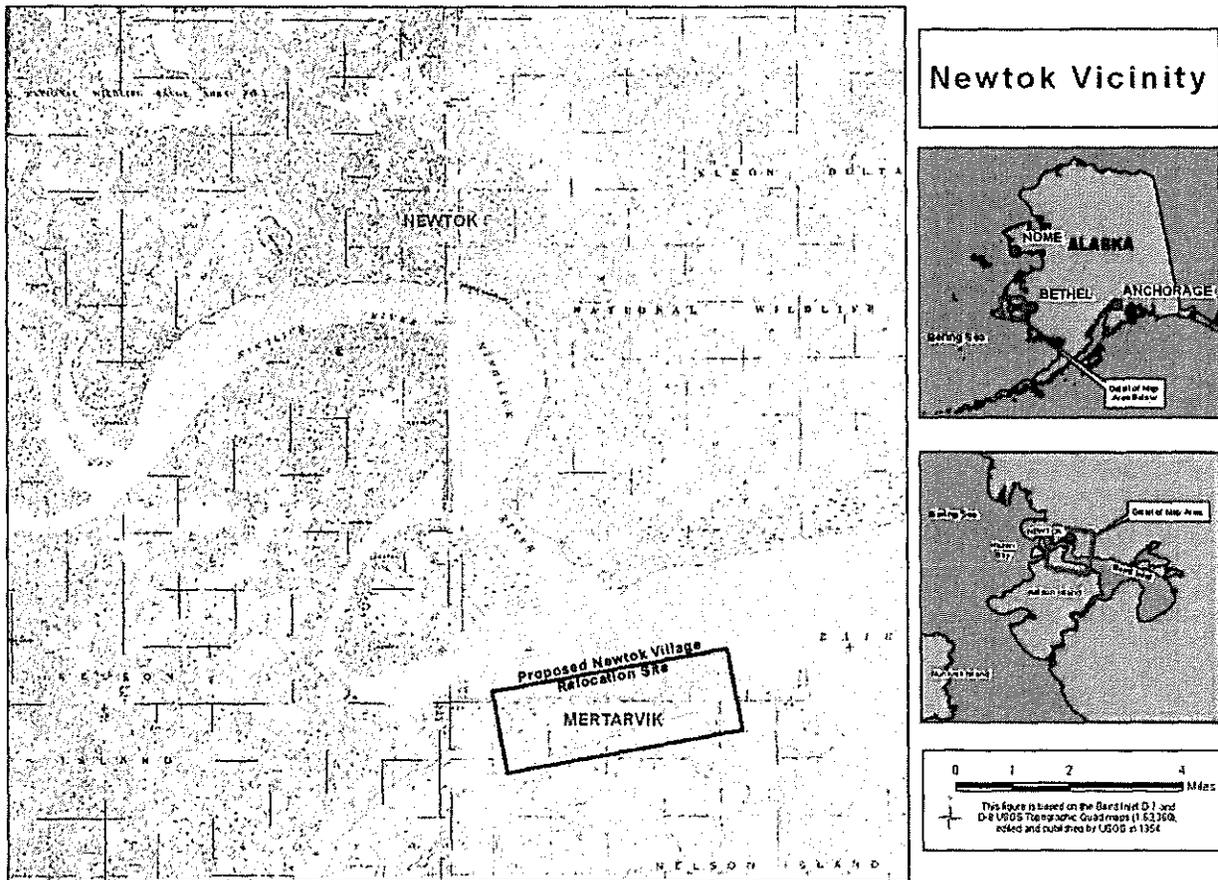


Figure 1. Location and vicinity.

The environment around Newtok is similar to many portions of the lower Yukon-Kuskokwim Delta – a moist low lying plain with little elevation change, a great deal of surface water, and many lakes (figure 2). In contrast, Mertarvik gently slopes to the toe of the Kaluyut Mountains on the north shore of Nelson Island. The underlying basaltic bedrock is volcanic in

origin. There is little standing water in the area, although a small creek flows to the west, and a freshwater spring and several seasonal drainages cross the area (figure 3; USFWS 1988).



**Figure 2. Newtok (2005).**



**Figure 3. Mertarvik area with temporary ramp (2006, courtesy Village Safe Water).**

## **Project Purpose**

As part of the 2003 Energy and Water Development Act, Congress established the U.S. Army Corps of Engineers, Alaska District (Corps), Alaska Villages Erosion Technical Assistance program to obtain information on the costs of continued erosion and relocation of Newtok and six other Alaskan communities. The 2004 Energy and Water Development Act clarified that the 2003 funds were “to be used to provide technical assistance to Alaskan communities at full federal expense...to address the serious impacts of coastal erosion.” In subsequent legislation, Congress asked to know about the practicality of and costs associated with relocating Newtok, collocation with another community, and the no-action alternative. In addition, Section 22 of the Water Resources Development Act (WRDA) of 1974 (Public Law 93-251), as amended, provides authority for the U.S. Army Corps of Engineers to assist states, local governments, and other non-federal entities to prepare comprehensive plans for the development, use, and conservation of water and related land resources. The Corps conducted environmental baseline studies including cultural resources studies under this program.

The Corps conducted archaeological surveys in 2002 and 2005 to assist Newtok in planning and evaluating costs of development of Mertarvik and eventual relocation. The surveys were designed to provide Newtok Traditional Council and other entities with basic information on cultural resources in the vicinity of Mertarvik for compliance with Section 106 of the National Historic Preservation Act (36 CFR 800).

## **Yukon-Kuskokwim Culture History**

Dumond (1984) divided the cultural history of southwestern Alaska into the Paleoarctic, Northern Archaic, Arctic Small Tool, Norton, and Thule traditions. The Paleoarctic tradition is marked by blade and core technology. Igiugig (ILI-00002) on the south end of Iliamna Lake and Koggiung (NAK-00020) on the Alaska Peninsula were two occupation sites that aided in defining this tradition. Microblades, cores, and core tablets were recovered along with large blades, transverse burins, and scrapers. The radiocarbon data suggest an occupation date from between 10,000 and 8,000 years before present (BP; Dumond 1984).

This was followed by the Northern Archaic tradition, which was dated to as early as 6,000 years BP. Chipped lanceolate projectile points or knives, heavy, chopper-like semilunar scrapers, and small endscrapers were representative of this tradition, specifically the Brooks River Beachridge phase from the upper Naknek River drainage. Dumond (1984) suggested that procurement strategies focused on land-based resources based on tool types.

The Arctic Small Tool tradition appeared in the Naknek River drainage around 3,800 years BP. The assemblage consisted of microblades, small burins, small bifacially chipped sideblades and endblades, unifacially flaked knives, triangular bifacial harpoon endblades, adze blades with polished bits, and an occasional lance or double-edged knife blade. Village and camp sites excavated indicated that some winter occupations and a considerable number of summer ones focused on salmon and other riverine resources (Dumond 1984).

The Norton tradition is represented by three phases that date between 2,300 and 1,000 years BP. The Smelt Creek phase had plain and impressed fiber tempered pottery, a small

collection of unstemmed small basalt projectile blades, and a large number of stemmed ones. The Brooks River Weir phase was derived from the Smelt Creek phase. Changes were made in the style of endblades, sideblades, and ground slate ulu forms. The pottery changed shape, increased in size, and was more often check-stamped or plain. New styles of projectile points marked the third phase, the Brooks River Falls phase. Sideblades were almost completely replaced by ground slate ulus, and large, double-edged, ground slate knives or lance blades became common. The pottery was almost always plain and very thick (Dumond 1984:100).

The Thule tradition is associated with the late prehistoric Eskimo culture. The Naknek River drainage has three recognizable phases – the Brooks River Camp, Brooks River Bluffs, and Pavik phases. Large barbed and stemmed ground slate lance and knife blades and thick, globular shaped pottery dominate the Brooks River Camp phase. During the Brooks River Bluffs phase, there were fewer large lance blades, the style of projectile inset blades and adze blades changed, and relatively thin pottery appeared. The last phase, the Pavik phase, contained Russian and American trade goods. These replaced most stone implements except ground slate inset blades. Organic tools included harpoon dart heads, occasional plain toggling harpoon heads, dart heads designed to take a stone or metal projectile inset tip, and other arrow and bird dart pieces. Settlements of significant size began to appear on the coast. Populations grew in the interior, but the settlements remained small. Interior and coastal focuses became apparent in the archaeological record during this tradition (Dumond 1984:102).

Vanstone (1984a) further defined these two recent ecological focuses. The maritime peoples in the communities of Bristol Bay, the Yukon Delta, and Nunivak Island focused on sea mammal hunting and seals in particular. Some inland resources were harvested; caribou and salmon were significant resources to the people at the mouths of rivers and some bays (Vanstone 1984a). The inland peoples in riverine communities primarily on the lower Yukon River, the lower and central Kuskokwim River, and the Togiak and Nushagak rivers (Vanstone 1984a) focused on fish supplemented by caribou. Occasionally, they traveled to the coast to hunt sea mammals. The dialectical differences between the inland and coastal groups were small and did not impede the movement of people between the two groups. Inland and coastal people exchanged goods and had established relationships that encouraged this movement (Vanstone 1984a, 1984b).

Some researchers proposed that the maritime adaptation was older. In this scenario, maritime people penetrated the interior by moving up the rivers and their tributaries in the recent past. It has also been posited that a much older inland population related to the Arctic Small Tool tradition farther north may have preceded this penetration and may even have been partly ancestral to the inland people (Vanstone 1984a).

The people of Newtok, Chefornak, and Nelson Island (Tununak, Tooksook Bay, Nightmute) are known as the *Qaluyaarmiut* or the “People of the Dip Net (Newtok Traditional Council 2004:3). People of this region move seasonally to harvest resources where they are available. Movement between settlements at various times of the year was common. The *Qaluyaarmiut* have a shared history of the origins of Nelson Island and their ancestors. It begins that Nelson Island was created when Raven threw dirt on an ice flow to provide an area of land for his wife to have a footing on, so that she would not be swept out to sea. During this time,

“the land was thin” but since then vegetation appeared and debris washed ashore, thickening the land (Fienup Riordan 1980, 1983).

Generally, people in the Yukon-Kuskokwim region were contacted by Russians and other Europeans relatively late. Captain James Cook was the first European to explore Alaska's northwest coast in 1778, when he traveled as far north as Icy Cape. The next expedition into the region did not take place until 1818, when Russian explorer Eremai Rodionov traveled up the Nushagak River, portaged, and then sailed down the Kuskokwim River. There were several other minor expeditions the same year. Between 1818 and 1841, the Russian-American Company built several posts in southwest Alaska and began exploring and trading more regularly in the region. However, little information about southwest Alaska's Yup'ik residents was recorded until Lavrentiy Zagoskin was sent to travel the region's river systems in 1848 to collect ethnographic samples and information on traditional trade routes between Alaska and Siberia (Oswalt 1999). Lieutenant Zagoskin noted that the *Qaluyaarmiut* (erroneously calling them the *Agulmyut*) conducted fairly profitable trade activities with Russian trading posts. Beaver, otter, fox, and seal were traded with noted success. Most Russian-American fur trading activities at the time concentrated on the upper Kuskokwim River. Despite this, a small pox epidemic in 1838-1839 seriously reduced the populations of the region (Oswalt 1963). This was the first of many such epidemics.

Edward W. Nelson, an employee of the Smithsonian and weather observer for the U.S. Army Signal Corps at St. Michael from 1877 to 1881, also traveled around the lower Kuskokwim River region and collected ethnographic samples and information. He grouped most of Nelson Island and the lower Yukon-Kuskokwim delta as the *Kaialigamut*, but grouped the residents of western Nelson Island and Nunivak Island as the *Nunivagmut*. While Nelson spent a relatively great deal of time in the lower Kuskokwim area and collected ethnographic information and specimens, his discussion of the region is not specific enough to elicit information about Nelson Island residents at the time (Nelson 1899; Oswalt 1999).

During the Russian occupation of Alaska, few Russian Orthodox priests worked in the lower Kuskokwim region. More missionaries began to work in the region after Alaska was purchased by the United States. The first mission on Nelson Island was built by the Moravian Church in 1898 at Tununak. Missionaries often complained that their work was hampered by the Yup'ik people's insistence on continuing their seasonal movements. Throughout these epidemics and the establishment of boarding schools and missions, Nelson Island residents continued their lifestyle, despite the considerable population movement that ensued (Vanstone 1984b).

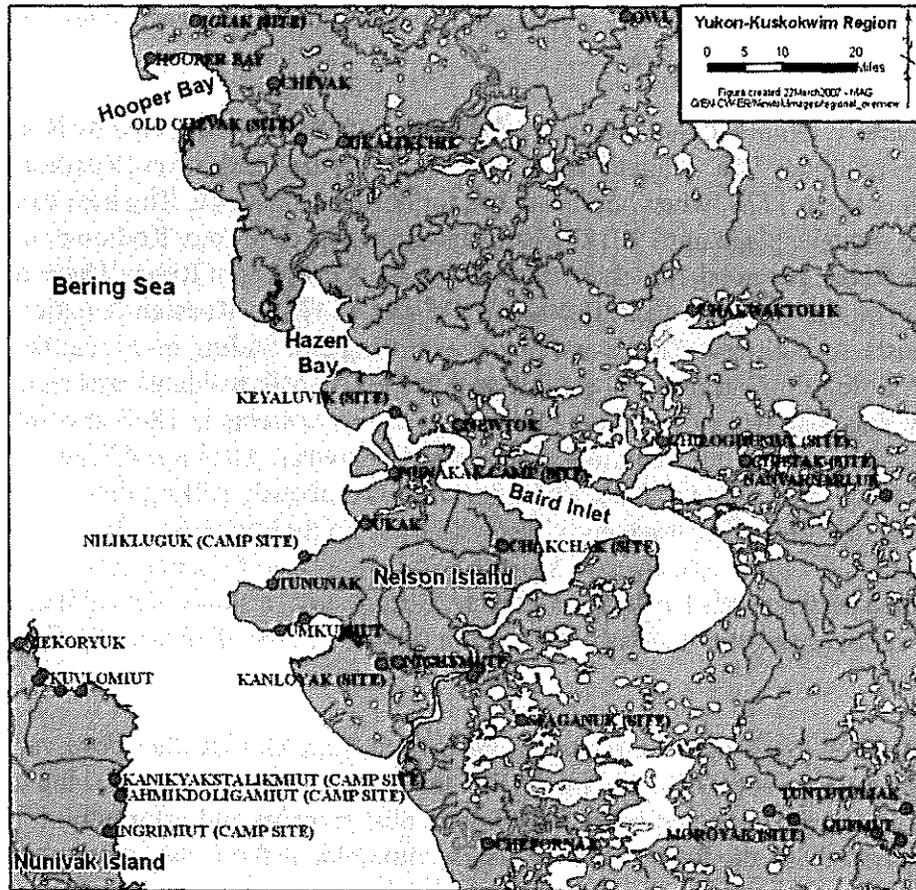


Figure 4. The lower Yukon-Kuskokwim region.

Today, *Qaluyaarmiut* live on Nelson Island in Toksook Bay, Tununak, and Nightmute, Newtok, and Cheformak (to the south). Other *Qaluyaarmiut* areas or camps commonly mentioned are Nunakauyak (another name for Toksook Bay, settled by Nightmuters in 1964), Chakchak, Umkumiut, and Kipnuk (south of Cheformak on the Kuguklik River). Figure 4 illustrates the relationships between some of these communities and camps.

Newtok (Niugtaq, *rustling of grass*) was settled in 1949, when seasonal flooding and erosion at Old Kealavik (Kayalivik or Keyaluvik) became insurmountable. According to the Newtok Traditional Council, the history of Newtok is as follows:

Around 1949 the village was relocated from Old Kealavik three miles away, to its present location... and a school was built in 1958. The existing village site was the farthest point up river the BIA [Bureau of Indian Affairs] barge could access to off-load the school building materials. The residents of Newtok continued a migratory pattern through the 1960s, summering in fish camps on Nelson Island and wintering at the current village site. After the fishing season, Newtok's men often traveled to Bristol Bay to work in the canneries. Thus Newtok remained primarily a winter residence for its people. By the 1970s, however, the snow machine and modern housing projects had replaced dog teams and sod houses in

Newtok; residents began to assimilate elements of American culture and to remain more stationary (2004:3).

Some of this seasonal movement was to settlements or camps on Nelson Island (e.g. Umkumiut), while others traveled north to Hooper Bay. The *Qaluyaarmiut* continue to be subsistence oriented. Herring and their eggs is a critical food staple, but numerous other species of fish are harvested as well. Seal, waterfowl, berries, other vegetation, and bird eggs are also important. Residents travel inland on the network of rivers and lakes to hunt caribou and moose. Distribution of subsistence foods throughout the region serves to reinforce a unified cultural identity.

Newtok incorporated as 2<sup>nd</sup> class city in 1976 and was dissolved in 1997. The Newtok Traditional Council is responsible for all local government affairs. There are 323 residents in Newtok. In November 2003, the United States Congress authorized an exchange of lands between the U.S. Fish and Wildlife Service and the Newtok Native Corporation. The land acquired through this legislation was to be used for the purpose of relocation and includes Takikchak Creek and Mertarvik.

## Known Cultural Resources in Project Area

There are a variety of cultural resource sites around Nelson Island – rock cairns, hunting blinds, fish camps, settlements, clay collection areas, etc. Three sites have been reported near the mouth of Takikchak Creek - XBI-00156, XBI-00157, and XBI-00158. The Bureau of Indian Affairs recorded the sites on an allotment (AA-11435, parcels A, B, and C). According to the BIA reports, XBI-00156, XBI-00157, and XBI-00158 were part of an old winter camp and summer reindeer herding station called *Taqikcaq*. XBI-00156 includes two graves that date to the 1940s. XBI-00157 consists of five depressions and a group of 55-gallon drums, and XBI-00158 includes 13 depressions. The sites have not been evaluated for the National Register of Historic Places. Figure 5 shows the location of these sites as they relate to the 2002 and 2005 archaeological surveys.

There are no cultural resources reported in the Alaska Heritage Resources Survey database in Newtok. However, two frame buildings were reportedly dismantled in Old Kealavik and moved to Newtok in the 1940s. Most residents lived in semi-subterranean sod houses for at least a decade before more frame structures could be built. In addition, the now abandoned BIA school was completed in 1958.

## Methods

Two pedestrian surveys of the project area with differing purposes were conducted. Margan Grover (Corps Archaeologist), Greg Carpenter (Corps Geologist), and Charles E. Diters (Regional Archaeologist, U.S. Fish & Wildlife Service) arrived at Mertarvik on September 16, 2002. The purpose of the visit was to survey the proposed relocation site for archaeological deposits and historic remains prior to soil drilling and testing, as well as to prepare for the land transfer between U.S. Fish & Wildlife Service and Newtok Native Corporation. Between August 22 and August 28, 2005, Grover, Marcia Heer (Corps Regulatory Specialist), and Estrella Campellone (Corps Biological Technician) went to Mertarvik to conduct archeological, wetland

and, vegetation surveys. Most of the data collection was conducted in the vicinity of the relocation site, runway 1, runway 4, the proposed barge landing, and the potential borrow site. Due to intense rainstorms and strong winds, work in the field had to conclude on August 28<sup>th</sup> (a day earlier than planned).

Both the 2002 and 2005 surveys took place at Mertarvik, the new town site for the community of Newtok. Mertarvik is approximately 4 miles southeast of Newtok on the north shore of Nelson Island (Sections 1, 2, 3, 4, 9, and 10, T8N, R87W, USGS Baird Inlet D-7 and Sections 34, 35, and 36, T9N, R87W, USGS Baird Inlet D-7).

A public meeting was held at the end of the 2002 survey and another in February 2006. There have also been several meetings of the Newtok Relocation Working Group – an interagency coalition designed to expedite the relocation effort and eliminate duplication of effort. The archaeological surveys and other environmental studies are the result of this coordination and were aimed at eliminating the need for multiple agency archaeologists to visit Mertarvik.

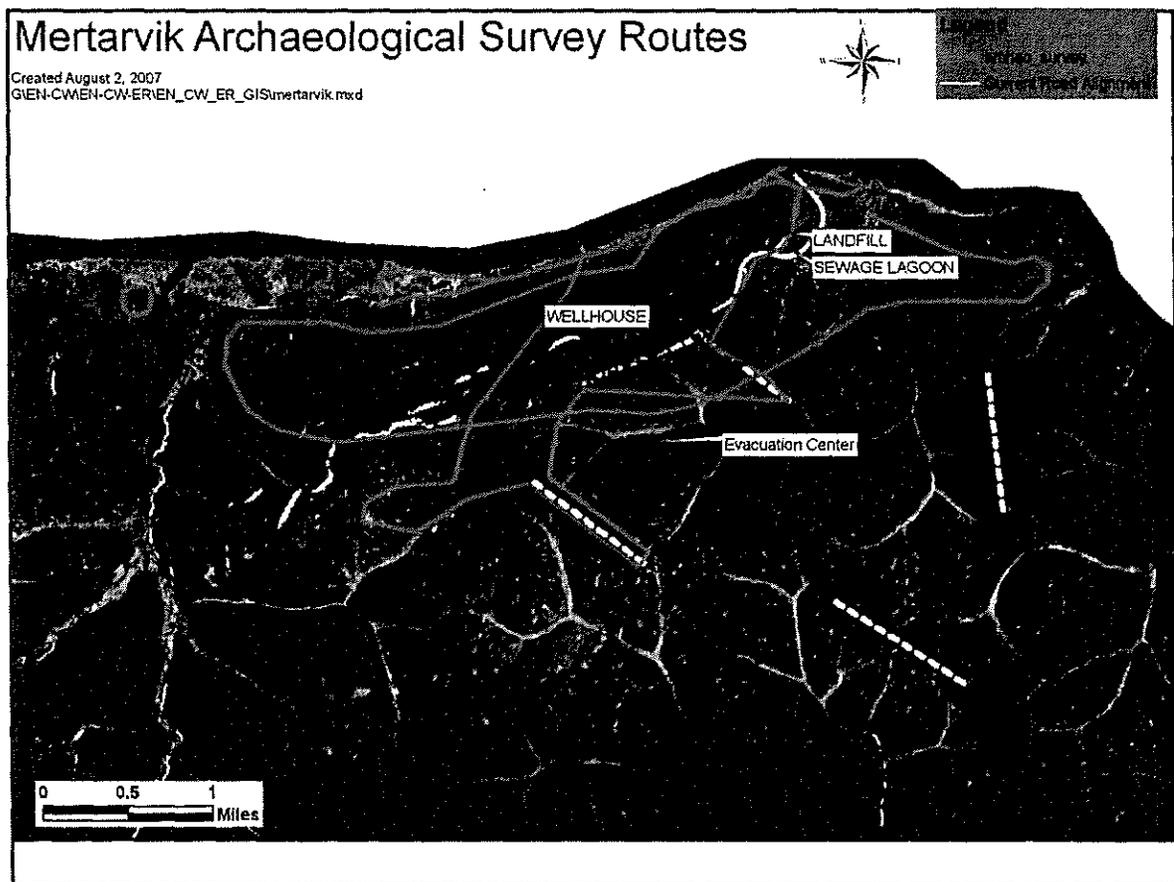


Figure 5. Archaeological survey routes, corresponding features, and archaeological sites.

## Results

### *Mertarvik*

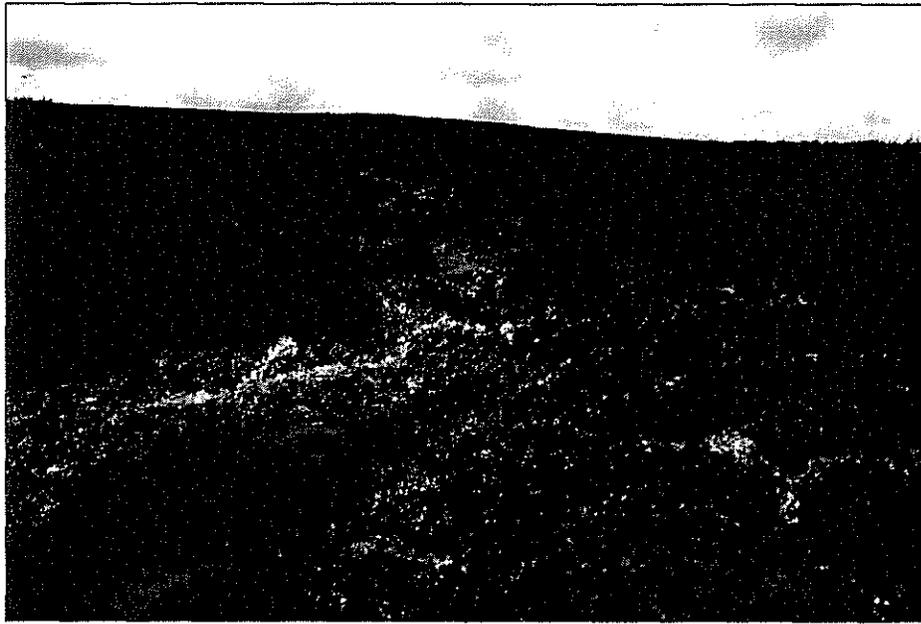
During public meetings and conversations with members of the community, we were told that the only archaeological resources in the vicinity of the new town site were along Takikchak Creek. Residents reported there were no remains of reindeer corrals or rock cairns. In addition, community members remembered that the reindeer herding station reported by Bureau of Indian Affairs archaeologists was only a camp. It was pointed out that the community gets water from Mertarvik Spring when there is no water available in Newtok.

In 2002, the team traveled by boat to Takikchak Creek. With the tide up, it was difficult to find the channel into the creek until the tide receded slightly. The boat could not go very far up the creek. We examined the west side of the creek and could see fenced graves (figure 6), but were not able to reach it. Newtok residents informed us that these were not Newtok people. We did not observe the remains of the camp or corral in the areas examined. After looking more closely at a USGS map, it was decided that the sites were probably on the east bank of Takikchak Creek, which could not be reached in the limited time available.

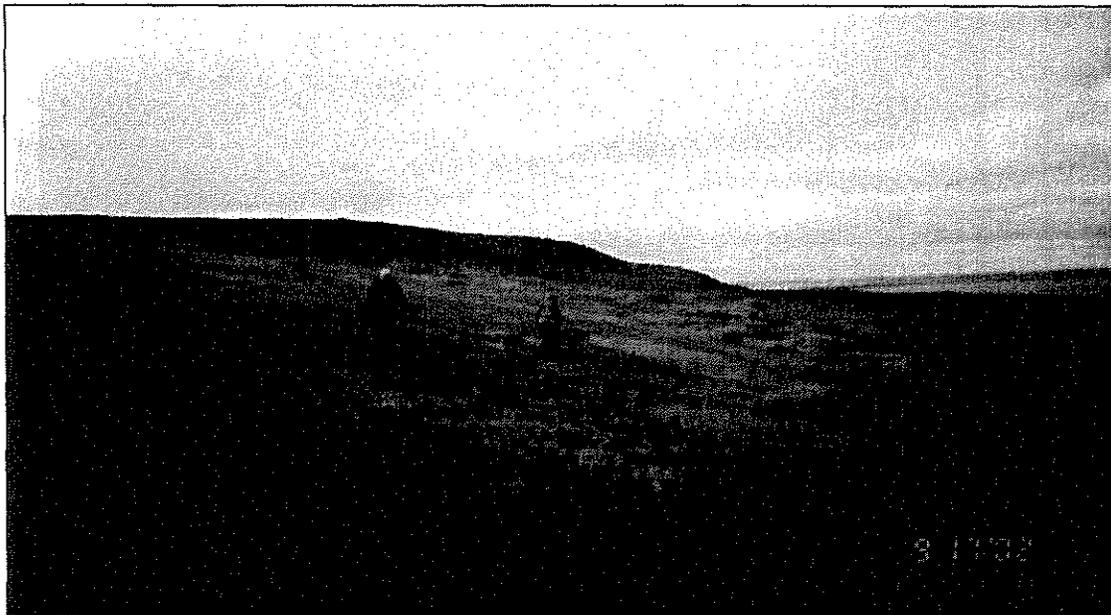


Figure 6. XBI-00156, fenced graves (Sept 2002).

We then traveled by boat to Mertarvik Spring and noted that rocks had been piled around the mouth of the creek to form a pool. The boat operator drank water from the pool, adjusted the rocks, and then began tearing away wood from a beaver dam near the head of the creek. We walked along the length of the proposed relocation site to a potential rock quarry (figure 7). No cultural resources were observed. We had hoped we would be able to walk to the east bank of Takikchak Creek, but the distance was too much for the time we had between tides.



**Figure 7. Mertarvik Spring Looking south from beach (June 2005).**



**Figure 8. Potential gravel source (Sept 2002). Note Takikchak Creek in center right of frame.**

In 2005, we examined several proposed runways, the proposed barge landing, and revisited the potential rock quarry. We attempted to reach the east bank of Takikchak Creek, but were traveling on foot and the limited day light hours made it difficult to reach the creek and return to camp safely. Figure 5 illustrates those areas examined for cultural resources and their association with the area of potential effect.

No cultural resources were observed at runways 1 and 4 or the rock quarry. Small test pits were placed throughout the area of potential effect for the purpose of defining wetlands. These tests were observed and examined by Grover. No cultural material was observed in any tests. At

the rock quarry, exposed bedrock made subsurface testing impossible. Exposed ground-surfaces were examined for archaeological material and features such as rock cairns or hunting blinds. None were observed.

At the barge landing, there were at least six circular pits (XBI-00183 - figures 8 and 9). The pits were in a grassy clearing area between two small drainages, which indicates the area is well drained. They were each about 1 meter in diameter. Their depths varied from 0.25 meters to 1.0 meters. Vegetation had grown into some of the pits, while the dirt walls of others were exposed. In a previous letter, the Corps reported these features as possible herring pits. After consulting with Newtok residents, it was determined that these are likely pits from collecting clay for making pottery.

There were also structural remains along the beach north of XBI-00183 (figure 10). The flattened barrels had circular holes cut in them and there were nail holes along the margins. They appeared to have once served as roofing or possibly siding. The remains were laying on the surface, could have washed onto the bank during a storm, and may have come from a camp to the north or east, as there were no other indications of a structure in the area.



Figure 9. Possible clay pits at barge landing (XBI-00183, Aug 2005). Red arrows indicate some of the pits.



Figure 10. Detail of a possible clay pit at the barge landing (Aug 2005).



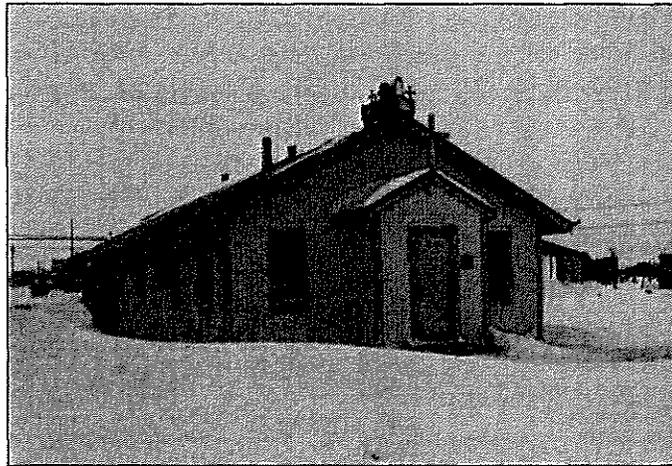
Figure 11. The structural remains along the beach at the barge landing (Aug 2005).

### *Newtok*

No formal archaeological survey has been conducted in Newtok to date. However, during trips for Mertarvik surveys and for public meetings, several observations were made about cultural resources at the current town site. Some background on these observations is provided here as reference. For purposes of this report, these resources will not be evaluated for the National Register of Historic Places. The relocation to Mertarvik has the potential to effect historic properties in Newtok because demolition or relocation of some structures will be required, and environmental restoration may be needed for infrastructure such as tank farms, sewage lagoons, and dumps. Residents may choose to maintain structures at Newtok for camps or recreation; however, details of the 'abandonment' of Newtok have not been resolved. For that

reason, the effect of the relocation on cultural resources in Newtok will not be assessed in this report.

When residents moved from Old Kealavik to Newtok, two buildings were reportedly dismantled and then rebuilt at Newtok. Residents indicated that one was the Catholic Church (figure 11) and the other was George Tom's house nearby. The two structures are similar in size, materials, and design. No written resources were referenced to confirm these statements. More research will need to be done to confirm which buildings in Newtok were moved from Old Kealavik and when they were built. With this information, their significance to local and regional history may be properly assessed for the National Register of Historic Places.



**Figure 12. Catholic Church in Newtok (Nov 2006).**



**Figure 13. George Tom's House (August 2005).**

Construction of the Bureau of Indian Affairs school was completed in 1958. According to accounts of Newtok residents, Old Kealavik was suffering from erosion and flooding. When the Bureau of Indian Affairs sought to establish a school for their community, local leaders and elders decided that this was an opportunity to move to a new location. A site was chosen and the

Bureau of Indian Affairs sent materials on a barge for the school. The current location of Newtok is the farthest the barge could reach up the Ninglick River to the chosen site. A new school was built in 2001 and the old school now stands unused. At this time, the BIA school is not yet 50 years old. As the relocation continues over the next few years, the building will surpass that benchmark and its eligibility for the National Register of Historic Places will need to be assessed.

Newtok residents state that when they moved from Old Kealavik to Newtok, most families lived in semi-subterranean sod houses. Over time, wood frame homes were built and the sod houses were abandoned. When asked about the locations of these sod houses, informants generally gestured toward the east side of Newtok. An archaeological survey was not conducted in Newtok, but the remains of sod houses are not immediately apparent while walking through Newtok. Interviews aimed at understanding the history of Newtok should be conducted and architectural and archaeological surveys in Newtok should be completed to identify cultural resources eligible for the National Register of Historic Places.

## **Cultural Resource Evaluations and Recommendations**

### ***XBI-00156, XBI-00157, XBI-00158***

More research will be needed before the graves at XBI-00156 can be evaluated for the National Register of Historic Places. Under the National Register evaluation process, a cemetery is a collection of graves that may be marked or unmarked, fenced, indicated on maps, or identified through testing. The graves at XBI-00156 are surrounded by a fence and marked with at least one wooden marker. Both Criteria Considerations C and D may apply to XBI-00156. According to National Register Bulletin #15 (*How to Apply the National Register Criteria for Evaluation*), a grave "of a historical figure is eligible if the person is of outstanding importance and if there is no other appropriate site or building directly associated with his or her productive life." This includes graves being evaluated for information potential (Criteria Consideration C). Similarly, a cemetery "is eligible if it derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events" (Criteria Consideration D). More investigation is required to evaluate the graves for these criteria considerations of National Register of Historic Places.

Two resources along Takikchak Creek - XBI-00157 and XBI-00158 - could not be relocated. XBI-00157 consists of five depressions and a group of 55-gallon drums and XBI-00158 includes 13 depressions. Both sites are associated by Newtok residents as part of a winter camp and summer reindeer herding station called *Taqikcaq*. Few archaeological sites associated with reindeer herding have been investigated by archaeologists in Nelson Island. If the sites can be located and their potential to yield information evaluated, they may eventually be found eligible.

### ***Mertarvik Spring***

Mertarvik Spring is an important water source for Newtok residents, who have modified and maintained the spring over time. The community plans on continuing to use the spring after the move to Mertarvik. Other than the rock alignment for pooling water, there were no other cultural resources observed in the vicinity. It is difficult to determine how long the spring has been in existence and more information about the spring's history should be sought from Newtok

and Nelson Island residents. The development plan for Mertarvik includes a buffer around the spring. As part of the National Register of Historic Places, Mertarvik Spring may be evaluated as a **site**, “the location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, or a building or structure, whether standing, ruined, or vanished, where the location itself possesses historic, cultural, or archaeological value regardless of the value of any existing structure” (National Register Bulletin 15 *How to Apply the National Register Criteria for Evaluation*). It may be sub-categorized as **landscape natural feature** (National Register Bulletin *How to Complete the National Register Registration Form*). The spring may also be evaluated as a **traditional cultural property**, “because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community’s history and (b) are important in maintaining the continuing cultural identity of the community” (National Register Bulletin 38 *Guidelines for Evaluating and Documenting Traditional Cultural Properties*).

The period of significance for Mertarvik Spring has not been determined, although it is likely within the last few hundred years. According to National Register Bulletin 38, there are two fundamental integrity questions – does the site “have an integral relationship to traditional cultural practices or beliefs” and “is the condition of the property such that the relevant relationships survive?” (p.11). Ethnographic or ethnohistorical research will help identify whether the spring can be associated with traditional cultural values and if it has retained integrity.

Based on current information, it is not known whether Mertarvik Spring is associated with events significant to local or regional history (Criteria A). According to Bulletin 15, a property may be eligible under Criteria A for its relationship to traditional cultural values:

Traditional cultural significance is derived from the role a property plays in a community’s historically rooted beliefs, customs, and practices. Properties may have significance under Criterion A if they are associated with events, or a series of events, significant to the cultural traditions of a community (p.13).

Particularly if evaluated as a traditional cultural property, this may include events such as “specific moments in history or a series of events reflecting a broad pattern or theme.” The time or period of the event may be ambiguous (National Register Bulletin 38, p.12-13)

Based on limited information from Newtok residents, Mertarvik Spring has not been associated with the lives of persons significant in the past (Criteria B). Nor does the spring embody distinctive characteristics of type, period, or method of construction, represent the work of a master, or possess high artistic value (Criteria C). The spring also has not yielded information important in understanding history; however, future ethnographic or ethnohistoric research may find that the site has that potential (Criteria D). It is recommended that Mertarvik be evaluated as a traditional cultural landscape as plans for relocation continue. Newtok residents have expressed a desire to retain control of their cultural heritage and identity, which may prevent outside researchers from addressing this question. It is possible that the community may choose to collect a history of the spring and manage the resource on their own.

Because Newtok residents are dedicated to preserving the quality of the spring, planning has included means to avoid impacts to Mertarvik Spring; therefore, with regard to the spring, there will be **no historic properties affected** by the relocation to Mertarvik.

### ***Gravel Source, Runways, and Proposed Location for Mertarvik***

The gravel source or rock quarry is east of the Mertarvik town site. A road may be developed from the community to the gravel source. The general route between Mertarvik and the gravel source was examined in both 2002 and 2005. The area has a low potential for cultural resources and none were observed. There will be **no historic properties affected** by construction of a road and gravel source near Mertarvik.

At the time of the 2005 survey, five runway alignments were proposed. Two were not examined because they were either environmentally unacceptable or were unacceptable to Newtok residents. Runways 1 and 4 were surveyed, and no cultural resources were observed. The areas have low potential to yield cultural resources. There will be **no historic properties affected** by construction of runway 1 or 4 near Mertarvik.

### ***XBI-00183***

At the proposed barge landing, there were at least six circular clay pits (XBI-00183) as well as structural remains along the beach. There is no apparent connection between the remains and XBI-00183. Based on vegetation and sedimentation, clay was removed from XBI-00183 within the past few hundred years (no datable material was recovered at the site). Based on current information, the site is not associated with events that made a significant contribution to the broad patterns of history (Criteria A), is not associated with the lives of persons significant in the past (Criteria B), and does not embody distinctive characteristics of type, period, or method of construction, represent the work of a master, or possess high artistic value (Criteria C).

XBI-00183 does have the integrity to yield information important in understanding history (Criteria D). Pottery from Nelson Island has been researched for at least the last half century (VanStone and Lucier 1992; VanStone 1954; Lutz 1970; Oswalt 1956; Dumond 1969; Oswalt 1952; Frink and Harry 2007). Recently, Frink and Harry (2007) collected ethnographic and historic data on pottery production techniques, and then conducted experimental replication of traditional pottery types. Important research questions that may be addressed by information from XBI-00183 include:

- what quality of clay was used for ceramics on Nelson Island,
- what methods were used for collecting clay,
- is this clay source similar to others in the Nelson Island region,
- over what territory was pottery made from this clay brought or traded (using chemical analysis), and
- can this clay be associated with a specific type, technique, design, or people?

The site is in its original location and appears to retain its elements of design. There has been no development along the northern shore of Nelson Island and the area has likely not changed aesthetically in centuries (setting and feeling). XBI-00183 has the original elements deposited when they were being used as a clay source (materials) and clearly exhibits the qualities of a clay source (workmanship). Finally, the physical features of the site convey its historic character (association). XBI-00183 is eligible for the National Register of Historic Places under Criteria D as a late pre-contact clay extraction site. With regard to this property, the relocation to Mertarvik would result in **historic properties adversely affected**. It is

recommended that any development of the barge landing take precautions to avoid this resource and that eventually a more detailed archaeological excavation of XBI-00183 be conducted to recover information.

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# APPENDIX A – TRIP REPORT MEMORANDA

## ALASKA DISTRICT TRIP REPORT *Alaska Villages Erosion Technical Assistance* Newtok, Alaska Draft – 9/27/05

**LOCATION OF TDY:** Takikchak, Nelson Island, Alaska

Approximately 4 miles south east of Newtok on the north shore of Nelson Island (Sections 1, 2, 3, 4, 9, and 10, T8N, R87W, USGS Baird Inlet D-7 and Sections 34, 35, and 36, T9N, R87W, USGS Baird Inlet D-7).

**DATE OF TRAVEL:** September 16-19, 2002 and August 22 to August 28, 2005

**PURPOSE:** Archaeological surveys and Wetland delineation fieldwork.

### NARRATIVE

Margan Grover (Environmental Resources Archaeologist), Greg Carpenter (Soils and Geology), and Charles E. Diters (Regional Archaeologist, U.S. Fish & Wildlife Service) arrived at Takikchak on September 16, 2002. The purpose of the visit was to survey the proposed relocation site for archaeological deposits and historic remains in preparation for soil drilling and testing.

During August 22 to August 28, 2005, Grover, Marcia Heer (Regulatory Specialist), and Estrella Campellone (Environmental Resources Biological Technician) went to Takikchak, the proposed Newtok relocation site on Nelson Island, with the purpose to conduct archeological, as well as wetland and vegetation surveys. Due to intense rainstorms and strong winds, work in the field had to conclude on August 28<sup>th</sup> (a day earlier than planned).

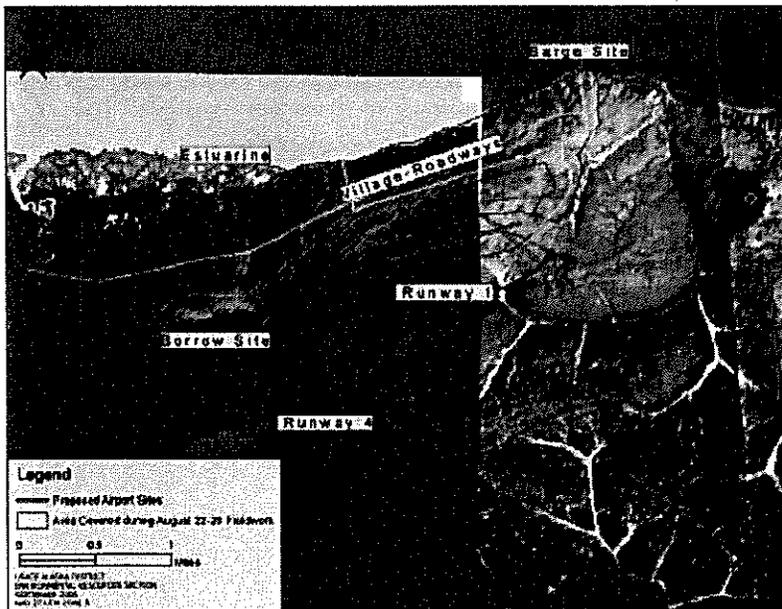


Figure 1: August 2005 survey areas and features.

## ARCHAEOLOGICAL SURVEY 2002 and 2005

Most of the data collection was conducted in the vicinity of the relocation site, runway 1, runway 4, the proposed barge landing, and the potential borrow site. The green hatch in figure 1 indicates the approximate areas surveyed.

### Known cultural resources

Near mouth of Takikchak Creek (XBI-154, XBI-155, XBI-156)  
Barge Landing (XBI-183)

### Areas examined that have no cultural resources

The proposed townsite  
The runways along the hills south of the proposed townsite  
The proposed rock/gravel source  
(See Figure 5).

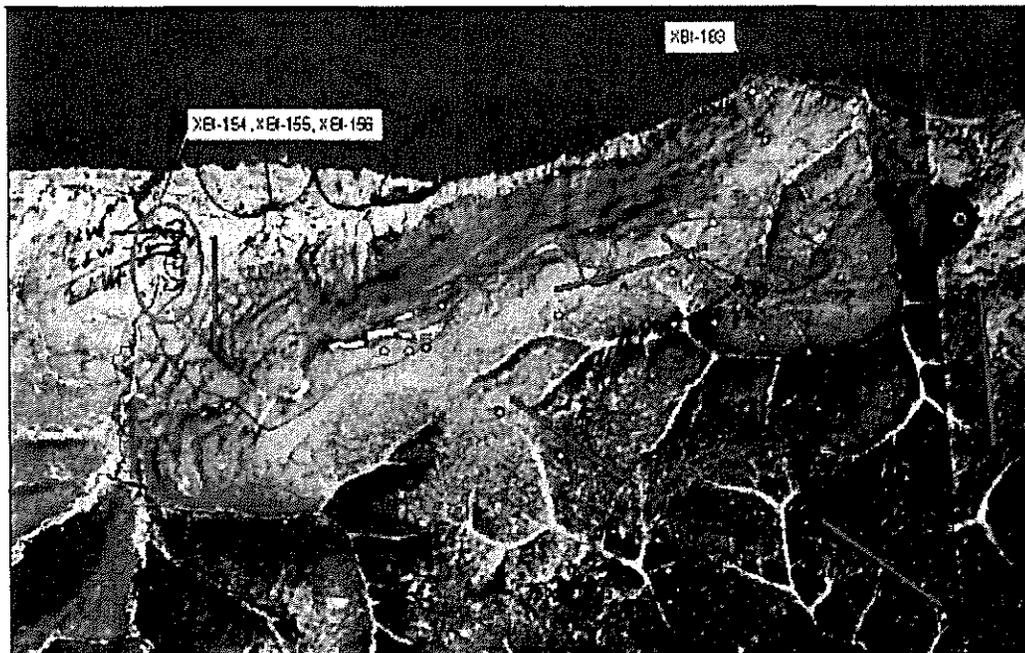


Figure 2. GPS points from archaeological survey, corresponding features, and archaeological sites.

## DISCUSSION

The archaeological sites along Takikchak Creek were reported by BIA and are on an allotment (AA-11435, parcels A, B, and C). According to the BIA reports, XBI-00156, XBI-00157, and XBI-00158 were an old winter camp and summer reindeer herding station. XBI-00156 includes two graves that date to the 1940s. XBI-00157 consists of 5 depressions and a group of 55-gallon drums and XBI-00158 includes 13 depressions. During a public meeting and conversations with members of the community, we were told that the only archaeological resources were those along

Takikchak Creek. They reported there were no remains of reindeer corrals or rock cairns. In addition, community members remembered that the reindeer herding station was only a camp. They reported that they fished in the unnamed creek, that moose and bears had been seen occasionally in the area, and that there was a problem with beavers in the unnamed creek. It was pointed out that the community gets water from a fresh-water spring when there is no water available in Newtok.

On September 18, 2002, Murphy John took us in his boat to the unnamed creek. With the tide up, it was difficult to find the channel into the creek. We examined other areas, and then tried to enter the unnamed creek when the tide receded slightly. The boat could not go very far up the creek. We examined the west side of the creek. We could see the fenced grave (figure 3), but were not able to reach it. We did not observe the remains of the camp or corral in the areas examined. After looking more closely at a USGS map, it was decided that the sites were probably on the east bank of Takikchak Creek.



Figure 3. XBI-00156, fenced graves (Sept 2002).

In 2005, we examined several proposed runways, the proposed barge landing, and the proposed rock quarry. We attempted to reach the east bank of Takikchak Creek, but we were traveling on foot and the limited day light hours made it difficult to reach the Creek and return to camp safely. No cultural resources were observed at runways 1 and 4 or the rock quarry.

At the barge landing, I recorded at least six circular pits (XBI-00183) that resembled herring pits (figures 4 and 5). The pits were in a grassy clearing area between two small drainages, which indicates the area is well drained. They were each about 1 meter in diameter. Their depths varied from 0.25 meters to 1.0 meters. Vegetation had grown into some of the pits, while the dirt walls of others were exposed. Along the beach, I observed some structural remains (figure 6). The flattened barrels had circular holes cut in them and there were nail holes along the margins. They appeared to have once served as roofing or possibly siding. The remains were laying on the surface and could have washed up onto the bank during a storm, as there were no other indications of a structure in the area.



Figure 4. Possible herring pits at barge landing (XBI-00183, Aug 2005). Pink flags mark some of the pits.



Figure 5. Detail of a possible herring pit at the barge landing (Aug 2005).



Figure 6. The structural remains along the beach at the barge landing (Aug 2005).

A more detailed report is being prepared, but if you have any questions about cultural resources and fieldwork status, please feel free to contact Margan Grover at 907-753-5670.

**ACTION ITEMS:**

- The known archaeological sites will need to be fully documented in order to evaluate them for the National Register of Historic Places, as required under Section 106 of the National Historic Preservation Act. Recommend documentation include sub-surface testing, which requires permission from the land-owners.
- Need to assess affects of relocation from Newtok to Takikchak on subsistence practices and land use on residents in Newtok, Tooksook Bay, Tununak, and Nightmute.



REPLY TO  
ATTENTION OF:

DEPARTMENT OF THE ARMY  
U.S. ARMY ENGINEER DISTRICT, ALASKA  
P.O. BOX 6898  
ELMENDORF AFB, ALASKA 99506-0898

3130-1R COE / Environ.  
3330-6 XBI-183  
RECEIVED

AUG 09 2007

OHA

AUG 08 2007

Environmental Resources Section

Ms. Judith Bittner  
State Historic Preservation Officer  
Office of History and Archaeology  
550 West 7<sup>th</sup> Avenue, Suite 1310  
Anchorage, AK 99501-3565

Dear Ms. Bittner:

Newtok Traditional Council, with assistance from the U.S. Army Corps of Engineers, Alaska District (Corps), is planning to build an evacuation center and access road at Mertarvik, Alaska (Sections 1, 2, 3, 4, 9, and 10, T8N, R87W, and Sections 34, 35, and 36, T9N, R87W, USGS Baird Inlet D-7; figure 1). Enclosed please find the report *Archaeological Evaluation of Cultural Resources Around Mertarvik, Alaska: Proposed Relocation Site for Newtok*. The report describes the results of two archaeological surveys (2002 and 2005) conducted by the Corps, evaluates some of the resources for the National Register of Historic Places, and presents recommendations for compliance activities as planning for the relocation from Newtok to Mertarvik progresses. The surveys discussed in the report comprised the area of potential effect for the relocation site, including the current undertaking (evacuation center and access road). The purpose of this letter is to provide you with a copy of the report, to seek your concurrence on a determination of eligibility, and your concurrence on an assessment of effect for the evacuation center and access road.

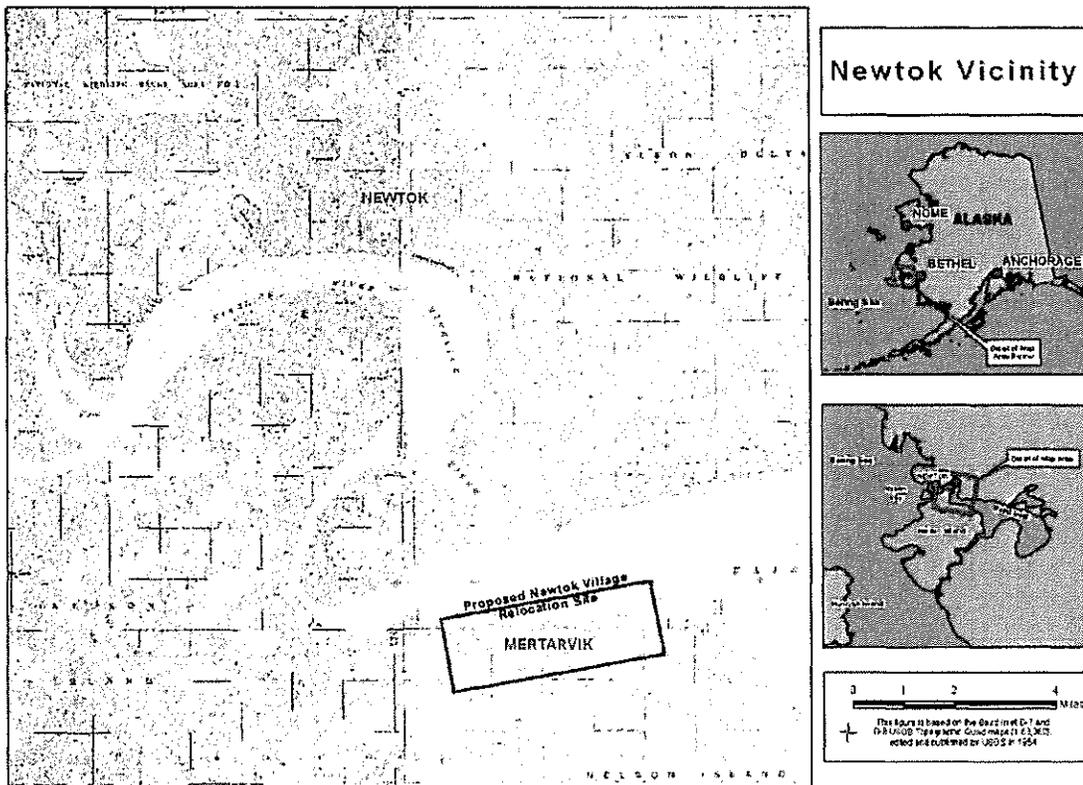


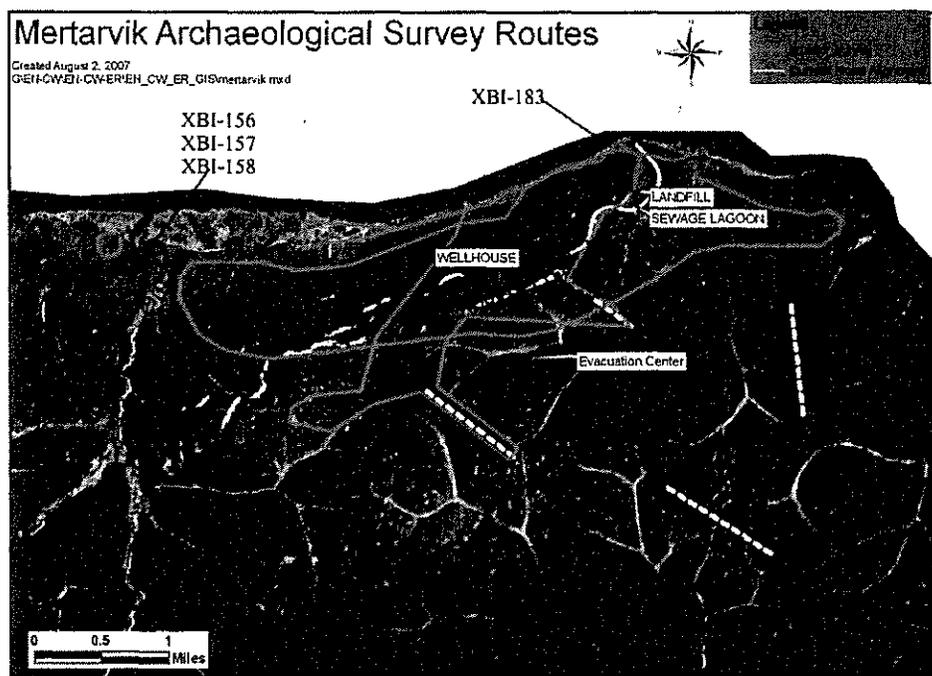
Figure 1. Present town site of Newtok and planned town site for Mertarvik.

### **Cultural Resources Survey Results**

The enclosed report discusses several cultural resources in the vicinity of Mertarvik, the relocation site for the community of Newtok (figure 2). Not all reported sites in the vicinity were examined by archaeologists; however, the immediate vicinity of Mertarvik was surveyed. This includes Mertarvik Spring, two proposed runways, the town site, the proposed rock or gravel source, and the barge landing.

Mertarvik Spring is an important water source for Newtok residents, who have modified and maintained the spring over time. The community plans on continuing to use the spring after the move to Mertarvik. Other than the rock alignment for pooling water, there were no other cultural resources observed in the vicinity. It is difficult to determine how long the spring has been in existence and more information about the spring's history should be sought from Newtok and Nelson Island residents. The development plan for Mertarvik includes a buffer around the spring. The current study did not collect sufficient data to adequately evaluate Mertarvik Spring. For the National Register of Historic Places.

The gravel source or rock quarry is east of the Mertarvik town site. A road may be developed from the community to the gravel source. The general route between Mertarvik and the gravel source was examined in both 2002 and 2005. The area has a low potential for cultural resources and none were observed. At the time of the 2005 survey, five runway alignments were proposed. Two were not examined because they were either environmentally unacceptable or were unacceptable to Newtok residents. Runways 1 and 4 were surveyed, but no cultural resources were observed. The areas have low potential to yield cultural resources.



**Figure 2. 2002 and 2005 archaeological survey routes.**

At the proposed barge landing, there were at least six circular clay pits (XBI-00183) as well as structural remains along the beach. There is no apparent connection between the remains and XBI-00183. The enclosed report provides a detailed assessment of the site for the National Register of Historic Places. In summary, XBI-00183 does have the integrity to yield information important in understanding history (National Register Criteria D) and retains integrity of location, design, setting,

feeling, materials, workmanship, and association. XBI-00183 is eligible for the National Register of Historic Places under Criteria D as a late pre-contact clay extraction site.

**Description of the undertaking**

Currently, the Newtok and the Corps are designing a road and evacuation center at Mertarvik. Boring locations along the road and evacuation center will be drilled and sampled to a depth of 15 to 30 feet using a self propelled Nodwell-mounted drill rig with low ground-pressure tracks. XBI-00183 is near the proposed road, but will be flagged as an "exclusion zone." No ground disturbing activity will take place in the vicinity of the site. It has not been determined how the Nodwell will be moved from the barge landing area to the uplands.

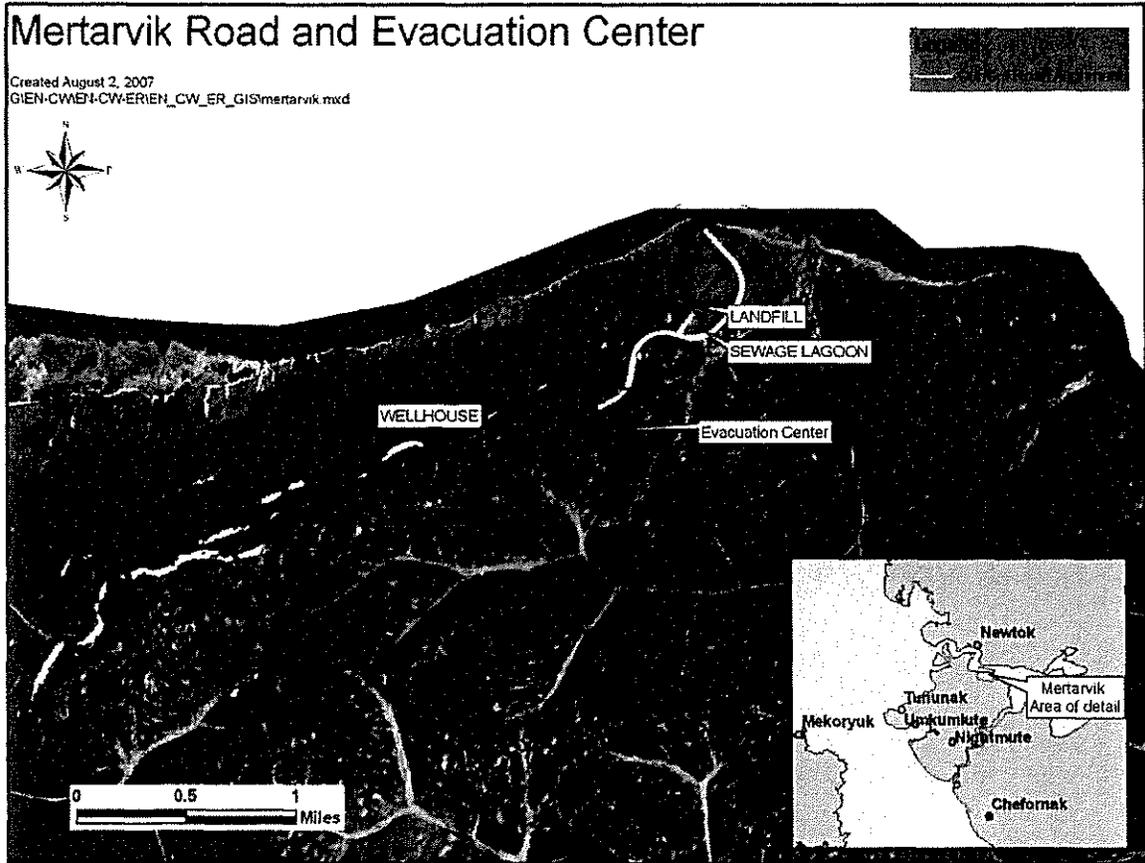


Figure 3. Proposed undertaking - access road and evacuation center.

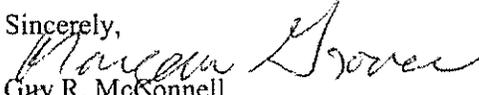
**Determinations of Eligibility and Assessment of Effects**

With regard to the effects of a relocation of Newtok to Mertarvik, the Corps is only developing the access road and evacuation center. The undertaking will include landing a barge and equipment at the proposed barge landing site, geotechnical borings along the proposed road and at the proposed evacuation center, and eventual construction of the road and evacuation center. With regard to XBI-00183, the proposed undertaking would result in **historic properties adversely affected**, provided the area is flagged so ground disturbing activity avoids the site. The proposed road alignment and evacuation center site were surveyed and no cultural material was observed (see enclosed report); therefore, there will be **no historic properties affected** by landing at the proposed barge landing site, geotechnical borings along the proposed road and at the proposed evacuation center, and construction of the road and evacuation center

NO  
(Email from  
Margaret Gower  
8/20/07)

We seek your concurrence on the determination of eligibility and assessments of effect. Please send comments to Ms. Margan Grover at the above address, or via e-mail: [margan.a.grover@poa02.usace.army.mil](mailto:margan.a.grover@poa02.usace.army.mil). If you have any questions about the project, please call Ms. Margan Grover at 907-753-5670.

Sincerely,

  
For  Guy R. McSonnell  
Chief, Environmental Resources Section

cf: w/ enclosure

Moses Carl, President, Newtok Traditional Council

# STATE OF ALASKA

## DEPARTMENT OF NATURAL RESOURCES

### DIVISION OF PARKS AND OUTDOOR RECREATION

#### OFFICE OF HISTORY AND ARCHAEOLOGY

SARAH PALIN, GOVERNOR

550 W. 7TH AVENUE, SUITE 1310  
ANCHORAGE, ALASKA 99501-3565  
PHONE: (907) 269-8721  
FAX: (907) 269-8908

August 31, 2007

File No.: 3130-1R COE/Environmental  
3330-6 XBI-183

SUBJECT: Relocation of Newtok to Mertarvik, Alaska  
Proposed evacuation center

Guy R. McConnell  
Chief, Environmental Resources Section  
U. S. Army Corps of Engineers, Alaska District  
PO Box 6898  
Elmendorf AFB, AK 99506-6898

Dear Mr. McConnell,

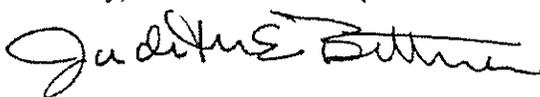
The State Historic Preservation Office received on August 9, 2007, your letter and attached report by Margan Allyn Grover titled *Archaeological evaluation of cultural resources around Mertarvik, Alaska: Proposed relocation site for Newtok* (March 2007). We have reviewed your submitted materials under Section 106 of the National Historic Preservation Act.

We understand that the current undertaking consists of the construction of an evacuation center, access road and associated barge landing at the future townsite of Metarvik. We concur with your finding that XBI-183 (Clay pits) located near the proposed barge landing, is eligible for the National Register of Historic Places under criterion D. We also concur that no historic properties will be adversely affected by the current undertaking provided that the area containing XBI-183 is flagged and avoided during construction.

As indicated in the archaeological survey report, the current undertaking is part of a larger project to relocate the Newtok community to Metarvik. We encourage the Army Corps of Engineers to coordinate with other agencies involved in the relocation efforts and comprehensively evaluate the long term effects of this project on Newtok and Metarvik.

Please contact Stefanie Ludwig at 269-8720 if you have any questions or if we can be of further assistance.

Sincerely,



Judith E. Bittner  
State Historic Preservation Officer

JEB:sl



---

**Environmental Assessment Scoping Summary**  
***Newtok Relocation Project – Pioneering Phase***  
**Newtok Village Council**

*May 6, 2016*



**FEMA**

U.S. Department of Homeland Security  
FEMA Region X  
130 228<sup>th</sup> Street SW  
Bothell, WA 98021-9796

## Introduction

The Federal Emergency Management Agency (FEMA) has a pending Hazard Mitigation Grant Program (HMGP) funding request from the Newtok Village Council (NVC) through the Alaska Department of Homeland Security and Emergency Management (DHA&EM), which administers HMGP for FEMA. The NVC has applied for funds to relocate 12 residential structures from Newtok to Mertarvik, consistent with its *Strategic Management Plan - Newtok to Mertarvik* (Plan) and specifically the 'Pioneering Phase' therein. Additionally, the NVC has Bureau of Indian Affairs (BIA) Tribal Transportation Program funds available to build some roads in Mertarvik which would also support the pioneering elements. The NVC also anticipates funds from the U.S. Department of Housing and Urban Development's (HUD) Office of Native American Programs Imminent Threat Grant Program that would support additional critical infrastructure for occupancy of the 12 homes once relocated to Mertarvik. The proposed or pending federal actions require review per the National Environmental Policy Act (NEPA) of 1969 and related environmental and historic preservation statutes and executive orders; as implemented by each respective agency's NEPA implementing regulations.

This report includes a summary of formal scoping activities completed for the proposed Newtok Relocation Project per NEPA and consistent with the Council on Environmental Quality's (CEQ) NEPA regulations, 40 Code of Federal Regulations Part 1501.7, *Scoping*. The purpose of 'scoping' is to inform the scope, focus, and content of an Environmental Assessment (EA). FEMA's NEPA scoping informally started in October 2015, after the project was determined programmatically eligible for funding; and included gathering available information about Newtok and Mertarvik, including prior federal environmental review and initiation of coordination with federal and state resource agencies and stakeholders.

The proposed action, for NEPA purposes, includes elements of the NVC's Plan pioneering phase. This includes FEMA-funded relocation of 12 homes from Newtok to Mertarvik and BIA-funded road construction in Mertarvik. HUD funds may be available to provide needed interim utilities to support occupancy of the homes once in Mertarvik. Furthermore, there may be other 'connected actions' funded or planned by non-federal entities that will require outlining in the EA. Early coordination was done with BIA to collaborate on an EA that would satisfy both agency's NEPA requirements, as well as with HUD in anticipation of their funding; with detailed discussion deferred to the outcome scoping and pending other NVC funding actions.

Much of the planning and details associated with this formal scoping effort were FEMA-coordinated because its proposed action, relocating 12 homes, has the most significant public interest and need for feedback. Additionally, during a FEMA site visit to Newtok on November 12, 2015 the NVC requested FEMA participate in a public meeting to explain the EA process to its residents, in the interest of transparency and community decision-making. The scoping effort was fully coordinated in advance with the NVC, DHS&EM, Alaska Department of Commerce, Community and Economic Development (DCCED), and BIA.

## Public and Agency Scoping Notices

The notification of scoping efforts and the public comment period, March 25 to April 25, 2016 was done through published ads, web-posting, emails, and mailings as follows:

- Information about scoping was posted on DCCED's Newtok webpage on March 23, 2016: <https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/NewtokPlanningGroup.aspx> this included a Notice of Intent to Prepare an EA, scoping information, and comment sheet
- The Notice of Intent to Prepare EA was published in the March 23, 2016 issue of *The Delta Discovery* and in the March 24, 2016 issue of *The Tundra Drums*, which included the public meeting information and link to DCCED website for additional information
- Emails were sent on March 24, 2016 to 78 individuals making up a broad contact list for federal/state/regional/Tribal entities mostly associated with Newtok Planning Group, attached were the Notice of Intent, scoping information, and comment sheet, and an invitation to attend the April 11, 2016 agency meeting (contact list available on request)
- Direct mail was sent on March 24, 2016 to 40 individuals making up a select list (subset of emails) of federal/State/regional entity leadership, including the Notice of Intent, scoping information, and comment sheet (mailing list available on request)

## Scoping Meetings

Two meetings were scheduled to provide information about the proposed project and invite comments, as follows.

### Newtok Public Meeting:

- Held on April 5, 2016 from 7 to 9pm at the Newtok School gymnasium
- Meeting was well attended with 36 folks signing in and several others joining after meeting started. Participants included several homeowners of the 12 homes proposed to be relocated, NVC members, Newtok Corporation members, and Newtok residents
- Scoping information was made available as well as comment sheets, and posters were affixed on walls that had information about the proposed project including conceptual plans or community layout of Mertarvik
- Meeting format included a power point guided presentation (available upon request) to briefly explain the grant processes, the NEPA process and specifically scoping, the proposed project, and what feedback was sought
- After introductions by the NVC and Sally Cox, DCCED; presentations were done by Science Kilner, FEMA; Brent Nichols, DHS&EM; Andrea Meeks, CRW; and Romy Cadiente, Newtok Relocation Coordinator
- The Newtok School principal, Grant Kaskatok, translated the presentation in Yup'ik Eskimo
- Notes of the meeting were taken by Ramona VanCleve, FEMA, and others
- Chris Allard, Denali Commission, and Don Antrobus, ANTHC also attended
- Several participants asked questions and provided comments consistent with the intent of scoping, summary below

Anchorage Agency Meeting:

- Held on April 11, 2016 from 1 to 2pm at DCCED office, 550 W 7<sup>th</sup> Ave, Anchorage, a conference line was made available for folks to call in
- Meeting was well attended with 22 folks present in person and signed in (available on request), and several others joining the conference line
- Participants included NVC members and their attorney, Senator Murkowski’s Office, Denali Commission, DCCED, AK DCRA, DHS&EM, Governor’s Office, HUD, BIA, ANTHC, VSW, CEQ, CCHRC, TCC, AVCP
- Scoping information was made available as well as comment sheets
- Meeting format included a power point guided presentation, same as provided at public meeting (described above), after an introduction by Sally Cox, DCCED, the presentation was made by Science Kilner and Brent Nichols and Julie Stoneking, BIA, provided information on roads
- Notes of the meeting were taken
- Several participants asked questions and provided comments consistent with the intent of scoping, summary below

**Summary of Comments**

Written or verbal comments were provided by state agencies, one business, and individuals or households. The comments mainly expressed concerns about alternative details and community/social/public service plans at Mertarvik. When questions were asked about the process or project and answers were known by those presenting, they were provided to participants. The below table summarizes the scoping comments received and they are listed in no particular order.

<b>Commenter</b>	<b>Method</b>	<b>Comment Summary</b>
USACE AK District, Environmental Section	voice mail	<ul style="list-style-type: none"><li>• Some prior environmental reviews completed for Mertarvik</li><li>• planned EA should be comprehensive</li></ul>
USDA, Rural Development, Palmer AK	email	<ul style="list-style-type: none"><li>• Supportive of project and combined EA effort</li><li>• USDA can provide loans to NVC for future development in Mertarvik for full range of housing and infrastructure needs</li></ul>
AK Dept. of Environmental Conservation, Solid Waste Program	email	<ul style="list-style-type: none"><li>• Recommendations provided for Mertarvik landfill facility</li><li>• Newtok currently has no permitted landfill facility so no waste may be disposed of there</li></ul>
Gazewood & Weiner Attorneys at Law	letter via email	<ul style="list-style-type: none"><li>• FEMA should limit the scope of its EA to its funded action, and not include BIA TTP funded roadwork in Mertarvik, which will have separate environmental review, information provided about BIA NEPA reviews</li></ul>

Commenter	Method	Comment Summary
		<ul style="list-style-type: none"> <li>• Relocation efforts should be coordinated with past, ongoing and future environmental reviews by other agencies, referred to 2008 USACE EA completed for Mertarvik Evacuation Center</li> <li>• Concern over disruptions, extent and timing of environmental review relative to proposed summer 2016 work in Mertarvik</li> <li>• Is a EA level of review appropriate for relocations, referred to FEMA's NEPA regulations for Categorical Exclusions</li> <li>• Alternatives may not be relevant</li> <li>• Encouraged buyout as the preferred option</li> </ul>
Individual or Household		
<i>Purpose and Need</i>	verbal	<ul style="list-style-type: none"> <li>• What is timing or schedule for relocations, 2016 or 2017, need to move is urgent</li> <li>• Ninglick River erosion severe, a lot concern over 4 structures closest to bank</li> <li>• Flooding along Newtok River (slough) and lake has been getting worse</li> <li>• Continued ground settling, land subsidence, is worsening flooding and erosion risks</li> </ul>
<i>Proposed Action</i>		<ul style="list-style-type: none"> <li>• Ground is very soft, there will need to be enough gravel to move and set up homes so they are stable</li> <li>• Will homes be able to be loaded onto a barge</li> <li>• Can homes be moved in the winter, over ice road</li> <li>• If relocation sites aren't good will funding be lost</li> <li>• What are plans for more homes in Mertarvik</li> <li>• Concerns over damage to the homes during the move and whether repairs would be made</li> <li>• Could the homes be dismantled and reassembled</li> </ul>
<i>Alternatives</i>		<ul style="list-style-type: none"> <li>• Building a flood control/erosion wall or levee won't work</li> <li>• Many questions about buy-out alternative and how this would work and impact relocations and substitutions</li> <li>• If buyout, demolition debris could be burned on-site instead of transporting to landfill (expensive barging and disposal costs)</li> <li>• If buyout, building materials could also be salvaged and reused since building materials are costly to ship in and scarce</li> </ul>

Commenter	Method	Comment Summary
<i>Environmental/Natural/Cultural Resources</i>		<ul style="list-style-type: none"> <li>• Impacts to fish need considered, salmon and seals</li> <li>• Ground is very soft, wetlands, will need to be enough gravel to move and set up homes</li> </ul>
<i>Social/Community/Public Services</i>		<ul style="list-style-type: none"> <li>• What are plans for health care or a medical facility/clinic in Mertarvik for pioneer residents</li> <li>• What are plans for transportation in and out of Mertarvik, by air or boat, to support pioneer residents</li> <li>• What are plans for education, will a school be built to support relocated families with children</li> </ul>

### Scoping Conclusions

The comments received during this scoping effort will be helpful to finalize the scope of the proposed action for an EA. They also help focus continued coordination and collaboration with federal funding agencies and stakeholders that have connected actions and concurrent NEPA requirements. Implementation details of the proposed action and the buyout alternative will be need to be further explored/evaluated for presentation in a draft EA, and to the NVC to support decision-making. Additionally, given the urgency to take action and anticipated extent of time to further develop supporting infrastructure in Mertarvik, interim mitigation measures will need to be explored at least for the structures most at risk to riverine erosion. Given the interest over community, social, or public services and facilities in Mertarvik, the draft EA will need to articulate the NVC's plans to address these critical elements that will be needed to support permanent occupancy of relocated 'pioneer' residents in Mertarvik.

### Next Steps

The following includes tasks and coordination needed to draft the EA.

- Scope of EA federal action, including connected actions, needs finalizing with NVC, BIA and HUD; and other stakeholder as necessary
- Details on roles (lead/cooperating federal agency), responsibilities, EA tasks, documentation, and EA schedule need to be defined initially amongst FEMA, BIA and HUD, and then coordinated with the NVC and others
- Information gaps need to be addressed to draft a meaningful EA, make findings of effect, determine mitigation measures, and further NEPA decision-making, including further public involvement; these includes provision of:
  - Finalized Mertarvik community survey/layout, housing master plan (at least for relocated homes and those that may be built with HUD loans)
  - Preliminary infrastructure design and engineering plans for the pioneering phase (community and quarry roads, utility retrofits for potable water, wastewater management, solid waste management, power and bulk fuel storage)

- Essential community/public/social service plans, including facilities, are needed for Mertarvik that detail how pioneers residents will be supported (education, health care, emergencies, transportation by air or boat, communication, supplies)
- Draft EA and complete necessary additional resource studies and agency consultations
- Complete public involvement to present and make available draft EA findings
- Finalize EA and agencies issue decision documents
- Federal funds released for use and implementation



**CCHRC**

The Newtok Village Council  
PO Box 5596  
Newtok, Alaska 99559

# MERTARVIK

## MULTI-PURPOSE BUILDING

### Retrofit Feasibility Study

January 24, 2016



The Cold Climate  
Housing Research Center  
1000 Fairbanks, AK 99708  
907.457.3454  
[www.cchrc.org](http://www.cchrc.org)

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# CCHRC

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 Chena Hot Springs Resort  
 Cook Inlet Housing Authority  
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 Dena Strait  
 Daniel White

To:  
 Paul Charles  
 Romy Cadiente  
 Newtok Village Council  
 Newtok, Alaska

The Cold Climate Housing Research Center is pleased to have been tasked by the Newtok Village Council to complete a feasibility study on the construction of the Mertarvik Multi-Purpose Building, formerly known as the Mertarvik Evacuation Center (MEC). CCHRC has been deeply committed to aiding the people of Newtok in any way that adds to the larger relocation effort to the new town site at Mertarvik. The MEC project has undergone many changes and challenges since CCHRC and the community last worked on the concept in 2009. We are honored to be invited back to the table to work on finishing this important building.

The following report describes an in-depth analysis of the project up to this point, observations on site, and recommendations for finishing the project in a constructive and meaningful way. As the Council is well aware, both construction costs and energy costs in rural Alaska remain high, even as funding is becoming less available. Leadership of the Council has shown wisdom of their efforts to find a way to complete the building economically, while insuring that the MEC is energy efficient and long lasting. The results should create a useful facility that is not a cost burden to maintain and operate.

As Alaskan Communities are faced with adapting to a changing climate, Newtok will be an inspiration to others burdened with the necessity to relocate their communities. The Council's commitment to finish the MEC will set the stage for following activities to establishment Mertarvik as a viable and healthy village for generations.

All of us at the Cold Climate Housing Research Center wish the Newtok Village Council success in moving forward with the completion of this important structure, and pledge our support in future efforts.

Sincerely,

Jack Hébert

# PROJECT DESCRIPTION

## The Mertarvik Evacuation Center

In 2015, CCHRC was asked by the Newtok Village Council (NVC) to provide an assessment of the Mertarvik Evacuation Center (MEC) Project. The MEC project began in 2008, and has passed through various stages of funding, design, construction, and change in that time. A brief timeline of the MEC project is below:

### MEC TIMELINE

**2008:** At the invitation of the Newtok Planning Group and the former Newtok Traditional Council, CCHRC works with the community to create a concept design for a place of refuge at the Mertarvik site that could serve multiple purposes over the course of the relocation from Newtok to Mertarvik. In 2009 CCHRC publishes this concept design in a 30% Design Analysis Report (DAR) for the Tribe.

2010: DOT/PF (Project Manager), PDC Engineering, and Bezek Durst Seiser (BDS), Architects are awarded the contract to take the 30% DAR and produce Construction Documents for the building. The foundation is changed from earth-bermed on bedrock to a raised steel pile foundation. The floorplan, roof structure, and mechanical approach is also changed.

2011: The foundation for the MEC is constructed by Cornerstone Construction. The rest of the building cannot be completed due to budgetary concerns.

**2012:** DOT/PF and BDS are released from the project and a redesign commences. The redesign is taken up by George Watt Architects of Colorado. Working with Earthcore, a producer of Structurally-Insulated Panels (SIPs), they redesign a shell for the building at roughly 75% design.

**2013:** Earthcore SIPs are delivered to the site. However, they are the wrong thickness. 6-5/8" instead of the specified 10-1/4". The frame is not constructed. George Watt and Earthcore are released from the project.

**May 2015:** Summit Construction of Tok, Alaska, submits an Assessment and Construction Feasibility Study of the MEC foundation and design. The report declares the foundation sound, and posits strategies to complete the building. The strategies in the report outline a cost of \$300,000 to finish design and \$601/SF - \$730/SF to finish the building. The Newtok Village Council (NVC) deems this too expensive to be feasible, and begins looking for other strategies.

**November 2015:** CCHRC is invited by the NVC to travel to Mertarvik and advise the Council on the Summit Report, the MEC Assessment, and the strategies for completing the building.

### The NVC requested that CCHRC perform the following tasks:

1. Review/assess the Summit Construction Report and familiarize deficiencies in such report identified by the owner.
2. Review and assess all plans: the original CCHRC design, DOT/PF MEC design, Earthcore SIPs MEC design.
3. Travel to Mertarvik in order to review and assess the existing MEC foundation.
4. While at Mertarvik, perform an inspection/ inventory of SIPs at Mertarvik.
5. Develop alternative action plans and cost estimates including alternatives within existing budgets and or 150% of existing budget.

# EXISTING CONDITIONS

## Literature Review:

### MEC Plans Assessment and Construction Feasibility Study

As requested by NVC, CCHRC Staff reviewed the following documents:

1. Summit Consulting Services, Inc: Mertarvik Evacuation Center Plans Assessment and Construction Feasibility Study
2. Alaska DOT/PF Mertarvik Evacuation Center Construction Plans Bid Set
3. George Watt Architecture Sheets A2.0, A2.1, and A2.2 for redesigned Mertarvik Evacuation Center
4. Mertarvik Evacuation Center Structural Insulated Panels Specifications.

#### Summit Consulting Services Assessment and Feasibility Study

In May 2015 Summit Consulting completed a thorough and detailed assessment of the MEC. Its report analyzes challenges to the project that led to its eventual discontinuation and proposes two feasible alternatives to remobilizing the project and finishing the building. In the interest of avoiding repetition of work, this report began with a literature review of the Summit Report. NVC requested that CCHRC Staff pay particular attention to the design and costs associated with finishing the building, as Summit's plans were deemed by NVC to be prohibitively expensive.

#### Key Observations from Literature Review:

- The SIPs were delivered to Mertarvik, and one crate was disassembled and inspected. It appears that the full building envelope was delivered to the site. However, the SIPs were not consistent with the procurement document specifications. They are 6-3/8" thick with 7/16" thick oriented strand board (OSB) sheathing. This is significant because the SIPs were specified to be 10-1/4" thick. Mertarvik is in a very cold region and energy costs are likely to be quite high in the new village. The R-value of the delivered SIP panels is 40% less than specified (R-33 vs. R-55.5) and will result in significantly higher heating costs for the building. It is not in the best interests of the community to build a building that they will not be able to afford to heat. Additionally, SIPs in Alaska should be sheathed in plywood as opposed to OSB, which is significantly more vulnerable to water infiltration, swelling, and rot. The SIPs will need to be protected.
- Although the foundation of the MEC was designed by one party (DOT/BDS/PDC), and the SIP shell was designed by another (Watt/Earthcore), "there appears that there is not a conflict pertaining to the existing foundation and the use of the SIPs as designed. Framing plans utilizing the SIPs were approved by the Fire Marshal for the SIP building but that permit has expired." (Summit, 2)
- Summit was not able to make a site visit to Mertarvik, which is remote and not accessible for part of the year. CCHRC Staff were requested to visit the site to inspect the foundation, SIPs, and other materials. A description of that site visit is included in this report.
- Summit analyzed both designs. The DOT/BDS design called for spray foam insulation, while the Watt Design called for SIPs. Summit recommends spraying polyurethane insulation to the inside of the structure if the DOT/BDS design is selected.
- The Glulam beams incorporated by BDS are custom-made and expensive, and would also require heavy equipment and specialized labor. The plan to use spray foam insulation also requires specialized equipment, however, this equipment would likely already be at the site for ongoing housing projects. The delivery of the spray foam is a logistical challenge. Spray foam barrels cannot be allowed to freeze, so barge delivery would

need to be timed correctly. If flown, the barrels would need to be transported by boat from the Newtok Airstrip.

- The SIP structure delivered by Earthcore and Watt Architects is also evaluated in the literature. Summit recommends that the wall cross section include an interior wall finish, the SIP, 2x4 battens, 1-1/2" XPS insulation board followed by siding.
- Summit modeled the two buildings and found that the original BDS design would use 11% less heating fuel than the Watt design. The SIP design is recorded as being R-38.5 plus R-7.5 for the 1.5" of rigid insulation applied to the outside (Watt plans A2.2.2 and A2.2.3). However, this wall section is cause for concern. If the battens create an air gap between the SIP and the layer of XPS, then the R-value of the XPS would be negated. The order of assembly as drawn on the plans would need to be adjusted in order to provide the desired R-value. Additionally, CCHRC uses an industry-accepted aged R-value of R-6 per inch for this polyurethane foam material. CCHRC calculates that the overall aged R-value of the assembly would be R-33 for the SIP, with no added R-value for the XPS in that arrangement.
- Summit provided two options for roof systems: one with dormers in the loft and one without, that are both less costly and more efficient than the BDS plans. This report evaluates these two options and posits a third option.
- Summit concludes that the George Watt plans are not finalized. "There were minimal structural and no mechanical and electrical disciplines included in the plans. The architectural plans were effectively at the 75% design level... Even though the SIP panels arrived in the summer of 2012 and a construction permit was granted, no construction took place. Subsequent discussions with the Department of Fire and Life Safety resulted in an agreement whereby the completed plans would be provided prior to any construction taking place." (Summit, 9-10)
- Summit interviewed all team members involved in the design and construction of the MEC foundation, analyzed the blow counts, dynamic pile strain tests, and factors of safety. The piles of the MEC were driven to between 20-34' and rest on bedrock. The Summit Report concludes that the existing pile foundation is more than adequate to support the MEC building. "A sacrificial deck was placed over the trusses and I-joists after the foundation was completed. The plywood decking was coated with a black mastic sealant which helps shed water and snow away from the structural members below. The decking is beginning to weather, and CCHRC was asked to inspect the protective decking on the site visit. This is discussed in the Site Visit Section.
- The Summit report concludes that the foundation as constructed is suitable for either the original plan or the revised SIPs plan. Because the foundation rests on bedrock, the difference in loads will not be an issue.
- A crate inventory was performed by David Cramer during the summer of 2013, and Summit concludes from his findings that 570 were delivered to site. However, during the inventory one crate was opened and all 30 SIPs from that crate were left out in the weather. When CCHRC staff visited the site in 2015 these SIPs had deteriorated to the point where they are no longer usable. This leaves 540 SIPs on site. The original design calls for 558 SIPs. "It is clear that the SIPs manufactured and shipped do not match the procurement specifications which indicate a 10-3/4" thickness. We [Summit] have found no indication of when or how this change was implemented or agreed to." (Summit, 16).
- Earthcore SIPs' parent company may still exist, but its Alaska branch Kenai Manufacturing LLC, does not appear to be in business at this time.
- To finish the MEC building, the Summit Report states that \$300,000 is needed for design. For construction, depending on which of the two strategies are selected, costs will run \$601/SF or \$730/SF, and the annual O&M costs will be approximately \$45,000.

## CCHRC Conclusions from Literature Review

- Summit's Report is thorough and professional. Its research is currently the most comprehensive review of the challenges facing the completion of the MEC building, and should be considered a primer to future contractors involved in the project.
- The steel pile foundation of the MEC, although it pertains to an earlier design iteration, is structurally sound and robust. The eventual completion of the building should be attainable without significant changes to the foundation as built.

However, the wood floor decking of the MEC is vulnerable to decay, rot, and eventual loss. An inspection of the floor system was deemed necessary. If possible, methods of protecting the decking from further degradation should be considered a first step in the critical path of finishing the project.

- Since the SIPs are already at site, they represent an asset that can be used in the completion of the project. Ordering new materials will be more expensive. However, NVC was not sure if the SIP panels were still usable. If they were found to be in good condition during the site visit, the SIPs still do not have the R-value specified in procurement, and the cost of heating the building may turn the MEC into an untenable financial liability for the new community instead of a resource. If the SIPs are to be incorporated into the completed building, some method of adding R-value to the structure will need to be investigated.

- The Summit Report posits two structural modifications for the MEC that greatly simplify the original design. However, the NVC is concerned about the procurement of heavy equipment necessary for these changes, as much of the heavy equipment used in the construction of the foundation has been demobilized and removed. The current state of heavy equipment at the site was unknown before the site visit. Additionally, the report only addresses gravity loads, not shear/lateral loads. CCHRC will use these strategies posited as a starting point, and will complete a structural strategy for the building.

- The cost of completing the building outlined in the Summit Report is significant, and it will be challenging for NVC to find lump sum funding for this project amidst a long list of other needs for the new community site. Methods to reduce cost will need to be considered, including a staged approach that emphasizes prioritized steps towards completion that can be funded separately.

## Site Visit

On October 29, 2015 CCHRC design staff performed a site inspection with the following goals:

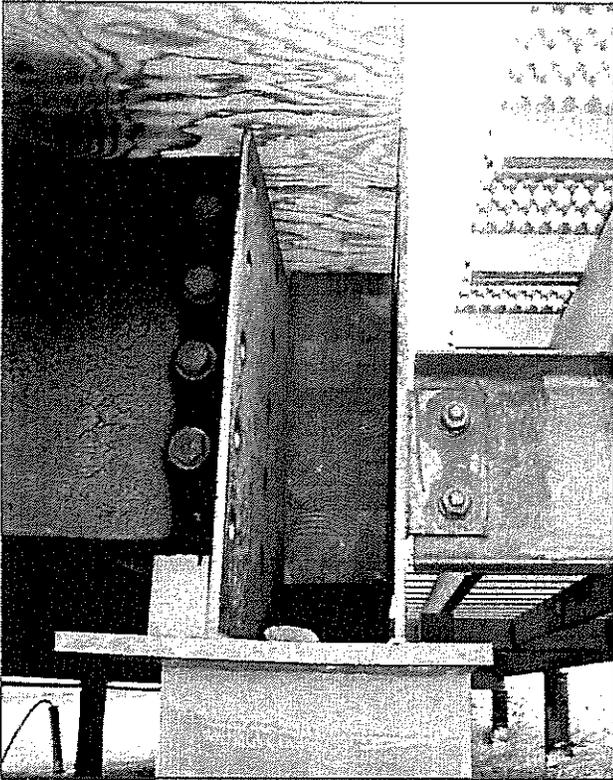
1. Assess the condition of the existing floor framing at the Mertarvik Evacuation Center (MEC).
2. Assess the condition of the Structural Insulated Panels that were delivered to the site by Earthcore SIPs.
3. Document heavy equipment and job site materials present.

### Floor Framing

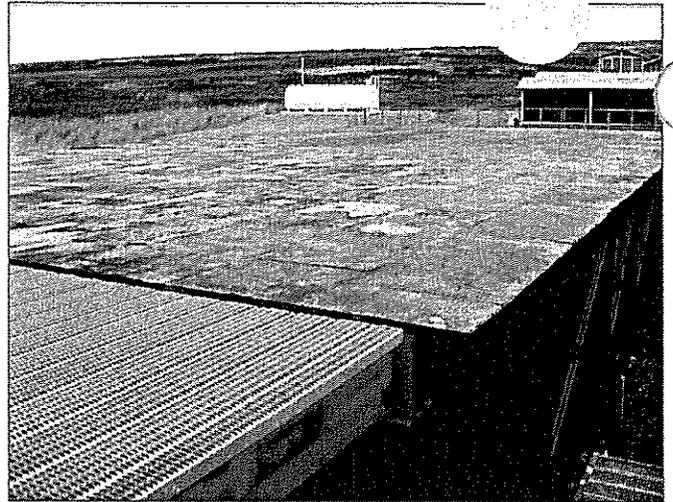
According to the May 2015 study performed by Summit Consulting Services, the MEC foundation and floor system construction was completed in fall 2011. It appears that at that time a sacrificial layer of ¾" CDX plywood sheathing was applied over the completed beam and joist framing to protect them from the elements. A liquid coat of black waterproofing sealant of unknown type was then applied over this floor sheathing to provide additional weather protection to the joists and beams underneath.

The protective decking runs past the structure of the foundation on two sides (the east and west, long dimension) and ends flush with the perimeter Glulam beams on the other two sides (the north and south, short dimension). The decking was unable to be constructed to run past these edges due to the presence of metal porch material. However, the Glulam beams and the steel under the decking do not appear to be degrading. The steel is not exhibiting undue corrosion, and the Glulam beams do not appear to be damaged by water infiltration.

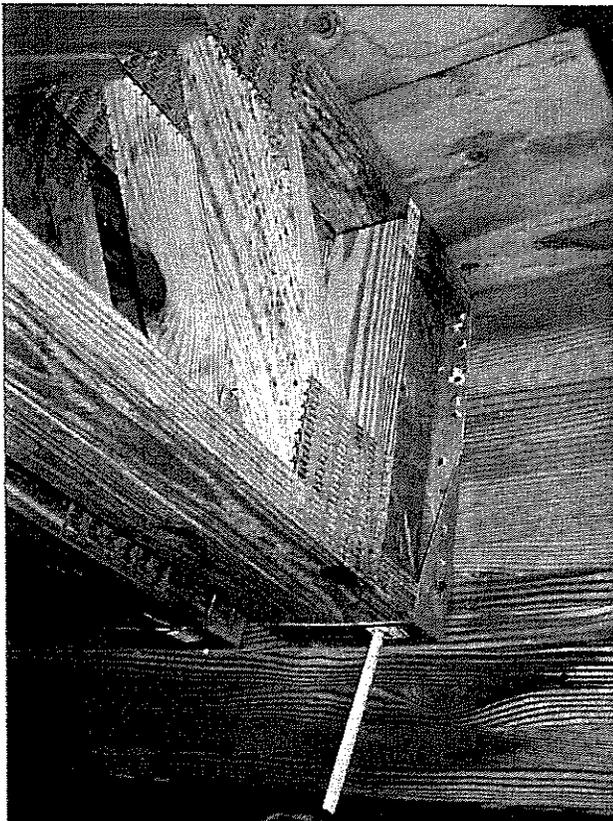
It appears that after 4 years of exposure to the elements, this temporary waterproofing strategy has begun to fail. Currently, the seams at most sheets are allowing rain and snowmelt to wick into the framing underneath. During rainy periods, water is ponding on the floor, and CCHRC Staff observed water running through many of the joints in the sheathing. Wetting has occurred along the tops of the joists and beams, and those areas are starting to show signs of long-term moisture-related discoloration. This ongoing water intrusion is of serious concern, and over a relatively short time it will lead to rot that affects the structural integrity of the floor framing. Therefore, before anything else is done in the development of the building, it is imperative that the existing foundation, beams, and floor joists be protected from the elements as soon as possible. If this is not done, by the time funding has been allocated to finish construction of the building, the floor joists will no longer be usable.



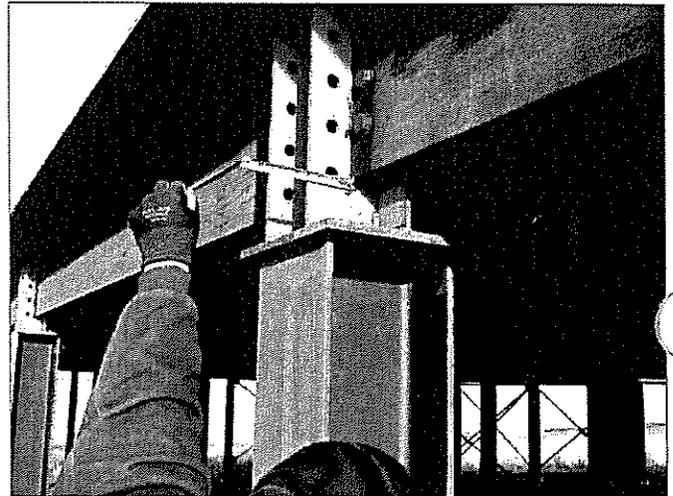
Above: The decking overhangs the long side of the structure, protecting the Glulam beam. On the short side, it ends flush.



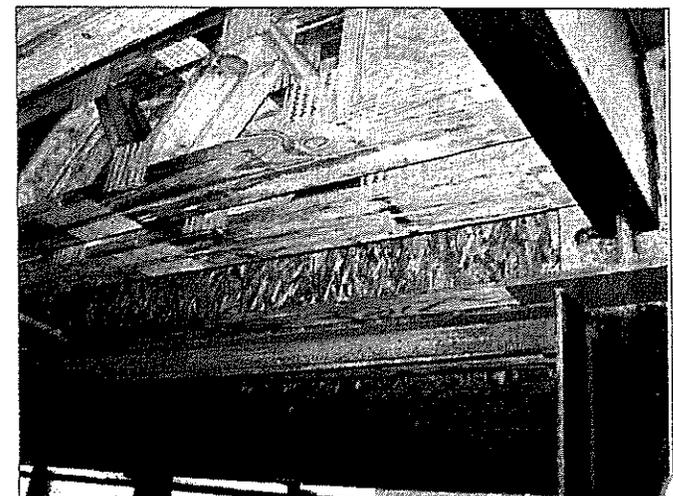
Above: The sacrificial decking meant to protect the floor is beginning to degrade and let water down in to the structural members



Above: Water has begun to infiltrate the temporary decking above the structure. Water can be seen wetting structural members from above.



Above: The perimeter Glulam beams and steel columns appear to be in good condition.



Above: Discoloration of structural joist members by water infiltration through the decking.

## Earthcore Structural Insulated Panels

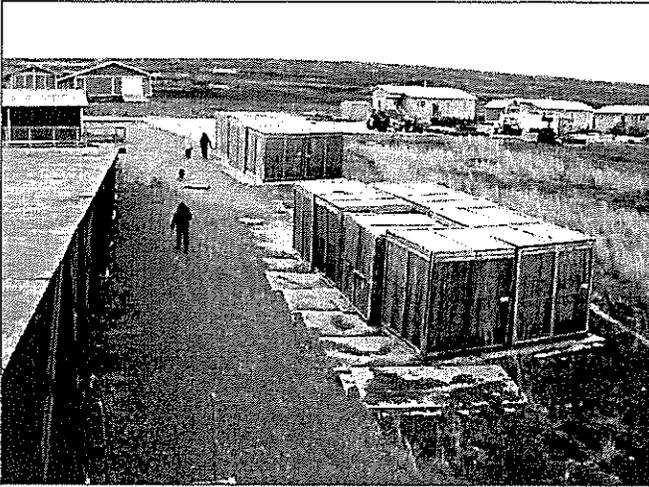
According to the calculations in the Summit Report, 570 SIPs were to be shipped to the site. When one crate was opened, and its content extrapolated to the remaining unopened crates, this number was determined to be confirmed. 558 SIPs are necessary to construct the George Watt Design, which would have left twelve extra SIPs in case any were damaged. The SIPs were shipped as blanks, and the design intent was that windows and other openings would be cut on site. However, when the crate was opened to inspect the SIPs in 2012, the 30 SIPs contained in that crate were left to weather and decay. At the time of CCHRC's site visit in 2015, they had degraded to the point that they are no longer usable. According to Summit's calculations, there are now 540 SIPs on site. This would be 18 short of completing the building as designed by George Watt Architects, assuming zero waste and no errors or damaged SIPs once the rest of the crates are opened.

The CCHRC team and NVC conferred and decided that opening all of the remaining crates without a place to store them and protect them from the weather could potentially damage more materials, especially since there is currently no funding or schedule for completing the building. Instead, CCHRC Staff pried one panel of one crate open enough to pull away the Tyvek weather coating inside, inspecting the quality of the OSB SIP, in order to ascertain if any damage or degradation had occurred to the SIPs within the crates themselves. CCHRC Staff observed that the crated SIPs appear to be unaffected by weather since the delivery, and are likely still usable at this time.

## Heavy Equipment

At one time, a drill rig, excavator, and crane were present on site and used by various contractors to construct the well, septic, and foundation of the MEC, as well as other facilities at the Mertarvik site. However, all those pieces of heavy equipment have been demobilized and barged out. There are currently two pieces of heavy equipment remaining at the Mertarvik site. A Volvo Michigan L190 Loader is located adjacent to the cargo container yard. This loader is not likely to be useful to the process of finishing construction of the MEC, as there is no dirt work to be done and the foundation has been completed. The loader is damaged, with a flat tire and what appears to be a rear axle out of alignment. A Gradall 534D9-45W Squirt Boom is also present at the Mertarvik site. The squirt boom has a 66" carriage, 36' vertical reach and 9000lbs capacity fully extended. This piece of equipment has keys held by NVC and would be very useful for the completion of the shell structure of the MEC. It would also be necessary in order to move materials from the barge landing to the MEC. At the time of CCHRC's site visit, the squirt boom was not operational. But the local foreman stated that it required only a new battery to be operational.

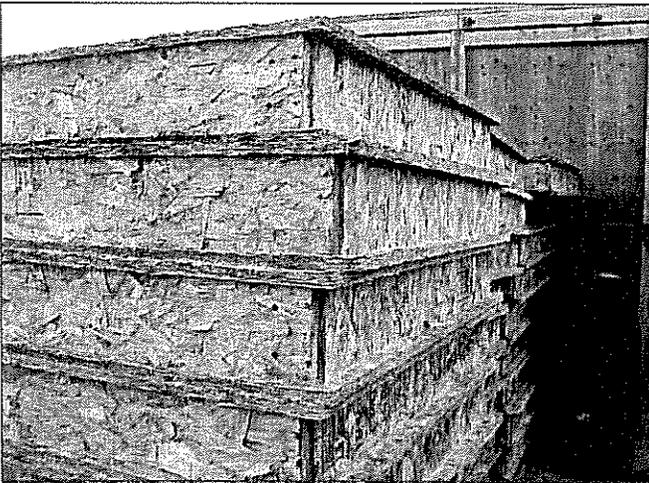
In addition to the heavy equipment, two job connexes are situated at the site, filled with various tools and files associated with the MEC foundation construction. An inventory of available tools would be helpful, and the connexes could be cleaned up and used for future jobs. Consequently, future contractors will not need to add the mobilization cost of shipping one out to site. Additionally, four small outbuildings are located adjacent to the MEC foundation. They have overhead garage doors and would be beneficial as materials storage during construction.



Above: The crated SIP panels are staged on Durabase mats adjacent to the existing MEC foundation.



Above: A Volvo L190 Loader was left at the Mertarvik Site but is currently damaged.



Above: The SIPs uncrated on a prior site visit were left out in the elements and are no longer usable.



Above: A Volvo L190 Loader was left at the Mertarvik Site but is currently damaged.



Above: the SIPs still within their protective crating appear to be as yet undamaged by the elements and should still be usable.



Above: A Gradall Squirt Boom was left at site and would be useful for continued construction. Keys are present and its battery must be replaced, but was otherwise reported to be in good condition by the local residents

## Implications for Retrofit Feasibility

### **Status of Foundation**

The MEC pile foundation is sound. The steel is built to a standard that could accommodate either of the two designs initially pursued, as well as both options posited by Summit Construction. However, the decking is under threat from moisture and exposure to the elements. It is possible that raising funding for the building's completion will take long enough that by the time it arrives, the decking will no longer be usable.

### **Status of the SIPs**

The Structurally Insulated Panels were not constructed to specification and their overall R-value may create a financial liability to the community due to heating costs. Additionally, there are currently 18 SIPs short (assuming zero wastage) of the number necessary to complete the George Watt Design. Although the SIPs that are still crated appear to be in good condition, there are concerns over quality control in the fabrication process. Based on anecdotal conversations with materials suppliers familiar with this particular product line in the state, other panels from this supplier (Earthcore) have been known to warp or contain voids in the insulation. However, they are already at site. Any way that they can be used would mean less materials to be purchased and shipped to complete the building. A method of using the on-site SIPs that adds value to the overall project should be pursued.

### **Status of Heavy Equipment**

The status of heavy equipment is unknown and can add significant cost and logistical constraints to the project. Any construction method that limits the need for heavy equipment should be considered.

### **State of Funding**

The stop-and-start process of design, redesign, mobilization and demobilization of this building thus far has shown that acquiring bulk funding for a project of this size will be a significant challenge. Additionally, the staging of the completion of the building should address its place within the overall staging of relocation. Three homes were constructed too early at Newtok and never occupied, and these unheated homes were rendered uninhabitable due to mold damage before members of the community were able to relocate. For this reason, it is imperative that funding be staged according to sensible stages of construction, in the event that bulk, single-source funding be unobtainable. Additionally, staging the completion of the building will need to consider its place within the overall relocation master plan.