

## OCT 22<sup>nd</sup> DRAFT Catalog of Policy Options- Public Infrastructure TWG

**DATE:** October 22, 2008  
**TO:** Public Infrastructure (PI) Technical Work Group (TWG) Members  
cc: PI Adaptation Advisory Group Members  
**FROM:** Barbara Sheinberg, PI TWG facilitator

PI TWG members John Madden, Andy Jones and I have taken our lead from the October 10 PI TWG meeting conversation and summary to revise the draft PI Catalog of Options.

There is now a hierarchy of policies, programs and projects/actions.

- There are 7 policies that address some overarching themes, then current and future infrastructure.
  1. **Define climate change in Alaska.** Create simple narrative and visuals (SNAP is currently too complicated for citizens and many agency staff) that highlight the range/spectrum of impacts that regions of Alaska currently, and likely will increasingly, experience over time. Recognize the high degree of regional variation. Promote uniform use of this narrative/ visuals. **NOTE: SEND THIS POLICY TO RESEARCH NEEDS ADVISORY GROUP AND "CROSS-CUTTING" ADVISORY GROUP**
  2. **Monitor and disseminate climate change data.** Develop and maintain a system for surveillance, monitoring, documentation, and dissemination of key climate change indicators. **NOTE: SEND THIS POLICY TO RESEARCH NEEDS ADVISORY GROUP AND "CROSS-CUTTING" ADVISORY GROUP**
  3. **Educational curricula must address climate change's planning and engineering needs.** Develop university, community college, vocational-technical, and community-based education programs and curriculum on planning, design, engineering, construction and hazard mitigation standards and techniques that address climate change.
  4. **Government agencies must coordinate.** Tribal, local, state and federal governments must coordinate and act in concert to address impacts of climate change on public infrastructure.
  5. **Maximize the life of and investment in existing public infrastructure.** Maximize use of and the investment in existing public infrastructure by ensuring continued access, use and increased resilience in the face of changing climate conditions.
  6. Integrate climate change considerations into **planning** for emergencies, new public infrastructure, community land use and facilities.
  7. Integrate climate change considerations into all aspects of **siting, development and funding of new** public infrastructure.

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- There are 8 programs that translate policies into program areas to address.
  1. Protect existing public infrastructure by following a process to evaluate, mitigate, retrofit, stabilize, prepare emergency plans, and enhance viability.
  2. Develop and maintain inventory of public infrastructure.
  3. Systematically evaluate the vulnerability and risk to public infrastructure from climate change.
  4. When public infrastructure is replaced or built, use siting, design, engineering standards and codes, and maintenance practices that address climate change conditions.
  5. Integrate comprehensive emergency, community and transportation planning to prevent or reduce impacts to public infrastructure from climate change. Use community land use, zoning, setbacks and other land management tools.
  6. Future public infrastructure investment decisions must consider climate change.
  7. Integrate climate change considerations into decision-making policies for replacement and new public infrastructure, community land use and facility siting and design.
  8. Identify public infrastructure and related needs due to increased ice free periods in the Arctic Ocean and Beaufort Sea and increased transshipment and commercial use.

- There are many specific projects/actions (but far fewer than in the last version of the catalog).

As you will recall, written and oral comments that the PI TWG provided on the draft October 8<sup>th</sup> Catalog were that many of the projects/actions were redundant, overly focused on sea level rise, and some were not relevant. To address these concerns I, 1) grouped the projects/actions under the new policy and project topics, and then 2) for each topic “lumped” the projects/actions to remove redundancies and group similar topics together.

In this October 22<sup>nd</sup> DRAFT Catalog of Public Infrastructure Options:

Definitions are shaded brown.
Policies are shaded green.
Programs are shaded pink.
Projects/actions are white.
The yellow column is for balloting, which we will discuss and possibly begin on October 27.

I look forward to seeing you on Monday, October 27 to discuss the Draft Catalog in detail. Please note that you received the meeting agenda from me on Monday (10/20). Don't hesitate to call me (907) 586-3141 or email me [bsheinberg@gci.net](mailto:bsheinberg@gci.net) with any questions. Thank you, - Barbara

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BALLOT#	POLICIES	PROGRAMS	PROJECTS/ACTIONS
	<p><b>DEFINITIONS</b></p> <p><b>PUBLIC INFRASTRUCTURE</b> - Public infrastructure includes publicly-owned or maintained highways, roads, bridges, ice-roads, sidewalks, railroads and tracks, non-road ground transportation, airports, landing strips, seawalls, river shoreline protection, harbors, barge landings, fuel facilities and pipelines, power generation, water and sewer systems, dumps and landfills, storm water systems, river and ocean shipping lanes, and buildings. A broader definition that reflects the reality of Alaskan communities is buildings and infrastructure that is community owned, used by the community, been built for community use, or that is privately owned but community residents depend upon.</p> <p><b>CLIMATE CHANGE CONSIDERATIONS</b> – The policies, programs and projects/actions herein repeatedly refer to climate change considerations. The PI TWG 1<sup>st</sup> policy is to clearly define a range/spectrum of impacts that regions of Alaska currently, and likely will increasingly, experience over time, with recognition of the high degree of regional variation in Alaska.</p> <p>In the absence of a definition now, the PI TWG working definition of climate change considerations includes increased coastal and flood inundation, increased coastal erosion due to reduced sea ice (longer fetch and more wave action), increased storminess, increased storm surge, increased thawing and degradation of permafrost, reduced extent of sea ice and a longer ice-free season in Arctic Ocean and Beaufort Sea, more rapid glacial melting resulting in increased siltation, changes to sea surface temperature, etc. <b>PI TWG - Please improve this working definition.</b></p>		
	<p><b>1. Define climate change in Alaska.</b> Create simple narrative and visuals (SNAP is currently too complicated for citizens and many agency staff) that highlight the range/spectrum of impacts that regions of Alaska currently, and likely will increasingly, experience over time. Recognize the high degree of regional variation. Promote uniform use of this narrative/ visuals. <b>NOTE: SEND THIS POLICY TO RESEARCH NEEDS ADVISORY GROUP AND “CROSS-CUTTING” ADVISORY GROUP</b></p>		
	<p><b>2. Monitor and disseminate climate change data.</b> Develop and maintain a system for surveillance, monitoring, documentation, and dissemination of key climate change indicators. <b>NOTE: SEND THIS POLICY TO RESEARCH NEEDS ADVISORY GROUP AND “CROSS-CUTTING” ADVISORY GROUP</b></p>		
			<p>2A Develop and/or strengthen a system for the comprehensive surveillance, monitoring, documentation, and dissemination of rates and locations of climate change indicators (see climate change considerations definition).</p>
			<p>2B Comply with new USCG requirement to NOAA to provide 7 day a week marine ice forecasts and sea temperature charts and disseminate this information. Request that NOAA partner with ADOT&amp;PF to develop the capability for improved, higher temporal and spatial resolution sea and river ice forecasts to enhance safety of winter travel in roadless areas.</p>
	<p><b>3. Educational curricula must address climate change’s planning and engineering needs.</b> Develop university, community college, vocational-technical, and community-based education programs and curriculum on planning, design, engineering, construction and hazard mitigation standards and techniques that address climate change.</p>		

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			3A Enhance public education programs aimed at informing the public about climate change and coastal hazards. Create and use standardized community education materials on hazards that addresses the relationship between climate variability and climate change.
			3B Integrate climate change and adaptation issues into advanced training in university, community college, and technical training programs. Change state education funding and curriculum to include engineering and planning research needed due to climate change. Establish training and vocational support for trades and others involved in implementation of new design standards related to climate change.
	<b>4. Government agencies must coordinate.</b> Tribal, local, state and federal governments must coordinate and act in concert to address impacts of climate change on public infrastructure.		
			4A Establish a coordinating body/mechanism/council mechanism to coordinate public infrastructure investment decisions of tribal, local, state and federal governments with regard to climate change.
			4B Recognize that different strategies and approaches may apply in large municipal, small municipal and rural communities.
	<b>5. Maximize the life of and investment in existing public infrastructure.</b> Maximize use of and the investment in existing public infrastructure by ensuring continued access, use and increased resilience in the face of changing climate conditions.		
		<b>5-1 Protect existing public infrastructure by following a process to evaluate, mitigate, retrofit, stabilize, prepare emergency plans, and enhance viability.</b>	
			5-1A Evaluate infrastructure design standards/codes associated with retrofitting existing infrastructure to address lower probability events and to recognize coastal inundation, potential increased severity of storms and storm surges, and other climate change considerations. For example, some cities are protecting to the 500 year flood or storm event rather than the 100 year event because of the increased vulnerability.
		<b>5-2 Develop and maintain inventory of public infrastructure.</b>	
			5-2A Develop an inventory of potentially impacted infrastructure and maintain this database relative to emerging projected sea level rise findings. This is a first step in scoping relevance/viability of potential adaptation options. ISER-UAA has a public infrastructure database that was created to assess climate risk. See Larsen et al (2008) and Foster and Goldsmith (2008) for more info.
		<b>5-3 Systematically evaluate the vulnerability and risk to public infrastructure from climate change.</b>	
			5-3A Conduct a comprehensive vulnerability assessment for all public infrastructure. This should also include critical facilities that may be privately owned, such as power stations, hospitals, etc, as well as important cultural resources such as museums.
			5-3B Identify Facilities at High Risk; Implement Strict Maintenance Regime. <ul style="list-style-type: none"> <li>Identify public and quasi-private systems and facilities at serious risk due to climate change and initiate a system for</li> </ul>

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			<p>siting such facilities away from vulnerable areas.</p> <ul style="list-style-type: none"> <li>• Implement strict maintenance regulations for existing infrastructure in acute hazard and vulnerable zones.</li> </ul>
			<p>5-3C Airports and Landing Strips.</p> <ul style="list-style-type: none"> <li>• Evaluate and address the impacts on airports and landing strips related to thawing permafrost, coastal and river erosion and flooding, including the need to relocate, re-align or repair airstrips.</li> </ul>
			<p>5-3D Public Buildings.</p> <ul style="list-style-type: none"> <li>• Survey existing damage and loss to public buildings due to shoreline erosion, less shorefast ice, melting permafrost, storms, realignment of rivers and flooding and identify the need to relocate buildings (e.g. Koyukuk) and plan for future siting.</li> </ul>
			<p>5-3 E Floodplain Maps.</p> <ul style="list-style-type: none"> <li>• Provide funding to regularly update floodplain maps. Detailed elevation mapping is required along with detailed surveys of transportation routes and critical infrastructure in coastal areas in order to define evacuation routes and facilities at risk under flooding scenarios of various intensities. Emergency managers must know at what point during a storm event the road to the airport will flood, for example, and thus be cut off.</li> </ul>
			<p>5-3F Offshore Mapping.</p> <ul style="list-style-type: none"> <li>• Detailed mapping of the offshore environment is needed. Computer models used to predict flooding and wave activity during storms depend on detailed measure of water depths and the form of the underwater environment. This exerts strong control on the flood/wave response during a storm. For many areas of the Alaska coast information is from maps created in the 1960s or earlier. Without detailed offshore maps even the best storm surge model will only ever give results of moderate accuracy. This underpins many of the recommendations listed, including all related to event-level emergency planning.</li> </ul>
			<p>5-3G Coastal and River Shorelines.</p> <ul style="list-style-type: none"> <li>• Evaluate the vulnerability of existing and future unprotected reaches of shoreline with respect to existing infrastructure.</li> <li>• Determine need for and type of shoreline protection appropriate to these reaches.</li> </ul>
			<p>5-3H Fuel Delivery and Storage, Fuel and Utility Pipelines.</p> <ul style="list-style-type: none"> <li>• Address impacts of coastal inundation and coastal and river erosion on buried or above-ground utility and oil pipelines.</li> <li>• Address impacts of sea thawing permafrost on existing buried or above-ground pipelines.</li> <li>• Address the impacts of thawing permafrost and erosion on shoreline and river-side fuel delivery, storage, and piping.</li> </ul>
			<p>5-3I Wild Fires.</p> <ul style="list-style-type: none"> <li>• Evaluate wild fire risk to buildings due to increased wild fire intensity and frequency and increased threat from</li> </ul>

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			diseased/dead trees (e.g. Caribou Hills fire in 2007)
			5-3J Harbors. <ul style="list-style-type: none"> <li>Study the impacts of increased siltation in harbors stemming from glacier melt and flooding events.</li> </ul>
			5-3K Highways, Roads, Bridges and Sidewalks (HRBS) <ul style="list-style-type: none"> <li>Evaluate and address damage to HRBS from thawing permafrost and temperature changes.</li> <li>Building on permafrost in the first place changes the temperature profile of the permafrost. This effect needs to be netted out from the temperature effects related to greenhouse gas-induced climate change.</li> <li>Evaluate and address damage to and loss of HRBS from coastal and river erosion.</li> <li>Evaluate and address buckling and submersion of boardwalks in village communities.</li> <li>Evaluate and address damage to HRBS from glacier melting, flooding, avalanches, and debris flows.</li> </ul>
			5-3L Water, Sewer and Storm Water Systems. <ul style="list-style-type: none"> <li>Address the current and future flooding and erosion impacts from climate change (thawing permafrost and flooding and erosion from storm surges) on water and sewer facilities for communities most vulnerable along shorelines of rivers and seas.</li> <li>Investigate the contamination impacts from flooding on surface water and well water sources for drinking water and sewage lagoons.</li> <li>Address public health impacts due to contamination of public drinking water and surface water from climate change related storm surge, coastal inundation or erosion on dumps, landfills and sewage lagoons. <b>Cross-cutting with Health &amp; Culture TWG</b></li> </ul>
			5-3M Piers. <ul style="list-style-type: none"> <li>Increase construction protocols/conventions for piers and wharves for wave strength</li> </ul>
			5-3 N Landfills. <ul style="list-style-type: none"> <li>Address the current and future flooding and erosion impacts to dumps and landfills caused by storm surges for communities most vulnerable along shorelines of rivers and seas.</li> </ul>
		<b>5-4 When public infrastructure is replaced or built, use siting, design, engineering standards and codes, and maintenance practices that address climate change conditions.</b>	
			5-4 A Develop new Codes and Standards. <ul style="list-style-type: none"> <li>Develop standards and codes for siting, design, engineering, and operations to prevent or reduce impacts of climate change on public infrastructure.</li> <li>Strengthen existing building codes for new infrastructure and incorporate an increase in building inspection effectiveness as part of the strengthened codes.</li> <li>Incorporate projected climate change considerations into the design storm event, as the design criteria applicable to</li> </ul>

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			vulnerable infrastructure.
			<p>5-4B 1<sup>st</sup> floor Elevations in Flood Zones.</p> <ul style="list-style-type: none"> <li>Evaluate the need for raising or redeveloping structures to a defined elevation above the base flood elevation. Such action would need to be based on compliance with climate change-proofed comprehensive standards/codes; base flood elevation refers to the 100-yr flood incorporating sea level rise considerations.</li> </ul>
			<p>5-4C Airports and Landing Strips.</p> <ul style="list-style-type: none"> <li>Develop new standards for developing airport and landing strips in light of climate change impacts.</li> <li>Develop a comprehensive airstrip maintenance plan to address issues associate with climate impacts (thawing permafrost, ice, heavy precipitation, flooding, vegetative growth, etc...).</li> <li>Re-evaluate current icing and ice control methods due to more ice from longer seasonal transition periods.</li> <li>Evaluate and address dangerous flying conditions associated with icing, coastal fog, and non-traditional storms.</li> </ul>
			<p>5-4D Public Buildings.</p> <ul style="list-style-type: none"> <li>Establish a mechanism to evaluate and recommend new design standards for structures (and placement of mechanical and electrical equipment) that may be vulnerable to SLR and associated hazards</li> </ul>
			<p>5-4E Coastal and River Shorelines.</p> <ul style="list-style-type: none"> <li>Evaluate structural and non-structural options for beach protection (flood walls, dune restoration and creation, and periodic beach nourishment).</li> <li>Evaluate existing shoreline protection structures to determine their effectiveness under varying sea level rise and the need for modification/ replacement/ abandonment.</li> <li>Review of available Federal, state, and local shoreline protection programs; provide recommendations on how each could be modified to address future changes in seas level rise with respect to infrastructure and other land assets</li> </ul>
			<p>5-4F Fuel Delivery and Storage, Utility and Fuel Pipelines.</p> <ul style="list-style-type: none"> <li>Develop new standards for the future development of shoreline and river-side fuel delivery, storage, and pipeline facilities. <b>Health &amp; Culture TWG raises this as cross-cutting issue.</b></li> <li>Develop appropriate standards for the future development of buried and above-ground utility and oil pipelines taking into account sea level rise, coastal and river erosion, and thawing permafrost.</li> </ul>
			<p>5-4G Dikes, Levees, Seawalls and Similar Structures.</p> <ul style="list-style-type: none"> <li>Evaluate the effectiveness of hard structural options such as dikes, levees, floodwalls, saltwater intrusion barriers and install these options based upon effectiveness and feasibility.</li> </ul>
			<p>5-4H Design Standards for Floods.</p> <ul style="list-style-type: none"> <li>Revise design standards to address lower probability events (e.g. some cities are protecting to the 500 year event rather than the 100 year event because of the increased vulnerability).</li> </ul>

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			5-4I Harbors. <ul style="list-style-type: none"> <li>• Develop measures to minimize the impacts of siltation in harbors stemming from glacier melt and flooding events.</li> <li>• Provide incentives for the development of mechanisms that can minimize the levels of and impacts from siltation in harbors.</li> </ul>
			5-4J Highways, Roads, Bridges, Sidewalks. <ul style="list-style-type: none"> <li>• Strengthen design codes for bridges, roads, and highways, to account for climate impacts</li> </ul>
			5-4K Landfills. <ul style="list-style-type: none"> <li>• Develop new standards for the future development of landfills that will address impacts associate with climate change such as sea level rise, thawing permafrost, and more intense storms.</li> </ul>
			5-4L Piers and Wharves. <ul style="list-style-type: none"> <li>• Review construction standards for piers and wharfs for wave strength. Sea ice will impact offshore resource development and marine supply to coastal villages. This is of special importance for the Bering, Chukchi and Southern Beaufort Seas.</li> <li>• Create new standards for floating piers to accommodate both lower water flow and flooding events. Create new standards for floating piers to accommodate both higher water levels and flooding events. (both of these are in the draft catalog?)</li> </ul>
			5-4M Water, Sewer and Storm Water Systems. <ul style="list-style-type: none"> <li>• Develop new standards for designing water and sewer systems that will address future conditions caused by climate change.</li> <li>• Evaluate and improve capacity of storm water infrastructure in areas subject to increasing high intensity rainfall events.</li> </ul>
			5-4N Soft Structural, Bioengineered and Vegetative Engineering Options. <ul style="list-style-type: none"> <li>• Develop a suite of low-technology and soft structural/bio-engineered construction and best management techniques for Alaska’s regions that will protect natural coastlines, riverfronts, improve drainage, and reduce storm water retention (including but not to vegetative solutions, better use of natural swales and wetlands and reduced paving).</li> <li>• Initiate a study that examines the replacement of soft protection options with hard structural options such as dikes, levees, floodwalls, saltwater intrusion barriers (this presupposes a solution).</li> <li>• Evaluate and develop a management plan for vegetative growth along infrastructure (highways, pipelines, etc.) where vegetation has not previously been (North Slope).</li> <li>• Minimize the installation of paved surfaces as a strategy for flood runoff control.</li> <li>• Plant trees and other vegetation to reduce flooding and erosion. Where practical, develop and implement a tree planting program along vulnerable coastal areas as a flooding control strategy. In areas where vegetative solutions</li> </ul>

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			<p>are implemented, ATV use should be limited.</p> <ul style="list-style-type: none"> <li>Evaluate the effectiveness of soft structural options such as dune restoration and creation, wetland restoration, periodic beach nourishment, temporary barriers and other options and implement the best options based upon effectiveness and feasibility.</li> </ul>
<b>6. Integrate climate change considerations into planning for emergencies, new public infrastructure, community land use and facilities.</b>			
		<b>6-1 Integrate comprehensive emergency, community and transportation planning to prevent or reduce impacts to public infrastructure from climate change. Use community land use, zoning, setbacks and other land management tools.</b>	
			<p>6-1A Siting Public Infrastructure.</p> <ul style="list-style-type: none"> <li>Site industrial systems away from areas vulnerable to changes in sea level rise and associated hazards.</li> <li>Increase erosion and hazard planning focused on all coastlines, especially sheltered coastlines.</li> </ul>
			<p>6-1B Emergency and Disaster Planning.</p> <ul style="list-style-type: none"> <li>Community emergency and disaster plans, including emergency evacuation routes, must incorporate climate change considerations. For example, include storm-surge evacuation planning.</li> <li>Require all municipalities to have written and operational disaster response plans that are updated at least every 5 years, and that include consideration of likely changes in the frequency and intensity of extreme events due to climate change.</li> <li>Re-evaluate evacuation routes in light of climate change and modify as necessary.</li> <li>Synchronize future design with emergency planning and evacuation infrastructure requirements.</li> </ul>
			<p>6-1C Community Planning.</p> <ul style="list-style-type: none"> <li>Integrate climate change considerations into community comprehensive, land use and facility planning.</li> <li>Add additional planning scrutiny to prevent new development from infringing upon sensitive shoreline areas subject to sea level rise hazards.</li> <li>Guide future development out of areas vulnerable to sea level rise and associated hazards.</li> <li>Require that counties act on comprehensive planning requirements.</li> <li>Evaluate presence and significance of threatened historical structures and develop plans for their relocation and/or protection.</li> </ul>
			<p>6-1D Development Setbacks and Related Tools.</p> <ul style="list-style-type: none"> <li>Require communities to implement simple set-back ordinances for new construction in areas that are or likely will be impacted by climate change related hazards.</li> <li>Community and state planning should include and enforce setback ordinances/no-development zones for coastal areas and river banks that will be subject to climate change impacts.</li> <li>Evaluate the need for shoreline erosion buffers in zones subject to flooding in which significant infrastructure is</li> </ul>

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			<p>located.</p> <ul style="list-style-type: none"> <li>• End permitting of new homes in areas vulnerable to sea level rise and associated hazards.</li> <li>• Investigate potential and limitations of eminent domain, vesting, grandfathering, and amortizing strategies to support retreat activities.</li> <li>• Buy-out undeveloped properties in areas vulnerable to climate change hazards.</li> </ul>
			<p>6-2E Transportation Planning.</p> <ul style="list-style-type: none"> <li>• Ensure climate change is considered as part of update and review of Alaska’s State Transportation Plan and regional plans (e.g. Southeast Alaska Transportation Plan Update).</li> <li>• Review Department of Transportation’s Future Corridors Initiatives to insure it appropriately addresses climate change.</li> <li>• Require/Enable Metropolitan Planning Organizations to take climate into account. (Anchorage MATS <a href="http://www.muni.org/transplan/amats.cfm">http://www.muni.org/transplan/amats.cfm</a> Fairbanks Metropolitan Area Transportation System (FMATS) <a href="http://www.dot.state.ak.us/nreg/planning/fmats/index.shtml">http://www.dot.state.ak.us/nreg/planning/fmats/index.shtml</a>)</li> </ul>
			<p>6-2F Rural Routes.</p> <ul style="list-style-type: none"> <li>• Develop rural infrastructure and alternate routes to supplement lost rural routes due to shortened ice road season, thinner winter ice, insufficient snow, and ground that does not freeze.</li> <li>• Develop new regulations for traveling across ice roads, taking into account thinner ice and shorter season length.</li> <li>• Develop river transportation routes to accommodate lower water flow as well as flooding events.</li> </ul>
			<p>6-3G Airports and Landing Strips.</p> <ul style="list-style-type: none"> <li>• Further develop rural airstrips to accommodate larger planes with greater cargo capacity to compensate for the shortened ice road season.</li> </ul>
<b>7. Integrate climate change considerations into all aspects of siting, development and funding of new public infrastructure.</b>			
<b>7-1 Future public infrastructure investment decisions must consider climate change.</b>			
			7-1A Develop a rational benefit/cost formula for public investments to prevent or reduce impacts to public infrastructure from climate change.
			7-1B Add additional planning scrutiny to future infrastructure investments in undeveloped hazard-affected coastal areas.
			7-1C Limit infrastructure investments in hazard-affected coastal areas.
<b>7-2 Integrate climate change considerations into decision-making policies for replacement and new public infrastructure, community land use and facility siting and design.</b>			
			7-2A Promote the new development of Early-Warning-Radar Sites capable of withstanding thawing permafrost and erosion. (Note: CRREL is working on a project that attempts to look at DOD and climate change risk.)

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			7-2B Use LEED standards for new building construction to reduce heat generation.
			7-2C Develop new, or expand current storm water management facilities and systems to address increased precipitation and possible flooding.
		<b>7-3 Identify public infrastructure and related needs due to increased ice free periods in the Arctic Ocean and Beaufort Sea and increased transshipment and commercial use.</b>	
			<p>7-3A Arctic and Beaufort Sea Shipping and Infrastructure.</p> <ul style="list-style-type: none"> <li>• Evaluate the potential opportunities, risks, and needs associated with reduced sea ice and new shipping lanes opening up in the Arctic Ocean and Bering Sea.</li> <li>• Develop new shipping lanes through the Arctic Ocean and Bering Sea.</li> <li>• Consider establishing a container port facility in Nome, Barrow or Prudhoe Bay, linked by rail, to the continental interior. Without this, opportunities associated with increased arctic shipping will not be realized by Alaska. Alaska could instead be stuck with the bad aspect, e.g. Selendang Ayu messes to clean up. Work with Yukon and BC/Alberta on this.</li> <li>• Monitor shipping lanes through the Arctic Ocean and Bering Sea for ice melt, glacier melt, and related navigation problems.</li> <li>• Sea ice will impact offshore resource development and marine supply to coastal villages. This is of special importance for the Bering, Chukchi and Southern Beaufort Seas.</li> <li>• Address national security concerns associated with new shipping lanes in the Arctic Ocean and Bering Sea.</li> </ul>
		<b>BELOW ARE OTHER ACTIONS/POLICIES FROM OCT 8<sup>TH</sup> DRAFT CATLAOG THAT I AM NOT SURE WHERE TO PUT/WHAT TO DO WITH...</b>	
		?	Establish a Climate Change and Public Infrastructure Task Force (focused on adaptation).
		?	Develop and evaluate a public repurchase program for vulnerable lands and public/private infrastructure.
		Educ?	Create on-line mapping capability for multiple audiences including local governments. NOTE: SNAP program at UAF is working on this.
		?	Permafrost and infrastructure. This is of special importance where non-continuous permafrost occurs and the mean annual temperature is close to the freezing point. Special importance for road and airport construction and maintenance.
		?	<p>Navigational Hazards.</p> <ul style="list-style-type: none"> <li>• Develop operational protocols that specify disclosure requirements for coastal hazards. This should include newly inundated underwater structures that may pose a risk to navigation, among other risks.</li> <li>• Develop retreat strategies for the management of existing structures or conditions that may become submerged</li> </ul>

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			hazards to navigation or public health (e.g. effluent outfalls, water intakes, septic fields, rockwalls, docks, and piers.
		?	Develop a strategy to assure long-term public access to water
		n/a	Assess financial impact of property value changes
		?	Evaluate if the current failures from thawing permafrost were caused by climate change instead of poor design and construction.
		?	Evaluate the potential risks from climate impacts to a ferry system (incl. public transportation and emergency planning)
		?	Develop an emergency evacuation plan for the ferry system
		?	<p>Research and Development - New Transportation Modes.</p> <ul style="list-style-type: none"> <li>• Provide incentives for the development of new modes of transportation that can travel across the altered rural landscape.</li> <li>• Provide incentives for the development of and purchase of nautical vessels capable of navigating rivers during times of low water flow and flooding events.</li> <li>• Provide rural public transportation across new and existing rural transportation routes to more efficiently move people and freight across the altered rural landscape.</li> </ul>
		?	Develop a mechanism that requires utility companies to relocate existing overhead utility wires underground and require new wires to be placed underground. Comment: This option needs to be reviewed by a utility company representative as it may be risky from a reliability and serviceability perspective (i.e. submerged networks).
		?	Provide incentives for the development of increased efficiency of hydroelectricity facilities. (ability to operate with less water).
		n/a?	Assess sea level rise hazard insurance for businesses as part of standard operations
		n/a?	Assess sea level rise hazard insurance for home owners in inundation hazard zones
		n/a?	Investigate opportunities and innovations with potential to benefit the economy, public services, and business sectors
		n/a?	Modification of land use, agricultural, and landscape practices including aquaculture, saline-resistant crops, depending on location and purpose
		?	Develop and use insurance policies to drive and support retreat activities
		?	Evaluate the riparian rights/property rights in the context of sea level rise. Current riparian rights are based on the paradigm that sea level is constant. Could include recommendations for resolving issues resulting from consequences of protective measures.
		?	Develop a strategy for managing the retreat of small and large ports and associated infrastructure, such as rail and roads