

Appendix B

Criteria for Assessing Community Needs

Criteria for Assessing Community Needs

Assigning Response Priorities for Erosion and Flooding in Alaskan Communities

Overview

There is a heightened awareness that many Alaskan communities are suffering from erosion and flooding impacts. When looking to identify those in most need, certain criteria can be utilized to differentiate between the issues in each community. Appropriate criteria for differentiating between communities need to focus upon the characteristics that make up a community. Remote Alaska villages typically are largely native, have a significant interest in culture and tradition, rely heavily upon air and water transportation, have economies that are more based in subsistence/trade/barter than upon the exchange of money for goods and services, and typically do not have the ability to internally raising funds to support develop or maintenance of facilities, infrastructure, or measures for protection against natural phenomenon.

Criteria and Factors

Criteria for assigning priority typically will have one or two factors influencing the criteria's magnitude of concern. Single factor criteria are ones that are general descriptors i.e. Does the community have the ability to pay for a project? A two factor criteria is influenced by two measures i.e. How severely is development being damaged and what is the timeline for the damage?

Developing Criteria and Rankings

No single person should believe they can make the determinations of what criteria are to be used, how to scale the criteria, how to weight the criteria, or assigning values for criteria for items being ranked. A typical approach to develop these items is to assemble an "expert panel" of individual from the area of expertise needed. These experts are typically not policy makers or agency executives. These individuals are those who work most closely to the actual problems and are integrally involved in formulating, describing, and developing solutions.

Alaska Baseline Erosion Risk Criteria Workshop

A workshop was held at Alaska District to develop the risk criteria for which the communities can be assessed.

A focus of discussion at the workshop was the identification of Evaluation Factors for scoring the relative Severity of Expected Erosion Damages across communities. After initial brainstorming and screening, a list of Evaluation Factors was identified for further consideration for ranking communities based upon the level of information available in the ABEA Erosion Information Papers (EIPs). Relative weights were identified for each factor. The identified factors and weights are presented in Table 1.

Table 1 – Workshop Identified Evaluation Factors and Weights

Evaluation Factor	Relative Weight
Infrastructure (School, Utilities, Transportation, Critical)	3
Life Safety	3
Subsistence and Shoreline Use Being Limited	2
Setting/Geographic Location	1
Time Until Damage	3
Population	1
Housing In Parallel	2
Environmental Hazard	3
Cultural Importance	1
Percent Of Affected (Numbers of Structure/People)	2
Commercial/Public/Store/Church/Community Infrastructure	2
<i>Source: Meeting Minutes provided to Tetra Tech by Melanie Harrop, 1/23/08.</i>	

Further consideration of the identified factors following the meeting resulted in the following recommendations:

- 1) “Population” and “Percent of Affected” be combined into one category: “Housing and Population Affected” – these categories seem to be similar and may have the effect of doubling the weight for the impact on housing.
- 2) “Time until Damage” be removed as a Severity of Damage Evaluation Factor and instead be rated and multiplied by the Severity of Damage Score for each community as a more appropriate way of scoring the relative Erosion Risk at each community. (See Section 3).
- 3) Several of the headings have suggested editorial changes

Table 2 presents the suggested changes to the identified Evaluation Criteria.

Table 2 – Suggested Revisions to Identified Evaluation Factors

Evaluation Factor	Relative Weight
Critical Infrastructure (for example, School, Utilities, Transportation)	3
Human Health and Safety	3
Subsistence and Shoreline Use	2
Community Setting/Community Geographic Location	1
Time Until Damage	3
Housing and Population Affected	1
Housing in Parallel	2
Environmental Hazard (for example, Landfills, Sewer Lines, Sewage Lagoons, Fuel Tanks)	3
Cultural Importance	1
Percent Of Affected (Numbers of Structure/People)	2
Commercial/Public/Store/Church/Community Infrastructure	2

Incorporation of Risk Consideration into Methodology

There are various definitions of risk. The Corps of Engineer’s report Beyond Expected Value: Making Decisions under Risk and Uncertainty (USACE, IWR Report 02-R-4 (Dick Males); September 2002) provides the following simplistic definition of risk and uncertainty:

“Risk is the chance of something bad happening. Uncertainty is a characteristic of a situation in which a number of possibilities exist but we do not know which of them will occur. Uncertainty exists because of natural variability and knowledge gaps.”

The entire BEA study is a risk analysis (examination of erosion risk) across communities throughout the state. Due to the number of communities with potential problems, Alaska District is proceeding with the study in an iterative manner to systematically assess the relative risk across communities and prioritize follow-on detailed study activity on those communities at the highest perceived risk first.

Risk analysis as applied to the Corps Civil Works problems can be viewed as having three components:

- Risk assessment;
- Risk communication; and
- Risk management.

In Risk Analysis and Risk Informed Decision Making: An Overview (USACE; Planning Ahead, Volume 10, Issue 10 (Brian Harper/David Moser) November, 2007), these three components are described as follows:

- Risk assessment is a systematic process for quantifying and describing the nature, likelihood, and magnitude of risk associated with a situation, action, or event. The assessment includes consideration of relevant uncertainties.
- Risk management is the process used to identify, evaluate, select, implement, monitor and modify actions taken to alter levels of risk. The goal of risk management is scientifically sound, cost-effective, integrated actions that reduce risks while taking into account economic, environmental, social, cultural, ethical, political and legal considerations.
- Risk communication is the open, two-way exchange of information and opinion about hazards and risks leading to a better understanding of the risks and better risk management decisions.

The prioritization exercise which is the topic of this memo is a form of risk assessment where the *Severity of Damage* ratings estimate the relative nature and magnitude of erosion risk in each community and the *Time Until Damage* ratings estimate the likelihood/timing of the expected event. Together, these two factors can provide the basis for prioritizing communities for further evaluation. The following relationship is recommended:

$$\text{Erosion Risk Ranking} = \text{Severity of Damage Score} * \text{Time until Damage Score}$$

Risk assessment should also explicitly consider the uncertainties that are inherent to our estimates of the *Severity of Damage* and *Time until Damage*. Based on the preliminary level of data (in many cases anecdotal, subjective descriptions) available for the EIP's, the largest source of uncertainty for both scale ratings is likely information gaps (for example; no data available, overly general information available, or uncertainty in reliability of available data).

During the rating of "Time until Damage" for each community, a rating of the relative confidence in the score also be recorded. This allows explicit consideration of the uncertainty in the ratings by providing another layer of information (For example, "We think Community X has a rating of 20 however because of uncertainty in our estimate of Time until Damage, its rating could range from a 15 to a 25. This information is useful for informing the prioritization decision making process and allows for flexibility in selecting communities for further study.

Severity of Damage Evaluation Factor Rating Criteria:

Through research by the PDT, input from the workshop, and recommendations by Tetra Tech, a consultant to the Corps assisting on the Baseline Erosion Assessment, the following criteria have been developed. Tetra Tech compiled these thoughts and with their additional insight, submitted the following criteria. These are now the proposed that will be utilized is assessing the risk for each community. Table 3 documents these criteria.

Table 3 – Draft Rating Criteria for Severity of Damage Evaluation Factors

Evaluation Factor	Weight	Scoring Criteria	
Critical Infrastructure (for example, School, Utilities, Transportation)	3	Low Impact (1)	<ul style="list-style-type: none"> ▪ One item of critical community infrastructure at risk ▪ Loss of infrastructure would not result in loss of community sustainability ▪ Damage could be repaired or alternative service restored in less than 1 month
		Medium Impact (2)	<ul style="list-style-type: none"> ▪ More than one item of critical community infrastructure at risk ▪ Loss would not result in loss of community sustainability ▪ Damage could be repaired or alternative service restored between 1 and 6 months
		High Impact (3)	<ul style="list-style-type: none"> ▪ More than one item of critical community infrastructure at risk ▪ Loss would impact community sustainability ▪ Repaired or establishment of alternative service would take more than 6 months
Human Health and Safety	3	Low Impact (1)	<ul style="list-style-type: none"> • Situations that would cause life safety concerns or negatively affect ability to provide emergency services are not likely • Ingress/egress to/from community not at risk • Community has ability to mitigate or avoid life safety concerns
		Medium Impact (2)	<ul style="list-style-type: none"> • Only rare events would threaten life safety • Access to or from community by land or airport threatened • Quick and easy access to emergency services is available

Table 3 – Draft Rating Criteria for Severity of Damage Evaluation Factors

Evaluation Factor	Weight	Scoring Criteria	
		High Impact (3)	<ul style="list-style-type: none"> • Erosion damage is expected to result in human health and safety concerns • Critical health/safety services facility at risk • Portions or all of the population cut-off from emergency services • Air &/or road access at great risk or impassable to all or a portion of community
Subsistence and Shoreline Use	2	Low Impact (1)	<ul style="list-style-type: none"> • Minor and temporary interruptions that are a nuisance but made up in same year • Damage could be repaired locally, for example regarding boat launch access each spring • Access is altered but not of substantial consequence or inconvenience
		Medium Impact (2)	<ul style="list-style-type: none"> • Frequent loss or disruption of access to subsistence or damage to important shoreline uses • Structural mitigation of risk practicable solution but may disrupt high value traditional use and access areas • Critical habitat &/or use areas mild to moderately threatened; traditional practices inconvenienced but not disrupted
		High Impact (3)	<ul style="list-style-type: none"> • Interruptions sever enough to impact supply on a continual basis • Critical habitat &/or use areas severely threatened; traditional practices limited to focus on survival • Structural mitigation of risk possible but may eliminate or harm vital subsistence/shoreline use area

Table 3 – Draft Rating Criteria for Severity of Damage Evaluation Factors

Evaluation Factor	Weight	Scoring Criteria	
Community Setting/Community Geographic Location	1	Low Impact (1)	<ul style="list-style-type: none"> • Land is readily available in erosion free zones for new development or relocations • Soils, hydrology/hydraulic conditions not conducive to erosion; aggregate resources available locally if erosion protective measures needed • Land use controls in place and/or safe land area between shoreline and development exists
		Medium Impact (2)	<ul style="list-style-type: none"> • Lands in erosion free zones are limited, precluding new development or relocations into safe areas • Soils and hydrologic/hydraulic conditions conducive to erosion • Limited distance between shoreline and development but safe zones available and some local resources to assist with mitigating problem
		High Impact (3)	<ul style="list-style-type: none"> • High erosion rates and flooding • Poor soils conducive to erosion, permafrost melt possible added impact • No or limited safe land areas to move structures; community on barrier islands or spit • Community is hub of goods/services supporting other communities in region/sub-region
Housing and Population Affected	1	Low Impact (1)	<ul style="list-style-type: none"> • Less than 10 % of population/housing affected • Alternative housing available

Table 3 – Draft Rating Criteria for Severity of Damage Evaluation Factors

Evaluation Factor	Weight	Scoring Criteria	
		Medium Impact (2)	<ul style="list-style-type: none"> • 10 to 25% of population/housing affected • Alternative housing available but limited
		High Impact (3)	<ul style="list-style-type: none"> • Over 25% of population/housing • Limited to no alternative housing available
Housing in Parallel	2	Low Impact (1)	<ul style="list-style-type: none"> • Only a few waterfront structures and limited associated infrastructure at risk (one time loss)
		Medium Impact (2)	<ul style="list-style-type: none"> • Multiple Rows of structures parallel to waterfront and limited associated infrastructure improvements are at risk (expected future recurrence of damages)

Table 3 – Draft Rating Criteria for Severity of Damage Evaluation Factors

Evaluation Factor	Weight	Scoring Criteria	
		High Impact (3)	<ul style="list-style-type: none"> • Multiple Rows of structures parallel to waterfront and extensive associated infrastructure improvements are at risk (higher level of expected future recurrence of damages)
Environmental Hazard (for example, Landfills, Sewer Lines, Sewage Lagoons, Fuel Tanks)	3	Low Impact (1)	<ul style="list-style-type: none"> • Minor issue that can be easily addressed at the time of damage • Impact can be addressed locally
		Medium Impact (2)	<ul style="list-style-type: none"> • Moderate environmental effect that will require limited intervention by an external agency for a limited period of time
		High Impact (3)	<ul style="list-style-type: none"> • Large issue that will require extensive intervention by one or more external agencies for an extended period of time • Damage or loss will impact the entire population or high % of population, such as contaminated water supply • If erosion causes environmental impact that has long term impacts &/or impacts to other communities or region may suffer (such as hazardous substances, fuel facilities or landfills eroding into an anadromous stream)

Table 3 – Draft Rating Criteria for Severity of Damage Evaluation Factors

Evaluation Factor	Weight	Scoring Criteria	
Cultural Importance	1	Low Impact (1)	<ul style="list-style-type: none"> • Minor or temporary disruption in cultural/traditional activities with no lingering negative impacts • Minimal expected damage to known cultural and historic resources
		Medium Impact (2)	<ul style="list-style-type: none"> • Intervention required for community to continue with cultural/traditional activities • Some cultural resources are lost, but rarely occurs without appropriate records being taken to catalog what resources have been lost.
		High Impact (3)	<ul style="list-style-type: none"> • Cultural resource being lost at a high rate with little or no ability to catalog and record what is being lost. • Traditional practices are being abandoned to focus solely on life-safety and survival.
Commercial/Non-Residential	2	Low Impact (1)	<ul style="list-style-type: none"> • Impacts have no or little affect on overall community cash flow • Little and only temporary impact to a community’s ability to operate their commercial facilities with minor interruptions • Little or no exterior financial support is necessary to re-establish full capacity

Table 3 – Draft Rating Criteria for Severity of Damage Evaluation Factors

Evaluation Factor	Weight	Scoring Criteria	
		<p>Medium Impact (2)</p>	<ul style="list-style-type: none"> • Impacts have moderate impact on overall community cash flow • Impacts to a community’s commercial infrastructure will require significant external assistance to come back to full capacity • Loss of commercial infrastructure can be handled at an alternative site or location (such as a 2nd local store, or other commercial/public dock facilities)
		<p>High Impact (3)</p>	<ul style="list-style-type: none"> • Impacts have severe, dramatic affect on cash flow of a community • The ability to operate the commercial sector for the community is severely impacted • Loss of commercial infrastructure will impact entire community (such as loss of a single store, with no replacement facilities); or ability to gather materials or have goods and services brought in is no longer possible (i.e. a commercial dock is destroyed with no replacement or alternate facilities)

Revised Strawman Matrix

Following the workshop, Tetra Tech prepared a prioritization ranking framework that incorporates the risk assessment factors described in the recommendations in this memorandum. The framework is presented in Table 4 and provided as an electronic file (Excel spreadsheet) under separate cover.

The spreadsheet file would allow the District to enter accepted scoring values for each Evaluation Factor in Table 3 from drop down lists, apply user defined weights (currently set to those in Table 3), select accepted scoring values for Time until Damage, and select accepted values for Confidence in Time until Damage estimates. The spreadsheet calculates a Damage Score based upon the Evaluation Factors and their respective weights, and calculates Community Ranking Scores with uncertainty based upon user selected confidence in the Time until Damage rating. (Note that the scores shown in Table 4 are for example only and do not reflect scores developed for any specific communities.).

TABLE 4 - DRAFT COMMUNITY RANKING METHODOLOGY

<p align="center">SCORES FOR COMMUNITY RANKING CRITERIA BASED UPON INFORMATION IN EIPS</p>		Community 1	Community 2	Community 3	Community 4	Community 5	Community 6	Community 7	Community 8	Community 9	Community 10	Community 11	Community 12
		<i>SEVERITY OF DAMAGE:</i>											
<p>Critical Infrastructure (for example, School, Utilities, Transportation)</p>	<p>(1) LOW IMPACT:</p> <ul style="list-style-type: none"> • One item of critical community infrastructure at risk • Loss of infrastructure would not result in loss of community sustainability • Damage could be repaired or alternative service restored in less than 1 month 												
	<p>(2) MEDIUM IMPACT:</p> <ul style="list-style-type: none"> • More than one item of critical community infrastructure at risk • Loss would not result in loss of community sustainability • Damage could be repaired or alternative service restored between 1 and 6 months 	0	1	1	1	1	1	2	2	2	3	3	3
	<p>(3) HIGH IMPACT:</p> <ul style="list-style-type: none"> • More than one item of critical community infrastructure at risk • Loss would impact community sustainability • Repaired or establishment of alternative service would take more than 6 months 												

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<p align="center">Human Health and Safety</p>	<p>(1) LOW IMPACT:</p> <ul style="list-style-type: none"> • Situations that would cause life safety concerns or negatively affect ability to provide emergency services are not likely • Ingress/egress to/from community not at risk • Community has ability to mitigate or avoid life safety concerns 												
	<p>(2) MEDIUM IMPACT:</p> <ul style="list-style-type: none"> • Only rare events would threaten life safety • Access to or from community by land or airport threatened • Quick and easy access to emergency services is available 	0	1	1	1	1	1	2	2	2	3	3	3
	<p>(3) HIGH IMPACT:</p> <ul style="list-style-type: none"> • Erosion damage is expected to result in human health and safety concerns • Critical health/safety services facility at risk • Portions or all of the population cut-off from emergency services • Air &/or road access at great risk or impassable to all or a portion of community 												

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<p align="center">Subsistence and Shoreline Use</p>	<p>(1) LOW IMPACT:</p> <ul style="list-style-type: none"> • Minor and temporary interruptions that are a nuisance but made up in same year • Damage could be repaired locally, for example regarding boat launch access each spring • Access is altered but not of substantial consequence or inconvenience 	0	1	1	1	1	1	2	2	2	3	3	3
	<p>(2) MEDIUM IMPACT:</p> <ul style="list-style-type: none"> • Frequent loss or disruption of access to subsistence or damage to important shoreline uses • Structural mitigation of risk practicable solution but may disrupt high value traditional use and access areas • Critical habitat &/or use areas mild to moderately threatened; traditional practices inconvenienced but not disrupted 												
	<p>(3) HIGH IMPACT:</p> <ul style="list-style-type: none"> • Interruptions severe enough to impact supply on a continual basis • Critical habitat &/or use areas severely threatened; traditional practices limited Structural mitigation of risk possible but may eliminate or harm vital subsistence/shoreline use area 												

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<p align="center">Community Setting/Community Geographic Location</p>	<p>(1) LOW IMPACT:</p> <ul style="list-style-type: none"> • Land is readily available in erosion free zones for new development or relocations • Soils, hydrology/hydraulic conditions not conducive to erosion; aggregate resources available locally if erosion protective measures needed • Land use controls in place and/or safe land area between shoreline and development exists 												
	<p>(2) MEDIUM IMPACT:</p> <ul style="list-style-type: none"> • Lands in erosion free zones are limited, precluding new development or relocations into safe areas • Soils and hydrologic/hydraulic conditions conducive to erosion • Limited distance between shoreline and development but safe zones available and some local resources to assist with mitigating problem 	0	1	1	1	1	1	2	2	2	3	3	3
	<p>(3) HIGH IMPACT:</p> <ul style="list-style-type: none"> • High erosion rates and flooding • Poor soils conducive to erosion, permafrost melt possible added impact • No or limited safe land areas to move structures; community on barrier islands or spit • Community is hub of goods/services supporting other communities in region/sub-region 												

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<p align="center">Housing and Population Affected</p>	<p>(1) LOW IMPACT: • Less than 10 % of population/housing affected • Alternative housing available</p>												
	<p>(2) MEDIUM IMPACT: • 10 to 25% of population/housing affected • Alternative housing available but limited</p>	0	1	1	1	1	1	2	2	2	3	3	3
	<p>(3) HIGH IMPACT: • Over 25% of population/housing • Limited to no alternative housing available</p>												
<p align="center">Housing in Parallel</p>	<p>(1) LOW IMPACT: • Only a few waterfront structures and limited associated infrastructure at risk (one time loss)</p>												
	<p>(2) MEDIUM IMPACT: • Multiple Rows of structures parallel to waterfront and limited associated infrastructure improvements are at risk (expected future recurrence of damages)</p>	0	1	1	1	1	1	2	2	2	3	3	3
	<p>(3) HIGH IMPACT: • Multiple Rows of structures parallel to waterfront and extensive associated infrastructure improvements are at risk (higher level of expected future recurrence of damages)</p>												

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<p align="center">Environmental Hazard</p>	<p>(1) LOW IMPACT:</p> <ul style="list-style-type: none"> • Minor issue that can be easily addressed at the time of damage • Impact can be addressed locally 	0	1	1	1	1	1	2	2	2	3	3	3
	<p>(2) MEDIUM IMPACT:</p> <ul style="list-style-type: none"> • Moderate environmental effect that will require limited intervention by an external agency for a limited period of time 												
	<p>(3) HIGH IMPACT:</p> <ul style="list-style-type: none"> • Large issue that will require extensive intervention by one or more external agencies for an extended period of time • Damage or loss will impact the entire population or high % of population, such as contaminated water supply • If erosion causes environmental impact that has long term impacts &/or impacts to other communities or region may suffer (such as hazardous substances, fuel facilities or landfills eroding into an anadromous stream) 												

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<p>Cultural Importance</p>	<p>(1) LOW IMPACT: <ul style="list-style-type: none"> • Minor or temporary disruption in cultural/traditional activities with no lingering negative impacts • Minimal expected damage to known cultural and historic resources </p>												
	<p>(2) MEDIUM IMPACT: <ul style="list-style-type: none"> • Intervention required for community to continue with cultural/traditional activities • Some cultural resources are lost, but rarely occurs without appropriate records being taken to catalog what resources have been lost. </p>	0	1	1	1	1	1	2	2	2	3	3	3
	<p>(3) HIGH IMPACT: <ul style="list-style-type: none"> • Cultural resource being lost at a high rate with little or no ability to catalog and record what is being lost. • Traditional practices are being abandoned to focus solely on life-safety and survival. </p>												

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<p align="center">Commercial/ Non-Residential</p>	<p>(1) LOW IMPACT:</p> <ul style="list-style-type: none"> • Impacts have no or little affect on overall community cash flow • Little and only temporary impact to a community's ability to operate their commercial facilities with minor interruptions • Little or no exterior financial support is necessary to re-establish full capacity 	0	1	1	1	1	1	2	2	2	3	3	3
	<p>(2) MEDIUM IMPACT:</p> <ul style="list-style-type: none"> • Impacts have moderate impact on overall community cash flow • Impacts to a community's commercial infrastructure will require significant external assistance to come back to full capacity • Loss of commercial infrastructure can be handled at an alternative site or location (such as a 2nd local store, or other commercial/public dock facilities) 												
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SCORES FOR COMMUNITY RANKING CRITERIA BASED UPON INFORMATION IN EIPS	Community 1	Community 2	Community 3	Community 4	Community 5	Community 6	Community 7	Community 8	Community 9	Community 10	Community 11	Community 12
DAMAGE SCORE:	0	18	18	18	18	18	36	36	36	54	54	54

TIME UNTIL DAMAGE:													
TIME UNTIL DAMAGE RATING	<i>Enter One of Following Values or Select from Drop Down List: 3 for Short Term (1 to 10 Years) 2 for Mid Term (10 to 20 years) 1 for Long Term (20 years and beyond)</i>	1	2	2	2	2	3	1	2	3	1	2	3
CONFIDENCE IN TIME UNTIL DAMAGE RATING	<i>Enter Closest of following Values or Select from Drop Down List: 25% Confidence Rating (Hunch) 50% Confidence Rating (Educated Guess) 75% Confidence Rating (Think so) 100% Confidence Rating (Sure)</i>	25%	25%	50%	75%	100%	25%	25%	75%	100%	25%	75%	100%

COMMUNITY RANKING SCORES:												
COMMUNITY RANKING SCORE:	0	36	36	36	36	54	36	72	108	54	108	162
CONFIDENCE RANGE LOW:	0.0	22.5	27.0	31.5	36.0	40.5	36.0	63.0	108.0	54.0	94.5	162.0
CONFIDENCE RANGE HIGH:	0.0	49.5	45.0	40.5	36.0	54.0	63.0	81.0	108.0	94.5	121.5	162.0