Date: August 26, 2015
Division: Pacific Ocean Division
District: Alaska District
District Working Draft

POINT WORONZOF SECTION 103 STORM DAMAGE REDUCTION
Continuing Authorities Program (CAP) Section 103
Preliminary CAP Fact Sheet

1. **Project Name:**

Point Woronzof Coastal Storm Damage Reduction Section 103

2. **Location of Project/Congressional District:**

Point Woronzof is located at the northwest end of Ted Stevens Anchorage International Airport within the Municipality of Anchorage (Figure 1). The Municipality of Anchorage has a population of 300,000 and is located 260 air miles south of Fairbanks and 1,450 air miles northwest of Seattle.

The study area is in the Alaska Congressional District, which has the following congressional delegation:

Senator Lisa Murkowski (R-AK)
Senator Dan Sullivan(R-AK)
Representative Don Young (R-AK)

3. **Study Authority:**

This study is being performed under Section 103 of the Rivers and Harbors Act of 1962 (P.L. 87-874), as amended, and in accordance with current policies and procedures governing projects of the same type, which are specifically authorized by Congress.

Section 103 has a Federal expenditure limit of $5.0 million, with a cost share requirement of 50/50 (Federal/Non-Federal, respectively) during the Feasibility portion of the project, and a 65/35 cost share (Federal/Non-Federal) during the design and construction portion of the project. The 103 authority may be used for protecting multiple public and private properties and facilities, and single non-Federal public properties and facilities, against damages caused by storm-driven waves and currents.

4. **Study Purpose:**

The purpose of this study is three-fold: First, identify problems and opportunities for providing storm damage reduction at Point Woronzof; second, determine whether there is a Federal (Corps) interest in project continuation into feasibility and construction; and third, identify a non-Federal sponsor willing and able to share in the costs and/or labor associated with feasibility and construction if a Federal interest is determined to be warranted.

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

The Alaska Earthquake, March 27, 1964, Effects on Communities: This document looks at the effects of the March 27, 1964 earthquake on Anchorage, Alaska. The report investigates the geology of the Anchorage area, seismic effects on Anchorage infrastructure such as the Alaska Railroad and marshalling yards, Anchorage International Airport, Cordova Building, Elmendorf Air Force Base, and historic land sliding in Anchorage and surrounding area prior to the March 27th earthquake.

Tony Knowles Coastal Trail Rehabilitation Project Erosion Study Combined Document: This study was developed by USKH Inc. (1998) and evaluates the potential for coastal erosion damage to the Tony Knowles Coastal Trail. The study proposes three alternatives for restoration of the area and has four sub-study elements: (1) evaluation of Point Woronzof Bluff stabilization concepts, (2) erosion potential and remediation options at Point Woronzof Bluff, (3) erosion potential and remediation of the Tony Knowles Coastal Trail, and (4) investment alternatives.

Ted Stevens Anchorage International Airport 2014 Master Plan Update Chapter 2: This Master Plan update identifies conditions of existing inventory, condition and capabilities of land area, facilities, infrastructure, and operations at Ted Stevens Anchorage International Airport. The general purpose of this report is to provide a baseline understanding of the facilities and operations for future planning considerations.

6. Plan Formulation:

The continued erosion of the Point Woronzof bluff presents a number of problems to the existing infrastructure located adjacent to the bluff. These problems include losing the use of Runway 33 at Ted Stevens Anchorage International Airport, loss of a portion of the Tony Knowles Coastal Trail, and loss of access to the Alaska Water and Wastewater Treatment Plant.

a. Identified Problems:

Ted Stevens Anchorage International Airport: Ongoing erosion at Point Woronzof Bluff is encroaching upon the safety area of Ted Stevens Anchorage International Airport's (ANC) primary departure runway, (Runway 33). ANC is the largest airport in Alaska and serves as both the primary passenger airport for Alaska and a major international freight hub for cargo transported between Asia and the United States. Loss of the use of Runway 33 would have a severe impact on the capacity of the airfield to support air traffic, which could result in millions of dollars in lost revenue (Figure 1).

Tony Knowles Coastal Trail: The coastal trail is one of the most popular and well-used recreational assets in Anchorage. The Tony Knowles Coastal Trail provides recreational users (e.g. cross country skiers, walkers, runners, rollerbladers, and cyclists) a unique view of Knik Arm and Cook Inlet. A significant portion of the trail is located along the Point Woronzof Bluff area and is being endangered by the bluff erosion. Loss of the trail would remove a vital recreational asset of the Anchorage community (Figure 1).

Point Woronzof Drive: Point Woronzof Drive traverses Point Woronzof Bluff for approximately 1.5 miles, of which approximately 1 mile is being endangered by the bluff erosion. Point Woronzof Drive allows access to Point Woronzof Overlook, Anchorage Water and Wastewater Treatment plant, ANC for maintenance, and the Tony Knowles Coastal Trail. Loss of Point Woronzof Drive would eliminate access to these facilities (Figure 1).

Point Woronzof Overlook: Point Woronzof Overlook features a 60 slot parking area with trail access to Tony Knowles Coastal Trail, and is located on the northwestern end of ANC. The overlook allows visitors and Alaska residents to observe Cook Inlet and Knik Arm. From this observation point people have the possibility of seeing belugas and other sea life, the famous Turnagain Arm bore tide, and aircraft take off and land from ANC. It is anticipated that the parking lot providing trail and park access will be affected by erosion within 15 years. Relocation costs of the parking lot are estimated to be $420,000 in 2014 dollars (Figure 1).[1]

Figure 1: Impacted Infrastructure Layout

[1] USKH, Inc. *Tony Knowles Coastal Trail rehabilitation Project Erosion Study Combined Document.* Prepared for MOA Department of Cultural and Recreation Services Parks and Beautification Division. September 1998.

Historical Native Ground: **"**Point Woronzof is the site of two Dena'ina historical and cemetery sites. The Point Woronzof area contains a housing structure, along with a cemetery containing the remains of Dena'ina people who died from the 1917 influenza epidemic[2]**"**. Any investigation or disturbance of the area would have to be coordinated with Dena'ina representatives.

- **Existing Conditions:**

Physical Properties: The project site is located along Knik Arm and is subject to the tide range measured at the Port of Anchorage (Table 1).

Table 1: Tides at Anchorage, Alaska

Published tidal data for Anchorage, Alaska (ft)

Highest Observed Water Level (10/06/02)…	+34.86
Mean Higher High Water (MHHW).....	+29.16
Mean High Water (MHW).....	+28.44
Mean Sea Water (MSL).....	+16.47
Mean Tide Water (MTL).....	+15.34
Mean Low Water (MLW).....	+2.25
Mean Lower Low Water (MLLW).....	0.00 (datum)
Lowest Observed Water Level (12/25/99).....	-6.3

Source: NOAA, Tidal Epoch 1983-2001.

The toe of the bluff along this stretch of shoreline is assumed to have an elevation between 10 and 20 feet above MLLW. The beach below the toe of the bluff was observed to have a slope of 1V:8H (Figure 2). The bluff face was observed to have a slope of 1V:1H. The elevation of the top of the bluff generally varies between 130 and 160 feet above MLLW, with elevations below this range at Point Woronzof Overlook. For the purpose of this report, the toe was assumed to be at a constant elevation of +18 feet MLLW and the top of the bluff at +150 feet MLLW (Figure 2). These elevations and slopes are consistent with prior investigations published by USKH in 1998.

[2] A patent on Point Woronzof Park. (2012, July 5). Retrieved July, 2015. http://www.anchoragepress.com/news/patent-point-woronzof-park

Figure 2: Point Woronzof Bluff base looking Northeast

The top of the bluff was documented to erode at an average rate of 2 feet per year (USKH, 1998). This erosion rate is caused by loss of material at the toe and lower slope of the bluff from wave and current action. As material is removed from the lower portion of the bluff, the slope becomes unstable and material from the upper portion of the bluff slides either into the water at higher tides or onto the beach at lower tides to be transported from the site by local currents. This continuous sloughing off and washing away cycle leaves the bottom half of the bluff with an approximate 1V:1H slope and the upper half of the bluff with a near vertical shear face (Figure 2 and Figure 3). Wind and runoff are not the controlling factors in the erosion rate but do contribute minimally. If erosion at the toe of the bluff was prevented, the top of the bluff would continue to erode until it achieved a stable condition (angle of repose). For the purpose of this report, it is assumed that the bluff's angle of repose would be at a slope of 1V:2H.

Figure 3: Top of bluff showing near vertical face.

- **Expected Future Conditions:**

Estimated damages due to infrastructure loss are $7 million to $8 million over the 50-year period of analysis and $292,000 to $334,000 estimated damages annually. Table 2 and Table 3 show Future Without-Project estimated damages based on low and high estimates for Point Woronzof Drive and other utilities. Due to the limited budget of this investigation, an in depth analysis of impacts to airport facilities and operations was not conducted. Further analysis and investigation are required to understand the full impact to ANC.

Table 2: Future Without-Project Infrastructure Loss: Low Estimate

FWOP Loss	Airport facilities	Road	Parking Lot	Other utilities	Total Infrastructure
Period of analysis	$5,864,000	$70,000	$420,000	$646,000	$7,000,000
Average Annual	$244,000	$3,000	$18,000	$27,000	$292,000

Note: Estimates are reported in 2014 dollars and are based on a 50-year period of analysis and Federal Fiscal Year 2015 discount rate of 3.375 percent.

Table 3: Future Without-Project Infrastructure Loss: High Estimate

FWOP Loss	Airport facilities	Road	Parking Lot	Other utilities	Total Infrastructure
Period of analysis	$5,864,000	$105,000	$420,000	$1,638,000	$8,027,000
Average Annual	$244,000	$4,000	$18,000	$68,000	$334,000

Note: Estimates are reported in 2014 dollars and are based on a 50-year period of analysis and Federal Fiscal Year 2015 discount rate of 3.375 percent.

Figure 4: Erosion projection and extent of potential revetment construction. The red line (closest line to water) indicates the top of the bluff in 2015 while the purple line indicates the projected top of bluff in 2065 at an average erosion rate of 2 feet per year.

Assumptions of Expected Future Conditions:

- At an erosion rate of 2 feet per year, approximately 4,000 linear feet of Tony Knowles Coastal Trail would be affected within the 50-year period of analysis
- It is assumed three separate sections of trail would require relocation; within approximately 10 years (100 feet), 20 years (700 feet), and 40 years (3,200 feet)
- Trail relocation in year 10 and year 20 is expected to affect recreation benefits for 2 years each, while the third and largest relocation in year 40 is expected to affect recreation benefits at Point Woronzof for 3 years
- Estimated trail relocation cost is $221.12 per linear foot[3]
- At an erosion rate of 2 feet per year, it is estimated that Point Woronzof Drive would be affected in approximately 30 years. Low and high damage estimates are based on assumed road construction costs of $2 million and $3 million per mile[4]
- Cost estimates of $5.8 million for other FAA infrastructure include instrument lighting and a tower and are based on correspondence with airport officials[5]
- Maintenance and repairs due to erosion are assumed to occur once in 2015 for an Alaska Water & Wastewater Utility (AWWU) Chlorination Control Tank and approximately every 5 years for an access road down the bluff at Point Woronzof. The chlorination control tank repair estimate is

[3] *USKH, Inc. Tony Knowles Coastal Trail Rehabilitation Project Erosion Study Combined Document.* Prepared for MOA Department of Cultural and Recreation Services Parks and Beautification Division. September 1998.
[4] http://www.artba.org/about/transportation-faqs/
[5] Mike Lee. Phone interview with Lorraine Cordova on March 15, 2015.

$500,000 to $1.5 million, and access road repair is $10,000 to $15,000. Cost estimates are based on correspondence with AWWU[6]

- It is anticipated that a parking lot providing trail access would be affected in approximately 15 years. Estimated relocation cost is $420,000[7]
- A Chugach Electric Association (CEA) utility line is estimated to be damaged in year 13 based on the current rate of erosion with an estimated repair cost of $175,000[5]

- **Planning Constraints & Planning Objectives:**

Constraints:

- Any enacted solution must consider all natural processes that are significantly contributing to bluff erosion including, but not limited to: waves, tides, ground water seepage, and overbank flow
- Plans must provide continued operations and access to ANC, Tony Knowles Coastal Trail, residential areas, and AWWU
- Plans must avoid or minimize impacts to historic sites and/or critical infrastructure

Objective(s):

- Reduce storm damage effects at Point Woronzof Bluff
- Increase life expectancy of infrastructure located at or near Point Woronzof
- Increase public safety for the Point Woronzof area

- **Concise statement of specific problems & opportunities with emphasis on problems warranting Federal participation:**

Within the 50-year period of analysis, anticipated erosion is expected to affect existing infrastructure at Point Woronzof, notably Runway 33 at ANC, Point Woronzof Drive, Tony Knowles Coastal Trail, and Point Woronzof Overlook. Erosion abatement would increase the useful period of the airport, coastal trail, and park system.

The Runway Protection Zone (RPZ) of Runway 33 already extends into Cook Inlet, and the Runway Safety Area (RSA) extends from the end of Runway 33 to Point Woronzof Drive. Runway 33 is the airport's primary departure runway, and as erosion encroaches on the RSA, the runway, and all activity associated with it, will be affected. This would severely impact operations at the airport.

Further investigation and analysis is needed to determine the cost of operational damages to the airport and to determine the opportunities that will be gained by developing a project in the area. Due to the limited budget of the CAP 103 authority, these operational damages and opportunities have not been included in this analysis. Further investigation would need to be conducted during a General Investigation feasibility investigation.

[6] Stephen Nuss, AWWU Capital Program Manager. Email correspondence with Eric Johnson on March 11, 2015.
[7] USKH, Inc. *Tony Knowles Coastal Trail Rehabilitation Project Erosion Study Combined Document.* Prepared for MOA Department of Cultural and Recreation Services Parks and Beautification Division. September 1998.

b. Alternative Plan: An alternative was developed that will reduce erosion at Point Woronzof Bluff. This alternative consists of constructing a stone revetment at the toe of the bluff along Knik Arm and allowing the face of the bluff to reach its angle of repose naturally over time.

Point Woronzof Bluff Stabilization:

The revetment would include three layers of graded stone placed over a gravel wedge built at a 1.5V:1H slope at the toe of the bluff (Figure 5). The revetment would be built out from the bluff face. The outer stone layer would be made from 1,500-pound stones, which are assumed to be heavy enough to resist wave and ice forces in Knik Arm. The armor layer would be two stones thick, which is approximately 5 feet for 1,500-pound stone. Two under layers with nominal stone weights of 150 pounds and 10 pounds would be constructed to provide filtering to prevent gravel and native bluff material from migrating through the voids of the larger stones of the armor layer. The toe would be buried into the beach, approximately 8.75 feet, to protect it from ice forces, and a third layer of armor stone would be added to the toe for additional stability. A typical revetment section is shown in Figure 5.

The extent of the revetment toe would be approximately 50 feet seaward from the current toe of the bluff. Ground elevation at the toe is estimated to be +12 feet MLLW. The top of the revetment would be at +42 feet MLLW, or approximately 25 feet above the toe of the existing bluff.

The revetment would be constructed from the beach and material would be barged to the site from the Port of Anchorage. It is assumed that rock and aggregates would be developed at a quarry that has easy accessibility to the Alaska Railroad, and stockpiled at the port. For the purpose of this report, all material was assumed to be produced in Seward and then transported to the Port of Anchorage by rail. Material would then be delivered to the site on landing craft capable of grounding on the beach during low tides. Stone would be placed with land based equipment during low tides.

When completed, this revetment would reduce erosion at the toe of the bluff but allow the upper bluff slope to continue to erode and stabilize through wind, rain, and overland flow processes. It is not known how rapidly these processes would occur, though it is estimated that the final stable slope of the bluff above the revetment would be 1V:2H. Based on an idealized typical bluff section, this would lead to a final top of bluff on the order of 100 feet landward of the current top of bluff line (Figure 6), though this would depend on the height of the bluff at any given location.

Limiting this investigation to one alternative is in keeping with the 2010 Pacific Ocean Division Program Management Plan for the Continuing Authorities Program, Section II-2.f(1):

> *"CAP studies must be converted to a General Investigation study once it has been determined that the solution will be beyond the scope of CAP. If possible, any such determination should be made during that portion of the feasibility phase that is at 100 percent Federal expense."*[8]

[8] 2010, Pacific Ocean Division, Program Management Plan for the Continuing Authorities Program. Section II; 2.f(1)

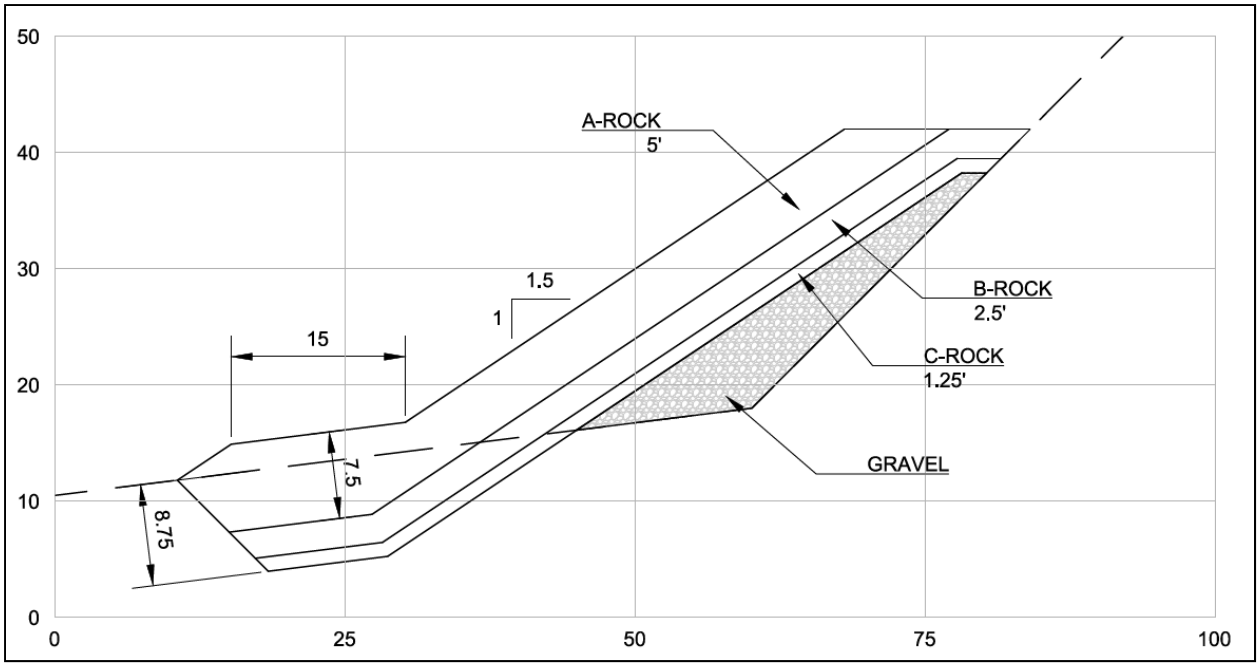

Figure 5: Typical revetment section.

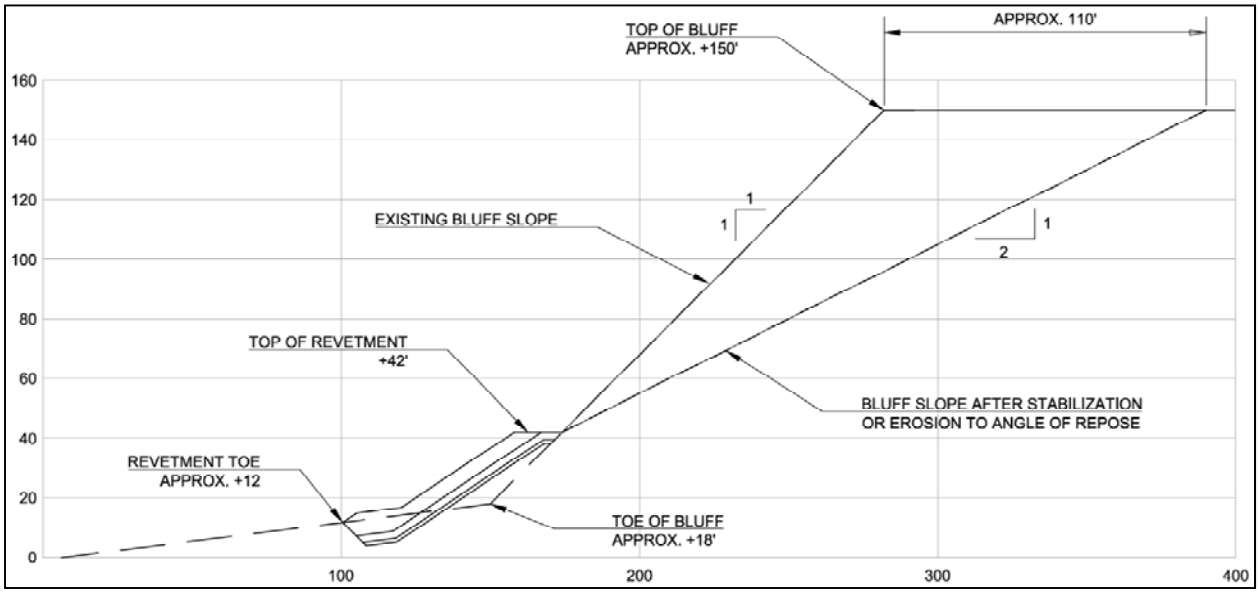

Figure 6: Typical bluff section

c. Preliminary Evaluation of Alternative:

A feasibility study would need to be conducted in order to fully understand and develop the potential alternatives needed to protect the bluff from wave, current, and ice conditions. A feasibility level study includes data gathering efforts, design efforts, and planning efforts to produce more accurate information on which to base a decision to construct a project. The following summarizes activities required to formulate and compare engineering alternatives.

- **Site Survey:** A physical survey of the site needs to be performed to provide a basis for design of alternatives. Survey data gathering would need to include land and hydrographic elements that cover all expected construction impacts on the site. Minimum survey extents would be 200 feet landward of the top of the bluff, 200 feet seaward of the toe of the bluff, and the entire bluff face to the extents shown in Figure 4. Due to the slope of the bluff face, it may be advantageous to collect survey data with LiDAR and supplement features at the top and toe of the bluff with traditional land surveying.

- **Wind, Wave, and Water Level Analysis:** A detailed analysis of wind and waves would need to be performed to determine the design parameters for the project. Local and regional wind data would be analyzed to determine probabilistic wind speeds and direction. The effort to construct probabilistic wind and wave fields would be conducted through the Coastal Hydraulic Laboratory in conjunction with Ocean Weather. Probabilistic winds and waves would be employed in a numeric model of the project area to determine the potential wave height and the effects of shoaling and refraction as wave energy travels over the bathymetry of Knik Arm. Design wave parameters would be established as a basis for sizing armor stone and setting crest elevations for revetments and breakwaters.

- **Ice Analysis:** Ice may produce larger forces against a shoreline structure than waves at Point Woronzof. A review of existing stone revetments in Knik Arm would be conducted through a literature review and discussions with municipal and state officials familiar with construction and maintenance requirements of the Port of Anchorage, Tony Knowles Coastal Trail, and Anchorage Water and Wastewater Utility (AWWU). The primary objective would be to determine what stone sizes show movement and what stone sizes have proven to be stable along the shoreline. Findings would also include estimates of the ice pan size and thickness that can reasonably be expected to impact the shoreline.

- **Sediment Transport Analysis:** A study of the movement of sediment along the project shoreline should be conducted to determine what long term effects would be caused by armoring the bluff. The beach below the toe of the bluff is composed of material eroded from the bluff face. By eliminating erosion of the bluff, the beach would no longer have a source of material to maintain its slope and elevations, and it is expected that the beach slope would steepen and its elevation would drop. A sediment transport study would involve constructing a numerical model that is validated with physical site measurements and comparison of historical shorelines to estimate material volumes generated at the site due to erosion. Physical measurements would require repeated surveys of the bluff to determine changes in material volumes of the bluff face and beach over time. Sediment transport modeling is also assumed to be conducted through the Coastal Hydraulic Laboratory.

- **Stability Analysis:** A geotechnical analysis of slope stability will be performed for each alternative to ensure that the final slope geometry of the project meets minimum factor of safety criteria. Soil properties of the bluff and beach material would be determined through a drilling program that produces physical samples of the site, which would be analyzed in a lab.

- **Plan, Profile and Section Design:** A range of alternatives would be designed using criteria developed from the analysis tasks. Design would include plan views of each alternative and typical cross sections, with critical details such as maintaining beach access at Point Woronzof Park and to the AWWU outfalls.

- **Physical Modeling:** Selected preferred alternatives would be evaluated with physical scale models constructed in a laboratory wave tank to validate armor stone size and elevations. Physical modeling would also include freezing the surface of the tank and moving ice sheets into the project sections to validate whether the stone size is stable when it impedes ice pan movement.

- **Construction Analysis:** A construction analysis would be based on a hypothetical plan to construct the alternatives that looks at material sources, construction methods, and temporary facilities needed to build the project. These assumptions would form the basis of construction cost estimates, which would be generated for each alternative.

- **Environmental Analysis:** The environmental impacts associated with the proposed project are unknown at this time. In accordance with the National Environmental Policy Act of 1969, either an Environmental Assessment (EA) or Environmental Impact Statement (EIS) will be prepared during the General Investigation feasibility study, with public participation and input.

- **Economic Analysis:** Potential Storm Damage Reduction benefits from a project at Point Woronzof, Alaska include reduced damages to Point Woronzof Drive, adjacent parking lot, utilities, and operations at the Ted Stevens Anchorage International Airport. These will be examined in more detail during the proposed feasibility study.

- **Real Estate Plan:** The Real Estate Plan (REP) will constitute the coordination efforts between the Real Estate Agent, Project Manager, and Non-Federal Sponsor of all lands, easements, rights-of-way, relocations, and disposal (LERRD's) required for project construction, operation, and maintenance.

The REP will identify all lands necessary to be acquired in Fee for permanent structure, construction areas, and public access areas.

7. Federal Interest: The findings of this report indicate that the cost of this project exceeds the Federal expenditure capability for a CAP Section 103 of $5.0 million Federal. The Corps recommends the initiation of a General Investigation Section 116 study.

a. Cost

The following cost tables are based on unit prices derived from historical project costs and from cost quotes provided from the Alaska Railroad (ARR) Company. Unit prices were compared and engineering judgment was used to determine the estimated unit price for the construction of the alternatives. All quantities and project costs are estimates using the best available data at the time of the investigation. Quantities and prices are subject to change upon further investigation and more detailed information.

Table 4: Estimated Project Feasibility Study and Construction Cost

Point Woronzof				
Item	Unit	Unit Price	Quantity	Amount
Pre-Construction				
Feasibility	EA	$3,000,000	1	$3,000,000
Pre-Construction Engineering and Design (PED)	EA	$3,000,000	1	$3,000,000
Construction Costs				
Mob/Demob	EA	$135,000	2	$270,000
Topographic Survey	LF	$9.00	4,800	$43,000
Interim Surveys	EA	$12,000	1	$12,000
Excavate, Haul, Dispose	CY	$0.50	1,250,000	$625,000
Revetment Rock Royalties, Fees & Tariffs	CY	$180.00	190,000	$34,200,000
Construction of Revetment (Filter)	CY	$14.00	55,000	$770,000
Construction of Revetment (Core)	CY	$12.00	20,000	$240,000
Construction Revetment "B" Rock	CY	$13.00	40,000	$520,000
Construction Revetment "A" Rock	CY	$24.00	75,000	$1,800,000
Construction Cost Sum				$38,480,000
Feasibility, D&I, and Construction Costs				**$44,480,000**

Note: All Costs are in 2014 dollars

Cost Estimate Assumptions:

- Excavated material will be disposed of at a nearby location
- 180 day schedule for construction
- Seward, AK Quarry is able to develop sufficient quantities of "A," "B," and Core rock

b. Benefits: Potential avoided damages for a project at Point Woronzof include land loss due to coastal erosion, damage to existing infrastructure including but not limited to the ANC's runway 33, and damage to the Tony Knowles Coastal Trail. Damage estimates are reported in 2014 dollars and are based on a 50-year project period of analysis and Federal Fiscal Year 2015 discount.

Table 5: Benefit to Cost Ratio	
Period of Analysis Estimated Benefits (Low)	$7,000,000
Average Annual Benefits (Low)	$292,000
Period of Analysis Estimated Benefits (High)	$8,027,000
Average Annual Benefits (High)	$334,000
Project Cost Estimate	$44,480,000
Low Estimated B/C Ratio	**0.4**
High Estimated B/C Ratio	**0.5**

The current Benefit to Cost Ratio does not include benefits that would accrue due to prevention of damages to ANC. Further investigation will be performed should a feasibility study commence under general investigation.

c. Environmental Impacts: Based on an assessment of the environmental impacts associated with other projects of this type in Alaska, the impacts of the proposed alternative are expected to be minimal. Preparation of an Environmental Assessment (EA) or Environmental Impact Statement (EIS), however, will be conducted in accordance with the National Environmental Policy Act (NEPA). If, during the initial preparation of an Environmental Assessment, the expected environmental impacts of the project are expected to be significant, then an Environmental Impact Statement (EIS) will be prepared.

The environmental coordination, analysis, and permit requirements for the alternative would likely include, but not be limited to:

- Coordination with Alaska Department of Fish and Game for obtaining a Fish Habitat Permit
- Coordination with the State Historical Preservation Officer (SHPO) under the National Historic Preservation Act (NHPA) Section 106, including identification of historical/cultural resources in the project area
- Coordination with the National Marine Fisheries Service (NMFS) in regard to Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act
- Coordination with the Alaska Department of Natural Resources (DNR) for a Letter of Entry or Tideland permit should it be necessary to land heavy equipment on State tidelands
- Coordination with U.S. Fish & Wildlife Service (USFWS) and NMFS under the Endangered Species Act (ESA)
- Coordination with the USFWS under the Fish & Wildlife Coordination Act
- Coordination with the NMFS under the Marine Mammal Protection Act
- Coordination with the Alaska Department of Environmental Conservation under Section 401 of the Clean Water Act, including issuance of a Water Quality Certification
- Coordination with the AWWU to ensure project impacts do not threaten the performance of the facility's outflow pipeline
- Coordination with the Municipality of Anchorage Parks and Recreation with regard to mitigating short-term construction-related impacts to recreational use of the area

8. Study Phase Schedule:

Table 6: Feasibility Schedule

Feasibility Milestone	Date
Receive Funding	October 2017
Alternatives Milestone	April 2018
TSP Milestone	April 2019
Agency Decision Milestone	October 2019
Civil Works Review Board	April 2020
Chiefs Report	September 2020

9. Recommendations: Due to a $5.0 Million Federal expenditure limit on all Section 103 CAP projects, further investigation under this authority is not recommended. It is recommended that this project be converted to a General Investigation Study and pursued under the authority of Section 116 (P.L. 111-85) of the 2010 Energy and Water Development and Related Agencies Appropriations Act relating to Alaska flood, erosion, and ice damage, as stated below:

"Section 116, the Secretary of the Army is authorized to carry out structural and non-structural projects for storm damage prevention and reduction, coastal erosion, and ice and glacial damage in Alaska, including relocation of affected communities and construction of replacement facilities…"[9]

10. Views of the Sponsor:

Department of Transportation and Public Facilities, Ted Stevens Anchorage International Airport: The ongoing erosion at Point Woronzof is a serious concern due to the potential impact to the safety area of the primary departure runway, Runway 33, at Ted Stevens Anchorage International Airport (ANC). ANC is willing and able to be the primary non-Federal sponsor for this project.

11. Views of Other Resource Agencies:

Nordic Skiing Association of Anchorage (NSAA): The erosion of the bluff is a serious concern of the NSAA and its 5,000 members and other trail users in the Anchorage Bowl. The bluff erosion, unabated, will eventually impact major Municipal assets, the Tony Knowles Coastal Trail, and the adjacent Point Woronzof Drive. The NSAA supports the ANC's request for Feasibility study.[10]

Turnagain Community Council: Turnagain Community Council (TCC) has informed the U.S. Army Corps of Engineers with an official letter that they fully support the ANC's request for a Feasibility study on the erosion problem at Point Woronzof Bluff[11].

Municipality of Anchorage (MOA): MOA is the owner of the Tony Knowles Coastal Trail and relies on Point Woronzof Drive to gain access to the AWWU plant and Clitheroe Center. The Municipality of Anchorage has shown interest in the preservation of Point Woronzof Bluff and in conjunction, preserving Point Woronzof Drive, Turnagain Community Trail, and Point Woronzof Park.

[9] 2010 Water Resources and Reform and Development Act.
[10] Nordic Skiing Association of Anchorage letter to Corps of Engineers, dated March 18, 2013.
[11] Turnagain Community Council letter to Corps of Engineers, dated February 21, 2013

12. Project Area Map: See Figure 7

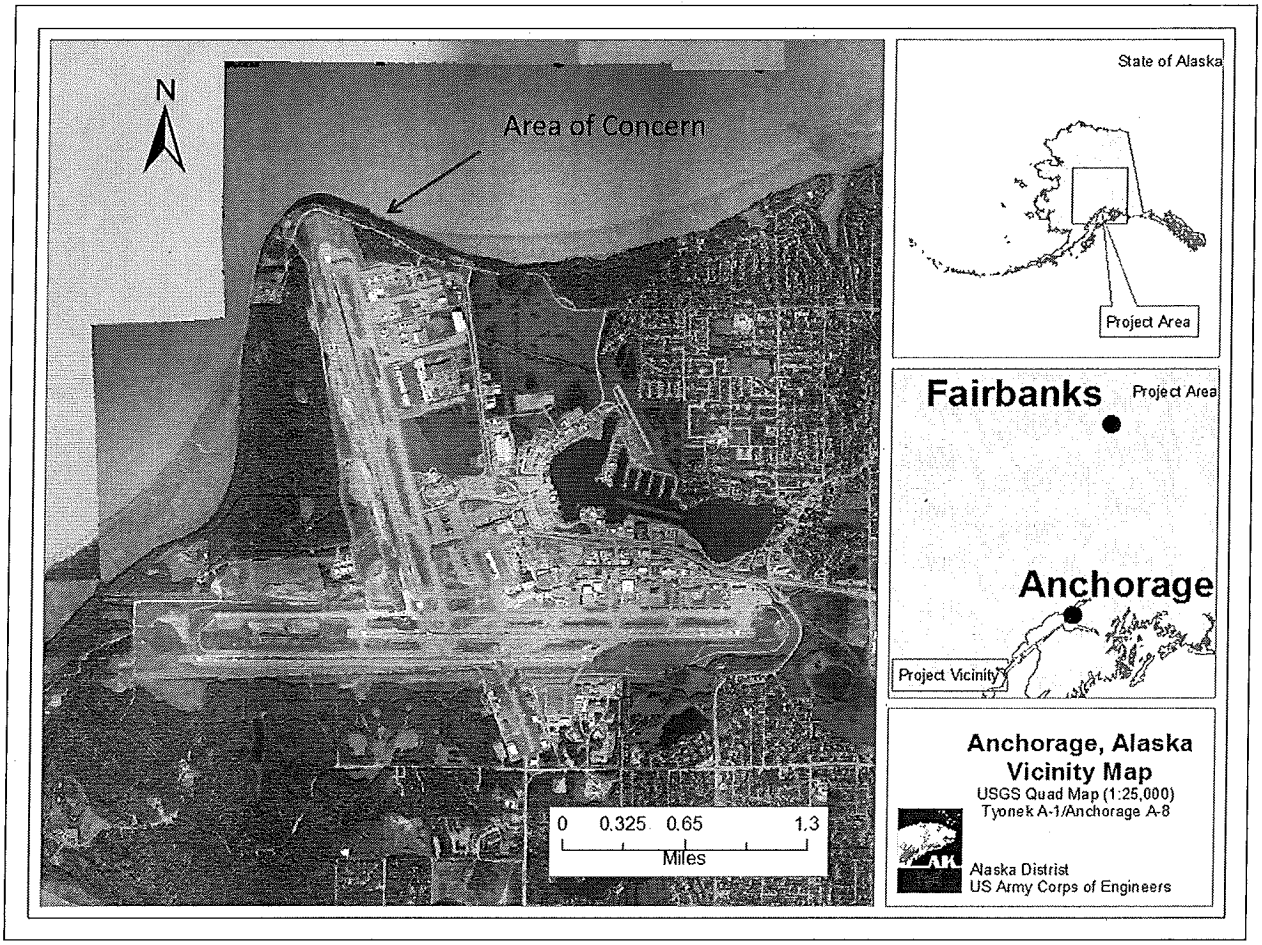

Figure 7: Project Area Map

13. Feasibility Phase Study Cost Estimate

Point Woronzof Feasibility Phase Study Cost Estimate	
Section	**Estimated Budget**
Plan Formulation	$450,000
Project Management	$330,000
Hydraulics and Hydrology	$600,000
Environmental	$150,000
Economics	$600,000
Real Estate	$120,000
Cost Estimating	$120,000
Geotechnical Engineering	$300,000
Programming Assistance	$180,000
Overhead	$90,000
Review	$60,000
Total Feasibility Cost	**$3,000,000**