



Memorandum

To: Valdez City Council
CC: Charlotte Burrill, Project Manager
From: William L. Wilcox, City Engineer *Bill*
Date: May 19, 1997
Subject: Alpine Woods Flood Control

At the May 12th work session, there was some discussion on the approach to flood control in Alpine Woods. Attached is the final report and executive summary from the flood control study that was prepared by CH²M Hill in 1990. The City is still following the plan recommended in this study.

If you have any further questions or comments, please do not hesitate contact me.



Engineers
Planners
Economists
Scientists

December 7, 1990

ANC30126.A0/A1

Mr. David Dengel, Director
Community Development Department
City of Valdez
P.O. Box 307
Valdez, Alaska 99686

Dear Mr. Dengel:

Subject: Lowe River Stabilization/Relocation Project
 Final Report

At your request we have prepared this summary technical letter and appendix compilation of our technical memorandums and letters. This is the project final report. This project was completed with the assistance of the following approved subconsultants:

- Northwest Hydraulic Consultants, Ltd.
Eugene K. Yaremko, P.E.
- Appraisal Company of Alaska
Michael C. Renfro, Partner
- Hartech Surveying
Kim Hartman

The work scope for this project consisted of nine work tasks. This summary and the Appendixes are organized by task in the following order (this summary is the product of Task 7):

- Tasks 1 and 2--Inventory of Existing Properties/Develop Flooding Estimates
- Tasks 3 and 6--Review Conceptual Design/Analyze Alternatives

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- Tasks 4 and 5--Mass Appraisal for Existing Condition/Mass Appraisal With Concept Design
- Task 8--Recommend Gravel Extraction Methods and Immediate Short-term Flood and River Control Works
- Task 9--Program for Immediate Action

RECOMMENDATIONS

The City of Valdez needs to make a final determination on the future of Alpine Woods Estates and Nordic Subdivision with respect to flood risk. During the course of this study, considerable erosion of the river bank near Alpine Woods Estates No. 1 and minor flooding of the westerly portion of Alpine Woods Estates occurred several times. Emergency dike construction was initiated by the City near Alpine Woods Estates No. 1. No measurable private property damage was reported, but considerable time and money were expended by the City.

The City of Valdez needs to decide if this area is to remain available for existing and new residential development or be abandoned for this type of use. Absent a decision for total abandonment of the area, the following actions are recommended:

- The City of Valdez needs to assess its building codes/flood plain regulations for building elevations, basements, water well construction, waste disposal systems, and acceptable flood proofing methods.
- Complete the work recommended in Task 9--Program for Immediate Action. This work was bid this fall and is planned to be constructed in 1991.
- Construct the recommended plan, the full subdivision dike, as described in Task 6--Analyze Alternatives.

The Task 6 recommended plan is compared to five other options, including doing nothing, in Table 1.

Table 1
COMPARISON OF FLOOD CONTROL OPTIONS
ALPINE WOODS/NORDIC SUBDIVISION/VALDEZ, ALASKA

Options	Initial Cost (\$)	Annual Cost (\$)	Annual Benefit (\$)	Initial Mill Rate (20-Year Period)	Maint. Mill Rate	Risk of Failure	Benefit/Cost Ratio*	Advantages/Disadvantages
Option 1: Do Nothing	0	15,000 ^a 40,000 ^b	0	0	11.6	1:50 Erosion 1:10 Flooding	N/A (No benefit)	- Minimal initial and annual maintenance costs - Faced with eventual flood damage costs
Option 2: Buy Out Owners	3,150,000	0	15,000 ^a 40,000 ^b 14,200 ^c	N/A	0	0	0.30	- Immediately eliminates the problem - High initial cost - Substantial administration and legal requirements
Option 3: Gravel Extraction	30,000	15,000 ^a 30,000 ^d 40,000 ^b	0	0.7	18.0	1:1 Gravel Ext. 1:10 Flooding 1:50 Erosion	N/A (No benefit)	- Low probability of subchannel excavation being successful - Special permitting requirements
Option 4: Minor Improvements to Dikes and Homes	75,000	15,000 ^a 35,000 ^c	900 ^c 5,000 ^e	1.71	10.6	1:50 Erosion 1:10 Flooding	0.30	- Keeps property values depressed
Option 5: Partial Dike and Buy Out Remaining (Unprotected) Properties	1,165,000	17,000 ^a 4,150 ^f	40,000 ^b 5,100 ^c Property tax ^g Property Value Increase ^h	26.51	3.7	<1:100 Erosion ⁱ 1:100 Flooding	1.27	- Maintains part of development having least flood risk - May reduce insurance rates
Recommended Plan: Full Subdivision Dike	830,000	20,000 ^a	40,000 ^b 5,100 ^c Property tax ^g Property Value Increase ^h	18.9	4.2	<1:100 Erosion ⁱ 1:100 Flooding	1.77	- Primary benefit is increase in property value/reduced risk of failure - May reduce insurance rates

*Present value of benefits divided by present value of costs (assume 5 percent inflation, 8-3/4 percent interest, 20 years)

^aAnnual maintenance cost. Need to add long term average annual flood damage cost; damage begins occurring at floods equal to or greater than 1:10 probability

^bLong term average annual flood damage cost (rough estimate)

^cFlood Insurance Premium Savings

^dAnnual cost to excavate subchannels

^eAnnual flood damage; assumes several homes are floodproofed

^fLost tax revenue due to buy-out

^gAssumes two new homes per year will be built (\$80,000 home, 16 mills)

^h15 percent increase, realized over 3-year period

ⁱRisk of erosion not assessed since flood data not available for floods greater than 100-year

SUMMARY

All work for this study is based on the December 1, 1983, Federal Emergency Management Agency's published flood elevations for Alpine Woods Estates and Nordic Subdivision. No review or analysis of the methods used to determine the flood elevations was performed.

TASKS 1 AND 2--INVENTORY OF EXISTING PROPERTIES/DEVELOP FLOODING ESTIMATES

Tasks 1 and 2 present data for the 148 properties within the boundaries of this study. The following type of development exists within this area:

- 62 percent (92 lots) have improvements, 38 percent (56 lots) have no improvements.
- The 92 lots that have improvements are divided as follows:
 - 33 percent (30 lots) have wood frame or log houses.
 - 46 percent (42 lots) have mobile homes.
 - 17 percent (16 lots) have modular "Alyeska" type houses.
 - 2 percent (2 lots) have small cabins.
 - 2 percent (2 lots) have garages only.

The 148 properties have the following predicted flooding characteristics (see Figure 1):

- 64 percent (95 lots) of the properties are below the predicted 100-year flood elevation.
- 37 percent (55 lots) of the properties below the predicted 100-year flood elevation have improvements on them.
- 16 structures (6 mobile homes, 2 houses, 1 modular house, 3 cabins, and 4 garages) have first floor elevations below the predicted 100-year flood elevation. One of these structures has a basement.

- Nine structures with first floor elevations above the predicted 100-year flood elevation have basements that are estimated to be below the predicted 100-year flood elevation.

The Tasks 1 and 2 technical memorandum describes how some property owners may obtain a "letter of map amendment" from the Federal Emergency Management Agency if their property is incorrectly shown on current flood maps to be within the 100-year flood zone. Corrections may assist property owners with property transactions and reduce flood insurance rates.

TASKS 3 AND SIX--REVIEW CONCEPTUAL DESIGN/ANALYZE ALTERNATIVE

Task 3 was the review of the 1983 concept design to protect the Alpine Woods Estates/Nordic Subdivision. The conclusion of Task 3 is that the concept should not be constructed because the City has proceeded, after 1983, with construction of major river control works that did not follow the concept. The City has constructed two long groins and provided bank armoring.

Task 6 was the analysis of alternatives. Six options were analyzed for initial cost, annual cost, mill rate impact for the property owners of Alpine Woods Estates/Nordic Subdivision, risk of failure, and benefit cost ratio. Table 1 is a summary list of the options. The six options requested to be analyzed by the City are:

- Option 1--Do nothing, except maintain the existing river protection system. There are no identified benefits compared to the current situation.
- Option 2--Purchase properties and relocate improvements to another Valdez location. The benefits are the elimination of maintenance, damage, and flood insurance costs. The benefit/cost ratio is estimated to be 0.30.
- Option 3--Gravel extraction to help encourage flow away from the developed area. There are no identified benefits compared to the current situation.

- Option 4--Provide only minor improvements to the existing river protection system and floodproof the existing improvements within the developed area. The benefits are the reduction in flood damage and flood insurance costs. The benefit/cost ratio is estimated to be 0.30.
- Option 5--Purchase all properties within the westerly portion of Alpine Woods Estates and relocate improvements to Alpine Woods Estates Addition No. 1 and Nordic Subdivision. Build only the upstream portion of the river protection system. The benefits are elimination of flood damage, flood insurance cost reduction, general increase in property values, and increased property tax revenue from new development. The benefit/cost ratio is estimated to be 1.27.
- Recommended Plan--Extend the existing dike system upstream of Groin 1 and between the groins and extend Groin 2. See Figure 2. The benefits are elimination of flood damage, flood insurance cost reduction, general increase in property values, and increased property tax revenue from new development. The benefit/cost ratio is estimated to be 1.77.

The recommended plan is estimated to cost \$830,000 for the new dike and have a \$20,000 annual maintenance cost. The benefits are estimated to be a savings of \$40,000 per year for elimination of flood damage, \$5,100 in flood insurance cost reduction, 15 percent \pm increase in property values, and an increase in property taxes (based on the assumption that two new houses will be constructed each year for the next 20 years, valued at \$80,000 each and a 16 mill rate).

TASKS 4 AND 5--MASS APPRAISAL FOR EXISTING CONDITION/MASS APPRAISAL WITH CONCEPT DESIGN

Tasks 4 and 5 were prepared by Appraisal Company of Alaska. The estimated fair market value (August 1, 1990) for the Alpine Woods Estates and Nordic Subdivision, south of the Richardson Highway, is \$5,127,200. If flood control structures are completed, and existing structures improved, it is felt that this will have a positive effect on the property values and within 3 years of dike construction, the projected market value will increase approximately 15 percent.

Using State Farm Insurance rate book information, current flood insurance rate is estimated to be \$14,200 (\$0.45 per \$100 of improvement valuation) per year for the

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improvements. After flood control measures are in place, the estimated annual flood insurance rate is \$9,100 (\$0.25 per \$100 of improvement valuation). This results in a projected annual savings of \$5,100.

TASK 8--RECOMMEND GRAVEL EXTRACTION METHODS AND IMMEDIATE SHORT-TERM FLOOD AND RIVER CONTROL WORKS

Alpine Woods Estates and Nordic Subdivision have been in existence for about 15 years. They occupy a portion of the Lowe River flood plain. Previous studies have recommended either a dike plus groins, subdivision relocation, or systematic abandonment of flood prone areas.

Two river related problems exist for this property:

- Property can be eroded by shifting Lowe River subchannels.
- General flooding can occur due to high water elevation.

Erosion is expected to have the greatest potential during 2- to 10-year flood events (50 percent to 10 percent chance per year). General area flooding can be expected for flood events greater than 10-year (10 percent chance per year). The westerly portion of the developed area is more subject to general flooding than the easterly portion.

The City has constructed two long groins and reinforced banks with riprap. From a May 1990 inspection of the groins, recommendations were made to: 1) consider an additional groin; 2) build a dike between the groins; 3) groin riprap needed to be checked and upgraded where necessary; 3) the groins may need to be raised to prevent overtopping. The groins were believed to be doing the job they were built to do, but require frequent maintenance and river bank work to prevent the river from out-flanking them.

Task 8 presents a program for immediate action, which resulted in a contract change to include new work. The additional work is described in Task 9.

Gravel mining was addressed as a means to reduce flooding potential of the developed area. Gravel mining was not recommended for the following reasons:

- 50,000 to 100,000 cubic yards of gravel will have to be excavated each year, on the average.

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- Many years of work may be required before benefits are realized.
- Excavation of a new subchannel away from the subdivision may have negative secondary impacts to other property owners (Alyeska, for example), and special permits may be required.

TASK 9--PROGRAM FOR IMMEDIATE ACTION

Task 9 was initiated as a direct result of the Task 8 recommendation to construct improvements in the near future. Several options were proposed for the 1990 construction season. The options addressed the identified weak points in the natural and man-made river bank system. Due to possible budget limitations, six immediate action options were presented to the City in the following order of priority (see Figure 3):

1. Construct a depressed groin upstream of the Groin 1 dike.
2. Add a dike between the Groin 1 dike and Option 1.
3. Upgrade the existing riprap upstream of Groin 1.
4. Raise Groin 2 and its attached dike.
5. Repair the Groin 2 riprap armor.
6. Improve the existing dike that partially connects Groins 1 and 2.

The Task 9 construction cost estimate was \$91,000. Some modifications were made to these recommendations and a construction project was bid by the City. Construction is expected to occur during early 1991.

We have appreciated this opportunity to work with you and your staff on this interesting and challenging project. Important decisions remain for the City of Valdez. We trust that our work has met your expectations and enables you to develop a long-term solution to flood damage risk in the project area.