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# **Snoqualmie Flood-Farm Task Force Report**

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January 2008



**King County**

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# Table of Contents

I. Introduction .....	1
A. Purpose and Scope.....	1
B. Agriculture and Floods: Background .....	1
C. Flood Management – State, Federal, and Local Regulations.....	3
II. Demonstration Project (Ordinance 15883) .....	5
A. Purpose .....	5
B. Summary of Demonstration Project Results .....	5
C. Evaluation of Alternative Development Standards .....	6
D. Additional Information Directed by Section 4, Subsection I of Ordinance 15883 .....	9
E. Evaluation of Alternative Review Process.....	13
III. Agriculture Task Force (Motion 12559) .....	14
A. Findings of the Agriculture Task Force .....	15
B. Other Findings of the Flood–Farm Task Force .....	18
IV. Recommendations of the Flood-Farm Task Force.....	21
V. Other Ideas to be Noted but Not Recommend .....	26
VI. Framed Issue: New Farm Houses in the FEMA Floodway .....	27
VII. Conclusion.....	28
Appendices .....	30

# SNOQUALMIE FLOOD-FARM TASK FORCE REPORT

January 14, 2008

## I. INTRODUCTION

### A. Purpose and Scope

This report contains the findings and recommendations requested by two separate but related pieces of legislation adopted by the King County Council:

1. Task Force – Motion 12559. The King County Executive was directed to convene a Task Force that included agricultural representatives to review measures intended to encourage the continued viability of agriculture in the Snoqualmie Valley Agricultural Production District. The Task Force included representatives from the agricultural community, Hmong, and the King Conservation District.
2. Demonstration Project – Ordinance 15883. This ordinance authorized a demonstration project for the repair or reconfiguration of existing livestock flood sanctuaries (or “farm pads”, the term to be used in the report). The Task Force established under Motion 12559 was instructed to evaluate the effectiveness and success of the demonstration project.

The findings and recommendations will help achieve the multiple objectives of improving the viability of agriculture in the Snoqualmie River Valley while simultaneously maintaining floodplain management that results in no adverse impacts and furthering salmon recovery in the lower Snoqualmie River.

### B. Agriculture and Floods: Background

The Snoqualmie Valley is a rich agricultural area with over 14,000 acres in a variety of productive farms. King County has invested in preserving the agricultural land and in helping to maintain agriculture viability. The Snoqualmie Valley Agriculture Production District (APD) was designated in the 1985 King County Comprehensive Plan, and subsequently designated as agriculture land of long term commercial significance under the Growth Management Act. The County’s Farmland Preservation Program has further protected 4700 acres through the purchase of development rights. The County recognizes that the preservation of the land is not enough to retain successful farming, and has provided marketing and other technical assistance to help farmers to overcome obstacles and to take advantage of opportunities in an urbanizing county.

The nature of farming in the valley has changed over the years. Early settlers developed successful dairies and other livestock operations. Some of these are still operating today. As

the county became more urban, land became more expensive, and markets changed, farms became smaller. Farmers began growing higher value vegetable, berry and niche crops. Many of these smaller, specialty farms are located on the fertile valley floor, and include no high ground, making these operations more vulnerable to flood damage.

During the Thanksgiving 1990 flood, farmers in the Snoqualmie Valley lost over 500 cows, calves, and heifers, and hundreds of tons of alfalfa, hay, dry grain, and straw. The agricultural losses from the Presidential-declared flood disaster in November 2006 renewed attention to the needs of Snoqualmie Valley farmers to be able to protect their investments from flooding if farming is going to remain viable in the Snoqualmie Valley (APD). The 2006 losses included fences, crops and bulbs in fields, chickens and other animals, hay and equipment. Over one million dollars in losses were sustained by the Hmong farmers alone. A sense of urgency stems from the concerns that climate change will increase the frequency, timing, duration and magnitude of floods.

Farmers appreciate that flooding is a part of the reason they exist. Floods replenish the rich agricultural soils and they preclude more intense development in the valley, allowing agriculture to survive. In fact, almost all of the productive agriculture in King County is located in floodplains. However, between 1990 and 2006, farmers in the APD have experienced four floods larger than any flood in 75 years of records measured at Carnation, and considerably longer than that according to anecdotal information from older farmers. Seeds and seedlings, bulbs, tubers, winter annuals, and perennial crops cannot survive prolonged inundation by flood waters. While landowners can manage livestock or poultry in emergency conditions for a few days, they cannot sustain such flood emergency operations for a week or two. Similarly, farmers can recover from occasional serious floods, but cannot sustain losses year after year.

Before 1990, farmers accommodated flooding in the valley in three ways:

- constructed elevated buildings in which to operate agricultural activities;
- hauled in fill to elevate areas for buildings or “farm pads”; or
- moved livestock or equipment to nearby higher ground either when a flood was imminent, or at the beginning of winter for its duration.

Many of the dairies were built immediately adjacent to the river because this was naturally the highest ground and because milk was transported by boats on the river. Houses and barns were elevated on pilings or on fill, or on naturally high ground at the edge of the floodplain. In the event that one did not have high ground on their own property, it might be available on neighbor’s land where livestock and equipment could be moved before a flood. After the unprecedented loss of cattle in the flood of 1990, “critter pads” were allowed on a one time basis by the County and the Federal Emergency Management Agency (FEMA) as “sanctuaries” for livestock during floods.

Today, many of the smaller farms do not include high ground, and regulations to ensure property protection for all landowners have precluded the option of building elevated pads with fill within the designated Federal Emergency Management Agency (FEMA) floodway, which is mapped to include a significant portion of the Snoqualmie Valley Agricultural

Production District. Over sixteen hundred acres that could be farmed are out of production or under-utilized. While we do not know why these acres are not being farmed, some valley residents have indicated a contributing factor may be the lack of high ground to support farming operations. Many of these farms operate well into the winter, so they are unable to move equipment out of the valley for the duration of the flood season. Farmers dismissed the option of an off-site shared storage facility because of inaccessibility to their equipment, which they work on during the winter months, security concerns for equipment and animals left unattended, and the possibility of the spread of disease among animals. Additionally, some landowners are reporting they have fewer hours to prepare for a flood because waters are rising more rapidly. In some areas of the Snoqualmie Valley APD, road closures occur in each flood, making it impossible to move goods and livestock out of the floodplain.

The vegetable and flower crops have an additional vulnerability to floods, in that they may still be in the ground when the fall floods hit, or they may need to be planted in the spring before the spring floods recede. A new threat to agricultural viability appeared after the November 2006 flood. As a result of food contamination caused by toxic chemicals and e-coli in the floodwaters from Hurricane Katrina, the federal Food and Safety Administration (FSA) declared that food crops contaminated by flood waters could not be sold for human consumption. Many Snoqualmie Valley farmers, who had invested in winter greens and other vegetable crops, had to throw away tons of food. This heightened agricultural concerns about the frequency, severity, and source of flood waters.

Farmers who lease land face the challenge of persuading the landowners to invest in the infrastructure - new elevated buildings or elevated farm pads – for flood readiness and farm operations. Approximately thirty Hmong families farm in the Snoqualmie; only three of these families own land. While there are a lot of people who would like to lease land to farm, they generally do not have sufficient capital. Landowners have relatively little incentive to invest out of pocket to help their lessees avoid potential flood losses. If there is no elevated area, lessees are limited to short summer season farming options.

### **C. Flood Management - Federal, State, and Local Regulations**

The goal of the County’s floodplain management is based on the principle of “No Adverse Impact”. Regulations and policies are designed to ensure that the actions of one property owner do not adversely impact the rights of other property owners, as measured by increased flood peaks, flood stage, flood velocity, and erosion and sedimentation. The safest, most effective and least-cost floodplain management strategies to minimize risks to public safety and preventing costly damages is to significantly limit occupation of the floodplain by people or infrastructure and to ensure that cumulative actions by public and private entities do not worsen flood conditions. The recent devastating floods in Lewis and Thurston counties was in part the consequence of allowing unregulated and unmitigated development in floodplains which demonstrated that cumulative actions result in significant public safety risks and damages to public and private property.

In the late 1960s, in response to the devastating effects of unmitigated development in floodplains, the expense and unreliability of structural flood-protection projects, and the huge

cost of federal disaster assistance, the U.S. Congress established the National Flood Insurance Program (NFIP), which is currently administered by FEMA now within the Department of Homeland Security. In order for landowners to purchase federally backed flood insurance, the community must adopt the minimum standards of the NFIP. Among the federal regulations, the most relevant to agriculture is prohibition of any development within the FEMA floodway that will result in an increase in the base flood elevation, often referred to as the 100-year flood. This is commonly known as the “zero-rise” standard.

Nearly all jurisdictions throughout the United States, including state agencies, recognize that the NFIP minimum standards are not adequate to ensure No Adverse Impact from floodplain development. Washington State legislators have prohibited the state from adopting standards that are more restrictive than the minimum NFIP standards with one exception - that of prohibiting new residential development within the FEMA floodway.

Since 1990, King County code has included some regulatory standards that exceed mandatory federal and state requirements. These are applied uniformly to all land uses, including agriculture. The challenge for King County is that nearly all of the Snoqualmie Valley APD lies within the FEMA floodway, which is where the most protective federal, state and local standards apply because it generally includes the area of highest flood risk. The following are the standards that the Task Force identified as affecting agriculture opportunities in the Snoqualmie Valley APD:

- New residential and non-residential buildings have not been allowed, with the exception of a provision to allow the repair, reconstruction, replacement or improvement to an existing farmhouse.
- “Substantial improvements” to existing buildings have not been allowed.
- Construction of “livestock sanctuaries” or “farm pads” have been allowed under King County code up until 2005, but with the exceptions of those recently constructed under the emergency Demonstration Project, Ordinance 15883, and in the early 1990s under similar emergency circumstances; no new facilities have been constructed. The standards for siting and construction were so restrictive that the feasibility of constructing a new pad was limited and generally cost prohibitive for some. Both exceptions were achieved through agreements with FEMA and the Washington State Department of Ecology.
- Structures have not been allowed to be constructed on “livestock sanctuaries.”
- Compensatory storage is required at the same elevation for any development in the floodplain, including the construction of “livestock sanctuaries” or “farm pads.”

Recognizing that agriculture is a low-density use that occupies significant floodplain acreage in King County, the Task Force recommends specific modifications to King County code to provide flexibility for agricultural land uses while at the same time maintaining a strong “No Adverse Impact” floodplain management program.

## II. DEMONSTRATION PROJECT (Ordinance 15883)

### A. Purpose

K.C.C. chapter 21A.55 allows “demonstration projects” as mechanisms to test and evaluate alternative development standards and processes prior to amending King County policies and regulations. Specifically, Ordinance 15883 authorized a demonstration project for the repair or reconfiguration of existing livestock flood sanctuaries. The Task Force was instructed to evaluate the effectiveness and success of the demonstration project.

### B. Summary of the Demonstration Project Results

The demonstration project was an enormous success.

The Agriculture Commission approved thirteen proposed farm pads as eligible for participation in the project. These were modeled for compliance with flood management standards. Eleven of the eligible participants followed through with the application for an exemption, and received their eleven shoreline exemption letters. One participant dropped out after his exemption was issued.

Of the ten who have proceeded with their projects:

- Seven landowners constructed farm pads; they were prepared for flood season and have reported a reduction in stress that they felt with flood season approaching.
- Five of these are now able to significantly expand their agricultural operations and to make investments in additional livestock, equipment or supplies because they have a safe place for those investments to withstand flood conditions. The other five may maintain a similar level of operation but no longer risk losses.
- Six of the farm pads are located in a cluster in the southern half of the Snoqualmie Valley APD which brings a renewed vitality to agriculture in this area.
- Four pads increase the viability of parcels enlisted in the Farmland Preservation Program, one of which is the second largest dairy in the Snoqualmie and another part of the new Puget Consumer Co-op Land Trust.
- Three landowners were unable to construct their pads because of weather conditions, wet fields, and lack of available fill.

As directed by ordinance, the Department of Natural Resources and Parks (DNRP) completed hydraulic modeling for compliance with both King County and federal flood hazard regulations. The modeling was conducted both individually and cumulatively for the thirteen proposed projects, and did not account for compensatory storage that is being provided for some of the pads. The results were as follows:

- Individually, none of the 13 individual farm pad alterations that were proposed and modeled in the preliminary analysis would result in a measurable rise in flood elevation, as defined in King County code.
- Cumulatively, the 13 farm pad alterations that were proposed and modeled would not result in a measurable rise in flood elevation, as defined in King County code.

- Model results did show some sensitivity to the modeled alterations, including minor rises in both calculated water surface elevations and energy grade near most of the pad sites. At two of the sites these rises were almost measurable, as defined by the code, but none exceeded that threshold.
- The provision of compensatory storage was a challenge in this demonstration project: only three of the projects were able to provide compensatory storage at the same elevation. Six others provided compensatory storage, in some cases not quite all required; and one provided none at all.

The environmental review of the projects was conducted by the ecologists of DNRP's Water and Land Division (WLRD). Current wetland and stream regulations did not affect the placement of the pads.

Many landowners in the Snoqualmie Valley APD have commented that this project sends a new and crucial message that they will once again be able to expand their operations with the confidence they can protect themselves. More landowners would have participated if the opportunity had occurred with a different timeline and earlier in the year.

The project demonstrated that a staff team could respond in a very compressed time frame with a high degree of coordination among the Department of Development and Environmental Services (DDES), DNRP, the King County Agricultural Commission, and the King Conservation District (KCD), driven by a mutual understanding of the urgent need to beat the rain and flood season. The team from the River and Floodplain Management Unit, Science Unit, Critical Areas Review, Clearing and Grading, GIS mapping unit, Agriculture Program, KCD farm planners and Natural Resource Conservation Service (NRCS) engineers/planners had to each reorganize work priorities and work schedules to meet deadlines and respond to the unique needs of the applicants. This was an immense effort and other work priorities shifted. While this course would not be recommended as a standard mode of business, the results of providing both immediate and long-term protection to these landowners is satisfying for all involved.

### **C. Evaluation of Alternative Development Standards**

Ordinance 15883 allowed modification to several areas of King County Code and to the standards in the Farm Management Plan Public Rule in order for the pilot project to occur. These changes are listed below and evaluated for effectiveness.

#### **1. Modified K.C.C. 16.82.095 to allow clearing and grading between October 1 and April 30.**

Evaluation: The timeframes set forth in Ordinance 15883 could not be met without this modification. However, wet weather complicated these earthwork projects, and it limited the ability of some participants to finish their work. Both for resource protection and practical construction considerations, it is preferable to limit grading projects to the regulated construction season.

Recommendation: Do not amend the code.

**2. Modified K.C.C. 21A.24.240A to not require compensatory storage at the same elevation and not require that it be hydraulically connected.**

Evaluation:

- Three projects were able to locate compensatory storage at elevation from the same site on one nearby farm.
- Three projects will receive partial compensatory storage from this same site, with one or two vertical feet of the project occurring at the same elevation.
- Three projects were initially able to locate some or all compensatory on site but not at the same elevation. In one instance, the identified soil turned out to be unusable for a pad and would have to instead be hauled out of the floodplain. In another, the top soil has to be excavated and set aside, the lower soil horizons taken for the pad, and then the topsoil re-spread on that area. In a third site, topsoil must be removed and a seasonal pond will be left.
- The largest project could not locate any compensatory storage.
- For those sites that located compensatory storage, it was located at a site that met the criteria for hydraulic connectivity.

Recommendation: Retain the requirement that compensatory storage be provided in equivalent volume and at equivalent elevation. Provide flexibility within that context by establishing a compensatory storage bank to provide opportunities for those sites that cannot meet this standard. See Recommendation #12 in Section V, Recommendations of the Flood-Farm Task Force, for an explanation of the bank.

**3. Modified K.C.C. 21A.24.240C to allow development where the base flood depths exceed three feet or the base flood velocity exceeds three feet per second.**

Evaluation: This modification was important to the success of the demonstration project, as most of the pads are in areas exceeding a depth of three feet. The standard is intended to help guide new land uses away from areas of highest risk. However, the demonstration project involved existing agricultural land uses, and serves to reduce the known hazard to that existing use. Modification of this standard is reasonable as it allows reduction of hazard where the risk is greatest.

Recommendation: Amend K.C.C. 21A.24.240C to allow limited agricultural exceptions to the required depth and velocity standards, and to waive the associated requirements for analysis. See Recommendation #7 in Section IV: Recommendations of the Flood-Farm Task Force, page 23.

**4. Modified K.C.C. 21.24.240K to allow up to 40,000 square feet of cumulative encroachment if compensatory storage at elevation was not available;**

Evaluation: Because many of the farm pads were constructed without providing compensatory storage at the same elevation, approximately 24,000 square feet of cumulative encroachment was used. Only three of the pads could have been constructed without this code flexibility.

Recommendation: Allow the remaining 16,000 square feet of cumulative encroachment to be used while the compensatory storage bank is being developed. See Recommendation #12 in Section IV: Recommendations of the Flood-Farm Task Force, page 24. This will be addressed in the Compensatory storage bank.

**5. Modified K.C.C. 21A.24.260 to allow repair and configuration to existing livestock flood sanctuaries in the FEMA floodway.**

Evaluation: The construction of the farm pads in the demonstration project would have been prohibited without this code flexibility.

Recommendation: Amend the code to allow farm pads in the FEMA floodway. See Recommendation #6 Section IV: Recommendations of the Flood-Farm Task Force, page 22.

**6. Modify K.C.C. 21A.24.270 to not require an elevation certificate prior to issuance of a letter of completion for the project.**

Evaluation: Elevation Certificates provide critical elevation data to ensure the farm pads are constructed to proper elevations above based flood elevation levels. Elevation Certificates will be provided for the farm pads constructed under the demonstration project. .

Recommendation: Do not amend the code.

**7. Allowed modification of the standards in the Farm Plan Public Rule that pertain to livestock sanctuaries.**

Evaluation: The Farm Plan Public Rule standards augment the code. Relaxation of some of the standards was necessary to accomplish the project. Any permanent changes in code will have to be reflected in the Public Rule.

Recommendation: Amend Farm Plan Public Rule to reflect any changes in code.

**8. Required recorded non-conversion agreement**

Evaluation: All the participating landowners agreed to execute a non-conversion agreement recorded on the title to the parcel on which the pad was located. The agreement states that the farm pad will only be used for agricultural purposes and that it may not be converted to any other use. However, the Task Force agreed that agricultural buildings should be allowed

on farm pads and that an investment in a building required that it have other agricultural uses, and not only storage during floods. The primary concern is that the allowance of a building does not lead to any non-agricultural use, especially residential use, which is prohibited in the FEMA floodway by state law.

Recommendation: Require a non-conversion agreement to be recorded for any new farm flood pad that indicates it will remain in agricultural use and conversion to non-agricultural purposes is prohibited. See Recommendation #10 in Section V; Recommendations of the Flood-Farm Task Force.

**D. Additional Information Directed by Section 4, Subsection I of Ordinance 15883:**

**1. A complete inventory of all existing livestock flood sanctuaries in the Snoqualmie and the parcel number on which they are located.**

The map in Appendix A includes 22 farms that are thought to have had a livestock sanctuary exempted in the early 1990s. (Two of these were in the Demonstration Project and therefore have star. Records from the original livestock sanctuary exemptions are incomplete. There is difficulty in identifying the exact location of several of these: either they were never built or have been modified over time. The original owners need to be located to better understand the situation. Two of the properties have piles composed significantly of hog fuel that may not be the original sanctuary.) The chart in Appendix B includes the number of the parcel on which the livestock flood sanctuary is or was located. The map also includes any farm pads that were elevated in this project. Appendix B also includes their parcel number; as well as any other known farm pads.

**2. The size and base flood elevation of each livestock flood sanctuary.**

Appendix B includes an estimate of the top square footage of each livestock flood sanctuary; and an estimate of how its top elevation relates to the base flood elevation.

**3. An assessment of the need for new livestock flood sanctuaries and an assessment of the need for farm pads, ... including an evaluation of the alternatives to fill.**

a. The Need:

The following data represents what is known on the limited option of “farm pads.” The need was assessed by a mapping exercise in which the WLRD Agriculture Program staff and the KCD farm planners put their collective knowledge of farms on a map (Appendix C) and also initiated personal contact with landowners. While this work is not entirely complete, the assessment and the map represent a significant amount of knowledge about “farm pads” in the valley.

The findings include:

- i. Farms that have high ground or adequate farm pads:

- Many farms at the edge of the floodplain have high ground – an area on their property that is above the base flood elevation where livestock, equipment and supplies can be taken - and do not need a farm pad or an alternative to a farm pad. The accuracy of this assessment needs to be confirmed by speaking with all landowners and only some have been contacted. The farm acreage associated with high ground is shown on the maps in Appendix C, and represents approximately 50% (6,600 acres) of the active farm acreage in the Snoqualmie Valley APD.
  - In addition to the farms that have natural high ground, some farms have an adequate farm pad. Once the demonstration project is completed, 16 farms will have farm pads above the Base Flood Elevation (BFE). This represents 12 % of the active farm acreage in the APD.
- ii. Farms that need a flood safe location or farm pads:
- Eleven farms have a farm pad that either straddles the BFE (not level) or is within a foot and a half of the BFE. They have flood protection for all but the most severe events.
  - Five farms have a pad that is well below BFE.
  - Nineteen additional landowners have expressed a need for a farm pad, three of whom received exemptions as an original “livestock sanctuary” but were originally constructed below BFE or whose pad was removed or never completed.

The farms that need to elevate pads or find a flood-safe location represent 2,250 acres of the active farm acreage in the APD.

b. The Survey of Farmers

The Task Force decided that it might be short-sighted to simply ask the question “what is the need for farm pads.” Consequently, a survey (Appendix D) was mailed to 150 properties in the Snoqualmie Valley APD to determine what all the potential needs of agriculture for safe, dry places or for expanded infrastructure that may want a farm pad or elevated building. Only ten farms responded, although staff received additional information by speaking directly with additional landowners and the responses were useful. Some people do take a few livestock to other places that have high ground; others report that this is a challenge that cannot be conducted frequently or for long duration. The survey also found that landowners are willing to elevate buildings though some will not have the capital for this and in other instances an elevated structure will not work for their specific farm operations.

c. The Future Demand for Flood-Safe Locations

If farming expands in the valley, there may be an additional need for flood-safe locations/options. The expansion would occur if the over 1600 acres that is now out of production or under-utilized were to be brought into production, or if farms are segregated into smaller parcels. Some of these may have access to high ground, but it is likely that some parcels will require at least a small on-site flood-independent location in order to establish a viable agricultural operation. The

“new agriculture”, the vegetable and flower production that is coming into the valley, can be viable with 10-acre holdings.

- d. Alternatives to Fill.
  - i. Floating structures were researched to the extent allowed by the time frame. (see Appendix F). They were dismissed for the near term as expensive or operationally unfeasible.
  - ii. Farm pads with flow through culverts were suggested by the Roads Maintenance representative to the Task Force and will be further explored. See Recommendation #15 in Section V: Recommendations From the Flood-Farm Task Force. A farm pad design that includes culverts as flow through devices could reduce compensatory storage needs by at least 50%. Orientation of the culverts for conveyance would have to be considered.
  - iii. Elevated structures provide the best alternative to fill. While they may cost more at the time of construction, they also keep the floodplain free for conveyance and flood storage – a long term necessity for agricultural viability. They have significant farm advantages that include: new structures can be designed and sited in a location that is suitable for current operations, are safe from flooding, and would receive insurance benefits through reduced premiums. Examples of cost are provided in Appendix G. Many farms had elevated structures historically. The Task Force recommends financial incentives to support farmers in employing this alternative whenever it is feasible. See Recommendation #3 in Section V: Recommendations From the Flood-Farm Task Force.

**4. A determination of the impact on the available compensatory storage, backwater effects and base flood elevation as a result of this demonstration project.**

The ordinance directed that the DNRP complete hydraulic modeling for compliance with flood hazard regulations. Staff did this work using the base model created by Northwest Hydraulic Consultants in a new Flood Insurance Study completed under contract by DNRP in 2006. This HEC-RAS model is the basis for preliminary Flood Insurance Rate Maps that were made public on September 28, 2007. This is a sophisticated model that well represents the hydraulics of the lower Snoqualmie River floodplain with flood hydrographs in an unsteady state simulation of conditions in a branched flow network.

DNRP staff modified the HEC-RAS model to include 13 specific farm pad alterations that were proposed for inclusion in the demonstration project (only ten of these have been or will be constructed). Model results for pre- and post-project conditions were compared for each of these 13 pad alterations individually, and for all 13 pad alterations collectively. Water surface elevations and energy grade elevations were compared at every modeled location for each modeled condition. All of the differences rounded to 0.00 feet, meaning that the impacts do not involve a measurable rise in the surface water elevation as defined by King County code.

The model did show some sensitivity to the demonstration project alterations. Model results included some minor rise in both calculated water surface and energy grade near most of the pad sites. At two of the sites these rises were almost measurable, as defined by the code, but none actually met or exceeded that threshold.

The unsteady HEC-RAS modeling technique used for the demonstration project accounts for both the conveyance obstruction (i.e., backwater effects) and the storage displacement associated with the modeled alterations. Neither of these types of impact would result in a change in base flood elevation as a result of this demonstration project.

It is important to note that compensatory storage was provided for three of the demonstration project pads. None of these compensatory storage mitigations were included in the model. Presumably, the mitigations would further reduce the cumulative hydraulic impact of the demonstration project, increasing the confidence that no measurable rise will result.

Finally, it is important to remember that the 13 alterations that were proposed and modeled had been relatively small dimensions. When similar construction has been allowed in previous years, the constructed pads were several times larger. The model results for these 13 small pad alterations should not be misconstrued to suggest that all such pads are hydraulically negligible. That suggestion does not logically follow from the available data. If larger pads were modeled, such as those from the 1990 project, they might have measurable adverse hydraulic impacts.

**5. An identification of possible funding assistance in the form of grants or loans for farmers that could be used for alternative flood protection solutions that would not require placing additional fill in the floodplain.**

Federal flood mitigation grants available to assist with elevation projects:

- Pre-Disaster Mitigation (PDM): awarded on a competitive basis and without reference to state allocations, quotas, or other formula-based allocation of funds.
- Flood Mitigation Assistance (FMA): Available for structures insurable under the NFIP.
- Hazard Mitigation Grant Program (HMGP): Provides grants after a major disaster declaration.

State flood mitigation grants available to assist with elevation projects:

- Flood Control Assistance Account Program (FCAAP): Provides mitigation funding for the protection of human life and property from flood-related events.

Local Funding Options:

- Surface Water Management Fees: SWM fees are already used to alleviate some flooding that may be related to upslope drainage or runoff through the Agricultural Drainage Assistance Program that helps with drainage

maintenance. They are also used to monitor stream flows into the APD. The Neighborhood Drainage Assistance Program has been reduced significantly in recent budgets due to declining revenue. In some cases technical advice can be offered to the property owner on how they might pursue fixing the problem themselves.

- King County Flood Control Zone District: See Recommendation #3 in Section IV: Recommendation of the Flood-Farm Task Force on possible funding from the District, page 23.
- King Conservation District: KCD members of the Task Force report that they will look at possible cost-share grant opportunities.
- King County Current Expense Funds: The Task Force suggests that CX funds are appropriate for helping agriculture to meet the County’s floodplain management standards.

## **E. Evaluation of Alternative Review Process**

### **1. Alternative fees and review process:**

Evaluation: DDES capped the fees at \$500 for a Shoreline Exemption and did not require a grading permit; conducted a grouped pre-application; and issued and reviewed a shoreline exemption for the entire group at once (“batched review”).

Recommendations: These fee reductions and batched review used for the demonstration project are not recommended as a permanent change. However, DDES already provides a 50% reduction in the hourly review costs for agricultural landowners and caps the cost at fixed fee for agricultural grading permits and counter service fees. As a result the estimated DDES permit fees for a landowner to construct a farm pad would be (details in Appendix E):

Less than .2 acres in area:	\$1537	(DDES Actual Cost \$7015)
More than .2 acres	\$2986	(DDES Actual Cost \$8464)

### **2. Hydraulic analysis and environmental review:**

Evaluation: WLRD’s River and Floodplain Management Unit conducted the zero rise floodway analysis and the compensatory flood storage analysis, building a model and conducting the analysis for each farm pad individually and as a group; the total cost for these analyses was approximately \$10,000. The short time frame forced permit decisions to be made on the basis of preliminary analyses, which were done without the detailed survey information that is necessary for regulatory compliance. Additional analyses will be required before all regulatory compliance measures are met. The estimated cost is approximately \$5,000 to have a consultant conduct the zero rise floodplain and compensatory storage analysis for an individual site.

WLRD’s Watershed and Ecological Assessment Team conducted the environmental review process, going into the field to assess each site for wetland, stream or wildlife issues. The estimated cost for environmental review is \$800 per individual site if environmental review is required on a site. This does not include the cost of a consultant should one be required.

If the costs of the hydraulic analysis, environmental review and permitting are not made affordable, it is likely that projects will not be done effectively or will not be done at all and agricultural enterprises will not be viable.

Recommendation: The County should make it a priority to identify mechanisms that will make costs more affordable or to find sources of funding to cost share the expenses. One possibility is to use a portion of the funding from the King County Flood Control Zone District that is being recommended for cost sharing barn elevation mitigations to pay WLRD staff to conduct the hydraulic modeling at a much lower cost than a consultant. This form of cost-shared technical assistance would be comparable to other forms of County technical assistance provided through the Agricultural Drainage Assistance Program or the Livestock Management Program.

### **3. Identification of compensatory storage and outreach to landowners:**

Evaluation: WLRD's Agriculture Program and GIS unit identified compensatory storage opportunities (based on topography), and the River and Floodplain Management Unit provided field review and confirmation. WLRD's Agriculture Program conducted outreach to landowners, provided assistance with the shoreline exemption applications, and recorded the required covenants for the farm pads.

Recommendation: Continue to fund the WLRD Agriculture Program staff to provide outreach, technical assistance, education, and permit coordination on county regulatory and incentive programs. Work with the King Conservation District to utilize their expertise. Continue to fund GIS staff to help identify potential compensatory storage opportunities.

### **4. Elevation benchmarks and elevation certificates:**

Evaluation: KCD and NRCS provided surveyed elevation benchmarks, technical assistance on farm pad construction and finishing. The KCD was able to pay for it this time but will not necessarily pay for it in the future. However, KCD relies on the expertise of the NRCS for these tasks; in this case the work was performed by staff from the Snohomish Conservation District. Their participation in this demonstration project was helped by DDES' batched permitting. Their capacity to help on an individual basis will vary according to their work load. The KCD provides financial cost share to landowners as they can. However, competition for KCD's limited financial assistance resources will need to be balanced against other requests beyond flood mitigation projects.

Recommendation: Support continued funding for the KCD.

## **III. AGRICULTURE TASK FORCE (MOTION 12559)**

The King County Executive was directed to convene a task force to review and make recommendations on farm protection measures related to flooding in the Snoqualmie Valley

APD. A Task Force of twelve individuals and one facilitator met for seven half days and one all day meeting between October 15<sup>th</sup>, 2007 and January 9<sup>th</sup>, 2008. Twelve other people attended some of the sessions to observe, contribute, or to make formal presentations. As outlined by Motion 12559, the following groups or agencies participated in the Task Force:

- Agriculture Commission (one farmer, plus an alternate);
- King Conservation District (KCD) (Supervisor and farm planner); and
- Hmong Community (one farmer, plus an alternate).

In addition, representatives from the following groups were invited:

- Sno-Valley Tilth;
- Federal Emergency Management Agency (declined);
- Washington State Department of Ecology;

Others were invited according to agenda topic:

- University of Washington Climate Impacts Group;
- U.S. Department of Agriculture;
- A farm contractor; and
- Snohomish County Surface Water Utility.

#### **A. Findings of the Flood Farm Task Force.**

The following specific topics that Motion 12559 requested that the Task Force address the following specific topics:

##### **1. Expansion of the opportunities to construct farm pads to protect livestock, equipment, and products such as seeds, bulbs, hay or other feed during floods.**

###### Findings:

- Federal and state regulations do not prohibit farm pads in the designated FEMA flood-way, but do require that any fill placed within the FEMA floodway does not result in an increase in the base flood elevation.
- King County code prohibits livestock flood sanctuaries in the designated FEMA floodway.
- Floodplain management for No Adverse Impact requires compensating for fill placed in the flood plain by removing material from the same elevation.
- The location of one farm pad or a cluster of farm pads could trigger a variety of unintended hydraulic impacts that can not be accurately predicted until the farm pads are assessed through hydraulic modeling.
- Elevated buildings, farm pads, or any alternatives to farm pads are critical components of agricultural operations in the Snoqualmie APD because the entire valley farmland is inundated three to five times a year. This is a unique situation for Snoqualmie farmers compared to competitors in the Skagit, Snohomish or Green River flood plains.

###### Recommendations:

- Amend King County code to allow farm pads in the FEMA floodway if compensatory storage and zero-rise standards are met.

- Allow the construction of agricultural accessory buildings on farm pads provided a covenant assures the farm pad and the buildings will not be converted to non-agricultural uses, including residential, which is prohibited in the FEMA floodway under both State and King County regulations.
- Identify sources of funding to assist farmers to implement projects and/or meet the regulatory requirements.
- Establish a compensatory storage “bank” to support the viability of agriculture in the Snoqualmie Valley. See recommendation #12 in Section IV: Recommendations of the Flood-Farm Task Force., page 24.

**2. Ability to repair flood-damaged building regardless of the assessed value.**

Findings:

- Federal and state regulations require that when a structure is “substantially improved,”(improvements exceeding 50% of the market value of the structure) the structure must be brought up to current code.
- Federal and state laws do not prohibit substantial improvements in the FEMA floodway.
- King County DDES had interpreted the (Sensitive Areas Ordinance which went into effect in November 1990) to prohibit substantial improvements within the FEMA floodway. The Critical Area Ordinance regulations that went into effect January 1, 2005, obviated this earlier determination which was officially reversed by the department’s Regulatory Review Committee in December 2007.
- The assessed value of many old agricultural buildings is low so that the substantial improvement threshold is also low. When an old structure needs to be brought up to current code, the cost of the upgrade can be prohibitive. Any change to the threshold for determining “substantial improvement” would require a change in federal and state regulations.

Recommendation:

- Implement the DDES Regulatory Review Committee’s recent interpretation that a substantial improvement to a non-residential building is allowed within the FEMA floodway if it meets the federal and state requirements to bring the structure up to current code.

**3. Application of expanded storm drainage technology and requirements, including berms, for urban developments that contribute storm water into the Snoqualmie River Basin;**

Findings:

- Flood flows in the lower Snoqualmie River valley are primarily the result of snowmelt and rainfall in the North, Middle, and South Forks of the Snoqualmie River basin, the Raging River basin, and the Tolt River basin.
- Based on available data, the increase in impervious surfaces in the lower part of the basin will have a negligible impact on the river in severe flood events. However, storm water runoff from development may explain why some agricultural fields near tributary streams flood earlier than flows from river flooding and remain inundated longer than they used to be after river flows recede.
- Tightlines from the Urban Planned Developments appear not to be the issue they were perceived to be based on available data. Redmond Ridge does not flow to the Snoqualmie. Snoqualmie Ridge and Redmond Ridge East have detention facilities that meet strict standards in King County’s Stormwater Design Manual and the discharge tightlines are for emergency overflow only.
- Berms may be effective to prevent minor flooding adjacent to small streams.
- There are no gages to measure storm water runoff from some of the small creeks and streams that flow into the Snoqualmie River.

Recommendation:

- Add flow gages on Tuck Creek and Ames Creek – the two main tributaries in the Snoqualmie that are not currently monitored for flow to further analyze and understand the hydrologic affects of tributary and stormwater impacts in the Snoqualmie Basin. Investigate the need for additional gaging. See Recommendation #9 in Section V: Recommendations of the Flood-Farm Task Force.

**4. Implementation of a flood control program within the Snoqualmie Valley APD that focuses upon the reduction of flooding to farmlands.**

Findings:

- Control of winter flooding by upstream control of Snoqualmie River flows would require reservoir volume in excess of those on the Cedar and Green River systems.
- Row crop farmers report that spring floods generally do more agricultural damage or inhibit viable agriculture more than the larger floods of winter months.
- Spring floods might be controlled with an upstream reservoir of more modest size.
- Prior studies by the U.S. Army Corps of Engineers and others have found problems with the most likely locations and design concepts for reservoir construction in the upper Snoqualmie Valley. With the exception of the North

Fork Dam site proposed in the early 1970s, few feasible opportunities have been identified. The North Fork proposal was vetoed by then Governor Daniel Evans primarily for environmental reasons.

- Salmon recovery planners have identified the natural, unregulated flows of the Snoqualmie River system as a unique and important benefit that is not present in most of King County’s other major river systems, making the Snoqualmie River critical for salmon recovery in the Puget Sound region.

Recommendation:

- The County should conduct a hydrologic analysis of the Snoqualmie River basin. See Recommendation #16 in Section IV: Recommendations of the Flood-Farm Task Force, page 25.

## **B. OTHER FINDINGS OF THE FLOOD-FARM TASK FORCE**

### **1. Hydrologic Trends.**

- There is wide variability in how the Snoqualmie River responds in a flood event.
- Factors affecting variability include: amount and location of rainfall in the basin; existing snow pack; temperatures; degree of soil saturation before the storm; and pre-flood levels in the South Fork Tolt River reservoir.
- Existing data do not indicate any significant changes in flow response in the basin, despite periods of logging and of sediment removal (dredging).
- Data indicates that the time for flood progression from Snoqualmie Falls to Carnation continues to match established rules of thumb: Carnation crests approximately 12 hours, plus or minus 6 hours, after Snoqualmie. Records from both Snoqualmie River stations (at Snoqualmie and at Carnation) are considered “good” by the U.S. Geological Survey. “Good” is defined as meaning 95% of reported measurements are within 10% of actual values.

### **2. Future Flood Predictions**

- The predictions for the future are that there will be higher variability in storms and floods due to global climate change.
- In a mixed rain and snow basin like the Snoqualmie River that variability is more pronounced than in lowland or high mountain basins. The Snoqualmie Basin is one of the most sensitive basins to climate change on the West Coast.
- Regional warming from predicted global climate change will result in high snow levels. Precipitation that once fell as snow would fall as rain and therefore runoff will be greater.
- Historic records may require adjustment to yield useful predictions in light of climate change.
- Models indicate there will be increased winter flows but lower winter peaks flows and reduced spring flows with drier conditions in the summer.

### **3. Snoqualmie 205 Project Effects**

- The Snoqualmie 205 Project involved channel widening done in 2004 to reduce flood problems in the City of Snoqualmie, which previously had the highest number of flood insurance claims of any city in the state. Pre-project study by the U.S. Army Corps of Engineers suggests that the project can cause about 1,500 cubic feet per second (cfs) more water to go over the falls at the peak of a major flood; later in the flood, the same study predicts a 500 cfs decrease.
- The Snoqualmie 205 Project contributed mitigation funding to raise 12 structures (7 houses, 3 barns, 1 office, 1 shop) as mitigation for downstream impacts. Total project contribution is \$328,500.
- The project contributed mitigation funding to raise 12 structures (7 houses, 3 barns, 1 office, 1 shop) as mitigation for downstream impacts. Total project contribution is \$328,500.
- Flood storage was restored as mitigation and included the removal of 90,000 cubic yards of a berm at the former Weyerhaeuser mill site. Berm removal also enhanced the river's access to a much larger area of active floodplain behind the berm.

### **4. Backwaters from the Snohomish/Skykomish**

- Dikes in the Snohomish are now built to a uniform profile and all overtop at a 5-year event. They do not contribute to or cause a back up the Snoqualmie.
- Tidal effects can be seen as far as SR 522, where gage measurements show this tidal influence when river flows are low. In flood conditions, the gage does not show this tidal influence.
- A diary from the 1880s observed the Skykomish River back up into the Snoqualmie River, which indicates that the Skykomish has historically had a backwater effect on the Snoqualmie River.
- The Skykomish River has a very steep grade and when its flows reach the flatter Snohomish Valley floor, a hydrologic mound forms in the Snohomish Valley that can cause the Snoqualmie to back up into King County.
- The degree to which the Skykomish River backs up into the Snoqualmie depends upon the timing of the flood crests in the two basins.

### **5. Federal and State Regulations**

The majority of the Snoqualmie Valley APD is mapped in the FEMA floodway where the most protective regulations apply.

- In the Snoqualmie River floodplain, the FEMA floodway includes some areas of deep, fast flowing, and especially dangerous waters, and it includes some areas of lesser hazard.
- Federal and state regulations recognize that agriculture requires some degree of flexibility or relief if agriculture is to occupy the floodplain. Agriculture is a compatible land use in floodplain and is recognized as a preferred land use over more intense residential or commercial development.
- Based on federal regulations, under no circumstance can the activities cause an increase in the base flood elevation within the FEMA floodway.

- Federal and state regulations allow wet flood-proofing through a variance process for agricultural buildings, or they can be allowed outright for low damage potential buildings.
- State and federal laws allow construction of new non-residential structures in the FEMA floodway as long as performance standards are met.
- Construction of new residential structures is prohibited in the FEMA floodway under state law.

## **6. Compensatory Storage**

- Compensatory storage at elevation is essential for effective No Adverse Impact floodplain management.
- Most jurisdictions now require compensatory storage even though it is not required by federal or state regulations.
- Available compensatory storage opportunities are unusually limited by topography in the flat floodplain of the Snoqualmie River.

## **7. Elevating Buildings**

- The cost of elevating some types of new buildings adds a relatively marginal expense to the initial construction cost.
- Elevating existing and new agricultural buildings can greatly reduce flood damages and can also result in savings in flood insurance premiums. Flood insurance premium discounts may be sufficient to recover the incremental costs borne by property owners in just few years time for some buildings.
- Federal flood mitigation grant funding can be applied to elevating buildings. However, the criteria for grants generally seek to reduce flood insurance claims, so they tend to favor homes instead of agricultural buildings.
- Federal flood mitigation grant funding can be applied to elevating buildings. However, the criteria for meeting minimum benefit-cost analysis may reduce the potential grant eligibility of agricultural buildings.
- Elevation is not feasible for some agricultural buildings that are either too old or need to be located at grade to be accessible by animals or equipment.
- Elevating an existing building that consists primarily of walls and a roof to shelter livestock or heavy equipment on the ground can involve significant cost for heavy structural flooring that is not otherwise necessary.
- The agricultural representatives state that it is cheaper to elevate buildings by importing fill. Flood management staff question this statement and have found data to the contrary.

## **8. Floating Technologies.**

- Floating technologies tend to be used in marine tidal environments or lake environments more than in river environments.
- Designs that would address flood debris may not be ideal for a farm environment.
- The technologies explored are cost prohibitive for a single farm.

## 9. Miscellaneous Findings.

- Produce crops such as vegetables and flowers are not considered commodity crops. As a result, Snoqualmie farmers are not compensated by federal assistance for their losses. The Farm Services Agency staff advised the Task Force that attention should be drawn to this issue so that federal insurance funds can be available to local agriculture.
- Floods leave agricultural landowners with miscellaneous debris from upstream properties that need to be cleared from their land. The landowners have to clear the debris, haul it to a disposal site, and pay the disposal fees – all at a time when they need time and funding to recover from the flood event.
- Hazardous wastes can contaminate the food supply when transported in floodwaters. A pilot program in the basin is underway to promote safe storage, collection and disposal.

## IV. RECOMMENDATIONS OF THE FLOOD-FARM TASK FORCE

The Task Force is forwarding the following recommendations for consideration by the King County Council, in no order of priority:

**Recommendation 1.** Allow new non-residential agricultural accessory buildings in the FEMA floodway in King County’s APDs (K.C.C. 21A.24.260C), as long as applicable standards are met.

New elevated buildings – on post and piling, not on fill – may be the best solution for both floodplain management and agricultural viability in the long term. New elevated structures provide protection, reduce flood damage, chaos, and stress, and provide lower insurance rates. Grants and cost share may be able to help defray their costs.

**Recommendation 2.** Allow for wet flood-proofing of some agricultural buildings through an alteration exception to the critical areas ordinance or through a code amendment.

Wet flood-proofing allows buildings to be constructed or remain at grade while requiring that permanent or contingent measures are applied to the building or its contents which prevent or provide resistance to damage from flooding while allowing floodwaters to enter the structure or area. Generally, these measures include properly anchoring the structure, using flood resistant materials below the base flood elevation, protecting mechanical and utility equipment, and the use of openings or breakaway walls. Federal law allows this provision through a variance process, which in King County would be through an alteration exception, or it can be allowed outright if certain standards are specified in King County Code. Approval would be needed from FEMA and the Department of Ecology to allow this change to code. This outright provision is generally approved only for buildings that are of relatively low value. FEMA has approved a \$65,000 limitation for such buildings in Snohomish County.

**Recommendation 3.** Help reduce flood impacts to agriculture by providing \$100,000 per year for 10 years from the King County Flood Control Zone District to be used as cost share for mitigation projects, such as the elevation of barns or other mitigation measures in King County APDs.

Because flood mitigation measures can be expensive, the King County Flood Control Zone District funds can provide a cost share to leverage other sources of funding, including property owner contributions. The funds may also be used to cost share the expenses of conducting the hydraulic modeling and permit expenses required for construction of new or repair of existing farm pads.

**Recommendation 4.** Work with the federal Farm Services Agency to propose modifications to the federal insurance programs to recognize and provide coverage for the type of agriculture that occurs in King and Snohomish counties.

Most federal crop insurance programs cover only commodity crops such as wheat, corn, and cotton. Most crops grown in King County, such as vegetables, herbs and flowers, are considered specialty crops and are not covered by federal crop insurance. The Farm Services Agency recognizes that alterations to the flood insurance program, such as reimbursing for loss of income, are needed to assist Snoqualmie Valley farmers. A representative of the agency spoke to the Task Force and encouraged our collaboration on this issue.

**Recommendation 5.** Add a definition of farm pads to K.C.C. 21A.06. The definition should include the storage of equipment, seeds, hay, bulbs, livestock and small animals.

This recommendation reflects the change in agriculture in the Snoqualmie Valley from the predominance of dairies in the early 1990s to the “new” agriculture centered on hay, vegetable, flower and herb production, and range-fed beef, sheep and poultry. Farm pads are needed to be more than just livestock sanctuaries; they need to provide protection for equipment and supplies as well as animals.

**Recommendation 6.** Allow farm pads in the FEMA floodway (K.C.C. 21A.24.260D) as long as applicable standards are met.

Since the 1990 exemption, no new livestock sanctuaries have been constructed in the FEMA floodway. The original livestock sanctuaries were sized for large dairy herds and resulted in approximately 275,000 cubic yards of fill being imported into the floodplain. If constructed today, many of them would not meet federally-required conveyance or King County’s compensatory storage standards. Farm pads needed for the “new” agriculture will generally be much smaller. The recommendation is to encourage alternative means of flood protection to minimize this import of fill, but to allow farm pad construction if the project can meet the applicable compensatory storage and conveyance standards. Changes to the floodplain regulations to allow farm pads within the FEMA floodway also require an amendment to the county’s shoreline regulations. These changes will require review from the Department of Ecology and FEMA.

**Recommendation 7.** Provide limited agricultural exceptions to the maximum depth and velocity thresholds. (K.C.C. 21A.24.240C).

The code amendment would give the DDES director the authority to waive the requirement for a depth and velocity analysis for agricultural uses and to approve certain projects that exceed depth and velocity thresholds.

**Recommendation 8.** Extend the demonstration project deadlines for the ten project participants to complete farm pad construction to September 1, 2008, and to submit the required elevation information by September 30, 2008.

The late start of these of the demonstration project process, combined with early wet weather, resulted in projects that could not be completed in the Fall of 2007. Specific factors included:

- the river was high in September and fields were wet before the exemptions were issued. Those farmers with wet fields could not run equipment in and out of them to construct the farm pads;
- there was very little fill available from contractors late in September at the end of the construction season;
- haulers were afraid of liability if they damaged county roads when turning onto or off the saturated shoulder of an unpaved farm road;
- it was too late to stabilize and hydro-seed the farm pads or to surface them with gravel or plants; and
- ideally a final certification of elevation should be done after the farm pads have a had time to settle.

**Recommendation 9.** Install flow gages on Tuck Creek and Ames Creek.

The addition of gages on these two streams will complete the monitoring of flows in streams that come into the Snoqualmie Valley APD and may affect the inundation of farm fields – independent of river levels. The other major streams in the Snoqualmie Basin are already being monitored. These data will be used for the hydrologic analysis proposed in ecommendation #16.

**Recommendation 10.** Allow non-residential agricultural accessory buildings on farm pads.

Buildings are needed on farm pads because equipment and supplies require protection from the rain as well as from floodwaters. These structures must be used only for farm operations with conditions such as the prohibition on septic systems, public use and residential use. Other conditions will be worked out by the DDES Agriculture Permit Team, which includes the Seattle-King County Public Health Department, the King Conservation District and WLRD. Outreach should specifically be targeted to the Hmong farmers, working with Hmong representatives and interpreters.

**Recommendation 11.** Increase public education workshops and materials for landowners on flood preparedness and flood response in order to gather more information and to convey the

progress made on improving flood protection for agriculture. Conduct outreach targeted specifically to farm members of the Hmong community.

An annual workshop could be hosted by WLRD’s Agriculture Program and supported by DDES, WLRD’s River and Floodplain Management Program, and WRIA 7 to help landowners prepare for and respond to floods. This workshop could serve as a forum to track progress on the implementation of the recommendations in this report. Other ideas include a “Guide to the Valley” document that discusses floods and the responsibility they entail, workshops for realtors to educate them on flood hazards when they market property in floodplains, and a video displayed at DDES in the permit center.

**Recommendation 12.** For the purposes of promoting agricultural viability, the Agriculture Program and the River and Floodplain Management Unit of WLRD shall establish a “compensatory storage bank” to the floodplain to enable easy transfer of compensatory storage between property owners and to expedite permitting.

The preservation of flood storage capacity is an essential underpinning of the nationally recognized King County strategy for safe long term management of the floodplain. The standards do not outright prohibit all floodplain fill, but rather require compensatory storage for any displacement. This allows some flexibility for floodplain development without allowing adverse impacts to neighboring properties. However, the lower Snoqualmie Valley APD is one area where the standard offers little opportunity for compensatory storage opportunities: there is limited high ground that could be excavated to compensate for adding fill into the floodplain. The Task Force recommends that the County:

- Continue to protect floodplain storage capacity by requiring that compensatory storage be provided in equivalent volumes at equivalent elevations to those being displaced.
- Establish a “compensatory storage bank” to facilitate agricultural and important public projects while continuing to protect the flood storage capacity of the floodplain.
- Open the bank with an initial balance equal to the unused remainder of the 40,000 square foot allowance for unmitigated flood storage displacements established by the 2007 Demonstration Project, equal to approximately 16,000 square feet.
- Supplement the bank balance with an additional deposit to represent an allowable additional storage loss that would appear to satisfy the county’s zero-rise threshold, according to proposed computer model simulations of hydraulic impacts. The estimated time frame for completing this analysis is June 30, 2008.
- Locate and quantify potential contributors to the bank such as, Chinook Bend levee removal, King County Department of Transportation roads maintenance activities, etc.
- Explore options with DNRP for design of the north Snoqualmie Trail Extension to determine whether there are any options that might contribute compensatory storage to the bank, such as lowering, narrowing or elevating some portions of the trail. Any outcome would have to recognize the importance of the trail as not only essential to the Regional Trail System, but as an essential public facility, and the additional costs of constructing and maintaining the trail under any reconfiguration as a public

- investment. A major constraint may be the Trans-Continental Fiber Optic Cable that is located with the trail fill.
- Explore whether there is any opportunity to obtain compensatory storage from locations in Snohomish County.

**Recommendation 13.** Develop a plan to coordinate cleanup and disposal of miscellaneous post-flood debris among the various entities – contract haulers, the Solid Waste Division, Duvall, and Carnation. The County should support basin-wide programs, including collection and safe storage, to reduce the possibilities of hazardous waste coming in contact with floodwaters.

In the last flood, haulers voluntary offered clean up services in the Duvall area and King County Solid Waste cancelled disposal fees. However, there is no official plan coordinated among the various entities. Landowners end up cleaning up the debris deposited on their land from upstream landowners, and they cover the hauling and disposal fees. This happens at the same time that they need to be spending time and funds on flood recovery in their own operations.

The King County Local Hazardous Waste Program is conducting a pilot program to reduce hazardous waste in the basin. Farmers are very supportive of this effort because it will help abate concerns about potential adulteration of food by floodwaters. The Task Force members would like to see this program continued and strengthened.

**Recommendation 14.** Examine the feasibility of establishing secure locations for seasonal storage of equipment or livestock outside the floodplain or during flood events.

Historically some agricultural landowners take equipment and livestock out of the floodplain, either for the season or during flood events. Many relocate livestock and equipment to land of a neighbor, but this option has its limitations. People want a secure location where their equipment and livestock are safe. Livestock need oversight, some degree of quarantine and care. County staff, farmers, the KCD, Task Force members and survey respondents all provided evidence that many people currently use this option for part of their flood protection need. However, because some fields are frequently flooded during the winter and spring, and if floods become more frequent, this option diminishes. Moving livestock once every two years in an emergency is tolerable; moving them chronically three or four times a year – whenever the river rises – presents an entirely different logistical challenge.

**Recommendation 15.** Investigate the feasibility of constructing farm pads with flow-through devices such as culverts.

This idea may require only half the compensatory storage and may address conveyance issues at some sites. Further work is needed on costs and hydraulic modeling to determine if the benefits outweigh the costs.

**Recommendation 16.** Conduct a hydrologic study of the Snoqualmie River Basin.

Hydrologic simulation of the basin would allow a more thorough understanding of many concerns developed elsewhere in this report. The model could help to better quantify the cumulative impacts of changing land use in the basin, which is often blamed for flood problems in the Snoqualmie Valley APD. The model may also help to improve flood warning capabilities, and serve as a planning tool for future flood reduction projects.

## **V. Other Ideas to be Noted but Not Recommended**

The ideas listed below were suggested by members of the Task Force as potential solutions but were generally considered infeasible because of constraints such as cost, impacts on environmental resources, or were beyond the scope of the Task Force’s roles. However, some Task Force members wanted these ideas to be included in this report.

### **A. Comparisons to Regulations in Snohomish County.**

Snohomish County has mapped a “density fringe” for agricultural lands within the Snohomish River floodplain. Under this approach, each farm is allowed to fill 2% of their land for agricultural purposes. The agricultural representatives on the Task Force expressed the desire to adopt a similar mapping and regulation approach.

The Task Force representative from the Department of Ecology stated that the “density fringe” was approved for Snohomish County because of the tidal influence on the lower Snohomish River that is not present in King County. Because of this tidal influence, Snohomish County has constructed an extensive dike system, which disrupts the natural storage and flow of floodwater. In addition, these dikes only provide protection to the five-year storm and are designed to be over-topped at those flood levels.

King County proposes to provide flexibility for farmers through the establishment of a compensatory storage bank and is optimistic that this will help the agricultural community meet the compensatory storage regulations, which Task Force member agree are valuable floodplain management standards. Additionally, the County is finding ways to support the elevation of buildings – the preferred long-term option for agricultural viability and floodplain protection.

### **B. Pump Carnation Marsh to Provide Flood Storage During Flood Events.**

This concept could provide additional flood storage volume that would be available before the onset of a flood. However, the marsh is on relatively low-lying ground that is not isolated from the river by levees, railroad grades, or similar impervious features. For these reasons, it is unlikely the marsh could be pumped down without significant investment in infrastructure to facilitate pumping. Furthermore, the marsh would probably fill in the early hours of a flood, providing little benefit in the later hours when the damaging crest arrives. Also, this proposal would adversely impact rearing habitat for multiple salmonid species, including Endangered Species Act (ESA) listed Chinook salmon and steelhead trout.

**C. Prioritize and Schedule Five Sediment Removal Sites in the Snoqualmie Basin in Accordance with Flood Plan Policy.**

Consider the two sites on the mainstem Snoqualmie River channel (below the Raging River and below the Tolt River) as the highest priorities for agriculture.

Proposals such as these are being examined under the umbrella of the new Flood Management Plan. However, there would not be significant flood relief from these proposals. Since these two areas account for over 50% of ESA listed Chinook salmon spawning grounds, and for a fairly large portion of ESA listed steelhead trout spawning grounds, there are significant environmental challenges associated with removing this gravel. Thus, these two sites will likely score very low in terms of priorities for the controversial issue of sediment removal on the river.

**D. Raise the West Snoqualmie River Road in Locations That Make it Impassable at Lower Flood Stages.**

This would entail significant costs for the benefit of few landowners. Road project funds are extremely limited and this project would likely be a low priority compared to other public safety needs when determining how these limited resources will be used.

**E. Hire a Consulting Firm to Analyze Feasibility of Multipurpose Flood Control Dams and Reservoirs.**

First analyze the capacity necessary to reduce flooding in a way that would make a difference to agriculture, by determining what flood levels are acceptable for agriculture.

Recommendation 16 begins part of the process needed to undertake this proposal by recommending collecting and modeling necessary background information. However, it does not address that natural flooding levels benefit ESA listed salmonid habitat. Attempts to install any dam within the Snoqualmie Basin would face significant environmental challenges.

**F. Provide compensatory storage by elevating some of the Snoqualmie Valley roads on pilings.**

As in Idea D, this would entail significant costs and would likely be a low priority use of limited road project funds.

**VI. Framed Issue: New Farm Houses in the FEMA Floodway**

One item the Task Force addressed, which some members of the Task Force suggested as a recommendation, is not being carried forth as a recommendation of this report. The Task Force did not reach consensus on allowing new residential farm houses in the FEMA floodway, however it is important to recognize that this issue was not fully discussed or

explored. New residential homes, including farm houses, are not allowed in the FEMA floodway by state law and King County code.

The agricultural representatives of the Task Force wanted to recommend that the King County Council should endorse a farmer-initiated proposal that State Legislators amend State Law to allow new residential farm houses to be built in the FEMA flood-way of APDs (such as Snoqualmie Valley) that are not protected by levees or dikes, provided that they meet appropriate requirements.

They argue that the County has expressed a desire to support “family farms” and thereby provide the community with the social, cultural, and economic benefits that local family farms provide. Agricultural representatives to the Task Force believe that giving farmers the opportunity to live on their farms is essential to the existence of these small family farms.

Farmers further argue that because the flows during floods are not of high velocity in all parts of the Snoqualmie floodway, it is not too dangerous to locate a house in the floodway if it is elevated above the flood level.

The recommendation of King County staff is to preserve the prohibition of new residential homes in the FEMA floodway. Staff believe that the floodway is generally thought of as the corridor of deepest, fastest flow. From a state-wide perspective, this general understanding is reasonably accurate, although the methods used to define the floodway do not always correspond with the deepest and fastest conditions. In general, the floodway would be a very dangerous place to live.

The existing state law has saved lives and prevented property damage by keeping people out of areas that are truly unsafe. Unless the state can more precisely map areas of extreme flood risk, the floodway should continue to be considered as the most hazardous subset of the floodplain where residential construction remains prohibited.

A State legislative process would be expensive and lengthy, and require many years of work. It would open a “Pandora's Box” for those with less sensitivity to the flood issue and this could put far more people in harm’s way. With floods perhaps increasing in both frequency and magnitude, King County staff believes this is not a wise direction.

## **VII. CONCLUSION**

For effective long-term management of floodplain functions – which will benefit the viability of agriculture in the long term – alternatives to placing fill in the floodplain are the solution of choice. Agricultural landowners need protected storage opportunities that are elevated above the base flood elevation. The protected storage can be provided by options that do not require fill, such as elevating existing buildings, constructing new elevated buildings, or taking equipment and supplies out of the floodplain for the flood season. Importing fill is the least desirable option.

A suite of options must remain open for agricultural landowners to both contribute to long term floodplain protection and to protect themselves individually during floods. The agricultural community will need support to help them meet the regulations that will provide the flood protection they need. The key to success is ongoing dialogue.

Staff will meet with the agricultural members that were on the Task Force to report on such items as the status of the modeling for the compensatory storage bank, the outcome of the fully completed demonstration project proposals, the legislative package related to these proposals, and any further information on agricultural needs. In addition, staff will provide an annual update to the King County Agriculture Commission on the issues addressed in this report.

The Executive will evaluate the code changes recommended by this report and forward appropriate legislation by April 30. Changes to the floodplain regulations to allow farm pads within the FEMA floodway also require an amendment to the county's shoreline regulations. This latter code amendment is part of the larger shoreline code rewrite which will not be completed until later this year. This also will require approval from Washington Department of Ecology. We understand farmer's expectations regarding work that might be done in the summer of 2008, however any work planned for this summer should not assume flexibility from current regulations could be provided by these code changes.

This report has taken an immense effort from agricultural representatives, including the King Conservation District and King County managers and staff. However, there was a very short time frame and the Task Force members recognize that some report items may be lacking in adequate details.

## **Farm Flood Task Force – Appendices.**

Appendix A: Map of Livestock Sanctuaries and Demonstration Projects.

Appendix B: Farm Pad Data: Farm name, parcel number, BFE, pad height, exemption or permit number, dimensions.

Appendix C. Maps: Assessment of Need for Farm Flood Pads.  
South Snoqualmie APD  
North Snoqualmie APD

Appendix D. Flood Farm Survey

Appendix E. Estimated Permit Costs of Farm Flood Pads.

Appendix F. Floating Technologies

### **Other Presentations To Task Force:**

Appendix G. Modeling Effects Results: Impacts of the Demonstration Ordinance

Appendix H. Power Point: Hydrologic Trends in the Snoqualmie

Appendix I. Excess Flood Volumes

Appendix J. 205 Project

Appendix K Costs: (a) Estimated Costs for Building Elevations  
(b) Costs: One Estimate for Elevating a Sample Agricultural Building