

**Document C**  
**Skagit CFHMP**  
**Draft Criteria for Screening and Selecting Projects/Measures**  
**Recommendations from Technical Committees**

The Skagit County Flood Control Zone District Advisory Committee requested that each Technical Committee (Environmental, Dike and Drainage, Land Use) develop recommendations regarding flood project screening/selection criteria. This document provides a compilation of criteria developed by the three Technical Committees. Original Technical Committee documents are also included below.

Thoughts about criteria:

- Definition: a rule or principle for evaluating or testing something (Dictionary.com).
- Synonyms include: decisive factor, principle, measure, standard, norm, condition, reason.
- Used to assist in deciding what CFHMP actions should be implemented or prioritized. May also be used in Skagit GI measures selection.
- Can be weighted or include fatal flaw screening component.

To assist with Advisory Committee discussion, we created criteria categories, based on the criteria suggested by the technical committees. The Advisory Committee needs to assess whether these are the correct categories.

When considering the criteria, think about a 1-5 rating scale to evaluate the degree to which each criterion is met, i.e. if a specific project really meets a particular criterion it might be rated a 5 to show this, while if it really doesn't meet it at all, it might be rated a 1. Since there are still so many unknowns associated with each project, also consider including a designation of some sort that would indicate - "we don't know, but think the concept may have promise".

That said, for the November Advisory Committee meeting, the hope is that criteria will be selected. A future meeting would then be used to further develop weighting factors, if any, and to agree on specifics of how a rating system might be applied. The rating system is only mentioned here to help Advisory Committee members envision how the criteria might be used and to help with how the criteria might be worded so that they are established correctly for ultimate use.

While a lot of good information was generated by the technical committees, not all of it seemed directly applicable to being incorporated as criteria. In the compiled criteria below, we included just what we thought truly are meant to be criteria. The verbatim technical committee submittals are included below the compiled criteria for reference.

**1. Criteria focused on Broad Community Support**

- a. Is the project consistent with CFHMP mission/goals/objectives?
- b. Can the project be implemented in a short time frame?
- c. Does the project have multi-jurisdictional cooperation including broad-based support from the public and elected officials?
- d. Does the project create or enhance recreation opportunities? This will be important in the development of public support for funding.
- e. Are there other multi-objective benefits to the project?

**2. Criteria focused on Flood Protection and Infrastructure**

- a. Does the project address a known flood problem?
- b. Does the project demonstrate effectiveness in reducing flood risk?
- c. Does the project provide effective flood protection?
- d. Does the project decrease chance of catastrophic failure or increase levee capacity to survive overtopping?
- e. Does the project maintain or improve public safety at existing level of flood risk management and development?
- f. Does the project reduce potential damage to property?
- g. Does the project protect existing infrastructure and essential public facilities (wastewater and water treatment plants, transportation hubs, fire/police stations, etc).
- h. Does the project reduce the number of properties that experience repetitive flood damage?
- i. Does the project encourage maintenance and preservation of existing flood protection infrastructure before consideration of new or expanded projects?

<b>Criteria from Stakeholder Interviews*</b>
<ul style="list-style-type: none"><li>○ Life safety</li><li>○ Higher level of protection for critical infrastructure</li><li>○ Consider benefits of ecosystem restoration</li><li>○ Satisfy multiple objectives</li><li>○ Consider scale of projects – large may not be feasible</li><li>○ Consider resource losses and how they impact the valley</li><li>○ Frequency of floods and number of people affected</li><li>○ Level of benefits to region in general</li><li>○ Chance of success</li><li>○ Fundable</li><li>○ Compatible with land use laws</li></ul>
<p>*Stakeholder interviews were conducted by FCZD consultants in March-June, 2008 during formation of the FCZD Technical and Advisory Committees</p>

**3. Criteria focused on Environmental Components**

- a. Does the project evaluation include a complete scientific and ecological understanding of real and potential impacts?
- b. Does the project recognize impacts to entire river system and mitigate where feasible?
- c. Does the project address channel modification that impacts fish?

- Restores flood plain processes or provides fish access to the flood plain by reducing constraints on channel migration
- Reduce the amount of bank armoring
- Restore flood plain processes or reconnect river to its floodplain
- c. Does the project increase amount (reconnect) of functional floodplain habitat?
- d. Does the project increase amount of functional tidal marsh?
- e. Does the project increase amount of estuarine and nearshore habitat?
- f. Does the project address projected climate change impacts, such as sea level rise and hydrologic / sediment changes, in project selection and design?
- g. Does the project restore riparian function?
- h. Does the project improve and/or preserve existing connectivity between freshwater and nearshore habitat?
- i. Does the project improve large woody debris conveyance & recruitment?
- j. Does the project maintain or restore native flow regime (including velocity)?
- k. Does the project have a net environmental gain?
- l. Does the project provide benefits to multiple species of fish and wildlife?
- m. Does the project reduce pollutants when flood occurs?
  - Sewer Treatment facilities
  - Chemical Storage
  - Pollution reduction management plans
- n. Does the project reduce water temperatures through riparian forest restoration (shading)?
- o. Does the project increase the amount of floodplain/tidal wetlands (to filter pollutants?)
- p. Does the project reduce scouring of prime soils in overflow events?

#### **4. Criteria focused on Land Use Components**

- a. Is project consistent with applicable plans, regulations, and programs?
- b. Less than 100 year protection is desired for rural areas to retain rural designation and preserve farmland. Does the project achieve less than 100 year flood protection outside of UGA's?
- c. Does the project ensure any farmland loss achieves multiple benefits (e.g. environmental restoration as well as flood control)?
- d. Does the project increase protection of farmland outside flood/habitat project footprints?
- e. (Placeholder) Existing 1974 document, provided by Gary Jones, should be reviewed and criteria and proposed measures evaluated as part the current CFHMP planning effort.
- f. Consistent with Corps guidance, preference would be given to measures such as buying flood easements on agricultural land, where flooding would have lower impact than in more densely populated areas and paying for removing flood debris from fields before the next season's planting. Does this criterion apply to projects?

**5. Criteria focused on Practicality of Implementation, including Cost and Cost Effectiveness**

- a. Be economically feasible and cost effective. Cost effective needs to address a broader community interest.
- b. Does the project have comprehensive cost effectiveness, including structural maintenance?
- c. Do the cost/benefit data presented contain the full ecological value of both restoration components and resources lost
- d. Does the project receive a positive economic benefit evaluation through the Skagit GI screening process? (*Wording from TC: Skagit GI screening process should include combinations / alternatives and the economic benefits at this initial stage before meaningful evaluations can be completed.*)
- e. Do the control measures and related restoration elements address the sustainability of both the measure and the environmental benefits:
- f. Do the control measures identify adaptive management scenarios and related costs;
- g. Have potential funding mechanisms/sources been identified?

**6. Criteria focused on Preferred Alternative Package (will include numerous individual projects)**

- a. It is important to remember that not just one measure will be the solution - that it will involve the creative combination of several measures. Do the identified projects fit with the preferred alternative package? (*Wording from TC: Independent evaluations of measures is not an effective way to analyze the effectiveness when it is clear that there just aren't any "single" measure flood control projects waiting to be identified.*)
- b. Does the package of control measures have a net environmental gain and provide synergy with other programs (shared-strategy goals, etc)
- c. Land-use policies and regulations must be included in the mix of flood control measures to be considered (including restrictions on floodplain and farmland development);

### **Land Use Technical Committee Recommended Criteria**

Screening Criteria: The following recommendations on the criteria to be considered for screening were discussed and approved (as amended) to be forwarded to the Advisory Committee at the 11/06/08 LUTC meeting:

- Projects/Measures should:
  - Be consistent with CFHMP mission/goals/objectives.
  - Protect existing infrastructure and essential public facilities (wastewater and water treatment plants, transportation hubs, fire/police stations, etc).
  - Be consistent with applicable plans, regulations, and programs.
  - Recognize impacts to entire river system and mitigate where feasible.
  - Encourage maintenance and preservation of existing flood protection infrastructure before consideration of new or expanded projects.
  - Demonstrate effectiveness in reducing flood risk.
  - Be economically feasible and cost effective. Cost effective needs to address a broader community interest.
  - Acknowledge and encourage those projects that can be implemented in a short time frame.
  - Reduce the number of properties that experience repetitive flood damage.
  - Have multi-jurisdictional cooperation including broad-based support from the public and elected officials.

Environmental Committee Recommended Criteria

**Environmental Technical Committee  
Draft Criteria for Evaluation of CFHMP Measures  
Compiled and Revised 11/3/2008  
Criteria for Evaluation of CFHMP Measures**

**Preamble** – Provided by Terry Stevens

The members of the ETC understand the significant and potentially catastrophic impacts from major flood events on the Skagit River. Development in the lower valley floodplain, the location of critical infrastructure, and current agricultural practices now require floodwaters to be restrained, diffused, and/or managed to reduce potential impacts to the community. We also understand the impact of anthropogenic changes in the valley over the past 100+ years and the loss of habitat, natural and cultural resources associated with these alterations. The ETC believes that Skagit County has an enormous, once-in-a-lifetime opportunity to address these two issues in a simultaneous, mutually supporting manner – a potential win-win that advances two of the most pressing and heartfelt concerns to the local community: flood control and natural resource conservation.

Within our assignment to develop criteria upon which to evaluate the forthcoming measures there are several overarching considerations to which we strongly subscribe: 1) control measures must be presented with complete scientific and ecological understanding of real and potential impacts; 2) cost/benefit data presented must contain the full ecological value of both restoration components and resources lost; 3) control measures and related restoration elements must address the sustainability of both the measure and the environmental benefits; 4) control measures should identify adaptive management scenarios and related costs; 5) land-use policies and regulations must be included in the mix of flood control measures to be considered (including restrictions on floodplain and farmland development); 6) control measures must have a net environmental gain and provide synergy with other programs (shared-strategy goals, etc). Within these considerations, the ETC presents the following criteria for evaluation of CFHMP measures:

**Goal statement from AC draft**

- 2. Incorporate ecosystem protection, restoration and natural resource considerations into flood hazard solutions.**
- **Objective 1: Increase the natural flood water and sediment storage capacity of the floodplain through the protection and restoration of natural river, bank, tidal marsh, off channel, and wetland habitats.**
  1. Address channel modification that impacts fish
    - Restores flood plain processes or provides fish access to the flood plain by reducing constraints on channel migration

- Reduce the amount of bank armoring
  - Restore flood plain processes or reconnect river to its floodplain
- 2. Increase amount (reconnect) of functional floodplain habitat
- 3. Increase amount of functional tidal marsh
- 4. Increase amount of estuarine and nearshore habitat
- 5. Address projected climate change impacts, such as sea level rise and hydrologic / sediment changes, in project selection and design
- **Objective 2. Protect and restore natural riverine, riparian and estuarine processes.**
  - 6. Restore riparian function
  - 7. Improves and/or preserves existing Connectivity between freshwater and nearshore habitat
  - 8. Improve large woody debris conveyance & recruitment
  - 9. Maintain or restore native flow regime (including velocity)
  - 10. Any project should have a net environmental gain
  - 11. Provides benefits to multiple species of fish and wildlife
- [M1]
- **Objective 3. Increase the natural water filtration through wetland restoration and prevent water quality contamination during flood events.**
  - 12. Reduction of pollutants when flood occurs
    - a. Sewer Treatment facilities
    - b. Chemical Storage
    - c. Pollution reduction management plans
  - 13. Reduce water temperatures through riparian forest restoration (shading)
  - 14. Increase the amount of floodplain/tidal wetlands (to filter pollutants)
- **Objective 4. Minimize impacts on farmland while maximizing ecosystem restoration opportunities.**
  - 15. Reduce scouring of prime soils in overflow events
  - 16. Achieve less than 100 year flood protection outside of UGA's
  - 17. Ensure any farmland loss achieves multiple benefits (e.g. environmental restoration as well as flood control)
  - 18. Increase protection of farmland outside flood/habitat project footprints.

Other Issues for the AC to consider regarding criteria development

- t. Recreation opportunities should be considered. This will be important in the development of public support for funding.
- u. It is important to remember that not just one measure will be the solution that it will involve the creative combination of several measures. [M2]

## Dike and Drainage Committee Recommended Criteria

### Skagit FCZD Dike and Drainage Technical Committee Dike District Technical Committee Measure Criteria Outline

#### Hydrology & Hydraulics:

- Group emphasized need to get Hydrology correct so measures can be evaluated
  - Concerned that current Corps H and H raises question on ability to manage flood risk and protect public health and safety
  - Requested future presentations on recent PI Engineer's H & H report and County / nhc report

#### Flood Protection First:

- Does not adversely affect Public Safety and existing level of risk management
- Design measures for effective flood protection first.
- Setback levees where possible to provide a riverward shelf along the toe.
- Determining maximum flow that can be safely conveyed through bridge corridor and existing levee alignments and
- Where the excess 100-year flow will go and how often
- Need accurate existing conditions mapping
  - Mapping effort needs to be adequate to evaluate existing conditions and compare effectiveness of measures.
- Need to get Nookachamps storage right
  - Evaluate delaying filling Nookachamps basin not increasing WSE of current storage
- Follow-up on question of County's jurisdiction and role in Sterling overflow area outside of both cities' limits and DD #12 district boundary.

#### Overland Flow Conveyance and relief structures:

- Overland flow conveyance pathways and outlet structure locations need to be identified and evaluated.
  - Flow pathways should be identified and relief structures located and designed with adequate capacity to convey outflow to bay
  - Analysis should include how much flow and where the flow will go once the river discharge exceeds the levee capacity and flow starts to leave (end run) the levee system.
  - Identify areas where flood overland flows would be go and design structures (e.g. floodgates) to allow return flows back into the river when the flood stage drops
- Roadways and other structures perpendicular to or that impede overland flow in anyway should be identified and modified so as not to impede overland flow conveyance and increase flow depth
  - I-5 and other major roads may need causeways or underpasses constructed to convey flow to west side of existing roadways.
  - Structures within flow pathways should be evaluated for impact and measures taken to reduce damage to property and overland flow restrictions



- Options could include:
      - Elevating structures
      - Relocating structures
      - Property buyout
      - Conservation easements
    - Comprehensive Land Use Plan should be reviewed and additional overland flow pathways identified and included as special flood hazard areas etc.
  - Overland flow pathways and special flood hazard areas should be evaluated similar to Sterling / LaFayette road area : Existing Conditions or “No Action” Alternative
  - Areas like Gages slough, Joe Leary slough, the historic North fork of the Samish River and other existing “low swale” areas should also be evaluated for flow capacity and potential “outfall” structures to reduce overland flow Water Surface Elevation (WSE) which will reduce damage in the floodplain.
    - The 2001 Evaluation Areas report could be expanded to include this analysis.
  - Early warning systems should established and evacuation routes identified for high risk areas
  - Levee failure analysis is a critical analysis and important for existing conditions and levee failures as well as for many of the proposed measures.
  - Evaluate for “Cost efficiency including structural maintenance”.

#### **Critical Infrastructure:**

- Critical infrastructure needs to be identified and located on map and prioritized for protection
- Known problem areas need to be similarly identified.

#### **Certified Levees:**

- 100 year certified levee locations need to be identified and prioritized.

#### **Rural Preservation:**

- Less than 100 year protection is desired for rural areas to retain rural designation and preserve farmland
- Comprehensive Land Use Plan should be reviewed and additional overland flow pathways identified and included as special flood hazard areas etc.
- Existing 1974 document, provided by Gary Jones, should be reviewed and criteria and proposed measures evaluated as part the current CFHMP planning effort.
- Consistent with Corps guidance, preference would be given to measures as buying flood easements on agricultural land, where flooding would have lower impact than in more densely populated areas and paying for removing flood debris from fields before the next season's planting.

### **Maximum Multi-bridge Corridor conveyance:**

- Need to establish maximum conveyance through Multi-bridge corridor reach before districts can commit to design of levee improvements in lower basin.
- Need to identify level of debris buildup on bridges when modeling maximum flow.
- Need to evaluate impact to existing levees from any increase in velocity due to any proposed changes to the levee system up and downstream.

### **Existing levee alignment:**

- Improve levees along existing levee alignments and utilize County road right-of-way to widen base of existing levees for levee improvements where available.

### **Measure evaluations:**

- Independent evaluations of measures is not an effective way to analyze the effectiveness when it is clear that there just aren't any "single" measure flood control projects waiting to be identified.
- The Skagit GI screening process should include combinations / alternatives and the economic benefits at this initial stage before meaningful evaluations can be completed.

### **Levee Failure Analysis:**

Cathy Desjardin briefly described a levee failure analysis model that the Corps is planning to develop for levees in the Skagit River basin and requested that DD commissioners work with her to identify known problem areas within the districts. The purpose of the model is to provide a more detailed levee failure analysis than what has been available for the Skagit River basin in the past. The main improvement over the existing levee failure, non-failure analysis is the inclusion of more detailed geotechnical information. Cathy provide a copy of a Corps study completed for the Hamilton City in California as an example of a study that included more specific geotechnical work. Copies of this document will be made available for review upon request.

One of the benefits of the levee failure point analysis would be that the **levee reaches where 100-year certification is desired could potentially receive more detailed geotechnical exploration and analysis.** This detail analysis could then serve as Corp documentation for the FEMA levee certification process. The Corps has stated that the levee analysis study that Cathy is proposing will be their top priority for FY '09 funding and a more detailed scope of work and schedule will be provided at a later date.