APPENDIX L.
ISSUE PAPERS AND CITIZENS COMMITTEE REPORT

This appendix contains the nine issue papers discussed at the Citizens Committee meetings and the Citizens Committee Report which summarizes the feedback received from the Citizens Committee.

The issue papers include:

- Capital Project Funding for Coastal Flood and Erosion Risks
- Urban Flooding and Small Streams
- Levee Vegetation and Eligibility for U.S. Army Corps of Engineers Levee Repair Funding
- Gravel and Sediment Management
- Capital Project Prioritization, Sequencing Approach, and Eligibility Criteria
- Equity and Social Justice: Outreach to Underserved and Vulnerable Populations
- Relocation of Residential and Commercial Tenants
- Design Guidelines and Bioengineering Approaches to Levees and Revetments
- Levee Certification, Accreditation and Flood Risk Reduction “Levels of Service”

2012 KING COUNTY FLOOD HAZARD MANAGEMENT PLAN UPDATE
February 1, 2012

TOPIC:
Capital project funding for coastal flood and erosion risks

STATEMENT OF ISSUE:
Should the Flood Control District's capital program include funding for coastal flood and erosion risk reduction projects?

BACKGROUND:

The geographic scope of the 2006 King County Flood Hazard Management Plan includes the unincorporated and incorporated areas of King County, with a 'focus' on the major river floodplains and their significant tributaries. The 2006 Plan also includes a recommendation to cost-share hazard mapping studies with FEMA for marine shorelines so that this technical information identifying hazard areas can be made available to jurisdictions, other public agencies, as well as the residents and businesses exposed to these hazards. While the adopted plan for King County calls for a 'focus' on major rivers, the state authorization for flood districts does allow for improvements that include "the extension, enlargement, construction, or acquisition of dikes and levees, drain and drainage systems, dams and reservoirs, or other flood control or storm water control improvements; widening, straightening, or relocating of stream or water courses; and the acquisition, extension, enlargement, or construction of any works necessary for the protection of stream and water courses, channels, harbors, life, and property" (RCW 86.15.100).

When the 10-year work plan was developed for the newly formed countywide Flood Control District in 2007, the capital project list included $2M for a feasibility study for a potential coastal project (replacement of the Elliott Bay Seawall). During subsequent discussions in 2010 of a proposal to provide additional engineering design support for the Seawall project, the technical staff participating in the Basin Technical Committees and the elected officials on the Advisory Committee did not question the need to replace the Seawall, but many requested additional clarity regarding whether the capital project prioritization policies and criteria in the 2006 Plan were intended to be applied to coastal projects such as the Seawall. The Board provided some clarification with respect to the Elliott Bay Seawall in 2011 by adopting a technical amendment to the Plan and appropriating $4.25M for pre-engineering design support, along with a commitment to provide an additional $25.75M in the six-year capital program. In the motion adopting the amendment, the Board cited RCW 86.15.100, noted the consequence and severity of a seawall failure on the region's economy, and cited a U.S. Army Corps of Engineers finding that there is a 'federal interest' in rehabilitating the Elliott Bay Seawall.

While the decision to cost-share the Elliott Bay Seawall is not in question, the Board has requested input from the Citizen Committee to more clearly articulate a policy for coastal risk reduction actions along the unincorporated Vashon/Maury Islands shoreline and the incorporated shorelines along Puget Sound.

The Board also asked for input on urban and small stream flooding, which is related but discussed in a separate issue paper.

ALTERNATIVES TO CONSIDER (stand-alone or in combinations):

1. Capital funding used for river and stream flooding only; limit coastal funding to existing commitments previously adopted by the Board.
   - PRO: Maintains focus on reducing flood and channel migration risks in mapped floodplains of King County while continuing technical support for hazard identification and mapping. Would not impact projects identified on the existing CIP.
   - CON: Coastal risk reduction projects that might otherwise be considered high priority would not be funded by the Flood Control District.

2. Capital funding for coastal areas only if the U.S. Army Corps of Engineers finds there is a federal interest in the project.
   - PRO: Ensures that the public safety and economic benefits of the project are clearly defined and regional in scope.
   - CON: Places a higher standard on coastal project funding than river floodplain projects. May displace existing high-priority floodplain projects.

3. Capital funding for coastal areas is considered only to reduce risk to public property or infrastructure.
   - PRO: Ensures that public funding is not used to rebuild private seawalls and bulkheads.
   - CON: Places a higher standard on coastal project funding than river floodplain projects, where public property and infrastructure are given greater weight but private property is considered. May displace existing high-priority projects.

4. Capital funding for coastal areas is evaluated based on consequence, severity, and urgency alongside other flood risk reduction actions.
   - PRO: Consistent treatment of risk reduction needs, regardless of freshwater versus saltwater distinctions.
   - CON: Unless additional revenue is obtained, consideration of additional needs could delay high priority projects that have already been identified along major river systems.

5. Possible addition to the options listed above:
   Capital funding for coastal areas should be provided only on the condition that additional resources are provided such that other projects are not deferred, and there is a significant cost-share from other funding sources.
   - PRO: Matches expenditure increases with revenue increase so that other high-priority flood risk reduction needs are not delayed.

CON: Options to obtain additional funding are limited.

ADDITIONAL RESOURCES:

1. Preliminary map of public and private shoreline armoring along King County marine shorelines

2. Flood Control District's Motion amending the 2006 Flood Plan (FCD 2011-05)

3. Advisory Committee Annual Recommendations (August 2010):
http://your.kingcounty.gov/dnrp/library/water-and-land/flooding/kcfzcd/KCFCD_advisory_committee_2011_draft_recommendations.pdf

4. Advisory Committee Q&A on the Elliott Bay Seawall (April 2010)
http://your.kingcounty.gov/dnrp/library/water-and-land/flooding/kcfzcd/03_Advisory%20Committee%20Q&A_DRAFT.pdf

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2012 KING COUNTY FLOOD HAZARD MANAGEMENT PLAN UPDATE
February 15, 2012
For Discussion Purposes Only

TOPIC: Urban Flooding and Small Streams

STATEMENT OF ISSUE:
How should flood district funds allocated for urban flooding and small streams that are not the 'focus' of the 2006 FHMP?

BACKGROUND:
The adopted 2006 King County Flood Hazard Management Plan (FHMP) includes policies and actions related to hazard identification and mapping, outreach and communications about these hazards, land use management (including regulations, acquisitions, and elevations), channel maintenance (including sediment and wood management), and rehabilitation of flood risk reduction structures (levees and revetments). The geographic scope of the 2006 King County Flood Hazard Management Plan includes the unincorporated and incorporated areas of King County, but the plans calls for a 'focus' on the major river floodplains and their significant tributaries. Under state law (RCW 86.12.210), countywide flood plans shall be adopted by each jurisdiction within 120 days. Because this statue has not been enforced, the 2006 plan includes a policy stating that minimum compliance with the National Flood Insurance Program (NFIP) constitutes 'consistency' with the 2006 Plan. Analysis is needed to more fully understand the extent to which city land use policies are integrated with FHMP policies, and the reason for deviation from these countywide policies.

Capital projects identified in the FHMP are prioritized and sequenced using a scoring system that evaluates the consequence, severity, and urgency of each problem as well as implementation factors such as readiness, multiple floodplain benefits, partnerships, and cost-sharing.

During the initial discussions of the Advisory Committee following the formation of the Flood District, King County staff clarified that while the state law authorizing flood districts allows funds to be used for both flooding and stormwater management, King County's original intent was to address regional flood management rather than local stormwater problems resulting from land development that are typically addressed through local stormwater utilities. However, jurisdictions outside the major river floodplains have countered that 'flooding is flooding', whether due to runoff caused by land development or by land development in locations where rivers naturally overtop their banks.

With the establishment of the countywide Flood Control District and a new property tax to provide revenue for high-priority projects and programs that provide regional benefits, several have sought additional funding for projects outside the major river floodplains that are the focus of the Plan. Since the formation of the District the Board has provided direction through the budget process based on three key Advisory Committee recommendations:

1. 'Flooding is flooding' – regardless of whether on major rivers or small streams, projects should be evaluated using the prioritization criteria. If, for example, a small stream floods

a state highway posing a threat to life safety and interfering with regional economic activities, than it should be judged on these attributes rather than the size of the waterbody.

2. The capital project prioritization process has been refined to more clearly recognize 'regional economic benefits', and the implementation criteria have also been enhanced to recognize whether a jurisdiction has an active CIP program of their own and undertakes planning efforts to reduce flood risk, as evidenced by their rating under FEMA's Community Rating System.
3. Consistent with these two recommendations, additional projects outside of the major river floodplains have been included in the District's capital program, including two small stream projects and one coastal project.
4. In recognition of the fact that communities throughout King County have flooding and water quality problems, the Board established a 'Subregional Opportunity Fund' that allocates a portion of all tax revenue collected to all jurisdictions proportional to property taxes generated in each jurisdiction. The fund has been set at 10% of tax revenues since its establishment in 2009; in 2012 this amounted to $3.6 million. For example, if 35% of the property taxes collected come from one jurisdiction, than that jurisdiction receives 35% of the Opportunity Fund. Funds must be used consistent with the requirement in state law and the Board's adopted resolution.

As noted above the requirement that countywide flood plans be adopted by cities has not been rigorously enforced by the Department of Ecology, and many of the land use elements of the 2006 Plan are unlikely to be supported by all jurisdictions. In an external expert review of King County's floodplain program, it was noted that the resulting differential land use standards may result in flood risks being transferred from one jurisdiction to another, and may also result in the need for capital funding to mitigate the effects of developing in at-risk areas.

ALTERNATIVES TO CONSIDER:

1. As a first step toward achieving the intent of RCW 86.12.210, work with cities to inventory floodplain land use policies and regulations, and collaboratively identify ways to improve the integration of floodplain land use practices across jurisdictional boundaries.
   PROS: Builds understanding of different regulatory approaches and areas where integration could be improved so that land use practices do not unintentionally increase risks or result in the need for capital investments such as new levees.
   CON: Staff time and resources for multiple jurisdictions; does not enable the letter of RCW 86.12.210 to be met within 120 days of plan adoption.

2. Evaluate all projects based on prioritization criteria; no direct allocation for the Opportunity Fund
   PRO: Provides for a more transparent and accountable allocation of funds in the capital program
   CON: Opportunity Funds have the potential to help leverage other funds for local stormwater drainage issues, and provide significant funding flexibility for local governments.

3. Same as #2, but urban flooding problems are eligible if they cross jurisdictional boundaries.
   PRO: Enables funding for drainage problems that cross jurisdictional boundaries and may therefore not be adequately addressed via the local stormwater utility.
   CON: High-priority flood problems may exist within basins that are entirely located in one jurisdiction

3. Opportunity Funds available only for those jurisdictions that do not have capital projects funded within their jurisdiction within a set timeframe (i.e. the prior year or two of appropriations)
   PRO: More clearly focuses Opportunity Fund on those jurisdictions that are not already directly benefiting from the larger capital program (mainly floodplain cities).
   CON: Floodplain jurisdictions would not be able to access Opportunity Funds for local drainage issues, to cost-share grants, etc.

4. Revise Opportunity Fund to a competitive process.
   PRO: Provides for a more transparent and accountable Opportunity Fund, and depending on the size of individual awards it could fully rather than partially fund projects.
   CON: Competitive process might put jurisdictions with fewer resources at a disadvantage.

5. Increase Opportunity Fund allocation to jurisdictions. This increase could potentially be combined with options 3 or 4, and it could also be backed by additional revenue.
   PRO: Provide additional direct funding support for local stormwater needs
   CON: May divert funds from existing high-priority projects unless matched with revenue

6. Connect eligibility for capital project funding with compliance with land use policies and regulations that help to limit residual risk and reduce the need for more capital projects over time.
   PRO: Encourages jurisdictions to pro-actively reduce flood risks via land use policies
   CON: Need better understanding of why cities are reluctant to adopt higher regulatory standards. Consider survey to understand the opportunities and constraints for integrated land use policies.

ADDITIONAL RESOURCES:

1. Flooding vs Stormwater Background paper
http://your.kingcounty.gov/dnrp/wlr/flood/flood-control-zone-district/advisory-committee-docs/pdf/070720-meeting/15-faq-swm-x-fczd.pdf

2. Opportunity Fund Resolution (KCFCD2008-10.2)

3. Advisory Committee report on the formation of the Opportunity Fund and revision to the capital project prioritization approach.
http://your.kingcounty.gov/dnrp/library/water-and-land/flooding/kcfzcd/2008_Annual-Report.pdf

2012 KING COUNTY FLOOD HAZARD MANAGEMENT PLAN UPDATE
March 6, 2012

TOPIC:

Levee vegetation and eligibility for US Army Corps of Engineers (Corps) levee repair funding

STATEMENT OF ISSUE:

How should the Flood Control District engage with the Corps on levee vegetation management and disaster funding eligibility under the PL 84-99 program?

Local governments in the Puget Sound region continue to be caught between conflicting federal mandates: we are required to degrade riparian areas identified as critical habitat for federally listed species so that we can retain our eligibility for federal PL 84-99 funding for critical public safety projects. In other words, to comply with one federal mandate we must risk violating both the Endangered Species and Clean Water Acts. Since 2009 the State of California Department of Fish and Game and several environmental organizations have filed a notice of intent to sue the Corps over vegetation management policies.

BACKGROUND:

- Since the early 1990s King County has successful constructed levee projects that rely on native riparian vegetation as a primary means of erosion protection.
- Under Public Law 84-99 (PL 84-99), the Corps is authorized to provide emergency assistance to cost-share and construct levee repairs following a disaster event. Eligibility for this cost-sharing program requires that levee sponsors comply with the Corps Rehabilitation and Inspection Program (RIP), which requires the removal of vegetation greater than 2 inches in diameter from levees.
- Through an existing regional variance the Corps' Seattle District allows the presence of vegetation up to 4 inches in diameter.
- While the purpose of these Corps standards is solely eligibility for federal disaster funding, they are often incorrectly perceived as federal guidance for maintenance necessary for levee accreditation by FEMA. Land behind FEMA accredited levees is not subject to federal insurance requirements or floodplain development regulations. To the degree that the Corps is considered the authority on levee safety, their standards are often cited as the default maintenance standard even for levees outside the PL 84-99 program.
- Federal funding levels under PL 84-99 vary considerably. Since 1990 Corps funding of levee repairs in King County has totaled $27 million, including $25 million received in 2008-9 alone. The 2008-9 level of Corps funding was unique in the last 20 years.

The Corps has proposed the following changes to the policy for local vegetation variances:

- To apply for a variance, local levee operators will need to submit a variance request for individual levee systems, but may look at river systems in a larger planning context. Variances for each individual levee would require approval at multiple levels, with a final decision by Corps Headquarters rather than the local District.
- Responsibility for providing the engineering justification and federal environmental compliance for the variance shifts from the local Corps District to the local sponsor (i.e., King County).

- Drafts of the PGL Corps Policy Guidance Letter (PGL) to date have not included clear standards for an acceptable variance – while the required submittals are clear the criteria against which these submittals will be evaluated is not.
- Along with the PGL revisions, the Corps is also proposing changes to the System-Wide Improvement Framework (SWIF). Under a SWIF, any risk to levee stability posed by vegetation can be prioritized alongside other levee safety risks, with the target of eventual compliance with a levee variance from the national standard developed under the PGL / SWIF process. The two may be used in combination to develop a prioritized SWIF that includes vegetation variances for specific levee segments. A SWIF would be developed collaboratively by multiple parties including the Corps, County, tribes, federal and state agencies, and other local governments, and be used to inform a capital budget that addresses the most pressing levee stability issues along a river system.

King County has been working with a team of state and federal partners (including the Corps Seattle District) to develop a two-pronged approach to achieving the following goals for levee vegetation management in Western Washington:

1. *Safe and Effective Levees*: resilient structures that can be accessed and inspected during floods.
2. *Functional Habitat*: in many densely developed locations our levees are our riverbanks.
3. *Cost-Effective*: use limited resources to address the worst problems first.
4. *Science-Based*: responsive to new information and research.

With these goals in mind, the team has been pursuing a science-based federal policy that reflects regional conditions and provides flexibility from uniform national standards, support for other stated federal habitat and clean water goals, appropriate prioritization of levee vegetation alongside other known levee safety risks, and a commitment to future research.

In pursuit of these objectives we have worked with state and federal colleagues on a two-pronged levee vegetation strategy to (1) apply political pressure to revise the PGL so that regional approaches would be allowed and (2) participated, at the invitation of the Corps Seattle District, in the levee vegetation framework effort to develop an alternative vegetation management proposal with the Corps, federal and state agencies, and the Muckleshoot Tribe.

In part due to the political pressure, the draft PGL policy was delayed several times before being released for public comment in February 2012. The Corps is also proposing changes to the System-Wide Improvement Framework (SWIF), an alternative that allows vegetation to be prioritized against other levee safety risks with the long-term intent of bringing all PL 84-99 levees into compliance with either the national standard or individual variances issued under the revised PGL. The work group convened by the Seattle District has developed a Levee Vegetation Management Framework as an alternative to the national standard. This Framework has not been reviewed and approved by Corps Headquarters, but has been described as a ‘powerful tool’ in helping to address multiple floodplain objectives It been evaluated for Endangered Species Act (ESA)/or Clean Water Act (CWA) compliance. The Flood Control District is currently working with the Puget Sound Partnership and the Corps to host a workshop on how the Framework might be implemented via a SWIF and vegetation variances to support the four goals listed above.

ALTERNATIVES TO CONSIDER:

1. Comply with national standard; no variances or SWIFs.
   PRO: Eligible for Corps levee repair funding if it is available.

CON: Depending on Corps requirements, would divert up to $165M from high-priority risk reduction needs to remove vegetation and root systems, patch levees, and mitigate for the removal of vegetation; inconsistent with Endangered Species Act and Clean Water Act objectives; does not reflect regional conditions.

2. Apply for variances under the new PGL from the Corps; no SWIF.
   PRO: If approved by the Corps, funding eligibility is maintained.
   CON: Uncertain what constitutes an acceptable variance, and unclear whether such a variance would comply with ESA and CWA. Time and money spent on variance application and review process will be diverted from risk reduction projects.

3. SWIF plus individual levee variances
   PRO: Prioritizes funding based on risk over a larger geographic scale as above; variances would enable some additional vegetation to remain on levees while maintaining federal funding eligibility
   CON: Unclear what constitutes an acceptable SWIF or variance. Assumes that some vegetation will eventually be removed over a longer timeframe if not consistent with variance. Development and approval of a SWIF and variances will divert resources from existing work program, although significant work has already been completed for the Green River. ESA and CWA compliance are uncertain.

4. Withdrawal from PL 84-99 (would not include Horseshoe Bend and Tukwila federal levees)
   PRO: Reduced ESA/CWA liability. Increased ability to support ecological objectives as part of public safety flood risk reduction program.
   CON: Does not contribute to regional effort to resolve problem of conflicting federal mandates. Ineligibility for federal levee repair funding. May increase legal exposure related to levee performance should a levee breach occur.

ADDITIONAL RESOURCES:

Levee Vegetation Symposium Keynote Speech (2007)
https://www.kingcounty.gov/environment/waterandland/flooding/ron-sims-levee-vegetation-speech/video-transcript.aspx

Overview of Levee Vegetation Management and Army Corps Funding Eligibility (2010)
http://your.kingcounty.gov/dnrp/library/water-and-land/flooding/kcfzcd/Overview_Levee_Vegetation_Board_042610.pdf

Federal Executives Letter on Levee Vegetation (USACE Northwest Division, EPA, and National Marine Fisheries Service, 2010) (attached)

Army Corps of Engineers Levee Vegetation Research Fact Sheet (Sept 2011)
http://wri.usace.army.mil/documents/woody_vegetation_report/FactSheet-Woody_Vegetation_Report.pdf

Levee Vegetation Presentation - Floodplain Management Association (Sept 2011)
http://www.floodplain.org/cmsAdmin/uploads/Murray-Trees_on_Levees.pdf

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King County Flood Plan Update Issue Paper: Gravel Removal and Sediment Management

Topic: Gravel removal and sediment management for flood risk reduction purposes.

Statement of Issue:

Sediment accumulation in river channels can increase flood hazard and flood risk in King County. The 2006 King County Flood Hazard Management Plan (Flood Plan) established a comprehensive sediment management program, which can include gravel removal (dredging), to reduce the flood risk. This issue paper describes implementation of the sediment management program in specific King County rivers since 2006 and also identifies recent actions at the countywide or regional scale regarding sediment management. One such recent countywide action warrants a minor revision in this Flood Plan update. Other than this one revision, it is proposed that the existing King County sediment management program be continued as it is in the 2006 Flood Plan.

Background:

Gravel Removal and the King County Sediment Management Program in the 2006 Flood Plan

The Flood Plan recognizes gravel removal as a potential flood risk reduction strategy that can be considered on a case-by-case basis, as long as its flood risk reduction effectiveness, potential impacts and priority relative to other projects also are considered. Flood Plan Policy RCM-3 on Gravel Removal states that "King County should remove gravel from rivers and streams for flood hazard management purposes" only when a set of six conditions can be met. Policy RCM-3 is consistent with state and federal policies and regulations. No revisions to Policy RCM-3 are proposed.

The King County sediment management program, described in Flood Plan Section 4.3.1 and depicted in Figure 4-6, identifies two main program components: channel monitoring and sediment management actions. Channel monitoring includes the periodic survey of in-channel sediment levels to document trends in sediment accumulation. Channel monitoring also includes hydraulic modeling of flood water surface elevations in response to changes in sediment levels. In these monitoring analyses, persistent increases in sediment levels along with corresponding increases in modeled flood water surface elevations typically indicate that flood hazard has increased due to sedimentation. Channel monitoring results are used to inform decisions on sediment management actions; they also would be required for permit applications on any gravel removal project.

Channel monitoring is conducted in King County on eight river segments: the South Fork Snoqualmie and the Middle Fork Snoqualmie Rivers (both near North Bend), Snoqualmie River along Fall City, Snoqualmie River along Carnation, Lower Tolt River, Lower Raging River, Lower Cedar River (where the City of Renton conducts the monitoring) and the Lower White River (where King County cooperates with City of Auburn in collection of survey data).

The sediment management actions part of the program applies to these same monitored river channels and includes evaluation of the channel monitoring data relative to an identified flood risk reduction objective. If that objective is not being met and it can be demonstrated that there is an increased flood risk that is attributable to sediment accumulation, then potential sediment management action alternatives can be considered, including:

- Short term: gravel removal; install temporary flood barrier
- Long term: elevate, or purchase and remove at-risk structures; set back levee(s)

The primary criteria that are used to evaluate potential sediment management alternatives are based on the three main goals of the Flood Plan (Section 1.2):

1. Reduce risks from flood and channel migration hazards.
2. Avoid or minimize the environmental impacts of flood hazard management.
3. Reduce the long-term costs of flood hazard management.

The intent is that such criteria, or others based on these same goals, be used to select a preferred sediment management or flood risk reduction project. Examples that illustrate the use of such criteria to evaluate and select preferred alternatives in implementation of the King County sediment management program are described below.

Implementation of the King County Sediment Management Program in King County Rivers:

South Fork Snoqualmie River Gravel Removal Study and Levee Improvement Project:
The South Fork Snoqualmie River decreases in channel gradient within a leveed river segment along the City of North Bend; ongoing sedimentation is a flood hazard concern in this area. Flooding in 1990 was followed by gravel removal in 1991 and 1994. Channel monitoring results since the 1990s identified areas and rates of sedimentation and associated increases in flood water surface elevations, and determined that an identified flood reduction objective was not being met along part of the South Fork Snoqualmie. The South Fork Snoqualmie River gravel removal study, completed in 2011, evaluated three gravel removal scenarios for flood hazard reduction effectiveness, potential adverse impacts and planning-level cost estimates using criteria based on the three main Flood Plan goals listed above. Study findings indicated that two of the gravel removal scenarios would result in moderate decreases in flood hazard that could persist for about a decade at one critical location where overtopping has occurred in the past. Potential adverse impacts (to salmonid habitat, levee stability, or downstream flooding) were characterized generally, and planning-level costs were estimated at $1.5M to $3.6M, depending on the gravel removal scenario.

Another notable finding of this study was that gravel removal would be ineffective in decreasing flood hazard in the area affected by Bendigo Blvd Bridge backwater conditions. This finding corroborates the results of an earlier hydraulic study and suggests that the most effective approach to decreasing the flood hazards at this particular location would be a capital project to modify the Bendigo Blvd Bridge, e.g., by widening its opening.

The South Fork Snoqualmie River gravel removal study identified one scenario that would be most appropriate if it is decided that gravel removal is going to be pursued as a project on this river. Because no other flood risk reduction/sediment management alternatives have been

evaluated yet, no recommendations were made in that study. Instead, findings from the South Fork Snoqualmie River gravel removal study are being used in the South Fork Snoqualmie River Levee Improvement study, now in progress, which is evaluating a set of flood risk reduction alternatives such as levee setback, home elevations, property acquisitions, levee reconstruction and elevation as well as gravel removal. A preferred alternative, or combination of alternatives, will be selected based on the results of the South Fork Snoqualmie River Levee Improvement study using selection criteria that will be similarly based on the three main Flood Plan goals.

City of Pacific Flood Risk Reduction Options (Lower White River):
The Lower White River along the Cities of Auburn, Pacific and Sumner is located at the downstream end of a sediment-rich basin in an area of natural deposition. Also, in-channel sediment accumulation probably is accelerated due to the channelization and confinement in the early 1900s of a previously dispersed network of distributary channels. The historical response to aggradation since channelization typically was persistent and widespread dredging. Channel monitoring data indicate that ongoing aggradation has occurred since cessation of channel dredging in the late-1980s, and hydraulic studies show associated decreases in channel conveyance capacity to a point where the identified flood reduction objective is no longer being met. Sediment accumulation in the Lower White River channel exacerbated overbank flooding in January 2009 within the City of Pacific. In response, a number of actions have been or are being implemented over different time scales.

Because of the direct connection between channel sedimentation and the 2009 flood damages, and the high likelihood that such flooding and damage would be repeated, a short-term flood protection measure was rapidly deployed. In October 2010, King County installed (and continues to maintain) more than 4,000 lineal feet of HESCO © structures, with supporting pumps, as a temporary flood barrier along the area of January 2009 flooding. Even as an urgent short-term action, this flood barrier was evaluated for it flood reduction effectiveness (by hydraulic modeling), for potential impacts (as part of permit requirements) and for cost effectiveness (relative to potentially repeated flood damages).

In addition, King County purchased and removed 11 at-risk residential structures and purchased a 7-acre undeveloped riverside parcel within the area of January 2009 flooding. This project was implemented relatively quickly, with completion in 2011, even though acquisition and removal projects have longer-term flood risk reduction benefits. Because such acquisition projects so consistently have been demonstrated to be a preferred and effective long-term flood risk reduction strategy and due to the urgency of the situation, a standard evaluation of potential alternatives against selection criteria was not conducted. However, this project is consistent with Lower White River Flood Hazard Management Objectives and Strategies identified in Section 5.10.10 of the Flood Plan (to acquire properties and follow up with levee modification to reconnect the river to its floodplain) and with the provisions and objectives of the sediment management program.

For longer-term flood risk reduction on the river reach scale, King County is preparing detailed project design for the Countyline levee setback and floodplain reconnection project along the left (east) riverbank. This project was proposed with equal purposes of habitat restoration and flood risk reduction, and was conceptualized well before the recently more direct effect of

sedimentation on flood hazards became evident. Its alternatives analysis used evaluation criteria based on the three main Flood Plan goals, but did not explicitly consider gravel removal as a project alternative due mainly to its broader purpose of floodplain reconnection. However, a recent US Geological Survey (USGS) study documents decreased channel flood capacity below an identified flood objective and evaluates sediment management options for this same river reach. It found that a levee setback project would be much more effective than gravel removal in reducing flood hazards, which is considered sufficient substantiation that a levee setback is the appropriate preferred project alternative in this river reach. A more detailed and updated evaluation of gravel removal will be included as part of the advanced design and review process for the project. A planning-level cost estimate for the Countyline levee setback and floodplain reconnection project is $9M.

Even as short-term and longer-term flood risk reduction/sediment management projects are considered, designed and implemented, the channel monitoring portion of the program continues on the Lower White River, with periodic resurvey of channel topography. In addition, King County is cooperating with the USGS to better understand Lower White River sedimentation through two new efforts: a basin-scale analysis of sediment production, transport and deposition, the findings of which will inform long-term sediment management efforts and the design of capital projects in the Lower White River; the installation of four additional river stage gages to monitor flood flow levels in greater detail through this part of Lower White River.

Cedar River Gravel Removal Project:
In 1912, the Lower Cedar River was redirected to its present course into Lake Washington via 1.4 miles of constructed channel. Because of its very low gradient, the constructed channel experiences sediment deposition and the sediment deposition results in a corresponding reduction in channel flood capacity. Consequently, the constructed channel has been dredged periodically to reestablish flood capacity, most recently in 1998. Dredging of the lower 1.25 miles of the Cedar River is identified in the 2006 Flood Plan as the Cedar River Gravel Removal Project, which is proposed for implementation in the near future.

In 1998, the US Army Corps of Engineers implemented the Cedar River 205 Flood Control Project with the City of Renton as the local sponsor. That project included dredging and construction of levees and floodwalls along the lower 1.25 miles of the constructed channel. Its stated objective was to reduce flood damages within the Renton area of the Cedar River in a cost effective manner and with minimal impacts to fish and wildlife habitat, with the intent to provide protection against the 100-year flood. Analysis and design of the 1998 project, including preparation of an EIS, evaluated a set of project alternatives against several criteria in the categories of flood damage reduction effectiveness, cost effectiveness, environmental quality, regional development and other social effects. Potential project alternatives included modification to Chester Morse Dam operations, a setback levee upstream of Renton, channel widening within Renton, a sediment trap, floodwall and levees, channel dredging and others. A combination of constructed levee/floodwalls, modification to a bridge near the river mouth, channel dredging and other features was identified as the preferred alternative.

The Army Corps required future maintenance dredging as part of the 205 Project to maintain its flood protection benefits. Also, because this 205 Project is federally certified, the required

maintenance dredging was accredited in the federal flood hazard mapping of this portion of the Cedar River. Annual channel monitoring by the City of Renton demonstrates that ongoing deposition in the constructed channel is decreasing flood capacity below the identified flood protection objective and therefore maintenance dredging is needed. This maintenance dredging would be implemented as a part of the King County Flood District's 6-year Capital Improvement Project list, with the City of Renton as local sponsor. Implementation of dredging is targeted to commence in 2013, subject to obtaining all required permits. A planning-level cost estimate for the total Cedar River dredging project is $5.7M.

Other factors affecting the Cedar River project also provide context. The Lower Cedar River in this project area is a constructed channel that was redirected from its original location. It now flows through densely developed areas of municipal and industrial infrastructure that includes downtown Renton, the Renton Municipal Airport and the Renton Boeing Plant. These areas have regional economic significance and maintenance dredging is intended to avoid extensive flood damage to these areas. Also, available information indicates that the planning and permit process for a project such as the proposed Cedar River dredging can require extensive time and effort to ensure appropriate project implementation and mitigation of impacts. Compensatory mitigation measures will be required to offset project impacts, including adverse effects on regulated wetlands or salmonid habitat of species listed under the Endangered Species Act.

These projects on three river segments on the South Fork Snoqualmie, Lower White and Lower Cedar Rivers, demonstrate how the King County sediment management program is being implemented through all of its intended components. In each river segment, a flood reduction objective has been identified, channel monitoring results are compared to that objective, and, if appropriate, flood risk reduction/sediment management alternatives are identified, analyzed and evaluated against criteria that are based on the three main Flood Plan goals. Application of this alternatives analysis and evaluation process has resulted in selection of different preferred alternatives in two of the river segments: channel dredging on the Lower Cedar River and a levee setback project on the Lower White River. The selection of a preferred alternative(s) is yet to be determined on the South Fork Snoqualmie River.

On five other river segments, the channel monitoring component of the sediment management program is being implemented: the Lower Raging and Lower Tolt Rivers, the Snoqualmie River along Fall City and Carnation, and the Middle Fork Snoqualmie River. This channel monitoring information will be used to analyze the effectiveness of gravel removal in these river reaches, as appropriate. Consideration of flood risk reduction/sediment management alternatives are yet to be conducted in these five segments. Evaluation of gravel removal along with other potential project alternatives against the evaluation criteria similarly based on the three main Flood Plan goals would occur as part of basin-scale capital project planning efforts by King County.

Recent Countywide or Regional Actions Regarding Sediment Management:

Terminology:
Use of the term "gravel removal" in King County Code (KCC) has been questioned. The proposed remedy is to replace it with the term "dredging", whose definition in the Washington Administrative Code is consistent with the provisions intended by "gravel removal" in the

current KCC and 2006 Flood Plan. This correction in the term has no effect on the associated development standards specified in the KCC.

Draft 2012 Pierce County Flood Plan:
King County staff recently reviewed and commented on the Draft Pierce County Flood Plan with regard to gravel removal and sediment management, as part of ongoing coordination between Pierce County and King County on flooding issues. The Draft Pierce County Flood Plan also proposes two gravel removal pilot projects on the Puyallup River, the progress of which King County staff will follow for its informative value.

Sediment Management Group:
A Sediment Management Issues Group (SMIG) was formed by the Washington Association for Floodplain Management (WAFM; now part of the Northwest Regional Floodplain Management Association; NORFMA). The SMIG is composed of scientists, engineers, agency staff and other practitioners who meet regularly to share information on sediment management evaluations and projects particular to this region. King County staff attends the meetings and participates in a sub-committee that is preparing a searchable library of articles and documents relevant to sediment management.

Summary statements:

Projects on three river segments demonstrate the implementation of all components of the King County sediment management program. Implementation of the channel monitoring component of the program continues in five river segments, with analysis and evaluation of gravel removal and other project alternatives yet to be conducted. Evidence from these examples, plus feedback from other agencies indicate that the King County sediment management program is appropriate in its approach, scope and provisions because it includes documentation of existing conditions, evaluation of a range of potential action alternatives, and consideration of potential impacts and long-term costs in selecting a sediment management (or flood risk reduction) action.

One specific, proposed revision is that terminology be revised in the Flood Plan update and in King County Code so that the term “gravel removal” is replaced with the term “dredging”.

Other than the one revision to terminology, King County proposes to continue to implement the existing sediment management program as described in Flood Plan Section 4.3.1, with minor edits to update it. Gravel removal for flood risk reduction purposes will continue to be considered on a case-by-case basis, along with other potential sediment management/flood risk reduction actions.

2012 KING COUNTY FLOOD HAZARD MANAGEMENT PLAN UPDATE
June 2012

TOPIC:
Capital project prioritization, sequencing approach, and eligibility criteria

STATEMENT OF ISSUE:
The current capital project prioritization process evaluates the consequence, urgency, and severity of flooding and channel migration risks, and sequences project implementation based on factors such as readiness, partnerships, external funding opportunity, and legal responsibility. The fundamental purpose of these criteria is to ensure that limited funding is targeted at the highest priority flood and channel migration risks, and that the proposed solutions are consistent with the goals, objectives, and guiding principles in the Plan. With the benefit of the experience applying these criteria over five budget cycles and multiple mid-year revisions, the criteria and scoring system should be assessed with the following questions in mind:

- Do the prioritization scoring criteria adequately define eligible and ineligible projects?
- Do the criteria help decision-makers focus on long-term solutions and 'getting ahead of the next flood' rather than 'reacting to the last flood'?
- Do the prioritization criteria clearly identify when flood damage repairs are necessary to protect public safety and prevent a small problem from becoming larger and more expensive to fix?

BACKGROUND:
The proposed capital program continues to focus on high priority flood risk reduction needs through rehabilitation of flood facilities and the acquisition and removal of floodprone structures throughout King County. New projects proposed for the District's capital program are responsive to flood events, in the form of either high priority repairs or new projects that address flood hazards identified during the flood or through updated flood hazard maps. The addition of new projects does not result in the removal of any project adopted in the 6-year project list, although it may result in delays to other projects.

The *2006 King County Flood Hazard Management Plan* (FHMP) describes flood risks in King County; outlines a series of goals, objectives, and policies for managing these risks; and recommends basin-by-basin actions for reducing risks throughout the County. By adopting this planning document, the District's governing body—the Board of Supervisors—agreed with the suite of flood risk policies and strategies contained in the plan, and it follows that capital projects funded by the District should be implemented in accordance with FHMP guidance. The FHMP is considered under the RCW to be the comprehensive plan for the King County Flood Control District (KCFCD).

Proposed projects are reviewed and prioritized by the Basin Technical Committees, along with a discussion of project sequencing over the 6-year Capital Improvement Program (CIP). Project prioritization and sequencing is guided by the policies contained in the District's adopted comprehensive plan (the 2006 FHMP). Projects are reviewed and scored against flood risk reduction factors (consequence, severity, and urgency) to prioritize projects across the county;

implementation factors such as readiness and leveraging are then evaluated to determine how to sequence high-priority projects over the 6-year CIP timeframe. By evaluating flood risk reduction and implementation factors, appropriate strategies can be developed to ensure that high priority projects are implemented and any implementation constraints are identified and addressed.

The goals of the capital project prioritization and evaluation process are as follows:

- Identify flood risk reduction projects on an annual basis that would be eligible for potential inclusion and prioritization in the KCFCD's 6-year CIP
- Provide an objective and transparent method for prioritizing and sequencing flood risk reduction projects throughout King County
- Provide an objective method for evaluating project eligibility an ineligibility
- Familiarize other agencies within the project evaluation criteria to be considered by the District when identifying and prioritizing capital projects for inclusion in the KCFCD's 6-year CIP
- Provide a mechanism for transparently redistributing funds in the KCFCD's 6-year CIP in response to unanticipated events which may impact the 6-year CIP

Current project prioritization policies that form the foundation for project identification and evaluation are described in Chapter 2 of the 2006 FHMP. Key policies, provided as supplementary material, include: Policy G-2: Flood Risks; Policy G-3: Comprehensive River and Flood Hazard Management; Policy G-9: Multi-Objective Management; Policy G-10: Protecting Natural Functions and Values; PROJ-1: Prioritizing Flood Hazard Risks; and Policy PROJ-6: Flood Protection Facility Design and Maintenance Objectives. These policies outline the criteria that King County should use in prioritizing projects to address flood and channel migration risks; in particular, G-2 and PROJ-1 directly address prioritization approaches to evaluating project proposals.

Projects are evaluated based on these key policies and against a set of criteria approved by the District's Board, which falls into two categories – flood risk and implementation opportunity. Each criterion is numerically scored. The prioritization scoring system provides a relative comparison of capital projects to guide decision-makers; definitive quantitative thresholds between prioritization categories are neither intended nor implied.

Expenditure of public funds to reduce flood hazards may be more appropriate for some types of projects than others. Capital projects funded by the KCFCD should be implemented in accordance with FHMP guidance; policy should be strengthened and brought into alignment with best practices to better reflect how the prioritization and eligibility criteria have evolved over the past five years of project implementation. Ensuring consistency with the FHMP, and appropriately directing public funding toward the most relevant and highest priority projects that provide long-term solutions aimed at reducing flood hazard risks will enable the most effective projects to be implemented.

In the end, the District needs a transparent and consistent way to measure the effectiveness of a proposed solution to a given flooding problem, and incorporating the FHMP's policies in the project evaluation process presents an opportunity to accomplish this objective. This paper does

not intend to recommend one approach over another, yet the hope is that it generates discussion that leads to an improved process.

Project Eligibility
The District's capital project evaluation criteria were developed with the numerous FHMP project proposals in mind, and as a result, the present evaluation process assumes project proposals are consistent with FHMP policies. However, the District has received project proposals from individual jurisdictions within King County, and for these proposals, there is no clear mechanism in place to determine whether a new project proposal meets FHMP policies. For this reason, the criteria and evaluation process may require refinement to ensure that approved projects, regardless of their origin, are consistent with the adopted policies in the FHMP and meet minimum eligibility requirements.

Selecting the Most Appropriate Solution to a Problem
The current system works well to identify the problems, but lacks an explicit step in determining whether a proposed project is the best solution for the problem. The flood risk criteria are focused on the severity, consequences, and urgency of the problem but do not evaluate how effectively the proposed solution addresses the problem. This is a deficiency in the present system that does not allow for a clear and transparent assessment of whether proposed projects are consistent with FHMP goals, objectives, and policies. Further, an evaluation of a proposed project design should be conducted when considering the suitability of a solution. The proposed implementation criteria are straight-forward and complement the criteria focused on addressing the flood risk. These implementation criteria address the project's effectiveness in addressing the problem, the benefit of implementing the project and the readiness of a proposed solution to a flood risk problem.

POLICY CONSIDERATIONS:

Currently, broad policy is in place regarding prioritization and sequencing approaches to project implementation. Modifying the project evaluation process can help to ensure that all projects put forth for consideration by the District are consistent with the fundamental tenets of the District's FHMP. In order to keep focused, and target spending toward the most effective projects, the following policy changes are proposed for consideration.

1. While the 2006 FHMP includes policy regarding project prioritization and sequencing, it does not include explicit eligibility criteria for project funding. Should the FHMP update better define eligibility and ineligibility requirements for project funding and implementation through enhancement of FHMP policy to include an eligibility filter (a project, to the degree possible, must be consistent with the elements of this policy in order to be evaluated or prioritized)? Projects that do not meet the elements of the policy or a specified subset of the elements do not receive further consideration. Examples of minimum eligibility criteria could include:
    - Jurisdictions submitting the project must have adopted a planning document that includes capital projects intended to address flood hazard risks (e.g., comprehensive

stormwater plan, basin plan, coastal zone management plan, flood hazard reduction plan), AND

- Jurisdiction must be in good standing with the National Flood Insurance Program, AND
- Project must be located in a mapped floodplain, special flood hazard area (SFHA), channel migration zone, or reduce flood and channel migration risks in these area.

PRO: Using the Plan to define eligibility criteria eliminates ambiguity about whether a project is consistent with the District's goals, objectives, and guiding principles by making very explicit the link between a project proposal and the adopted FHMP policies.

CON: This option has the potential to generate conflict between the District and individual jurisdictions should a proposed project fail to move to the evaluation and prioritization stage.

2. Should the Plan update provide enhanced criteria that clearly identify when flood damage repairs are necessary? The policy change would enable the District to:
    a. Evaluate repair projects against the broader strategy to ensure choosing the most appropriate projects that adequately address the problem and prepare for the next flood rather than reacting to the last flood.
    b. Ensure consistency with strategies for long-term maintenance and cost reduction. If a project is not consistent with the strategy, an extra level of review would be needed.
    c. Evaluate effectiveness of the solution as part of the prioritization scheme.

    PRO: Defining criteria around when to repair flood facilities would help decision-makers focus on longer-term solutions and getting ahead of the flood rather than reacting to the last flood event?

    CON: Flood damages are unpredictable and highly variable. If criteria and requirements are too stringent it may limit our ability to respond to unanticipated conditions that require action to protect public safety.

3. The current capital project prioritization process evaluates the consequence, urgency, and severity of flooding and channel migration risks, and sequences project implementation based on factors such as readiness, legal responsibility and opportunity. Should the FHMP update strengthen the project prioritization and sequencing process criteria so that all project proposals are evaluated and screened against pertinent FHMP policies, receiving points if specified plan policy components are met and to better reflect the current annual CIP criteria which have evolved over the past four years since the KCFCD was established?

PRO: All project proposals are evaluated in the same fashion against a standard set of criteria, thus allowing the scoring to determine which projects move forward.

ADDITIONAL RESOURCES:

Relevant Policies and Recommendations from the 2006 FHMP:
http://your.kingcounty.gov/dnrp/library/water-and-land/flooding/0701-flood-hazard-mgt-plan/fhmp2006-chapter-2.pdf

Current King County Flood Control District Project Prioritization Criteria:
http://your.kingcounty.gov/dnrp/wlr/flood/flood-control-zone-district/advisory-committee-docs/pdf/070720-meeting/13-prioritization-criteria-regional.pdf

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TOPIC:
Equity and Social Justice: Outreach to Vulnerable and Underserved Populations

STATEMENT OF ISSUE:
The River and Floodplain Management Section's (RFMS) public service roles are primarily to:

1. **assess** flood and erosion risks in King County;
2. **communicate** flood risks to the public; and
3. **reduce** flood risks, including repairing and maintaining levees.

How should the King County Flood Hazard Management Plan be used to direct our efforts to ensure that the River and Floodplain Management program is providing these services equitably throughout King County?

BACKGROUND:

The King County Equity and Social Justice Initiative[1] (ESJI) directs all King County government services to be done in a fair and just manner – ensuring that those without traditional access to resources are being served – and to view the development of all policy, procedures and communication through this lens.

King County also has an Executive Order in place, establishing criteria for a Written Language Translation[2] process that requires a reasonable effort be made to provide all print materials in the languages spoken by the target audience.

Lastly, the King County Flood Control District has directed the River and Floodplain Management Program to ensure that we are reaching vulnerable populations[3] in our public outreach and education efforts.

RFMS, in response to these directives, has:

- Produced and promoted flood safety videos in the top 21 languages spoken in King County
- Provided language translation services available 24 hours a day to callers
- Developed maps based on King County 2010 census data to show the predominant language(s) spoken in the King County floodplain
- Produced all flood outreach materials in Spanish.
- Inserted directions for contacting King County, translated into 21 languages, into all critical flood information mailings sent countywide.
- Improved communication coordination with Public Health – Seattle & King County, Office of Emergency Management, and the American Red Cross Serving Kitsap and King County.

[1] King County Equity and Social Justice Initiative - http://www.kingcounty.gov/exec/equity.aspx

[2] Written Language Translation - http://www.kingcounty.gov/operations/policies/executive/itaeo/inf142aeo.aspx

[3] Vulnerable Population Segments - http://www.kingcounty.gov/healthservices/health/preparedness/VPAT/segments.aspx

- Accounted for vulnerable population segments that may be positively or negatively affect by future outcomes of a levee setback planning study in the Lower Green River valley. Study results found that the study area included a larger percentage of vulnerable population than King County and the Puget Sound as a whole. Therefore, residents of the study area stand to benefit the most from ecosystem services provided by flood risk reduction services, contributing to the goals of King County's Equity and Social Justice Initiative.

Flood risk reduction projects are sited and designed to mitigate flood and erosion impacts regardless of the economic group or population. Flood risk reduction project priority, selection and implementation are based on risks associated with death, human injury, and potential land use damage.

King County considers equity and social justice impacts in their public information and education programs to provide fairness and opportunity for all people, particularly for people with limited English proficiency or when decisions that have a negative impact on fairness and opportunity are unavoidable, steps are implemented that, mitigate the negative impact.

DISCUSSION

1. What networks can we build or enhance to improve our delivery of the Flood Education and Flood Preparedness Program[4] to vulnerable or historically underserved populations[5]?

    - **Example:** As a lesson learned from Hurricane Katrina, a recommendation is to formally coordinate with regional animal services and shelter organizations to improve messaging and logistics for evacuating with animals.

2. How can we assess the effectiveness of outreach to vulnerable and underserved populations, knowing that this is a very difficult population to assess by traditional survey methodology?

3. What networks can we build or enhance to improve our delivery of the flood risk reduction programs to vulnerable or historically underserved populations? What alternative mitigation options could be proposed for special needs, such as low-income, physical or developmental disabilities?
    - **Example:** While all flood risk reduction projects and acquisitions are prioritized on the basis of flood risk, regardless of income, race or language spoken, the Flood Elevation Program[6] is only available to those who can pay up to 25 percent, out of pocket, of the project cost ($70K-$120K) and any relocation costs needed if necessary. Additionally, property owners must pay for project costs up front and then be reimbursed by the county after project milestones are achieved. These requirements can make it difficult or impossible for residents without sufficient financial resources to participate in the elevation program.
    - **Suggestions:** Internships to provide training in the field and small business outreach.

[4] **4.5.1** "The King County Flood Hazard Education and Flood Preparedness Program is designed to increase awareness of locally available resources and information to help citizens prepare for flood events and prevent, minimize, and recover from flood damage."

[5] Physically disabled; blind; deaf, deaf-blind, or hard of hearing; mentally ill; developmentally disabled; impoverished; seniors; children; immigrant communities; limited English or non-English proficient; undocumented persons; medically dependent or medically compromised; chemically dependent; homeless and shelter dependent; clients of criminal justice system; and emerging or transient special needs.

[6] Flood Buyout and Elevation Program - http://www.kingcounty.gov/environment/waterandland/flooding/buyout.aspx

2012 KING COUNTY FLOOD HAZARD MANAGEMENT PLAN UPDATE
June 2012

TOPIC:
Relocation of Residential and Commercial Tenants

STATEMENT OF ISSUE:

- When land is acquired for flood risk reduction purposes and tenants are displaced, what types of relocation assistance should be provided?
- Should any other steps be taken minimize disruptions to economic activity and mitigate possible impacts on economic development and local tax revenue?

BACKGROUND:
Property buyouts are one of the most effective tools at permanently reducing flood and channel migration risks, and are also often necessary to provide the space needed to set back levees or simply rebuild them to a wider and more stable geometry. In some situations the property owner rents or leases the home. In those situations the tenants are provided with relocation assistance as described below.

History: Congress passed the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, and amended it in 1987. The law is referred to as the Uniform Act and is followed by all Federal, State, and local government agencies.

Purpose: To provide uniform procedures in relocation assistance that will assure legal entitlements and provide fair, equitable, and consistent treatment to persons displaced by a government project.

The Law: Contained in Chapter 8.26 of the Revised Code of Washington (RCW) and the Washington Administrative Code (WAC) 468-100.

Process: The following outlines the general process:

- Coordinate tenant-contact information with onsite Property Manager and Owner;
- Send General Notice of Relocation Rights letter to tenants;
- Hold an Open House (presentation, questions and answer session, etc.);
- Contract with appraiser to complete individual appraisals for owner-occupied units;
- Meet with individual owners for interview and appraiser site inspection;
- Calculate benefits based on appraisal, comparables and present offer to residents;
- Send Notice of Relocation Eligibility, Entitlements, and 90-Day Assurance letter giving at least 90 days notice by which they will be required to vacate;

- Provide Relocation Advisory Services (i.e. transportation, referrals, minimize hardships, provide listings of replacement availabilities, inspect replacement housing for decent, safe, and sanitary acceptability and other special needs etc.)
- All residents have the right to appeal and the right to file for "Hardship" to be granted a stronger priority in the event they need to move earlier than scheduled.

Entitlements: Owner-Occupants, renting space, may be eligible to receive:

1. Fair Market Value for their home, as determined by an appraiser;
2. Replacement housing payment (Purchase Price Differential), as determined by the Relocation Advisor;
3. A Rent Supplement or Differential (if costs to rent other space including utilities exceed what they are paying currently) based on a comparable, for 42 months and paid in a lump sum, as determined by the Relocation Advisor;
4. Moving expense payment for self-move (based on room count) or a commercial move (based on 50-mile radius and a federal schedule) direct payment to mover) as determined by the Relocation Advisor. and
5. Relocation Advisory Services (see above definition).

Timeline: Based on prior experience with residential tenants, once appraisals have been completed (45-60 days), the residents can be re-located within an approximate 2-4 month period each. This timeframe would likely be greater for commercial space, as the process to find comparable locations is more complex.

POLICY CONSIDERATIONS:

While relocation assistance is required under federal, state, and local laws, this should be clarified in the Flood Plan.

Two significant differences between residential and commercial relocations are (1) the possibility of higher costs to relocate and re-establish businesses compared to homes, and (2) the possibility of a larger impact on local government revenue (assuming the commercial structure was occupied by a commercial tenant and generating sales tax and B&O tax. Efforts to mitigate these impacts would remove or reduce one of the tensions between short-term financial impacts and long-term reductions in flood risk as well as long-term investor confidence in commercial/industrial areas. In addition, business re-establishment costs are higher than relocation of residential tenants due to the need to move business equipment and in some situations make improvements to the new location.

1. Establish a policy that relocation efforts will focus within the same jurisdiction wherever possible.

PROS: Preserves local government revenue associated with business activity.

CONS: No guarantee that the business will indeed be relocated within the same political

boundary. First responsibility under federal law is to find comparable locations to the displaced tenant, which may mean relocating elsewhere in the region.

2. Work with the appropriate local government(s) to communicate with the affected business community on plans and projects. Like with any major public works project, there are short-term and long-term impacts, and economic disruption can be minimized by clearly conveying the long-term objectives for flood risk reduction and the near-term priority actions to achieve these objectives.

ADDITIONAL RESOURCES:

Uniform Relocation Assistance and Real Property Acquisition Policies Act
http://uscode.house.gov/download/pls/42C61.txt

2012 KING COUNTY FLOOD HAZARD MANAGEMENT PLAN UPDATE
July 2012

TOPIC:
Design Guidelines and Bioengineering Approaches to Levees and Revetments

STATEMENT OF ISSUE:
Bioengineering approaches have been applied on King County levee and revetment projects over the past 20 years. Flood risk reduction, ecological objectives, and long-term maintenance, recreational safety and repair costs are taken into account when determining the best approach to levee and revetment repair projects. This paper explains why King County employs bioengineering approaches to levee and revetment projects and why we need to update our design guidelines. However, we have been asked:

- Should King County continue to employ bioengineering techniques and use large wood as a structural element of river projects given concern about recreational safety?
- Can bioengineering techniques and large wood be incorporated into projects and can public safety be addressed in the design and/or operations of the projects?

BACKGROUND:
King County employs bioengineering approaches to levee and revetment repairs, with the objectives of increasing the resiliency of the structure, reducing maintenance costs over time, and promoting multiple floodplain objectives for habitat, open space, and recreation along our river corridors. By incorporating bioengineering techniques into levee and revetment repair projects permitting agency requirements to provide habitat mitigation can be incorporated on-site using large wood and habitat structures in the project design. This can also reduce permitting time. Including bioengineering techniques may require more time for design and implementation, and an increase in funding needs but this depends on the project location and options for meeting the habitat mitigation requirements. An alternative to incorporating bioengineering techniques into a project would be to construct an off-site mitigation project, which may or may not require additional time and increases costs. Project specific circumstances must be investigated during the planning and predesign phase.

King County modifies rivers through capital projects to achieve flood risk reduction and other regional goals. The approach to these projects generally reconnects river channels to their floodplains, thereby encouraging more dynamic processes to increase flow capacity and better handle floods. Projects can produce substantial changes in river environments, sometimes suddenly occurring during a large flood event, or more incrementally over time. Physical changes resulting from river projects may affect in-river recreationalists that have previously used less complex and dynamic channels. Though these changes are viewed differently by different user groups, some in-river recreationalists may face possible increases in hazards due to changed river conditions. Further, when river channels shift, banks can be undercut, posing possible unseen hazards to riverside recreationalists. It is important to note that these processes and potential hazards are routinely created in dynamic river systems, whether or not any projects are done by King County. King County wants to design, construct, and operate its projects to address recreational safety. Further, King County needs to monitor projects over time to address any safety concerns that come up post project.

The recent MWH report (*Independent Expert Panel Review of Water and Land Resources Division's Project Scoping and Implementation Practices*) evaluated King County's approach to capital project identification and implementation, and stated the following:

> There is increasing awareness in recent decades of the interconnection and mutual influence among different objectives and associated actions for river and floodplain management. Therefore, project formulation and implementation has shifted from the traditional single purpose project, with necessary compensatory mitigations, to a multi-objective approach to incorporate features that promote public safety, flood management, ecosystem restoration and recreation. While traditional river management involves strategies to control a river through channelization or hardening embankments, the more integrated approach seeks opportunities to allow river meandering for transitory storage and potential restoration of critical floodplain functions. This multi-objective approach, especially when applied on a system wide level, allows more flexible management strategies, improved prioritization and effectiveness in using limited resources, and more sustainable outcomes … (King County) uses scientifically accepted principles for managing floodplains within the context of balancing other stated policy objectives" and that "… no consistent or systemic design or siting failures invalidate the new approaches to floodplain management or urge a moratorium on additional projects.

To date, project design has been guided by a collection of design guidelines that are either dated, such as "Guidelines for Bank Stabilization Projects in the Riverine Environments of King County" (Johnson and Stypula 1993) or from other sources, such as the Department of Fish and Wildlife's and the Army Corps of Engineers "Guidelines for the Construction of Levees." However, the Flood District and King County do not have established, county-specific guidelines for project design, construction, and maintenance.

The MWH report "recommended establishing design guidelines and specifications appropriate for integrating public safety and ecological objectives into King County's floodplain management strategies." Further supporting the development of county-specific guidelines, the MWH Report identified the need for the development of a formal process for reviewing project selections and design approaches. One of the primary findings from the MWH Report was the need for King County to clearly describe strategies in the shift from "hard engineering" to "ecological/dynamic" floodplain management strategies and to show how individual projects meet strategic goals or fit with current scientific theory and practice. The Flood Hazard Management Plan update includes policy language that recommends establishing such design guidelines and in each basin's vision and strategy, we will better coordinate and align projects and identify work program needs to develop an integrated river management strategy more clearly linking projects to the overall goals of the Flood Plan.

In response to the MWH report recommendations, King County has conducted recreational use and large wood surveys on the Cedar River, hosted a public workshop on upcoming projects along the Cedar River, documented and strengthened the project prioritization and sequencing criteria, strengthened connections between the Flood Hazard Management Plan with the WRIA salmon habitat plans and 3-year habitat work programs, conducted placed wood public meetings

to encourage stakeholder involvement in project design, and established internal basin coordination teams for each basin.

In addition to the items already implemented, King County is currently putting into practice a number of other recommendations from the MHW report which include: updating its project and construction management manuals, initiating studies to evaluate large wood, recreation, channel changes and sediment transport; conducting a landscape analysis for the Lower Snoqualmie (fish, flood, farm, floaters); developing an integrated river management strategy for each major river basin to be phased in over a 2-3 year period; developing a Lower Green River corridor conceptual approach; and enhancing outreach to stakeholders and the general public through several methods such as a web-based CIP mapping tool, posting project summary documents on the Web, and holding annual public meetings in each basin to discuss basin-wide strategies, goals, and objectives, along with project specific progress.

King County will incorporate recreation into monitoring protocols, as appropriate, and identify additional methods to obtain recreational use information and recreational user input into the design of monitoring approaches. All County projects to re-establish natural river processes now evaluate and plan for a range of likely potential outcomes, acknowledge areas of uncertainty, and identify and plan for mitigation of resulting risks. Further, capital projects will continue to consider river recreation in the planning and implementation of flood risk reduction and habitat improvement projects, and will invest in building public awareness and understanding of river hazards and recreational safety to minimize the potential for personal injury.

Bioengineering Approach

Historically, major maintenance activities on levees consisted primarily of replacing riprap eroded by the river, and clearing vegetation along river channels that were often constrained. This approach often did not address the causes of damage, or normal wear of the levee system. The high cost of frequent maintenance could not be sustained with limited revenue.

As a result of these temporary fixes, which did not fully address the cause of the repeated damage, King County has shifted toward a more systemic solution, increasing the use of bioengineering techniques as the basis for nearly all repairs and retrofits on existing levees and revetments along major rivers and streams. These changes aim to reduce maintenance costs, are more readily permitted to enable the project to be designed and constructed in a timely manner. The 1993 Flood Hazard Reduction Plan (FHRP) incorporated guidelines for the design, construction, and maintenance of structural capital improvement projects (CIPs) for flood reduction and flood control along the major rivers in King County stressing bioengineering approaches to bank stabilization.

This approach emphasized more environmentally friendly bioengineering methods (soil biostabilization) such as vegetative brush layering to stabilize riverbank and levee slopes, and toe-buttress construction with large stone and firmly anchored large wood emplacements at the base of a facility. These actions are designed to address instream habitat along the toe of the facility and to minimize the potential for flood-flow undercutting, erosion, and sloughing of the face of the facility.

The 2006 Flood Hazard Management Plan (FHMP) continues to put forward bioengineering as a design approach for levees and revetments; bioengineering is an available alternative for managing King County's flood protection facilities. Bioengineering mimics natural river bank stabilization techniques by incorporating live plants and engineered log jams (fallen trees lodge in the river channel's bed and banks, riparian vegetation lines the banks helping to slow localized flow velocities while the roots help bind the soil) into the fabric of the flood protection facility and as instream structures, reducing the potential for bank erosion and providing multiple valuable habitat objectives (protective cover from predation, shade, and food).

Incorporating natural elements for bank stabilization through bioengineering methods offer multiple benefits to the system creating more stable riverbanks and reducing long term maintenance and costs than those armored with rock riprap. Through recruitment of vegetation and additional woody debris during flooding, adding roughness to the channel (increasing flow resistance and slowing the river), and allowing vegetation in the project site to become established and form a cohesive matrix of interlocking plant root structures, the bank becomes naturally stronger and more resistant to erosion. At the same time, these methods improve fish and wildlife habitat. These projects provide an environmentally sensitive, low maintenance solution with lower long-term costs. Rather than deteriorating and requiring continual and costly maintenance, these structures grow stronger over time.

However, under certain conditions, bioengineering techniques may not be appropriate, or may need careful consideration when designing a project. A very confined section of a river, with levees on both sides, for example, may not be the optimal choice for applying bioengineering methods. A high energy system with high risk potential also may not be an appropriate location for bioengineering techniques; allowing the time needed for plant roots and wood structures to establish could leave a levee at risk for erosion and potentially increase the risk from flooding. Use of rock is a normal feature of levee project design, particularly in the toe of the levee, below ordinary high water. Wood features can help protect the toe, but bioengineering techniques exclusively do not create a stable toe; there is always an element of rock in the lower bank. County-specific design guidelines that include bioengineering techniques are needed and will increase consistency and provide an objective, transparent mechanism for design considerations and implementation. Updated guidelines will better direct the most appropriate design technique for the site.

Since adoption of the 2006 FHMP, Public Rule "Procedures for considering Public Safety when Placing Large Wood in King County Rivers" was approved to:

1) Consider public safety issues in the design of projects involving the placement of large wood in King County rivers and streams.
2) Evaluate strategies for design of wood placements that will maximize project benefits and minimize risks to public safety.
3) Make available to the public the opportunity to provide input on proposed projects utilizing large wood.

The Public Rule states that at 30% design, King County will document how public safety considerations have been addressed in the design, conduct public outreach in an effort to reach a broad spectrum of the community and incorporate safety features into project design. Further underscoring public safety issues, the MWH Report recommended that King County consider a

dedicated “Office of River Public Use” to support engineers in designing safe projects. We have secured contracts to provide professional expertise in project design to ensure we are addressing public safety issues. Until county-specific guidelines are available, King County will follow Public Rule procedures.

DISCUSSION:

While King County and the Flood Control District have been employing bioengineering approaches to levee and revetment repairs over the past 20 years, current design guidelines are dated. Bioengineering approaches can create resilient structures and reduce maintenance costs over time. Bioengineered structures slow erosive flows, direct higher velocity flows away from banks, and provide multiple objectives such as habitat benefits. When applied as part of an integrated system, this approach allows for a more resilient and sustainable flood risk reduction system.

The MWH report confirms King County is using the right scientific approach but we need updated, county-specific design guidelines that include bioengineering techniques. We are establishing a set of design guidelines that will direct design alternatives to consider appropriateness of scale (i.e. small streams vs. large rivers) and context (i.e. adjacent land uses, inside bend vs. outside bend, river use) for a project while taking into consideration the project location.

The design guidelines will also address how to evaluate recreation impacts (positive or negative) and address public safety either through design, closures, education or other means appropriate for the situation.

ADDITIONAL RESOURCES:

Engineering with Nature (FEMA)
http://www.fema.gov/pdf/about/regions/regionx/Engineering_With_Nature_Web.pdf

Integrated Stream Protection Guidelines (WDFW)
Integrated Streambank Protection Guidelines - WDFW Publications | Washington Department of Fish & Wildlife

Guidelines for Bank Stabilization Projects in the Riverine Environments of King County
http://www.kingcounty.gov/environment/waterandland/flooding/bank-stabilization-projects/guidelines.aspx?print=1

2012 Independent Expert Panel Review of Water and Land Resources Division’s Project Scoping and Implementation Practices http://your.kingcounty.gov/dnrp/library/water-and-land/rivers/1201-wlrd-project-practices-review.pdf
King County Rivers Program Programmatic Biological Effects Analysis
http://www.kingcounty.gov/environment/waterandland/flooding/documents/biological-effects.aspx

2011 King County River Management Survey:
http://www.kingcounty.gov/environment/wlr/sections-programs/river-floodplain-section/river-survey-2011.aspx

2010 Cedar River Recreational Study: http://www.kingcounty.gov/environment/wlr/sections-programs/river-floodplain-section/cedar-recreation-study.aspx

2009 Large Wood Stakeholder Committee http://your.kingcounty.gov/dnrp/library/water-and-land/flooding/0912-large-wood-safety-rule/Large_Wood_Stakeholder_Committee_Final_Transmittal.pdf

2010 Placed Wood Public Rule:
http://www.kingcounty.gov/operations/policies/rules/LandUse/lud121pr.aspx

2012 KING COUNTY FLOOD HAZARD MANAGEMENT PLAN UPDATE
July 2012
For Discussion Purposes Only

TOPIC:

Levee Certification, Accreditation and Flood Risk Reduction "Levels of Service"

STATEMENT OF ISSUE:

The Board has adopted a motion regarding District operations and maintenance responsibilities for levee certification and accreditation on the Green River. The motion identifies several criteria for determining when the District will take on these responsibilities. These include consistency with adopted Plan policies, contribution to long-term risk reduction solutions, and risk-based repair and maintenance. The motion asks that this policy review balance the certification and accreditation process and costs with long-term solutions that increase public safety and reduce flood risks throughout the county.

1. Do you suggest any other conditions or circumstances for determining when the District should consider taking on the long-term operations and maintenance responsibilities necessary to achieve levee certification and FEMA levee accreditation?

2. How should the District determine the appropriate level of service for levee systems in different parts of King County? What criteria should be used to determine the targeted level of service?

BACKGROUND:

The minimum standards used by FEMA for levee certification and levee accreditation on flood insurance maps are often misperceived as a safety standard for levees in general. This paper will review the differences between levee certification, levee accreditation, as well as the concept of a 'level of service' for levee systems that may in some contexts differ from FEMA's insurance program minimum standards.

Terminology

- Certification is the technical review process "certifying" that a levee meets certain engineering standards—conducted by a licensed Professional Engineer. Notably, the federal regulations governing certification and FEMA accreditation state that '*a certification by a registered professional engineer or other party does not constitute a warranty or guarantee of performance, expressed, or implied.*' FEMA goes on to further clarify that certification is not a safety standard: "It is important to note that the FEMA NFIP standards and flood hazard mapping do not reflect the performance, reliability or overall safety of a levee system." Actions taken to certify and accredit levees may result in improved stability for a given levee in some situations, but they should not necessarily be considered sufficient for long-term risk reduction.Accreditation refers to FEMA's recognition on flood maps that the certified levee system offers base flood protection.
- Engineering certification and FEMA accreditation administratively removes areas from the regulatory floodplain on flood insurance rate maps, but the process does not guarantee flood protection or eliminate all flood risk.
- Certification and accreditation of levees typically corresponds to the minimum of a 100-year (or, more accurately, the base flood which has a 1% chance of occurring each year) level of protection, but a higher standard is possible.

- To attain greater than 100-year protection, one can choose to construct taller levees alongside the river channel,allow for a wider corridor with setback facilities, or construct floodwalls.

Benefits of Certified and Accredited Levees under the National Flood Insurance Program

- National Flood Insurance Program (NFIP) floodplain development regulations and insurance requirements no longer apply. For property owners that elect to purchase flood insurance, premiums are lower.
- Simplifies requirements for new development and redevelopment in areas formerly regulated as floodplain.
- Certification and accreditation are perceived as providing greater certainty for economic development purposes, as land protected by FEMA accredited levees is considered low- or moderate-risk and not included as a mapped flood hazard area

Drawbacks of Certification and Accreditation

- Encourages development in inherently risky areas, and without requirements for flood-resistant construction methods and materials, property owners are more vulnerable to flood-related losses. Since flood insurance is not required, these owners may lack insurance coverage for their increased vulnerability.
- Does not recognize or convey residual risk, which leads the public to misinterpret the degree of flood risk present.
- Requires significant investments in time and money. Investments leading to improved infrastructure or flood mitigation actions may reduce flood risk, but investing in the creation of documentation at a rough cost of $1 million per levee segment sufficient to satisfy federal reviewers offers no real flood risk reduction benefit.
- Should the levee system fail or be overtopped, the certifying engineer or the engineer's employer faces liability concerns. Case law suggests that agencies with levee operation and maintenance responsibilities may be similarly liable.
- Implementation of near-channel certification and accreditation may preclude the pursuit of lower-maintenance, more ecologically-sensitive long-term flood risk reduction approaches.

National Debate regarding Levee Certification and Accreditation

The suitability of the 100-year standard for levee certification and accreditation has often been debated at the national level, thus drawing into question the logic of relying on certification to provide regulatory benefits. As far back as 1982, the National Research Council recommended to FEMA that FEMA "*should require purchase of flood insurance in all areas where the ground is lower than the unconfined 100-year flood level except where protected by a levee built to contain the 500-year flood*." The additional resources include additional findings from multiple Congressionally established committees, as well as engineering professional societies regarding levees. See the 'Additional Resources' for more congressional report highlights.

In recognition of this responsibility and acknowledgement of the reality that flooding has caused significant damage across the nation in communities protected by certified and accredited levees, the State of California has established a 200-year minimum design standard for urban areas (locations where levees protect more than 10,000 people), the City of Dallas is pursuing an 800-year level of service, and the Corps of Engineers now applies a probabilistic analysis of risk to determine the most appropriate level of service for levees.

For reference, Table 1 summarizes the cumulative risk associated with different flow events over time.

Table 1: Probability of Exeeding Flow Events Over Time:

	30 Years	50 Years	75 Years	100 Years
1:100	26%	39%	53%	63%
1:140	19%	30%	42%	51%
1:200	14%	22%	31%	39%
1:300	10%	15%	22%	28%
1:500	6%	10%	14%	18%

Regional and Local Considerations

The national debate over levee certification and accreditation has also played out locally. In response to a request from the Washington State Legislature to evaluate the certification status of levees in Washington, the Department of Ecology concluded:

> The 100-year standard may be woefully insufficient in some areas (such as highly urbanized environments) and perhaps overly protective in others (such as agricultural lands, undeveloped lands, etc), thus FEMA accreditation should include risk and economic analysis.

The 2006 King County Flood Hazard Management Plan does not include policy language regarding levee certification and accreditation. In King County, levee accreditation concerns have been most pressing in the Green River valley cities, which are home to over 100,000 jobs, the fourth largest warehouse and distribution complex in the nation, an annual payroll of $2.8 billion, one eighth of the gross domestic product of the state of Washington and annual taxable revenue of over $8 billion. In addition to the insurance and floodplain development benefits of FEMA accreditation, levee certification is seen by the cities as necessary to reassure the business community their investments are relatively safe. While the concern is most immediate on the lower Green River, other communities in King County may seek FEMA accreditation status. On the currently adopted FEMA flood hazard maps for the Green River the lower Green River levees are 'recognized as accreditated' despite the lack of any engineering certification other than a segment in Tukwila that is federally certified by the Corps of Engineers. This 'recognized as accredited' status will be removed from future FEMA flood insurance maps unless the levees are certified and accredited. At this time, the only certified and accredited levees in King County are the North Creek levee system in Bothell (privately certified) and the Tukwila 205 federally certified levee along the lower Green, which is also site of some of the District's highest priority levee rehabilitation needs.

In response to a request from the mayors of the four Green River valley cities in March 2011, the Board adopted a motion stating its intent to assume levee maintenance and operations responsibilities for FEMA accreditation efforts under the following conditions:

- Levee design and construction must be consistent with the policies in the 2006 King County Flood Hazard Management Plan,
- Short-term solutions to achieve certification should not conflict with long-term levee setback needs.
- Any future maintenance responsibilities for the District will be based on an assessment of risk.

Consistent with this Motion, King County staff have worked closely with the City of Kent to review the City's proposed levee and floodwall certification documentation submittals to FEMA. The City is seeking

accreditation of these levees and floodwalls by FEMA, so that when new FEMA floodplain maps eventually take effect the land behind these levees will not be subject to FEMA floodplain development or insurance requirements. At this time operations and maintenance agreements are underway with the City of Kent but have not been formally adopted.

At this time FEMA is revising the technical approach used to map floodplains, meaning that current draft federal insurance maps are on hold, and the timeline for FEMA to revise their approach is uncertain.

ALTERNATIVES

To establish appropriate levels of service for levees along King County's river systems, at least three general approaches could be applied:

1. Performance-Based Goals: Evaluation of 'tolerable risk' similar to US Army Corps of Engineers risk-based analysis. This results in a much more detailed risk analysis looking at the probability of different levels of damages, economic disruption, and threats to life safety, but also requires additional data and time to complete analyses.

2. Design-Based Goals: Use flow event as design standard, with different levels of service depending on contextual factors such as land uses behind the levees, population at risk, and hydrologic and physical factors. Examples include the Pierce County approach included in the 'Additional Resources' section and California's urban levee design standards.

3. Insurance-Based Goals: Use the National Flood Insurance Program (NFIP) minimum base 1% annual flood as a design standard.. Under this approach the design standard is the minimum necessary to remove insurance and floodplain development requirements, but may or may not be sufficient to protect health, safety, and welfare

4. Consider a District role for certification and accreditation when the appropriate 'level of service' is provided for a given community.

QUESTION:

1. Under what circumstances should the District consider taking on the long-term operations and maintenance responsibilities necessary to achieve levee certification and FEMA levee accreditation? What benefits and costs should be included in making this determination?

2. Under what circumstances, should the District consider taking on a larger role than operations and maintenance for certification efforts?

3. How should the District determine the appropriate level of service for levee systems in different parts of King County? Which of the three approaches described above are most appropriate? Are other approaches preferable? Should the approach vary by basin? What analyses should be included to inform decision-making regarding the most appropriate level of service (e.g. engineering design standards for safety, cost effectiveness, feasibility, opportunity costs, short-term versus long-term actions)?

ADDITIONAL RESOURCES:

1. FEMA Bulletin: The NFIP and Levee Systems.
   http://www.fema.gov/library/viewRecord.do?id=2159

2. American Society of Civil Engineers Policy Statement 529.
   http://www.asce.org/Content.aspx?id=8341

3. Washington State Department of Ecology Statewide Levee Inventory and Flood Protection Study: Levee Certification and Accreditation. November 2010. http://www.ecy.wa.gov/pubs/1006029.pdf

4. Army Corps of Engineers 'Tolerable Risk' Overview
   http://www.iwr.usace.army.mil/docs/iwrreports/10-R-8.pdf

5. Congressional Research Services – 2008 Missouri Flood Lessons Learned.
   http://www.policyarchive.org/handle/10207/bitstreams/18805.pdf

6. ASFPM – Levee Policy paper

7. General Gerald Galloway testimony to Congress, October 27 2005.

8. Briefing memo to the King County Flood Control District Executive Committee – March 28, 2011

9. King County Flood Control District Levee Accreditation Motion, July 2011

King County Flood Hazard Management Plan Update
Citizens Committee Report

September 2012

Introduction

The King County Flood Control District adopted the King County Flood Hazard Management Plan as their comprehensive planning document to provide policy guidance and identify capital improvement needs and priorities. The federal Disaster Mitigation Act and the Community Rating System under the National Flood Insurance Program both require updating the plan every five years. Motion FCD11-03 established a Citizens Committee to serve as a sounding board at key milestones in the plan update process.

The Citizens Committee was convened in December 2011 and has met seven times to review new information on the public safety and economic importance of flood risk reduction for the county and state, including commercial, agricultural, environmental, and residential data; current flood and channel migration studies and mapping; damage and changed conditions due to flood events; risk assessment; the 10-year capital improvement plan; and issue papers on specific topics identified in Motion FCD11-03. This report summarizes the feedback received from the Citizens committee.

Levee Certification, Accreditation and Flood Risk Reduction "Levels of Service"

Statement of Issue:
In response to a request from the mayors of the four Green River valley cities in March 2011, the Board of Supervisors for the Flood Control District adopted a motion stating its intent to assume levee maintenance and operations responsibilities for FEMA accreditation efforts under specific conditions. The 2006 King County Flood Hazard Management Plan does not include policy language regarding levee certification and accreditation. The suitability of the 100-year standard for levee certification and accreditation has been questioned resulting in a debate at the national level on whether a higher standard should be used. In addition, certified and accredited levees often result in a misperceived safety standard for people and property located behind those levees.

Summary of Committee feedback:
One Committee member stated strongly that the insurance industry is ignoring FEMA's mapping that shows areas behind certified and accredited levees are not at risk by mapping those areas out of the floodplain. The private commercial insurance industry uses a two-tiered system using the 100-year and 500-year flood elevations and then making sure the levee is constructed to US Army Corps of Engineers standards before they would recognize a levee for insurance purposes. Considering a levee as "accredited" by FEMA is not adequate; the private commercial insurance industry does not recognize any of the levees in King County, regardless of their FEMA status. The Committee suggested looking at the recent revisions to the National Flood Insurance Program which includes requirements for agreement among affected parties on what the standard should be as well as public outreach to people behind accredited levees. According to the Boeing

Company representative, the company did not previously consider flood events that might exceed the 100-year flood because they were confident Howard Hanson could provide that level of protection. Now they have to rethink that assumption if the discharge from the Dam could exceed 100-year flows. It is hard for Boeing to make a decision about certification and accreditation because the question is presented as an "either/or" scenario (accreditation or not accreditation) rather than debating a specific levee design standard based on the risk. According to one Committee member, there is a fair bit of consensus in the professional engineering community, reflected in the American Society of Civil Engineers' Policy Statement 529, that certification is something professional engineers don't have a lot of confidence in. The King County Flood Control District should only take on the operation and maintenance of structures they have some confidence will meet a specific risk-reduction standard. As for "performance-based standards," they can offer some benefits in savings in engineering and construction, but there needs to be the recognition that the savings come with a tolerance for some impacts and damages. In the context of flood engineering, there are regional scale problems that require consensus among all the stakeholders, which is different from an individual property owner or business taking on the risk for their own building, as in earthquake performance-based engineering.

Levee vegetation and eligibility for US Army Corps of Engineers (Corps) levee repair funding

Statement of Issue:
Local governments in the Puget Sound region continue to be caught between conflicting federal mandates that require degradation of riparian areas identified as critical habitat for federally listed species in order to retain eligibility for federal PL 84-99 funding for critical public safety projects. To qualify for one federal program that provides funding for levee repairs resulting from flood events, King County must risk violating both the Endangered Species and Clean Water Acts because the federal PL 84-99 Program standards require significant removal of vegetation on levees. This vegetation provides needed riparian habitat for Endangered Species Act-listed species as well as shade to meet Clean Water Act water temperature standards.

Summary of Committee feedback:
The Committee members generally agreed that simply walking away from the PL 84-99 Program was not the answer nor was it wise to follow the nation-wide US Army Corps of Engineers standards. Concern was raised that by disengaging with the Corps would send a message to floodplain residents and businesses that the levee systems are not safe. The Committee felt it made sense to try and either develop a new regional variance for a modified levee vegetation standard or work through the System-Wide Improvement Framework process. However several Committee members felt very strongly that King County should not participate in the PL 84-99 program. There was general support for finding opportunities for levee setbacks to allow more room for the rivers. One creative suggestion was to route water through the adjacent floodplain, such as along streets, during extremely high flows. A Committee member who was a member of the national engineering team reviewing the performance of the New Orleans levee system stated there is no scientific evidence that vegetation on levees compromises the levees integrity – quite the opposite. It was recommended that an independent group, such as the American Society of

Civil Engineers, could help to mediate the issue with the Corps because that Society is seen as a neutral party of experts.

Capital project funding for coastal flood and erosion risks

Statement of Issue:
The geographic scope of the 2006 King County Flood Hazard Management Plan includes the unincorporated and incorporated areas of King County, with a 'focus' on the major river floodplains and their significant tributaries. The 2006 Plan includes a recommendation to cost-share hazard mapping studies with FEMA for marine shorelines. The state authorization for flood districts does allow for improvements that include "the extension, enlargement, construction, or acquisition of dikes and levees, drain and drainage systems, dams and reservoirs, or other flood control or storm water control improvements; widening, straightening, or relocating of stream or water courses; and the acquisition, extension, enlargement, or construction of any works necessary for the protection of stream and water courses, channels, harbors, life, and property" (RCW 86.15.100). Should the Flood Control District's capital program include funding for coastal flood and erosion risk reduction projects?

Summary of Committee feedback:
The Committee's feedback was to continue to focus capital funding on river and stream flooding and to not divert funding for future coastal projects that are not already adopted by the Board. There was concern that using capital funding on coastal projects is not consistent with the 2006 Flood Hazard Management Plan, and there was little support to update the Plan to supporting coastal flood risk reduction projects since the there appeared to be agreement that the main flood risk in King County comes from river flooding.

Urban Flooding and Small Streams

Statement of Issue:
The geographic scope of the 2006 King County Flood Hazard Management Plan includes the unincorporated and incorporated areas of King County, but the plans calls for a 'focus' on the major river floodplains and their significant tributaries. How should flood district funds be allocated for urban flooding and small streams that are not the 'focus' of the 2006 FHMP?

Summary of Committee feedback:
In general, the Committee appeared to think the Board made the right decision initially in allocating 10% of the funding for an opportunity fund that the cities could use for any program or project that is consistent with RCW 86.15. There was no support for increasing that percentage. Some Committee members liked the idea of allocating that 10% through a competitive process based on risk rather than just an automatic allocation to the cities. There was also some support for allocating the opportunity fund to cities that agree to adopt strong floodplain management land use policies and regulations that exceed the minimum National Flood Insurance Program requirements, but this was not the opinion of all Committee members.

Equity and Social Justice: Outreach to Vulnerable and Underserved Populations

Statement of Issue:
The King County Equity and Social Justice Initiative (ESJI) directs all King County government services be done in a fair and just manner – ensuring that those without traditional access to resources are being served – and to view the development of all policy, procedures and communication through this lens. King County also has an Executive Order, establishing criteria for a Written Language Translation process that requires a reasonable effort be made to provide all print materials in the languages spoken by the target audience. Lastly, the King County Flood Control District has directed the River and Floodplain Management Program to ensure that we are reaching vulnerable populations in our public outreach and education efforts. How should the King County Flood Hazard Management Plan be used to ensure that the River and Floodplain Management program is providing these services equitably throughout King County?

Summary of Committee feedback:
The Committee asked for some clarification on terminology used when discussing vulnerable and underserved populations. There was interest in how to track the effectiveness of the outreach efforts. In addition to web site hits, a suggestion was made for a more qualitative assessment using focus groups. The Committee was most interested in the idea of equity. County staff clarified that reasonable efforts need to be made to make services available, and in some cases it may not be reasonable to provide services to every single person. Several excellent suggestions were offered, including partnering with the local Housing Authorities, working with tech-savvy teens, identifying community leaders, and educating primary caregivers for the young and disabled on flood response. Another recommendation was to include information in outreach materials about the benefits and opportunities created by flooding. Finally, a paper by Louise Comfort was brought to the attention of the Committee which points out information in and of itself doesn't result in action. What results in action depends on who says it, which reinforces the suggestion to identify community leaders.

Relocation of Residential and Commercial Tenants

Statement of Issue:
When land is acquired for flood risk reduction purposes, tenants are displaced. The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 provides relocation assistance for tenants to relocate to comparable or better housing or buildings when displaced by federal projects. Two significant differences between residential and commercial relocations are (1) the possibility of higher costs to relocate and re-establish businesses compared to homes, and (2) the possibility of a larger impact on local government revenue by the relocation of a commercial tenant that is generating sales tax and B&O tax. Should the Flood Plan include policy guidance to minimize disruptions to economic activity and mitigate possible impacts on economic development and local tax revenue?

Summary of Committee feedback:
The Committee asked for clarification on the relocation issue to understand that there are federal, state, and local regulations to provide assistance, but no guidance on working with cities to maintain the existing tax base that would be impacted if properties and businesses are purchased

in their jurisdictions. One Committee member asked if there has been any assessment on the impact on the tax base for properties that have already been purchased. It was pointed out that taxes removed from one property ends up getting paid by others, so in general, there is no net loss of property taxes, but who pays and the jurisdictions benefiting from the tax revenue might change. The Committee supported providing
relocation assistance to commercial tenants that relocate outside the floodplain. However the Committee did not provide any specific guidance on whether the Flood Plan should address the loss of tax base if commercial floodplain property is acquired and businesses are closed or relocated outside the jurisdiction where they were previously located.

Capital project prioritization, sequencing approach, and eligibility criteria

Statement of Issue:
The current capital project prioritization process evaluates the consequence, urgency, and severity of flooding and channel migration risks, and sequences project implementation based on factors such as readiness, partnerships, external funding opportunity, and legal responsibility. With the benefit of the experience applying these criteria over five budget cycles and multiple mid-year revisions, the criteria and scoring system should be assessed with the following questions in mind:

1. Do the prioritization scoring criteria adequately define eligible and ineligible projects?
2. Do the criteria help decision-makers focus on long-term solutions and 'getting ahead of the next flood' rather than 'reacting to the last flood'?
3. Do the prioritization criteria clearly identify when flood damage repairs are necessary to protect public safety and prevent a small problem from becoming larger and more expensive to fix?

Summary of Committee feedback:
In general, the Committee felt the criteria used to select projects was working, but several people expressed more emphasis being placed on considering the ecological value of natural resources, such as the value of protecting a wetland for flood storage. Committee members expressed concern about "mission creep" or "scope creep" that could jeopardize the ability for the Flood Control District to complete the high priority flood risk reduction projects if money gets diverted for other purposes, or for flood risk reduction projects that are lower priority based on risk. There appeared to be support for using some of the District funding to support the work of the WRIAs because of the nexus between salmon recovery and flood risk reduction, although not all Committee members agreed. Several Committee members supported funding actions outside floodplains, such as purchasing development rights in the upper watersheds, as a viable tool for reducing flooding. A suggestion was made to consider using performance-based measures for selecting projects similar to what is used in earthquake planning. Concern was raised that a lot of new projects are being added when the projects identified in the 2006 Flood Plan had not all been completed. The Committee did not seem to support using compliance with FEMA's Biological Opinion, prepared to set standards for implementing the National Flood Insurance Program in the Puget Sound region, as criteria for jurisdictions to receive funding for flood risk reduction projects. The Committee wanted to maintain focus on rivers and streams; if the criteria could help maintain this focus, there was support.

Design Guidelines and Bioengineering Approaches to Levees and Revetments

Statement of Issue:
Bioengineering approaches have been applied on King County levee and revetment projects over the past 20 years. Flood risk reduction, ecological objectives, and long-term maintenance, recreational safety and repair costs are taken into account when determining the best approach to levee and revetment repair projects. Concern has been raised that incorporating large wood as a structural element of a flood risk reduction project creates recreational safety concerns.

Summary of Committee feedback:
One Committee member summarized her concerns as: need to use rock at the toe; the County does not monitor well for safety resulting in the need to alter the County's Guidelines for Bank Stabilization document; not sure rip-rap is more expensive than wood; bioengineering is experimental resulting in three designs for Cedar Rapids project; wood does not increase flow resistance; wood rots and has limited lifespan; and recommends using the Stream Habitat Restoration Guidelines document published by Washington Department of Fish and Wildlife in April 2012. Another Committee member, who lived on the Cedar River for over ten years, said he saw the wood in projects break loose during flood events. He agreed that bioengineering is experimental and needs more time to see what works and what does not work. The majority of Committee members weighing in were supportive of updating the County's Guidelines for Bank Stabilization document to address both the most current science on this use of large wood as well as the impact on recreational safety.

Gravel removal and sediment management for flood risk reduction purposes

Statement of Issue:
Sediment accumulation in river channels can increase flood hazard and flood risk in King County. The 2006 King County Flood Hazard Management Plan (Flood Plan) established a comprehensive sediment management program, which can include gravel removal (dredging), to reduce the flood risk. For purposes of implementing the sediment management program, the term "sediment removal" is recommended to be changed to "dredging," which is a more defined term in state law. Other than this one revision, it is proposed that the existing King County sediment management program be continued as it is in the 2006 Flood Plan.

Summary of Committee feedback:
Committee members had strong reaction against the proposal to change the term "sediment removal" to "dredging" because dredging is a very politically-charged word. There appeared to be general support for sediment monitoring, but a suggestion was made to include monitoring smaller streams as well since sediment build-up in the stream is also impacting property owners. There was debate about whether sediment removal should be considered a short-term solution or long-term solution. Committee members seem to understand that sediment build-up is a natural process, but some argued if routine sediment removal is conducted, the action should be

considered a long-term solution. Others argued the frequent need for sediment removal makes it a short-term solution because the action needs to be repeated. Committee members discussed the costs associated with gravel removal and how that compared with other flood risk reduction actions, such as building higher levees, setting back levees, or home buy-outs. In general, Committee members believe gravel removal is a tool that has been underutilized and King County should re-evaluate when it might be the appropriate solution. One Committee member felt transfer of development rights should also be considered to address the impacts from sediments build-up and resultant flooding. King County should notify cities that might be impacted by gravel accumulation in rivers. However Committee members felt a better solution would be to restrict development in areas that are, or could be, impacted by sediment accumulation.

South Fork Skykomish River and Snoqualmie River Risk Assessment and Action Plans

Statement of Issue:
Has King County adequately identified the flooding and erosion hazards on the South Fork Skykomish and Snoqualmie Rivers and developed a reasonable strategy and set of actions to address those hazards?

Summary of Committee feedback:
A Committee member pointed out that if buildings and other infrastructure are protected in some fashion, such as elevating the buildings, flooding can be a good thing from a biological standpoint as flooding provides natural functions and values that are a benefit to the ecosystem. It is worse on the environment to try and keep all the water in the channel during a flood event than to allow it to inundate the floodplain in a more natural manner. There is also a tremendous cost to trying to keep all the water in the channels, so there are costs in expenditures for building and maintaining levees as well as the ecological cost related to the loss of floodplain functions and values. A Committee member asked if gravel removal is going to be part of the strategy for addressing flooding in this river basin. A recommendation was made to look at acquisitions more broadly by considering the benefit of land for flood storage in addition to, or even as an alternative to acquiring property only because a structure is at risk. The Committee appreciated that the County is looking at a wide range of tools – elevations, buyouts, gravel removal, levees – to address the risk from flooding. A suggestion was offered to use the streams more effective for both transporting water as well as storing water for release during the dry season. A request was made to look at the opportunities for recreational use county-wide, not just on some river systems. Finally, a Committee member asked if the County ever considered relocating some roads, such as Jones Road (on the Cedar River).

Sammamish River, Issaquah Creek and Cedar River Risk Assessment and Action Plans

Statement of Issue:
Has King County adequately identified the flooding and erosion hazards on the Sammamish River, Issaquah Creek, and Cedar River and developed a reasonable strategy and set of actions to address those hazards?

Summary of Committee feedback:

Committee members asked for clarification about city and county coordination and were told the cities generally implement the projects within their jurisdiction while the Flood District helps with funding. Questions were asked about whether dredging would be an option to consider for the Cedar River given the concerns from state agencies over the impacts to habitat. A Committee member wanted verification that the County was actually going to do work on the Lake Sammamish weir and whether maintaining weirs are covered under the Flood Plan. Will the Plan include the Pacific Fish Management Council recommendation to have 80 trees per mile of river in Western Washington, as well as clarify that hydraulic project approvals have to be issued by Washington Department of Fish and Wildlife before the County can do work?

Green River Risk Assessment and Action Plans

Statement of Issue:
Has King County adequately identified the flooding and erosion hazards on the Green River and developed a reasonable strategy and set of actions to address those hazards?

Summary of Committee feedback:
The Committee sought clarification on the release rates for the Howard Hanson Dam and the required design standard for the levees. They asked what the probability was that these levees will meet the conditions contained in the Motion that has been adopted related to the District taking on the role of Operations and Maintenance. Further clarification was asked about how risk-based maintenance compared to the Operations and Maintenance standards required for accreditation. One Committee member asked if King County and the City of Kent were on the same page on this issue or at odds. It was pointed out that the agreement for Howard Hanson dam was to put wood and gravel in the river downstream of the dam for a period of 50 years, and asked this be reflected in the minutes. Will the Plan recommend seeking accreditation for all the levees on the Green River? A Committee member stated that between the FEMA mapping and the Biological Opinion for the National Flood Insurance Program, a lot of the industries on the Green River have contingency plans to move to other locations, which is not a better environmental decision. Finally, clarification was asked about plans for river mile 41 to 44 at Flaming Geyser Park of which there is nothing proposed in that location.

White River Risk Assessment and Action Plans

Statement of Issue:
Has King County adequately identified the flooding and erosion hazards on the White River and developed a reasonable strategy and set of actions to address those hazards?

Summary of Committee feedback:
The Committee comments focused on several topics: how to manage flood waters, gravel removal, floodplain development regulations, and management of open space. One Committee member offered an approach to managing flood waters where the 10-year or 20-year floods would be allowed to inundate the floodplain rather than trying to keep those low flows in the river channel. This approach also recommended the placement of “friction devices” in the floodplain to help with the erosional forces of overbank flooding. Staff pointed out that the US Army Corps of Engineers is exploring the placement of log jams within the River channels of the

White River, which would serve the same purpose for reducing flood velocities. A lot of the Committee discussion focused on gravel removal with questions regarding whether King County would consider gravel removal on the White River. The Committee was reminded of the presentation at the previous meeting that outlined King County's Sediment Management Program that would inform decisions related to when the County might consider gravel removal. A Committee member pointed out that times have changed and gravel removal cannot be conducted like it had been in the past without consideration of the impact on listed species and their habitat. The County should provide additional education to those who believe the County can return to the old practices of gravel removal. It was suggested that buyout of homes from willing sellers was preferable to large public works projects. Questions were asked about subdividing property and were told that floodplain regulations require at least 5,000 square feet of land outside the floodplain for all new lots created. A question was asked about the management of Lake Tapps and whether that lake can play a larger role in providing flood storage. Finally, how is floodplain property that is purchased managed? One Committee member believes King County manages the open space primarily for habitat with little opportunity for the general public to actively use the land.

Appendices:

A. King County Flood Hazard Management Plan Citizens Committee
B. Issue Paper: Levee Certification, Accreditation and Flood Risk Reduction "Levels of Service"
C. Issue Paper: Levee vegetation and eligibility for US Army Corps of Engineers (Corps) levee repair funding
D. Issue Paper: Capital project funding for coastal flood and erosion risks
E. Issue Paper: Urban Flooding and Small Streams
F. Issue Paper: Equity and Social Justice: Outreach to Vulnerable and Underserved Populations
G. Issue Paper: Relocation of Residential and Commercial Tenants
H. Issue Paper: Capital project prioritization, sequencing approach, and eligibility criteria
I. Issue Paper: Design Guidelines and Bioengineering Approaches to Levees and Revetments
J. Issue Paper: Gravel removal and sediment management for flood risk reduction purposes
K. South Fork Skykomish River and Snoqualmie River Basin Fact Sheet and Map
L. Sammamish River, Issaquah Creek and Cedar River Basin Fact Sheet and Map
M. Green River Basin Fact Sheet and Map
N. White River Basin Fact Sheet and Map