

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?
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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 Exceeding 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 accredited’ 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