



King County

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KING COUNTY COUNCIL

The Honorable Dow Constantine
Chair, King County Council
Room 1200
C O U R T H O U S E

September 17, 2009

Dear Councilmember Constantine:

Today I transmit to the King County Council legislation in response to the very serious and unprecedented situation we are facing in the Green River Valley due to recently discovered damage at the federally owned and operated Howard Hanson Dam. This action follows my proclamation of emergency on September 10, 2009. We are informed by the Army Corps of Engineers (USACE) that damage to the dam's impoundment structure could lead to widespread flooding in the Green River Valley as early as November of this year. I have made preparing for the Green River flood a top priority of my time as King County Executive.

This challenge presented by this potential flooding is unlike anything else experienced by King County. With a 1 in 3 chance of flooding this fall and winter, we are faced with two difficult choices. We can do nothing and hope the flooding does not occur. This is by far the simplest and least expensive choice. Or we can prepare for the flood and incur huge expenses while knowing the flood may never happen.

I believe the County Council and the Executive are united in the belief that despite the cost, we must act to protect the public safety of the region. We will seek federal reimbursement for our flood preparations and expenses. However we cannot wait to know whether the federal government will step in. Therefore this legislation seeks supplemental appropriation authority equivalent to a \$27.2 million obligation to the General Fund and \$5.2 million for the Wastewater Treatment Division. These appropriations are necessary to support the planning and initial mitigation costs for 2009 as we prepare King County facilities and operations for the potential flooding situation. A separate supplemental appropriation request is being submitted to cover levee preparation work by the Flood Control District. In addition, a number of agencies are absorbing flood planning and mitigation costs within their existing appropriations.

Overview of the Problem

The Howard Hanson Dam, which is located near the headwaters of the Green River in southeast King County, is the primary facility that controls flooding throughout the Green River basin. The dam was completed in 1962 and is located approximately 62 miles upstream from Puget Sound. It is owned, operated and maintained by the USACE, with a primary

purpose of flood control and secondary purpose of municipal water supply for the city of Tacoma and additional regional customers that they serve including some in King County.

Prior to completion of the dam, the Green River Valley was predominately agrarian in nature and was subject to regular flooding. Since 1962, the dam, along with a system of levees, has successfully prevented flooding of the Green River Valley and has allowed its economic transformation to become the regional hub for manufacturing and distribution centers in the entire Pacific Northwest. In addition, the valley is now home to important retail establishments and large residential areas, with over 20,000 residents.

The valley is also home to a number of critical public facilities. King County's presence in the Green River Valley includes the following county-owned facilities:

- Maleng Regional Justice Center
- Aukeen District Court (also home to Kent Municipal Court)
- King County Animal Shelter
- Black River Building (housing the Department of Development and Environmental Services, the Assessor's Office and Public Health)
- Earlington Building (housing Elections)

In addition, a number of essential King County functions operate out of leased space in the valley, including public health facilities; office space supporting criminal justice functions; the radio shop; and the data center. King County also operates the South Wastewater Treatment Plant and critical pump stations in the area. Finally, King County also maintains roads and levees in the valley.

Unfortunately, all that thrives in the modern Green River Valley is now in jeopardy of serious flooding incidents beginning this fall as a result of a now compromised Howard Hanson Dam. The situation with the Howard Hanson Dam has created unique circumstances where a problem with a federal dam has become a local and regional problem. King County must proactively plan for the potentially disastrous results of widespread flooding this fall and winter in the Green River Valley. If we do not prepare for the flood, the results could be even more catastrophic.

With these fundamental responsibilities in mind, I transmit to the council this extraordinary supplemental appropriation request. Before describing the details of the supplemental appropriation request, I would like to provide some additional details about the dam itself, as it is important to understand this as background when considering the unprecedented preparations we are about to undertake.

Background on the Howard Hanson Dam Changed Circumstance

The Howard Hanson Dam is a concrete structure with abutments comprised of natural earthen material that existed prior to construction of the dam. During last winter's flood season, record water levels were stored behind the dam – six feet higher than ever previously recorded. After

the flood season, two depressions were discovered by the USACE in the right abutment. Seepage flow through the right abutment accelerated and turbid water was observed from one of the drains in the right abutment drainage tunnel. These discoveries indicated that a water seepage flow path had developed through the right abutment. Left unchecked, this seepage could ultimately lead to dam failure.

Although the USACE has not indicated there is a concern of immediate, catastrophic failure of the concrete dam structure itself, the compromised condition of the right abutment has led the USACE to warn local jurisdictions that they cannot operate the dam to its full capacity without risking significant damage to the right abutment. Thus, USACE has informed King County that without a successful interim repair of the right abutment, there is a one in three chance this winter that a storm will occur that will result in a release of more water than the target maximum flow of 12,000 cubic feet per second (cfs) at the Auburn gage. The higher river flows would be due to higher discharges from the dam to prevent the dam from filling to its full capacity. If these higher release levels occur, there will be significant downstream flooding, as the existing downstream levee system was not designed to withstand the water flows that are expected to be released from the dam following periods of heavy rain.

The target flood control flow for Howard Hanson Dam is a congressionally authorized flow of 12,000 cfs at river mile 31 near the city of Auburn. The dam controls flows for approximately 45% of the drainage basin; the remaining area feeds into the Green River below the dam. Therefore, dam operations must also consider the magnitude and timing of local inflows from upstream tributaries such as Soos and Newaukum Creeks.

Since 1962, dam operations in combination with King County's lower Green River levees have contained most major river flood events from Auburn downstream to the mouth of the Duwamish River. Prior to construction of the dam in 1962, the river exceeded the target 12,000 cfs 15 times since 1932. It is estimated that without the dam, the flows on the Green River would have exceeded this flood threshold 17 to 22 times since 1962.

Temporary and Permanent Dam Repairs

The USACE has yet to restore full flood storage operating capacity of the dam and will restrict the reservoir pool elevation until engineers' concerns have been fully addressed. Testing this summer indicated substantial seepage once the pool reached elevation 1,167 feet. As a result, the USACE tells us that they may limit the storage capacity to approximately one-third of normal levels. USACE preparations for the upcoming flood season include constructing a seepage barrier wall (grout curtain) and improving the drainage of the right abutment to direct seepage into the drainage tunnel. This work is on schedule to be completed by November 1, 2009. The USACE has informed King County that they will not likely test the reliability of the new grout curtain during a major winter storm, instead waiting until the spring 2010. Therefore, reduced water storage limits behind the dam will likely remain in effect for the duration of this coming winter. Depending on the outcomes of the tests on the new grout curtain, restrictions on water levels behind the dam may remain for three-to-five years until the USACE has implemented a permanent fix to address the seepage problems in the right abutment, which at the time is being considered to be construction of a right abutment cutoff wall.

Levee Impacts and Response

Most of the existing levees along the Green River were built many years ago and are not constructed to today's engineering standards. Additionally, they were designed assuming a fully functioning Howard Hanson Dam and are not capable of withstanding increased flows. Damages or even levee failures could occur if release of water from the dam is as significant as expected as a result of its compromised structure.

We should all be proud that even prior to the discovery of the Howard Hansen Dam vulnerability, King County recognized the need to upgrade aging levees and established the King County Flood Control District (FCD) in 2007 to finance levee replacements and repairs. Through the assessment of a county-wide property tax, which raises approximately \$35 million per year, the FCD has an adopted ten-year plan for making repairs and upgrades to the countywide levee system. FCD is in the second year of this ten-year plan.

In preparation for the new water flow levels from the dam, work is underway to accelerate projects on the levees along the Green River. The FCD completed 9,300 linear feet of levee repairs at five high priority sites along the lower Green River in 2008. In partnership with the USACE, the FCD is now completing repairs of 2,200 linear feet at the Horseshoe Bend levee in Kent and fixing low spots and the failing flap-gate in the Reddington/Brannon Park area near Auburn. The FCD is also completing emergency repairs at three other sites in Tukwila and Kent to protect critical public infrastructure and commercial and industrial land uses. In addition, the FCD is actively pursuing the fundamental prerequisite for rehabilitation of lower Green River levees and reduced risk of system failure, which is to acquire sufficient right of way to reconstruct levees during 2010. This includes over 18,000 linear feet of levees at 14 sites - approximately the same length as all the facilities damaged in the January flood throughout the entire county. However, there are approximately 40 miles of levees in the Green River system and they cannot all be reconstructed in time for the coming flood season.

King County has commissioned several engineering studies to determine the ability of the existing levees to withstand the expected increased volume, duration and frequency of high flows, and to determine whether there are additional improvements King County can make to provide additional protection for the valley. King County and the cities adjoining the lower Green River are analyzing the feasibility of several alternatives to temporarily raise the lower Green River levees to contain the higher flows of 13,900 and 17,600 cfs from overtopping levees adjacent to the cities of Auburn, Kent and Tukwila as a result of changed flood control operations at Howard Hanson Dam. The techniques and temporary structures under consideration for flood fighting include TRANSCO "super sacks" and HESCO container units. It is estimated that to contain 13,900 cfs in selected locations approximately nine miles of temporary structures from an elevation of one- to three-feet in height would be required; to contain 17,600 cfs would require approximately 11 miles of temporary facilities from an elevation of one- to eight-feet in height. Due to the age, construction materials and over-steeped slopes of the levees throughout the lower Green River Valley, King County's engineering consultant is currently evaluating the potential adverse levee stability impacts that may occur from these different techniques as a result of the additional weight on the top of the levees, the increased water pressure due to higher river levels, and increased seepage forces

through or beneath the levees. The completion of levee stability analysis and a final recommendation of temporarily raising the levees are imminent.

The Flood Warning Center (FWC) produced maps of the levee system where concerns exist regarding the structural stability of the levees due to age and over-steepened slopes for the cities, county and USACE staff to use in upcoming flood patrols and to estimate the height and length of temporary facilities to potentially contain a portion of the flood waters.

Flooding Consequences: Risk Scenarios

Because of the pool elevation restriction and the resultant reduced storage capacity behind the dam, there is an increased risk to the downstream communities for high flood levels. Should a major storm event occur with the temporary restrictions on pool elevation, it is likely that levees in the lower valley could be overtopped and even fail, as they were not designed to withstand increased water flows that will result from the reduced storage capacity of the dam.

A study commissioned by King County in 2006 determined that the loss of use of the flood plains in King County would result in lost economic activity of \$46 million per day, largely centered in the Green River Valley. A more recent study by the Federal Emergency Management Agency (FEMA), still in draft, estimates a range in flood damages from \$1.3 - \$3.8 billion for the flood scenarios provided by the USACE for the valley.

The county and cities have been working with the USACE on a request for the federal government to fund measures that we could take in advance of a potential flood event over the next three to five years. In addition to completing the grout curtain at the dam, the USACE has committed to having significant flood fighting capabilities on hand in case of flooding or a breach of a levee, increasing patrols along the levees, debris management at bridges, and enhanced communications. Advanced measures requested (and supported by the local USACE office), include requests for pumps and equipment and temporary flood containment materials.

A request to reprioritize projects within the FCD six-year CIP to allow for the flood preparations on the levees – included in a separate FCD transmittal – would be used to augment or replace USACE funding should the advanced measures requested not be approved. The approximately \$8.4 million assumes the purchase and installation of temporary facilities on levees, or possibly as secondary containment areas behind levees, a 20% contingency, and emergency pumps and flood protection for the Black River Pump station that will be instrumental in helping drain the cities of Renton and Kent if needed. Final costs will depend on negotiations with the USACE and our work with the valley cities. Again, these costs are requested in a separate but companion piece of legislation for the FCD. Should our request for federal funds be successful, some of these FCD funds could be restored to the projects for which they were originally programmed

The USACE, using elevation and floodplain data from King County, provided flood inundation maps to the local agencies for emergency response planning based on four release and storm scenarios: 13,900 cfs, 17,600 cfs, 19,500 cfs, and 25,000 cfs at Auburn. The river modeling estimated these flows based on 25, 50, and 100-year events and a restricted pool elevation. At