



# FACT SHEET - Howard Hanson Dam

U.S. ARMY CORPS OF ENGINEERS

BUILDING STRONG®

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## Background:

Following a record high level of water behind Howard Hanson Dam in January 2009, the U.S. Army Corps of Engineers became concerned after discovery of two depressions on the right abutment, increased water levels in groundwater monitoring wells, and the appearance of sediment-laden water entering the abutment drainage tunnel. These concerns compelled the Corps to limit the dam's operational capacity, in order to not put it at further risk. While the dam itself is not in immediate danger of failing, there is increased risk to downstream communities until seepage concerns with the right abutment have been resolved. The Corps of Engineers placed restrictions on flood storage and established an aggressive monitoring program, in addition to other risk reduction measures. Reduced flood storage capacity results in more frequent and larger volume releases during flood events, which could increase the probability that levees in the lower valley could be overtopped. Work already done to reduce risk includes construction of a seepage barrier (grout curtain) and improvements to drainage in the abutment. Extensive coordination with local communities has occurred to aid emergency preparedness.

## Situation:

Drainage improvement work is on schedule and is expected to be complete by the end of October 2011. Drains through the area of highest concern, known as the short path seepage area, have already been completed. The reservoir at Howard Hanson Dam reached a summer elevation of 1,167 feet above sea level in June, allowing engineers, geologists and other scientists to run a battery of tests to gather more data on the right abutment drainage improvements that are completed and underway. Last flood season the Corps had confidence that we could safely store water to the summer conservation pool level (48 percent of full). The Corps is currently in the process of determining to what level Howard Hanson Dam can safely store a flood pool during this coming flood season. The Corps is conducting a dam safety study to determine the best solutions to allow normal operation. The Corps has reviewed and concurred with the concept of additional measures identified below. A final dam safety study report will be completed by the end of 2012. Initially planned for completion in November 2010, additional funding has allowed for more in-depth quantitative (verses the former qualitative) risk analysis to be completed and included in the report.

## Key Points:

- Public safety is the Army Corps' number one priority. The Corps is working with local communities to prepare for the risk of flooding to downstream areas using the best available information.
- Engineering investigations and completed actions since 2009 greatly improve our understanding of the conditions at the dam and increase our confidence in the structure.
- Experts determined that additional corrective actions were needed to restore the dam to a safe condition and to provide full flood storage capacity. Construction of improvements to the existing drainage tunnel and additional drains in the short path seepage area began in January 2011. Construction of the work conveyed by the original contract will be completed by Nov. 1, 2011, which is the beginning of the flood season in the Northwest.
- As construction on the drainage improvement work continues, all indications are that the new measures will perform as intended. Once the current improvement work has been fully completed, experts will evaluate the effectiveness of those measures and determine to what level we will be able to hold a flood pool.
- When all the identified dam safety measures are completed and tested, the Corps anticipates being able to fully use the project for flood risk reduction operations.
- The Corps will continue to monitor the dam to ensure effectiveness of the corrective measures, especially during high flow events. Depending upon the results of the ongoing dam safety study, additional measures may need to be implemented to further address identified risk concerns.

- Three additional repairs required to further protect the dam in an extreme flood, including rock anchors to stabilize the spillway gate structure, additional rock protection on the upstream dam face, and a new log boom system in the reservoir are scheduled for construction contract award in the fall of 2011.
- The return of full operational capacity of Howard Hanson Dam, in partnership with a functioning levee system downstream does not eliminate all risks of flooding. The dam and levees only reduce the risk of flooding.

### **Additional Background Information:**

Howard Hanson Dam is located on the upper reach of the Green-Duwamish River in King County, 63 river miles above the mouth. It is in the city of Tacoma's municipal watershed 35 road miles east of Tacoma, 6 miles upstream from Palmer. This project is protected from public access.

The Howard Hanson Dam serves multiple purposes by providing flood risk reduction, municipal water supply and summer and fall low flow augmentation for fish. Flood risk reduction in the Green-Duwamish River Basin is accomplished by capturing excessive water runoff from the upper drainage area of the river and releasing the water under controlled conditions. After the end of the annual winter flood season, water is gradually stored in the reservoir beginning about March 1 for municipal water supply and for conservation (low flow augmentation) purposes.

Flood damage prevented by Howard Hanson Dam from the January 2009 flood is estimated at about \$4 billion.

The dam is an earth and rockfill structure with inclined core drain and filters. Outlet works on the left bank consist of an approach channel, an intake structure providing upstream control, a 19-foot diameter horseshoe concrete-lined tunnel, a stilling basin, and an auxiliary 48-inch diameter bypass pipe. A gated spillway on the left abutment with two 45 by 30-foot tainter gates permits reservoir storage to elevation 1,206 without utilizing the spillway for discharge. The paved spillway chute is 656 feet long.

The Corps of Engineers constructed a seepage barrier in November 2009 to reduce seepage and improved the drainage of the right abutment by installing drains that more effectively direct seepage into the drainage tunnel. Testing showed that the work controlled seepage more effectively. However, the 2009 grouting is not considered a permanent repair.

Along with the addition of vertical and horizontal filtered drains and the possibility of extending the drainage tunnel, the Corps is pursuing projects to increase confidence that the dam can safely operate during extreme flood events. These measures include:

- Installation of additional log booms to prevent debris from blocking the spillway
- Improvements to the spillway to allow improved flow passage
- Further stabilizing the spillway by improving how it is anchored to bedrock
- Placing rock in key places along the upstream face of the dam to protect it against erosion from fast-moving water in the event the spillway is used.