



Flood/Stormwater Education, Prevention, and Response Update

March 3, 2009



Tonight's Presentation

- Flood Causes
- Preventive Options
- Responses to Flooding



Flooding Causes

- There are two primary mechanisms associated with flooding within the City:
 - First, major storm events within the City Limits.
 - Secondly, major storm events within the Puyallup River Watershed.



Flooding Causes Cont'd

- Secondary Causes:
 - Shallow groundwater elevation.
 - Low surface gradients (slopes) on the valley floor.
 - Saturated soil conditions.



Flood Causes Cont

- When there is a major storm event within the City, the storm system may be overwhelmed by surface runoff resulting in flooding.
- However, flooding within the City will also occur when the Puyallup River is above normal flow, regardless of a storm event within the City.

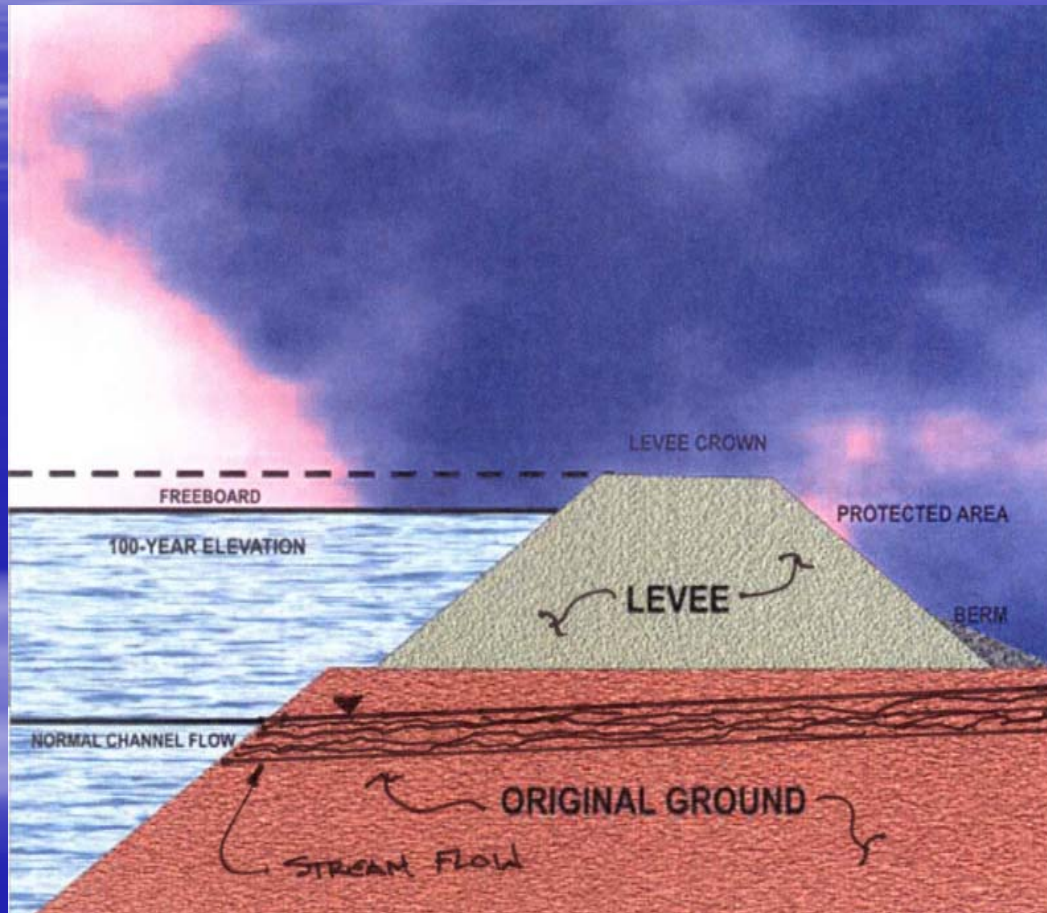


Flood Causes Cont'd

- There are two major “pathways” for water from the river to flow into the City, Clarks Creek and Deer Creek. (Consider these “pathways” as breaches through the levee).
- As a result, the high river water does not allow the creeks and City storm system to drain. This is called the Backwater Affect.
- Bottom Line – Any increase in river surface elevations and the resultant backwater affect can have serious consequences on our community, i.e., higher levees or sediment buildup.



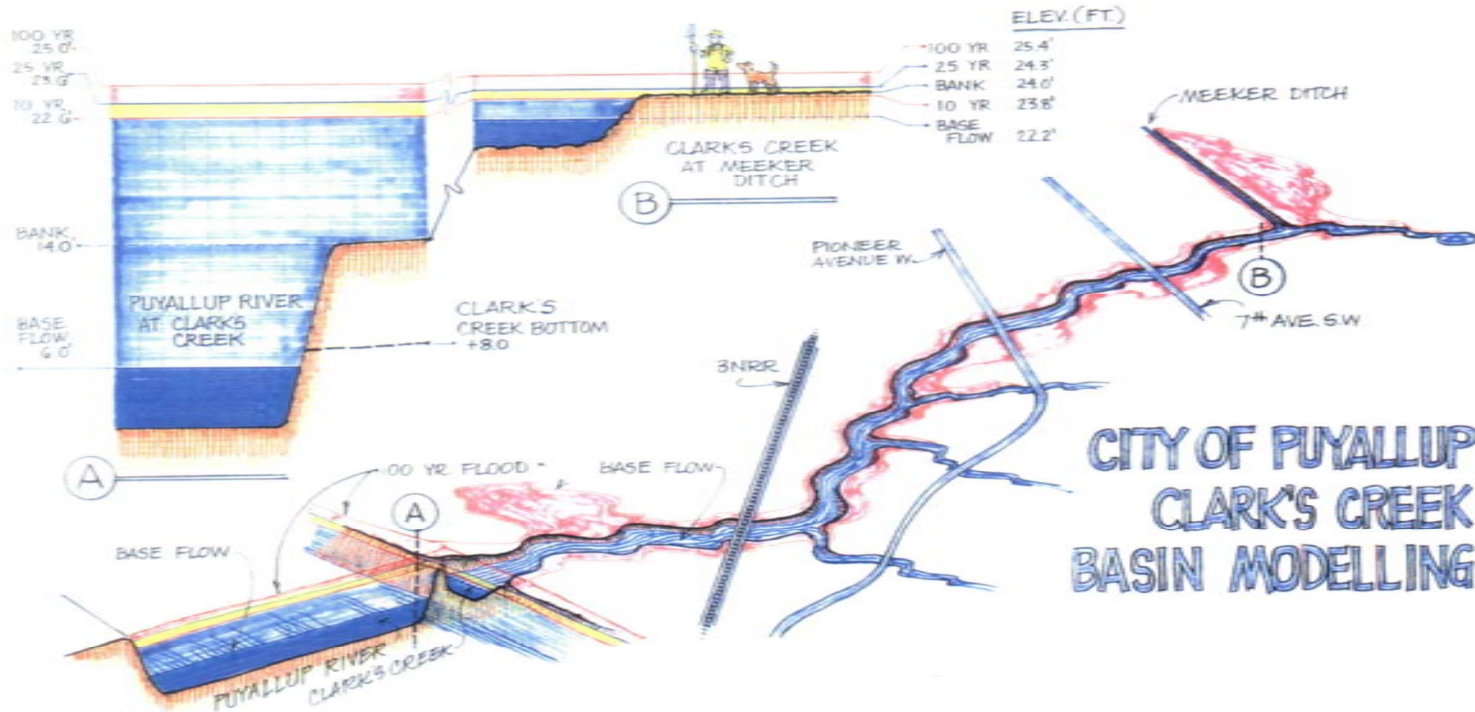
Flood Causes Cont'd



As the water rises during a flood event, the creek level also rises until it can find an outlet in a low lying area.



Flood Causes Cont'd





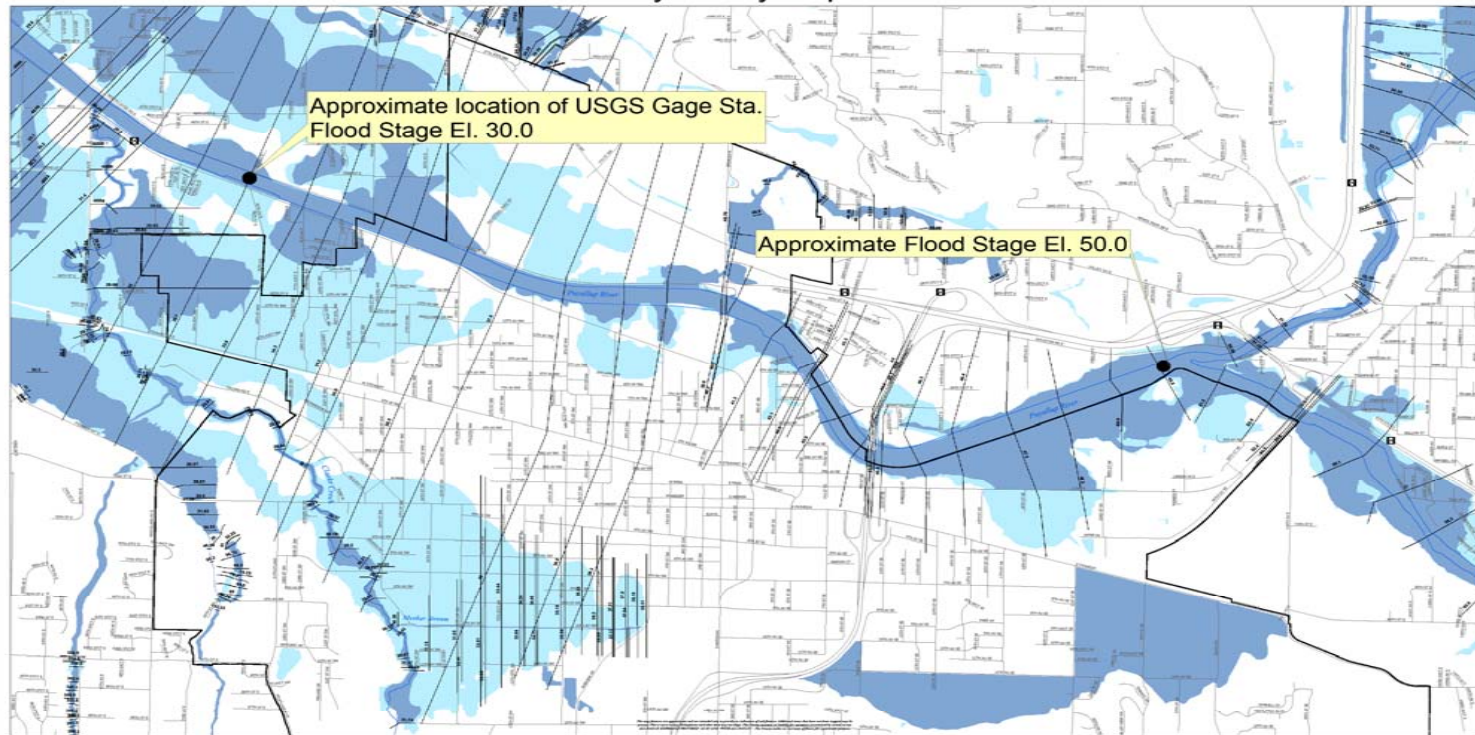
Flood Causes Cont'd

- Also, flood elevations are relative.
- The USGS Gage Station near the City is at River Mile 6.6, just upstream of the confluence with Clarks Creek.
- The 1% Chance Flood, or 100-year event, flood level at the Puyallup Gage Station is elevation 30.0 feet.
- When the Gage Station is at flood stage, areas within the City at higher elevations may be flooded due to the slope (gradient) of the river.



Flood Causes Cont'd

Flood Elevations for the Puyallup River and Clarks Creek
City of Puyallup

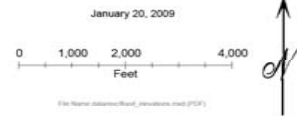


City of Puyallup
Information Technology
& Communications
Department

*The following is an excerpt of metadata created by Pierce County. These lines show the locations of channel surveys used for calculable flood elevations at hydraulic models. The Cross Sections are also shown on the Flood Profiles in the Flood Insurance Study (FIS) report and can be used to cross reference the Flood Profiles to the observed depth of the flood heights. The Cross Sections are lines generally extending from outside the floodplain, across the entire floodplain and out the other side. Each cross section is represented by a single line feature. This data is part of the FEMA preliminary DFIRMs (Digital Flood Insurance Rate Model) which will replace the FIRM (Flood Insurance Rate Map) after going through the approval process, including public review. The preliminary DFIRMs are scheduled to be published in late 2007. FEMA listed Northwest Hydraulic Consultants Inc. (NWHCI) to do the study.

Please check the metadata for the County Floodplain Cross Section for more information.

- Legend
- City Limits
 - Roads
 - Puyallup River
 - Clarks Creek
 - County Floodplain Cross Sections
 - 1% Annual Chance Flood
 - X - 0.2% Annual Chance Flood





Preventive Options

- To mitigate the negative impacts of the Puyallup River backwater on Clarks Creek and/or Deer Creek, a flood gate-pump station would be required at the respective confluences with the river.
- Extremely unlikely due to ESA, permitting, and costs.



Preventive Options

- Other methods to mitigate the backwater affect within the City is to lower the river water surface elevations. This can be accomplished by:
 - Sediment reduction (very controversial).
 - Setback levees (costly)
 - Controlled flows (dams)



Preventive Options

- Due to the extreme sediment loading of the river, continuous sediment reduction projects can never be the end-all solution .
- Also, sediment reduction projects on Clarks Creek and/or Deer Creek will provide only localized relief and will not alleviate the flooding associated with the Puyallup River backwater.



Preventive Options

- City's Approach to Flood Protection
 - Enforce current City standards and regulations in an effort to not make flooding worse and improve conditions where possible.
 - Undertake capital improvements to convey flows as best as possible:
 - Construction of the 15th Street NW Trunk Line
 - Replacement of the failing 14th Street SW storm system with a new box culvert
 - Future conveyance of Deer Creek through a 72-inch diameter culvert, replacing an existing undersized 36-inch culvert
 - Basin planning
 - Strategic property purchases



Preventive Options



Before (Dec '07)



After (Jan '09)



Responses to Flooding

- Citizens can, and should, prepare themselves prior to flood events by:
 - Maintaining storm drains, ditches, and creeks located on private property.
 - Getting emergency contact information organized.
 - Preparing a family disaster-communication plan including rendezvous locations.
 - Assemble disaster preparedness kits.

- Additional resource information may be obtained from the Department of Emergency Management.



Responses to Flooding

- In emergency situations, the City's Emergency Management Team works closely with regional safety personnel as well as the staff of Public Works to mitigate hazards to life and property.
 - The Emergency Management Team is activated and determines the level of event risk.
 - Public Works crews mobilize equipment and materials to known areas of concern prior to flooding.



Responses to Flooding

- Depending on the level of risk:
 - Citizen advisories are issued via the City's website, Reverse 911 calls, and/or in person.
 - Emergency shelters are opened.
 - Evacuation procedures and routes are determined.



Responses to Flooding

- In conclusion, the City is at risk of flooding whenever the Puyallup River exceeds “normal” flows.
- City staff and the Department of Emergency Management will continue to coordinate their emergency response efforts, improve upon previous performance by building upon lessons learned, and educate our community on safety preparedness and what it means to live in or near a floodplain.