

**SCOPE OF WORK**  
**PROJECT NAME: SNOQUALMIE BASIN –**  
**HYDROLOGIC EVALUATION OF FLOODING**  
**TRENDS AND CURRENT CONDITIONS**

This Work Order includes hydrologic analyses to characterize changes in flood regime in the Snoqualmie watershed based on analysis of historical gage data and other similar information. The work will also include a review of available data and literature to identify key factors that may be influencing changes in Snoqualmie River flood hydrology, including but not limited to sedimentation, climate change, forest practices, land development patterns, and stormwater standards. The work will be independently reviewed by Dr. Ed McCarthy, Ph.D., and results will be documented in a report and presented at meetings with residents and other stakeholders. The report will include information to help affected residents better understand the hydrology of flooding in the basin including the primary factors that influence it, how it can vary from event to event, and how it is changing over time.

**LOCATION OF WORK AREA**

The project area is the Snoqualmie River basin, including the River and its three forks and other major tributaries.

**TASKS**

- **USGS Stream Gages:** Consultant shall coordinate with the USGS and provide a critical review of gaging and historical data for key USGS gages in the Snoqualmie basin, including the North, Middle, and South Forks of the Snoqualmie River, the mainstem Snoqualmie River, the Tolt River and the Raging River. Consultant will review this information and the published discharge records to identify potential discrepancies or anomalies in the data. The causes of anomalies will be determined if possible and recommendations will be made for improving streamflow gaging (e.g., additional gages, moving gage locations, etc.), as well as recommendations for King County's ongoing reliance on stream gage data for flood warning purposes.
  
- **Hydrology Trends:** Consultant will evaluate long-term trends in flood flows on both an annual and seasonal basis to determine if the magnitude of large infrequent events is increasing or decreasing over time. The evaluation will seek to identify statistically significant changes in flood magnitude, timing, and duration. The analyses will also evaluate whether the frequency of high springtime flows (e.g. out of bank flows) is increasing over time.

The Consultant will also review NRCS SnoTel gaging and NWS precipitation gaging in the Snoqualmie Basin to see if there are trends in precipitation and/or snowpack that could be affecting flood hydrology.

The Consultant will perform a high-level review of likely drivers of hydrology trends in the basin, including changes in forestry, development/stormwater management, and climate. The Consultant will also analyze rates of sediment/gravel accumulation in the river and its impact on flooding and will summarize the history of sediment management (dredging) and flood control projects along the river.

In addition to the statistical analyses described above, the Consultant will conduct informational interviews with County staff, key landowners and other stakeholders to get input regarding hydrologic changes and observations during the 2009 and 2015 flood events. The Consultant shall also obtain and review relevant reports and information on hydrologic trends and potential future conditions.

- **Anatomy of a Flood:** The Consultant will prepare a detailed description of the character, timing, spatial and temporal characteristics, and likely meteorological influences and effects of up to three flood events. The “Anatomy of a Flood” descriptions will analyze antecedent conditions, rainfall patterns, snowpack, streamflow data, flood reports, and high water mark data to characterize how the floods developed, what the primary drivers were, what if any anomalous conditions existed, and what impacts were observed in the lower Snoqualmie valley. The “Anatomy of a Flood” descriptions will include evaluations of the January 2009 and January 2015 events as well as one other flood.
- **Historical High Water Marks:** The Consultant will locate 15 to 20 high water marks along the Snoqualmie River between Fall City and Duvall. High water marks will be used to compare the impacts of past flood events.
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