PERFORMANCE MEASURE INFORMATION SHEET #27

LOWER COLUMBIA RIVER: FLOOD CONTROL

Objective / Location	Performance Measure	Units	Description	MSIC
Flood Control/ Lower Columbia River	Frequency of Flood Flows	# of day per year flows exceed 165 000 cfs	Frequency with which flows potentially flood property in Genelle	N/A
	Infrastructure	# of day per year flows exceed 72,000 cfs	Frequency with which flows potential flood the Trail sewer service road	N/A
		# of day per year flows exceed 177,499 cfs	Frequency with which river flows limit use of the Indian Eddy ramp	N/A

Description

Under normal operation, Arrow Lakes Reservoir discharge should not exceed 100 kcfs and should not cause river flows at Birchbank (Kootenay plus total ARR flows) to exceed 160 kcfs. Increasing flooding impacts can be expected to occur along the lower Columbia River at discharges exceeding these values. At river flows above 165 kcfs, there is the potential for property at Genelle and Trail to be affected. Trail has experienced occasional floods in the past, with floods in 1948 and 1961, causing water depths of 3 ft. However, since construction of the Columbia River hydroelectric facilities, flood risk has been substantially reduced from historic levels. There have been three inflow years comparable to 1948 without any impact on Trail.

In 1992, a daily average flow rate of almost 180 kcfs (approximately equivalent to a “100-year flood”) at the Birchbank gauge disabled the septic system at a mobile home park and damaged other minor encroachments at Genelle. All of these areas were on the floodplain and there was no notable property damage. Flooding at the trailer park in Genelle was estimated to start at flows of 165 kcfs. BC Hydro has managed to maintain flows at or below 165 kcfs in recent years.

During the Columbia River WUP, a critical flow threshold of 165 kcfs at Genelle was used as a benchmark for flood impacts in the lower Columbia River. Potential flooding impacts associated with the four NTS scenarios is also being measured using this flow threshold, as measured at the Birchbank gauge.

For the NTS analysis, two additional thresholds were also developed to consider the potential for flooding of infrastructure in the City of Trail. Specifically, concern was expressed that Lower Columbia flows at Trail could affect servicing of the sewage trunk line and impede use of the Indian Eddy ramp for emergency rescue.

The following summarizes critical thresholds for Columbia River flows at Trail (G. De Rosa, City Councillor Trail, pers. correspondence).

Critical Flow Thresholds for Trail Infrastructure

	Critical Elev. (ft)	Critical Flows (cfs)
Sewage treatment site	1325	50,000
Base of river wall	1327	58,636
Sewer service road at Old Bridge Road	**1330**	**72,000**
River access/egress at Indian Eddy for emergency rescue	**1344**	**177,499**
Loss of beach at Gyro Park	1345	182,000
Downtown basement flooding begins	1349	223,000

Calculations

For each scenario:

1. Assemble the simulated results for total flow in the Lower Columbia River over 60 years including total discharges from Arrow Lakes combined with total Kootenay River flows from Brilliant Dam (Figure 1).
2. Count the number of days per year that exceed the flow threshold.
3. Summarize all statistics (Figures 2-4).

Key Assumptions and Uncertainties

- Each scenario is simulated using the same set of system constraints, input assumptions (e.g., load forecasts) and historic basin inflows (1940 – 2000).

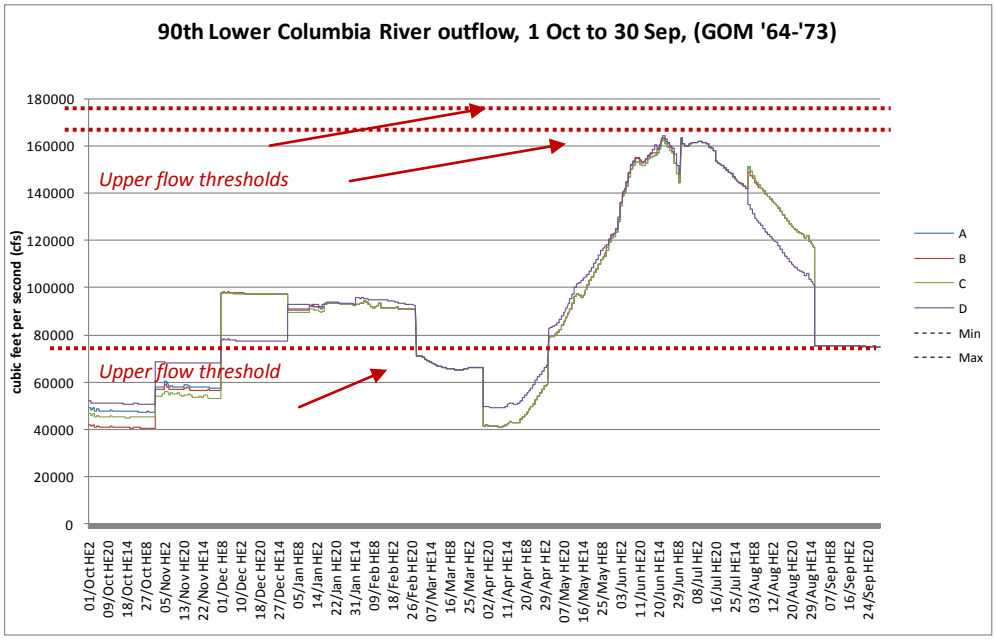

Figure 1. GOM Simulated Flows in the Lower Columbia River. 90th percentile flow over 10 years showing the critical flow thresholds for flooding of the Trail Sewer Service Road and Genelle and use of Indian Eddy ramp for emergency river access.

Results

Regardless of the statistic used, the modeling indicates that Scenario D (no NTSA) could cause flows in the lower Columbia River to impede use of the service road for the Trail sewage trunk line more often than under the "no NTSA" scenarios (A, B, C). However, none of the scenarios would represent a significantly greater potential of causing flows to exceed the flooding thresholds at Genelle or the Indian Eddy ramp.

Note: Control of potential flooding downstream of Arrow Reservoir is managed within the Columbia River Treaty. BC Hydro will take mitigative action in any case where there is risk of downstream flooding.

Figure 2. Flooding Days at Trail Sewer Service Road – HYSIM Results for all NTS scenarios

	Scen A	Scen B	Scen C	Scen D
Max	304	281	267	272
90th	232	232	232	225
Mean	175	174	176	165
Med	174	173	183	171
10th	118	120	118	71
Min	68	68	68	36

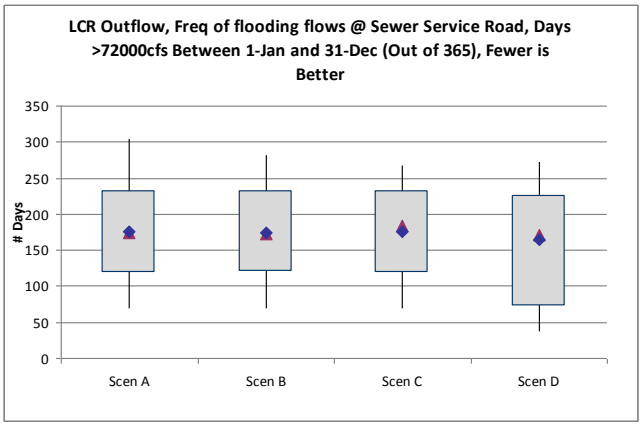

Figure 3. Flooding Days at Genelle – HYSIM Results for all NTS scenarios

	Scen A	Scen B	Scen C	Scen D
Max	28	28	28	26
90th	6.6	6.6	6.6	5.2
Mean	1.9	1.9	1.9	1.6
Med	0	0	0	0
10th	0	0	0	0
Min	0	0	0	0

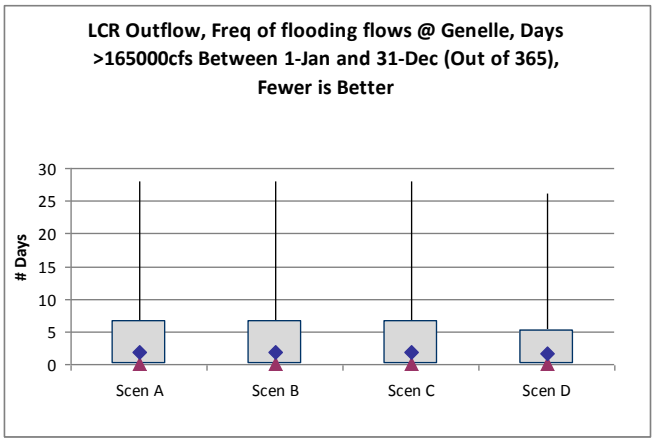

Figure 4. Emergency River Access at Indian Eddy – HYSIM Results for all NTS scenarios

	Scen A	Scen B	Scen C	Scen D
Max	21	21	21	21
90th	0	0	0	0
Mean	0	0	0	1
Med	0	0	0	0
10th	0	0	0	0
Min	0	0	0	0