SUMMARY OF FINDINGS
Geomorphology and Flood Hydraulics Analysis

This memo briefly summarizes the findings of the "Geomorphology and Flood Hydraulic Analysis Technical Memorandum," prepared by Northwest Hydraulic Consultants, September 22, 2004.

Location of diversion

Water rights records show that "there has been a diversion of some type at the location of the current Glendale Diversion weir since the late 1800's."

Sediment Analysis

Sediment is measured using "Wolman pebble counts" and classified as D84, D50, and D16. (D84 means that 84 percent of the material in the bed is finer than this size.) Steeper sections of the river have more large (D84) materials, because the water moves faster carrying more of the lighter materials downstream. Flatter sections of the river have more of the finer (D16) materials, because the water slows down allowing more of the lighter materials to settle to the bottom.

Flood Water Levels

Flood water levels were calculated using the USACE HEC-RAS model. This model includes information on how much water will be flowing during a 100-year flood as well as information about the geometry (size and shape) of the river channel in this location. TMWA did additional cross-sections for the USACE model to more accurately show how the water flows downstream of the weir and through the bridge. At Glendale Avenue, there would be 20,732 cubic feet per second (cfs) at the peak of a 100-year flood.

Existing conditions: Currently, the 100-year floodwaters stay in the river under the 395 bridge, but break out to the south immediately after that. The model shows that the floodwaters return to the river just upstream of the Glendale Bridge and stay in the river for quite a ways downstream.

Northwest Hydraulic Consultants looked at four alternatives to determine their impacts on floodwater levels:

#0: Existing conditions
#1: Existing Weir Removed (See Figure 5) -- Looked at removing the weir itself, not dredging out riverbed material upstream.
#2: New Weir in Existing Location (See Figure 7) -- The concept for the weir includes a more gradual downstream slope.
#3: New Weir 700 ft Upstream of Existing Location (See Figure 9) -- New weir 700 ft upstream, dig out channel bed to new weir.
#4: New Weir 2100 ft Upstream of Existing Location (See Figure 11) – New weir 2100 ft upstream, dig out channel bed to new weir.

A summary of the results of the analysis of these four alternatives is presented below:

Alt.	Diversion Rate	River bed impact	Water Surface Level	Shear Stress	Sediment/Geomorphology
#0 Existing Conditions	Water diversion rate = up to _____, unreliable	Elevation of the river bed upstream of weir "relatively constant" since 1959	Under existing conditions the peak flood water hits the bottom of the Glendale Avenue bridge	Existing shear stress . . . . materials upstream and downstream of the weir are "approximately equal"	The riverbed downstream of the weir has been building up due to deposits of sediments. Models show this has been caused by channel widening downstream of the weir
#1 Existing Weir Removed Only (no dredging)	Water diversion rate = none (???)	Results in steep river bed	Approximately 1 ft. drop in water surface elevation extends less than 600 ft. upstream	Increased shear stress upstream of weir & steep bed would cause the river to move a lot of sediment into the reach downstream of Glendale Avenue (See Figure 6)	This movement of sediments could cover spawning riffles and raise floodwater elevations
#2 New Weir at Existing Location	Water diversion rate = _____	Riverbed is the same as existing conditions	The 1 ft. to 2 ft. drop in water surface elevation extends less than 500 ft. upstream	Small increase in shear stress just upstream of weir would allow a little more sediment to travel over the weir, so it would not be trapped upstream of the weir	
#3 New Weir 700 ft. Upstream of Existing Location	Water diversion rate = _____	The new weir must be high enough to divert water into the treatment plant (gravity feed)	There is a 1+ ft. drop in water surface elevation below the new weir; up to a 1 ft. increase in water surface elevation above the new weir – this is localized effect	Decrease in shear stress upstream of the new weir may result in sediment build-up upstream of the new weir; increase in shear stress downstream likely will result in bed and bank scour and require bank protection (See Figure 10)	
#4 New Weir 2100 ft. Upstream of Existing Location	Water diversion rate = _____	The new weir must be high enough to divert water into the treatment plant (gravity feed)	There is a 1 ft. to 2 ft. drop in water surface elevation below the new weir; a slight increase above the new weir – this is a localized effect	Increase in shear stress above and below new weir likely will result in bed and bank scour and require bank protection (See Figure 12)	

The information in this summary is from the following sources:

- U.S. Army Corps of Engineers (USACE) geomorphologic study (1990)
- USACE sedimentation study (1993)
- Hydraulic modeling by Northwest hydraulic consultants
- USACE HEC-RAS model

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