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## Executive Summary

The City of Kenmore and other parties are concerned about sediment deposition at the mouth of Tributary 0056, a small stream that drains into Lake Washington near the western boundary of Kenmore, Washington. This sedimentation study of the Tributary 0056 watershed was conducted to assess historical and current sediment production conditions within the watershed, to predict the future rates of sediment delivery to the lowest (most downstream) portion of the channel network, and to provide recommendations for managing sediment production in the watershed and sediment transport through the stream system.

Tributary 0056 drains a 1.85-square-mile watershed and flows into the north end of Lake Washington. Much of the stream channel network, including the mouth, is located in Kenmore. The watershed encompasses portions of Lake Forest Park, Brier, and unincorporated Snohomish County. Just upstream of its mouth, Tributary 0056 flows through a series of ponds at the Harbour Village Condominiums. These ponds create a depositional environment for sediment that is produced in the Tributary 0056 watershed and transported through the stream channel. The sediment deposition in these ponds has been extensive. Nearly every 2 years between 1981 and 1995, approximately 500 to 700 cubic yards of sediment were dredged from the ponds, and an additional 110 cubic yards of sediment were dredged in 1999 to reestablish a channel to convey streamflow through the ponds. Tributary 0056 flows into Lake Washington at the Harbour Village Marina just downstream of the ponds. In November 2004, the Harbour Village Marina dredged 580 cubic yards of sediment from the delta that was forming at the mouth of Tributary 0056. That was the first time the mouth of the stream had been dredged at the Lake Washington shoreline.

According to an aerial photograph taken in 1998 from a satellite, by that time, approximately 78 percent of the land area in the Tributary 0056 watershed had been transformed from a native forested condition and developed to some degree, resulting in increased stormwater runoff and increased sediment transport capacity and erosive force of the stream. Furthermore, significant physical modifications have been imposed on the stream channel, principally confinement and armoring of the stream banks and bed. In the areas of the channel network that have no culverts, at least 17 percent of the stream banks were armored at the time of the stream survey that was completed for this study. In areas where bank armoring and grade control measures have not been implemented, chronic bank erosion and channel incision are widespread. In the portion of the channel network that is not routed through culverts or where stream banks are neither armored nor protected, approximately 87 percent of the stream banks are moderately to completely unstable. This is a prevailing condition along approximately 74 percent of the total channel length.

Although the principal sediment sources identified in this study are located within the Kenmore city limits, the combined storm flow in the stream, which results from runoff from all of the land area (and associated jurisdictions) in the Tributary 0056 watershed, contributes to sediment production and its transport downstream. The current sediment production rates are less than the maximum rates observed in previous decades and are now estimated to be between 80 and 120

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cubic yards per year. At this rate, future dredging of the ponds at the Harbour Village Condominiums may still be necessary every 4 to 10 years.

A complete elimination of sediment production is neither likely nor advisable. Because of the widespread bank instability throughout the channel network, the cost of implementing the necessary projects and programs to reduce sediment production in the Tributary 0056 watershed to natural levels would be prohibitive. A combination of management alternatives including control measures to address high-priority sediment sources, modifications to the mouth of the Tributary 0056, and implementation of a comprehensive stormwater control program in the watershed would result in reduced sedimentation in the lower reach of Tributary 0056, thereby decreasing the necessity of future dredging. Additional benefits from modifying the lower reach of Tributary 0056 would include the removal of a fish barrier and the return of this section of the stream to a more natural condition. Furthermore, relatively large-scale stormwater infiltration projects that improve streamflow conditions would also benefit fish and other aquatic organisms in the lower reaches of the stream.