Background
The restoration site is part of a larger restoration plan near the confluence of Mill Creek and the Green River, in Kent, WA (Figure 1). Historically, the site was an orchard. The Green/Duwamish River system is generally considered one of the most altered systems in the Puget Sound Basin with respect to both habitat and hydrology. Much of the historic floodplain of the river has been isolated by the construction of levees and other water control features. The lack of suitable juvenile salmonid rearing habitat in the Lower Green River was cited as a specific limiting factor in the Water Resource Inventory Area (WRIA) 9 Limiting Factors Report.

The City of Kent’s main restoration objectives are:

- Provide off-channel refuge habitat during high river flows,
- Enhance riparian habitat in the project area,
- Increase low-flow rearing habitat for juvenile salmonids in the project reach,
- Increase wetland area, and
- Increase floodplain storage capacity.

Original Design
The City of Kent’s original conceptual design was developed prior to any site-specific investigations and depended on a critical assumption that the low-flow water elevations in the Green River would be higher than the water elevation at the outlet from the new side channel. The original design incorporated the following conceptual design elements (Figure 2):

- a side channel, with 3:1 slopes, connected to the east bank of Mill Creek;
- a permanently wetted pool habitat;
- an island feature with wetlands and riparian zone;
- side channel planted with native wetland vegetation to create wetlands; and
- enhancement of the existing riparian zone with native plants.

Studies and Results
To determine the feasibility of constructing the City of Kent’s original design the following studies were conducted (Figure 3):

- upland soils testing for grain size, pesticides, and herbicides (TP-01, TP-02, etc);
- riparian condition survey;
- geomorphic conditions survey;
- HEC-RAS modeling to develop flow duration expressed as water surface elevations;
- stream channel and riparian topographic survey (1, 2, 3, etc); and
- in-stream habitat condition survey.

Results of these studies invalidated several assumptions used in preparing the original design:

- upland soils were dominated by sand, indicating 3:1 slopes would not be stable; and
- Mill Creek was incised 17 to 20 feet below top of bank versus the estimated 15 feet, indicating the pool could not be permanent and that cooler, more oxygenated, water from the Green River would not flow into the side channel to reduce water temperature.

Revised Design
A revised restoration conceptual design was developed based on the results of site-specific studies and the main restoration objectives (Figures 4 through 8). The revised conceptual design includes the following elements:

- direct connection to the Green River; and
- enhancement of habitat at the mouth of Mill Creek.