
LEWIS CREEK GABION REACH BANK STABILIZATION

Location:	Lewis Creek (tributary to Lake Sammamish), City of Issaquah, King County, WA. WRIA #08
Proposed Action:	Train the thalweg away from the gabion wall by excavating a narrower radius bend in the channel, creating a weir/pool formation in the channel to dissipate hydraulic energy, and installing large wood at the toe of the wall to prevent failure.
Species Benefiting:	kokanee, coho, cutthroat trout



Kokanee/Chinook Restoration Feasibility Assessment in the Sammamish Watershed

Map B - Lewis Creek - Gabion Reach Stabilization Project



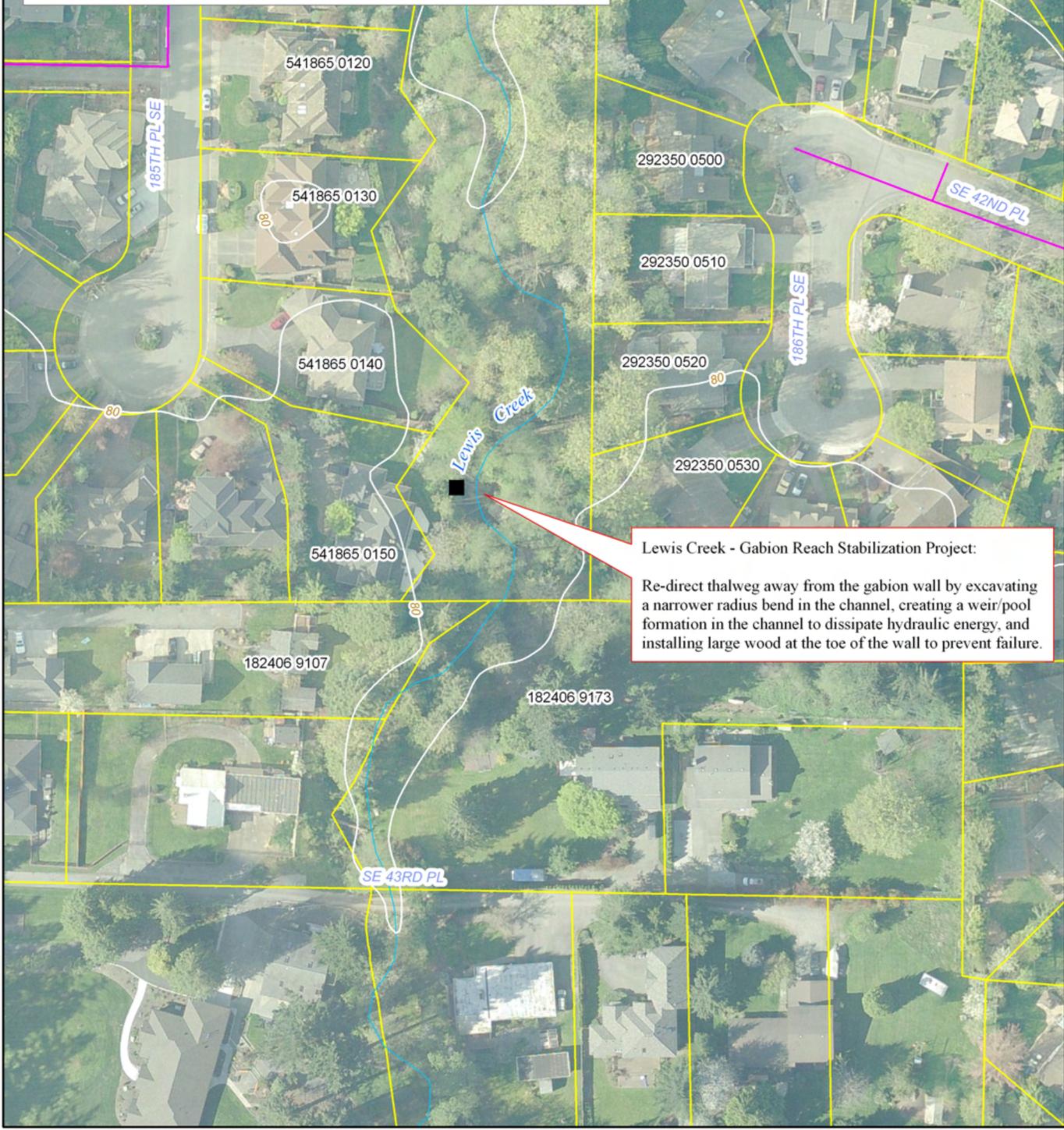
11810 North Creek Parkway N
Bothell, WA 98011

Project 0-915-17013-0

- Sanitary sewer
- Storm sewer
- Water utility
- Contour
- Watercourse
- Parcel



0 50 100 Feet



Lewis Creek - Gabion Reach Stabilization Project:
Re-direct thalweg away from the gabion wall by excavating a narrower radius bend in the channel, creating a weir/pool formation in the channel to dissipate hydraulic energy, and installing large wood at the toe of the wall to prevent failure.

SITE BACKGROUND

Lewis Creek originates on the north slope of Cougar Mountain and flows through a steep, narrow canyon to the southwestern shore of Lake Sammamish. The stream's naturally high gradient, in combination with an increasing amount of impervious surfaces in the watershed due to residential development, lead to rapid and amplified fluctuations in flow during rain events. Over most of the year, flows are typically less than 10 cfs, but heavy winter rains can generate flows well over 200 cfs (Figure 1). These high flows scour sediment and erode banks, causing problems for homeowners who live along its banks. In an effort to protect property, rip-rap and gabions have been used to armor the banks, especially at sharp bends in the river, where hydraulic energy is concentrated and bank instability is likely.

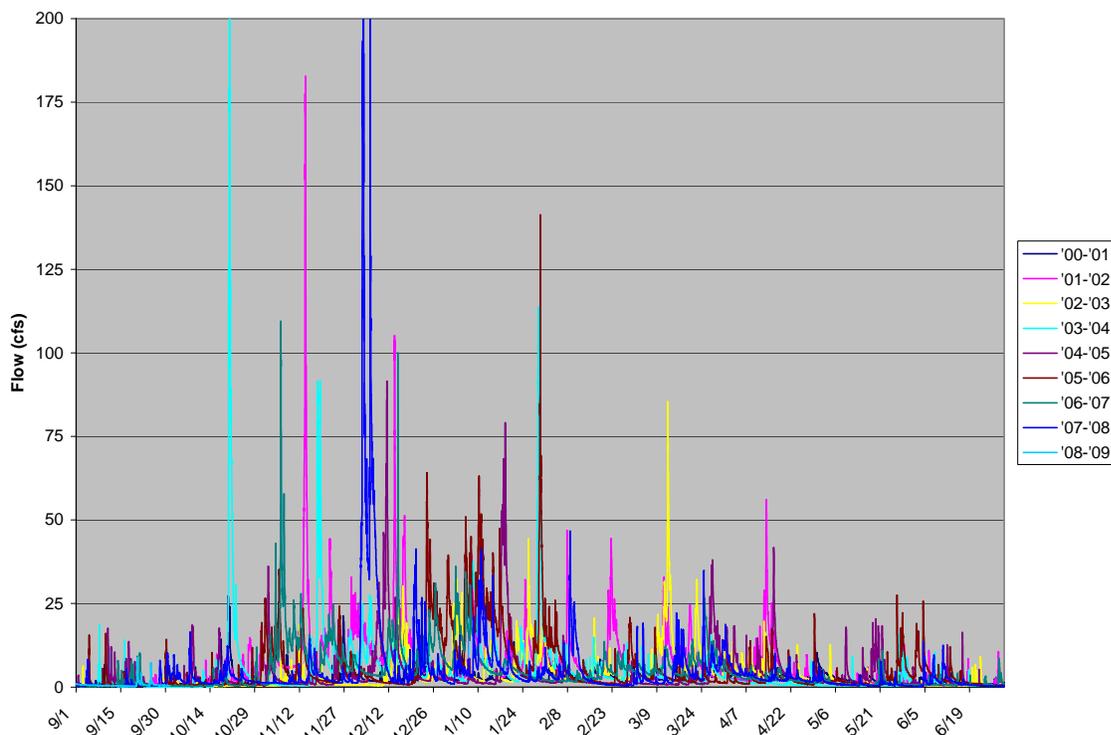


Figure 1. Lewis Creek discharge measured at the 187th Ave NE bridge during water years 2000 to 2009.

The “gabion reach” is approximately 0.2 miles upstream from the lake and consists of a shallow ravine and forested riparian zone between moderate-density residential neighborhoods. The bed material is primarily coarse gravel and cobble, heavily embedded in some places. At one particularly sharp bend in the creek, a 15 to 20 foot high and 40 foot long gabion wall was installed to protect the bank and backyard from erosion. The creek is currently undermining the upstream end of the wall making it unstable and causing it to lean over the creek. On the downstream end, the gabions are still vertical, but some of the cobble fill material has been eroded from within the wire frames.

IMPORTANCE FOR KOKANEE AND/OR CHINOOK POPULATIONS

Lewis Creek is highly significant for kokanee. It is one of only three streams in the Sammamish Basin that consistently receives a natural spawning run of the late-run kokanee. While watershed scale problems, such as flashy flows and high sediment transport, may limit the potential of the site to some extent, the local conditions are relatively good for kokanee spawning and migration. Upstream of the gabion wall, kokanee spawn along a 0.4 mile reach up to where Lewis Creek crosses under I-90 via a substantial culvert. This culvert is a complete fish passage barrier.

LIMITING FACTORS

Failure of the gabion wall would likely create an impassable barrier to upstream migrating kokanee and other species such as coho salmon and cutthroat trout. If such conditions were to arise, approximately 0.4 miles of significant spawning habitat (two thirds of the total available in Lewis Creek) would be inaccessible to kokanee. Similar to other reaches on Lewis Creek, the gabion reach has a limited number of pools, which offer upstream migrating kokanee refuge from high flows. Appropriately sized spawning gravel is sparse, which reduces the success of redd excavation and egg incubation. The banks and riparian zone of the creek are infested with non-native invasive species such as Himalayan blackberry and Japanese knotweed. These invasive plant species prevent the establishment of native riparian habitat forming species.

PROPOSED ACTION

The objective of this project is to train the thalweg of Lewis Creek away from the failing gabions, and to construct a log weir/pool structure that will: dissipate the hydraulic energy of high flows to prevent scouring downstream; trap sediment conveyed during high flows on the overflow banks; and control the grade of the main channel to ensure fish passage criteria are maintained. The gabions will be reinforced by installing large wood along the toe of the wall and transforming the current channel into side-channel habitat.

The proposed project will include the following elements:

- Creek flow will be temporarily diverted around the work area and fish remaining within the project area will be recovered and released to another reach.
- Best Management Practices will be used to prevent water quality impacts during the construction and operation of the flow bypass (i.e., work area will be dewatered and discharge will be appropriately treated at an upland area).
- A new main channel and pool will be excavated in the center of the existing floodplain and lined with spawning gravel.

- A V-shaped log weir will be installed in conjunction with the pool on the upstream side.
- Large wood and root wads will be placed in a matrix and anchored at the toe of the gabions.
- A small side-channel will be excavated from the upstream side of the weir and routed along the installed wood at the toe of the gabions, then reconnected with the new main channel.
- Mature native plants in the riparian zone will be kept intact. Non-native species will be removed from the project area and native vegetation will be planted in any disturbed areas in the immediate vicinity of the stream.

EXPECTED BENEFITS

The project will reduce the potential for a catastrophic failure of the unstable gabions and thereby ensure continued access to over two thirds of the available spawning habitat in Lewis Creek. It will also create pool habitat for kokanee holding as they move upstream, increase channel roughness to reduce the energy of scouring flows; and reduce the sediment load being transported to the lower watershed where bed aggradation is leading to flood concerns.

SELECTION CRITERIA SCORING MATRIX RESULTS

Category	Basic Question	Scoring Question	Score	Justification
Location	In which stream and reach is the project located? What is the historical and current significance for kokanee and/or Chinook?	What is the historical and current significance of the site for kokanee?	10	Historically and currently important kokanee stream; part of the supplementation effort
		What is the historical and current significance of the site for Chinook?	4	Unlikely that this site is accessible by juveniles; anecdotal evidence of historic use for spawning
Limiting Factors	Would the project address specific limiting factors?	How well does the project address factors limiting kokanee?	8	Not currently limiting but would reduce high risk of blocking upstream passage for spawning and improve habitat quality
		How well does the project address factors limiting Chinook?	2	Unknown current use by adult or juvenile Chinook
Watershed Context and Condition	Is project success dependent on conditions elsewhere in the watershed?	Do surrounding land uses and/or management strategies lead to constraints (or opportunities) for the proposed restoration? Examples: water quality, sediment, flow regime, fish access, riparian vegetation	6	Will improve habitat and reduce future risks, but will continue to be limited by issues upstream
		Who owns project area and is long-term protection ensured?	7	Private Residential (Meadowbrook Homeowners Association). Expected to support stabilization.
		Who owns neighboring parcels? What land uses occur upstream and/or downstream that could be affected by restoration? What risks do those uses pose to the site now and in the future?	7	Private Residential
Costs	How expensive will proposed action be? What is the likelihood for funding?	What is the order of magnitude cost estimate?	7	Rough estimate of total project cost = \$150K
		Are matching funds available?	6	Unsure of funding strategy, but lots of interest
		Are specific grants or appropriations in mind that would be likely to fund this type of project?	8	Unsure of funding strategy; fish passage grants or landowner partnerships
Socio-Political	What other considerations will determine feasibility of implementation?	Does the project have public support and/or support from the local jurisdiction?	9	Project identified as a potential in reports for the City and in Chinook plan.
		Does the project have landowner support?	5	Yes, but degree of support not known
		Does the project utilize or create public access?	2	No, but could affect salmon-watching bridge downstream



LEWIS CREEK GABION REACH BANK STABILIZATION





Downstream end of the Lewis Creek gabion wall.
Photograph taken looking upstream



Upstream end of the Lewis Creek gabion wall.
Photograph taken looking downstream



Additional bank armoring along Lewis Creek
downstream of the gabion wall