

Swift Creek

Sediment Management Action Plan (SCSMAP)

PHASE 2 PROJECT PLAN PROPOSAL

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Table of Contents

Proposal for: SCSMAP Phase 2 Project Plan..... 2

1.1 North Fork Swift Creek Re-Route Concept 2

1.2 North Fork Swift Creek Re-Route Preliminary Benefits Analysis 3

1.3 North Fork Swift Creek Re-Route Next Steps..... 4

Appendix A: Watershed Science & Engineering Letter Report: Swift Creek Sediment Management
Alternatives – North Fork Swift Creek Reroute 5

Proposal for: SCSMAP Phase 2 Project Plan

To meet challenges related to Swift Creek flooding, potential health risk, and potential for creek avulsion, Whatcom County has identified a set of strategies appropriate for implementation under the Swift Creek Sediment Management Action Plan (SCSMAP). The SCSMAP identified and prioritized problems within the watershed. Highest priority problems included potential avulsion in all reaches, potential for sediment deposition that could be considered a potential public health risk, and the need to plan for debris flow or outbreak flooding. In addition, Swift Creek overbank flooding or avulsion could significantly impact the Breckenridge Creek watershed, a watershed on which Whatcom County has worked to restore overall ecological health.

The high priority strategies identified in the SCSMAP included:

- Development of debris deflection and setback levees
- Development of in-stream sediment traps
- Further exploration of sediment basins for trapping suspended sediment
- Maintenance and repair, including annual maintenance, channel conveyance, and large-scale maintenance and repair
- Slide stabilization in the form of a toe buttress.

1.1 North Fork Swift Creek Re-Route Concept

Projects were identified for implementation in SCSMAP Phase 1 to address high priority strategies of the plan. The concept of the removal of a portion of the total flow has been discussed for many years and has now been identified as a high priority strategy for management of the sediment that would move into and through project areas developed under SCSMAP Phase 1. Removal of a portion of the flow in the form of rerouting the North Fork of Swift Creek is included in this Phase 2 Project Plan Proposal for examination of a possible reroute and its implications for Swift Creek sediment movement.

The SCSMAP describes the two Swift Creek sediment primary components as bedload and suspended load. Bedload is sediment that moves along the bottom of a stream or river by rolling or sliding. Bedload movement occurs during moderate or higher water flows that are typically related to higher precipitation levels during the fall and winter months. Suspended load is clay, silt, and fine sand that is carried above the bed within lower to middle portion of the water column.

Hydraulic modeling completed by Northwest Hydraulic Consultants in 2010 for Whatcom County shows that the North Fork of Swift Creek contributes 50% of the total flow to the lower Swift Creek system. The concept behind the North Fork reroute is to reduce bedload sediment transport in Swift Creek by decreasing flow rates downstream from the North and South Fork confluence, located in the Canyon Reach. The North Fork would be diverted to either the Breckenridge Creek watershed (the adjacent watershed to the north) or to the mouth of Swift Creek near its confluence with the Sumas River.

The North Fork Reroute is included in the SCSMAP as Sediment Management Strategy 4.2E. The SCSMAP notes in its discussion of Strategy 4.2E that the reroute would be complicated. If the creek were to be rerouted to Breckenridge Creek, the revised route would cross the William Northwest Pipeline high pressure gas pipelines, South Pass Road, Goodwin Road, and numerous privately-held properties. If the creek were to be rerouted to the mouth of Swift Creek, a viable route would likely occur along the southerly boundary of South Pass Road; crossing the high pressure gas pipelines and numerous private properties would be required.

Challenges in addition to determining a technically and topographically feasible route would include regulatory permitting challenges associated with the possible change of flow to a new watershed, and the expense of implementing the actual re-route. Negotiations with private property owners and collaboration with Williams Northwest Pipeline Company on a crossing location and structure would also be required.

1.2 North Fork Swift Creek Re-Route Preliminary Benefits Analysis and Planning-Level Costs

To address the possible benefits or disadvantages of rerouting the North Fork of Swift Creek, Whatcom County retained Watershed Science & Engineering to examine existing information and provide a recommendation. Watershed Science & Engineering reviewed North Fork Swift Creek flow conditions, basin sediment quantity, and grain size data included in the following analyses:

- Converse Davis Dixon (1976): Sediment Core Results and Analysis
- BGC (2003): Converse Davis Dixon Sediment Core Results Review and Additional Analysis
- Whatcom County (2004) Sediment/Grain Size Data
- KWL (2008): Grain Size Analysis
- Northwest Hydraulic Consultants (2010): HEC-RAS model

Existing hydrologic and hydraulic data were examined to better understand the effect of North Fork Swift Creek flow in relation to sediment movement through the Swift Creek system.

Flow rate is a variable in the rate of movement of bedload in Swift Creek. Bed shear stress, the stress parallel to the creek bed, is also a variable in bedload transport rate. Typically, the higher the velocity or bed shear stress, the higher the bedload sediment transport rate. Watershed Science & Engineering found after review of existing data that the bedload sediment transport rate in Swift Creek would be expected to decrease with the lower discharges that would be seen if the North Fork flows were diverted out of the system. Watershed Science & Engineering calculated a velocity decrease of up to 17% and a bed shear stress decrease of up to 25%, resulting in a reduction of bedload transport.

Strategy		Projected Planning Level Cost
4.2E	Swift Creek North Fork Re-Route	\$14,000,000 (if whole properties are needed to be purchased)

1.3 North Fork Swift Creek Re-Route Next Steps

Next steps involved in planning and implementing a North Fork Swift Creek reroute include:

- Route determination based on topography, feasibility, and manageable permit requirements
- Cost/benefit analysis
- Additional technical analyses beyond the preliminary velocity and bed shear stress data to quantify sediment transport characteristics of Swift Creek, including:
 - Hydrologic analysis
 - Hydraulic modeling refinement
 - Quantitative with/without North Fork flow sediment transport analyses.

Appendix A: Watershed Science & Engineering Letter Report: Swift Creek Sediment Management Alternatives – North Fork Swift Creek Reroute