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WHATCOM COUNTY PUBLIC WORKS

STAFF REPORT

Swift Creek Sediment Management Action Plan

**FINDINGS, CONCLUSIONS,
AND RECOMMENDATIONS**

I. SUMMARY OF RECOMMENDATIONS

Proposed Action:

Whatcom County Public Works (on behalf of the Flood Control Zone District) is requesting adoption by resolution of the *Swift Creek Sediment Management Action Plan (SCSMAP)* and approval for implementation of strategies included in the plan. Strategies would be implemented in phases. The first three strategy implementation phases have been identified. The first SCSMAP implementation phase includes construction of four primary sediment management projects; five projects are described, with one project being considered an alternative to a primary project. The second and third SCSMAP implementation phases are in the development stage.

RECOMMENDATION: Staff recommends approval of the request.

II. PRELIMINARY INFORMATION

A. BACKGROUND INFORMATION

FILE NAME: Swift Creek Sediment Management Plan

REQUEST:

Adoption:	Swift Creek Sediment Management Action Plan (SCSMAP)
Adoption:	SCSMAP Phase 1 Project Plan
Approval	SCSMAP Phase 2 Project Proposal
Approval	SCSMAP Phase 3 Project Proposal

LOCATION: Swift Creek originates on the ridge of Sumas Mountain in northern Whatcom County, Washington. Implementation of proposed SCSMAP active and passive sediment management strategies, along with development of proposed Phase 1 projects, would occur along the Swift Creek corridor. Swift Creek flows to the Sumas River, providing a

physical connection for Swift Creek-source sediment to flow to the Sumas River.

B. PROCEDURAL INFORMATION

SEPA REVIEW:

The Whatcom County SEPA Official issued a Determination of Significance (DS) for the proposed Swift Creek Sediment Management Plan on April 18, 2011. Scoping was conducted between April 18, 2011 and May 18, 2011. Between completion of scoping under SEPA and initiation of the Draft EIS on the Plan, Whatcom County Public Works reorganized the Plan to incorporate appendices as background information, regulatory framework, and sediment management strategies within a Swift Creek Sediment Management Action Plan (SCSMAP). Projects identified in the original Swift Creek Sediment Management Plan were included in the SCSMAP Phase 1 Project Plan. The Draft EIS examined both the SCSMAP and the SCSMAP Phase 1 Project plan; the Draft EIS was released for review and comment on February 15, 2013. After completion of a 45-day comment period, a Final EIS was prepared that included additions, corrections, and clarifications to the Draft EIS and responded to comments received on the Draft EIS. The Final EIS was issued on June 12, 2013.

PUBLIC NOTICE:

Pursuant to WAC 197-11-510, legal notice was published in the Bellingham Herald on February 15, 2013 notifying agencies, affected tribes, and the public of the availability of the Draft EIS for the Swift Creek Sediment Management Action Plan (SCSMAP) and SCSMAP Phase 1 Project Plan. Notification via US Mail was also provided to property owners within one mile of Swift Creek and the Sumas River.

PUBLIC HEARING:

Pursuant to WAC 197-11-535, a public hearing on the Swift Creek Sediment Management Action Plan (SCSMAP) Draft EIS and SCSMAP Phase 1 Project Plan was held on March 13, 2013. Notice was provided in the legal notice published for Draft EIS availability in the Bellingham Herald on February 15, 2013 and by US Mail.

III. FINDINGS AND CONCLUSIONS – SCSMAP ADOPTION

A. BACKGROUND INFORMATION – SCSMAP ADOPTION

HISTORY:

Swift Creek, originating on Sumas Mountain, has a long history of sediment loading and reduced hydraulic conveyance capacity with consequent flooding as a result of a natural landslide. Sediment from the slide is from a unique geologic deposit that contains naturally occurring asbestos. In addition to the asbestos content, sediment from the slide is also known to release trace metals; trace metals of concern include cadmium, cobalt, manganese, and nickel. Sediment loading within Swift Creek creates conditions that inhibit animal life and growth vegetation in and adjacent to the Creek.

Federal, State and local agency's approach to managing Swift Creek has primarily been related to dredging to maintain channel conveyance, bank hardening to prevent flooding and avulsion. These maintenance requirements have been a balance between the need to protect health, safety and public assets and funding and resource availability. Recognizing the need for a more

organized effort, Whatcom County Public Works developed, through a consultant, a sediment management plan for Swift Creek in 1998 that primarily involved large-scale dredging. When the initial dredging work and subsequent monitoring were completed on the 1998 plan, Whatcom County determined that the plan required expansion to provide a more comprehensive approach to the Swift Creek problem. Follow-up studies and monitoring, as well as inter-agency discussions on possible solutions, culminated in issuance of the Draft SCSMAP in December, 2012.

A list of technical studies commissioned by Whatcom County that support the SCSMAP are included on SCSMAP Page 2-2. As part of the SEPA process, additional Swift Creek sampling was completed for groundwater analysis, soil/sediment metals leachability, and fish populations and habitat. A health impact assessment (HIA) was also completed. The groundwater analysis and the soil/sediment leachability analyses were conducted by consultants for Whatcom County and simultaneously completed by EPA and its consultants.

While the technical analyses completed as part of the SEPA process do not functionally change the sediment management strategies included in the SCSMAP, the information collected through this process informs project-based decisions that may be made in the future under these strategies. Major conclusions drawn from these analyses that will be applied to the SCSMAP include:

- Asbestos fibers do not travel in groundwater (consensus was reached between Whatcom County's groundwater consultant and EPA's groundwater consultant).
- Metals associated with Swift Creek sediment (chromium, cobalt, manganese, nickel) do not leach to groundwater.
- Swift Creek sediment composition does not promote plant life, providing little to no fish habitat in the lower creek reaches. Primary blockages in the upper Canyon Reach prevent fish migration.
- The North Fork of Swift Creek includes good quality fish habitat and a healthy trout population.
- Swift Creek-source sediment poses a potential health risk in terms of lung-related disorders through potential inhalation if sediment dries and becomes airborne.
- Swift Creek-source sediment alters the calcium-to-magnesium (ca:mg) ratio, essentially causing agricultural sterility that requires many years of soil amendment to return contaminated fields to a viable state.

SCSMAP COMPONENTS:

The SCSMAP establishes clear avenues for future actions to protect watershed infrastructure and adjacent watersheds, and to minimize property damage and health impacts. The SCSMAP includes an assessment of watershed processes and conditions, as well as identification of problems and management challenges that may result.

- Watershed conditions assessed include the upper watershed landslide, sediment, flooding, habitat, and health risk.
- Problems that may result from these conditions include ongoing landslide movement and associated sediment generation, potential for channel avulsion (Swift Creek leaving its channel and developing a new channel through the alluvial fan) and/or overbank flooding, potential for elevated health risk stemming from deposition of sediment on floodplains, and

potential debris flow or debris flood occurrence (debris flow is described in the SCSMAP as a sudden release of landslide debris from a location of accumulation and, after debris deposition in areas of lower topography, would continue as a debris flood).

Strategies were developed over many years and were built on management techniques suggested by consultants for the Soil Conservation Service in 1996 and incorporated techniques from the Whatcom County 1998 management plan. Strategies were refined to address:

- Current understanding of asbestos risk associated with Swift Creek sediment
- Federal, state, and local regulatory frameworks
- Problem areas within the upper and lower Swift Creek watershed.

Note that the upper Swift Creek watershed is divided into North Fork Swift Creek and South Fork Swift Creek and the lower watershed is divided into the Canyon Reach (located immediately below the landslide and extending to the apex of the alluvial fan), the Goodwin Reach (extending from the apex of the alluvial fan to Goodwin Road), and the Oat Coles Reach (extending from Goodwin Road to Oat Coles Road).

The SCSMAP includes both active and passive management strategies. Active management strategies will be developed into sediment management projects; passive management strategies will be developed into departmental sediment management programs. The SCSMAP will, when fully developed into projects and programs, provide solutions that address risk, regulations, and specific problem areas as a directed and prioritized management approach. The SCSMAP includes 13 active and 9 passive management strategies for

- Flood hazard and floodplain management and planning
- Sediment management and planning
- Necessary maintenance and repair
- Managing the Swift Creek landslide
- Managing health risk and emergencies.

The SCSMAP includes a prioritization protocol for implementing strategies and future projects, as well as very rough planning level cost estimates. Timing or implementation priority for specific strategies is expected to be based on analysis of effectiveness of the strategy, potential benefit, and readiness of strategy implementation.

The SCSMAP also acknowledges the Public Works Asbestos Policy (PWAP), adopted in 2010, to protect worker safety when handling Swift Creek Sediment. The PWAP provides guidelines for use of personal protective equipment, as well as decontamination of personnel and equipment.

B. FINDINGS OF FACT AND REASONS FOR ACTION – SCSMAP ADOPTION

1. The Swift Creek landslide, located on the South Fork of Swift Creek in the upper watershed, moves at a calculated rate of 30 feet per year.
2. Bedrock underlying the Swift Creek landslide includes serpentinite, a deposit that contains asbestos and metals (chromium, cobalt, manganese, and nickel). Asbestos is

known to cause lung-related disorders. Metals associated with Swift Creek sediment are known to decrease viability of agricultural crops.

3. The Swift Creek landslide movement is the source of sediment that fills the lower portion of the creek, causing overbank flooding and the potential for avulsion.
4. Sediment accumulation (aggradation) threatens public infrastructure, including bridges that cross Swift Creek at Goodwin Road and Oat Coles Road, as well as area roadways, such as Goodwin Road, Oat Coles Road, and South Pass Road.
5. Sediment accumulation may threaten the stability of the Williams Pipeline Corridor, which underlies Swift Creek in the Upper Goodwin Reach.
6. Overbank flooding carries Swift Creek sediment onto area agricultural fields, depositing asbestos and threatening the viability of agricultural crops.
7. Whatcom County completed an analysis of high probability problem areas. Problem areas are where overbank flooding is most likely to occur; areas most susceptible to avulsion were also identified. Primary problem areas include potential undermining of the Williams pipeline corridor, flooding both the right bank and left of Swift Creek in the Goodwin Reach, and avulsion along the right bank to Breckenridge Creek.
8. Federal, State and Local agency's historic response to sediment accumulation and resulting overbank flooding has been dredging and localized bank armoring. These activities have been, on average, minimally conducted as a result of limited resources. Although there have been two large project "big digs" to remove sediment, accumulation far exceeds Whatcom County's ability to maintain Swift Creek through its as-resources-allow dredging program.
9. Whatcom County has completed studies and analyses in support of a comprehensive set of strategies to address primary problem areas, as well as the extreme sediment accumulation. Strategies were identified based on the ability for Whatcom County to implement sediment management projects under the strategies within existing regulatory frameworks while meeting health guidelines as recommended for Swift Creek sediment.
10. The Swift Creek Sediment Management Action Plan (SCSMAP) is the accumulation of many years of study of the Swift Creek problems and includes Whatcom County's analysis of viable solutions in the form of implementable strategies.
11. SCSMAP flood hazard management strategies will allow for continued, targeted bank armoring to prevent avulsion where necessary. Flood hazard management strategies will also allow for sediment removal from the system, for construction of debris deflection and setback levees, as well as bridge removal or roadway raising or lower as deemed necessary by Whatcom County Public Works.
12. SCSMAP sediment management strategies will allow for development of in-stream sediment traps where necessary and construction of a single or a series of sediment basins to trap suspended particulate. These strategies will also allow for planning of new sediment stockpile management locations and techniques that will allow for capping and vegetating to blend stockpiles into the environment. Sediment management strategies also allow for identification of sediment storage repositories that may allow for

removal of existing stockpiles. This set of strategies also provides an avenue to examine re-routing the Swift Creek North Fork to remove North Fork flow from the system, alleviating its contribution to sediment movement through the system and possibly improving connectivity of fish habitat to the North Fork.

13. SCSMAP maintenance and repair strategies allow for development of an annual maintenance program for structures developed under other strategies, as well as formalizing a dredging program.
14. SCSMAP landslide stabilization strategies provide avenues for examining the possibility of stopping landslide movement through a stabilizing structure located at the landslide to or through dewatering of the landslide. These strategies, while expensive, could prevent sediment generation and alleviate necessity or construction of downgradient sediment management structures.
15. The SCSMAP includes strategies for development of programs that would help to manage Swift Creek sediment. These programs include flood hazard management planning and a floodplain acquisition program. Program strategies also include monitoring landslide movement, sediment accumulation, and stockpile-generated airborne asbestos, as well as education, warning, and emergency response.

C. CONCLUSIONS – SCSMAP ADOPTION

1. Swift Creek sedimentation and channel aggradation are increasing faster than Whatcom County can respond, given a resource-allocation-as-available policy, requiring emergency-based sediment accumulation management responses. The unique Swift Creek problems require a multi-agency coordinated action plan for sediment management.
2. In the absence of a coordinated action plan, more frequent and widespread flooding with associated downstream movement of sediment is likely. With more frequent and widespread flooding there is increased potential health risk for residents through increased sediment deposition on the alluvial fan and Sumas River floodplains, as well as higher risk of avulsion and subsequent contamination of the Breckenridge Creek watershed.
3. A coordinated action plan provides a basis for Whatcom County to work within its structure and with other agencies to develop sediment management structures outlined under SCSMAP strategies that will help to manage sediment-related flooding and associated health risks. A coordinated action plan for Swift Creek is also necessary to manage health risk from stockpile accumulations and to provide for early detection of landslide changes, along with a warning and emergency response system.

D. BACKGROUND INFORMATION – SCSMAP IMPLEMENTATION

SCSMAP IMPLEMENTATION:

Whatcom County Public Works intended strategy implementation to include a phase-based plan to incorporate both project identification under a specific strategy and prioritization justification based on the protocol included in the SCSMAP. Phasing plans are expected to include project conceptual design and analysis, as well as planning level costs.

Phase 1:

Phase 1 projects were identified early in the SCSMAP planning process as providing immediate solutions to high risk areas along the Swift Creek corridor. Projects were identified under the major strategy categories of 4.1 Flood Hazard Management and 4.2 Sediment Management. These projects were formalized in the SCSMAP Phase 1 Project Plan, which underwent preliminary project-level SEPA review in conjunction with the SCSMAP. The phase 1 project plan includes conceptual designs for:

- In-stream sediment traps (Strategy 4.2A)
- Sediment basins to trap suspended particles (Strategy 4.2B)
- Debris Deflection / Setback Levees (Strategy 4.1B: 1 deflection levee to protect the right bank in the upper Goodwin Reach and 1 setback levee on the right bank in the Oat Coles Reach to protect the Breckenridge watershed from potential overflow from Swift Creek).

A setback levee is identified for the Swift Creek left bank as an alternative to sediment basin development.

Planning level costs for phase 1 are included in the SCSMAP Phase 1 Project Plan. Some preliminary, *planning-level* cost refinement of direct capital costs has been completed and is as follows:

Strategy		Projected Planning Level Cost
4.2A	In-Stream Sediment Traps	\$600,000
4.2B	Sediment Basin(s)	\$5,800,000
4.1B	Debris Deflection / Setback Levees for Upper Goodwin Reach and Oat Coles Reach near South Pass Road	\$700,000

Phase 2:

The second phase of strategy implementation includes Strategy 4.2E, Swift Creek North Fork Re-Route. Implementing this strategy would remove 50% of the flow to the lower Swift Creek watershed, reducing total flow velocity. A decrease in flow velocity results in a decrease in shear stress of the creek bed, thus reducing downgradient bedload sediment (larger fraction) transport. The potential for a decrease in sediment transport has been determined to be high priority for implementation under the SCSMAP.

SCSMAP Phase 2 strategy analysis is preliminary; an exact route for the North Fork has not been determined and, as a result, preliminary, *planning-level* costs, as included in the SCSMAP, remain general.

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

Phase 3:

The third phase of SCSMAP strategy implementation includes identification of a repository for Swift Creek sediment. Whatcom County has been working with state and federal agencies, WA Department of Ecology and EPA, to implement solutions to Swift Creek sediment problems and associated risks. Identification of a repository, included in the SCSMAP strategy of Safe Sediment Disposal (Strategy 4.2D) received an initial ranking of medium priority according to the SCSMAP prioritization protocol. As a result of identified potential health hazards associated with Swift Creek sediment stockpiles, Safe Sediment Disposal has increased in priority and is now proposed for further analysis.

Preliminary, *planning-level*, direct capital costs associated with identification of a safe repository, including permitting, annual dredging, and sediment transportation are:

Strategy	Projected Planning Level Cost
4.2D	Safe Sediment Disposal Repository Identification (including purchase): \$1,000,000 Annual Dredging, Transportation, PWAP Implementation, Monitoring: \$2,170,000

E. FINDINGS OF FACT AND REASONS FOR ACTION – SCSMAP IMPLEMENTATION

SCSMAP PHASE 1 PROJECTS

1. In-stream sediment traps are considered a SCSMAP Phase 1 priority to reduce downstream migration of bedload sediment. In-stream sediment trap design includes bedload storage of approximately 50,000 yd³ within approximately 1,800 lineal feet of Swift Creek channel starting at the upper end of the Swift Creek Canyon just below the confluence of the North Fork Swift Creek.
2. The SCSMAP includes a recommendation to design and construct sediment basins to slow runoff velocities and allow deposition of sediment. Sediment capture addresses flooding downstream from sediment accumulation in the creek channel. In addition, the basins address sediment transport and provide protection for more than 50% of the residents on the Swift Creek alluvial fan. Sediment basin conceptual design includes a west basin and an east basin; basin construction is proposed to be phased so that a single basin could be functioning as soon as possible after initiation of construction.
3. A setback levee on the right bank of Swift Creek in the Oat Coles Reach near South Pass Road is a high priority in the SCSMAP and is included in the Phase 1 plan. This proposed South Pass levee would provide an avenue for capture and containment of Swift Creek sediment to alleviate sediment loading in the Sumas River and protect the Breckenridge Creek watershed from Swift Creek sediment and floodwaters. A channel avulsion into Breckenridge Creek is possible due to the unstable nature of the stream channel in response to high levels of sedimentation and flood flows.
4. A debris flow setback and deflection levee is a strategy included in the SCSMAP to capture and contain larger debris flows and sediment from flooding events. The Phase 1

SCSMAP Project Plan includes placement of a debris deflection levee on the Swift Creek right bank in the upper Goodwin Reach. The debris flow setback levee was designed to protect the Swift Creek alluvial fan area from a sudden debris flow from the Swift Creek landslide. The levee was conceptually designed to accommodate a total volume of 300,000 yd³ of debris, including a safety factor.

5. A setback levee on the left bank (south side) of Swift Creek immediately upstream from the Goodwin Road Bridge in the lower Goodwin Reach is a high priority in the SCSMAP and is included in the Phase 1 plan. This lower Goodwin Reach levee is considered to be an alternative to sediment basin placement if funding remains unavailable for sediment basin development, providing protection for residents, but not capturing sediment and preventing downstream migration.

SCSMAP PHASE 2 PROJECTS

1. Flow rate and bed shear stress (stress parallel to the creek bed) are variables in the rate of movement of bedload sediment in Swift Creek. This rate of movement would decrease if the North Fork flow were to be diverted out of the system.
2. If North Fork of Swift Creek flow were removed from the system, velocity of the lower Swift Creek main channel would decrease of up to 17% and bed shear stress would decrease of up to 25%. The result would be a reduction of bedload transport and a reduction in total sediment loading in the lower Swift Creek system.
3. Additional technical analysis of sediment transport in Swift Creek is required to determine the ultimate benefit of removing North Fork Swift Creek flow from the system. These analyses would include hydrologic analysis to estimate flow level duration and hydraulic modeling refinement to examine flow through the system with and without the North Fork flow.
4. A route for North Fork Swift Creek either to the confluence of Swift Creek with the Sumas River or to the Breckenridge Creek watershed must be identified.

SCSMAP PHASE 3 PROJECTS

1. A sediment storage location (repository) in close proximity to Swift Creek is required to store sediment with low transportation costs.
2. A sediment repository will be required to store sediment from Swift Creek dredging between Goodwin Road and Oat Coles Road to restore channel cross-sections, annual maintenance of in-stream sediment traps to be constructed in the Canyon Reach, sediment basin maintenance (constructed as part of Phase 1 implementation).
3. The identified repository would be expected to contain 1,000,000 yd³ of Swift Creek-source sediment for a 10-year period. If a sufficiently large repository is identified, existing Swift Creek stockpiles may be removed and placed in the repository.
4. Additional analysis of potential repository locations for safe sediment disposal is required. The analysis will be on previous Whatcom County research into potential locations within a six mile radius of lower Swift Creek.

IV. RECOMMENDATION

Based upon the above findings of fact and conclusions, Whatcom County Public Works recommends adoption by resolution of the Swift Creek Sediment Management Action Plan (SCSMAP) and the SCSMAP Phase 1 Project Plan. In addition, Whatcom County Public Works recommends approval to proceed with further review and analyses called for in the SCSMAP Phase 2 Project Plan Proposal and the SCSMAP Phase 3 Project Plan Proposal. The SCSMAP is attached as Exhibit 1. The project plans and proposals are attached as Exhibits 2, 3, and 4. The Swift Creek Sediment Management Action Plan (SCSMAP) and SCSMAP Phase 1 Project Plan Draft EIS and Final EIS, which help to inform this process, are attached as Exhibits 5 and 6.

EXHIBITS

1. Swift Creek Sediment Management Action Plan (SCSMAP)
2. SCSMAP Phase 1 Project Plan
3. SCSMAP Phase 2 Project Plan Proposal
4. SCSMAP Phase 3 Project Plan Proposal
5. Swift Creek Sediment Management Action Plan (SCSMAP) and SCSMAP Phase 1 Project Plan Draft EIS and Appendices
6. Swift Creek Sediment Management Action Plan (SCSMAP) and SCSMAP Phase 1 Project Plan Final EIS and Appendices
7. List of Background Documentation