

# Potential Cumulative Impacts to City of Sultan Shoreline Environments

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## ***Introduction***

The Shoreline Management Act guidelines require local shoreline master programs to regulate new development to maintain no net loss of shoreline ecological functions. While some impacts are immediate and can be directly addressed through avoidance and mitigation, other impacts are cumulative in nature. Individually, the action may not result in a significant impact, but the composite of many similar actions over time may lead to a significant cumulative impact to the ecosystem. For example, the creation of a small area of impervious surface may have only a negligible impact on the environment. The creation of numerous impervious surfaces that in total result in a significant change in the amount of such surface throughout a watershed over time could lead to significant impacts, such as: water quality degradation, increased peak storm flows, channel erosion, decreased vegetation and habitat areas, increased local temperatures, and other potential impacts.

The guidelines state that, “To ensure no net loss of ecological functions and protection of other shoreline functions and/or uses, master programs shall contain policies, programs, and regulations that address adverse cumulative impacts and fairly allocate the burden of addressing cumulative impacts.

Evaluation of such cumulative impacts should consider:

- (i) current circumstances affecting the shorelines and relevant natural processes;
- (ii) reasonably foreseeable future development and use of the shoreline; and
- (iii) beneficial effects of any established regulatory programs under other local, state, and federal laws.”<sup>1</sup>

In addition to the Shoreline Master Program under Shoreline Management Act (SMA), developments in the City of Sultan are also regulated under the City’s Comprehensive Plan and the City’s Critical Areas Regulations, both required under the Growth Management Act (GMA).

Other state and federal regulations also apply to the city’s shoreline jurisdiction when local developments will affect critical areas or large areas adjacent to shorelines. Some of these state and federal regulations include, but are not limited to: the Endangered Species Act (ESA) to protect and recover federally listed species; the Clean Water Act (CWA) to protect water quality and regulate excavation and dredging; Hydraulic Project Approval (HPA) regulates projects that change waters of the state and affect fish habitat; and the National Pollution Discharge and Elimination System (NPDES) which regulates discharges into surface waters.

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<sup>1</sup> WAC 173-26-186(8)(d)

## **Relationship to SEPA**

The State Environmental Protection Act (SEPA) requires an assessment of environmental impacts. This cumulative impact analysis is a supplement to the environmental review done under SEPA and is intended to address cumulative rather than isolated or individual impacts that might not otherwise be considered as part of the environmental checklist.

The SEPA review process is intended to provide a list of possible environmental impacts that may occur as a result of a project or change in policy. This helps identify potential impacts that may need to be mitigated, conditioned, or this may result in the denial of a project or proposal. This cumulative impact analysis is intended to look at impacts as a whole on the basis of whether or not multiple similar projects collectively result in gradual, but significant impacts. While SEPA looks at impacts by topic and the effects they may have as a whole for the project area, the cumulative impacts analysis examines impacts that may result from multiple projects over time.

## **Assumptions**

This analysis is looking at foreseeable impacts over time. These impacts are being looked at segment by segment, as done in the rest of the SMP document and in the Sultan Shoreline Characterization Report. Site specific impacts are also expected to be addressed on a case-by-case basis during individual project reviews. The segments used in this analysis are pre-determined areas based on water body that have previously been analyzed for alterations to key processes. It is assumed that available lands in the shoreline jurisdiction have little potential for new development due to current adopted land use regulations.

## ***Reasonably Foreseeable Future Development***

Cumulative impacts to the shoreline environment may result from a wide range of possible actions. Consistent with the guidelines, an appropriate evaluation of cumulative impacts on ecological functions will consider reasonably foreseeable future development and use of the shoreline that is regulated by the shoreline master program, as well as actions that are caused by unregulated activities and development exempt from permitting. The guidelines, “[R]ecognize that methods of determining reasonably foreseeable future development may vary according to local circumstances, including demographic and economic characteristics and the nature and extent of local shorelines.”<sup>2</sup> The focus of foreseeable development is on those actions that have been identified as potential impacts to the shoreline environment and that are or would be foreseeable based on past development patterns, dependent on shoreline regulations.

The Sultan shoreline is unlikely to experience much more development, as much of the property is in public ownership or is currently built out. Few vacant parcels remain that could potentially be developed, and in these cases utilities and streets already exist as the result of earlier land subdivision. Therefore, a different pattern of

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<sup>2</sup> WAC 173-26-186(8)(d)

development is unlikely to be created in the Sultan shoreline that will result in additional cumulative impacts.

Below these conditions are described by segment, and areas within them likely to experience development and what types of development are expected. At the end of this document is a table explaining in detail what kinds of developments could take place and the functions that would be at risk due to this development. The table also describes how these developments would be offset by the proposed policies and regulations of the Sultan Shoreline Master Program.

### ***Condition of Segments***

The 2005 Shoreline Characterization Report provides a comprehensive description of shoreline conditions by segment. This report was originally completed in May 2003, and the 2005 version contains updated information and maps.

The City of Sultan is located to the northeast of the confluence of the Sultan and Skykomish Rivers. The majority of the land within the City of Sultan is zoned residential. The areas along the shorelines are mostly built out, and most of the newer development is taking place to the west of the city and in the plateau area in the northeast section of the city. The Sultan and Wallace Rivers are both designated as “shorelines of the state” and the Skykomish River is designated as a “shoreline of statewide significance.”

The City of Sultan is located in Water Resource Inventory Area (WRIA) 7, the Snohomish River Basin, Skykomish River Watershed. Rivers falling within the City’s Shoreline Master Program jurisdiction include the Skykomish, Sultan, and Wallace Rivers. The Sultan and Wallace Rivers are both tributary to the Skykomish River. Winters Creek is a tributary to the Sultan River, located in the west portion of the City. Winters Creek headwaters are in the northwest portion of the City. It flows south and discharges to the Sultan River in the city limits. Wagleys Creek is a tributary to the Skykomish River, located in the east portion of the City. Wagleys Creek headwaters are located northeast of the City’s UGA. This stream flows south from its source into the City’s UGA. Above approximately 200 feet in elevation, the stream meanders in and out of the UGA. Wagleys Creek then flows west in the City at the base of the plateau to its Rivers (Figure 3). Due to mean annual flows less than 20 cfs, Winters Creek and Wagleys Creek are not regulated shorelines of the state.

Major alterations to surface water flow on the Sultan River include Culmback Dam and Spada Reservoir in the Upper Sultan River Basin. The City of Everett maintains a series of smaller dams on Champlain Creek below Lake Champlain, which is a tributary to the Sultan River. Shallow groundwater is generally found at depths beginning at 0 or 1-foot and no more than 5 feet below the surface throughout the City’s UGA. Mapped aquifer recharge areas correspond generally to the floodplain areas of the Sultan, Skykomish, and Wallace Rivers, and flood zones associated with the lower reaches of Wagleys Creek.

Most of the wetland areas identified in the City UGA are associated with Winters Creek and the Sultan River floodplain, or are found on the higher plateau in the eastern part of the City draining to Wagleys Creek. Wetlands in the Skykomish and Wallace River floodplains are less prevalent in the City's UGA. However, NWI maps indicate that forested wetlands do occur along the north bank of each river, in or adjacent to the city limits. Outside of the City's UGA, large areas of hydric soils and mapped wetlands occur associated with Wagleys Creek and Wallace River to the east and along the mainstem of the Skykomish River to the east and west of the UGA boundaries. Processes and functions of wetlands within the City may affect wetlands and other aquatic resources downstream of the City along the lower mainstem of the Skykomish River.

### **Segments of the Shoreline Inventory**

The City of Sultan shoreline is divided into five segments, A through D and the UGA segment. These shoreline segments were identified in the City of Sultan Shoreline Characterization Report. These segments were determined primarily by water body and current land use and zoning. These segments are described below by location, land use, shoreline environment, at risk areas, and potential for future development.

**Segment A** is to the west of the city, along the Sultan River. This area is characterized by large land areas mostly used as parks and open space, and there are many mapped wetlands in this area. The SMP designation is predominantly conservancy, with patches of urban and rural designations. At risk areas include shoreline vegetation enhancement areas, habitat protection, restoration of wetland areas, floodplain protection, and habitat protection. The wetland areas in this segment are important since they feed into the Sultan River and are impacted by upland areas.

Segment A is the most likely to experience development impacts. The majority of the existing developments are single family homes, and the majority of the existing zoning is for low to moderate residential development, although a lot of the segment is publicly owned. Only a few new residences could be built in this area, which would result in the extension of utilities, but no additional streets. Most of the shoreline along the Sultan River is unaltered due to the location of several city parks along the riverfront.

**Segment B** is southwest of the city at the confluence of the Sultan and Skykomish Rivers. This segment contains a variety of land uses; it is part of the downtown urban core and is also the location of a utility use. The area is designated urban and contains many wetlands. At risk areas in segment B include vegetation restoration areas and restoration of frequently flooded areas.

Segment B is not very likely to experience the impacts of new developments. Much of the land in this segment at the confluence of the two rivers is in public ownership. This area is susceptible to flooding, which has decreased vegetation cover and could lead to more runoff into the river system.

**Segment C** is along the south side of the city. This segment is primarily residential, and is designated as urban and rural. This segment is experiencing growth and conversion of riparian land to residential, resulting in more impervious surfaces. At risk areas in segment C are vegetation enhancement areas and habitat protection and restoration areas.

Segment C is also more likely to experience residential development; there are several vacant parcels in this segment that are zoned for low/moderate density residential which is allowed under the SMP. Only several new residences could result from further development in this segment, this would also result in the extension of utility services and potentially a few road extensions. This segment could also potentially have some public access.

**Segment D** is in the southeast side of the city. This segment is designated as conservancy and currently contains riparian forest and wetlands. The predominant land use in this segment is commercial. At risk areas in segment D are flood protection areas, associated wetlands, and vegetation protection areas.

## ***Ecological Functions at Risk from Future Developments***

### **Vegetation and Habitat**

Fish and wildlife habitat have been inventoried as part of the shoreline characterization for the City of Sultan. Segment A contains bands of coniferous and deciduous vegetation along both sides of the Sultan River in the park areas. Winters Creek also provides riparian habitat for wildlife on the shores of the creek. Wetlands in the vicinity of the Sultan River and Winters Creek could potentially provide fish habitat with some restoration. Segment B does not offer many opportunities for habitat due to disturbances from public uses. Segment C offers few opportunities as well since vegetation is limited to trees without low vegetation, although with some protection and restoration these areas could offer opportunities. Segment D offers more opportunities for habitat since this segment is undeveloped and not proposed for future development. Vegetation along this segment is deciduous and coniferous forest. This segment of shoreline is also the location of federally threatened species such as bald eagle and salmon. The UGA segment contains areas that have been cleared and have the potential for woody debris.

Preservation of native vegetation helps protect watershed processes, reduces flood damages, and provides open space for the City. Enhanced vegetation could offer better opportunities for in stream habitats. Current city policy does not provide for options such as density transfers, conservation easements, and restoration assistance.

### **Wetlands**

Wetland areas have been inventoried as part of the shoreline characterization for Sultan. Segment A contains the largest acreage of wetlands, approximately 73 acres. These wetlands are associated with the shorelines of Winters Creek and the Sultan

River. The majority of these wetlands are proposed to be protected by the SMP; however there is an area that extends into privately owned land outside of the shoreline area which are currently protected under the city's Critical Areas Regulations, and will be protected by the SMP once it is adopted. These wetlands are important to groundwater recharge and stream flow for Winters Creek. Improvement of these wetlands would also help improve fish habitat. Segment B also contains wetlands along the Sultan River. This is an area that frequently experiences flooding and could benefit from species diversification to improve water quality. In segment C wetlands are important to stream flow for Wagleys Creek and the Skykomish River. Plans for wetland protection are not specified for this area. Wetlands make up the majority of segment D. This area experiences flood overflow and groundwater discharge. Segment D does not contain any developable parcels. The majority of the segment is in public ownership as Cemetery Park, the rest of the segment is commercially developed. The UGA segment also contains wetlands that are fed by area streams and support salmon habitats, this area is important since it is upstream from segment A. This area is vulnerable to potential residential development.

Protection of wetlands is important for decreasing stream temperatures, erosion control, distribution of nutrients, and maintaining a flow regime. Wetlands in the city's shoreline jurisdiction need to be protected as well as those that are outside of the shorelines, but feed into the area rivers.

## **Floodplains**

Segment A does not have any identified frequently flooded areas. However, it does contain floodplains and hyporheic flows that support the area wetlands and streams. Segment B contains the majority of the frequently flooded areas in Sultan's shoreline as identified in the City's Repetitive Flood Loss Mitigation Plan. The City also has a Comprehensive Flood Hazard Management Plan which addresses flood prevention and mitigation for this area. Restoration for this area could be accomplished through vegetation planting to control storm water and maintenance. Segment C does not contain frequently flooded areas, but the area south of the Skykomish does experience frequent flooding, this is addressed in the City's Comprehensive Flood Hazard Management Plan. There are not any frequently flooded areas in Segment D or in the UGA segment.

Floodplain management is important for maintaining habitats and wetlands, ecological functions need to be considered in flood control projects and in pursuing non-structural alternatives. Developing floodplain management policies which help minimize more vulnerable development and encourage more compatible uses will also help maintain habitats and wetlands.

## **Geologically Hazardous Areas**

There are not any soils identified within segment A that contains slopes of 15% or more, there are also no steep slope areas in the shoreline identified in the city's jurisdiction critical areas mapping. Due to a wide channel migration zone and intact riparian forest, the slopes along the shoreline in segment A are not very steep and tend

to be stable. Segment B as well does not contain any steep slopes according to soils and critical areas analysis. Segment C does not contain any steep slopes either. Segment D does not contain any soils with slopes greater than 15%, however it does contain steep slopes according to the critical areas mapping.

Shoreline stability is important to minimizing flooding damage. Sound shoreline slopes with intact vegetation are alternatives to structural devices.

## ***Key Processes Altered by Potential Cumulative Impacts Stressors***

### **Nutrient Delivery and Removal**

Nutrient delivery and removal can result from a variety of processes that take place in the City of Sultan. This would include runoff and irrigation from agricultural uses, residential landscaping, and land clearing. These processes lead to an excess of nutrients being released into the Sultan and Skykomish Rivers, due to loss of area wetlands to store these nutrients. Ditching in the area has also reduced connectivity between wetlands and has caused alterations in the nutrient runoff.

### **Groundwater Flow**

Groundwater flow within the City of Sultan floodplain has been altered by development and infrastructure resulting in disrupted interactions between the riverine ecosystems and the hyporheic zone. Overbank flooding and hyporheic flows in the floodplain areas are important processes. These surface and subsurface water flow processes support the hydrology of existing wetlands and stream/riverine ecosystems. Development causes greater areas of impervious surfaces by paving, creating building coverages, or compacting soil, and by removing vegetation that would intercept precipitation. All of these factors lead to greater surface runoff and lower infiltration rates, which result in a lower level of aquifer recharge. Wetlands are useful in slowing surface water runoff and storing surface waters in addition to storm water detention facilities that are required in the development of land.

### **Surface Water Flow**

Ditching and channelization of streams has intercepted and altered surface water flows, resulting in altered flow and lower infiltration rates. This could result in increased storm water runoff and increased peak flow and velocities. Ditching and channelization could also impact hyporheic flows if floodplains are not protected, these flows are needed to support existing and potential wetlands.

### **Sediment Delivery and Removal**

Sediment delivery and removal in the City of Sultan has been affected by logging and urban development in the area. Conversion of forested lands to agriculture, timber harvesting, mining, road construction, and development have all changed the sediment transport processes in the Sultan area. Increased impervious surfaces and altered hydrology from new developments in the area could also potentially alter sediment processes.

### **Wood Delivery**

Woody debris delivery in the Sultan and Skykomish Rivers has also been affected by logging and urban development in the area. The removal of woody materials from riparian zones and shorelines has limited the amount that is being introduced to either river. These systems tend to carry less woody debris in altered shorelines than in those found in their natural state.

### **Fish and Wildlife Habitat**

Fish and wildlife habitat is affected by urban developments, logging, road construction; culverts, loss of riparian cover, and stream bank alterations. Important habitat elements for fish include – riparian cover, large woody debris, passage for migration, clean water, spawning habitat, forage habitat, and food sources. There are several areas of spawning habitat in the Sultan shoreline areas, and rearing habitat has been identified in all of the river systems within Sultan. Alteration of these habitats, loss of wetlands and riparian areas reduce the habitat area for all species.

### ***Foreseeable Development***

The above stressors to the shoreline environment can result from individual developments, or as the result of several factors such as residential developments, road construction, or utilities development. These shoreline stressors, the potential cumulative impacts, and the benefits of regulation are examined by segment in the tables below. The tables will examine foreseeable development and the impacts on the shoreline stressors, and it identifies policies and regulations under the SMP that will offset the impacts of development. These tables will help in determining if significant impacts will result the foreseeable future development in the Sultan shorelines. While some of these impacts may be mitigated others may be cumulative and lead to significant environmental changes in the environment.

**Table 1 - Foreseeable Development in Shoreline Environments**

<p><b>Segment A</b></p> <p>This segment along the Sultan River contains a riparian corridor, in-stream habitat, and there are many wetlands found in this area which is impacted by the dam and hydroelectric project upstream. There are no shoreline modifications in this segment. There are three shoreline environment designations in this segment: Natural, Shoreline Residential, and Urban Conservancy.</p> <p><u>Vacant lands:</u>          Natural – Two vacant parcels owned by City, one in private ownership, 3 acres total;          Shoreline Residential - Several small vacant parcels in private ownership, less than one acre total;          Urban Conservancy - Owned by City</p> <p><u>Under Current city zoning:</u>          Natural - Under current city zoning, this could result in low/moderate residential, 35% lot coverage, 4-6 units per acre;          Shoreline Residential - Moderate residential, 40% lot coverages, 6-8 units per acre on the small parcels in private ownership;          Urban Conservancy – This area probably not likely to experience development on the parcel owned by the city.</p> <p><u>Under the Shoreline Master Program:</u>          In the Natural designation development of these lots could result in 200 foot setbacks, single family would be considered as a conditional use;          In the Shoreline Residential designation, development would require 100 foot setbacks, and residential would be considered a conditional use;          The Urban Conservancy designation would allow for public access and recreation</p>
<p><b>Segment B</b></p> <p>Much of this segment has been modified and does not offer much in stream habitat. This segment contains a boat ramp, bank armoring, bank hardening, and floodplain confinement. This segment is designated as Urban Conservancy.</p> <p><u>Vacant Land:</u>          3 parcels</p> <p><u>Under Current city zoning standards:</u>          Low/moderate density residential, 35% lot coverage, 4-6 units per acre</p> <p><u>Under SMP development standards:</u>          Urban Conservancy - Two vacant parcels owned by city or State, one privately owned vacant parcel. It is unlikely there will be any residential development in this segment, however recreation improvements are possible. Development in this segment would require 100 foot setbacks, water oriented and water dependent uses are preferred.</p>
<p><b>Segment C</b></p> <p>This segment contains bank armoring throughout and many riparian areas have been converted to impervious surfaces. Natural floodplain functions have been impaired by roads, bridges, and the railroad. This segment has two shoreline designations: Shoreline Residential and Urban Conservancy.</p> <p><u>Vacant Land:</u>          Approximately 9 acres</p> <p><u>Under current city zoning standards:</u>          Moderate residential, 40% lot coverage, 6-8 units per acre;          Low/moderate density residential, 35% lot coverage, 4-6 units per acre</p> <p><u>With SMP development standards:</u>          Aquatic - Approximately 4 acres of privately owned, vacant lands; residential development is prohibited in the aquatic designation          Shoreline Residential - Approximately 5 acres of vacant land, all privately owned, development would require 100 foot setbacks, and residential would be considered a conditional use;</p>
<p><b>Segment D</b></p> <p>This segment contains intact riparian forest and offers in-stream habitats. The shoreline designation for this segment is Natural. There is only one parcel located in this segment, and it is in private ownership at Cemetery Park, it is not expected that there will be any further development in this segment. Any use that would substantially degrade the ecological functions or natural character of the shoreline area should not be allowed.</p>

**Table 2 – Cumulative Impacts to Shoreline Environment**

Shoreline Process and Function	Resource at Risk	Shoreline alterations Impacting Processes and Functions	Proposed Restoration/Protection Measures and Draft SMP Policies and Regulations	Non-Regulatory Measures
<p><u>Process:</u> Nutrient/Pollutant delivery and removal</p> <p><u>Function:</u> Water quality</p>	<p>Resources at Risk: Depressional wetlands in Wagleys and Winters Creek watersheds (outside the shoreline) and riparian areas on the Sultan, Skykomish and Wallace Rivers (within shoreline) and Wagleys and Winters Creeks</p>	<p>Existing impervious surfaces increase delivery of nutrients.</p> <p>Existing ditching, draining and filling of wetlands.</p> <p>Clearing of riparian buffers.</p> <p>New residential development will result in additional impervious surfaces and may result in further impacts (filling, ditching, reducing buffers) to existing aquatic resources at risk of including depressional wetlands.</p> <p><u>Degree of future cumulative impact:</u> Limited number of residential lots within existing developed Central Business District Basin so future impacts should be low in this basin. Impacts from new residential development in eastern basin (terrace above Wagleys Creek) to depressional wetlands and riparian areas outside of the shoreline could be significant. This may impact</p>	<p>Proposed overall measures: reduce impervious surface through LID measures, protect existing riparian areas and wetlands (including buffers) and restore riparian areas and ditched, drained depressional wetlands.</p> <ul style="list-style-type: none"> <li>▪ Wetland buffers are specified in the CAO, section 16.80 SMC</li> <li>▪ Wetland ecosystems should be preserved and protected to prevent their continued loss and degradation. (Chapter 6, Wetland Policy #1, Page 16)</li> <li>▪ A wetland buffer of adequate width should be maintained between a wetland and the adjacent development to protect the functions and integrity of the wetland. (Chapter 6, Wetland Policy #4, page 16)</li> <li>▪ Wetland ecosystems should be preserved and protected to prevent their continued loss and degradation. (Chapter 6, Wetland Policy #1, Page 16)</li> <li>▪ All shoreline development and activity shall be located, designed, constructed, operated, and managed to minimize interference with beneficial natural shoreline processes (Chapter 6, Environmental Impact Regulation #6, Page 5)</li> <li>▪ If wetlands or other environmentally sensitive areas are located on the development site, clustering of residential units shall be required in order to avoid these areas. (Chapter 6, Residential Regulation #3,</li> </ul>	<p>Restore degraded depressional wetlands. Restore water quality functions by eliminating (blocking or filling) ditches or subsurface tiles that drain these wetlands and increasing residence time of ponded waters. Restore degraded riparian areas through replanting with riparian species. Low impact Development storm water controls</p>

		<p>nutrient/pollutant processes and water quality functions within the City's shoreline. New development in Northern Basin could directly impact depressional wetlands and riparian habitat on Winters Creek and impact nutrient/pollutant processes and water quality functions on the Sultan River.</p>	<p>page 44)</p> <ul style="list-style-type: none"> <li>▪ For lawns and other vegetation maintained within shoreline jurisdiction, alternatives to the use of chemical fertilizers, herbicides and pesticides shall be a preferred BMP (Chapter 6, Water regulation #6, page 7)</li> <li>▪ Enhancement, restoration and/or creation of coniferous riparian forest or forested riparian wetland shall be the preferred mitigation for impacts to riparian vegetation and wetlands when avoidance is not possible (Chapter 6, Plant and Animal regulation #8, Page 9)</li> </ul> <p>Opportunity Areas:</p> <ul style="list-style-type: none"> <li>▪ Unlabeled Opportunity Area – protect wetlands in terrace areas in City limits in Eastern and Northern Basins</li> <li>▪ Opportunity Areas A-3, A-4, A-5, B-2, B-3, C-1, C-2, C-3, D-1D-2, Opportunity Area UGA-2</li> </ul>	
<p><u>Process:</u> Surface and Groundwater flow</p> <p><u>Function:</u> Reducing downstream flooding and erosion (surface storage), aquifer recharge and storage.</p>	<p>Resources at Risk: Depressional wetlands in Wagleys and Winters Creek watersheds (outside of shoreline) and floodplain/riparian areas on the Sultan, Skykomish and Wallace Rivers (within shoreline) and Wagleys and Winters Creeks.</p>	<p>Existing impervious areas and forest clearing decrease infiltration recharge and subsurface storage and groundwater discharge to streams and wetlands.</p> <p>Existing wetland fill, development in floodplain (including shoreline protective structures) reduces surface storage, overbank flooding and increased flooding frequency and duration.</p> <p>New development will remove forested areas and increase impervious cover. Additional</p>	<p>Proposed overall measures: Minimize impacts to surface and groundwater processes by employing non-structural approach to reducing downstream flooding and erosion. This would also include protecting and restoring depressional wetlands.</p> <ul style="list-style-type: none"> <li>▪ Shoreline developments and activity shall minimize impacts to geohydraulic processes, surface water drainage, and groundwater recharge. (Chapter 6, Water Regulation #3, Page 7)</li> <li>▪ Shoreline development and activity shall avoid any further alteration of river currents or floodway capacity (Chapter 6, Page 7)</li> <li>▪ Non-structural control solutions are preferred over structural flood control devices. (Chapter 6, Page 7)</li> <li>▪ Substantial stream channel modification realignment</li> </ul>	<p>Restore degraded depressional wetlands. This includes restoring water quality functions by eliminating (blocking or filling) ditches or subsurface tiles that drain these wetlands and increasing residence time of ponded waters. Restore degraded floodplain and riparian areas through removal of dikes/levees that prevent overbank flooding and replanting with riparian species. Low Impact Development storm water</p>

		<p>impacts to surface storage functions may occur from shoreline fill and encroachment.</p> <p><u>Degree of future cumulative impact:</u>  Limited number of residential lots within existing developed Central Business District Basin so future impacts should be low in this basin. Recessional outwash deposits in the upper reaches of the northern basin (Winters Creek) are important areas for infiltration and recharge and support discharge to depressional wetlands and the Sultan River in the lower shoreline reaches of this basin. These areas could be impacted by new development. Impacts from new residential development in eastern basin (terrace above Wagleys Creek) to depressional wetlands and riparian areas outside of the shoreline could be significant. This may impact storage of surface waters in depressional wetlands and floodplains in this basin which in turn could affect flooding and erosion functions within downstream shoreline areas.</p>	<p>and straightening should be discouraged as a means of flood protection. (Chapter 6, Page 14)</p> <ul style="list-style-type: none"> <li>▪ Uses that preserve the natural character of the area or promote preservation of open space, floodplain or sensitive lands either directly, or over the long term should be the primary allowed uses (Chapter 5, page 8)</li> <li>▪ The City shall require engineered design of flood protection works where such projects may cause interference with normal river geohydraulic processes, off site impacts, or adverse effects to shoreline resources and uses. Non-structural methods of flood protection shall be preferred over structural solutions, when the relocation of existing shoreline development is not feasible. (Chapter 6, Page 15).</li> <li>▪ Projects proposed in the floodplain must assure no potential impacts of channel migration. Structures should be located to avoid the need for future protection due to channel migration. (Chapter 6, Page 15).</li> <li>▪ Adequate provisions to prevent water runoff from contaminating surface and groundwater shall be included in shoreline development design. (Chapter 6, Water Regulation #5, Page 7)</li> </ul> <p>Opportunity Areas: A-3, Unlabeled Opportunity area A, B-2, B-3, Unlabeled Opportunity area C, D-1, D-2, Unlabeled opportunity area D.</p>	controls.
<p><u>Process:</u> Sediment transport</p> <p><u>Function:</u> Sediment delivery</p>	Resources at Risk: Depressional wetlands in Wagleys and Winters Creek watersheds (outside	Sediment delivery and removal processes have been affected by both natural and man-made factors. Logging and urban development in the watershed has altered the process of sediment transport. Converting	Proposed overall measures: minimize the delivery of sediment from land alterations through retention of natural vegetation, protection of riparian corridors, application of a comprehensive erosion and sedimentation control program and measures and proper siting of development.	In well forested areas of the jurisdiction, create incentive programs to conserve and retain native vegetation. Programs such as on-site density transfers and

<p>and removal from area water systems.</p>	<p>the shoreline) and riparian areas on the Sultan, Skykomish and Wallace Rivers (within shoreline) and Wagleys and Winters Creeks</p>	<p>forest vegetation to agricultural land, harvesting timber, mining, constructing logging roads, and urban development have altered or accelerated sediment transport processes within the basin.</p> <p><u>Future Cumulative Impact:</u></p> <p>Further sediment delivery into water systems without protective vegetation due to land clearing and development upstream of Sultan Rivers. Impacts from new residential development in eastern basin (terrace above Wagleys Creek) to depressional wetlands and riparian areas outside of the shoreline could be significant. This may impact storage of surface waters in depressional wetlands and floodplains in this basin which in turn could affect flooding and erosion functions within downstream shoreline areas.</p>	<ul style="list-style-type: none"> <li>▪ All shoreline development and activity shall be located... to minimize sand and gravel movement, erosion, and accretion. (Chapter 6, Environmental Impact Regulation # 6, Page 5)</li> <li>▪ The proponent shall incorporate AKART measures into the erosion and sedimentation control program. (Chapter 6, Earth Regulation #5, Page 7)</li> <li>▪ An erosion and sedimentation control program shall be submitted with a permit application that involves the removal of vegetation, stockpiling of earth or other materials, or any activity that could result in shoreline erosion and siltation of the rivers and their associated wetlands. (Chapter 6, Earth Regulation #4, Page 6)</li> <li>▪ The perimeter of landfills should be designed to avoid or eliminate erosion and sedimentation impacts, both during initial landfill activities and over time. (Chapter 6, Landfill Policy #2, Page 36)</li> <li>▪ Projects shall be designed to avoid the removal of trees in shorelines, wherever practicable and to minimize the removal of other woody vegetation (Chapter 6, Plant and Animal Regulation #4, page 8)</li> <li>▪ For extensive clearing and grading proposals, a plan addressing species removal, re-vegetation, irrigation, erosion and sedimentation control, and other methods of riparian corridor protection should be required. (Chapter 6, Clearing and Grading Policy #5, Page 26)</li> </ul> <p>Opportunity Areas: B-2, B-3, C-1, D-2</p>	<p>conservation easements could help protect these areas.</p>
<p><u>Process:</u> Wood debris</p> <p><u>Function:</u> Wood delivery to the river systems and protection of</p>	<p>Resources at Risk: Depressional wetlands in Wagleys and Winters Creek watersheds (outside the shoreline) and</p>	<p>Removal of wood debris upstream from developments along the river could increase surface runoff and lower infiltration rates.</p> <p>Delivery of large woody debris to the Sultan River and the Skykomish has</p>	<p>Proposed overall measures: protect and retain natural shorelines and require re-vegetation plans.</p> <ul style="list-style-type: none"> <li>▪ Projects shall be designed to avoid the removal of trees in shorelines, wherever practicable and to minimize the removal of other woody vegetation (Chapter 6, Plant and Animal Regulation #4, page 8)</li> </ul>	<p>Incentive programs to discourage use of shoreline modifications and use of bioengineering in cases where shorelines are altered. Retain natural areas along shorelines through density transfers and</p>

shorelines	riparian areas on the Sultan, Skykomish and Wallace Rivers (within shoreline) and Wagleys and Winters Creeks	<p>been altered by logging and development in the basin. Removal of woody material from the riparian zones and floodplains for agricultural uses and logging has limited the potential for woody debris being delivered to either system. Woody debris is typically less abundant in areas where shoreline banks are altered or modified. Surveys along the Snohomish River show that woody debris as it relates to a percentage of channel edge habitat is two times more abundant along natural stream banks versus modified banks</p> <p><u>Future cumulative impact:</u></p> <p>Further development and land clearing leading to less woody debris being delivered to the system. Alteration of shoreline banks and natural bank modification impacting downstream areas. Impacts from new residential development in eastern basin (terrace above Wagleys Creek) to depressional wetlands and riparian areas outside of the shoreline could be significant. This may impact the amount of woody debris in these areas if the shorelines are altered from their natural state.</p>	<ul style="list-style-type: none"> <li>▪ For extensive clearing and grading proposals, a plan addressing species removal, re-vegetation, irrigation, erosion and sedimentation control, and other methods of riparian corridor protection should be required. (Chapter 6, Clearing and Grading Policy #5, Page 26)</li> </ul> <p>Opportunity Areas: A-3, A-4</p>	conservation easements.
<u>Process:</u> Habitat	Resources at Risk: Depressional	Important in-stream and riparian habitat is available with the	Proposed overall measures: protect and restore riparian habitats and depressional wetlands	Restore degraded depressional wetlands. This includes

<p><u>Function:</u> Fish and wildlife habitat</p>	<p>wetlands in Wagleys and Winters Creek watersheds (outside the shoreline) and riparian areas on the Sultan, Skykomish and Wallace Rivers (within shoreline) and Wagleys and Winters Creeks. Chinook salmon spawn in the Skykomish mainstem and lower Sultan River and coho may spawn in these areas as well. Spawning habitat for Bull trout populations are not anticipated in the City's UGA, as spawning occurs only in the upper portion of the Skykomish watershed. However, rearing habitat has been identified by WDFW in the City's UGA on the Sultan, Wallace,</p>	<p>Snohomish River basin and the City's UGA. Habitat functions are altered with urban development, logging, road construction, culvert installation, loss of riparian cover, and stream bank modification and hardening. Habitat elements important to fish include riparian cover, large woody debris, passage for migration, clean water, spawning habitat and forage habitat, and the availability of food sources. Alteration of forested habitat, loss of wetlands and riparian areas reduce overall habitat for other wildlife species, including waterfowl. Habitat connectivity is diminished as riparian cover is removed.</p> <p><u>Future cumulative impacts:</u></p> <p>Limited number of residential lots within existing developed Central Business District Basin so future impacts should be low in this basin. Impacts from new residential development in eastern basin (terrace above Wagleys Creek) to depressional wetlands and riparian areas outside of the shoreline could be significant. This may impact habitat and water quality functions within the City's shoreline.</p>	<ul style="list-style-type: none"> <li>▪ Shoreline development and activity shall be scheduled to protect biological productivity to minimize interference with fish resources including salmonid migration, spawning, and rearing activity. (Chapter 6, Plant and Animal regulation #3, page 8)</li> <li>▪ The diversity of aquatic life, wildlife, and habitat within the shoreline should be enhanced. (Chapter 6, Environmentally Sensitive Area Policy #2, Page 12)</li> <li>▪ In general, this Master Program shall strive to protect and restore anadromous fish resources in the Skykomish, Sultan, and Wallace Rivers. (Chapter 6, Plant and Animal regulation #1, page 8)</li> <li>▪ Shoreline development and activity shall maintain the unconstrained upstream and downstream migration of both adult and juvenile anadromous and resident fish, when applicable. (Chapter 6, Plant and Animal regulation #6, page 8)</li> <li>▪ Where mitigation for loss of or impact to PFC, natural systems and resources is required, a habitat mitigation plan shall be required. Habitat management plans shall be prepared by a professional wildlife biologist or fisheries biologist as determined appropriate by the Shoreline Administrator. (Chapter 6, Plant and Animal regulation #6, page 9)</li> </ul> <p>Opportunity Areas: A-2, A-3, A-4, A-5, B-2, B-3</p>	<p>restoring water quality functions by eliminating (blocking or filling) ditches or subsurface tiles that drain these wetlands and increasing residence time of ponded waters. Restore degraded riparian areas through replanting with riparian species. Development density transfers and conservation easements.</p>
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