

# Chapter 17

## Cumulative impacts analysis

### Phase 3, Task 3.6

### Shoreline Master Program Planning Process

## Introduction

The purpose of the cumulative impacts analysis is to ensure that Shoreline Master Program (SMP) updates include shoreline policies and regulations that will achieve no net loss of shoreline ecological functions, as the SMP is implemented over time. The analysis describes anticipated shoreline development within your jurisdiction and assesses the cumulative impacts of such development on shoreline ecological functions over the long term. The cumulative impacts analysis should inform decisions about where to apply regulations to most effectively protect shoreline ecological functions.

The preliminary analysis is typically prepared later in the planning process, after your jurisdiction has completed the inventory and characterization and is well on the way to developing a complete draft SMP. The analysis should be submitted to Ecology with the draft SMP.

The analysis is a key step in forecasting the future and being proactive in dealing with anticipated impacts. Ideally, you should be thinking about potential cumulative impacts along the way, from the time the SMP update starts. Your goal is to develop an SMP that fully addresses cumulative impacts.

If changes are made to the SMP as it winds its way through the local review and approval process, additional analysis of cumulative impacts may be necessary. Significant changes to SMP policies and regulations may alter or invalidate assumptions regarding future shoreline development that form the basis for the findings of the preliminary analysis. If planning commissioners and elected officials understand the basis for the conclusions in the analysis, they will likely better understand the implications of their proposed changes.

WAC 173-26-186(8)(d): “Local master programs shall evaluate and consider cumulative impacts of reasonably foreseeable future development on shoreline ecological functions and other shoreline functions fostered by the policy goals of the act. 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 among development opportunities. Evaluation of such cumulative impacts should consider:

- (i) Current circumstances affecting the shore lines 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.

It is recognized 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.”

A cumulative impacts analysis should:

- Use the information in the shoreline inventory and characterization report as the baseline or “current circumstances affecting the shorelines” for the analysis.
- Assess cumulative impacts on shoreline functions from “reasonably foreseeable future development” that would be allowed by the draft SMP. Reasonably foreseeable development is that development likely to occur during the next 20 years (roughly) based on the proposed shoreline environment designations, proposed land use density and bulk standards, and current shoreline development patterns.
- Demonstrate how the draft SMP policies, regulations and environment designations will achieve no net loss of shoreline functions over time.

The SMP Guidelines in sections WAC [173-26-186\(8\)\(d\)](#) and [173-26-201\(3\)\(d\)\(iii\)](#) address these requirements.

## What are cumulative impacts?

Neither the SMA nor the SMP Guidelines specifically define cumulative impacts. However, the National Environmental Policy Act provides a definition. A cumulative impact is

the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Ecology guidance on Washington’s State Environmental Policy Act states that a review of cumulative impacts) should address

how the impacts of the proposal will contribute towards the total impact of development in the region over time. Example -- Increased runoff and contaminants from the development would be added to the volumes and levels of contamination from similar developments surrounding the wetland (cumulative impacts).

The cumulative impacts to be addressed in this analysis are those that will result from development and uses within shoreline jurisdiction and regulated by the SMP. Cumulative impacts that may result from development outside shoreline jurisdiction do not need to be considered in this analysis.

## Key considerations

Developing a comprehensive SMP update or new SMP provides a rare opportunity to look at your jurisdiction’s existing landscape, contemplate future conditions, and take action to avoid

future impacts through new protective shoreline use regulations that preserve existing ecological functions.

Every attempt should be made during the SMP planning process to first avoid cumulative impacts through appropriate environment designations and shoreline use regulations, including permit standards. New shoreline development should be required to avoid, minimize or compensate for impacts. Finally, after the SMP is approved, enforce regulations as it is implemented over time and individual projects are reviewed and approved.

As you prepare your cumulative impacts analysis, consider the following questions:

- What information was considered, and what assumptions have been made regarding anticipated future development?
- How have you projected the impacts of these anticipated developments in your analyses?
- Will ecological functions of your shorelines be maintained as your SMP is implemented?

If the cumulative impact analysis shows that ecological functions will decline, (i.e., the no net loss standard will not be achieved) the draft SMP must be revised. The cumulative impacts analysis must also then be revised to reflect the new SMP standards.

The cumulative impacts analysis relies on five documents that are prepared as part of the master program update:

- Shoreline inventory.
- Shoreline characterization.
- Shoreline use analysis, with a projection of reasonably foreseeable future development.
- Restoration plan.
- Draft SMP with environment designations, policies and regulations.

Like the inventory, characterization, use analysis, and restoration plan, the cumulative impacts analysis is not a part of the SMP itself, but is one of the supporting documents.

### Three elements

The cumulative impacts analysis must consider three elements:

- 1) **Current circumstances** affecting the shorelines and relevant natural processes.
- 2) **Reasonably foreseeable future development** and use of the shoreline.
- 3) **Beneficial effects** (for resource protection or public access) of any existing regulatory programs beyond those contained in the SMP.

To determine the cumulative impact of an SMP, it is critical that a local government integrate the information from these three elements. Otherwise, the factor with the greatest cumulative impact in the future may be overlooked.

For example, a city might focus on the cumulative impacts of the future clearing for residential development on the remaining 20 percent of a lake shoreline. The city might impose setback standards and restoration measures to protect the shoreline.

However, existing information (#1, current circumstances) may reveal that the lake is at an eutrophication threshold. Additional residential septic systems and sedimentation from development would exceed this threshold, resulting in significant impacts to all of the lake's habitat functions. In this case, the setbacks and restoration measure would not be effective at preventing eutrophication. Addressing this higher-priority cumulative impact may require a different approach. A combination of onsite septic standards, in-lieu fees to address repair of existing septic systems, and incentive-based programs to reduce sedimentation would be more effective in the lake watershed.

An integrated approach for these three elements can be achieved by asking these questions:

- **Current Circumstances.** What land use and ecological conditions or problems within the watershed pose the greatest threat to shoreline functions? (You'll need to identify the ecological functions at risk. This information should be in the inventory and characterization report.)
- **Future development.** How will reasonably foreseeable future development affect shoreline functions? Reasonably foreseeable future development includes development that requires a shoreline permit and development that is exempt from requirements for a shoreline Substantial Development Permit.
- **Beneficial effects.** For those problems and impacts that pose the greatest threat, what actions and solutions can be applied? Do the SMP environment designations and regulations incorporate these actions and solutions? Do existing regulatory programs contribute to these solutions and actions?

A table can be used to organize answers to these questions. Examples are provided at the end of this chapter.

Keep in mind the following points when conducting the analysis:

- Shoreline ecological functions analyzed must include, at a minimum, habitat, water quantity and water quality. Ideally, the cumulative impacts analysis is a science-based exercise that considers future development and use scenarios.
- Impacts on "other shoreline functions fostered by the policy goals of the Act" such as public access or use of the shoreline by water-dependent uses also must be considered. For example, are there impacts on navigation from development of docks and piers?
- Mitigation of impacts from projected shoreline uses and activities should be evaluated in the cumulative impacts analysis. Shoreline uses and developments have impacts on the

shoreline that must be mitigated. The cumulative impacts analysis should include an evaluation of how effective mitigation required during SMP implementation will be.

- The information regarding the current shoreline ecological conditions should be well documented in the inventory and characterization. If only limited data and information are available, a qualitative demonstration of measures that will be implemented to achieve no net loss of ecological functions may be acceptable. However, keep in mind the following: “As a general rule, the less known about existing resources, the more protective shoreline master program provisions should be to avoid unanticipated impacts to shoreline resources” [WAC 173-26-201(3)(g)].

## General method

The following steps represent a general method for conducting a cumulative impacts analysis. Ecology recommends that you use a table to convey this information. Several examples of tables are provided at the end of this chapter.

### 1. Identify existing shoreline functions

Drawing from the shoreline characterization, list the existing ecosystem-wide functions that are at risk. The cumulative impacts analysis will examine the potential impacts on these functions.

At a minimum, the cumulative impacts analysis should evaluate potential impacts to existing shoreline habitat, water quantity and water quality functions. If certain shoreline functions don't exist within portions of your shoreline, you do not need to identify them. For example, some shoreline reaches are highly altered and paved, and vegetation does not exist. These reaches would not need to be analyzed for impacts on vegetative habitat.

To make the scope of the analysis more manageable, you may use representative “indicators” of these principal ecological functions that you can measure or observe. Examples of shoreline functions and representative indicators include:

**Table 17-1: Shoreline functions and indicators of changes in function**

Habitat function	Water quantity function	Water quality function
Loss of vegetative cover upland - amount, type and age	Loss of wetlands	New impervious surface area
Loss of riparian vegetation	Lower stream flow	Warmer water temperatures
Sediment loading	Potential hazards due to channel migration	Increase in nutrients and contaminants
Changes in species type and quantity	Flooding	Increases in turbidity
Decrease in large woody debris	Loss of floodplain connectivity due to roads, levees, railroads, houses	Shellfish closures
Change in bank erosion	Change in bank erosion	303(d) listings
Warmer water temperatures	Increased flow velocity	Stormwater runoff increases

## 2. Determine “reasonably foreseeable future development”

The next step is to determine the reasonably foreseeable future development that is likely during the planning period—generally about 20 years. Reasonably foreseeable development is that development likely to occur based on the proposed shoreline environment designations, proposed land use density and bulk standards, and current shoreline development patterns (that is, existing parcels that are platted but undeveloped).

- An existing buildable lands analysis may be helpful in providing some information about development patterns and vacant or partially developed land.
- Platted but undeveloped parcels are likely to be built out over time.
- Development will vary from jurisdiction to jurisdiction. In some jurisdictions, development will be limited to residences, bulkheads, piers, docks, stairs to the beach, and boat ramps. In other jurisdictions, development will include port development such as container facilities; sewer and stormwater outfalls; transportation facilities such as roads or ferry terminals; public parks; etc.
- Assume that some development will lead to other development. Owners of new and existing single family residences may propose docks or bulkheads in the future. Port facilities may expand.
- Include development that will require a shoreline permit and development that is exempt from the requirement for a shoreline Substantial Development Permit, such as owner-occupied single-family residences, shoreline armoring for these residences, and normal maintenance and repair of structures such as docks.
- Next, identify areas where new shoreline development will be prohibited or significantly restricted (for example, in large, undisturbed shoreline parcels designated as Natural or Rural Conservancy).

### 3. Determine impacts of foreseeable development

Analysis of projected impacts can focus on shoreline development that commonly occurs in your jurisdiction, such as residential development and related piers and docks. (Dealing with unanticipated impacts is addressed below in Section 8.)

There are a couple ways of analyzing these impacts.

1. Explain how commonly occurring and reasonably foreseeable future development will affect (in the aggregate) the selected indicators of existing functions (see discussion in Step 1, above).
2. Or, state your assumptions based on the science about causes and effect of impacts to shoreline functions. Be sure to explain your assumptions. Don't forget to analyze impacts from development that is exempt from requirements for a Substantial Development Permit and activities that are not regulated under the SMA, such as dismantling a bridge.

WAC 173-26-201(3)(d)(iii): "... An appropriate evaluation of cumulative impacts on ecological functions will consider the factors identified in WAC [173-26-186 \(8\)\(d\)\(i\)](#) through (iii) and the effect on the ecological functions of the shoreline that are caused by unregulated activities, development exempt from permitting, effects such as the incremental impact of residential bulkheads, residential piers, or runoff from newly developed properties."

This step should result in a description of likely impacts to ecosystem functions for each shoreline reach. A table is the most efficient way to portray this information.

Remember to integrate existing conditions into your analysis. For example, projected industrial development on a shoreline reach that is moderately altered could have significant adverse impacts on vegetative cover, water quantity, water quality, fish foraging, and so on. Evaluation of potential cumulative impacts in areas with limited development potential can be minimal.

### 4. Demonstrate how impacts will be mitigated

Describe how proposed SMP environment designations, policies and regulations will mitigate a net loss of shoreline ecosystem functions. You may need to discuss this for each reach, or you may be able to combine reaches, such as reaches with similar functions or issues, if that makes sense for your shoreline.

- Describe the net losses of ecosystem function expected from current and future development. Draw on the analysis of impacts you conducted in Step 3, above.
- Identify measures that will be taken to avoid impacts.
- Identify measures that will mitigate for impacts from new shoreline development. These include shoreline environment designations, policies, regulations, and restoration activities. For example, in shoreline areas with armoring, measures may include

forbidding new armoring in order to protect habitat, or restoring areas with older armoring during redevelopment.

## 5. Evaluate incremental impacts

Evaluate how incremental impacts that will remain after mitigation is applied will be offset over time. Generally, mitigation applied at the project level is not 100 percent successful. The resulting small impacts associated with incremental development can add up, causing adverse cumulative impacts. For example, the stormwater runoff from a four-lot subdivision would carry pollutants from vehicles and pesticides from lawns into local streams and eventually the larger receiving water, such as Puget Sound or the Columbia River. The pollutants and pesticides from this subdivision may be minor, but add up such pollutants from 5 or 10 more subdivisions and they may be significant.

You will not achieve no net loss of shoreline functions under these scenarios. How will you address incremental development in your SMP? Will any planned shoreline restoration activities offset incremental impacts? Restoration activities included in the Restoration Plan and other planning documents should be considered in determining whether the SMP will address cumulative impacts and achieve no net loss. Restoration activities can offset incremental impacts, although it is difficult to measure how well they do so.

## 6. Address anticipated beneficial effects

Describe the anticipated beneficial effects of other regulatory programs in your jurisdiction or regional programs that affect shorelines within your jurisdiction. Identify other local, state, and federal laws (such as programs governing wetland protection or water quality) that will help offset or minimize potential adverse cumulative impacts. These additional mitigation and restoration activities may result in positive impacts to ecological functions.

You should identify these programs so that SMP provisions do not counter their positive contributions in managing cumulative impacts. However, relying solely on the beneficial effects of other programs or regulations outside the authority and requirements of the SMA and SMP to address cumulative impacts is not adequate and will not be accepted by Ecology. The beneficial effects of other programs do not absolve local governments from demonstrating that no net loss will be achieved over time through implementation of updated SMP environment designations, policies, and regulations.

## 7. Revise draft SMP provisions

When preparing the cumulative impacts analysis, you may determine that the SMP's allowance of shoreline armoring will cause detrimental impacts to endangered fish species in specific reaches, such as along feeder bluffs. Or you may realize that proposed shoreline densities or buffer requirements will not adequately protect shoreline functions in certain areas.

If the cumulative impacts analysis identifies such deficiencies in your draft SMP, it should include recommendations for revised SMP provisions that will better achieve the no net loss



standard. Re-evaluate your SMP environment designations, policies and regulations to identify the ones at issue. What needs to change so that endangered fish species in those specific reaches do not suffer detrimental impacts? Do you need to decrease densities or increase buffers in order to protect shoreline functions?

You may decide to more tightly control some uses allowed in a particular environment or even prohibit them from the environment altogether. Similarly, you might change the environment designation for a section of shoreline to a designation with lower development intensity or larger shoreline buffers. You may also need to revise your policies and regulations, or add additional ones, to assure that the SMP will adequately protect ecological functions from future development.

Give yourself enough time to make changes to the SMP and to update the analysis so it reflects the revisions before bringing the SMP to your council for approval. Keep a record of the original draft SMP, impacts analysis and the revisions and your rationale for making changes. This information can be helpful in explaining to the planning commission, council, property owners and others understand why the SMP was written as it was. It will also be useful in preparing the No Net Loss Report (Task 4.3). Changes made to the SMP by local planning commissioners or elected officials should be reflected in the final analysis.

Revisions to SMP provisions that address the findings and recommendations of the cumulative impacts analysis should be documented for each shoreline reach. This is probably best done in a table.

## **8. Explain how the SMP will deal with unanticipated impacts**

The actual developments that will be proposed in the future and their potential impacts are predictable only to a degree. The master program should address how your jurisdiction will avoid “unanticipated or uncommon impacts that cannot be reasonably identified at the time of master program development” (WAC 173-26-201(3)(d)(iii)) during the permit review process for future development. Conditional use permits may be needed for development proposals that are not identified in the SMP. Explain that you will apply the mitigation sequence during permit review to avoid new incremental impacts to shoreline ecological functions.

## **What to avoid**

Ecology has reviewed numerous cumulative impacts analyses in the past couple of years. We’ve seen some good products and also some things to avoid when preparing this document.

Please avoid the following:

- Comparing the proposed SMP to the existing SMP, and discussing how the proposed SMP will better protect shoreline resources, therefore resulting in no net loss of shoreline ecological function. While such evaluation may be useful elsewhere, this is not the purpose of the cumulative impacts analysis. The purpose is to compare existing shoreline

conditions (identified in the inventory and characterization) with the likely shoreline conditions resulting from foreseeable development. The existing SMP is not the baseline for comparison. The analysis should show how the proposed SMP as written will avoid or compensate over time for any loss of shoreline ecological functions identified in the shoreline characterization.

- Providing a generalized analysis that doesn't specifically link proposed policies and regulations with ecological functions at risk. The analysis should show what ecological functions are at risk from future development, and what policies and regulations will reduce that risk.
- Justifying environment designations because they are consistent with existing land use designations in the comprehensive plan. The comprehensive plan sets the community's plan for land use, but for purposes different than shoreline management. While existing land use regulation is one consideration in determining environment designations, maintaining ecological functions as characterized in the shoreline inventory and characterization is more critical
- Understating or entirely missing discussion of cumulative impacts from anticipated new development and redevelopment. Please consider what impacts will result if an undeveloped section of shoreline is newly developed or a developed area is redeveloped with more intense uses.
- Forgetting to include restoration opportunities identified during the SMP update as part of the overall program to address cumulative impacts.
- Ignoring the cumulative impacts from future platting or subdividing of property and increased intensity of use of residential lots.
- Addressing only one function, such as salmonid habitat. The analysis must address, at a minimum, habitat, hydrology and water quality.
- Not linking the beneficial effects of other regulatory programs to cumulative impacts.
- Reiterating large sections of the inventory and characterization. Be selective, and keep the impacts analysis focused on explaining the impacts of development on shoreline functions. Don't clutter the important information with masses of distracting data.

## Examples of Cumulative Impacts Analyses tables

Following are several examples of tables that provide details of potential cumulative impacts of draft SMPs.

**Table 17-2**  
**Portion of Redmond Cumulative Impacts Analysis Table**

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> Surface and Groundwater Movement and Storage</p> <p><u>Functions:</u> reduce downstream flooding and erosion, aquifer recharge and storage, hyporheic flow, water quality, enhancing summer base flows for streams</p>	<p>Lake Sammamish and its large wetland complex at the north end of the lake (actually in King County).</p> <p>The Bear/Evans Creek valley along with associated floodplain and extensive wetland network. This also includes Wellhead Protection Zones One and Two which coincide with these creeks.</p> <p>The Sammamish River Valley and its broad floodplain and wetlands.</p>	<p>Increasing impervious areas and forest clearing decreases infiltration recharge, subsurface storage, and groundwater discharge to streams and wetlands.</p> <p>Fill and development in floodplain reduces surface storage and increases flooding frequency and duration.</p> <p>Draining and filling of riverine and depressional wetlands.</p> <p>Disconnection of streams from the floodplain and/or associated wetlands.</p> <p>Water supply and water management activities may alter surface and subsurface flow.</p> <p>Interception of subsurface flow by ditches and roads.</p> <p>Channelization of streams.</p> <p>Development and/or fill in wetlands reduce potential stormwater storage.</p> <p>Groundwater withdrawals can impact subsurface storage.</p>	<p>Protect and restore the natural resources and ecological functions of the shoreline, including wildlife habitat, fisheries and other aquatic life, natural hydrologic processes, and shoreline vegetation consistent with the planned uses of the shorelines. (SF-2) Regs. 20D.150.40-010, <i>Regulations of General Application</i>; 20D.150.60, <i>Shoreline Buffers and Setbacks</i>; 20D.150.110, <i>Tree Protection, Landscaping and Screening Within Shorelines</i>; 20D.140.20-020, <i>Stream Buffers</i>.</p> <p>In salmon and steelhead habitats, realignment or channelization of streams, clearing of adjacent native vegetation or large woody debris, and water withdrawals and diversions, except for the purpose of habitat restoration and enhancement, shall not be allowed. Restoration that reconstructs a meandered channel or channel diversity should be allowed and encouraged. (SL-8) Regs. 20D.150.90, <i>Clearing, Grading, Landfilling, and Excavation Within Shorelines</i>; 20D.150.110, <i>Tree Protection, Landscaping and Screening Within Shorelines</i>; 20D.140.20-020, <i>Stream Buffers</i>.</p> <p>As opportunities become available, the natural channel characteristics of the Sammamish River shall be reintroduced, by moving levee embankments away from the channel, removing barriers to connect streams and wetlands to the river, changing in-stream channel cross-sections, revegetating the riverbank, and placing complex large woody debris.(SL-15)</p>	<p>Restore degraded floodplain and wetlands where connectivity has been lost.</p> <p>Restore riparian buffers.</p> <p>Encourage the utilization of alternative technologies and engineering which emphasize Low Impact Development strategies through incentives.</p> <p>Design and construct capital improvement projects such that they do not interrupt surface or subsurface water flow.</p> <p>Use incentives for private development that help restore floodplain connections and</p>

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>Removal or compaction of native soils can impact infiltration and shallow sub-surface flow.</p> <p>Removal of native vegetation and forest cover.</p> <p>Rerouting drainage.</p> <p>Land uses with impervious cover exacerbate runoff from geologic deposits of low permeability.</p>	<p>Retain aquifer recharge capacity in areas that have not already been committed to urban uses. (NE-36) Regs. 20D.140.50, <i>Critical Aquifer Recharge Areas</i>.</p> <p>Encourage retention of open spaces, tree protection areas and other areas of protected native vegetation with a high potential for groundwater recharge and which can be protected from contaminated stormwater runoff. (NE-37) Regs. 20D.140.10-010, <i>Purpose and Intent of Critical Areas Regulations</i>.</p> <p>Employ no net impact floodplain management to avoid impacts to both upstream and downstream properties. (NE-40) Regs. 20D.140.40, <i>Frequently Flooded Areas</i>.</p> <p>Strive towards no net loss of the structure, value, and functions of natural systems constituting Frequently Flooded Areas. (NE-41) Regs. 20D.140.40, <i>Frequently Flooded Areas</i>.</p> <p>Direct uses that require substantial improvements or structures away from areas within the 100-year floodplain. (NE-43) Regs. 20D.140.40, <i>Frequently Flooded Areas</i>.</p> <p>Require compensatory floodplain storage for all projects constructed within the 100 year floodplain, except Downtown development in the 100 year floodplain of the Sammamish River. (NE-48) Regs. 20D.140.40, <i>Frequently Flooded Areas</i>.</p> <p>Limit impervious surfaces outside the Downtown to reduce the possibility of flooding, to protect the</p>	<p>maximum aquifer recharge potential.</p> <p>Educate businesses on surface and groundwater protection best management practices in conjunction with other governmental agencies and organizations.</p> <p>Educate the public and businesses on how to substitute materials and practices with a low risk of surface or groundwater contamination for materials and practices with a high risk of contamination.</p> <p>Encourage proper disposal of materials.</p> <p>Acquisition of shoreline areas with particularly vulnerable or fragile features (or degraded shoreline areas) for the</p>

<b>Shoreline Process and Function</b>	<b>Resource at Risk</b>	<b>Shoreline Alterations Impacting Processes and Functions</b>	<b>Proposed Restoration/Protection Measures and Draft SMP Policies and Regulations</b>	<b>Non-Regulatory Measures</b>
			environment, and to allow for groundwater recharge. (NE-52)	purposes of long-term protection and enhancement.

Table 17-3  
Portion of Tukwila Cumulative Impacts Analysis

## Cumulative Impacts Summary Table

Reach or Site Name	Rating of Processes and Functions (unimpaired condtions)	Rating of Impairment (existing conditions)	Cumulative Impacts from Future Development	Recommended Solutions
<p>EMU 3</p> <p>Urban Conservancy</p> <p>AU 5.09</p>	<p><b>Processes – Potential is high</b> for hydrologic, hyporheic processes. This includes overbank flooding and tidal process. Important area for groundwater discharge, surface storage, water quality processes. <i>(Use existing inventory-characterization and basin plans information, including proper functioning conditions analysis)</i></p> <p><b>Functions – Potential is high for functions.</b> Historically this was a tidally influenced riverine area with adjacent riverine wetlands within the floodplain. A wide variety of habitat types would have been present (intertial and subtidal , emergent, scrub-shrub and forested habitat) which would have supported a high species richness. Water quality functions include de-nitrification, adsorption of toxics, phosphorous and filtration sedimentation in floodplain</p>	<p><b>Processes –High.</b> All riverine and tidal processes have been significantly impacted by a river levee and channelization system. <i>(Use Inventory and characterization of impairments for this rating or existing info from basin plans).</i></p> <p><b>Functions - High.</b> Extensive clearing of riparian habitat and loss of riparian and tidal wetlands has eliminated forest and scrub-shrub and emergent habitat which has significantly reduced species richness. Significant impacts to water quality functions through elimination of floodplain.</p>	<p>Proposed redevelopment of this reach will result in a higher level of vehicular use and the transport of contaminants into the Duwamish River ecosystem. This will further stress the limited water quality processes and functions in the system which in turn will affect riverine organisms.</p>	<p><b>Land Use Designation– Urban Conservation.</b> Measures to implement the levee setback within the 125’ foot buffer have been established. This includes an in-lieu fee program which fairly allocates the burden of addressing cumulative impacts within the City’s shoreline.</p> <p><b>Restoration &amp; regulatory policy/measures.</b> Ranked # 16 in the restoration priorities (Inventory document). EMU is important biologically since it is a tidal transistion zone which potentially has high productivity and supports a diverse estuarine food web.</p> <p><b>No Net Loss Determination</b> The proposed regulatory measures in combination with the environment designation will ensure “no net loss” of shoreline function from future development impacts</p>

Table 17-4 Portion of Kent Cumulative Impacts Analysis Table

Shoreline Segment	Existing Conditions	Likely Development / Functions or Processes Potentially Impacted	Effect of SMP Provisions	Effect of Other Development and Restoration Activities / Programs	Net Effect
<b>HIGH INTENSITY</b>					
<p>Green River (all or portions of segments B1-7 and PAA-B1 as described in SMP Section 2.C.2.d and Appendix A of the SMP)</p>	<p>These segments include areas generally dominated by commercial and industrial uses. This includes industrial areas just east and west of SR 187 (near SE 259<sup>th</sup> St.), along Russell Road between I-5 and SR 187, and near Briscoe Park (just south of S 180<sup>th</sup> St.). Uses are generally one-story buildings surrounded by surface parking lots. A majority of the buildings are separated from the shoreline by the Green River Trail corridor and Urban Conservancy – Open Space environment designation.</p>	<p><b>Future Development:</b> It is likely that underdeveloped shoreline properties (approximately 1,000 feet of shoreline) will, over time, convert to large- to moderate-scale industrial uses. Remaining areas are built-out and thus unlikely to undergo extensive redevelopment.</p> <p><b>Functions/Processes Impacted:</b></p> <ol style="list-style-type: none"> <li>1. Hydrology: Because of the position of the potential new development relative to the river and the levee, potential impacts are generally related to indirect effects of new impervious surface and stormwater management on hydrologic processes (see Table 14a of the <i>Final Shoreline Inventory and Analysis Report</i>). Per the analysis in Table 14a of the <i>Final Shoreline Inventory and Analysis Report</i>, hyporheic function currently is low because of past hydromodifications to the system.</li> <li>2. Vegetation and habitat: Upland and aquatic habitat and vegetation functions related to the Green River shoreline would be largely unaffected by new and redevelopment.</li> </ol> <p>The function of all leveed Green River segments is likely to improve over time with implementation of levee improvements. Even in the most constrained portions of the High-Intensity environment, the reconstructed levee would likely include improved riparian vegetation on the waterward side, large woody debris, and possibly reduced bank slope or an increased levee setback. Reconstruction of levees to include benches can allow overbank flooding of the bench, thus contributing to restoration of ecological functions that protect and improve water quality and wildlife habitat.</p>	<p>SMP policies for the "High Intensity" environment (see Section 2.C.2 in the SMP) state that:</p> <ul style="list-style-type: none"> <li>• "Developments in the 'High-Intensity' environment should be managed so that they enhance and maintain the shorelines for a variety of urban uses, with priority given to water-dependent, water-related, and water-enjoyment uses."</li> <li>• "In order to make maximum use of the available shoreline resource and to accommodate future water-oriented uses, shoreline restoration and/or public access, the redevelopment and renewal of substandard, degraded, obsolete urban shoreline areas should be encouraged."</li> </ul> <p>All private development would be subject to 140- or 150-foot setbacks depending upon whether a levee is present (140 feet if a levee is present and 150 feet if no levee is present) (SMP Section 3.B.1.c.7). All HI-designated areas and associated new and re-development on the Green River are located landward of the existing levee.</p> <p>The SMP (and by reference the critical areas regulations) prohibits projects that "cause significant ecological impacts... unless mitigated according to" standard mitigation sequencing outlined in Section 3.B.4.c.4.</p> <p>SMP Sections 3.B.5 (Flood Hazard Reduction and River Corridor Management) and 3.B.12 (Water Quality and Quantity) have a number of provisions that will minimize adverse modifications to the river channel that might further impair water quality or water movement through the system.</p> <p>The Commercial Development standards (Section 5.C.4.c.4) stipulate that "All new commercial development proposals will be reviewed by the City for ecological restoration and public access opportunities. When restoration or public access plans indicate opportunities exist, the City may require that those opportunities are either implemented as</p>	<ol style="list-style-type: none"> <li>1. Any in- or over-water (including wetlands) proposals would require review not only by the City of Kent, but also by the Washington Department of Fish and Wildlife (WDFW), the U.S. Army Corps of Engineers (Corps), and/or the Washington Department of Ecology. Each of these agencies is charged with regulating and/or protecting streams, lakes, and wetlands, and would impose certain design or mitigation requirements on applicants. A project that includes stream, lake, or wetland fill would require Corps review and permitting. For similar projects along the Green River, a Biological Evaluation would be prepared to assess project impacts on listed fish and wildlife, and that document would be routed to U.S. Fish and Wildlife Service and National Marine Fisheries Service for Endangered Species Act review. These agencies would also impose certain design and mitigation requirements on a proposed project to minimize adverse impacts.</li> <li>2. As mentioned in the <i>Final Shoreline Inventory and Analysis Report</i>, the City currently uses its 2002 <i>Kent Surface Water Design Manual</i>, which is an addendum to the 1998 <i>King County Surface Water Design Manual</i>. The City will be updating its <i>Surface Water Design Manual</i> as part of the NPDES Phase II permit requirement. Both Ecology's 2005 <i>Stormwater Management Manual for Western Washington</i> and <i>King County's 2005 Surface Water Design Manual</i> will be evaluated as the NPDES Phase II permit requires that the City use minimum requirements that are equivalent to Ecology's manual. Use of the current and future updated stormwater manuals will ensure that stormwater management is effectively designed to minimize/eliminate construction- and operations-related stormwater runoff impacts and mitigate any potential remaining adverse affects.</li> <li>3. The Natural Resources section of the Land Use chapter of the City of Kent's Comprehensive Plan contains a number of general and specific goals and policies that direct the City to permit and</li> </ol>	<p>Because of the developed nature of this environment and redevelopment pressures, unmitigated new development has the potential to further degrade the baseline condition. Strict implementation of the SMP and the critical areas regulations will be needed to minimize impacts, and is expected to result in the long-term improvement in ecological function. Specifically, requirements for stormwater management, minimization of impervious surface, and installation of native vegetation will help minimize and mitigate impacts.</p> <p>Further the planned implementation of the Green River levee reconstruction and numerous other projects under WRIA 9, the Green/Duwamish Ecosystem Restoration Project, and the King County Flood Control District, ensure that ecological function will be substantially improved in the long-term.</p>

Shoreline Segment	Existing Conditions	Likely Development / Functions or Processes Potentially Impacted	Effect of SMP Provisions	Effect of Other Development and Restoration Activities / Programs	Net Effect
			<p>part of the development project or that the project design be altered so that those opportunities are not diminished." This is expected to result in moderate to substantial shoreline function improvements over time. The Industry regulations (SMP Sections 5.C.5.1 and 8) also require minimization of impervious surfaces, installation of native landscaping, and use of Low Impact Development (LID) techniques when appropriate.</p>	<p>condition development in such a way that the natural environment is protected, preserved and enhanced. Techniques suggested by the various policies to protect the natural environment include requiring setbacks from sensitive areas, preventing adverse alterations to water quality and quantity, preserving existing vegetation, educating the public, and mitigating necessary sensitive area impacts, among others.</p> <p>4. The City of Kent will be implementing a long-term program to reconstruct the Green River levee so that it meets federal certification requirements for the 100-year flood. To the extent possible, the levee will be set back farther from the existing ordinary high water mark, floodplain benches will be installed with native riparian vegetation, and large woody debris will be incorporated into the toe and placed on the benches (SMP Section 8.E.2.a). While there may be short-term construction impacts and temporal loss of vegetation cover in some areas, the levee reconstruction projects in all cases will improve habitat function for salmonids, other aquatic life, and terrestrial wildlife that utilize riparian corridors. As further described in the SMP (Sections 8.D.1-3, 13), the City also is engaging in a number of projects implementing WRIA 9 actions and the Green/Duwamish Ecosystem Restoration Project (ERP). The ERP is cooperative effort between 16 local governments, Indian Tribes, the State of Washington, NOAA Fisheries Service, the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, and many other organizations and private citizens. Funding is certain for many of these projects, and the effect of those projects will also be to improve habitat function and other ecosystem-wide processes.</p>	
Springbrook Creek	<p>The two industrial parcels to either side of the stream are developed, with buildings between 100 and 200 feet from the ordinary high water mark, and parking areas 50 or more feet from the ordinary high water mark. Some riparian plantings and LWD have</p>	<p><b>Future Development:</b> While the specific uses within the developed footprint of the Springbrook Creek shoreline may change, the impervious footprint is not expected to increase and remaining vegetation is not expected to be cleared or altered.</p> <p><b>Functions/Processes Impacted:</b> No new impacts to functions or processes are expected, except possible improvements to adjacent stormwater runoff management which</p>	<p>Same as above for High Intensity – Green River, other than the setback discussion.</p>	<p>Same as items #1-3 above in High Intensity for Green River.</p>	<p>No net loss of ecological functions is expected as no alterations to the existing conditions in this environment along Springbrook Creek are likely to occur.</p>



Shoreline Segment	Existing Conditions	Likely Development / Functions or Processes Potentially Impacted	Effect of SMP Provisions	Effect of Other Development and Restoration Activities / Programs	Net Effect
	been installed by the City in the narrow strip of park land that parallels the creek on the east side.	may support improved water quality.			

THIS PAGE INTENTIONALLY LEFT BLANK