Planning Commission Meeting Date: June 4, 2015 Agenda Item

PLANNING COMMISSION AGENDA ITEM

CITY OF SHORELINE, WASHINGTON

AGENDA TITLE: **Discussion of Critical Areas Ordinance Update - Wetlands**
DEPARTMENT: **Planning & Community Development**
PRESENTED BY: **Juniper Nammi, AICP, Associate Planner**
Paul Cohen, Planning Manager

☐ **Public Hearing** ☒ **Study Session** ☐ **Recommendation Only**
☐ **Discussion** ☐ **Update** ☐ **Other**

INTRODUCTION

The City of Shoreline began the State required periodic update process of the Critical Areas Ordinance (CAO) in Shoreline Municipal Code (SMC) Chapter 20.80 of the Development Code in May. The State of Washington Growth Management Act (GMA) requires the City of Shoreline to periodically update the Comprehensive Plan, Master Plans, and development regulations. The CAO is the final section of development regulations requiring update under this process. The City is required to complete the current periodic update cycle in 2015.

The purpose of this study session is to:

- Review the public comments received to date.
- Review staff recommended code amendments for Chapter 20.80 Critical Areas, Subchapter 4-Wetlands (SMC 20.80.310 through 20.80.350), and associated definitions (SMC Chapter 20.20) and exemptions (SMC 20.80.030).
- Review staff recommended code amendments for Shoreline Master Program (SMP) Chapters 20.210 Definitions, and 20.230.030 Environmentally sensitive areas within the shoreline.
- Respond to questions.
- Receive feedback from the Commission on the proposed amendments.
- Determine what proposed changes may need more research or analysis.
- Develop recommended code amendments to the CAO Wetlands Subchapter, SMP critical area regulations and associated definitions and provisions for the public hearing.

BACKGROUND

The Commission was introduced to the Critical Areas Ordinance periodic update requirements, as mandated by the Growth Management Act, on May 21, 2015. A summary of the State requirements, history of the CAO, and proposed direction for the code updates is in the staff report from the May 21, 2015, Planning Commission meeting.

Approved By: **Project Manager** ____ **Planning Director** ____

The Planning Commission reviews and makes recommendations to Council on the critical area regulations because they are part of the Title 20 Development Code and include regulations that govern environmental protection, which is the stated purpose of the Planning Commission under SMC 2.20.010 and SMC 2.20.060(B).

The decision criteria for these planned Development Code amendments are found in SMC 20.30.350:

> ***B. Decision Criteria.*** *The City Council may approve or approve with modifications a proposal for the text of the Land Use Code if:*
>
> *1. The amendment is in accordance with the Comprehensive Plan; and*
>
> *2. The amendment will not adversely affect the public health, safety or general welfare; and*
>
> *3. The amendment is not contrary to the best interest of the citizens and property owners of the City of Shoreline.*

The City of Shoreline Comprehensive Plan was updated in December 2012 in compliance with the periodic update requirements of the Growth Management Act. The updated Comprehensive Plan added Element 6-Natural Environment as a new element specifically supporting the City's responsibility for protection of the natural environment. Many of the policies existed previously, but were identified as important enough to move into their own detailed element. The Comprehensive Plan goals and policies that support the regulation of land use to protect wetlands include:

GOALS

Goal NE I. Minimize adverse impacts on the natural environment through leadership, policy, and regulation, and address impacts of past practices where feasible.

Goal NE II. Lead and support efforts to protect and improve the natural environment, protect and preserve environmentally critical areas, minimize pollution, and reduce waste of energy and materials.

Goal NE IV. Protect, enhance, and restore habitat of sufficient diversity and abundance to sustain indigenous fish and wildlife populations.

Goal NE VI. Manage the stormwater system through the preservation of natural systems and structural solutions in order to:

- Protect water quality;
- Provide for public safety and services;
- Preserve and enhance fish and wildlife habitat, and critical areas;
- Maintain a hydrologic balance; and
- Prevent property damage from flooding and erosion.

Goal NE VIII. Preserve, protect, and where feasible, restore wetlands, shorelines, and streams for wildlife, appropriate human use, and the maintenance of hydrological and ecological processes.

POLICIES

General

NE2. Preserve environmental quality by taking into account the land's suitability for development, and directing intense development away from *critical areas*.

NE3. Balance the conditional right of private property owners to develop and alter their land with protection of native vegetation and critical areas.

Vegetation Protection

NE20. Minimize clearing and grading if development is allowed in an environmentally critical area or critical area buffer.

Wetlands and Habitat Protection

NE23. Participate in regional species protection efforts, including salmon habitat enhancement and restoration.

NE24. Preserve critical wildlife habitat, including those identified as *priority species or priority habitats* by the Washington Department of Fish and Wildlife, through regulation, acquisition, incentives, and other techniques. Habitats and species of local importance will also be protected in this manner.

NE25. Strive to achieve a level of no net loss of wetlands function, area, and value within each drainage basin.

NE26. Restore existing degraded wetlands where feasible.

NE27. Focus on wetland and habitat restoration efforts that will result in the greatest benefit for areas identified by the City as priority for restoration.

PROPOSAL & ANALYSIS

Proposal Summary

The focus of today's study session is changes for the critical area regulations, and definitions in the Shoreline Master Program and the Wetland subchapter of the Critical Areas Ordinance regulations. Currently, the City has two distinctly different sets of regulations for wetlands and floodplains. The City would like to have consistent critical area regulations throughout the City.

With the 2013 adoption of the City's Shoreline Master Program (SMP), the City incorporated best available science and included the DOE wetland rating system and recommended buffer and modification standards in the SMP. The wetland regulations in the CAO do not meet this standard. Staff recommends updating the CAO wetland regulations for consistency with BAS and consolidation of the wetland regulations into one chapter for consistency and ease of administration.

Floodplain management regulations were incorporated into the 2013 SMP in two ways. They were incorporated by reference to the Critical Areas Ordinance and not excluding the Flood Hazard Areas subsections. Floodplain specific policies and regulations were also adopted directly in the text of the SMP under SMC 20.230.030(2). Staff recommends deleting the text regulations in the SMP and confirming the applicability of the Flood Hazard Areas and Floodplain Management sections updated to incorporate BAS in 2012.

The staff proposed revisions to the wetlands section of the CAO basically moves the regulations adopted in the SMP over into Chapter 20.80 Critical Areas with the following additions:

- Add definitions that are currently not included in the CAO or SMP for clarity;
- Update the rating system and function points references for consistency with the 2014 Update of the State's wetlands ratings system;
- Revise exemptions and allowed activities language so cumulative impacts from small changes are mitigated;
- Add mapping references for clarity;
- Regulated activities section from SMP is covered by the applicability language in the critical areas general provisions so inclusion of this section is not recommended.
- Development standards section added based on policies in the SMP and SMC 20.80.340 Alterations in order to provide clear standards for when alterations are allowed, allowed with mitigation, or require a reasonable use permit, special use permit, or shoreline variance.
- Report requirements for wetland critical area reports added for clarity and predictability so it is easier to determine when all the required information is included in a critical area report or not.
- Provision allowing development in required buffers that are physically separated or functionally isolated where BAS and site specific investigation indicates there is no benefit to the critical area to protect or improve those areas.
- Retention of the Wetlands Performance Standards and Monitoring and Contingency Plan requirements as standards to augment the compensatory mitigation plan requirements from the SMP for clarity and predictability.

The existing sections to be discussed include:

Chapter 20.210 SMP Definitions

Chapter 20.230 SMP Shoreline Policies and Regulations, including:
20.230.030 Environmentally sensitive areas within the shoreline

Chapter 20.20 Definitions, including:
20.20.010 A definitions.
20.20.012 B definitions.
20.20.014 C definitions.
20.20.034 M definitions.
20.20.036 N definitions.
20.20.044 R definitions.
20.20.054 W definitions.

Chapter 20.80 Critical Areas, Subchapter 1. Critical Areas – General Provisions, including:

20.80.030 Exemptions.

Chapter 20.80 Critical Areas, Subchapter 4. Wetlands

20.80.310 Purpose.
20.80.320 Designation, delineation and classification
20.80.330 Required buffer areas.
20.80.340 Alteration.
20.80.350 Mitigation performance standards and requirements.

In addition to revisions to the above listed sections, the following new sections are proposed:

20.80.323 WETLANDS – Development standards. (includes standards to replace 20.80.340)

20.80.326 WETLANDS – Critical Area Report requirements.

20.80.360 WETLANDS - Unauthorized alterations and enforcement.

Shoreline Master Program – SMC 20.210 Definitions and 20.230.030

Environmentally sensitive areas within the shoreline

The Shoreline Master Program (SMP) is one of the elements required by the Washington State Growth Management Act and the Shoreline Management Act. The purpose of the SMP is to adequately manage shorelines to protect ecological functions and values, public safety, and private property rights. The jurisdiction of the SMP is an overlay from the middle of Puget Sound between the north and south boundaries of the City to the shoreline and 200 foot landward from the Ordinary High Water Mark (OHWM) of Puget Sound (designated Shorelines of the State). The SMP contains many of the same types of regulations that the general Development code includes, but the standards development require more oversight and are more limited due to the need to protect the ecological functions and public's interest in the shorelines' values.

The current SMP was adopted in 2013 to meet the Growth Management Act periodic update requirements. Critical area regulations are required to be incorporated into the SMP. The City adopted Chapter 20.80 Critical Areas by incorporation into the SMP in SMC 20.230.030(A)(1) and exempt sections that did not meet the requirements of the SMP in SMC 20.230.030(A)(1)(a-h).

At the time of the SMP, adoption the City's wetland regulations did not meet the Washington State Department of Ecology (WA DOE) requirements for incorporating Best Available Science, so Subchapter 4 was excluded from incorporation in the SMP. Alternate policies and regulations for wetlands were adopted in the SMP in SMC 20.230.030(C) giving the City two separate sets of regulations for wetlands.

Additionally, the Flood Hazard Areas regulations were updated to comply with endangered species act and required by Federal Emergency Management Agency (FEMA) and the WA DOE. This process was concurrent with the SMP update project but was concluded prior to the adoption of the new SMP. This resulted in both incorporation of the Flood Hazard Area regulation in SMC 20.80.360 through 20.80.410,

then replaced with SMC 13.12 prior to the SMP adoption and inclusion of Floodplain Management regulations in SMC 20.230.030(B).

The proposed revisions to the Shoreline Master Program, included in **Attachment A,** are meant to eliminate duplicate regulations and incorporate by reference the updated Critical Areas regulations for all types of critical areas. These proposed regulations were sent to the WA DOE staff for preliminary review May 29, 2015. WA DOE approval of adopted SMP and CAO changes are required for the regulations to go into effect in the shoreline jurisdiction (200 feet landward of the ordinary high water mark).

The following is a summary of the revisions proposed to the wetlands and floodplain management regulations in the SMP as well as related definitions.

SMC 20.210.010 SMP Definitions

The purpose of this code section is to define terms as they shall be applied within the area regulated by the Shoreline Master Program. They are augmented by the definitions in SMC Chapter 20.20, but where they differ, the definitions in SMC 20.210.010 shall prevail in the shoreline jurisdiction. The definitions included in Attachment A, include all definitions that relate to critical areas, but only definitions that are to be moved to SMC 20.20 or are already duplicated by definitions in SMC 20.20 are proposed for deletion.

The definitions to be deleted and replaced by a definition in SMC 20.20 include:

Native Vegetation
Restoration
Wetland Delineation
Wetlands

The replacement definitions are on pages 1 through 4 of Attachment B.

SMC Chapter 20.230
SMP Shoreline Policies and Regulations

Section 20.230.030 Environmentally sensitive areas within the shoreline
Subsection A. Critical Areas
General Regulations

This section of the SMP incorporates the critical area regulations in Chapter 20.80 as the regulations to apply in the shoreline jurisdiction. It specifically identifies Ordinance 398, adopted in February 2006. The section goes on to specify sections that are excluded from incorporation. These include Exemptions and Partial Exemptions in the Critical Areas general provisions because the SMP has its own regulations for exemptions and allowed activities. Additionally, it excludes SMC Chapter 20.80, Subchapter 4 – Wetlands.

The proposed revisions to this section would update the ordinance reference to include the updated Critical Areas Ordinance that is currently being reviewed with Planning

Commission. Second, the exclusions of the sections regulating wetlands would be deleted so that the new wetlands subchapter is incorporated into the SMP.

Section 20.230.030 Environmentally sensitive areas within the shoreline Subsection B. Floodplain Management

The current SMP incorporates SMC sections 20.80.360 through 20.80.410, which were updated prior to adoption of the SMP to refer to SMC Chapter 13.12 Floodplain Management. The updated of the Flood Hazard Areas regulations was completed in 2012 to meet state and federal requirements to bring these standards into compliance with the Endangered Species Act and Best Available Science. The City adopted regulations based on the model ordinance developed by FEMA specifically for Region 10 and based on best available science for floodplain management in our region.

The proposed changes to the SMP would delete SMC 20.230.030(B) as it is duplicated by the current Flood Hazard Areas and Floodplain Management regulations. If required by WA DOE, Ordinance No. 641, adopted in 2012, can be referenced for incorporation specifically in 20.230.030(A)(1).

Section 20.230.030 Environmentally sensitive areas within the shoreline Subsection C. Wetlands

At the time of adoption of the SMP the City's wetland regulation in Chapter 20.80 did not meet the WA DOE requirements for incorporation of Best Available Science. In order to complete adoption of the SMP prior to this CAO update process, the state required Shoreline to incorporate separate regulations for wetlands in the SMP and not have the wetlands standards in Chapter 20.80 apply within the shoreline jurisdiction.

Now that Chapter 20.80 is being updated, the new wetlands regulations will incorporate BAS and are intended to meet the requirements of both the city-wide regulation of critical areas and the regulation of critical areas in the shoreline jurisdiction. In order to facilitate this dual function of one set of regulations, staff is proposing that the wetland regulations in SMC 20.230.030(C)(2) be moved to Chapter 20.80 to be incorporated into and replace the existing wetlands regulations in the CAO. The SMP Wetlands regulations are based on the sample wetlands chapter developed by the WA DOE as guidance for small cities in Western Washington.

The SMP wetlands policies in SMC 20.230.030(C)(1) are replaced both with the specific regulations moved from SMC 20.230.030(C)(2) and section proposed by staff to be added for clarity and predictability.

In addition, the WA DOE published an updated Wetland Rating System in 2014, after the adoption of the SMP. The proposal to move the SMP Wetlands regulations over to the Chapter 20.80 includes updating those regulations for consistency with the Washington State Wetland Ratings System for Western Washington, 2014 Update (Ecology Publication 14-06-029).

SMC 20.80 Critical Areas, Subchapter 4. Wetlands and related definitions and exemptions SMC 20.20, SMC 20.80.030, and SMC 20.80.310 through 20.80.350

The GMA specifically identifies the types of critical areas that cities and counties must include in their regulations. Wetlands are included as critical areas because of the numerous functions and values they provide ecologically and economically, contributing to public health, safety, and welfare.

The proposed revisions to the wetlands subchapter of the critical area regulations are included in **Attachment B**. The existing code in SMC Chapter 20.20 and Chapter 20.80 is normal text. Provisions moved from SMC 20.210 or 20.230 of the SMP are single underlined. Changes based on the DOE example code, other jurisdictions codes, or drafted by staff are double underlined. Provisions to be deleted, whether existing in 20.20 and 20.80 or from the SMP originally, are strike-through text.

The Washington State Department of Ecology *Wetlands & CAO Updates: Guidance for Small Cities, Western Washington Version (Publication #10-06-002, 2nd Revision October 2012)* is included as **Attachment C** as a summary reference of the state guidance for incorporation of Best Available Science in Critical Areas Ordinance updates as it pertains to wetlands in Western Washington. This attachment includes the Sample Wetlands Chapter, in Appendix A, which is referred to in the notes in the proposed code as the DOE example code. It also includes a limited list of wetland definitions for Western Washington in Appendix B.

The GMA requires inclusion of BAS in the update of the CAO at a minimum. The documents reviewed by the City to better understand current wetland BAS are listed later in the report for reference and inclusion in the record. The publications referenced throughout this report can be found in that list. Staff relied primarily on synthesis and guidance documents provided by the WA DOE to determine what the state considers to be the current best science for wetlands.

In addition to reviewing BAS and state guidance documents for developing wetlands regulations, staff reviewed the wetland regulations of three similar cities in the region – Edmonds, Issaquah, and Burien. These were compared with the current City of Shoreline CAO regulations for wetlands and the WA DOE example code. In the case of Edmonds and Burien, draft CAO updates (as of May 2015) were reviewed rather than existing regulations. These code comparisons of key sections that must incorporate best available science are included in **Attachment D**.

SMC 20.20 Definitions

The purpose of this code section is to define terms as they shall be applied throughout the City of Shoreline. Definitions related to critical areas are not located in a separate section from all regulatory definitions in the SMC. An excerpt of SMC 20.20 including existing definitions that related to all critical areas was included with the May 21 Planning Commission Agenda Packet, as Attachment A. Within the shoreline jurisdiction (SMP) the definitions in SMC 20.210.010 shall prevail. The definitions included in Attachment B, include all definitions that relate to critical areas for reference. Only definitions that are to be moved to SMC 20.20 or are already duplicated by definitions in SMC 20.20 are proposed for deletion. New definition language is primarily based WA

DOE guidance, whether added from state guidance publications or moved from the SMP.

The definitions to be deleted, added, edited, or moved from the SMP (SMC 20.210) include:

Compensatory Mitigation – added
Mitigation – edited
Native Vegetation, Native Plant(s) – moved from SMP
Restoration – edited to incorporate SMP language
Water Dependent Use – deleted
Wetland Creation – added
Wetland Delineation – moved from SMP
Wetland Edge – edited to incorporate SMP language
Wetland Enhancement – added
Wetland, Forested – deleted
Wetland, Isolated – deleted
Wetland Re-establishment – added
Wetland Rehabilitation – added
Wetlands – edited to incorporate SMP language and RCW 36.70A.030(21)

Some of the added definitions - such as wetland enhancement, wetland re-establishment, and wetland rehabilitation - can be generalized to apply to other types of critical areas. If there are other terms used in the code that would benefit from being defined, please let staff know so they can look for example language for those terms.

SMC Chapter 20.80 Critical Areas
Subchapter 1. Critical Areas – General Provisions
SMC 20.30.030 Exemptions

This section lists activities that are exempted from the provisions of SMC Chapter 20.80. It was not incorporated into the SMP. Changes are proposed one of these exemptions.

Exemption 20.80.030(E) is specific to wetlands and not supported by science so is proposed for removal. New provision SMC 20.80.323(E) is intended to replace this exemption and incorporate BAS.

The best available science synthesis from WA DOE indicates that the loss of and impacts to small and isolated wetlands are one of the most common cumulative impacts on wetlands and wildlife in Washington (Ecology Publication # 05-06-008). Ecology allows for exemption of small, isolated wetlands however, the impacts to those wetlands when altered cannot be exempted from the requirement to provide compensatory mitigation for those impacts (Ecology, Publication #*10-06-002, 2nd Revision)*.

SMC Chapter 20.80 Critical Areas
Subchapter 4. Wetlands.

The majority of the new regulations proposed for the wetlands subchapter are derived from the regulations that were adopted in the SMP in 2013. The language was provided

to staff by the WA DOE and is primarily modeled after the example code in Appendix A of Attachment C. It is reasonable to conclude that the SMP Wetlands regulations adequately incorporate BAS to meet the GMA requirements, so long as the Wetland Rating System references and related buffer requirements are updated for consistency with the 2014 Update of the Wetland Rating System for Western Washington (Ecology, Publication #13-06-11).

Additional provisions have been added or retained in the proposed regulations to provide clarity and predictability in the administration of these regulations. Some of the additions are modeled on the WA DOE example code (Ecology Publication #*10-06-002, 2nd Revision* and Publication #05-06-008) and others are drawn from the regulations of other cities in the region.

SMC 20.80.310 WETLANDS – Purpose.

This section reiterates the definition of wetlands (consistent with RCW 36.70A.030(21), identifies why they are regulated, and states the City's goals for regulation of this type of critical area. No substantive changes are proposed to this section, only typo corrections.

SMC 20.80.320 WETLANDS – Designation, delineation, mapping and rating.

This subchapter first defines Wetlands and describes how they are to be identified. The Revised Code of Washington (RCW) 36.70A.175 requires that wetlands regulated under GMA be delineated in accordance with the manual adopted by the WA DOE. The proposed identification and delineation provisions meet that requirement. The designation provision serves to indicate that any are meeting the criteria of a wetland per the adopted manual and are regulated as a critical area.

The staff recommended edits clarify that this is true regardless of any formal identification. This is consistent with SMC 20.50.360(M) and allows the Director to stop work and require revisions to an already permitted project if an undocumented critical area is discovered.

Critical area maps are identified in the general provision SMC 20.80.020, which indicates that critical area maps are adopted by this chapter. The current CAO and SMP do not specifically identify or list those maps. The new mapping provisions are intended to provide clarity and identify sources of information about known wetland critical areas.

The proposed rating provisions are moved from the SMP to replace the existing wetland type provisions and staff proposes revisions to incorporate the 2014 Update of the Wetland Rating System (Ecology Publication #14-06-029). It is clear from the changes other local jurisdictions are making to their regulations that the WA DOE rating system is consistent with BAS and was strongly recommended by WA DOE staff when City staff inquired about wetland categorization. Adopting standards that use the WA DOE rating system also simplifies critical area reports for projects that may require Joint Aquatic Resources Project Approvals, such as a WA Department of Natural Resources Hydraulic Project Approval or Army Corps of Engineers project approval, because it eliminates the need to rate the wetland according to different local, state and federal standards.

At this time, City staff does not know of any wetlands in the City of Shoreline that would be rated as Category I wetlands. There are probably small number of wetlands that are Category II wetlands with the majority being Category III and IV. The Public Works Surface Water Division is in the process of developing basin plans for all of the watersheds within the City of Shoreline. These basin plans do include rating of some of the identified wetlands in each basin using the state wetland rating system in effect at the time of the plan development. For example, the Boeing Creek Basin Plan rated five wetlands in that basin with the previous version of the wetlands rating system. Four were rated Category III and one was rated Category IV.

SMC 20.230.030(C)(3) Regulated Activities

The SMP currently includes provisions that specifically identify regulated activities. This is one of two general ways to trigger applicability of wetlands and other critical area regulations. The City's CAO currently uses the other approach which integrates review of critical areas throughout the various elements of the development code. Applicability of the critical areas provisions is currently granted in SMC 20.80.025 which states:

> *A. Unless explicitly exempted, the provisions of this chapter shall apply to all land uses and within all zoning designations in the City of Shoreline. All persons within the City shall comply with the requirements of this chapter.*
>
> *B. The City shall not approve any permit or otherwise issue any authorization to alter the condition of any land, water or vegetation or to construct or alter any structure or improvement without first assuring compliance with the requirements of this chapter.*
>
> *C. Approval of a development proposal pursuant to the provisions of this chapter does not discharge the obligation of the applicant to comply with the provisions of this chapter.*
>
> *D. The provisions of this chapter shall apply to any forest practices over which the City has jurisdiction pursuant to Chapter 76.09 RCW and WAC Title 222.*

Staff does not recommend moving the SMP provision for regulated activities into the CAO because it conflicts with the approach taken in the CAO for identifying applicability.

SMC 20.80.323 WETLANDS – Development standards. (NEW)

The current critical areas regulations include exemptions (SMC 20.80.030) and partial exemptions (SMC 20.80.040) for identified activities from the provisions of Chapter 20.80 that apply, in most instances, to all types of critical areas. Some of those exemptions apply only to specific types of critical areas. Impacts may need to be mitigated even if other provisions need not be applied. Other exemptions are better stated at activities that may be allowed within the critical area without a critical area report, but that should be subject to permits required for activities within critical areas in order to verify no impact to the critical area and that best practices are being followed and inspected for the project or activity.

The proposed new section 20.80.323 WETLANDS – Development standards includes provisions that first prohibit activities and uses in wetlands, then provides for exceptions to that prohibition. Allowed Activities are those activities (in addition to the exempted activities in 20.80.030 and 20.80.040) that are allowed without a critical area report. Edits to the language from the SMP provisions for allowed activities are for clarification or to eliminate redundancies. These activities are things that have little to no known impact on wetland and wetland buffer functions and values or are beneficial to the long term health of the wetland.

Subsections C, D, and E are proposed by staff to replace SMC 20.80.340 as there is no similar language in the SMP wetland regulations. This language is intended to clearly state when development is prohibited except when reasonable use of the property would be denied by the critical area regulations or where development can be permitted following the compensatory mitigation provisions of this ordinance.

Subsection F is proposed to replace the SMC 20.80.030(E) to allow for impacts to small, hydrologically isolated, Category IV wetlands without having first to try and avoid the impacts, provided that those impacts are mitigated and under specific conditions.

Subsection G addresses requirements that apply when subdivisions are proposed for lands that include wetland(s) and/or wetland buffer(s). This was previously in the SMP Regulated Activities section.

SMC 20.80.326 WETLANDS – Critical Area Report requirements. (NEW)

Critical area reports are required under the general provision in SMC 20.80.110 and additional clarification is planned for this general provision. Critical area types are regulated for different reasons and the information is needed to evaluate the impacts of a project varies depending on the type.

For example a wetland report would focus on the potential impacts to habitat, hydrology, water quality and other ecological functions. A geologic hazard area report would look at soils and slope stability for risk of landslide, erosion, seismic hazards for life and safety considerations. For this reason it is useful to provide clear report requirements specific for each type of critical area. Standards for critical area reports are intended to answer the question “What does the report need to include?” clearly and predictably regardless of the qualified professional writing the report or the planner reviewing the application. Staff expects that clear report standards, combined with clarification to the qualified professional and third party review standards, will result in better report submittals with less review time or revision requirements. Third party review by a qualified professional contracted by the City adds cost and time to project reviews.

The language proposed in this section combines current SMP text and revisions intended to clarify these SMP provisions. Subsection A identifies when a critical area report is required, who prepared it and who pays for it, as well as, what code provisions are applied to the critical area report.

Subsection B is not from the SMP Wetland regulations. It is intended to augment the requirement in 20.80.110 for preparation of the report to be completed by a qualified

professional. This section also proposes language identifying when review of the critical area reports will be conducted by a third party qualified professional under contract with the City verses when it is done by City staff assigned to review of the project.

Subsection C is intended to identify that there are different levels of detail that a critical area report may include. The need for a general reconnaissance report, a site specific delineation report, or a mitigation report depends on the site and the specific project proposed.

Subsection D comes directly from the SMP wetland regulations with minimal edits to the adopted language. The intent is to clearly state what information should be included in a wetland critical area report for reconnaissance and delineation. The mitigation report requirements are currently located separately in proposed section SMC 20.80.350(H).

Subsection D could be reorganized to refer to general report requirements common to all types of critical areas in a new section in the Critical Areas General Provisions. Alternately, report requirements could be referenced in WA DOE guidance documents rather than included directly in the code. The staff recommendation is to place all the provisions for critical area reports in the applicable subchapter for that type of critical area, so it is all located in one place and applicants do not have to refer to other subchapters or other documents to find the information.

SMC 20.80.330 WETLANDS – Required buffer areas.

The science on wetlands is clear that buffers are necessary to protect wetland functions and values (Ecology Publication #10-06-002, 2nd Revision). The purpose of the wetlands buffer is to protect wetlands from indirect impacts through the retention of adjacent vegetated upland. The science reviewed by WA DOE in the referenced publications provides guidance on buffer characteristics to protect specific wetlands, including widths, but very little direction on how to structure buffer regulations.

Buffers provide the most function and protection for the wetland when they are relatively undisturbed, native vegetation areas adjacent to the critical area. In developed urban areas the buffers are almost always disturbed, may not be native species if they are vegetated, and sometimes are disconnected from the wetland by roads or buildings.

Ecology guidance (Ecology Publication #05-06-008) on buffers suggests that the primary factors to evaluate in determine the buffer width are:

1. The wetland type and functions needing protection;
2. The types of adjacent land uses and their expected land uses; and
3. The characteristics of the buffer area.

The WA DOE example code actual includes four distinct alternatives to determining buffer widths (Ecology Publication #05-06-008 and #10-06-002). The alternatives include:

1. Fixed buffer widths based on wetland category only;

2. Widths based on wetland category and intensity of adjacent land use;
3. Widths based on wetland category, intensity of use, and other function scores and characteristics derived from the wetland rating form; and
4. Widths based only on the habitat function score from the wetland rating form.

Alternative 4 is the version that is currently included in the SMP wetland regulations and is recommended by staff for inclusion in this CAO update. Almost all uses existing or typically allowed in the City are high intensity uses, so varying the buffer based Alternative 2 would not result in any variation except based on wetland category. Alternative 1 provides no flexibility based on the qualities of the wetland. Alternative 3 is complicated to administer, but provides the most flexibility.

All of the WA DOE buffer recommendations are based on a moderate-risk approach to protecting wetland function. Wetland functions will be impacted, but moderately. Smaller buffers would be higher-risk and larger buffers would reduce the risk.

Much of the recommended buffer width is already impacted in developed areas of the City and opportunities for varying buffer width to facilitate enhancement and restoration of buffers when development are proposed in this section. Simply protecting buffers that have been altered from their predevelopment condition will fail to provide the necessary characteristics to protect a wetland. In those cases, requiring restoration to a more naturally vegetated condition can serve as well or better than requiring an increased buffer size (Ecology Publication #05-06-008).

Subsection A establishes standard buffer widths based on the current SMP buffer regulations with revisions to incorporate the 2014 Update of the Wetland Rating System. It also explains how the tables are used and variations in the buffers if mitigations are not implemented or if the buffer is not sufficiently vegetated already to protect the wetland. The provisions following the tables identify circumstances under which buffer widths should be increased or when buffer averaging may be applied.

Subsections B through G provide guidance on measurement, maintenance, buffers for mitigation sites, and what to do when there are overlapping buffers for multiple critical areas. These are similar to the current provisions in the critical areas regulations and are proposed with language from the SMP with little editing.

Subsection H is similar to proposed SMC 20.80.323(B) in that it lists activities allowed in the buffers that might be different from activities allowed in the wetlands themselves. Some of the provisions moved from the SMP in this section duplicate provisions in 20.80.323(B) and 20.80.030(K) as currently proposed. These can be organized so they are not repetitive, or they can be organized so that all the allowed activities for each type of critical area and buffer area has its own complete list of allowed activities.

Staff recommended language adds a new provision to allow for development in buffer areas that are physically separated and functionally isolated from the wetland. These are standard required buffer areas that are interrupted by roads or buildings with the result that they cannot protect the functions of the wetland even if they are enhanced

(Publication #05-06-008). The proposed provision would allow for exclusion of these areas from being designated as buffer with demonstration from a qualified professional that they are in fact functionally isolated from the wetland. This provision could be applied exclusively to wetlands or could be moved or duplicated to apply to streams as well.

Subsection I includes provisions that help to protect wetland buffers during and after development projects such as temporary and permanent fencing and signage. SMC 20.80.060 already includes provisions for permanent signs so this provision is edited to augment the existing general provision.

SMC 20.80.340 Alteration. (moved to 20.80.323)

The current SMC 20.80.340 section setting standards for alteration based on the classification of the wetlands was edited and moved to the new SMC 20.80.323 section setting development standards for wetlands. Knowing when development activities and uses will be allowed in specific types of wetlands and under certain conditions follows logically after activities allowed regardless of wetland type and without critical area reports.

SMC 20.80.350 WETLAND – Compensatory mitigation performance standards and requirements.

A common tool in wetlands regulations in Western Washington is compensatory mitigation. BAS also makes it clear that compensatory mitigation frequently fails to adequately replace wetland area and functions. It is also costly to plan, implement, maintain, and monitor for success. For these reasons, compensatory mitigation is only allowed after it is demonstrated that the impacts of a project cannot be avoided without denying reasonable use of a property. The most common use of mitigation under the current CAO standards is to mitigate the reduction of a buffer width to allow for a larger buildable area on a property.

The proposed CAO revisions (SMC 20.80.323) would allow use of compensatory mitigation for impacts to the more sensitive and valuable wetlands (Categories I, II, and III) only when impacts cannot be avoided and reasonable use cannot be accomplished. Impacts to Category IV wetlands would be more permissible, but still require avoidance if at all possible except in very limited circumstances.

More often compensatory mitigation would be used under the proposed CAO revisions to either avoid increased buffer widths due to existing degraded conditions or for averaging of buffers to allow for reasonable use.
The standards proposed in this section for compensatory mitigation are primarily moved from the SMP wetland regulations, but are supplemented with performance standards and mitigation monitoring and contingency requirements from the current CAO. This section includes provisions for:

1. Timing of mitigation relative to the proposed development project;
2. How much and what type of mitigation is required to replace the functions, values and area of the impacted wetlands and buffers;

3. Where mitigation can occur;
4. Ratios of impacted wetland or buffer to amount of created, reestablished, rehabilitated, enhanced or preserved wetland and buffer;
5. Performance standards for the mitigation projects;
6. Report requirement for mitigation plan reports; and
7. Requirements for monitoring and correcting projects that are not succeeding.

The WA DOE, US Army Corps of Engineers and US Environmental Protection Agency jointly published a report on compensatory mitigation that is referenced in the proposed regulations (Ecology Publication #s 06-06-011a and 06-06-011b). This will help ensure consistency between levels of government and simplify permitting when approvals are required from multiple levels of government.

SMC 20.80.360 WETLANDS – Unauthorized alterations and enforcement. (NEW)

Violations of SMC Title 20 Development code, including Chapter 20.80 are governed in SMC Chapter 20.30 Procedures and Administration, Subchapter 9. Code Enforcement (SMC 20.30.720 through 20.30.790). These provision as mostly general, with specific provision for violations of Chapter 20.80 in SMC 20.30.770(D)(2). These provisions require both restoration of the critical area and apply civil penalties. Specific standards for what restoration entails, what needs to be submitted to demonstrate that the functions and values will be restored are not part of the current Code Enforcement provisions.

The staff proposed provisions in this section are based on the WA DOE example code and edited so they do not duplicate provisions already existing in the Code Enforcement subchapter. These are meant to codify existing policy applied when critical areas are illegally modified and need to be restored. Correction of illegal modifications is needed to help mitigate cumulative impacts to wetland and wetland buffers and should not result in further damage to the critical areas.

Best Available Science

The Washington State Department of Ecology compiled a broad review and synthesis of best available science for wetlands in 2005 and updated that BAS review in 2013. This documentation is the primary source of information guiding the anticipated changes to the wetlands provisions in the CAO.

The following documents are included in the record by reference as the Best Available Science reviewed by the City to inform the update of the wetlands section of the CAO:

Corps of Engineers Wetlands Delineation Manual, Wetlands Research Program Technical Report Y-87-1, January 1987 – Final Report. US Army Corps of Engineers Waterways Experiment Station.

Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0), May 2010, Publication ERDC/EL TR-10-3. US Army Corps of Engineers, Engineering

Research and Development Center, Wetlands Regulatory Assistance Program.

Update on Wetland Buffers: The State of the Science, Final Report, October 2013. Washington State Department of Ecology, Publication #13-06-11.

Washington State Wetland Rating System for Western Washington: 2014 Update, October 2014 – Effective January 2015. Washington State Department of Ecology, Publication #14-06-029.

Wetlands & CAO Updates: Guidance for Small Cities, Western Washington Version, October 2012. Washington State Department of Ecology, Publication #10-06-002, 2nd Revision.

Wetlands in Washington State – Volume 1: A synthesis of the Science. Washington State Department of Ecology, Publication #05-06-006.

Wetlands in Washington State – Volume 2: Guidance for Protecting and Managing Wetlands. Washington State Department of Ecology, Publication #05-06-008.

Wetland Mitigation in Washington State – Part 1: Agency Policies and Guidance – Version 1, March 2006. Washington State Department of Ecology Publication # 06-06-011a.

Wetland Mitigation in Washington State – Part 2: Developing Mitigation Plans (Version 1), March 2006. Washington State Department of Ecology Publication No. 06-06-011b.

Public Comment

Comments and suggestions received at the May Critical Area Conversation events and via mail, email, website, in person, and phone to date have been complied. These comments are included for the records in **Attachments E, F, and G**.

Comments generally indicated that attendees value protection of critical areas and do not want the regulations to be less protective than they currently are. Some comments address tree removal in critical areas both for and against allowing tree removal for views. Information was also submitted referencing science resources for geologic hazard areas, and in particular regarding biological and vegetative stabilization and management of these areas.

Staff is still reviewing the comments and information submitted, but has not identified any specific code changes to make in response to these comments at this time. Planning Commission is asked to inform staff of any areas of additional research they would like considered during the development of the updates to the critical areas regulations.

Additionally, the City has received public comment questioning the adequacy of the public outreach and participation opportunities to date. City staff compiled the following documentation of the means used to date for notification of the project as a whole and the May Community Conversation meetings as well as the scheduled Planning Commission and City Council meetings.

"City staff has updated the Critical Areas webpage Shorelinewa.gov/critical-areas to include a link to the City's current critical area regulations along with other links to information that may be helpful. Your points were well taken that making this information easy to find would be helpful for interested residents.

"You also had comments regarding notification to the public about the Conversation meetings. I did want to let you know that the notification in the May issue of Currents was not the City's only notification method to the public. Here are the other means that were used:

- *2/25 - City's Critical Areas project webpage with meeting information published*
- *2/26 – Announcement at the Park, Recreation & Cultural Services Board meeting*
- *3/4 – Announcement at the Council of Neighborhoods Meeting*
- *3/31 – April ENews announcement via Alert Shoreline for Neighborhood News. This goes to 1,579 subscribers. Below is a copy of that notification:*
  - ***Critical Areas Conversation - Public Meeting Tuesday, May 5, 6:30-8:30 pm** at Richmond Beach Library. Learn about the update of our regulations of natural areas. An eastside meeting is scheduled for Thursday, May 14 at North City Water. Information and meeting details: Critical Areas.*

- *4/1 – City Calendar entries were published on City's website*
- *5/7 – May ENews announcement via Alert Shoreline for Neighborhood News. Notification of the 5/14 meeting.*
- *Delivered to City households by 5/1 - May Currents article*
- *5/4 & 5/11 – City Manager Report at the City Council Meeting*
- *Twitter reminders on the days of the Conversation meetings"*

The City will continue to use the Currents newsletter, City website, Alert Shoreline announcements, Twitter, and reminders in reports to City boards and councils to communicate about the upcoming public meetings scheduled with Planning Commission and Council for this project.

In addition, any interested person can provide their email address to Juniper Nammi, project manager, to request direct updates and reminders for this project. May 21, 2015 a reminder of the Planning Commission meeting schedule, was sent to all community members who requested updates on the May community meeting sign in sheets. The reminder included the following:

SCHEDULE

The current schedule for Planning Commission study sessions and public hearing is:

- *May 21 – Introduction and Overview*
- ***June 4 – Wetlands and Shoreline Master Program (Current meeting)***
- *June 18 – Geologic Hazard Areas (tentative)*
- *July 2 – Streams and General Critical Area Provisions (tentative)*
- *July 16- Public Hearing and Recommendation (tentative)*

City Council review and adoption is tentatively scheduled for August-September 2015, with staff update to handouts, forms, processes, and permitting tools to follow thereafter. A more detailed project work plan is included as Attachment A.

The State deadline for completing these updates is June 30, 2015. While there are no immediate ramifications for not meeting the deadline, a number for State grant programs are tied to compliance with the GMA and cannot be awarded if we are not in compliance. Shoreline would be considered to be in compliance if we are not more than twelve months past the deadline and demonstrate substantive progress towards compliance.

This legislative action is subject to the State Environmental Policy Act (SEPA) and notification of the proposed changes must go to the Washington State Department of Commerce and Department of Ecology. The timing of the SEPA Determination and noticing will depend on whether the current schedule is adjusted or not.

RECOMMENDATION

No decision is required of the Planning Commission at this time. This meeting is to discuss the first of three sets of staff recommended update to the Critical Area Ordinance. Questions and feedback from Planning Commission on the proposed Wetlands and SMP code language are requested at this time towards development of a recommended code update package for the public hearing.

ATTACHMENTS

Attachment A – CAO Subchapter 4-Wetlands_June2015
Attachment B – SMP draft code_June2015
Attachment C – Wetlands & CAO Updates Guidance for Small Cities 2010
Attachment D – Wetlands code comparison_May 2015
Attachment E – CAO Community Meeting notes May 2015
Attachment F – 5.14.15_Meeting_submission
Attachment G – 5.07.15_Email_submission_Marine Bluff workshops

Title 20

DEVELOPMENT CODE

Division II. Shoreline Master Plan

20.210.010 Definitions.

The Master Program shall be implemented according to the definitions contained in Chapter 20.20 SMC, Chapter 90.58 RCW, and WAC 173-26-020. Where definitions contained in Chapter 20.20 SMC conflict or differ from definitions contained in the Shoreline Management Act, the definitions in the RCW and WAC shall prevail.

Accretion. May be either natural or artificial. Natural accretion is the buildup of land, solely by the action of the forces of nature, on a beach by deposition of water- or airborne material. Artificial accretion is a similar buildup of land by reason of an act of man, such as the accretion formed by a groin, breakwater, or beach fill deposited by mechanical means.

Anadromous Fish. Fish born in fresh water, which spend most of their lives in the sea and return to fresh water to spawn. Salmon, smelt, shad, striped bass, and sturgeon are common examples.

Associated Wetlands. Those wetlands that are in proximity to and either influence, or are influenced by, tidal waters or a lake or stream subject to the Shoreline Management Act. Refer to WAC 173-22-030(1).

Enhancement. Alteration of an existing resource to improve or increase its characteristics and processes without degrading other existing functions. Enhancements are to be distinguished from resource creation or restoration projects.

Feasible. An action, such as a development project, mitigation, or preservation requirement, shall meet all of the following conditions:

A. The action can be accomplished with technologies and methods that have been used in the past in similar circumstances, or studies or tests have demonstrated in similar circumstances that such approaches are currently available and likely to achieve the intended results;

B. The action provides a reasonable likelihood of achieving its intended purpose; and

C. The action does not physically preclude achieving the project's primary intended legal use.

In cases where these guidelines require certain actions unless they are infeasible, the burden of proving infeasibility is on the applicant. In determining an action's infeasibility, the reviewing agency may weigh the action's relative public costs and public benefits, considered in the short- and long-term time frames.

Flood Control. Any undertaking for the conveyance, control, and dispersal of floodwaters caused by abnormally high direct precipitation or stream overflow.

Geotechnical Report or Analysis. A scientific study or evaluation conducted by a qualified expert that includes a description of the ground and surface hydrology and geology, the affected landform and its susceptibility to mass wasting, erosion, and other geologic hazards or processes, conclusions and recommendations regarding the effect of the proposed development on geologic conditions, the adequacy of the site to be developed, the impacts of the proposed development, alternative approaches to the proposed development, and measures to mitigate potential site-specific and cumulative geological and hydrological impacts of the proposed development, including the potential adverse impacts to adjacent and down-current properties. Geotechnical reports shall conform to accepted technical standards and must be prepared by qualified professional engineers or geologists who have professional expertise about the regional and local shoreline geology and processes.

Grading. The movement or redistribution of the soil, sand, rock, gravel, sediment, or other material on a site in a manner that alters the natural contour of the land.

Ground Water Recharge. A hydrologic process where water moves downward from surface water to ground water. Recharge occurs both naturally (through the water cycle) and anthropologically (i.e., "artificial ground water recharge"), where rainwater and/or reclaimed water is routed to the subsurface.

Hydric Soil. Soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper soil horizon(s).

~~**Native Vegetation.** Vegetation comprised of plant species, other than noxious weeds, that are indigenous to the coastal region of the Pacific Northwest and which reasonably could have been expected to naturally occur on the site. Examples include trees such as madrona, Douglas fir, western hemlock, western red cedar, alder, big leaf maple, and vine maple; shrubs such as willow, elderberry, salmonberry, and salal; and herbaceous plants such as sword fern, foam flower, and fireweed.~~

Moved to SMC 20.20.036.

Native Vegetation Conservation Area. Vegetated area between the native vegetation setback line and the ordinary high water mark.

Native Vegetation Setback Line. Unless otherwise indicated within this Master Program, the line that establishes the limits of all buildings, fencing and impervious surfaces along the shoreline.

Normal Maintenance. Usual acts to prevent a decline, lapse, or cessation from a lawfully established condition.

Normal Repair. To restore a development to a state comparable to its original condition, including but not limited to its size, shape, configuration, location and external appearance, within a reasonable period after decay or partial destruction, except where repair causes substantial adverse effects to shoreline resource or environment. Replacement of a structure or development may be authorized as repair where such replacement is the common method of repair for the type of structure or development and the replacement structure or development is comparable to the original structure or development including but not limited to its size, shape, configuration, location and external appearance

and the replacement does not cause substantial adverse effects to shoreline resources or environment.

Ordinary High Water Mark (OHWM). OHWM on all lakes, streams, and tidal water is that mark that will be found by examining the bed and banks and ascertaining where the presence and action of waters are so common and usual, and so long continued in all ordinary years, as to mark upon the soil a character distinct from that of the abutting upland, in respect to vegetation as that condition exists on June 1, 1971, as it may naturally change thereafter, or as it may change thereafter in accordance with permits issued by a local government or the Department; provided, that in any area where the ordinary high water mark cannot be found, the ordinary high water mark adjoining salt water shall be the line of mean higher high tide and the ordinary high water mark adjoining fresh water shall be the line of mean high water.

~~**Restoration.** The reestablishment or upgrading of impaired ecological processes or functions. This may be accomplished through measures including but not limited to revegetation, removal of intrusive structures, toxic materials, or invasive or nonnative plants. Restoration does not imply a requirement for returning the area to pre-European settlement conditions.~~

Similar definition in SMC 20.20.044

Riparian. The characteristic of relating to or living or located on the bank of a natural watercourse (as a river) or sometimes of a lake or a tidewater.

~~**Wetland Delineation.** A technical procedure performed by a wetland specialist to determine the area of a wetland, ascertaining the wetland's classification, function, and value, and to define the boundary between a wetland and adjacent uplands. Identification of wetlands and delineation of their boundaries pursuant to this chapter shall be done in accordance with the approved Federal wetland delineation manual and applicable regional supplements. All areas within the City meeting the wetland designation criteria in that procedure are hereby designated critical areas and are subject to the provisions of this program.~~

Moved to SMC 20.20.054

Wetland Delineation moved without any proposed edits.

~~**Wetlands.** Areas that are inundated or saturated by surface water or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands do not include those artificial wetlands intentionally created from nonwetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificial wetlands intentionally created from nonwetland areas to mitigate the conversion of wetlands.~~ (Ord. 668 § 4 (Exh. 3), 2013).

Wetlands combined with existing definition in 20.20.054 and verified for consistency with RCW 36.70A.030(21) as required by the GMA.

Chapter 20.230

SMP Shoreline Policies and Regulations

Sections:

A. **Critical Areas.**

General Policy

1. Preserve and protect unique, rare, and fragile natural and manmade features and wildlife habitats.

2. Enhance the diversity of aquatic life, wildlife, and habitat within the shoreline.

3. Conserve and maintain designated open spaces for ecological, educational, and recreational purposes.

4. Recognize that the interest and concern of the public are essential to the improvement of the environment, and sponsor and support public information programs.

5. The level of public access should be appropriate to the degree of uniqueness or fragility of the geological and biological characteristics of the shoreline (e.g., wetlands, spawning areas).

6. Discourage intensive development of shoreline areas that are identified as hazardous or environmentally sensitive.

General Regulations

1. Critical areas in shoreline jurisdiction are regulated by the critical areas regulations (which were adopted on February 27, 2006, by Ordinance No. 398, and as updated by Ordinance No. XXX adopted on September XX, 2015) codified under Chapter 20.80 SMC, which is herein incorporated into this SMP with the exceptions of the following:

   a. SMC 20.80.030.

   b. SMC 20.80.040.

   ~~c. Chapter 20.80 SMC, Subchapter 4, Wetlands.~~

   ~~d. SMC 20.80.310.~~

   ~~e. SMC 20.80.320.~~

   ~~f. SMC 20.80.330.~~

   ~~g. SMC 20.80.340.~~

Insert reference ordinance numbers and verify that correct sections are listed as exceptions after recommended changes are finalized.

Determine whether ordinances that changed CAO between 398 and current project also need to be listed or not.

~~h. SMC 20.80.350.~~

2. The provisions of Chapter 20.80 SMC, Critical Areas, must be factored into decisions regarding development within the regulated shoreline and associated critical areas.

3. All shoreline uses and activities shall be located, designed, constructed, and managed to protect or at least not adversely affect those natural features which are valuable, fragile, or unique in the region. They should also facilitate the appropriate intensity of human use of such features, including but not limited to:

a. Wetlands, including but not limited to marshes, bogs, and swamps;

b. Fish and wildlife habitats, including streams and wetlands, nesting areas and migratory routes, spawning areas, and the presence of proposed or listed species;

c. Natural or manmade vistas or features;

d. Flood hazard areas; and/or

e. Geologically hazardous areas, including erosion, landslide, and seismic hazard areas.

4. The standards of the City of Shoreline's critical area regulations shall apply within the shoreline jurisdiction, where critical areas are present. If there are any conflicts or unclear distinctions between the Master Program and the City's critical areas regulations, the most restrictive requirements apply as determined by the City.

~~B. **Floodplain Management.** The following policies and regulations must be factored into decisions regarding all flood management planning and development within that portion of the 100-year floodplain that falls within Shoreline's shoreline jurisdiction (within 200 feet of OHWM).~~

~~Floodplain management involves actions taken with the primary purpose of preventing or mitigating damage due to flooding. Floodplain management can involve planning and zoning to control development, either to reduce risks to human life and property, or to prevent development from contributing to the severity of flooding. Floodplain management can also address the design of developments to reduce flood damage and the construction of flood controls, such as dikes, dams, engineered floodways, and bioengineering.~~

SMC 20.80.360 through 20.80.410 Flood Hazard Areas and SMC 13.12 Floodplain Management were incorporated into the SMP under 20.230.030(A) when it was adopted. The policies and regulations in 20.230.030(B) duplicate the standards already incorporated in (A). Inquiry submitted to DOE to confirm whether this proposed change would be acceptable for the SMP.

~~Policy~~

~~1. Flood management planning should be undertaken in a coordinated manner among affected property owners and public agencies and should consider the entire coastal system. This planning should consider off-site impacts such as erosion, accretion, and/or flood damage that might occur if shore protection structures are constructed.~~

~~2. Nonstructural control solutions are preferred over structural flood control devices, and should be used wherever possible when control devices are needed. Nonstructural controls include such actions as prohibiting or limiting development in areas that are historically flooded or limiting increases in peak flow runoff from~~

new upland development. Structural solutions to reduce shoreline damage should be allowed only after it is demonstrated that nonstructural solutions would not be able to reduce the damage.

3. Substantial stream channel modification, realignment, and straightening should be discouraged as a means of flood protection.

4. Where possible, public access should be integrated into the design of publicly financed flood management facilities.

5. The City supports the protection and preservation of the aquatic environment and the habitats it provides, and advocates balancing these interests with the City's intention to ensure protection of life and property from damage caused by flooding.

6. Development should avoid potential channel migration impacts.

Regulations

1. The City shall require and utilize the following information as appropriate during its review of shoreline flood management projects and programs:

a. Stream channel hydraulics and floodway characteristics, up and downstream from the project area;

b. Existing shoreline stabilization and flood protection works within the area;

c. Physical, geological, and soil characteristics of the area;

d. Biological resources and predicted impact to coastal ecology, including fish, vegetation, and animal habitat;

e. Predicted impact upon area, shore, and hydraulic processes, adjacent properties, and shoreline and water uses; and/or

f. Analysis of alternative flood protection measures, both nonstructural and structural.

2. The City shall require engineered design of flood protection works where such projects may cause interference with normal geohydraulic processes, off-site impacts, or adverse effects to shoreline resources and uses. Nonstructural methods of flood protection shall be preferred over structural solutions when the relocation of existing shoreline development is not feasible.

C. **Wetlands.** Presently, the wetlands within the City's shoreline jurisdiction have not been delineated and rated using current State standards. As the wetland category combined with the habitat functions rating defines the required buffers using current State standards, the requirements of this section apply to any new development application in the vicinity of an associated wetland. At that time, the wetland and its buffers would need to be categorized and delineated and the activities would be regulated using the following standards.

Wetlands regulations to be moved to replace SMC 20.80.310 to 20.80.350, including updates to address 2014 Update to Wetland Rating System and standards added for clarity and predictability.

1. **Policy.**

a. Wetland ecosystems serve many important ecological and environmental functions, which are beneficial to the public welfare. Such functions include, but are not limited to, providing food, breeding, nesting and/or rearing habitat for fish and wildlife; recharging and discharging ground water; contributing to stream flow during low flow periods; stabilizing stream banks and shorelines; storing storm and floodwaters to reduce flooding and erosion; and improving water quality through biofiltration, adsorption, and retention and transformation of sediments, nutrients, and toxicants; as well as education and scientific research.

b. Wetland areas should be identified according to established identification and delineation procedures and provided appropriate protection consistent with the policies and regulations of this Master Program.

c. The greatest protection should be provided to wetlands of exceptional resource value, which are defined as those wetlands that include rare, sensitive, or irreplaceable systems such as:

i. Documented or potential habitat for an endangered, threatened, or sensitive species;

ii. High quality native wetland systems as determined by the Washington State Natural Heritage Program;

iii. Significant habitat for fish or aquatic species as determined by the appropriate State resource agency;

iv. Diverse wetlands exhibiting a high mixture of wetland classes and subclasses as defined in the U.S. Fish and Wildlife Service classification system;

v. Mature forested swamp communities; and/or

vi. Sphagnum bogs or fens.

d. 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.

e. The width of the established buffer zone should be based upon the functions and sensitivity of the wetland, the characteristics of the existing buffer, and the potential impacts associated with the adjacent land use.

f. All activities that could potentially affect wetland ecosystems should be controlled both within the wetland and the buffer zone to prevent adverse impacts to the wetland functions.

g. No wetland alteration should be authorized unless it can be shown that the impact is both unavoidable and necessary, and that resultant impacts are offset through the deliberate restoration, creation, or enhancement of wetlands.

h. Wetland restoration, creation, and enhancement projects should result in no net loss of wetland acreage and functions. Where feasible, wetland quality should be improved.

i. Wetlands that are impacted by activities of a temporary nature should be restored immediately upon project completion.

j. In-kind replacement of functional wetland values is preferred. Where in-kind replacement is not feasible or practical due to the characteristics of the existing wetland, substitute ecological resources of equal or greater value should be provided.

k. On-site replacement of wetlands is preferred. Where on-site replacement of a wetland is not feasible or practical due to characteristics of the existing location, replacement should occur within the same watershed and in as close proximity to the original wetland as possible.

l. Where possible, wetland restoration, creation, and enhancement projects should be completed prior to wetland alteration. In all other cases, replacement should be completed prior to use or occupancy of the activity or development.

m. Applicants should develop comprehensive mitigation plans to ensure long-term success of the wetland restoration, creation, or enhancement project. Such plans should provide for sufficient monitoring and contingencies to ensure wetland persistence.

n. Applicants should demonstrate sufficient scientific expertise, supervisory capability, and financial resources to complete and monitor the mitigation project.

o. Proposals for restoration, creation, or enhancement should be coordinated with appropriate resource agencies to ensure adequate design and consistency with other regulatory requirements.

p. Activities should be prevented in wetland buffer zones except where such activities have no adverse impacts on wetland ecosystem functions.

q. Wetland buffer zones should be retained in their natural condition unless revegetation is necessary to improve or restore the buffer.

r. Land use should be regulated to avoid adverse effects on wetlands and maintain the functions and values of wetlands throughout Shoreline, and review procedures should be established for development proposals in and adjacent to wetlands.

2. **Regulations.**

a. **Identification and Delineation.** Identification of wetlands and delineation of their boundaries pursuant to this chapter shall be done in accordance with the approved Federal wetland delineation manual and applicable regional supplements. All areas within the City meeting the wetland designation criteria in that procedure are hereby designated critical areas and are subject to the provisions of this chapter. Wetland delineations are valid for five years; after such date the City shall determine whether a revision or additional assessment is necessary.

b. **Rating.** Wetlands shall be rated according to the Washington Department of Ecology wetland rating system, as set forth in the Washington State Wetland Rating System for Western Washington (Ecology Publication #04-06-025, or as revised and Wetlands Guidance for Small Cities Western approved by Ecology), which contains the definitions and methods for determining whether the criteria below are met.

i. **Category I.** Category I wetlands are: (1) relatively undisturbed estuarine wetlands larger than one acre; (2) wetlands that are identified by scientists of the Washington Natural Heritage Program/DNR as high quality wetlands; (3) bogs; (4) mature and old-growth forested wetlands larger than one acre; (5) wetlands in undisturbed coastal lagoons; and (6) wetlands that perform many functions well (scoring 70 points or more). These wetlands: (1) represent unique or rare wetland types; (2) are more sensitive to disturbance than most wetlands; (3) are relatively undisturbed and contain ecological attributes that are impossible to replace within a human lifetime; or (4) provide a high level of functions.

ii. **Category II.** Category II wetlands are: (1) estuarine wetlands smaller than one acre, or disturbed estuarine wetlands larger than one acre; (2) interdunal wetlands larger than one acre; (3) disturbed coastal lagoons or (4) wetlands with a moderately high level of functions (scoring between 51 and 69 points).

iii. **Category III.** Category III wetlands are: (1) wetlands with a moderate level of functions (scoring between 30 and 50 points); and (2) interdunal wetlands between 0.1 and one acre. Wetlands scoring between 30 and 50 points generally have been disturbed in some ways and are often less diverse or more isolated from other natural resources in the landscape than Category II wetlands.

iv. **Category IV.** Category IV wetlands have the lowest levels of functions (scoring fewer than 30 points) and are often heavily disturbed. These are wetlands that we should be able to replace, or in some

cases to improve. However, experience has shown that replacement cannot be guaranteed in any specific case. These wetlands may provide some important functions, and should be protected to some degree.

c. **Illegal Modifications.** Wetland rating categories shall not change due to illegal modifications made by the applicant or with the applicant's knowledge.

3. **Regulated Activities.**

a. For any regulated activity, a critical areas report (see SMC 20.80.110) may be required to support the requested activity.

b. The following activities are regulated if they occur in a regulated wetland or its buffer:

i. The removal, excavation, grading, or dredging of soil, sand, gravel, minerals, organic matter, or material of any kind;

ii. The dumping of, discharging of, or filling with any material;

iii. The draining, flooding, or disturbing of the water level or water table;

iv. Pile driving;

v. The placing of obstructions;

vi. The construction, reconstruction, demolition, or expansion of any structure;

vii. The destruction or alteration of wetland vegetation through clearing, harvesting, shading, intentional burning, or planting of vegetation that would alter the character of a regulated wetland;

viii. "Class IV – General Forest Practices" under the authority of the "1992 Washington State Forest Practices Act Rules and Regulations," WAC 222-12-030, or as thereafter amended; and/or

ix. Activities that result in:

(A) A significant change of water temperature;

(B) A significant change of physical or chemical characteristics of the sources of water to the wetland;

(C) A significant change in the quantity, timing, or duration of the water entering the wetland; and/or

(D) The introduction of pollutants.

c. **Subdivisions.** The subdivision and/or short subdivision of land in wetlands and associated buffers are subject to the following:

i. Land that is located wholly within a wetland or its buffer may not be subdivided; and

ii. Land that is located partially within a wetland or its buffer may be subdivided; provided, that an accessible and contiguous portion of each new lot is:

(A) Located outside of the wetland and its buffer; and

(B) Meets the minimum lot size requirements of SMC Table 20.50.020(1).

d. **Activities Allowed in Wetlands.** The activities listed below are allowed in wetlands. These activities do not require submission of a critical area report, except where such activities result in a loss of the functions and values of a wetland or wetland buffer. These activities include:

i. Those activities and uses conducted pursuant to the Washington State Forest Practices Act and its rules and regulations, WAC 222-12-030, where State law specifically exempts local authority, except those developments requiring local approval for Class 4 – General Forest Practice Permits (conversions) as defined in Chapter 76.09 RCW and Chapter 222-12 WAC.

ii. Conservation or preservation of soil, water, vegetation, fish, shellfish, and/or other wildlife that does not entail changing the structure or functions of the existing wetland.

iii. The harvesting of wild crops in a manner that is not injurious to natural reproduction of such crops and provided the harvesting does not require tilling of soil, planting of crops, chemical applications, or alteration of the wetland by changing existing topography, water conditions, or water sources.

iv. Drilling for utilities/utility corridors under a wetland, with entrance/exit portals located completely outside of the wetland buffer; provided, that the drilling does not interrupt the ground water connection to the wetland or percolation of surface water down through the soil column. Specific studies by a hydrologist are necessary to determine whether the ground water connection to the wetland or percolation of surface water down through the soil column will be disturbed.

v. Enhancement of a wetland through the removal of nonnative invasive plant species. Removal of invasive plant species shall be restricted to hand removal unless permits from the appropriate regulatory agencies have been obtained for approved biological or chemical treatments. All removed plant material shall be taken away from the site and disposed of appropriately. Plants that appear on the Washington State Noxious Weed Control Board list of noxious weeds must be handled and disposed of according to a noxious weed control plan appropriate to that species. Revegetation with appropriate native species at natural densities is allowed in conjunction with removal of invasive plant species.

vi. Educational and scientific research activities.

vii. Normal and routine maintenance and repair of any existing public or private facilities within an existing right-of-way; provided, that the maintenance or repair does not expand the footprint of the facility or right-of-way.

4. **Wetland Buffers.**

a. **Buffer Requirements.** The standard buffer widths in Table 20.230.031 have been established in accordance with the best available science. They are based on the category of wetland and the habitat score as determined by a qualified wetland professional using the Washington State Wetland Rating System for Western Washington.

i. The use of the standard buffer widths requires the implementation of the measures in Table 20.230.032, where applicable, to minimize the impacts of the adjacent land uses.

ii. If an applicant chooses not to apply the mitigation measures in Table 20.230.032, then a 33 percent increase in the width of all buffers is required. For example, a 75-foot buffer with the mitigation measures would be a 100-foot buffer without them.

iii. The standard buffer widths assume that the buffer is vegetated with a native plant community appropriate for the ecoregion. If the existing buffer is unvegetated, sparsely vegetated, or vegetated with invasive species that do not perform needed functions, the buffer should either be planted to create the appropriate plant community or the buffer should be widened to ensure that adequate functions of the buffer are provided.

iv. Additional buffer widths are added to the standard buffer widths. For example, a Category I wetland scoring 32 points for habitat function would require a buffer of 225 feet (75 + 150).

Table 20.230.031 Wetland Buffer Requirements for Western Washington

Wetland Category	Standard Buffer Width	Additional buffer width if wetland scores 21 – 25 habitat points	Additional buffer width if wetland scores 26 – 29 habitat points	Additional buffer width if wetland scores 30 – 36 habitat points
Category I: Based on total score	75 ft	Add 30 ft	Add 90 ft	Add 150 ft
Category I: Forested	75 ft	Add 30 ft	Add 90 ft	Add 150 ft
Category I: Estuarine	150 ft	NA	NA	NA
Category II: Based on score	75 ft	Add 30 ft	Add 90 ft	Add 150 ft
Category III (all)	60 ft	Add 45 ft	Add 105 ft	NA
Category IV (all)	40 ft	NA	NA	NA

Table 20.230.032 Required measures to minimize impacts to wetlands

(Measures are required, where applicable to a specific proposal)

Disturbance	Required Measures to Minimize Impacts
Lights	Direct lights away from wetland.
Noise	Locate activity that generates noise away from wetland. If warranted, enhance existing buffer with native vegetation plantings adjacent to noise source. For activities that generate relatively continuous, potentially disruptive noise, such as certain heavy industry or mining, establish an additional 10 ft heavily vegetated buffer strip immediately adjacent to the outer wetland buffer.
Toxic runoff	Route all new, untreated runoff away from wetland while ensuring wetland is not dewatered. Establish covenants limiting use of pesticides within 150 ft of wetland. Apply integrated pest management.
Stormwater runoff	Retrofit stormwater detention and treatment for roads and existing adjacent development. Prevent channelized flow from lawns that directly enters the buffer. Use Low Intensity Development techniques (per PSAT publication on LID techniques).
Change in water regime	Infiltrate or treat, detain, and disperse into buffer new runoff from impervious surfaces and new lawns.
Pets and human disturbance	Use privacy fencing OR plant dense vegetation to delineate buffer edge and to discourage disturbance using vegetation appropriate for the ecoregion. Place wetland and its buffer in a separate tract or protect with a conservation easement.
Dust	Use best management practices to control dust.
Disruption of corridors or connections	Maintain connections to off-site areas that are undisturbed. Restore corridors.

v. **Increased Wetland Buffer Area Width.** Buffer widths shall be increased on a case-by-case basis as determined by the Administrator when a larger buffer is necessary to protect wetland functions and values. This determination shall be supported by appropriate documentation showing that it is reasonably related to protection of the functions and values of the wetland. The documentation must include, but not be limited to, the following criteria:

(A) The wetland is used by a plant or animal species listed by the Federal government or the State as endangered, threatened, candidate, sensitive, monitored or documented priority species or habitats, or essential or outstanding habitat for those species or has unusual nesting or resting sites such as heron rookeries or raptor nesting trees; or

(B) The adjacent land is susceptible to severe erosion, and erosion control measures will not effectively prevent adverse wetland impacts; or

(C) The adjacent land has minimal vegetative cover or slopes greater than 30 percent.

vi. Buffer averaging to improve wetland protection may be permitted when all of the following conditions are met:

(A) The wetland has significant differences in characteristics that affect its habitat functions, such as a wetland with a forested component adjacent to a degraded emergent component or a "dual-rated" wetland with a Category I area adjacent to a lower rated area;

(B) The buffer is increased adjacent to the higher functioning area of habitat or more sensitive portion of the wetland and decreased adjacent to the lower functioning or less sensitive portion as demonstrated by a critical areas report from a qualified wetland professional;

(C) The total area of the buffer after averaging is equal to the area required without averaging; and

(D) The buffer at its narrowest point is never less than either three-fourths of the required width or 75 feet for Category I and II, 50 feet for Category III, and 25 feet for Category IV, whichever is greater.

vii. Averaging through a shoreline variance may be permitted when all of the following are met:

(A) There are no feasible alternatives to the site design that could be accomplished without buffer averaging;

(B) The averaged buffer will not result in degradation of the wetland's functions and values as demonstrated by a critical areas report from a qualified wetland professional;

(C) The total buffer area after averaging is equal to the area required without averaging; and

(D) The buffer at its narrowest point is never less than either three-fourths of the required width or 75 feet for Category I and II, 50 feet for Category III and 25 feet for Category IV, whichever is greater.

b. To facilitate long-range planning using a landscape approach, the Administrator may identify and preassess wetlands using the rating system and establish appropriate wetland buffer widths for such wetlands. The Administrator will prepare maps of wetlands that have been preassessed in this manner.

c. **Measurement of Wetland Buffers.** All buffers shall be measured perpendicular from the wetland boundary as surveyed in the field. The buffer for a wetland created, restored, or enhanced as compensation for approved wetland alterations shall be the same as the buffer required for the category of the created, restored, or enhanced wetland. Only fully vegetated buffers will be considered. Lawns, walkways, driveways, and other mowed or paved areas will not be considered buffers or included in buffer area calculations.

d. **Buffers on Mitigation Sites.** All mitigation sites shall have buffers consistent with the buffer requirements of this chapter. Buffers shall be based on the expected or target category of the proposed wetland mitigation site.

e. **Buffer Maintenance.** Except as otherwise specified or allowed in accordance with this chapter, wetland buffers shall be retained in an undisturbed or enhanced condition. In the case of compensatory mitigation sites, removal of invasive nonnative weeds is required for the duration of the mitigation bond (subsection (C)(6)(h)(ii)(A)(8) of this section).

f. **Impacts to Buffers.** Requirements for the compensation for impacts to buffers are outlined in subsection (C)(6) of this section.

g. **Overlapping Critical Area Buffers.** If buffers for two contiguous critical areas overlap (such as buffers for a stream and a wetland), the wider buffer applies.

h. **Allowed Buffer Uses.** The following uses may be allowed within a wetland buffer in accordance with the review procedures of this chapter, provided they are not prohibited by any other applicable law and they are conducted in a manner so as to minimize impacts to the buffer and adjacent wetland:

i. **Conservation and Restoration Activities.** Conservation or restoration activities aimed at protecting the soil, water, vegetation, or wildlife.

ii. **Passive Recreation.** Passive recreation facilities designed and in accordance with an approved critical area report, including:

(A) Walkways and trails; provided, that those pathways are limited to minor crossings having no adverse impact on water quality. They should be generally parallel to the perimeter of the wetland, located only in the outer 25 percent of the wetland buffer area, and located to avoid removal of significant trees. They should be limited to pervious surfaces no more than five feet in width for pedestrian use only. Raised boardwalks utilizing nontreated pilings may be acceptable; and/or

(B) Wildlife viewing structures.

iii. Educational and scientific research activities.

iv. Normal and routine maintenance and repair of any existing public or private facilities within an existing right-of-way; provided, that the maintenance or repair does not increase the footprint or use of the facility or right-of-way.

v. The harvesting of wild crops in a manner that is not injurious to natural reproduction of such crops, and provided the harvesting does not require tilling of soil, planting of crops, chemical applications, or alteration of the wetland by changing existing topography, water conditions, or water sources.

vi. Drilling for utilities/utility corridors under a buffer, with entrance/exit portals located completely outside of the wetland buffer boundary; provided, that the drilling does not interrupt the ground water connection to the wetland or percolation of surface water down through the soil column. Specific studies by a hydrologist are necessary to determine whether the ground water connection to the wetland or percolation of surface water down through the soil column is disturbed.

vii. Enhancement of a wetland buffer through the removal of nonnative invasive plant species. Removal of invasive plant species shall be restricted to hand removal. All removed plant material shall be taken away from the site and disposed of appropriately. Plants that appear on the Washington State Noxious Weed Control Board list of noxious weeds must be handled and disposed of according to a noxious weed control plan appropriate to that species. Revegetation with appropriate native species at natural densities is allowed in conjunction with removal of invasive plant species.

viii. **Stormwater Management Facilities.** Stormwater management facilities are limited to stormwater dispersion outfalls and bioswales. They may be allowed within the outer 25 percent of the buffer of Category III or IV wetlands only; provided, that:

(A) No other location is feasible;

(B) The location of such facilities will not degrade the functions or values of the wetland; and

(C) Stormwater management facilities are not allowed in buffers of Category I or II wetlands.

ix. **Nonconforming Uses.** Repair and maintenance of nonconforming uses or structures, where legally established within the buffer, provided they do not increase the degree of nonconformity.

i. **Signs and Fencing of Wetlands and Buffers.**

i. **Temporary Markers.** The outer perimeter of the wetland buffer and the clearing limits identified by an approved permit or authorization shall be marked in the field with temporary "clearing limits" fencing in such a way as to ensure that no unauthorized intrusion will occur. The marking is subject to inspection by the Administrator prior to the commencement of permitted activities. This temporary marking shall be maintained throughout construction and shall not be removed until permanent signs, if required, are in place.

ii. **Permanent Signs.** As a condition of any permit or authorization issued pursuant to this chapter, the Administrator may require the applicant to install permanent signs along the boundary of a wetland or buffer.

(A) Permanent signs shall be made of an enamel-coated metal face and attached to a metal post or another nontreated material of equal durability. Signs must be posted at an interval of one per lot or every 50 feet, whichever is less, and must be maintained by the property owner in perpetuity. The signs shall be worded as follows or with alternative language approved by the Administrator:

Protected Wetland Area Do Not Disturb

Contact the City of Shoreline Regarding Uses, Restrictions, and Opportunities for Stewardship

(B) The provisions of subsection (C)(4)(i)(ii)(A) of this section may be modified as necessary to assure protection of sensitive features.

iii. **Fencing.** Fencing installed as part of a proposed activity or as required in this subsection shall be designed so as to not interfere with species migration, including fish runs, and shall be constructed in a manner that minimizes impacts to the wetland and associated habitat.

5. **Critical Area Report for Wetlands.**

a. If the Administrator determines that the site of a proposed development includes, is likely to include, or is adjacent to a wetland, a wetland report, prepared by a qualified professional, shall be required. The expense of preparing the wetland report shall be borne by the applicant.

b. **Minimum Standards for Wetland Reports.** The written report and the accompanying plan sheets shall contain the following information, at a minimum:

i. The name and contact information of the applicant; the name, qualifications, and contact information for the primary author(s) of the wetland critical area report; a description of the proposal; identification of all the local, State, and/or Federal wetland-related permit(s) required for the project; and a vicinity map for the project.

ii. A statement specifying the accuracy of the report and all assumptions made and relied upon.

iii. Documentation of any fieldwork performed on the site, including field data sheets for delineations, rating system forms, baseline hydrologic data, etc.

iv. A description of the methodologies used to conduct the wetland delineations, rating system forms, or impact analyses including references.

v. Identification and characterization of all critical areas, wetlands, water bodies, shorelines, floodplains, and buffers on or adjacent to the proposed project area. For areas off site of the project site, estimate conditions within 300 feet of the project boundaries using the best available information.

vi. For each wetland identified on site and within 300 feet of the project site provide: the wetland rating, including a description of and score for each function, per wetland ratings (subsection (C)(2)(b) of this section); required buffers; hydrogeomorphic classification; wetland acreage based on a professional survey from the field delineation (acreages for on-site portion and entire wetland area

including off-site portions); Cowardin classification of vegetation communities; habitat elements; soil conditions based on site assessment and/or soil survey information; and to the extent possible, hydrologic information such as location and condition of inlet/outlets (if they can be legally accessed), estimated water depths within the wetland, and estimated hydroperiod patterns based on visual cues (e.g., algal mats, drift lines, flood debris, etc.). Provide acreage estimates, classifications, and ratings based on entire wetland complexes, not only the portion present on the proposed project site.

vii. A description of the proposed actions, including an estimation of acreages of impacts to wetlands and buffers based on the field delineation and survey and an analysis of site development alternatives, including a no-development alternative.

viii. An assessment of the probable cumulative impacts to the wetlands and buffers resulting from the proposed development.

ix. A description of reasonable efforts made to apply mitigation sequencing pursuant to Mitigation Sequencing (subsection (C)(6)(a) of this section) to avoid, minimize, and mitigate impacts to critical areas.

x. A discussion of measures, including avoidance, minimization, and compensation, proposed to preserve existing wetlands and restore any wetlands that were degraded prior to the current proposed land use activity.

xi. A conservation strategy for habitat and native vegetation that addresses methods to protect and enhance on-site habitat and wetland functions.

c. An evaluation of the functions of the wetland and adjacent buffer. Include reference for the method used and data sheets.

d. A copy of the site plan sheet(s) for the project must be included with the written report and must include, at a minimum:

i. Maps (to scale) depicting delineated and surveyed wetland and required buffers on site, including buffers for off-site critical areas that extend onto the project site; the development proposal; other critical areas; grading and clearing limits; areas of proposed impacts to wetlands and/or buffers (include square footage estimates);

ii. A depiction of the proposed stormwater management facilities and outlets (to scale) for the development, including estimated areas of intrusion into the buffers of any critical areas. The written report shall contain a discussion of the potential impacts to the wetland(s) associated with anticipated hydroperiod alterations from the project; and

iii. A depiction of the proposed stormwater management facilities and outlets (to scale) for the development, including estimated areas of intrusion into the buffers of any critical areas. The written report shall contain a discussion of the potential impacts to the wetland(s) associated with anticipated hydroperiod alterations from the project.

6. **Compensatory Mitigation.**

a. **Mitigation Sequencing.** Before impacting any wetland or its buffer, an applicant shall demonstrate that the following actions have been taken. Actions are listed in the order of preference:

i. Avoid the impact altogether by not taking a certain action or parts of an action.

ii. Minimize impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts.

iii. Rectify the impact by repairing, rehabilitating, or restoring the affected environment.

iv. Reduce or eliminate the impact over time by preservation and maintenance operations.

v. Compensate for the impact by replacing, enhancing, or providing substitute resources or environments.

vi. Monitor the required compensation and take remedial or corrective measures when necessary.

b. **Requirements for Compensatory Mitigation.**

i. Compensatory mitigation for alterations to wetlands shall be used only for impacts that cannot be avoided or minimized and shall achieve equivalent or greater biologic functions. Compensatory mitigation plans shall be consistent with Wetland Mitigation in Washington State – Part 2: Developing Mitigation Plans (Version 1), Ecology Publication No. 06-06-011b, Olympia, WA, March 2006 or as revised.

ii. Mitigation ratios shall be consistent with subsection (C)(6)(g) of this section.

iii. Mitigation requirements may also be determined using the credit/debit tool described in "Calculating Credits and Debits for Compensatory Mitigation in Wetlands of Western Washington: Operational Draft" (Ecology Publication No. 10-06-011, February 2011, or as revised) consistent with subsection (C)(6)(h) of this section.

c. **Compensating for Lost or Affected Functions.** Compensatory mitigation shall address the functions affected by the proposed project, with an intention to achieve functional equivalency or improvement of functions. The goal shall be for the compensatory mitigation to provide similar wetland functions as those lost, except when either:

i. The lost wetland provides minimal functions, and the proposed compensatory mitigation action(s) will provide equal or greater functions or will provide functions shown to be limiting within a watershed through a formal Washington State watershed assessment plan or protocol; or

ii. Out-of-kind replacement of wetland type or functions will best meet watershed goals formally identified by the City, such as replacement of historically diminished wetland types.

d. **Preference of Mitigation Actions.** Methods to achieve compensation for wetland functions shall be approached in the following order of preference:

i. Restoration (reestablishment and rehabilitation) of wetlands.

ii. Creation (establishment) of wetlands on disturbed upland sites such as those with vegetative cover consisting primarily of nonnative species. This should be attempted only when there is an adequate source of water and it can be shown that the surface and subsurface hydrologic regime is conducive to the wetland community that is anticipated in the design.

iii. Enhancement of significantly degraded wetlands in combination with restoration or creation. Enhancement alone will result in a loss of wetland acreage and is less effective at replacing the functions lost. Enhancement should be part of a mitigation package that includes replacing the impacted area and meeting appropriate ratio requirements.

iv. **Preservation.** Preservation of high quality, at-risk wetlands as compensation is generally acceptable when done in combination with restoration, creation, or enhancement; provided, that a minimum of 1:1 acreage replacement is provided by reestablishment or creation. Preservation of high quality, at-risk wetlands and habitat may be considered as the sole means of compensation for wetland impacts when the following criteria are met:

(A) Wetland impacts will not have a significant adverse impact on habitat for listed fish, or other ESA listed species;

(B) There is no net loss of habitat functions within the watershed or basin;

(C) Mitigation ratios for preservation as the sole means of mitigation shall generally start at 20:1. Specific ratios should depend upon the significance of the preservation project and the quality of the wetland resources lost; and

(D) The impact area is small (generally less than one-half acre) and/or impacts are occurring to a low functioning system (Category III or IV wetland).

All preservation sites shall include buffer areas adequate to protect the habitat and its functions from encroachment and degradation.

e. **Type and Location of Compensatory Mitigation.** Unless it is demonstrated that a higher level of ecological functioning would result from an alternative approach, compensatory mitigation for ecological functions shall be either in-kind and on-site, or in-kind and within the same stream reach, sub-basin, or drift cell (if estuarine wetlands are impacted). Compensatory mitigation actions shall be conducted within the same sub-drainage basin and on the site of the alteration except when all of the following apply:

i. There are no reasonable opportunities on site or within the sub-drainage basin (e.g., on-site options would require elimination of high functioning upland habitat), or opportunities on site or within the sub-drainage basin do not have a high likelihood of success based on a determination of the capacity of the site to compensate for the impacts. Considerations should include: anticipated replacement ratios for wetland mitigation, buffer conditions and proposed widths, available water to maintain anticipated hydrogeomorphic classes of wetlands when restored, proposed flood storage capacity, and potential to mitigate riparian fish and wildlife impacts (such as connectivity);

ii. Off-site mitigation has a greater likelihood of providing equal or improved wetland functions than the impacted wetland; and

iii. Off-site locations shall be in the same sub-drainage basin unless:

(A) Established watershed goals for water quality, flood storage or conveyance, habitat, or other wetland functions have been established by the City and strongly justify location of mitigation at another site; or

(B) Credits from a State-certified wetland mitigation bank are used as compensation, and the use of credits is consistent with the terms of the bank's certification.

iv. The design for the compensatory mitigation project needs to be appropriate for its location (i.e., position in the landscape). Therefore, compensatory mitigation should not result in the creation, restoration, or enhancement of an atypical wetland. An atypical wetland refers to a compensation wetland (e.g., created or enhanced) that does not match the type of existing wetland that would be found in the geomorphic setting of the site (i.e., the water source(s) and hydroperiod proposed for the mitigation site are not typical for the geomorphic setting). Likewise, it should not provide exaggerated morphology or require a berm or other engineered structures to hold back water. For example, excavating a permanently inundated pond in an existing seasonally saturated or inundated wetland is one example of an enhancement project that could result in an atypical wetland. Another example would be excavating depressions in an existing wetland on a slope, which would require the construction of berms to hold the water.

f. **Timing of Compensatory Mitigation.** It is preferred that compensatory mitigation projects be completed prior to activities that will disturb wetlands. At the least, compensatory mitigation shall be completed immediately following disturbance and prior to use or occupancy of the action or development. Construction of mitigation projects shall be timed to reduce impacts to existing fisheries, wildlife, and flora.

i. The Administrator may authorize a one-time temporary delay in completing construction or installation of the compensatory mitigation when the applicant provides a written explanation from a

qualified wetland professional as to the rationale for the delay. An appropriate rationale would include identification of the environmental conditions that could produce a high probability of failure or significant construction difficulties (e.g., project delay lapses past a fisheries window, or installing plants should be delayed until the dormant season to ensure greater survival of installed materials). The delay shall not create or perpetuate hazardous conditions or environmental damage or degradation, and the delay shall not be injurious to the health, safety, or general welfare of the public. The request for the temporary delay must include a written justification that documents the environmental constraints that preclude implementation of the compensatory mitigation plan. The justification must be verified and approved by the City.

g. **Wetland Mitigation Ratios.**

Category and Type of Wetland	Creation or Reestablishment	Rehabilitation	Enhancement	Preservation
Category I: Bog, Natural Heritage site	Not considered possible	6:1	Case by case	10:1
Category I: Mature forested	6:1	12:1	24:1	24:1
Category I: Based on functions	4:1	8:1	16:1	20:1
Category II	3:1	6:1	12:1	20:1
Category III	2:1	4:1	8:1	15:1
Category IV	1.5:1	3:1	6:1	10:1

h. **Compensatory Mitigation Plan.** When a project involves wetland and/or buffer impacts, a compensatory mitigation plan prepared by a qualified professional shall be required, meeting the following minimum standards:

- Ratios for rehabilitation and enhancement may be reduced when combined with 1:1 replacement through creation or reestablishment. See Table 1a or 1b, Wetland Mitigation in Washington State – Part 1: Agency Policies and Guidance – Version 1 (Ecology Publication No. 06-06-011a, Olympia, WA, March 2006 or as revised).

i. **Wetland Critical Area Report.** A critical area report for wetlands must accompany or be included in the compensatory mitigation plan and include the minimum parameters described in the "Minimum Standards for Wetland Reports" section of this chapter.

ii. **Compensatory Mitigation Report.** The report must include a written report and plan sheets that must contain, at a minimum, the elements listed below. Full guidance can be found in Wetland Mitigation in Washington State – Part 2: Developing Mitigation Plans (Version 1) (Ecology Publication No. 06-06-011b, Olympia, WA, March 2006 or as revised).

(A) The written report must contain, at a minimum:

(1) The name and contact information of the applicant; the name, qualifications, and contact information for the primary author(s) of the compensatory mitigation report; a description of the proposal; a summary of the impacts and proposed compensation concept; identification of all the local, State, and/or Federal wetland-related permit(s) required for the project; and a vicinity map for the project;

(2) Description of how the project design has been modified to avoid, minimize, or reduce adverse impacts to wetlands;

(3) Description of the existing wetland and buffer areas proposed to be impacted. Include acreage (or square footage), water regime, vegetation, soils, landscape position, surrounding land uses, and functions. Also describe impacts in terms of acreage by Cowardin

~~classification, hydrogeomorphic classification, and wetland rating, based on wetland ratings (subsection (C)(2)(b) of this section);~~

~~(4) Description of the compensatory mitigation site, including location and rationale for selection. Include an assessment of existing conditions: acreage (or square footage) of wetlands and uplands, water regime, sources of water, vegetation, soils, landscape position, surrounding land uses, and functions. Estimate future conditions in this location if the compensation actions are not undertaken (i.e., how would this site progress through natural succession?);~~

~~(5) A description of the proposed actions for compensation of wetland and upland areas affected by the project. Include overall goals of the proposed mitigation, including a description of the targeted functions, hydrogeomorphic classification, and categories of wetlands;~~

~~(6) A description of the proposed mitigation construction activities and timing of activities;~~

~~(7) A discussion of ongoing management practices that will protect wetlands after the project site has been developed, including proposed monitoring and maintenance programs (for remaining wetlands and compensatory mitigation wetlands);~~

~~(8) A bond estimate for the entire compensatory mitigation project, including the following elements: site preparation, plant materials, construction materials, installation oversight, maintenance twice per year for up to five years, annual monitoring field work and reporting, and contingency actions for a maximum of the total required number of years for monitoring; and~~

~~(9) Proof of establishment of notice on title for the wetlands and buffers on the project site, including the compensatory mitigation areas.~~

~~(B) The scaled plan sheets for the compensatory mitigation must contain, at a minimum:~~

~~(1) Surveyed edges of the existing wetland and buffers, proposed areas of wetland and/or buffer impacts, location of proposed wetland and/or buffer compensation actions;~~

~~(2) Existing topography, ground-proofed, at two-foot contour intervals in the zone of the proposed compensation actions if any grading activity is proposed to create the compensation area(s). Also existing cross-sections of on-site wetland areas that are proposed to be impacted, and cross-section(s) (estimated one-foot intervals) for the proposed areas of wetland or buffer compensation;~~

~~(3) Surface and subsurface hydrologic conditions, including an analysis of existing and proposed hydrologic regimes for enhanced, created, or restored compensatory mitigation areas. Also, illustrations of how data for existing hydrologic conditions were used to determine the estimates of future hydrologic conditions;~~

~~(4) Conditions expected from the proposed actions on site, including future hydrogeomorphic types, vegetation community types by dominant species (wetland and upland), and future water regimes;~~

~~(5) Required wetland buffers for existing wetlands and proposed compensation areas. Also, identify any zones where buffers are proposed to be reduced or enlarged outside of the standards identified in this chapter;~~

~~(6) A plant schedule for the compensation area, including all species by proposed community type and water regime, size and type of plant material to be installed, spacing of plants, typical clustering patterns, total number of each species by community type, timing of installation; and~~

~~(7) Performance standards (measurable standards reflective of years post-installation) for upland and wetland communities, monitoring schedule, and maintenance schedule and actions by each biennium.~~

~~i. **Buffer Mitigation Ratios.** Impacts to buffers shall be mitigated at a 1:1 ratio. Compensatory buffer mitigation shall replace those buffer functions lost from development. (Ord. 668 § 4 (Exh. 3), 20~~13).

Chapter 20.20

Definitions

Sections:

20.20.010 A definitions.

Adverse Impact	A condition that creates, imposes, aggravates, or leads to inadequate, unsafe, or unhealthy conditions on a site proposed for development or on off-tract property or facilities.

20.20.012 B definitions.

Best Management Practices (BMPs)	A system of practices and management measures that minimize adverse impacts to an identified resource.

20.20.014 C definitions.

Compensatory Mitigation	Replacing project-induced losses or impacts to a critical area, and includes but is not limited to creation, re-establishment, rehabilitation, enhancement, and preservation.

Added for clarity, based on City of Edmonds code.

20.20.034 M definitions.

Mitigation	Avoiding, minimizing, or compensating for adverse critical areas impacts, including use of any or all of the following actions listed in descending order of preference: A. Avoiding the impact by not taking a certain action or parts of an action; B. Minimizing the impact by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce the impact; C. Rectifying the impact by repairing, rehabilitating, or restoring the affected ~~sensitive~~ critical area or buffer to the conditions existing at the time of initiation of the project; D. Minimizing or eliminating the hazard by restoring or stabilizing the hazard area through biological, engineered, or other methods; E. Reducing or eliminating the impact or hazard over time by preservation or maintenance operations during the life of the development proposal;

Update definition for clarity and consistency with recommended CAO definitions.

~~E~~F. Compensating for the impact by replacing, enhancing or providing substitute ~~sensitive~~ critical areas and environments; and

~~F~~G. Monitoring the hazard or required mitigation ~~impact~~ and taking appropriate corrective measures when necessary.

Mitigation for individual actions may include a combination of the above measures.

20.20.036 N definitions.

Native Vegetation, Native Plant(s)	~~A tree, shrub or groundcover plant of a species that is native to western Washington.~~ Vegetation comprised of plant species, other than noxious weeds, that are indigenous to the coastal region of the Pacific Northwest, which reasonably could have been expected to naturally occur on the site.	Update terminology and clarify definition for consistency with SMP and recommended CAO definitions.

20.20.044 R definitions.

Restoration	~~Returning~~ Measures taken to restore an altered or damaged ~~a stream, wetland, other sensitive~~ critical area or any associated buffer to a state in which its stability and functions approach its unaltered state as closely as possible~~.~~ including: A. Active steps taken to restore damaged wetlands, streams, protected habitat, or their buffers to the functioning condition that existed prior to an unauthorized alteration; and B. Actions performed to reestablished structural and functional characteristics of the critical area that have been lost by alteration, past management activities, or catastrophic events.	Update terminology and clarify definition for consistency with SMP and recommended CAO definition.

20.20.054 W definitions.

~~Water Dependent Use~~	~~A land use which can only exist when the interface between wet meadows, grazed land and water provides the biological or physical conditions necessary for the use.~~	Water Dependent Use is only used in the SMP and is correctly defined for the SMP in 20.200.210. This definition is not used in Title 20.
Wetland Creation	The manipulation of the physical, chemical, or biological characteristics to develop a wetland on an upland or deepwater site, where a wetland did no previously exist. Creation results in a gain in wetland acreage and function. A typical action is the excavation of upland soils to elevations that will produce a wetland hydroperiod and hydric soils, and support the growth of hydrophytic plant species.	New definition from DOE Wetland Definitions.

Wetland Delineation	A technical procedure performed by a wetland specialist to determine the area of a wetland, ascertaining the wetland's classification, function, and value, and to define the boundary between a wetland and adjacent uplands. Identification of wetlands and delineation of their boundaries pursuant to this chapter shall be done in accordance with the approved Federal wetland delineation manual and applicable regional supplements. All areas within the City meeting the wetland designation criteria in that procedure are hereby designated critical areas and are subject to the provisions of this program.	Move definition from SMP 20.210.010
Wetland Edge	The line delineating the outer edge of a wetland established based on the definitions and methods contained in Title 20.80. ~~by using the Federal Manual for Identifying and Delineating Jurisdictional Wetlands, 1987, jointly published by the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers and the U.S. Soil Conservation Service.~~	Definition out of date.
Wetland Enhancement	The manipulation of the physical, chemical, or biological characteristics of a wetland to heighten, intensify, or improve specific function(s) or to change the growth stage or composition of the vegetation present. Enhancement is undertaken for specified purposes such as water quality improvement, flood water retention, or wildlife habitat. Enhancement results in a change in wetland function(s) and can lead to a decline in other wetland functions, but does not result in a gain in wetland acres. Examples are planting vegetation, controlling non-native or invasive species, and modifying site elevations to alter hydroperiods.	New definition from DOE Wetland Definitions.
Wetland Functions	Natural processes performed by wetlands including functions which are important in facilitating food chain production, providing habitat for nesting, rearing and resting sites for aquatic, terrestrial and avian species, maintaining the availability and quality of water, acting as recharge and discharge areas for ground water aquifers and moderating surface water and stormwater flows, as well as performing other functions.	

~~Wetland, Forested~~	~~A wetland which is characterized by woody vegetation at least 20 feet tall.~~	Remove critical area types/classifications from definitions and relocate/only include in specific critical area sections.
~~Wetland, Isolated~~	~~A wetland which has a total size less than 2,500 square feet excluding buffers, which is hydrologically isolated from other wetlands or streams and which does not have permanent open water.~~	
Wetland Re-establishment	The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural or historic functions to a former wetland. Re-establishment results in rebuilding a former wetland and results in a gain in wetland acres and functions. Activities could include removing fill, plugging ditches, or breaking drain tiles.	New definition from DOE Wetland Definitions.
Wetland Rehabilitation	The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural or historic functions and processes of a degraded wetland. Rehabilitation results in a gain in wetland function but does not result in a gain in wetland acres. Activities could involve breaching a dike to reconnect wetlands to a floodplain or returning tidal influence to a wetland.	New definition from DOE Wetland Definitions.
Wetlands	Those areas ~~in Shoreline which~~ that are inundated or saturated by ground or surface water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas. Wetlands do not include those artificial wetlands intentionally created from non-wetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificial wetlands intentionally created from non-wetland areas to mitigate the conversion of wetlands.	Update definition for consistency with definition deleted from SMP 20.210.010 and as required by RCW 36.70A.030(21)

Chapter 20.80

Critical Areas

Sections:

Subchapter 1.
Critical Areas – General Provisions

20.80.030 Exemptions.

The following activities shall be exempt from the provisions of this chapter:

~~E. Activities affecting isolated Type IV wetlands which are individually smaller than 1,000 square feet;~~

Provision E recommended to be deleted. BAS does not support exemption of small and/or isolated wetlands. The loss of small wetlands is the most common cumulative impact on wetlands and wildlife. The City does not currently have mechanism in place to mitigate or limit the cumulative impacts of this exemption. (*Ecology, 2005).*

Replace with language in wetlands subchapter 20.80.323(E) to allow for mitigated impact to small, isolated category IV wetlands where mitigation is provided for no net loss.

20.80.310 WETLANDS - Purpose.

A. Wetlands are those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Wetlands do not include those artificial wetlands intentionally created from non-wetland sites, including, but not limited to, irrigation and drainage ditches, bio-swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificial wetlands intentionally created from non-wetland areas to mitigate the conversion of wetlands.

Typo corrections.

B. Wetlands help to maintain water quality; store and convey stormwater and floodwater; recharge ground water; provide important fish and wildlife habitat; and serve as areas for recreation, education, scientific study, and aesthetic appreciation.

C. The City's overall goal shall be to achieve no net loss of wetlands. This goal shall be implemented through retention of the function, value and acreage of wetlands within the City. Wetland buffers serve to moderate runoff volume and flow rates; reduce sediment, chemical nutrient and toxic pollutants; provide shading to maintain desirable water temperatures; provide habitat for wildlife; protect wetland resources from harmful intrusion; and generally preserve the ecological integrity of the wetland area.

D. The primary purpose of the wetland regulations is to avoid detrimental wetland impacts and achieve a goal of no net loss of wetland function, value, and acreage; and where possible enhance and restore wetlands.

20.80.320 WETLANDS - Designation, delineation, mapping, and ~~classification~~ rating.

A. ~~The identification of wetlands and the delineation of their boundaries shall be done in accordance with the Federal Wetland Delineation Manual and applicable regional supplements approved by the Washington State Department of Ecology per~~ **Identification and Delineation.** Identification of wetlands and delineation of their boundaries pursuant to this chapter shall be done in accordance with the approved Federal wetland delineation manual and applicable regional supplements per WAC 173-22-035. The exact location of a wetland's boundary shall be determined through the performance of a field investigation by a qualified professional. Wetland delineations are valid for five years; after such date the ~~City~~ Director shall determine whether a revision or additional assessment is necessary.

Replace/combine with regulations from SMP 20.230.030(C)(2)(a).

Existing section is essentially the same as the SMP designation statement. Edited statement of designation to provide protection for wetlands regardless of formal identification.

B. **Designation.** All areas identified as wetlands pursuant to

subsection A of this section, regardless of any formal identification, are hereby designated critical areas and are subject to the provisions of this chapter.

C. **Mapping.** The approximate location and extent of wetlands are shown in the following maps and inventories:

Added for specific map resources based on DOE example code.

1. *City of Shoreline, Basin Characterization Reports and Stream and Wetland Inventory and Assessment, Tetra Tech (May 2004);*

2. City of Shoreline stormwater basin plans as completed and updated;

3. Wetland data layer maintained in the City of Shoreline geographic information system (GIS);

3. Soils maps produced by the US Department of Agriculture, National Resources Conservation Service; and

3. the *National Wetlands Inventory*, produced by the US Fish & Wildlife Service.

The inventories and cited resources are to be used as a guide for the City of Shoreline, project applicants, and/or property owners, and may be continuously updated as new wetlands are identified or critical area reports are submitted for known wetlands. They are a reference and do not provide a final critical area designation.

Replace with regulations from SMP 20.230.030(C)(2)

~~C. Wetlands, as defined by this subchapter, shall be classified according to the following criteria:~~

~~1. "Type I wetlands" are those wetlands which meet any of the following criteria:~~

~~a. The presence of species proposed or listed by the Federal government or State of Washington as endangered, threatened, critical or priority, or the presence of critical or outstanding actual or potential habitat for those species; or~~

~~b. Wetlands having 40 percent to 60 percent open water in dispersed patches with two or more wetland subclasses of vegetation; or~~

~~c. High quality examples of a native wetland listed in the terrestrial and/or aquatic ecosystem elements of the Washington Natural Heritage Plan that are presently identified as such or are determined to be of heritage quality by the Department of Natural Resources; or~~

~~d. The presence of plant associations of infrequent occurrence. These include, but are not limited to, plant associations found in bogs and in wetlands with a coniferous forested wetland class or subclass occurring on organic soils.~~

~~2. "Type II wetlands" are those wetlands which are not Type I wetlands and meet any of the following criteria:~~

~~a. Wetlands greater than one acre (43,560 sq. ft.) in size;~~

~~b. Wetlands equal to or less than one acre (43,560 sq. ft.) but greater than one-half acre (21,780 sq.ft.) in size and have three or more wetland classes; or~~

~~c. Wetlands equal to or less than one acre (43,560 sq. ft.) but greater than one-half acre (21,780 sq.ft.) in size, and have a forested wetland class or subclasses.~~

~~3. "Type III wetlands" are those wetlands that are equal to or less than one acre in size and that have one or two wetland classes and are not rated as Type IV wetlands, or wetlands less than one-half acre in size having either three wetlands classes or a forested wetland class or subclass.~~

~~4. "Type IV wetlands" are those wetlands that are equal to or less than 2,500 square feet, hydrologically isolated and have only one, unforested, wetland class. (Ord. 695 § 1 (Exh. A), 2014; Ord. 398 § 1, 2006; Ord. 238 Ch. VIII § 5(B), 2000).~~

D. **Rating.** Wetlands shall be rated by a qualified professional according to the Washington Department of Ecology wetland rating system, as set forth in the Washington State Wetland Rating System for Western Washington (Ecology Publication No. 04-06-029, or as revised~~, and Wetlands Guidance for Small Cities Western approved by Ecology~~). All wetlands should be rated consistent with the 2014 Western Washington Rating Form, or as revised. These documents contain the definitions and methods for determining whether the criteria below are met. Wetland rating categories shall be applied as the wetland exists on the date of adoption of the rating system by the City, as the wetland naturally changes thereafter, or as the wetland changes in accordance with permitted activities.

1. **Category I.** Category I wetlands are those that represent unique or rare wetland types, are more sensitive to disturbance than most wetlands, are relatively undisturbed and contain ecological attributes that are impossible to replace within a human lifetime, or provide a high level of functions. The following types of wetlands are Category I:

a. Relatively undisturbed estuarine wetlands larger than one acre;

b. Wetlands that are identified by scientists of the Washington Natural Heritage Program/DNR as high quality wetlands;

c. Bogs;

d. Mature and old-growth forested wetlands larger than one acre;

e. Wetlands in undisturbed coastal lagoons; and

f. Wetlands that perform many functions well (scoring 23 ~~70~~ points or more based on functions).

2. **Category II.** Category II wetlands are those that are difficult, though not impossible to replace and provide high levels of some functions. The following types of wetlands are Category II:

Previously in SMP 20.230.030(C)(2)(b). Updated for use with 2014 Wetland Rating System for Western Washington based on *Guidance for Small Cities: Western Washington Version (Publication No. 10-06-002).* Changes for 2014 rating system shown with strike through and double underline.

Category text format edited for clarity and ease of reading.

Wetlands previously rated will need to be reevaluated using the new rating and buffer standards as new applications are submitted.

a. Estuarine wetlands smaller than one acre, or disturbed estuarine wetlands larger than one acre;

b. Interdunal wetlands larger than one acre;

c. Disturbed coastal lagoons; and

d. Wetlands with a moderately high level of functions (scoring between ~~51~~ 20 and ~~69~~ 22 points based on functions).

3. **Category III.** Category III wetlands are those with a moderate level of functions, generally have been disturbed in some ways, and are often less diverse or more isolated from other natural resources in the landscape than Category II wetlands. The following types of wetlands are Category III:

a. Wetlands with a moderate level of functions (scoring between ~~30~~ 16 and ~~50~~ 19 points based on functions); and

b. Interdunal wetlands between 0.1 and one acre. Wetlands scoring between ~~30~~ 16 and ~~50~~ 19 points generally have been disturbed in some ways and are often less diverse or more isolated from other natural resources in the landscape than Category II wetlands.

4. **Category IV.** Category IV wetlands are those with the lowest levels of functions (scoring ~~fewer than 30~~ below 16 points based on functions) and are often heavily disturbed. These are wetlands that we should be able to replace, or in some cases to improve. However, experience has shown that replacement cannot be guaranteed in any specific case. These wetlands may provide some important functions, and should be protected to some degree.

E. **Illegal Modifications.** Wetland rating categories shall not change due to illegal modifications or alterations made by the applicant or with the applicant's knowledge.

Previously in SMP 20.230.030(C)(2)(c).

~~**20.80.XXX WETLANDS Regulated Activities.**~~

~~A. For any regulated activity, a critical areas report (see SMC 20.80.110) may be required to support the requested activity.~~

~~B. The following activities are regulated if they occur in a regulated wetland or its buffer:~~

~~1. The removal, excavation, grading, or dredging of soil, sand, gravel, minerals, organic matter, or material of any kind;~~

~~2. The dumping of, discharging of, or filling with any material;~~

~~3. The draining, flooding, or disturbing of the water level or water table;~~

~~4. Pile driving;~~

~~5. The placing of obstructions;~~

~~6. The construction, reconstruction, demolition, or expansion of any structure;~~

~~7. The destruction or alteration of wetland vegetation through clearing, harvesting, shading, intentional burning, or planting of vegetation that would alter the character of a regulated wetland;~~

Previously in SMP 20.230.030(C)(3). Section not required if applicability is applied to any permitted activity if a wetland or its buffer is present.

SMC 20.80.025 currently states that Chapter 20.80 applies to all land uses and within all zoning designations in the city and that no permit shall be issued without first assuring compliance with this chapter. This Regulated Activities section is an alternate approach to designating applicability and is not needed with 20.80.025.

~~8. "Class IV – General Forest Practices" under the authority of the "1992 Washington State Forest Practices Act Rules and Regulations," WAC 222-12-030, or as thereafter amended; and/or~~

~~9. Activities that result in:~~

~~a. A significant change of water temperature;~~

~~b. A significant change of physical or chemical characteristics of the sources of water to the wetland;~~

~~c. A significant change in the quantity, timing, or duration of the water entering the wetland; and/or~~

~~d. The introduction of pollutants.~~

20.80.323 WETLANDS – Development standards.

20.80.323 Added/edited from DOE example code to replace SMC 20.80.340 and to clarify when and how alteration of wetlands and buffers might be allowed.

Allowed Activities provisions moved from SMP.

A. Activities and uses shall be prohibited in wetlands and wetland buffers, except as provided for in this Title.

B. **Activities Allowed in Wetlands.** The activities listed below are allowed in wetlands. Additional exemptions are listed in, the provisions established in SMC 20.80.030 and 20.80.040, but do not apply within the shoreline jurisdiction. These activities do not require submission of a critical area report, except where such activities result in a loss of the functions and values of a wetland or wetland buffer. These activities include:

~~1. Those activities and uses conducted pursuant to the Washington State Forest Practices Act and its rules and regulations, WAC 222-12-030, where State law specifically exempts local authority, except those developments requiring local approval for Class IV – General Forest Practice Permits (conversions) as defined in Chapter 76.09 RCW and Chapter 222-12 WAC.~~

Provision 1 not needed because there are no current forest practices sites permitted within City of Shoreline. No new ones allowed based on permitted uses in SMC Chapter 20.40 Subchapter 2.

1.~~2~~. Conservation or preservation of soil, water, vegetation, fish, shellfish, and/or other wildlife that does not entail changing the structure or functions of the existing wetland.

2.~~3~~. The harvesting of wild crops in a manner that is not injurious to natural reproduction of such crops and provided the harvesting does not require tilling of soil, planting of crops, chemical applications, or alteration of the wetland by changing existing topography, water conditions, or water sources.

3.~~4~~. Drilling for utilities/utility corridors under a wetland, with entrance/exit portals located completely outside of the wetland buffer; provided, that the drilling does not interrupt the ground water connection to the wetland or percolation of surface water down through the soil column. Specific studies by a hydrologist are necessary to determine whether the ground water connection to the wetland or percolation of surface water down through the soil column will be disturbed.

Provision 4 moved from SMP is similar to SMC 20.80.030(B) but not the same. It is distinct enough to include here.

4.~~5~~. Enhancement of a wetland through the select removal of nonnative invasive plant species. Removal of invasive plant species shall be restricted to hand labor and hand-held equipment ~~removal~~ unless permits from the appropriate regulatory agencies have been obtained for approved biological or chemical treatments. Not more than 500 square feet of area may be cleared, as

Provision 5 from SMP edited for clarity. King County Noxious Weed List includes species that are of concern locally, but not regulated state wide.

calculated cumulatively over one (1) year, on private property without a permit. All removed plant material shall be taken away from the site and disposed of appropriately. Plants that appear on the Washington State Noxious Weed Control Board list of noxious weeds or the King County Noxious Weed List must be handled and disposed of according to a noxious weed control plan appropriate to that species. Revegetation with appropriate native species at natural densities is allowed in conjunction with removal of invasive plant species.

~~6. Educational and scientific research activities.~~

~~7. Normal and routine maintenance and repair of any existing public or private facilities within an existing right-of-way; provided, that the maintenance or repair does not expand the footprint of the facility or right-of-way.~~

5. Permitted alteration to a legally constructed structure existing within a wetland or wetland buffer that does not increase the footprint of the development or hardscape or increase the impact to a wetland or wetland buffer.

C. **Category I wetlands.** Development activities and uses that result in alteration of Category I wetlands and their associated buffers shall be prohibited subject to the reasonable use provisions and special use provision of SMC 20.30.333 and 20.30.336, unless otherwise allowed by the exemptions or allowed activities provisions of this Title, or subject to the provisions of the Shoreline Master Program where the proposed development activity is located within the shoreline jurisdiction.

D. **Category II and III wetlands.** Development activities and uses that result in alteration of Category II and III wetlands is prohibited, unless the applicant can demonstrate that;

1. The basic project proposed cannot reasonable be accomplished on another site or sites in the general region while still successfully avoiding or resulting in less adverse impact on a wetland; and

2. All on-site alternative designs that would avoid or result in less adverse impact on a wetland or its buffer, such as a reduction to the size, scope, configuration or density of the project are not feasible.

Full compensation for the loss of acreage and functions of wetland and buffers shall be provided in compliance with the mitigation performance standards and requirements of these regulations.

E. **Category IV wetlands.** Development activities and uses that result in unavoidable impacts may be permitted in Category IV wetlands and associated buffers in accordance with an approved critical area(s) report and compensatory mitigation plan, and only if the proposed activity is the only reasonable alternative that will accomplish the applicant's objectives. Full compensation for the loss of acreage and functions of wetland and buffers shall be provided in compliance with the mitigation performance standards and requirements of these regulations.

F. **Small, hydrologically isolated Category IV wetlands.** The Director may allow small, hydrologically isolated Category IV wetlands to be exempt from the avoidance sequencing provisions of SMC 20.80.080 and SMC 20.80.323(D) and allow alteration of such wetlands provided that a submitted critical area report and mitigation plan provides evidence that all of the following conditions are met:

Provision 6 from SMP is already allowed through 20.80.030(K). Do not need here.

Provision 7 from SMP is similar to 20.80.030(C-D) but stated more simply. Consider replaced 20.80.030(C) and (D) with this language under general provisions.

New provision 5 similar to existing 20.80.040, but does not allow for increase in footprint/hardscape.

Provisions C, D, and E are edited language from SMC 20.80.340 Alterations to clearly state when alterations of wetlands and their buffers is prohibited, except by CARUP CASUP or Shoreline variance process, and when it is allowed with a development permit and compensatory mitigation.

Replacement language for SMC 20.80.030 Exemptions (E) to require compensation for the impacts. Language based on City of Edmonds code.

1. The wetland is less than one thousand (1,000) square feet in area;

2. The wetland is a low quality Category IV wetland;

3. The wetland does not provide significant habitat value for wildlife (score of less than 3 points in the adopted rating system) and is not located within a mapped priority habitat area or corridor;

4. The wetland is not adjacent to a riparian area and is hydrologically isolated from other wetlands or streams; and

5. A mitigation plan to replace lost wetland functions and values is developed, approved, and implemented consistent with SMC 20.80.350.

G~~C.~~ **Subdivisions.** The subdivision and/or short subdivision of land in wetlands and associated buffers are subject to the following:

Previously in SMP 20.230.030(C)(3). Moved from Regulated activities section proposed for deletion above.

This is intended to supplement the general provisions for subdivisions and critical areas in SMC 20.80.050(B).

1. Land that is located wholly within a wetland or its buffer may not be subdivided; and

2. Land that is located partially within a wetland or its buffer may be subdivided; provided, that an accessible and contiguous portion of each new lot is:

a. Located outside of the wetland and its buffer; and

b. Meets the minimum lot size requirements of SMC Table 20.50.020(1).

20.80.326 WETLANDS - Critical Area Report requirements.

Previously in SMP 20.230.030(C)(5).

Text added/modified based on DOE example code and City of Edmonds code. SMP code did not have general report requirements to refer to in another section.
- Language regarding qualified wetlands scientist depends on how general provisions are modified. Currently City approval of qualified professional required based on review of application demonstrating experience which is more extensive than this proposal.

A. If the Director determines that the site of a proposed development includes, is likely to include, or is adjacent to a wetland, a wetland critical area report, prepared by a qualified professional, shall be required. The expense of preparing the wetland report shall be borne by the applicant. Critical area reports for two or more types of critical areas must meet the report requirements for each relevant type of critical area. In addition to the general critical area report requirements of SMC 20.80.110, critical area reports for wetlands must meet the requirements of this section.

B. **Preparation by a Qualified Professional.** Critical area reports for wetlands shall be prepared, consistent with SMC 20.80.110 and at the applicant's expense, by a qualified professional who is a certified wetland scientist or a non-certified wetland scientist with a minimum of five (5) years of experience in the field of wetland science and with experience preparing wetland reports. Third party review by a qualified profession under contract with the City will be required, at the applicant's expense in any of the following circumstances:

1. The project requires a critical area reasonable use permit, critical area special use permit, or shoreline variance application; or

2. Compensatory mitigation is required for impacts to Category I, II, or III wetlands and or buffers; or

3. Compensatory mitigation is required for impacts to Category IV wetlands.

C. Critical area report requirements for wetlands may be met in stages or through multiple reports. A wetland report may include one or more of the following

sections or report types depending on the information required by the Director and the extent of potential wetland impacts. The Director may determine which report(s) alone or combined are sufficient to meet the requirements below. The typical sequence of potentially required reports that may in part or in combination fulfill the requirements of the section include:

1. Wetland reconnaissance report documenting the existence and general location of wetlands in the vicinity of a project area;

2. Wetland delineation report documenting the extent, boundary and type of a wetland per SMC 20.80.320; and

3. Wetland mitigation report documenting potential wetland impacts and mitigation measures designed to retain or increase the functions and values of a wetland in accordance with SMC 20.80.350 and the general provisions of this title.

D. **Minimum Standards for Wetland Reports.** The written report and the accompanying plan sheets shall contain the following information, at a minimum:

1. The name and contact information of the applicant; the name, qualifications, and contact information for the primary author(s) of the wetland critical area report; a description of the proposal; identification of all the local, State, and/or Federal wetland-related permit(s) required for the project; and a vicinity map for the project.

2. A statement specifying the accuracy of the report and all assumptions made and relied upon.

3. Documentation of any fieldwork performed on the site, including field data sheets for delineations, rating system forms, baseline hydrologic data, etc.

4. A description of the methodologies used to conduct the wetland delineations, rating system forms, or impact analyses including references.

5. Identification and characterization of all critical areas, wetlands, water bodies, shorelines, floodplains, and buffers on or adjacent to the proposed project area. For areas off site of the project site, estimate conditions within 300 feet of the project boundaries using the best available information.

6. For each wetland identified on site and within 300 feet of the project site provide: the wetland rating, including a description of and score for each function, per wetland ratings (SMC 20.80.320(D)); required buffers (SMC 20.80.330); hydrogeomorphic classification; wetland acreage based on a professional survey from the field delineation (acreages for on-site portion and entire wetland area including off-site portions); Cowardin classification of vegetation communities; habitat elements; soil conditions based on site assessment and/or soil survey information; and to the extent possible, hydrologic information such as location and condition of inlet/outlets (if they can be legally accessed), estimated water depths within the wetland, and estimated hydroperiod patterns based on visual cues (e.g., algal mats, drift lines, flood debris, etc.). Provide acreage estimates, classifications, and ratings based on entire wetland complexes, not only the portion present on the proposed project site.

7. A description of the proposed actions, including an estimation of acreages of impacts to wetlands and buffers based on the field delineation and survey and an analysis of site development alternatives, including a no-development alternative.

This section (D) could be modified so that all general requirements are moved to 20.80.110, and only wetland specific requirements are listed here.

Formatting or editing could provide more clarity regarding report requirements.

The 300 foot provision for identification of critical areas is based on the maximum potential buffer size wetlands in the DOE example code.

8. An assessment of the probable cumulative impacts to the wetlands and buffers resulting from the proposed development.

9. A description of reasonable efforts made to apply mitigation sequencing pursuant to SMC 20.80.360(A) Mitigation Sequencing to avoid, minimize, and mitigate impacts to critical areas.

10. A discussion of measures, including avoidance, minimization, and compensation, proposed to preserve existing wetlands and restore any wetlands that were degraded prior to the current proposed land-use activity.

11. A conservation strategy for habitat and native vegetation that addresses methods to protect and enhance on-site habitat and wetland functions.

C. An evaluation of the functions of the wetland and adjacent buffer. Include reference for the method used and data sheets.

D. A copy of the site plan sheet(s) for the project must be included with the written report and must include, at a minimum:

1. Maps (to scale) depicting delineated and surveyed wetland and required buffers on site, including buffers for off-site critical areas that extend onto the project site; the development proposal; other critical areas; grading and clearing limits; areas of proposed impacts to wetlands and/or buffers (include square footage estimates);

2. A depiction of the proposed stormwater management facilities and outlets (to scale) for the development, including estimated areas of intrusion into the buffers of any critical areas. The written report shall contain a discussion of the potential impacts to the wetland(s) associated with anticipated hydroperiod alterations from the project; and

~~3. A depiction of the proposed stormwater management facilities and outlets (to scale) for the development, including estimated areas of intrusion into the buffers of any critical areas. The written report shall contain a discussion of the potential impacts to the wetland(s) associated with anticipated hydroperiod alterations from the project.~~

Duplicate provision in SMP.

E. A cost estimate for the installation of any required mitigation (including site preparation, plant materials, and installation, fertilizers, mulch, and stakes) and the proposed monitoring and maintenance work for the required number of years.

Information required for financial guarantee calculations.

20.80.330 WETLANDS - Required buffer areas.

A. ~~Required wetland buffer widths shall reflect the sensitivity of the area and resource or the risks associated with development and, in those circumstances permitted by these regulations, the type and intensity of human activity and site design proposed to be conducted on or near the critical area.~~

Replace with regulations from SMP 20.230.030(C)(4)

~~Wetland buffers shall be measured from the wetland's edge as delineated in accordance with the Federal Wetland Delineation Manual and applicable regional supplements approved by the Washington State Department of Ecology per WAC 173-22-035.~~

Buffer Requirements. The standard buffer widths in Table 20.30.330(A)(1) have been established in accordance with the best available science. They are based on the category of wetland and

Previously in SMP 20.230.030(C)(4)(a)

the habitat score as determined by a qualified wetland professional using the Washington State Wetland Rating System for Western Washington.

1. The use of the standard buffer widths requires the implementation of the measures in Table 20.80.330(A)(2), where applicable, to minimize the impacts of the adjacent land uses.

2. If an applicant chooses not to apply the mitigation measures in Table 20.80.330(A)(2), then a 33 percent increase in the width of all buffers is required. For example, a 75-foot buffer with the mitigation measures would be a 100-foot buffer without them.

3. The standard buffer widths assume that the buffer is ~~vegetated with a~~ relatively intact native plant community ~~appropriate for the ecoregion~~ in the buffer zone adequate to protect the wetland functions and values at the time of the proposed activity. If the existing buffer is ~~unvegetated~~ bare ground, sparsely vegetated, or vegetated with nonnative or invasive species that do not perform needed functions, then the applicant must either develop and implement a wetland buffer restoration or enhancement plan to maintain the standard width ~~- the buffer should either be planted~~ to create the appropriate plant community or the buffer ~~should~~ must be widened to ensure that adequate functions of the buffer are provided.

Edited for clarity.

4. Additional buffer widths are added to the standard buffer widths. For example, a Category I wetland scoring ~~32~~ 9 points for habitat function would require a buffer of 225 feet (75 + 150).

~~B. Wetland buffers shall be established as follows:~~

~~Table 20.80.330B~~

~~Wetland Type~~	~~Standard Buffer Width (ft)~~	~~Minimum Buffer Width (ft)~~
~~Type I~~	~~150~~	~~115~~
~~Type II~~	~~115~~	~~75~~
~~Type III~~	~~65~~	~~35~~
~~Type IV~~	~~35~~	~~25~~

Previously SMP Table20.230.031 Wetland Buffers for Western Washington. Updated for use with 2014 Wetland Rating System for Western Washington based on *Guidance for Small Cities: Western Washington Version (Publication No. 10-06-002).* Changes for 2014 rating system shown with strike through and double underline.

This table can be formatted to list the total required buffer width rather than additional amount of buffer.

Table 20.80.330(A)(1) Wetland Buffer Requirements

Wetland Category	~~Standard~~ Buffer Width if wetland scores 3-4 habitat points	Additional buffer width if wetland scores ~~21 – 25~~ 5 habitat points	Additional buffer width if wetland scores ~~26 – 29~~ 6—7 habitat points	Additional buffer width if wetland scores ~~30 – 36~~ 8-9 habitat points
Category I: Based on total score	75 ft	Add 30 ft	Add 90 ft	Add 150 ft
Category I: Forested	75 ft	Add 30 ft	Add 90 ft	Add 150 ft
Category I: Estuarine	150 ft (habitat scores not applicable) ~~NA~~			

Wetland Category	~~Standard~~ Buffer Width if wetland scores 3-4 habitat points	Additional buffer width if wetland scores ~~21—25~~ 5 habitat points	Additional buffer width if wetland scores ~~26—29~~ 6—7 habitat points	Additional buffer width if wetland scores ~~30—36~~ 8-9 habitat points
	~~NA~~ ~~NA~~			
Category II: Based on score	75 ft	Add 30 ft	Add 90 ft	Add 150 ft
Category III (all)	60 ft	Add 45 ft	Add 105 ft	~~NA~~ Add 165 ft
Category IV (all)	40 ft (habitat scores not applicable) ~~NA~~ ~~NA~~ ~~NA~~			

Table 20.80.330(A)(2) Required measures to minimize impacts to wetlands (Measures are required, where applicable to a specific proposal)

Disturbance	Activities and Uses that Cause Disturbances	Required Measures to Minimize Impacts
Lights	• Parking lots • Warehouses • Manufacturing • Residential	• Direct lights away from wetland.
Noise	• Manufacturing • Residential	• Locate activity that generates noise away from wetland. • If warranted, enhance existing buffer with native vegetation plantings adjacent to noise source. • For activities that generate relatively continuous, potentially disruptive noise, such as certain heavy industry or mining, establish an additional 10 ft heavily vegetated buffer strip immediately adjacent to the outer wetland buffer.
Toxic runoff*	• Parking lots • Roads • Manufacturing • Residential areas • Application of agricultural pesticides • Landscaping	• Route all new, untreated runoff away from wetland while ensuring wetland is not dewatered. • Establish covenants limiting use of pesticides within 150 ft of wetland. • Apply integrated pest management.
Stormwater runoff	• Parking lots • Roads • Manufacturing • Residential areas • Commercial • Landscaping	• Retrofit stormwater detention and treatment for roads and existing adjacent development. • Prevent channelized flow from lawns that directly enters the buffer. • Use Low Intensity Development techniques (per PSAT publication on LID techniques).
Change in water regime	• Impermeable surfaces • Lawns • Tilling	• Infiltrate or treat, detain, and disperse into buffer new runoff from impervious surfaces and new lawns.
Pets and human disturbance	• Residential areas	• Use privacy fencing OR plant dense vegetation to delineate buffer edge and to discourage disturbance using vegetation appropriate for the ecoregion.

Previously SMP Table20.230.032 Wetland Buffers for Western Washington. Updated for use with 2014 Wetland Rating System for Western Washington based on *Wetlands in Washington State Volume 2 – Protecting and Managing Wetlands (Ecology Publication No. 05-06-008), Appendix 8-C, modified to use with the 2014 Washington State Rating System for Western Washington,*. Changes for 2014 rating system shown with strike through and double underline.

Disturbance	Activities and Uses that Cause Disturbances	Required Measures to Minimize Impacts
		• Place wetland and its buffer in a separate tract or protect with a conservation easement.
Dust	• Tilled fields	• Use best management practices to control dust.
Disruption of corridors or connections		• Maintain connections to off-site areas that are undisturbed. • Restore corridors.
* These examples are not necessarily adequate for minimizing toxic runoff if threatened or endangered species are present at the site.		

~~C. The standard buffer width shall be established; provided, that the buffer may be reduced to the minimum buffer listed above if the applicant can demonstrate that a smaller area is adequate to protect the wetland functions and one or both of the following:~~

Replace with regulations from SMP 20.230.030(C)(6).

~~1. The proposed use and activities are considered low impact, and may include the following:~~

~~a. A site layout with no parking, outdoor storage, or use of machinery;~~

~~b. The proposed use does not involve usage or storage of chemicals; and~~

~~c. Passive areas are located adjacent to the subject buffer; and~~

~~d. Both the wetland and its buffer are incorporated into the site design in a manner which eliminates the risk of adverse impact on the subject critical area.~~

~~2. Wetland and buffer enhancement is implemented that will result in equal or greater wetland functions. This includes but is not limited to the following:~~

~~a. Enhancement of fish and wildlife habitat by incorporating structures that are likely to be used by wildlife, including wood duck houses, bat boxes, nesting platforms, snags, rootwads/stumps, birdhouses, and heron nesting areas.~~

~~b. Planting native vegetation that would increase value for fish and wildlife habitat, improve water quality, or provide aesthetic/recreational value.~~

~~D. When a wetland has salmonid fish use consistent with SMC 20.80.470, the corresponding wetland or stream buffer, whichever is greater, shall be established.~~

~~E. The City may extend the width of the buffer on the basis of site specific analysis when necessary to achieve the goals of this subchapter.~~

5. **Increased Wetland Buffer Area Width.** Buffer widths shall be increased on a case-by-case basis as determined by the Director when a larger buffer is necessary to protect wetland functions and values. This

determination shall be supported by appropriate documentation showing that it is reasonably related to protection of the functions and values of the wetland. The documentation must include, but not be limited to, the following criteria:

a. The wetland is used by a plant or animal species listed by the Federal government or the State as endangered, threatened, candidate, sensitive, monitored or documented priority species or habitats, or essential or outstanding habitat for those species or has unusual nesting or resting sites such as heron rookeries or raptor nesting trees; or

b. The adjacent land has slopes greater than ~~30~~ 15 percent or is susceptible to severe erosion, and erosion-control measures will not effectively prevent adverse wetland impacts; or

c. The adjacent land has minimal vegetative cover. In lieu of increasing the buffer width where exiting buffer vegetation is inadequate to protect the wetland functions and values, development and implementation of a wetland buffer restoration/enhancement plan in accordance with SMC 20.80.350 may be substituted.

~~F. Wetland buffer widths may be modified by averaging buffer widths as set forth herein. Buffer width averaging shall be allowed only where the applicant demonstrates to the City:~~

~~1. The ecological structure and function of the buffer after averaging is equivalent to or greater than the structure and function before averaging;~~

~~2. That the total area contained within the buffer after averaging is no less than that contained within the standard buffer prior to averaging;~~

~~3. Buffer averaging will not result in a buffer width being reduced by more than 25 percent of the required buffer as set forth in Table 20.80.330B and in no case may the buffer be less than the stated minimum width.~~

~~4. A habitat survey shall be conducted within the area of concern in order to identify and prioritize highly functional fish and wildlife habitat within the study area.~~

~~The City may require buffer averaging to be designed to protect areas of greater sensitivity and function based on the recommendations of a wetland report prepared by a qualified professional.~~

6. Buffer averaging to improve wetland protection may be permitted when all of the following conditions are met:

a. The wetland has significant differences in characteristics that affect its habitat functions, such as a wetland with a forested component adjacent to a degraded emergent component or a “dual-rated” wetland with a Category I area adjacent to a lower rated area;

b. The buffer is increased adjacent to the higher functioning area of habitat or more sensitive portion of the wetland and decreased adjacent

to the lower functioning or less sensitive portion as demonstrated by a critical areas report from a qualified wetland professional;

c. The total area of the buffer after averaging is equal to the area required without averaging; and

d. The buffer at its narrowest point is never less than either three-fourths of the required width or 75 feet for Category I and II, 50 feet for Category III, and 25 feet for Category IV, whichever is greater.

7. Averaging through a Critical Area Reasonable Use Permit consistent with SMC 20.30.333 or Critical Area Special Use Permit consistent with SMC 20.30.336 or a shoreline variance consistent with 20.220.040 may be permitted when all of the following are met:

Edited to allow for application of averaging outside of the SMP regulated shoreline.

a. There are no feasible alternatives to the site design that could be accomplished without buffer averaging;

b. The averaged buffer will not result in degradation of the wetland's functions and values as demonstrated by a critical areas report from a qualified wetland professional;

c. The total buffer area after averaging is equal to the area required without averaging; and

d. The buffer at its narrowest point is never less than either three-fourths of the required width or 75 feet for Category I and II, 50 feet for Category III and 25 feet for Category IV, whichever is greater.

B. To facilitate long-range planning using a landscape approach, the Director may identify and preassess wetlands using the rating system and establish appropriate wetland buffer widths for such wetlands. The Director will prepare maps of wetlands that have been preassessed in this manner.

Previously in SMP 20.230.030(C)(4)(a)(v)

C. **Measurement of Wetland Buffers.** All buffers shall be measured perpendicular from the wetland boundary as surveyed in the field. The buffer for a wetland created, restored, or enhanced as compensation for approved wetland alterations shall be the same as the buffer required for the category of the created, restored, or enhanced wetland. ~~Only fully vegetated buffers will be considered. Lawns, walkways, driveways, and other mowed or paved areas will not be considered buffers or included in buffer area calculations.~~

See increased buffer widths for how to handle buffers that are not well vegetated with native vegetation.

D. **Buffers on Mitigation Sites.** All mitigation sites shall have buffers consistent with the buffer requirements of this chapter. Buffers shall be based on the expected or target category of the proposed wetland mitigation site.

E. **Buffer Maintenance.** Except as otherwise specified or allowed in accordance with this chapter, wetland buffers shall be retained in an undisturbed or enhanced condition. In the case of compensatory mitigation sites, removal of invasive nonnative weeds is required for the duration of the mitigation bond (SMC 20.80.350(H)(2)(a)(viii).

F. **Impacts to Buffers.** Requirements for the compensation for impacts to buffers are outlined in SMC 20.80.350 of this section.

G. **Overlapping Critical Area Buffers.** If buffers for two contiguous critical areas overlap (such as buffers for a stream and a wetland), the wider buffer applies.

~~G. Low impact uses and activities which are consistent with the~~

~~purpose and function of the wetland buffer and do not detract from its integrity may be permitted within the buffer depending on the sensitivity of the wetland. Examples of uses and activities which may be permitted in appropriate cases include trails constructed in a manner to reduce impervious surfaces, viewing platforms, and utility easements; provided, that any impacts to the buffer resulting from such permitted activities are fully mitigated. Uses permitted within the buffer shall be located as far from the wetland as possible.~~

H. **Allowed Buffer Uses.** The following uses may be allowed within a wetland buffer in accordance with the review procedures of this chapter, provided they are not prohibited by any other applicable law and they are conducted in a manner so as to minimize impacts to the buffer and adjacent wetland:

1. **Conservation and Restoration Activities.** Conservation or restoration activities aimed at protecting the soil, water, vegetation, or wildlife.

2. **Passive Recreation.** Passive recreation facilities designed and in accordance with an approved critical area report, including:

a. Walkways and trails; provided, that those pathways are limited to minor crossings having no adverse impact on water quality. They should be generally parallel to the perimeter of the wetland, located only in the outer 25 percent of the wetland buffer area, and located to avoid removal of significant trees. They should be limited to pervious surfaces no more than five feet in width for pedestrian use only. Raised boardwalks utilizing nontreated pilings may be acceptable; and/or

b. Wildlife viewing structures.

3. Educational and scientific research activities.

4. Normal and routine maintenance and repair of any existing public or private facilities within an existing right-of-way; provided, that the maintenance or repair does not increase the footprint or use of the facility or right-of-way.

5. The harvesting of wild crops in a manner that is not injurious to natural reproduction of such crops, and provided the harvesting does not require tilling of soil, planting of crops, chemical applications, or alteration of the wetland by changing existing topography, water conditions, or water sources.

6. Drilling for utilities/utility corridors under a buffer, with entrance/exit portals located completely outside of the wetland buffer boundary; provided, that the drilling does not interrupt the ground water connection to the wetland or percolation of surface water down through the soil column. Specific studies by a hydrologist are necessary to determine whether the ground water connection to the wetland or percolation of surface water down through the soil column is disturbed.

7. Enhancement of a wetland through the select removal of nonnative invasive plant species. Removal of invasive plant species shall be restricted to hand labor and hand-held equipment ~~removal~~ unless permits from the appropriate regulatory agencies have been obtained for approved biological or chemical treatments. Not more than1,500 square feet of area may be cleared, as calculated cumulatively over one (1) year, on private property without a permit. All removed plant material shall be taken away from the site and disposed of appropriately. Plants that appear on the Washington State Noxious Weed

These are similar to provisions in SMC 20.80.030 and in Activities allowed in wetlands. It may be feasible to consolidate these sections. One example is to refer to all activities allowed by SMC 20.80.XXX and then list only those things that are different.

Control Board list of noxious weeds or the King County Noxious Weed List must be handled and disposed of according to a noxious weed control plan appropriate to that species. Revegetation with appropriate native species at natural densities is allowed in conjunction with removal of invasive plant species.

~~H. Stormwater management facilities, such as bio-swales, may not be located within the minimum buffer area as set forth in Table 20.80.330B unless it is determined that the location of the facility will enhance the buffer area, and protect the wetland.~~

8. **Stormwater Management Facilities.** Stormwater management facilities are limited to stormwater dispersion outfalls and bioswales. They may be allowed within the outer 25 percent of the buffer of Category III or IV wetlands only; provided, that:

a. No other location is feasible;

b. The location of such facilities will not degrade the functions or values of the wetland; and

c. Stormwater management facilities are not allowed in buffers of Category I or II wetlands.

9. **Nonconforming Uses.** Repair and maintenance of nonconforming uses or structures, where legally established within the buffer, provided they do not increase the degree of nonconformity.

10. Development Proposals within Physically Separated and Functionally Isolated Stream or Wetland Buffers. Consistent with the definition of "buffers" (SMC 20.20.012), areas that are functionally isolated and physically separated from wetland due to existing, legally established roadways, paved trails eight (8) feet or more in width, or other legally established structures or paved areas eight (8) feet or more in width that occurs between the area in question and the wetland shall be considered physically isolated and functionally separated wetland buffer. Once determined by the Director based on a submitted critical area report to be a physically separated and functionally isolated wetland buffer, development proposals shall be allowed in these areas.

Buffer functions are provided when the buffer is contiguous with the wetland. Buffer area on the opposite side of a road, path or building, do not benefit the wetland. This provision allows for development in areas where permanent improvements disconnect the project site and additional buffer would not benefit the wetland.

New allowed activities provision could be added to Allowed activities in general provisions and applied to streams as well.

~~I. A regulated wetland and its associated buffer shall either be placed in a separate tract on which development is prohibited, protected by execution of an easement, dedicated to a conservation organization or land trust, or similarly preserved through a permanent protective mechanism acceptable to the City. The location and limitations associated with the wetland and its buffer shall be shown on the face of the deed or plat applicable to the property and shall be recorded with the King County Department of Records. (Ord. 695 § 1 (Exh. A), 2014; Ord. 469 § 1, 2007; Ord. 398 § 1, 2006; Ord. 238 Ch. VIII § 5(C), 2000).~~

I. **Signs and Fencing of Wetlands and Buffers.**

1. **Temporary Markers.** The outer perimeter of the wetland buffer and the clearing limits identified by an approved permit or authorization shall be marked in the field with temporary "clearing limits" fencing in such a way as to ensure that no unauthorized intrusion will occur. The marking is subject to

Cross reference with 20.50.330(E).

inspection by the Director prior to the commencement of permitted activities during preconstruction meeting required under SMC 20.50.330(E). This temporary marking shall be maintained throughout construction and shall not be removed until permanent signs, if required, are in place.

2. **Permanent Signs.** As a condition of any permit or authorization issued pursuant to this chapter, the Director may require the applicant to install permanent signs along the boundary of a wetland or buffer.

Cross reference with 20.80.060.

a. Permanent signs shall be made of an enamel-coated metal face and attached to a metal post or another nontreated material of equal durability. Signs must be posted at an interval of one per lot or every 50 feet, whichever is less, and must be maintained by the property owner in perpetuity. The signs shall be worded consistent with the text specified in SMC 20.80.060 ~~as follows~~ or with alternative language approved by the Director.~~:~~

~~Protected Wetland Area Do Not Disturb~~
~~Contact the City of Shoreline Regarding Uses, Restrictions, and Opportunities for Stewardship~~

b. The provisions of subsection (a) of this section may be modified as necessary to assure protection of sensitive features.

3. **Fencing.** Fencing installed as part of a proposed activity or as required in this subsection shall be designed so as to not interfere with species migration, including fish runs, and shall be constructed in a manner that minimizes impacts to the wetland and associated habitat. Permanent fencing shall be required at the outer edge of the critical area buffer under the following circumstances, provided that the Director may waive this requirement:

Clarifying language regarding when fencing is required added based on City of Edmonds code.

a. As part of any development proposal for subdivisions, short plats, multifamily, mixed use, and commercial development where the Director determines that such fencing is necessary to protect the functions of the critical area, provided that breaks in permanent fencing may be allowed for access to permitted buffer uses (SMC 20.80.330(H));

b. As part of development proposals for parks where the adjacent proposed use is active recreation and the Director determines that such fencing is necessary to protect the functions of the critical area;

c. When buffer averaging is part of a development proposal;

d. When buffer reductions are part of a development proposal; or

f. At the Director's discretion to protect the values and functions of a critical area.

~~20.80.340 Alteration.~~

Replace with new regulations clarifying when alteration to wetlands or their buffers are allowed or not. See new SMC 20.80.326.

~~A. **Type I Wetlands.** Alterations of Type I wetlands shall be prohibited subject to the reasonable use provisions and special use permit provision of this title.~~

~~B. **Type II, III and IV Wetlands.**~~

~~1. Any proposed alteration and mitigation shall~~

~~comply with the mitigation performance standards and requirements of these regulations; and~~

~~2. No net loss of wetland function and value may occur; and~~

~~3. Where enhancement or replacement is proposed, ratios shall comply with the requirements of this subchapter.~~

20.80.350 WETLANDS - Compensatory Mitigation performance standards and requirements.

Replace with regulations from SMP 20.230.030(C)(6).

~~A. **Appropriate Wetland Mitigation Sequence and Actions.** Where impacts cannot be avoided, and the applicant has exhausted feasible design alternatives, the applicant or property owner shall seek to implement other appropriate mitigation actions in compliance with the intent, standards and criteria of this section. In an individual case, these actions may include consideration of alternative site plans and layouts, reductions in the density or scope of the proposal, and/or implementation of the performance standards listed in this subchapter.~~

~~B. Impacts to wetland functions and values shall be mitigated. Mitigation actions shall be implemented in the preferred sequence: Avoidance, minimization, restoration and replacement. Proposals which include less preferred and/or compensatory mitigation shall demonstrate that:~~

~~1. All feasible and reasonable measures will be taken to reduce impacts and losses to the critical area, or to avoid impacts where avoidance is required by these regulations; and~~

~~2. The restored, created or enhanced critical area or buffer will be as available and persistent as the critical area or buffer area it replaces; and~~

~~In the case of wetlands and streams, no overall net loss will occur in wetland or stream functions and values.~~

Previously in SMP 20.230.030(C)(6).

A. **Mitigation Sequencing.** Before impacting any wetland or its buffer, an applicant shall demonstrate that the following actions have been taken. Actions are listed in the order of preference:

1. Avoid the impact altogether by not taking a certain action or parts of an action.

2. Minimize impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts.

3. Rectify the impact by repairing, rehabilitating, or restoring the affected environment.

4. Reduce or eliminate the impact over time by preservation and maintenance operations.

5. Compensate for the impact by replacing, enhancing, or providing substitute resources or environments.

6. Monitor the required compensation and take remedial or corrective measures when necessary.

B. **Requirements for Compensatory Mitigation.**

1. Compensatory mitigation for alterations to wetlands shall be used only for impacts that cannot be avoided or minimized and shall achieve equivalent or greater biologic functions. Compensatory mitigation plans shall be consistent with Wetland Mitigation in Washington State – Part 2: Developing Mitigation Plans (Version 1), Ecology Publication No. 06-06-011b, Olympia, WA, March 2006 or as revised.

2. Mitigation ratios shall be consistent with SMC 20.80.350(G).

3. Mitigation requirements may also be determined using the credit/debit tool described in "Calculating Credits and Debits for Compensatory Mitigation in Wetlands of Western Washington: Operational Draft" (Ecology Publication No. 10-06-011, February 2011, or as revised) consistent with SMC 20.80.350(G).

C. **Compensating for Lost or Affected Functions.** Compensatory mitigation shall address the functions affected by the proposed project, with an intention to achieve functional equivalency or improvement of functions. The goal shall be for the compensatory mitigation to provide similar wetland functions as those lost, except when either:

1. The lost wetland provides minimal functions, and the proposed compensatory mitigation action(s) will provide equal or greater functions or will provide functions shown to be limiting within a watershed through a formal Washington State watershed assessment plan or protocol; or

2. Out-of-kind replacement of wetland type or functions will best meet watershed goals formally identified by the City, such as replacement of historically diminished wetland types.

D. **Preference of Mitigation Actions.** Methods to achieve compensation for wetland functions shall be approached in the following order of preference:

1. Restoration (reestablishment and rehabilitation) of wetlands.

2. Creation (establishment) of wetlands on disturbed upland sites such as those with vegetative cover consisting primarily of nonnative species. This should be attempted only when there is an adequate source of water and it can be shown that the surface and subsurface hydrologic regime is conducive to the wetland community that is anticipated in the design.

3. Enhancement of significantly degraded wetlands in combination with restoration or creation. Enhancement alone will result in a loss of wetland acreage and is less effective at replacing the functions lost. Enhancement should be part of a mitigation package that includes replacing the impacted area and meeting appropriate ratio requirements.

4. **Preservation.** Preservation of high quality, at-risk wetlands as compensation is generally acceptable when done in combination with restoration, creation, or enhancement; provided, that a minimum of 1:1 acreage replacement is provided by reestablishment or creation. Preservation of high quality, at-risk wetlands and habitat may be considered as the sole means of compensation for wetland impacts when the following criteria are

met:

a. Wetland impacts will not have a significant adverse impact on habitat for listed fish, or other ESA listed species;

b. There is no net loss of habitat functions within the watershed or basin;

c. Mitigation ratios for preservation as the sole means of mitigation shall generally start at 20:1. Specific ratios should depend upon the significance of the preservation project and the quality of the wetland resources lost; and

d. The impact area is small (generally less than one-half acre) and/or impacts are occurring to a low functioning system (Category III or IV wetland).

All preservation sites shall include buffer areas adequate to protect the habitat and its functions from encroachment and degradation.

~~C. **Location and Timing of Wetland Mitigation.**~~

Replace with regulations from SMP 20.230.030(C)(6)(e)

~~1. Wetland mitigation shall be provided on-site, unless on-site mitigation is not scientifically feasible due to the physical features of the property. The burden of proof shall be on the applicant to demonstrate that mitigation cannot be provided on-site.~~

~~2. When mitigation cannot be provided on-site, mitigation shall be provided in the immediate vicinity of the permitted activity on property owned or controlled by the applicant such as an easement, provided such mitigation is beneficial to the critical area and associated resources. It is the responsibility of the applicant to obtain title to off-site mitigation areas.~~

~~3. In-kind mitigation shall be provided except when the applicant demonstrates and the City concurs that greater functional and habitat value can be achieved through out-of-kind mitigation.~~

~~4. Only when it is determined by the City that subsections (C)(1), (2), and (3) of this section are inappropriate and impractical shall off-site, out-of-kind mitigation be considered.~~

~~5. When wetland mitigation is permitted by these regulations on-site or off-site, the mitigation project shall occur near an adequate water supply (river, stream, ground water) with a hydrologic connection to the proposed wetland mitigation area to ensure successful development or restoration.~~

~~6. Any agreed upon mitigation proposal shall be completed prior to project construction, unless a phased schedule that assures completion concurrent with project construction, has been approved by the City.~~

~~7. Wetland acreage replacement ratios shall be as specified in this section.~~

~~8. When wetland mitigation is permitted by these regulations, native plant materials salvaged from the original wetland area shall be utilized to the maximum extent possible.~~

Previously in SMP 20.230.030(C)(6)(e).

E. **Type and Location of Compensatory Mitigation.** Unless it is demonstrated that a higher level of ecological functioning would result from an alternative approach, compensatory mitigation for ecological functions shall be either in kind and on site, or in kind and within the same stream reach, sub-basin, or drift cell (if estuarine wetlands are impacted). Compensatory mitigation actions shall be conducted within the same sub-drainage basin and on the site of the alteration except when all of the following apply:

1. There are no reasonable opportunities on site or within the sub-drainage basin (e.g., on-site options would require elimination of high functioning upland habitat), or opportunities on site or within the sub-drainage basin do not have a high likelihood of success based on a determination of the capacity of the site to compensate for the impacts. Considerations should include: anticipated replacement ratios for wetland mitigation, buffer conditions and proposed widths, available water to maintain anticipated hydrogeomorphic classes of wetlands when restored, proposed flood storage capacity, and potential to mitigate riparian fish and wildlife impacts (such as connectivity);

2. Off-site mitigation has a greater likelihood of providing equal or improved wetland functions than the impacted wetland; and

3. Off-site locations shall be in the same sub-drainage basin unless:

a. Watershed goals for water quality, flood storage or conveyance, habitat, or other wetland functions have been established by the City and strongly justify location of mitigation at another site.~~; or~~

~~b. Credits from a State-certified wetland mitigation bank are used as compensation, and the use of credits is consistent with the terms of the bank's certification.~~

There is currently no wetland bank located within the WRIA 8, let alone in the City. So mitigation through wetland banking would result in net loss of wetland acreage, functions and values within the City and is inconsistent with the purpose and intent of these regulations.

4. The design for the compensatory mitigation project needs to be appropriate for its location (i.e., position in the landscape). Therefore, compensatory mitigation should not result in the creation, restoration, or enhancement of an atypical wetland. An atypical wetland refers to a compensation wetland (e.g., created or enhanced) that does not match the type of existing wetland that would be found in the geomorphic setting of the site (i.e., the water source(s) and hydroperiod proposed for the mitigation site are not typical for the geomorphic setting). Likewise, it should not provide exaggerated morphology or require a berm or other engineered structures to hold back water. For example, excavating a permanently inundated pond in an existing seasonally saturated or inundated wetland is one example of an enhancement project that could result in an atypical wetland. Another example would be excavating depressions in an existing wetland on a slope, which would require the construction of berms to hold the water.

F. **Timing of Compensatory Mitigation.** It is preferred that compensatory mitigation projects be completed prior to activities that will disturb wetlands. At the least, compensatory mitigation shall be completed immediately following disturbance and prior to use or occupancy of the action or development. Construction of mitigation projects shall be timed to reduce impacts to existing fisheries, wildlife, and flora.

1. The Director may authorize a one-time temporary delay in completing

construction or installation of the compensatory mitigation when the applicant provides a written explanation from a qualified wetland professional as to the rationale for the delay. An appropriate rationale would include identification of the environmental conditions that could produce a high probability of failure or significant construction difficulties (e.g., project delay lapses past a fisheries window, or installing plants should be delayed until the dormant season to ensure greater survival of installed materials). The delay shall not create or perpetuate hazardous conditions or environmental damage or degradation, and the delay shall not be injurious to the health, safety, or general welfare of the public. The request for the temporary delay must include a written justification that documents the environmental constraints that preclude implementation of the compensatory mitigation plan. The justification must be verified and approved by the City.

~~D. **Wetland Replacement Ratios.**~~

~~1. Where wetland alterations are permitted by the City, the applicant shall restore or create areas of wetlands in order to compensate for wetland losses. Equivalent areas shall be determined according to acreage, function, type, location, timing factors and projected success of restoration or creation.~~

~~2. When creating or enhancing wetlands, the following acreage replacement ratios shall be used:~~

~~**Table 20.80.350D**~~

~~**Wetland Type**~~	~~**Wetland Creation Replacement Ratio (Area)**~~	~~**Wetland Enhancement Ratio (Area)**~~
~~Type I~~	~~6:1~~	~~16:1~~
~~Type II~~	~~3:1~~	~~12:1~~
~~Type III~~	~~2:1~~	~~8:1~~
~~Type IV~~	~~1.5:1~~	~~6:1~~

~~The Department shall have discretion to increase these standards where mitigation is to occur off-site or in other appropriate circumstances based on the recommendations of a wetlands report that includes best available science and is prepared by a qualified professional.~~

~~3. Enhanced wetlands shall have higher wetland values and functions than the altered wetland. The values and functions transferred shall be of equal or greater quality to assure no net loss of wetland values and functions.~~

~~4. Enhanced and created wetlands shall be appropriately classified and buffered.~~

~~5. An enhanced or created wetland and its associated buffer shall be placed either in a separate tract on which development is prohibited, protected by execution of an easement, dedicated to a conservation organization or land trust, or similarly preserved through a permanent protective~~

~~mechanism acceptable to the City and shall be recorded with the King County Department of Records.~~

G. **Wetland Mitigation Ratios[1].**

Category and Type of Wetland[2]	**Creation or Reestablishment**	**Rehabilitation**	**Enhancement**	**Preservation**
Category I: Bog, Natural Heritage site	Not considered possible	6:1	Case by case	10:1
Category I: Mature forested	6:1	12:1	24:1	24:1
Category I: Based on functions	4:1	8:1	16:1	20:1
Category II	3:1	6:1	12:1	20:1
Category III	2:1	4:1	8:1	15:1
Category IV	1.5:1	3:1	6:1	10:1

[1] Ratios for rehabilitation and enhancement may be reduced when combined with 1:1 replacement through creation or reestablishment. See Table 1a or 1b, Wetland Mitigation in Washington State – Part 1: Agency Policies and Guidance – Version 1 (Ecology Publication No. 06-06-011a, Olympia, WA, March 2006 or as revised).
[2] Category and type of wetland as determined consistent with SMC 20.80.320(D).

~~E. Wetlands~~ H. Mitigation Performance Standards. The performance standards in this section shall be incorporated into mitigation plans submitted to the City for impacts to critical areas. ~~In addition, the City may prepare a technical manual which includes guidelines and requirements for report preparation.~~ The following performance standards shall apply to any mitigations proposed within ~~Type~~ Category I, ~~Type~~ II, ~~Type~~ III and ~~Type~~ IV wetlands and their buffers. Modifications to these performance standards consistent with the guidance in *Wetland Mitigation in Washington State – Part 2: Developing Mitigation Plans (Version 1) (Ecology Publication No. 06-06-011b, Olympia, WA, March 2006 or as revised) may be considered for approval by the Director as alternatives to the following standards.*

1. Plants indigenous to the region (not introduced or foreign species) shall be used.

2. Plant selection shall be consistent with the existing or projected hydrologic regime, including base water levels and stormwater event fluctuations.

3. Plants should be commercially available or available from local sources.

4. Plant species high in food and cover value for fish and wildlife shall be used.

5. Mostly perennial species should be planted.

6. Committing significant areas of the site to species that have questionable potential for successful establishment shall be avoided.

7. Plant selection must be approved by a qualified consultant.

These standards still seem relevant and useful as criteria for mitigation plans. Added language to refer to existing manual with guidelines for mitigation plans and performance standards..

8. The following standards shall apply to wetland design and construction:

a. Water depth shall not exceed six and one-half feet (two meters).

b. The grade or slope that water flows through the wetland shall not exceed six percent.

c. Slopes within the wetland basin and the buffer zone shall not be steeper than 3:1 (horizontal to vertical).

d. The wetland (excluding the buffer area) should not contain more than 60 percent open water as measured at the seasonal high water mark.

9. Substrate should consist of a minimum of one foot, in depth, of clean (uncontaminated with chemicals or solid/hazardous wastes) inorganic/organic materials.

10. Planting densities and placement of plants should be determined by a qualified consultant and shown on the design plans.

11. The planting plan shall be approved by the City.

12. Stockpiling should be confined to upland areas and contract specifications should limit stockpiling of earthen materials to durations in accordance with City clearing and grading standards, unless otherwise approved by the City.

13. Planting instructions shall be submitted which describe proper placement, diversity, and spacing of seeds, tubers, bulbs, rhizomes, sprigs, plugs, and transplanted stock.

14. Controlled release fertilizer shall be applied (if required) at the time of planting and afterward only as plant conditions warrant (determined during the monitoring process).

15. An irrigation system shall be installed, if necessary, for the initial establishment period.

16. All construction specifications and methods shall be approved by a qualified consultant and the City.

17. Construction management shall be provided by a qualified consultant. Ongoing work on- site shall be inspected by the City.

H. **Compensatory Mitigation Plan.** When a project involves wetland and/or buffer impacts, a compensatory mitigation plan prepared by a qualified professional shall be required, meeting the following minimum standards:

Previously in SMP 20.230.030(C)(6)(h-i).

1. **Wetland Critical Area Report.** A critical area report for wetlands must accompany or be included in the compensatory mitigation plan and include the minimum parameters described in SMC 20.80.326(D) ~~the~~ "Minimum

Standards for Wetland Reports~~" section of this chapter~~.

2. **Compensatory Mitigation Report.** The report, prepared by a qualified professional, must include a written report and plan sheets that must contain, at a minimum, the elements listed below. Full guidance can be found in *Wetland Mitigation in Washington State – Part 2: Developing Mitigation Plans (Version 1) (Ecology Publication No. 06-06-011b, Olympia, WA, March 2006 or as revised).*

a. The written report must contain, at a minimum:

i. The name and contact information of the applicant; the name, qualifications, and contact information for the primary author(s) of the compensatory mitigation report; a description of the proposal; a summary of the impacts and proposed compensation concept; identification of all the local, State, and/or Federal wetland-related permit(s) required for the project; and a vicinity map for the project;

ii. Description of how the project design has been modified to avoid, minimize, or reduce adverse impacts to wetlands;

iii. Description of the existing wetland and buffer areas proposed to be impacted. Include acreage (or square footage), water regime, vegetation, soils, landscape position, surrounding land uses, and functions. Also describe impacts in terms of acreage by Cowardin classification, hydrogeomorphic classification, and wetland rating, based on wetland ratings (SMC 20.80.320(D));

iv. Description of the compensatory mitigation site, including location and rationale for selection. Include an assessment of existing conditions: acreage (or square footage) of wetlands and uplands, water regime, sources of water, vegetation, soils, landscape position, surrounding land uses, and functions. Estimate future conditions in this location if the compensation actions are not undertaken (i.e., how would this site progress through natural succession?);

v. A description of the proposed actions for compensation of wetland and upland areas affected by the project. Include overall goals of the proposed mitigation, including a description of the targeted functions, hydrogeomorphic classification, and categories of wetlands;

vi. A description of the proposed mitigation construction activities, construction/installation notes, and timing of activities;

vii. A discussion of ongoing management practices that will protect wetlands after the project site has been developed, including proposed monitoring and maintenance programs (for remaining wetlands and compensatory mitigation wetlands);

viii. A cost ~~bond~~ estimate for the entire compensatory mitigation project, including the following elements: site preparation, plant materials, construction materials, installation oversight, maintenance twice per year for up to five years, annual monitoring field work and reporting, and contingency actions for a maximum of the total required number of years for monitoring; and

ix. Proof of establishment of notice on title for the wetlands and

buffers on the project site, including the compensatory mitigation areas.

b. The scaled plan sheets for the compensatory mitigation must contain, at a minimum:

i. Surveyed edges of the existing wetland and buffers, proposed areas of wetland and/or buffer impacts, location of proposed wetland and/or buffer compensation actions;

ii. Existing topography, ground-proofed, at two-foot contour intervals in the zone of the proposed compensation actions if any grading activity is proposed to create the compensation area(s). Also existing cross-sections of on-site wetland areas that are proposed to be impacted, and cross-section(s) (estimated one-foot intervals) for the proposed areas of wetland or buffer compensation;

iii. Surface and subsurface hydrologic conditions, including an analysis of existing and proposed hydrologic regimes for enhanced, created, or restored compensatory mitigation areas. Also, illustrations of how data for existing hydrologic conditions were used to determine the estimates of future hydrologic conditions;

iv. Conditions expected from the proposed actions on site, including future hydrogeomorphic types, vegetation community types by dominant species (wetland and upland), and future water regimes;

v. Required wetland buffers for existing wetlands and proposed compensation areas. Also, identify any zones where buffers are proposed to be reduced or enlarged outside of the standards identified in this chapter;

vi. A plant schedule for the compensation area, including all species by proposed community type and water regime, size and type of plant material to be installed, spacing of plants, typical clustering patterns, typical plant installation details and notes, total number of each species by community type, timing of installation; and

vii. Performance standards (measurable standards reflective of years post-installation) for upland and wetland communities, monitoring ~~schedule~~ plan, contingency plan, and maintenance schedule and actions by each biennium consistent with SMC 20.80.350(H) and (K).

I. **Buffer Mitigation Ratios.** Impacts to buffers shall be mitigated at a 1:1 ratio. Compensatory buffer mitigation shall replace those buffer functions lost from development.

~~F~~J. **Approved Wetland Mitigation Projects – Signature.** On completion of construction, any approved mitigation project shall be signed off by the applicant's qualified ~~consultant~~ professional and approved by the City. Signature of the qualified ~~consultant~~ professional and approval by the City will indicate that the construction has been completed as planned.

Section retained from original for clear approval process. Terms corrected for accuracy.

~~G.~~K. Monitoring Program and Contingency Plan.

Monitoring requirements could be covered in general critical area provisions rather than in each specific critical area section.

1. A monitoring program shall be included in the mitigation plan and implemented by the applicant to determine the success of the mitigation project and any necessary corrective actions. This program shall determine if the original goals and objectives of the mitigation plan are being met.

Financial guarantee language is not aligned with current city financial guarantee procedures/policy. Consider rewording.

2. A contingency plan shall be established for indemnity in the event that the mitigation project is inadequate or fails. A performance and maintenance bond or other acceptable financial guarantee is required to ensure the applicant's compliance with the terms of the mitigation agreement. The amount of the performance and maintenance bond(s) shall equal 125 percent of the cost of the mitigation project (after City mobilization is calculated) in addition to the cost for monitoring for a minimum of five years. The bond may be reduced in proportion to work successfully completed over the period of the bond. The bonding period shall coincide with the monitoring period.

3. Monitoring programs prepared to comply with this section shall ~~reflect~~ include the following ~~guidelines~~ requirements:

Added based on DOE example code and guidance.

a. ~~Scientific procedures shall be used to establish the success or failure of the project~~. A protocol outlining the schedule for site monitoring and how the monitoring data will be evaluated to determine if the performance standards are being met.

b. For vegetation determinations, permanent sampling points shall be established.

~~c. Vegetative success shall, at a minimum, equal 80 percent survival of planted trees and shrubs and 80 percent cover of desirable understory or emergent plant species at the end of the required monitoring period. Additional standards for vegetative success, including (but not limited to) minimum survival standards following the first growing season, may be required after consideration of a report prepared by a qualified consultant.~~

Edited/Added based on DOE example code and guidance.

c. Standards for success shall be established based on the performance standards identified and the functions and values being mitigated based on the guidance in *Wetland Mitigation in Washington State – Part 2: Developing Mitigation Plans (Version 1) (Ecology Publication No. 06-06-011b, Olympia, WA, March 2006 or as revised).*

d. Monitoring reports on the current status of the mitigation project shall be submitted to the City on the schedule identified in the monitoring plan, but not less than every other year. The reports are to be prepared by a qualified consultant and reviewed by the City or a consultant retained by the City and should include monitoring information on wildlife, vegetation, water quality, water

flow, stormwater storage and conveyance, and existing or potential degradation, as applicable~~, and shall be produced on the following schedule: at the time of construction; 30 days after planting; early in the growing season of the first year; at the end of the growing season of the first year; twice during the second year; and annually thereafter~~.

e. Monitoring programs shall be established for a a period necessary to establish that performance standards have been met, but not for less than a minimum of five years without approval from the Director.

f. If necessary, failures in the mitigation project shall be corrected.

g. Dead or undesirable vegetation shall be replaced with appropriate plantings.

h. Damage caused by erosion, settling, or other geomorphological processes shall be repaired.

i. The mitigation project shall be redesigned (if necessary) and the new design shall be implemented and monitored, as in subsection ~~(G)(3)(d)~~ (K)(3)(d) of this section.

j. Correction procedures shall be approved by a qualified consultant and the City.

k. If the mitigation goals are not obtained within the initial monitoring period, the applicant remains responsible for restoration of the wetland values and functions until the mitigation goals agreed to in the mitigation plan are achieved.

Added based on DOE example code and guidance.

20.80.360 WETLANDS - Unauthorized alterations and enforcement.

A. When a wetland or its buffer has been altered in violation of this Chapter, the provisions of SMC Chapter 20.30, Subchapter 9 - Code Enforcement, apply.

B. Requirement for Restoration Plan. All development work shall remain stopped until a restoration plan is prepared and approved by the City. Such a plan shall be prepared by a qualified professional using the currently accepted scientific principles and shall describe how the actions proposed meet the minimum requirements described in Subsection (C). The Director shall, at the violator's expense, seek advice from a qualified professional in determining the adequacy of the plan. Inadequate plans shall be returned to the applicant or violator for revision and resubmittal.

C. Minimum Performance Standards for Restoration. The following minimum performance standards shall be met for the restoration of a wetland, provided that if the violator can demonstrate that greater functions and habitat values can be obtained, these standards may be modified:

1. The historic structure, functions, and values of the affected wetland shall be restored, including water quality and habitat functions.

2. The historic soil types and configuration shall be restored to the extent practicable.

The code enforcement provisions in SMC Chapter 20.30, Subchapter 9-Code enforcement provide the authority and process for code enforcement of Chapter 20.80 Critical Area violations, but is not very specific regarding how the violation must be corrected. The recommended provisions in 20.80.360 are based on the WA DOE example code and edited so the provisions do not duplicate the regulations already existing in Subchapter 9.

3. The wetland and buffers shall be replanted with native vegetation that replicates the vegetation historically found on the site in species types, sizes, and densities. The historic functions and values should be replicated at the location of the alteration.

4. Information demonstrating compliance with other applicable provisions of this Chapter shall be submitted to the Director.

D. Site Investigations. The Director is authorized to make site inspections and take such actions as are necessary to enforce this Chapter. The Director shall present proper credentials and make a reasonable effort to contact any property owner before entering onto private property.

E. Penalties. The provisions of SMC 20.30.770 through 20.30.790 apply to unauthorized alterations of a wetland or its buffer.

1. If the wetland affected cannot be restored, monies collected as penalties shall be deposited in a dedicated account for the preservation or restoration of landscape processes and functions in the watershed in which the affected wetland is located. The City may coordinate its preservation or restoration activities with other cities in the watershed to optimize the effectiveness of the restoration action.

DEPARTMENT OF ECOLOGY
State of Washington

Wetlands & CAO Updates:
Guidance for Small Cities

Western Washington Version

January 2010
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To ask about the availability of this document in a format for the visually impaired, call the Shorelands and Environmental Assistance Program at 360-407-6600. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

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By

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Table of Contents

Summary of July 2011 Revisions

Several important changes have occurred since this guidance was originally released in January 2010. These include:

- Change in requirements for wetland delineation
- Development of an additional "credit-debit" method for calculating mitigation ratios
- Expiration of the moratorium on adoption of new critical area regulations with respect to agriculture

The July 2011 revisions also include:

- Sample CAO language on monitoring that was inadvertently omitted from the original document
- Guidance on reducing mitigation ratios for rehabilitation and enhancement when used in combination with 1:1 replacement through creation or reestablishment, consistent with the recommendations in the joint mitigation guidance
- Criteria to be considered when approving alternative mitigation plans
- Correction of several formatting errors

If you have a paper copy of the January 2010 document, you should recycle it and use the July 2011 revision, which will be available on line only.

Summary of October 2012 Revisions

The second revision of this guidance document includes:

- Updated criteria for using credits from an in-lieu fee program for mitigation.
- Removing the "preservation only" column from the mitigation ratio table and revising the rehabilitation ratio for Category I bogs to case by case (from 6:1).
- Adding language for protection of the mitigation site.
- Reorganizing the sections on mitigation preference and location.
- Correction of several formatting errors.

If you have a printed copy of either the January 2010 or July 2011 document, you should recycle it and use the October 2012 revision, which will be available on line only.

Introduction

This document is intended to provide guidance and tools useful in developing a wetland protection program for small cities and towns that are in the process of updating their critical areas ordinances (CAOs) to meet the Growth Management Act (GMA) requirements. Wetlands are one of the five types of critical areas identified in the GMA.

We recognize that many local governments lack the planning staff and resources necessary to develop and implement wetland standards that are both locally appropriate and based on best available science (BAS). Nonetheless, they must comply with the GMA requirement to designate and protect wetlands.

The first part of this document describes the important topics that should be addressed in the wetlands section of your CAO. It includes recommendations for wetland protection based on BAS. Appendix A is a sample CAO chapter for wetlands that incorporates these recommendations into a format similar to that found in many local CAOs. (Please note that the sample CAO will need to be tailored to your jurisdiction's naming and numbering system. There are several generic "XX" references throughout the text.) Appendix B contains definitions that are commonly used in wetlands regulations.

This document does not include the more general provisions typically found in regulations related to all critical areas. These can be found in Appendix A of the *Critical Areas Assistance Handbook* published by the Washington State Department of Commerce (formerly the Department of Community, Trade, and Economic Development) in November 2003 (http://www.commerce.wa.gov/site/745/default.aspx). This document revises the wetland-specific provisions in the *Critical Areas Assistance Handbook.*

The recommendations in this document and the sample ordinance may not be appropriate for use by rural **county** governments. Factors to consider are the county's rate of growth, the nature and intensity of land uses in the county, the wetland resources at risk, and the ability of the county to implement its CAO. We suggest that you contact us to determine whether this guidance is applicable to your county. Please use the following link to find Ecology's wetland specialist for your area: http://www.ecy.wa.gov/programs/sea/wetlands/contacts.htm.

Guidance on the Science of Wetland Protection

Ecology has produced several different tools that can help local governments develop a comprehensive wetlands protection program for their jurisdictions. The Washington Departments of Ecology (Ecology) and Fish and Wildlife (WDFW) have published a two-volume guidance document to help local governments protect and manage wetlands:

- ***Wetlands in Washington State, Volume 1: A Synthesis of the Science*** (Washington State Department of Ecology Publication #05-06-006, Olympia, WA, March 2005). This volume is the result of an extensive search of over 15,000 scientific articles and synthesizes over 1,000 peer-reviewed works relevant to the management of Washington's wetlands.

- ***Wetlands in Washington State, Volume 2: Managing and Protecting Wetlands*** (Washington State Department of Ecology Publication # 05-06-008, Olympia, WA, April 2005). This volume was developed with the assistance of local government planners and wetland consultants. It can be used to craft regulatory language that is based on the best available science (BAS). We recommend that you review Chapter 8 and its appendices as you begin to work on updating your existing regulations.

Ecology, in coordination with the U.S. Army Corps of Engineers (Corps) and the U.S. Environmental Protection Agency (EPA), has also developed a two-part guidance document aimed at improving the quality and effectiveness of compensatory mitigation in Washington State:

- ***Wetland Mitigation in Washington State – Part 1: Agency Policies and Guidance (Version 1).*** (Washington State Department of Ecology Publication #06-06-011a, Olympia, WA, March 2006). Part 1 provides a brief background on wetlands, an overview of the factors that go into the agencies' permitting decisions, and detailed guidance on the agencies' policies of wetland mitigation, particularly compensatory mitigation. It outlines the information the agencies use to determine whether specific mitigation plans are appropriate and adequate.

- ***Wetland Mitigation in Washington State – Part 2: Developing Mitigation Plans (Version 1)***. (Washington State Department of Ecology Publication #06-06-011b, Olympia, WA, March 2006). Part 2 provides technical information on preparing plans for compensatory mitigation.

Ecology has also developed a wetland ratings system for western Washington. The rating system is a useful tool for dividing wetlands into groups that have similar needs for protection.

- ***Washington State Wetland Rating System for Western Washington – Revised*** (Washington State Department of Ecology Publication # 04-06-25, Olympia, WA, August 2004, annotated August 2006).

Links to all of these documents can be found at:
http://www.ecy.wa.gov/programs/sea/wetlands/gma/index.html.

Relationship of GMA and SMA

You may be planning to adopt a Shoreline Master Program (SMP) that will rely on the CAO for protection of wetlands and other critical areas in shoreline jurisdiction. Ecology does not have an approval role in the CAO adoption process; our role is advisory. The SMP, however, is a joint document of Ecology and the local government requiring Ecology approval. Before the SMP can be approved by Ecology, the CAO must meet the "no net loss of ecological functions" requirement (WAC 173-26-186(8)(b)(i)).

You should be aware that the Shoreline Management Act (SMA) may preclude or alter the administration of your CAO. For example, certain activities exempted under the CAO will not qualify for exemption under the SMP. In addition, activities allowed under the CAO may require permits under the SMP.

For assistance with CAO/SMP integration, please use the following link to find the shoreline planner for your area:
http://www.ecy.wa.gov/programs/sea/sma/contacts/index.html.

Policy Discussion for Your Wetlands Chapter

Your wetlands chapter will exist as one of several in your critical areas ordinance. Below we describe some of the important subsections in the wetlands chapter and include our recommendations for protecting wetlands based on the best available science.

Purpose

The chapter typically begins with a purpose statement, followed by designation criteria, which include a definition of wetlands and the methods by which they are identified and rated and other details listed below. The purpose statement may also state that this chapter is intended to be consistent with the requirements of 36.70A RCW and to implement the goals and policies of your Comprehensive Plan for protecting wetlands.

Definitions

Your wetlands chapter may include a separate list of definitions, or the definitions may be included in the general definitions section of the CAO. Appendix B is a list of definitions relevant to your wetlands chapter. This list includes terms identified in state law and agency guidance documents. Clarity and consistency in the use of these terms will make ordinance implementation easier.

Identifying, Designating, and Rating Wetlands

The first steps in regulating wetlands are to define what is being regulated and specify how these areas will be identified. The GMA requires the use of the following definition of wetlands and specifies how to identify and delineate them.

In designating wetlands for regulatory purposes, **counties and cities are required to use the definition of wetlands in RCW 36.70A.030 (21):**

> *"Wetland" or "wetlands" means areas that are inundated or saturated by surface water or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands do not include those artificial wetlands intentionally created from non-wetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificial wetlands intentionally created from non-wetland areas created to mitigate conversion of wetlands.*

Wetlands are subject to a local government's regulatory authority if they meet the criteria in this definition. This includes Prior Converted Croplands (PCCs) and isolated wetlands. These wetlands provide critical functions and habitat and should be regulated. **The GMA does not allow flexibility in adopting a modified definition of wetlands.**

Irrigation practices, such as the Irrigation District ditches in Sequim, can result in human-created, artificial wetlands. More frequently, however, irrigation practices may augment natural sources of water to a wetland. Wetlands that form along irrigation ditches that were intentionally created in uplands may be exempted from regulation. However, if a wetland is the unintentional by-product of irrigation activities, the wetland should be regulated. If a wetland disappears as the result of a change in irrigation practice, it will not be regulated in the future. However, most wetlands will not disappear completely as a result of local changes in irrigation practices because of natural sources of water or regional irrigation influences. Please see http://www.ecy.wa.gov/programs/sea/wetlands/irrigation.html for more information on how Ecology regulates irrigation-influenced wetlands.

Ecology is most concerned about those changes in land use that would eliminate wetlands as the result of fill or grading, such as a conversion to commercial or residential use. These activities should be regulated by the CAO, and appropriate protection standards (such as buffers and mitigation) should be required in order to prevent the loss of wetland area and function.

Many jurisdictions use the National Wetland Inventory (NWI) to determine whether wetlands exist within their boundaries. Since the NWI is based on photographs that are over 30 years old and provides only a general approximation of wetland location, it

cannot be used alone to designate wetlands. Wetlands are those areas that meet the above definition of "wetland." Wetlands are also dynamic systems that change over time. It is important to adopt the GMA definition and to have regulations in place to protect wetland functions and values, should wetlands that do not currently appear on the NWI or other maps be identified in the future.

State laws require that wetlands protected under the Growth Management Act and the Shoreline Management Act be delineated using a manual that is developed by Ecology and adopted into rules (RCW 36.70A.175; RCW 90.58.380). The Department of Ecology adopted a wetland delineation manual in 1997 (WAC 173-22-080) that was based on the original 1987 Corps of Engineers manual and subsequent Regulatory Guidance Letters.

During the last few years the Army Corps of Engineers has updated and expanded their delineation manual with regional supplements. To maintain consistency between the state and federal delineations of wetlands, Ecology has repealed WAC 173-22-080 (the state delineation manual) and replaced it with a revision of WAC 173-22-035 that states delineations should be done according to the currently approved federal manual and supplements. **The changes became effective March 14, 2011**.

The Growth Management Act states that "wetlands regulated under development regulations adopted pursuant to this chapter shall be delineated in accordance with the manual adopted by the department pursuant to RCW 90.58.380." RCW 90.58.380 allows the Department of Ecology to adopt rules that incorporate changes to the manual. **Therefore, the currently approved federal manual and supplements should be used for delineating wetlands in GMA jurisdiction**. See: http://www.ecy.wa.gov/programs/sea/wetlands/delineation.html.

Local governments are not required to rate or classify wetlands when regulating them. However, methods that classify, categorize, or rate wetlands help target the appropriate level of protection to particular types of wetlands and avoid the "one-size-fits-all" approach. If a local government uses a wetland rating system, it must consider the criteria described in WAC 365-190-090(3).

The *Washington State Wetland Rating System for Western Washington - Revised* (Ecology Publication #04-06-025, August 2004, annotated August 2006) is a useful tool for dividing wetlands into groups that have similar needs for protection. The revised rating system represents the best available science, as it is based on a better understanding of wetland functions, ways to evaluate them, and what is needed to protect them. It provides a quick "snapshot" characterization of a particular wetland. In many cases, it will provide enough information about existing wetland functions to allow adequate plan review and land use decisions to be made without the additional expense of a separate wetland functional assessment.

While local governments are not required to use Ecology's revised rating system, we strongly encourage you to adopt wetland regulations that require its use. Most qualified wetland specialists are using the revised rating system. In cases where state and

federal permits are required, the use of this rating system would benefit applicants by eliminating the need to rate wetlands according to a different local standard. If you choose not to use the state's wetland rating system, you must provide a rationale for this decision according to WAC 365-190-090(3).

We recommend that you include language that describes the four categories of wetlands. This text is different for eastern and western Washington jurisdictions. Please refer to Appendix A, Section XX.020.B.1-4 for the specific category descriptions.

Regulated Uses and Activities

Your wetland section should list those uses and activities that are regulated under the critical areas ordinance. Some of these items include: removal, excavation, grading, or dredging of material of any kind; draining, flooding, or disturbing of the wetland, water level or water table; the construction, reconstruction, demolition, or expansion of any structure; etc. More extensive examples are provided in the sample ordinance.

Wetlands are often impacted by unauthorized **clearing and grading** that takes place before application for development permits. You should make sure your CAO adequately regulates clearing and grading. If it doesn't, you should adopt a separate clearing and grading ordinance. The Department of Commerce (formerly Community, Trade and Economic Development) recently published technical guidance on developing a clearing and grading ordinance: http://www.commerce.wa.gov/_CTED/documents/ID_2062_Publications.pdf.

Most forest practices (as defined in RCW 76.09) are exempted from the provisions of a wetlands chapter in the CAO. However, those forest practices that are Class IV general should be regulated. These activities constitute a conversion from forestry to some other use. As such, buffers and wetland protections are appropriate.

Exemptions

Your wetlands section should identify those activities in or near wetlands that are regulated and those that are exempt from regulation. Exemptions include activities that will have little or no environmental effect or are an emergency that threatens public health or safety. In the case of emergency response activities that affect wetlands and buffers, the responsible party should be required to obtain after-the-fact permits and to rectify impacts. Some jurisdictions place the exemptions or exceptions in a general exemptions section near the front of the CAO. However, some exemptions or exceptions may apply only to wetlands, so it may be more practical to have these specific exemptions in the wetlands section.

Exempt activities should be limited to those that will not have a significant impact on a wetland's structure and function (including its water, soil, or vegetation) and those which are expected to be very short term. Local governments should, however, also consider the cumulative impacts from exempted activities. They can result in a loss of wetland acreage and function that are not replaced through compensatory mitigation.

The scope, coverage, and applicability of a critical areas ordinance should capture the full range of activities that are detrimental to wetland functions. Therefore, exemptions should be supported by the scientific literature and be carefully crafted to minimize the potential for adverse impacts. However, a local government should not assume that an exemption is appropriate in the absence of science to refute the exemption. The language should clearly state whether a given exemption is from applicable standards in the code or whether it is exempt from needing a permit but still must comply with the code. Exemptions should be limited and construed narrowly.

For more information on this topic please refer to Chapter 8 of *Wetlands in Washington State, Volume 2: Managing and Protecting Wetlands* (Ecology Publication # 05-06-008, Olympia, WA, April 2005, https://fortress.wa.gov/ecy/publications/summarypages/0506008.html).

The GMA, in RCW 36.70A.030(21), requires local governments to regulate wetlands that meet the definition of biological wetlands (see the definition of "wetland" in the following section). This includes **Prior Converted Croplands (PCCs)** and **hydrologically isolated wetlands**, two types of wetlands that have been exempt from federal regulation at times. PCCs are wetlands that have been ditched and drained for active agricultural use before December 23, 1985. Isolated wetlands are those wetlands that have no surface hydrologic connection to waters of the United States. These wetlands must be regulated by your CAO.

EPA and the Corps sent draft 2011 Guidance to the White House Office of Management and Budget (OMB) that would reportedly "clarify Clean Water Act responsibilities." The 2011 Guidance apparently will not address CWA jurisdiction over waste treatment systems or prior converted croplands, contentious issues that the agencies intend to address in future agency guidance documents. Please see http://www.ecy.wa.gov/programs/sea/wetlands/isolated.html for more information on how the state of Washington currently regulates isolated wetlands.

The scientific literature does not support exempting wetlands that are below a certain size. While we recognize an administrative desire to place size thresholds on wetlands that are to be regulated, you need to be aware that it is not possible to conclude from size alone what functions a particular wetland may be providing. Ecology has developed a strategy for exempting small wetlands when additional criteria are considered. This language is present in the sample ordinance. **However, impacts to small wetlands are NOT exempt from the requirement to provide compensatory mitigation for those impacts.** If an In-Lieu Fee (ILF) program or a mitigation bank is available in your area (page 12), these mitigation alternatives can help prevent loss of wetland function from impacts to small wetlands in your jurisdiction.

Exceptions are typically addressed in a CAO in the context of reasonable use of property. For more information about this regulatory tool, see Section VII of the *Critical Areas Assistance Handbook* published by the Washington State Department of Commerce (http://www.commerce.wa.gov/site/745/default.aspx). You should keep in mind that the

Shoreline Management Act does not allow reasonable use exceptions, providing instead a variance pathway to afford regulatory relief. **If you decide to incorporate your CAO into your SMP when the latter document is updated, you will need to address this potential inconsistency.**

Forest Practices

Class I, II, and III forest practices should be exempted from the wetlands section of your CAO. These activities are regulated through RCW 76.09, the Forest Practices Act.

Agricultural Activities

The moratorium on the adoption of new critical areas regulations with respect to agriculture provided by a 2007 law (SSB 5284) expired on July 1, 2011. Governor Gregoire signed ESHB 1886 in May 2011, which went into effect on July 22, 2011. This legislation creates the Voluntary Stewardship Program at the Conservation Commission, an alternative program for counties to protect critical areas on agricultural lands. For more information on this program, see http://www.scc.wa.gov/voluntary-stewardship/.

For small cities, Ecology encourages the use of Best Management Practices (BMPs), farm conservation plans, and incentive-based programs to improve agricultural practices in and near wetlands. The goal of the BMPs should be to ensure that ongoing agricultural activities minimize their effects on water quality, riparian ecology, salmonid populations, and downstream resources.

"Existing and ongoing agricultural activities" should not include removing trees, diverting or impounding water, excavation, ditching, draining, culverting, filling, grading, and similar activities that introduce new adverse impacts to wetlands or other aquatic resources. Maintenance of agricultural ditches should be limited to removing sediment in existing ditches to a specified depth at date of last maintenance. Conversion of wetlands that are not currently in agricultural use to a new agricultural use should be subject to the same regulations that govern new development.

Strategies for Protecting Wetlands from Impacts

Wetlands Inventory

You may wish to pursue accurate identification and rating of all wetlands in your planning area based on the *Washington State Wetland Rating System for Western Washington - Revised* (Ecology Publication #04-06-025, August 2004, annotated August 2006) and the approved federal wetland delineation manual and applicable regional supplements. These documents can be downloaded at:

- http://www.ecy.wa.gov/programs/sea/wetlands/ratingsystems/index.html (rating systems)
- http://www.ecy.wa.gov/programs/sea/wetlands/delineation.html (delineation manual and supplements)

While this approach may initially be more labor intensive and expensive, such information will allow rapid review of development proposals and can help your jurisdiction prioritize areas for preservation or acquisition.

This approach is consistent with best available science (BAS). It can help with the development of a landscape-analysis approach to protecting wetlands in your city. Landscape analysis for critical areas facilitates and informs long-range planning. The City of Aberdeen used this approach in their CAO update. (See Section XX.050.B in the sample ordinance.)

ABCs

The most basic approach to protecting wetland functions and values can be summarized as the **A-B-C Approach, or Avoid, Buffer, Compensate.** This means that a CAO should contain language to ensure that:

1. Wetlands impacts are **avoided** to the extent practicable.

2. Wetlands are **buffered** to protect them from adjacent land-use impacts.

3. Unavoidable impacts are **compensated**, or replaced.

Your CAO should provide requirements on how to reduce the severity of impacts to wetlands. When an alteration to a wetland is proposed, impacts should be avoided, minimized, or compensated for in the following sequential order of preference:

1. Avoiding the impact altogether by not taking a certain action or parts of an action;

2. Minimizing impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts;

3. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;

4. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action;

5. Compensating for the impact by replacing, enhancing, or providing substitute resources or environments; and/or

6. Monitoring the impact and taking appropriate corrective measures.

Buffers

Establishing standards for wetland buffers is usually the most challenging part of developing a CAO. However, developing a predictable, reasonable approach for

establishing buffers that includes the best available science is not as difficult as it may seem.

The scientific literature is unequivocal that **buffers are necessary to protect wetland functions** and values. The literature consistently reports that the primary factors to evaluate in determining appropriate buffer widths are:

1. The wetland type and functions needing protection (buffers filter sediment, nutrients, or toxics; screen noise and light; provide forage, nesting, or resting habitat for wetland-dependent species; etc.).

2. The types of adjacent land use and their expected impacts.

3. The characteristics of the buffer area (slope, soils, vegetation).

The widths of buffers needed vary widely, depending on these three factors. For example, providing filtration of coarse sediment from residential development next to a low-quality wetland would require only a relatively flat buffer of dense grasses or forest/shrub vegetation in the range of 20 to 30 feet. However, providing forage and nesting habitat for common wetland-dependent species such as waterfowl, herons, or amphibians in a high-quality wetland adjacent to residential development would require a buffer vegetated with trees and shrubs in the range of 200 to 300 feet. This illustrates the necessity of using an approach to buffers that incorporates wetland type and functions (based on an appropriate rating system), types of land use, and the environmental characteristics of the existing buffer.

Your CAO should require buffers for activities that will impact wetland functions. Ecology's buffer recommendations are presented in Appendix 8-C of *Wetlands in Washington State, Volume 2.* We recommend using the table shown in the sample ordinance. It is derived from the more detailed tables in Volume 2. It is a single table, is easy to use, and is based on BAS. This alternative provides the important balance of predictability and flexibility. Determination of buffer size is simply a matter of applying the results of the wetland rating system score to the buffer matrix, based on the wetland category and wildlife habitat score. It generally requires smaller buffers for those wetlands that do not have much wildlife use. The simpler table does not consider land-use intensity in the buffer calculation, since it is presumed that most urban land uses will be high or moderate intensity. However, if your city has an activity that can be considered low intensity, such as a passive recreation area or nature park with undeveloped trails, you may wish to prescribe a smaller buffer **for that area only**. The buffer for an area should be no less than 75% of the otherwise required buffer. Such a "low-intensity" buffer is not appropriate for residential, commercial, or industrial uses.

Some wetland types listed in the buffer table may not be present in your city (e.g., coastal lagoons, bogs, interdunal wetlands, etc.). If you are certain that these wetlands do not occur within your jurisdiction and would not be introduced by future annexations, you may remove those wetland types from the buffer table.

You may wish to adopt an even simpler approach to wetland buffers, one based only on wetland category. In this case, buffers must be large enough to protect the most-sensitive wetlands from the most damaging land-use impacts. Please refer to Appendix 8-C of *Wetlands in Washington State, Volume 2* for these examples.

Ecology's buffer recommendations are based on a moderate-risk approach to protecting wetland functions. This means that there is a moderate risk that wetland functions will be impacted. Adopting smaller buffers represents a high-risk approach, and you need to be prepared to justify why such an approach is necessary and to offer alternative means of protecting wetland functions that help reduce the risk.

Ecology's buffer recommendations are also based on the assumption that the buffer is well vegetated with native species appropriate to the ecoregion. If the buffer does not consist of vegetation adequate to provide the necessary protection, then either the buffer area should be planted or the buffer width should be increased.

Buffer Averaging

Local governments often wish to allow buffer widths to be varied in certain circumstances. This may be reasonable if your standard buffers are adequate. The width of buffers may be averaged if this will improve the protection of wetland functions, or if it is the only way to allow for reasonable use of a parcel.

We recommend that a request for buffer averaging include a wetland report. The report should be prepared by a qualified professional describing the current functions of the wetland and its buffer and the measures that will be taken to ensure that there is no loss of wetland function due to the buffer averaging. The width of the buffer at any given point after averaging should be no smaller than 75% of the standard buffer.

If you choose to adopt small standard buffer widths, then further reductions to the buffer width should not be allowed under any circumstances.

Mitigation

Unavoidable **impacts to wetlands should be offset by compensatory mitigation.** Your CAO should include standards for the type, location, amount, and timing of the mitigation. It should also include clear guidance on the design considerations and reporting requirements for mitigation plans.

Ecology's recommendations for the amount of mitigation (ratios) are based on wetland category, function, and special characteristics. Requiring a greater area helps offset both the risk that compensatory mitigation will fail and the temporal loss of functions that may occur. We recommend using the ratio table shown in the sample ordinance. It is derived from the more detailed tables in Part 1 of the joint agency guidance on mitigation: *Wetland Mitigation in Washington State, Parts 1 and 2* (Ecology publications #06-06-011a & b, March 2006).

As an alternative to the mitigation ratios found in the joint guidance, Ecology has developed a tool for calculating when a proposed wetland mitigation project adequately replaces the functions and values lost when wetlands are impacted. The tool is designed to provide guidance for both regulators and applicants during two stages of the mitigation process:

1. Estimating the functions and values lost when a wetland is altered, and

2. Estimating the gain in functions and values that result from the mitigation.

The Department of Ecology, however, does not require the use of this method. This current guidance provides one method for determining the adequacy of compensatory wetland mitigation. It does not set any new regulatory requirements. The document and worksheets can be downloaded at: http://www.ecy.wa.gov/mitigation/creditdebit-comments.html.

In 2008 the Corps and the EPA issued a rule governing compensatory mitigation. The rule establishes performance standards and criteria to improve the quality and success of compensatory mitigation, mitigation banks, and in-lieu fee programs. For more information on the federal rule, see: http://www.epa.gov/owow/wetlands/pdf/wetlands_mitigation_final_rule_4_10_08.pdf.

By adopting mitigation standards based on the state and federal guidance and rules, you will be providing consistency for applicants who must also apply for state and federal permits.

Mitigation Alternatives

Various options are available for mitigation, in addition to the traditional on-site concurrent option. These options include placing the mitigation away from the project site (off-site mitigation), building mitigation in advance of project impacts, and using third-party mitigation providers such as wetland banks and in-lieu-fee programs. Deciding which option should be used depends on what works best for the applicant and for the environment. Some of these options may not be available in your area at this time. However, we recommend that your CAO allow these options. They can be effective and valuable tools in preventing a net loss of wetland functions.

Some project applicants may propose mitigation that is consistent with sound ecological principles but is located outside of your jurisdiction. You may wish to include language in your CAO that enables your government to establish interlocal agreements or similar instruments with other jurisdictions to allow for such mitigation opportunities.

In addition to the following options, you might want to consider allowing transfer of development rights (TDR) as a tool for protecting wetlands. The Department of Commerce is working with four Puget Sound counties in a pilot TDR program. For more information, contact the Commerce planner for your jurisdiction or see: http://www.commerce.wa.gov/site/1060/default.aspx.

Mitigation Banking

A mitigation bank is a site where wetlands, streams, or other aquatic resource areas have been restored, established, enhanced, or (in certain circumstances) preserved for the purpose of providing compensation for unavoidable impacts to aquatic resources. A mitigation bank may be created by a government agency, corporation, nonprofit organization, or other entity. The bank sells its credits to permittees who are required to compensate for wetland impacts. Mitigation banks allow a permittee to simply write a check for their mitigation obligation. It is the bank owner who is responsible for the mitigation success. Mitigation banks require a formal agreement with the Corps, Ecology, and the local jurisdiction to be used for federal or state permits.

Ecology adopted the final Wetland Mitigation Banks Rule (WAC 173-700) in 2009. The purpose of the rule is to provide a framework for the certification, operation and monitoring of wetland mitigation banks. To learn more about wetland banking and the rule, see Ecology's website at http://www.ecy.wa.gov/programs/sea/wetlands/mitigation/banking/index.html.

In-Lieu Fee (ILF)

In this approach to mitigation, a permittee pays a fee to a third party in lieu of conducting project-specific mitigation or buying credits from a mitigation bank. ILF mitigation is used mainly to compensate for impacts to wetlands when better approaches to compensation are not available or practicable, or when the use of an ILF is in the best interest of the environment.

An ILF represents the expected costs to a third party of replacing the wetland functions lost or degraded as a result of the permittee's project. Fees are typically held in trust until sufficient funds have been collected to finance a mitigation project. Only a nonprofit organization such as a local land trust, private conservation group, or government agency with demonstrated competence in natural resource management may operate an ILF program. All ILF programs must be approved by the Corps to be used for Section 404 permits. To learn more about ILF programs, see Ecology's website at http://www.ecy.wa.gov/mitigation/ilf.html.

Off-Site Mitigation

This refers to compensatory mitigation that is not located at or near the project that generates impacts to wetlands. Off-site mitigation is generally allowed only when on-site mitigation is not practicable or environmentally preferable.

Ecology, the Corps of Engineers, and EPA have developed guidance to help applicants select potential off-site mitigation sites. To download a copy of *Selecting Wetland Mitigation Sites Using a Watershed Approach (Western Washington)*, (Ecology Publication #09-06-032, December 2009), please see https://fortress.wa.gov/ecy/publications/summarypages/0906032.html.

Advance Mitigation

When compensatory mitigation is implemented before, and in anticipation of, future **known** impacts to wetlands, it is referred to as "advance mitigation." Advance mitigation has been used mostly for large mitigation projects that are constructed in distinct phases where the impacts to wetlands are known. Advance mitigation lets an applicant provide all of the compensation needed for the entire project affecting wetlands at one time, which may result in more favorable mitigation ratios.

Although similar to mitigation banking, advance mitigation is different in several ways. Most importantly, advance mitigation is used only to compensate for a specific project (or projects) with pre-identified impacts to wetlands. Wetland banks provide mitigation for unknown future impacts within a specific "service" or market area. Ecology, WDFW, and the Corps of Engineers are developing guidance for advance mitigation. This guidance will be available by mid-2013. To obtain a copy after it is released, please see http://www.ecy.wa.gov/mitigation/guidance.html.

Conclusion

We hope you find this information helpful. If you have questions about this document or need additional assistance with the wetlands section of your critical areas ordinance update, please contact Donna Bunten at (360) 407-7172 or donna.bunten@ecy.wa.gov.

You may also contact one of Ecology's regional wetland specialists. They are available to work with you during your update process. For example, they can offer presentations to elected officials and planning commissions. They can also provide technical assistance including help with wetland delineation, wetland rating, ordinary high water mark determination, and project review. Please use the following link to find the wetland specialist for your area:
http://www.ecy.wa.gov/programs/sea/wetlands/contacts.htm.

For assistance with other aspects of your critical areas ordinance update, please contact the Department of Commerce (formerly Community, Trade, and Economic Development) at (360) 725-3000.

Appendix A - Sample Wetlands Chapter

(Western Washington)

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Subchapter XX.XX
Wetlands

Sections:

XX.010 Purpose

The purposes of this Chapter are to:

A. Recognize and protect the beneficial functions performed by many wetlands, which include, but are not limited to, providing food, breeding, nesting and/or rearing habitat for fish and wildlife; recharging and discharging ground water; contributing to stream flow during low flow periods; stabilizing stream banks and shorelines; storing storm and flood waters to reduce flooding and erosion; and improving water quality through biofiltration, adsorption, and retention and transformation of sediments, nutrients, and toxicants.

B. Regulate land use to avoid adverse effects on wetlands and maintain the functions and values of wetlands throughout (name of jurisdiction).

C. Establish review procedures for development proposals in and adjacent to wetlands.

XX.020 Identification and Rating

A. Identification and Delineation. Identification of wetlands and delineation of their boundaries pursuant to this Chapter shall be done in accordance with the approved federal wetland delineation manual and applicable regional supplements. All areas within the City meeting the wetland designation criteria in that procedure are hereby designated critical areas and are subject to the provisions of this Chapter. Wetland delineations are valid for five years; after such date the City shall determine whether a revision or additional assessment is necessary.

B. Rating. Wetlands shall be rated according to the Washington Department of Ecology wetland rating system, as set forth in the *Washington State Wetland Rating System for Western Washington* (Ecology Publication #04-06-025, or as revised and

approved by Ecology), which contains the definitions and methods for determining whether the criteria below are met.

1. Category I. Category I wetlands are: (1) relatively undisturbed estuarine wetlands larger than 1 acre; (2) wetlands that are identified by scientists of the Washington Natural Heritage Program/DNR as high-quality wetlands; (3) bogs; (4) mature and old-growth forested wetlands larger than 1 acre; (5) wetlands in undisturbed coastal lagoons; and (6) wetlands that perform many functions well (scoring 70 points or more). These wetlands: (1) represent unique or rare wetland types; (2) are more sensitive to disturbance than most wetlands; (3) are relatively undisturbed and contain ecological attributes that are impossible to replace within a human lifetime; or (4) provide a high level of functions.

2. Category II. Category II wetlands are: (1) estuarine wetlands smaller than 1 acre, or disturbed estuarine wetlands larger than 1 acre; (2) interdunal wetlands larger than 1 acre; (3) disturbed coastal lagoons or (4) wetlands with a moderately high level of functions (scoring between 51 and 69 points).

3. Category III. Category III wetlands are: (1) wetlands with a moderate level of functions (scoring between 30 and 50 points); and (2) interdunal wetlands between 0.1 and 1 acre. Wetlands scoring between 30 and 50 points generally have been disturbed in some ways and are often less diverse or more isolated from other natural resources in the landscape than Category II wetlands.

4. Category IV. Category IV wetlands have the lowest levels of functions (scoring fewer than 30 points) and are often heavily disturbed. These are wetlands that we should be able to replace, or in some cases to improve. However, experience has shown that replacement cannot be guaranteed in any specific case. These wetlands may provide some important functions, and should be protected to some degree.

C. Illegal modifications. Wetland rating categories shall not change due to illegal modifications made by the applicant or with the applicant's knowledge.

XX.030 Regulated Activities

A. For any regulated activity, a critical areas report (see Chapter XX.060 of this Chapter) may be required to support the requested activity.

B. The following activities are regulated if they occur in a regulated wetland or its buffer:

1. The removal, excavation, grading, or dredging of soil, sand, gravel, minerals, organic matter, or material of any kind.

2. The dumping of, discharging of, or filling with any material.

3. The draining, flooding, or disturbing of the water level or water table.

4. Pile driving.

5. The placing of obstructions.

6. The construction, reconstruction, demolition, or expansion of any structure.

7. The destruction or alteration of wetland vegetation through clearing, harvesting, shading, intentional burning, or planting of vegetation that would alter the character of a regulated wetland.

8. "Class IV - General Forest Practices" under the authority of the "1992 Washington State Forest Practices Act Rules and Regulations," WAC 222-12-030, or as thereafter amended.

9. Activities that result in:

   a. A significant change of water temperature.

   b. A significant change of physical or chemical characteristics of the sources of water to the wetland.

   c. A significant change in the quantity, timing, or duration of the water entering the wetland.

   d. The introduction of pollutants.

C. Subdivisions. The subdivision and/or short subdivision of land in wetlands and associated buffers are subject to the following:

1. Land that is located wholly within a wetland or its buffer may not be subdivided.

2. Land that is located partially within a wetland or its buffer may be subdivided provided that an accessible and contiguous portion of each new lot is:

   a. Located outside of the wetland and its buffer; and

   b. Meets the minimum lot size requirements of Chapter XX.XX.

XX.040 Exemptions and Allowed Uses in Wetlands

A. The following wetlands are exempt from the buffer provisions contained in this Chapter and the normal mitigation sequencing process in Chapter XX.XX. They may be filled if impacts are fully mitigated based on provisions in Chapter XX.070. If

available, impacts should be mitigated through the purchase of credits from an in-lieu fee program or mitigation bank, consistent with the terms and conditions of the program or bank. In order to verify the following conditions, a critical area report for wetlands meeting the requirements in Chapter XX.060 must be submitted.

1. All isolated Category III and IV wetlands less than 1,000 square feet that:

   a. Are not associated with riparian areas or buffers

   b. Are not part of a wetland mosaic

   c. Do not contain habitat identified as essential for local populations of priority species identified by the Washington Department of Fish and Wildlife or species of local importance identified in Chapter XX.XX.

B. Activities Allowed in Wetlands. The activities listed below are allowed in wetlands. These activities do not require submission of a critical area report, except where such activities result in a loss of the functions and values of a wetland or wetland buffer. These activities include:

1. Those activities and uses conducted pursuant to the Washington State Forest Practices Act and its rules and regulations, WAC 222-12-030, where state law specifically exempts local authority, except those developments requiring local approval for Class 4 – General Forest Practice Permits (conversions) as defined in RCW 76.09 and WAC 222-12.

2. Conservation or preservation of soil, water, vegetation, fish, shellfish, and/or other wildlife that does not entail changing the structure or functions of the existing wetland.

3. The harvesting of wild crops in a manner that is not injurious to natural reproduction of such crops and provided the harvesting does not require tilling of soil, planting of crops, chemical applications, or alteration of the wetland by changing existing topography, water conditions, or water sources.

4. Drilling for utilities/utility corridors under a wetland, with entrance/exit portals located completely outside of the wetland buffer, provided that the drilling does not interrupt the ground water connection to the wetland or percolation of surface water down through the soil column. Specific studies by a hydrologist are necessary to determine whether the ground water connection to the wetland or percolation of surface water down through the soil column will be disturbed.

5. Enhancement of a wetland through the removal of non-native invasive plant species. Removal of invasive plant species shall be restricted to

hand removal unless permits from the appropriate regulatory agencies have been obtained for approved biological or chemical treatments. All removed plant material shall be taken away from the site and appropriately disposed of. Plants that appear on the Washington State Noxious Weed Control Board list of noxious weeds must be handled and disposed of according to a noxious weed control plan appropriate to that species. Re-vegetation with appropriate native species at natural densities is allowed in conjunction with removal of invasive plant species.

6. Educational and scientific research activities.

7. Normal and routine maintenance and repair of any existing public or private facilities within an existing right-of-way, provided that the maintenance or repair does not expand the footprint of the facility or right-of-way.

XX.050 Wetland Buffers

A. Buffer Requirements**.** The standard buffer widths in Table XX.1 have been established in accordance with the best available science. They are based on the category of wetland and the habitat score as determined by a qualified wetland professional using the Washington state wetland rating system for western Washington.

1. The use of the standard buffer widths **requires** the implementation of the measures in Table XX.2, where applicable, to minimize the impacts of the adjacent land uses.

2. If an applicant chooses not to apply the mitigation measures in Table XX.2, then a 33% increase in the width of all buffers is required. For example, a 75-foot buffer with the mitigation measures would be a 100-foot buffer without them.

3. The standard buffer widths assume that the buffer is vegetated with a native plant community appropriate for the ecoregion. If the existing buffer is unvegetated, sparsely vegetated, or vegetated with invasive species that do not perform needed functions, the buffer should either be planted to create the appropriate plant community or the buffer should be widened to ensure that adequate functions of the buffer are provided.

4. Additional buffer widths are added to the standard buffer widths. For example, a Category I wetland scoring 32 points for habitat function would require a buffer of 225 feet (75 + 150).

Table XX.1 Wetland Buffer Requirements for Western Washington

Wetland Category	Standard Buffer Width	Additional buffer width if wetland scores 21-25 habitat points	Additional buffer width if wetland scores 26-29 habitat points	Additional buffer width if wetland scores 30-36 habitat points
Category I: Based on total score	75ft	Add 30 ft	Add 90 ft	Add 150 ft
Category I: Bogs	190 ft	NA	NA	Add 35 ft
Category I: Natural Heritage Wetlands	190 ft	N/A	NA	Add 35 ft
Category I: Coastal Lagoons	150 ft	N/A	Add 15 ft	Add 75 ft
Category I: Forested	75ft	Add 30 ft	Add 90 ft	Add 150 ft
Category I: Estuarine	150 ft	N/A	NA	N/A
Category II: Based on score	75 ft	Add 30 ft	Add 90 ft	Add 150 ft
Category II: Interdunal Wetlands	110 ft	NA	Add 55 ft	Add 115 ft
Category III (all)	60 ft	Add 45 ft	Add 105 ft	NA
Category IV (all)	40 ft	NA	NA	NA

Table XX.2 Required measures to minimize impacts to wetlands

(Measures are required, where applicable to a specific proposal)

Disturbance	Required Measures to Minimize Impacts
Lights	• Direct lights away from wetland
Noise	• Locate activity that generates noise away from wetland • If warranted, enhance existing buffer with native vegetation plantings adjacent to noise source • For activities that generate relatively continuous, potentially disruptive noise, such as certain heavy industry or mining, establish an additional 10' heavily vegetated buffer strip immediately adjacent to the outer wetland buffer
Toxic runoff	• Route all new, untreated runoff away from wetland while ensuring wetland is not dewatered • Establish covenants limiting use of pesticides within 150 ft of wetland • Apply integrated pest management
Stormwater runoff	• Retrofit stormwater detention and treatment for roads and existing adjacent development • Prevent channelized flow from lawns that directly enters the buffer • Use Low Intensity Development techniques (per PSAT publication on LID techniques)
Change in water regime	• Infiltrate or treat, detain, and disperse into buffer new runoff from impervious surfaces and new lawns
Pets and human disturbance	• Use privacy fencing OR plant dense vegetation to delineate buffer edge and to discourage disturbance using vegetation appropriate for the ecoregion • Place wetland and its buffer in a separate tract or protect with a conservation easement
Dust	• Use best management practices to control dust
Disruption of corridors or connections	• Maintain connections to offsite areas that are undisturbed • Restore corridors or connections to offsite habitats by replanting

5. Increased Wetland Buffer Area Width. Buffer widths shall be increased on a case-by-case basis as determined by the Administrator when a larger buffer is necessary to protect wetland functions and values. This determination shall be supported by appropriate documentation showing that it is reasonably related to protection of the functions and values of the wetland. The documentation must include but not be limited to the following criteria:

    a. The wetland is used by a plant or animal species listed by the federal government or the state as endangered, threatened, candidate, sensitive, monitored or documented priority species or habitats, or essential or outstanding habitat for those species or has unusual nesting or resting sites such as heron rookeries or raptor nesting trees; or

    b. The adjacent land is susceptible to severe erosion, and erosion-control measures will not effectively prevent adverse wetland impacts; or

    c. The adjacent land has minimal vegetative cover or slopes greater than 30 percent.

6 Buffer averaging to *improve wetland protection* may be permitted when **all** of the following conditions are met:

    a. The wetland has significant differences in characteristics that affect its habitat functions, such as a wetland with a forested component adjacent to a degraded emergent component or a "dual-rated" wetland with a Category I area adjacent to a lower-rated area.

    b. The buffer is increased adjacent to the higher-functioning area of habitat or more-sensitive portion of the wetland and decreased adjacent to the lower-functioning or less-sensitive portion as demonstrated by a critical areas report from a qualified wetland professional.

    c. The total area of the buffer after averaging is equal to the area required without averaging.

    d. The buffer at its narrowest point is never less than either ¾ of the required width or 75 feet for Category I and II, 50 feet for Category III, and 25 feet for Category IV, whichever is greater.

7. Averaging to *allow reasonable use* of a parcel may be permitted when **all** of the following are met:

    a. There are no feasible alternatives to the site design that could be accomplished without buffer averaging.

b. The averaged buffer will not result in degradation of the wetland's functions and values as demonstrated by a critical areas report from a qualified wetland professional.

c. The total buffer area after averaging is equal to the area required without averaging.

d. The buffer at its narrowest point is never less than either ¾ of the required width or 75 feet for Category I and II, 50 feet for Category III and 25 feet for Category IV, whichever is greater.

B. To facilitate long-range planning using a landscape approach, the Administrator may identify and pre-assess wetlands using the rating system and establish appropriate wetland buffer widths for such wetlands. The Administrator will prepare maps of wetlands that have been pre-assessed in this manner.

C. Measurement of Wetland Buffers**.** All buffers shall be measured perpendicular from the wetland boundary as surveyed in the field. The buffer for a wetland created, restored, or enhanced as compensation for approved wetland alterations shall be the same as the buffer required for the category of the created, restored, or enhanced wetland. Only fully vegetated buffers will be considered. Lawns, walkways, driveways, and other mowed or paved areas will not be considered buffers or included in buffer area calculations.

D. Buffers on Mitigation Sites**.** All mitigation sites shall have buffers consistent with the buffer requirements of this Chapter. Buffers shall be based on the expected or target category of the proposed wetland mitigation site.

E. Buffer Maintenance**.** Except as otherwise specified or allowed in accordance with this Chapter, wetland buffers shall be retained in an undisturbed or enhanced condition. In the case of compensatory mitigation sites, removal of invasive non-native weeds is required for the duration of the mitigation bond (Section XX.070.H.2.a.viii).

F. Impacts to Buffers**.** Requirements for the compensation for impacts to buffers are outlined in Section XX.070 of this Chapter.

G. Overlapping Critical Area Buffers. If buffers for two contiguous critical areas overlap (such as buffers for a stream and a wetland), the wider buffer applies.

H. Allowed Buffer Uses. The following uses may be allowed within a wetland buffer in accordance with the review procedures of this Chapter, provided they are not prohibited by any other applicable law and they are conducted in a manner so as to minimize impacts to the buffer and adjacent wetland:

1. Conservation and Restoration Activities. Conservation or restoration activities aimed at protecting the soil, water, vegetation, or wildlife.

2. Passive recreation. Passive recreation facilities designed and in accordance with an approved critical area report, including:

    a. Walkways and trails, provided that those pathways are limited to minor crossings having no adverse impact on water quality. They should be generally parallel to the perimeter of the wetland, located only in the outer twenty-five percent (25%) of the wetland buffer area, and located to avoid removal of significant trees. They should be limited to pervious surfaces no more than five (5) feet in width for pedestrian use only. Raised boardwalks utilizing non-treated pilings may be acceptable.

    b. Wildlife-viewing structures.

3. Educational and scientific research activities.

4. Normal and routine maintenance and repair of any existing public or private facilities within an existing right-of-way, provided that the maintenance or repair does not increase the footprint or use of the facility or right-of-way.

5. The harvesting of wild crops in a manner that is not injurious to natural reproduction of such crops and provided the harvesting does not require tilling of soil, planting of crops, chemical applications, or alteration of the wetland by changing existing topography, water conditions, or water sources.

6. Drilling for utilities/utility corridors under a buffer, with entrance/exit portals located completely outside of the wetland buffer boundary, provided that the drilling does not interrupt the ground water connection to the wetland or percolation of surface water down through the soil column. Specific studies by a hydrologist are necessary to determine whether the ground water connection to the wetland or percolation of surface water down through the soil column is disturbed.

7. Enhancement of a wetland buffer through the removal of non-native invasive plant species. Removal of invasive plant species shall be restricted to hand removal. All removed plant material shall be taken away from the site and appropriately disposed of. Plants that appear on the Washington State Noxious Weed Control Board list of noxious weeds must be handled and disposed of according to a noxious weed control plan appropriate to that species. Revegetation with appropriate native species at natural densities is allowed in conjunction with removal of invasive plant species.

8. Stormwater management facilities**.** Stormwater management facilities are limited to stormwater dispersion outfalls and bioswales. They may be allowed within the outer twenty-five percent (25%) of the buffer of Category III or IV wetlands only, provided that:

    a. No other location is feasible; and

    b. The location of such facilities will not degrade the functions or values of the wetland; and

    c. Stormwater management facilities are not allowed in buffers of Category I or II wetlands.

9. Non-Conforming Uses**.** Repair and maintenance of non-conforming uses or structures, where legally established within the buffer, provided they do not increase the degree of nonconformity.

I. Signs and Fencing of Wetlands and Buffers:

1. Temporary markers. The outer perimeter of the wetland buffer and the clearing limits identified by an approved permit or authorization shall be marked in the field with temporary "clearing limits" fencing in such a way as to ensure that no unauthorized intrusion will occur. The marking is subject to inspection by the Administrator prior to the commencement of permitted activities. This temporary marking shall be maintained throughout construction and shall not be removed until permanent signs, if required, are in place.

2. Permanent signs. As a condition of any permit or authorization issued pursuant to this Chapter, the Administrator may require the applicant to install permanent signs along the boundary of a wetland or buffer.

    a. Permanent signs shall be made of an enamel-coated metal face and attached to a metal post or another non-treated material of equal durability. Signs must be posted at an interval of one (1) per lot or every fifty (50) feet, whichever is less, and must be maintained by the property owner in perpetuity. The signs shall be worded as follows or with alternative language approved by the Administrator:

Protected Wetland Area
Do Not Disturb
Contact [Local Jurisdiction]
Regarding Uses, Restrictions, and Opportunities for Stewardship

    b. The provisions of Subsection (a) may be modified as necessary to assure protection of sensitive features or wildlife.

3. Fencing

    a. The applicant shall be required to install a permanent fence around the wetland or buffer when domestic grazing animals are present or may be introduced on site.

    b. Fencing installed as part of a proposed activity or as required in this Subsection shall be designed so as to not interfere with species migration, including fish runs, and shall be constructed in a manner that minimizes impacts to the wetland and associated habitat.

XX.060 Critical Area Report for Wetlands

A. If the Administrator determines that the site of a proposed development includes, is likely to include, or is adjacent to a wetland, a wetland report, prepared by a qualified professional, shall be required. The expense of preparing the wetland report shall be borne by the applicant.

B. Minimum Standards for Wetland Reports. The written report and the accompanying plan sheets shall contain the following information, at a minimum:

1. The written report shall include at a minimum:

    a. The name and contact information of the applicant; the name, qualifications, and contact information for the primary author(s) of the wetland critical area report; a description of the proposal; identification of all the local, state, and/or federal wetland-related permit(s) required for the project; and a vicinity map for the project.

    b. A statement specifying the accuracy of the report and all assumptions made and relied upon.

    c. Documentation of any fieldwork performed on the site, including field data sheets for delineations, rating system forms, baseline hydrologic data, etc.

    d. A description of the methodologies used to conduct the wetland delineations, rating system forms, or impact analyses including references.

    e. Identification and characterization of all critical areas, wetlands, water bodies, shorelines, floodplains, and buffers on or adjacent to the proposed project area. For areas off site of the project site, estimate conditions within 300 feet of the project boundaries using the best available information.

f. For each wetland identified on site and within 300 feet of the project site provide: the wetland rating, including a description of and score for each function, per *Wetland Ratings* (Section XX.020.B) of this Chapter; required buffers; hydrogeomorphic classification; wetland acreage based on a professional survey from the field delineation (acreages for on-site portion and entire wetland area including off-site portions); Cowardin classification of vegetation communities; habitat elements; soil conditions based on site assessment and/or soil survey information; and to the extent possible, hydrologic information such as location and condition of inlet/outlets (if they can be legally accessed), estimated water depths within the wetland, and estimated hydroperiod patterns based on visual cues (e.g., algal mats, drift lines, flood debris, etc.). Provide acreage estimates, classifications, and ratings based on entire wetland complexes, not only the portion present on the proposed project site.

g. A description of the proposed actions, including an estimation of acreages of impacts to wetlands and buffers based on the field delineation and survey and an analysis of site development alternatives, including a no-development alternative.

h. An assessment of the probable cumulative impacts to the wetlands and buffers resulting from the proposed development.

i. A description of reasonable efforts made to apply mitigation sequencing pursuant to *Mitigation Sequencing* (Chapter XX.XX) to avoid, minimize, and mitigate impacts to critical areas.

j. A discussion of measures, including avoidance, minimization, and compensation, proposed to preserve existing wetlands and restore any wetlands that were degraded prior to the current proposed land-use activity.

k. A conservation strategy for habitat and native vegetation that addresses methods to protect and enhance on-site habitat and wetland functions.

l. An evaluation of the functions of the wetland and adjacent buffer. Include reference for the method used and data sheets.

2. A copy of the site plan sheet(s) for the project must be included with the written report and must include, at a minimum:

   a. Maps (to scale) depicting delineated and surveyed wetland and required buffers on site, including buffers for off-site critical areas that extend onto the project site; the development proposal; other critical

areas; grading and clearing limits; areas of proposed impacts to wetlands and/or buffers (include square footage estimates).

b. A depiction of the proposed stormwater management facilities and outlets (to scale) for the development, including estimated areas of intrusion into the buffers of any critical areas. The written report shall contain a discussion of the potential impacts to the wetland(s) associated with anticipated hydroperiod alterations from the project.

XX.XXX Compensatory Mitigation.

A. Mitigation Sequencing. Before impacting any wetland or its buffer, an applicant shall demonstrate that the following actions have been taken. Actions are listed in the order of preference:

1. Avoid the impact altogether by not taking a certain action or parts of an action.

2. Minimize impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps to avoid or reduce impacts.

3. Rectify the impact by repairing, rehabilitating, or restoring the affected environment.

4. Reduce or eliminate the impact over time by preservation and maintenance operations.

5. Compensate for the impact by replacing, enhancing, or providing substitute resources or environments.

6. Monitor the required compensation and take remedial or corrective measures when necessary.

B. Requirements for Compensatory Mitigation:

1. Compensatory mitigation for alterations to wetlands shall be used only for impacts that cannot be avoided or minimized and shall achieve equivalent or greater biologic functions. Compensatory mitigation plans shall be consistent with *Wetland Mitigation in Washington State – Part 2: Developing Mitigation Plans--Version 1,* (Ecology Publication #06-06-011b, Olympia, WA, March 2006 or as revised), and *Selecting Wetland Mitigation Sites Using a Watershed Approach (Western Washington)* (Publication #09-06-32, Olympia, WA, December 2009).

2. Mitigation ratios shall be consistent with Subsection G of this Chapter.

3. Mitigation requirements may also be determined using the credit/debit tool described in "*Calculating Credits and Debits for Compensatory Mitigation in Wetlands of Western Washington: Final Report* (Ecology Publication #10-06-011, Olympia, WA, March 2012, or as revised) consistent with subsection H of this Chapter.

C. Compensating for Lost or Affected Functions**.** Compensatory mitigation shall address the functions affected by the proposed project, with an intention to achieve functional equivalency or improvement of functions. The goal shall be for the compensatory mitigation to provide similar wetland functions as those lost, except when either:

1. The lost wetland provides minimal functions, and the proposed compensatory mitigation action(s) will provide equal or greater functions or will provide functions shown to be limiting within a watershed through a formal Washington state watershed assessment plan or protocol; or

2. Out-of-kind replacement of wetland type or functions will best meet watershed goals formally identified by the City, such as replacement of historically diminished wetland types.

D. Preference of Mitigation Actions**.** Mitigation for lost or diminished wetland and buffer functions shall rely on the types below in the following order of preference:

1. Restoration (re-establishment and rehabilitation) of wetlands:

   a. The goal of re-establishment is returning natural or historic functions to a former wetland. Re-establishment results in a gain in wetland acres (and functions). Activities could include removing fill material, plugging ditches, or breaking drain tiles.

   b. The goal of rehabilitation is repairing natural or historic functions of a degraded wetland. Rehabilitation results in a gain in wetland function but does not result in a gain in wetland acres. Activities could involve breaching a dike to reconnect wetlands to a floodplain or return tidal influence to a wetland.

2. Creation (establishment) of wetlands on disturbed upland sites such as those with vegetative cover consisting primarily of non-native species. Establishment results in a gain in wetland acres. This should be attempted only when there is an adequate source of water and it can be shown that the surface and subsurface hydrologic regime is conducive to the wetland community that is anticipated in the design.

   a. If a site is not available for wetland restoration to compensate for expected wetland and/or buffer impacts, the approval authority may authorize creation of a wetland and buffer upon demonstration by the applicant's qualified wetland scientist that:

i. The hydrology and soil conditions at the proposed mitigation site are conducive for sustaining the proposed wetland and that creation of a wetland at the site will not likely cause hydrologic problems elsewhere;

ii. The proposed mitigation site does not contain invasive plants or noxious weeds or that such vegetation will be completely eradicated at the site;

iii. Adjacent land uses and site conditions do not jeopardize the viability of the proposed wetland and buffer (e.g., due to the presence of invasive plants or noxious weeds, stormwater runoff, noise, light, or other impacts); and

iv. The proposed wetland and buffer will eventually be self-sustaining with little or no long-term maintenance.

3. Enhancement of significantly degraded wetlands in combination with restoration or creation. Enhancement should be part of a mitigation package that includes replacing the altered area and meeting appropriate ratio requirements. Enhancement is undertaken for specified purposes such as water quality improvement, flood water retention, or wildlife habitat. Enhancement alone will result in a loss of wetland acreage and is less effective at replacing the functions lost. Applicants proposing to enhance wetlands or associated buffers shall demonstrate:

   a. How the proposed enhancement will increase the wetland's/buffer's functions;

   b. How this increase in function will adequately compensate for the impacts; and

   c. How all other existing wetland functions at the mitigation site will be protected.

4. Preservation. Preservation of high-quality, at-risk wetlands as compensation is generally acceptable when done in combination with restoration, creation, or enhancement, provided that a minimum of 1:1 acreage replacement is provided by re-establishment or creation. Ratios for preservation in combination with other forms of mitigation generally range from 10:1 to 20:1, as determined on a case-by-case basis, depending on the quality of the wetlands being altered and the quality of the wetlands being preserved.

   Preservation of high-quality, at-risk wetlands and habitat may be considered as the sole means of compensation for wetland impacts when the following criteria are met:

   a. The area proposed for preservation is of high quality. The following features may be indicative of high-quality sites:

i. Category I or II wetland rating (using the wetland rating system for western Washington)

ii. Rare wetland type (for example, bogs, mature forested wetlands, estuarine wetlands)

iii. The presence of habitat for priority or locally important wildlife species.

iv. Priority sites in an adopted watershed plan.

b. Wetland impacts will not have a significant adverse impact on habitat for listed fish, or other ESA listed species.

c. There is no net loss of habitat functions within the watershed or basin.

d. Mitigation ratios for preservation as the sole means of mitigation shall generally start at 20:1. Specific ratios should depend upon the significance of the preservation project and the quality of the wetland resources lost.

e. Permanent preservation of the wetland and buffer will be provided through a conservation easement or tract held by a land trust.

f. The impact area is small (generally <½ acre) and/or impacts are occurring to a low-functioning system (Category III or IV wetland).

All preservation sites shall include buffer areas adequate to protect the habitat and its functions from encroachment and degradation.

E. Location of Compensatory Mitigation. Compensatory mitigation actions shall be conducted within the same sub-drainage basin and on the site of the alteration except when all of paragraphs 1-4 below apply. In that case, mitigation may be allowed off-site within the subwatershed of the impact site. When considering off-site mitigation, preference should be given to using alternative mitigation, such as a mitigation bank, an in-lieu fee program, or advanced mitigation.

1. There are no reasonable opportunities on site or within the sub-drainage basin (e.g., on-site options would require elimination of high-functioning upland habitat), or opportunities on site or within the sub-drainage basin do not have a high likelihood of success based on a determination of the capacity of the site to compensate for the impacts. Considerations should include: anticipated replacement ratios for wetland mitigation, buffer conditions and proposed widths, available water to maintain anticipated hydrogeomorphic classes of wetlands when restored, proposed flood storage capacity, and potential to mitigate riparian fish and wildlife impacts (such as connectivity);

2. On-site mitigation would require elimination of high-quality upland habitat.

3. Off-site mitigation has a greater likelihood of providing equal or improved wetland functions than the altered wetland.

4. Off-site locations shall be in the same sub-drainage basin unless:

    a. Established watershed goals for water quality, flood storage or conveyance, habitat, or other wetland functions have been established by the City and strongly justify location of mitigation at another site; or

    b. Credits from a state-certified wetland mitigation bank are used as compensation, and the use of credits is consistent with the terms of the certified bank instrument;

    c. Fees are paid to an approved in-lieu fee program to compensate for the impacts.

The design for the compensatory mitigation project needs to be appropriate for its location (i.e., position in the landscape). Therefore, compensatory mitigation should not result in the creation, restoration, or enhancement of an atypical wetland. An atypical wetland refers to a compensation wetland (e.g., created or enhanced) that does not match the type of existing wetland that would be found in the geomorphic setting of the site (i.e., the water source(s) and hydroperiod proposed for the mitigation site are not typical for the geomorphic setting). Likewise, it should not provide exaggerated morphology or require a berm or other engineered structures to hold back water. For example, excavating a permanently inundated pond in an existing seasonally saturated or inundated wetland is one example of an enhancement project that could result in an atypical wetland. Another example would be excavating depressions in an existing wetland on a slope, which would require the construction of berms to hold the water.

F. Timing of Compensatory Mitigation. It is preferred that compensatory mitigation projects be completed prior to activities that will disturb wetlands. At the least, compensatory mitigation shall be completed immediately following disturbance and prior to use or occupancy of the action or development. Construction of mitigation projects shall be timed to reduce impacts to existing fisheries, wildlife, and flora.

1. The Administrator may authorize a one-time temporary delay in completing construction or installation of the compensatory mitigation when the applicant provides a written explanation from a qualified wetland professional as to the rationale for the delay. An appropriate rationale would include identification of the environmental conditions that could produce a high probability of failure or significant construction difficulties (e.g., project delay lapses past a fisheries window, or installing plants should be delayed until the dormant season to ensure greater survival of installed materials). The delay shall not create or perpetuate hazardous conditions or environmental damage or degradation, and the

delay shall not be injurious to the health, safety, or general welfare of the public. The request for the temporary delay must include a written justification that documents the environmental constraints that preclude implementation of the compensatory mitigation plan. The justification must be verified and approved by the City.

G. Wetland Mitigation Ratios[1]:

Category and Type of Wetland	Creation or Re-establishment	Rehabilitation	Enhancement
Category I: Bog, Natural Heritage site	Not considered possible	Case by case	Case by case
Category I: Mature Forested	6:1	12:1	24:1
Category I: Based on functions	4:1	8:1	16:1
Category II	3:1	6:1	12:1
Category III	2:1	4:1	8:1
Category IV	1.5:1	3:1	6:1

H. Credit/Debit Method. To more fully protect functions and values, and as an alternative to the mitigation ratios found in the joint guidance *"Wetland Mitigation in Washington State Parts I and II"* (Ecology Publication #06-06-011a-b, Olympia, WA, March, 2006), the administrator may allow mitigation based on the "credit/debit" method developed by the Department of Ecology in "*Calculating Credits and Debits for Compensatory Mitigation in Wetlands of Western Washington: Final Report,"* (Ecology Publication #10-06-011, Olympia, WA, March 2012, or as revised).

[1] Ratios for rehabilitation and enhancement may be reduced when combined with 1:1 replacement through creation or re-establishment. See Table 1a, *Wetland Mitigation in Washington State – Part 1: Agency Policies and Guidance--Version 1,* (Ecology Publication #06-06-011a, Olympia, WA, March 2006 or as revised). See also Paragraph D.4 for more information on using preservation as compensation.

I. Compensatory Mitigation Plan**.** When a project involves wetland and/or buffer impacts, a compensatory mitigation plan prepared by a qualified professional shall be required, meeting the following minimum standards:

1. Wetland Critical Area Report. A critical area report for wetlands must accompany or be included in the compensatory mitigation plan and include the minimum parameters described in *Minimum Standards for Wetland Reports* (Section XX.060.B) of this Chapter.

2. Compensatory Mitigation Report. The report must include a written report and plan sheets that must contain, at a minimum, the following elements. Full guidance can be found in *Wetland Mitigation in Washington State– Part 2: Developing Mitigation Plans (Version 1)* (Ecology Publication #06-06-011b, Olympia, WA, March 2006 or as revised).

    a. The written report must contain, at a minimum:

        i. The name and contact information of the applicant; the name, qualifications, and contact information for the primary author(s) of the compensatory mitigation report; a description of the proposal; a summary of the impacts and proposed compensation concept; identification of all the local, state, and/or federal wetland-related permit(s) required for the project; and a vicinity map for the project.

        ii. Description of how the project design has been modified to avoid, minimize, or reduce adverse impacts to wetlands.

        iii. Description of the existing wetland and buffer areas proposed to be altered. Include acreage (or square footage), water regime, vegetation, soils, landscape position, surrounding lands uses, and functions. Also describe impacts in terms of acreage by Cowardin classification, hydrogeomorphic classification, and wetland rating, based on *Wetland Ratings* (Section XX.XX) of this Chapter.

        iv. Description of the compensatory mitigation site, including location and rationale for selection. Include an assessment of existing conditions: acreage (or square footage) of wetlands and uplands, water regime, sources of water, vegetation, soils, landscape position, surrounding land uses, and functions. . Estimate future conditions in this location if the compensation actions are NOT undertaken (i.e., how would this site progress through natural succession?).

        v. A description of the proposed actions for compensation of wetland and upland areas affected by the project. Include overall goals of the proposed mitigation, including a description of the

targeted functions, hydrogeomorphic classification, and categories of wetlands.

vi. A description of the proposed mitigation construction activities and timing of activities.

vii. A discussion of ongoing management practices that will protect wetlands after the project site has been developed, including proposed monitoring and maintenance programs (for remaining wetlands and compensatory mitigation wetlands).

viii. A bond estimate for the entire compensatory mitigation project, including the following elements: site preparation, plant materials, construction materials, installation oversight, maintenance twice per year for up to five (5) years, annual monitoring field work and reporting, and contingency actions for a maximum of the total required number of years for monitoring.

ix. Proof of establishment of Notice on Title for the wetlands and buffers on the project site, including the compensatory mitigation areas.

b. The scaled plan sheets for the compensatory mitigation must contain, at a minimum:

i. Surveyed edges of the existing wetland and buffers, proposed areas of wetland and/or buffer impacts, location of proposed wetland and/or buffer compensation actions.

ii. Existing topography, ground-proofed, at two-foot contour intervals in the zone of the proposed compensation actions if any grading activity is proposed to create the compensation area(s). Also existing cross-sections of on-site wetland areas that are proposed to be altered, and cross-section(s) (estimated one-foot intervals) for the proposed areas of wetland or buffer compensation.

iii. Surface and subsurface hydrologic conditions, including an analysis of existing and proposed hydrologic regimes for enhanced, created, or restored compensatory mitigation areas. Also, illustrations of how data for existing hydrologic conditions were used to determine the estimates of future hydrologic conditions.

iv. Conditions expected from the proposed actions on site, including future hydrogeomorphic types, vegetation community types by dominant species (wetland and upland), and future water regimes.

v. Required wetland buffers for existing wetlands and proposed compensation areas. Also, identify any zones where buffers are proposed to be reduced or enlarged outside of the standards identified in this Chapter.

vi. A plant schedule for the compensation area, including all species by proposed community type and water regime, size and type of plant material to be installed, spacing of plants, typical clustering patterns, total number of each species by community type, timing of installation.

vii. Performance standards (measurable standards reflective of years post-installation) for upland and wetland communities, monitoring schedule, and maintenance schedule and actions by each biennium.

J. Buffer Mitigation Ratios. Impacts to buffers shall be mitigated at a 1:1 ratio. Compensatory buffer mitigation shall replace those buffer functions lost from development.

K. Protection of the Mitigation Site. The area where the mitigation occurred and any associated buffer shall be located in a critical area tract or a conservation easement consistent with Chapter XX.XX.

L. Monitoring. Mitigation monitoring shall be required for a period necessary to establish that performance standards have been met, but not for a period less than five years. If a scrub-shrub or forested vegetation community is proposed, monitoring may be required for ten years or more. The project mitigation plan shall include monitoring elements that ensure certainty of success for the project's natural resource values and functions. If the mitigation goals are not obtained within the initial five-year period, the applicant remains responsible for restoration of the natural resource values and functions until the mitigation goals agreed to in the mitigation plan are achieved.

M. Wetland Mitigation Banks.

1. Credits from a wetland mitigation bank may be approved for use as compensation for unavoidable impacts to wetlands when:

   a. The bank is certified under state rules;

   b. The Administrator determines that the wetland mitigation bank provides appropriate compensation for the authorized impacts; and

   c. The proposed use of credits is consistent with the terms and conditions of the certified bank instrument.

2. Replacement ratios for projects using bank credits shall be consistent with replacement ratios specified in the certified bank instrument.

3. Credits from a certified wetland mitigation bank may be used to compensate for impacts located within the service area specified in the certified bank instrument. In some cases, the service area of the bank may include portions of more than one adjacent drainage basin for specific wetland functions.

N. In-Lieu Fee. To aid in the implementation of off-site mitigation, the City may develop an in-lieu fee program. This program shall be developed and approved through a public process and be consistent with federal rules, state policy on in-lieu fee mitigation, and state water quality regulations. An approved in-lieu-fee program sells compensatory mitigation credits to permittees whose obligation to provide compensatory mitigation is then transferred to the in-lieu program sponsor, a governmental or non-profit natural resource management entity. Credits from an approved in-lieu-fee program may be used when paragraphs 1-6 below apply:

1. The approval authority determines that it would provide environmentally appropriate compensation for the proposed impacts.

2. The mitigation will occur on a site identified using the site selection and prioritization process in the approved in-lieu-fee program instrument.

3. The proposed use of credits is consistent with the terms and conditions of the approved in-lieu-fee program instrument.

4. Land acquisition and initial physical and biological improvements of the mitigation site must be completed within three years of the credit sale.

5. Projects using in-lieu-fee credits shall have debits associated with the proposed impacts calculated by the applicant's qualified wetland scientist using the method consistent with the credit assessment method specified in the approved instrument for the in-lieu-fee program.

6. Credits from an approved in-lieu-fee program may be used to compensate for impacts located within the service area specified in the approved in-lieu-fee instrument.

O. Advance Mitigation. Mitigation for projects with pre-identified impacts to wetlands may be constructed in advance of the impacts if the mitigation is implemented according to federal rules, state policy on advance mitigation, and state water quality regulations.

P. Alternative Mitigation Plans. The Administrator may approve alternative critical areas mitigation plans that are based on best available science, such as priority restoration plans that achieve restoration goals identified in the SMP. Alternative

mitigation proposals must provide an equivalent or better level of protection of critical area functions and values than would be provided by the strict application of this chapter.

The Administrator shall consider the following for approval of an alternative mitigation proposal:

1. The proposal uses a watershed approach consistent with *Selecting Wetland Mitigation Sites Using a Watershed Approach (Western Washington)* (Ecology Publication #09-06-32, Olympia, WA, December 2009).

2. Creation or enhancement of a larger system of natural areas and open space is preferable to the preservation of many individual habitat areas.

3. Mitigation according to Section E is not feasible due to site constraints such as parcel size, stream type, wetland category, or geologic hazards.

4. There is clear potential for success of the proposed mitigation at the proposed mitigation site.

5. The plan shall contain clear and measurable standards for achieving compliance with the specific provisions of the plan. A monitoring plan shall, at a minimum, meet the provisions in Section I.

6. The plan shall be reviewed and approved as part of overall approval of the proposed use.

7. A wetland of a different type is justified based on regional needs or functions and values; the replacement ratios may not be reduced or eliminated unless the reduction results in a preferred environmental alternative.

8. Mitigation guarantees shall meet the minimum requirements as outlined in Section.I.a.viii.

9. Qualified professionals in each of the critical areas addressed shall prepare the plan.

10. The City may consult with agencies with expertise and jurisdiction over the resources during the review to assist with analysis and identification of appropriate performance measures that adequately safeguard critical areas.

XX.080 Unauthorized Alterations and Enforcement

A. When a wetland or its buffer has been altered in violation of this Chapter, all ongoing development work shall stop, and the critical area shall be restored. The City

shall have the authority to issue a "stop-work" order to cease all ongoing development work and order restoration, rehabilitation, or replacement measures at the owner's or other responsible party's expense to compensate for violation of provisions of this Chapter.

B. Requirement for Restoration Plan**.** All development work shall remain stopped until a restoration plan is prepared and approved by the City. Such a plan shall be prepared by a qualified professional using the currently accepted scientific principles and shall describe how the actions proposed meet the minimum requirements described in Subsection (C). The Administrator shall, at the violator's expense, seek expert advice in determining the adequacy of the plan. Inadequate plans shall be returned to the applicant or violator for revision and resubmittal.

C. Minimum Performance Standards for Restoration**.** The following minimum performance standards shall be met for the restoration of a wetland, provided that if the violator can demonstrate that greater functions and habitat values can be obtained, these standards may be modified:

1. The historic structure, functions, and values of the affected wetland shall be restored, including water quality and habitat functions.

2. The historic soil types and configuration shall be restored to the extent practicable.

3. The wetland and buffers shall be replanted with native vegetation that replicates the vegetation historically found on the site in species types, sizes, and densities. The historic functions and values should be replicated at the location of the alteration.

4. Information demonstrating compliance with other applicable provisions of this Chapter shall be submitted to the Administrator.

D. Site Investigations**.** The Administrator is authorized to make site inspections and take such actions as are necessary to enforce this Chapter. The Administrator shall present proper credentials and make a reasonable effort to contact any property owner before entering onto private property.

E. Penalties**.** Any person, party, firm, corporation, or other legal entity convicted of violating any of the provisions of this Chapter shall be guilty of a misdemeanor.

1. Each day or portion of a day during which a violation of this Chapter is committed or continued shall constitute a separate offense. Any development carried out contrary to the provisions of this Chapter shall constitute a public nuisance and may be enjoined as provided by the statutes of the state of Washington. The City may levy civil penalties against any person, party, firm, corporation, or other legal entity for violation of any of the provisions of this Chapter. The civil penalty shall be assessed at a maximum rate of $XX dollars per day per violation.

2. If the wetland affected cannot be restored, monies collected as penalties shall be deposited in a dedicated account for the preservation or restoration of landscape processes and functions in the watershed in which the affected wetland is located. The City may coordinate its preservation or restoration activities with other cities in the watershed to optimize the effectiveness of the restoration action.

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Appendix B - Wetland Definitions

(Western Washington)

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Appendix B – Wetland Definitions

Alteration – Any human-induced change in an existing condition of a critical area or its buffer. Alterations include, but are not limited to, grading, filling, channelizing, dredging, clearing of vegetation, construction, compaction, excavation, or any other activity that changes the character of the critical area.

Best Available Science – Current scientific information used in the process to designate, protect, or restore critical areas, that is, derived from a valid scientific process as defined by WAC 365-195-900 through 925. Examples of best available science are included in *Citations of Recommended Sources of Best Available Science for Designating and Protecting Critical Areas* published by the Washington State Department of Commerce.

Best Management Practices (BMPs) – Conservation practices or systems of practices and management measures that:

(a) Control soil loss and reduce water quality degradation caused by high concentrations of nutrients, animal waste, toxics, or sediment;

(b) Minimize adverse impacts to surface water and ground water flow and circulation patterns and to the chemical, physical, and biological characteristics of wetlands;

(c) Protect trees, vegetation and soils designated to be retained during and following site construction and use native plant species appropriate to the site for re-vegetation of disturbed areas; and

(d) Provide standards for proper use of chemical herbicides within critical areas.

Bog – A low-nutrient, acidic wetland with organic soils and characteristic bog plants, which is sensitive to disturbance and impossible to re-create through compensatory mitigation.

Buffer or Buffer Zone – The area contiguous with a critical area that maintains the functions and/or structural stability of the critical area.

Critical Areas – Critical areas include any of the following areas or ecosystems: critical aquifer recharge areas, fish and wildlife habitat conservation areas, geologically hazardous areas, frequently flooded areas, and wetlands, as defined in RCW 36.70A and this Chapter.

Creation – The manipulation of the physical, chemical, or biological characteristics to develop a wetland on an upland or deepwater site, where a wetland did not previously exist. Creation results in a gain in wetland acreage and function. A typical action is the excavation of upland soils to elevations that will produce a wetland *hydroperiod* and hydric soils, and support the growth of hydrophytic plant species.

Cumulative Impacts or Effects – The combined, incremental effects of human activity on ecological or critical area functions and values. Cumulative impacts result when the effects of an action are added to or interact with the effects of other actions in a particular place and within a particular time. It is the combination of these effects, and any resulting environmental degradation, that should be the focus of cumulative impact analysis and changes to policies and permitting decisions.

Developable Area – A site or portion of a site that may be used as the location of development, in accordance with the rules of this Chapter.

Development – A land use consisting of the construction or exterior alteration of structures; grading, dredging, drilling, or dumping; filling; removal of sand, gravel, or minerals; bulk heading; driving of pilings; or any project of a temporary or permanent nature which modifies structures, land, or shorelines and which does not fall within the allowable exemptions contained in the City Code.

Enhancement – The manipulation of the physical, chemical, or biological characteristics of a wetland to heighten, intensify, or improve specific function(s) or to change the growth stage or composition of the vegetation present. Enhancement is undertaken for specified purposes such as water quality improvement, flood water retention, or wildlife habitat. Enhancement results in a change in wetland function(s) and can lead to a decline in other wetland functions, but does not result in a gain in wetland acres. Examples are planting vegetation, controlling non-native or invasive species, and modifying site elevations to alter hydroperiods.

Functions and Values – The services provided by critical areas to society, including, but not limited to, improving and maintaining water quality, providing fish and wildlife habitat, supporting terrestrial and aquatic food chains, reducing flooding and erosive flows, wave attenuation, historical or archaeological importance, educational opportunities, and recreation.

Growth Management Act – RCW 36.70A and 36.70B, as amended.

Hazardous Substances – Any liquid, solid, gas, or sludge, including any material, substance, product, commodity, or waste, regardless of quantity, that exhibits any of the physical, chemical, or biological properties described in WAC 173-303-090 or 173-303-100.

Historic Condition – Condition of the land, including flora, fauna, soil, topography, and hydrology that existed before the area and vicinity were developed or altered by Euro-American settlement, or in some cases before any human habitation occurred.

Impervious Surface – Any alterations to the surface of a soil that prevents or retards the entry of water into it compared to its undisturbed condition, or any reductions in infiltration that cause water to run off the surface in greater quantities or at an increased rate of flow compared to that present prior to development. Common impervious surfaces include, but are not limited to, rooftops, walkways, patios, driveways, parking

lots or storage areas, concrete or asphalt paving, gravel roads, packed earthen materials, and oiled macadam or other surfaces which similarly impede the natural infiltration of stormwater.

In-Kind Compensation – To replace critical areas with substitute areas whose characteristics and functions closely approximate those destroyed or degraded by a regulated activity.

In-Lieu-Fee Program – An agreement between a regulatory agency (state, federal, or local) and a single sponsor, generally a public agency or non-profit organization. Under an in-lieu-fee agreement, the mitigation sponsor collects funds from an individual or a number of individuals who are required to conduct compensatory mitigation required under a wetland regulatory program. The sponsor may use the funds pooled from multiple permittees to create one or a number of sites under the authority of the agreement to satisfy the permittees' required mitigation.

Infiltration – The downward entry of water into the immediate surface of soil.

Isolated Wetlands – Those wetlands that are outside of and not contiguous to any 100-year floodplain of a lake, river, or stream and have no contiguous hydric soil or hydrophytic vegetation between the wetland and any surface water, including other wetlands.

Mature Forested Wetland – A wetland where at least one acre of the wetland surface is covered by woody vegetation greater than 20 feet in height with a crown cover of at least 30 percent and where at least 8 trees/acre are 80 to 200 years old OR have average diameters (dbh) exceeding 21 inches (53 centimeters) measured from the uphill side of the tree trunk at 4.5 feet up from the ground.

Mitigation – Avoiding, minimizing, or compensating for adverse critical areas impacts. Mitigation, in the following sequential order of preference, is:

(a) Avoiding the impact altogether by not taking a certain action or parts of an action;

(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation, by using appropriate technology, or by taking affirmative steps, such as project redesign, relocation, or timing, to avoid or reduce impacts;

(c) Rectifying the impact to wetlands, critical aquifer recharge areas, and habitat conservation areas by repairing, rehabilitating, or restoring the affected environment to the conditions existing at the time of the initiation of the project;

(d) Minimizing or eliminating a hazard by restoring or stabilizing the hazard area through engineered or other methods;

(e) Reducing or eliminating the impact or hazard over time by preservation and maintenance operations during the life of the action;

(f) Compensating for the impact to wetlands, critical aquifer recharge areas, and habitat conservation areas by replacing, enhancing, or providing substitute resources or environments; and

(g) Monitoring the hazard or other required mitigation and taking remedial action when necessary.

Mitigation for individual actions may include a combination of the above measures.

Monitoring – Evaluating the impacts of development proposals on the biological, hydrological, and geological elements of such systems, and assessing the performance of required mitigation measures through the collection and analysis of data by various methods for the purpose of understanding and documenting changes in natural ecosystems and features. Monitoring includes gathering baseline data.

Native Vegetation – Plant species that occur naturally in a particular region or environment and were not introduced by human activities.

Off-Site Compensation – To replace critical areas away from the site on which a critical area has been impacted.

On-Site Compensation – To replace critical areas at or adjacent to the site on which a critical areas has been impacted.

Ordinary High Water Mark – That mark which is found by examining the bed and banks of water bodies and ascertaining where the presence and action of waters are so common and usual, and so long continued in all ordinary years, that the soil has a character distinct from that of the abutting upland in respect to vegetation.

Practical Alternative – An alternative that is available and capable of being carried out after taking into consideration cost, existing technology, and logistics in light of overall project purposes, with less of an impact to critical areas.

Preservation – The removal of a threat to, or preventing the decline of, wetland conditions by an action in or near a wetland. This term includes the purchase of land or easements, repairing water control structures or fences, or structural protection. Preservation does not result in a gain of wetland acres but may result in a gain in functions over the long term.

Project Area – All areas, including those within fifty (50) feet of the area, proposed to be disturbed, altered, or used by the proposed activity or the construction of any proposed structures. When the action binds the land, such as a subdivision, short subdivision, binding site plan, planned unit development, or rezone, the project area shall include the entire parcel, at a minimum.

Prior Converted Croplands – Prior converted croplands (PCCs) are defined in federal law as wetlands that were drained, dredged, filled, leveled, or otherwise manipulated, including the removal of woody vegetation, before December 23, 1985, to enable production of an agricultural commodity, and that: 1) have had an agricultural commodity planted or produced at least once prior to December 23, 1985; 2) do not have standing water for more than 14 consecutive days during the growing season, and 3) have not since been abandoned.

Qualified Professional – A person with experience and training in the pertinent scientific discipline, and who is a qualified scientific expert with expertise appropriate for the relevant critical area subject in accordance with WAC 365-195-905. A qualified professional must have obtained a B.S. or B.A. or equivalent degree in biology, engineering, environmental studies, fisheries, geomorphology, or related field, and have at least five years of related work experience.

(a) A qualified professional for wetlands must be a professional wetland scientist with at least two years of full-time work experience as a wetlands professional, including delineating wetlands using the federal manuals and supplements, preparing wetlands reports, conducting function assessments, and developing and implementing mitigation plans.

(b) A qualified professional for habitat must have a degree in biology or a related degree and professional experience related to the subject species.

(c) A qualified professional for a geological hazard must be a professional engineer or geologist, licensed in the state of Washington.

(d) A qualified professional for critical aquifer recharge areas means a hydrogeologist, geologist, engineer, or other scientist with experience in preparing hydrogeologic assessments.

Re-establishment – The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural or historic functions to a former wetland. Re-establishment results in rebuilding a former wetland and results in a gain in wetland acres and functions. Activities could include removing fill, plugging ditches, or breaking drain tiles.

Rehabilitation – The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural or historic functions and processes of a degraded wetland. Rehabilitation results in a gain in wetland function but does not result in a gain in wetland acres. Activities could involve breaching a dike to reconnect wetlands to a floodplain or returning tidal influence to a wetland.

Repair or Maintenance – An activity that restores the character, scope, size, and design of a serviceable area, structure, or land use to its previously authorized and undamaged condition. Activities that change the character, size, or scope of a project beyond the

original design and drain, dredge, fill, flood, or otherwise alter critical areas are not included in this definition.

Restoration – Measures taken to restore an altered or damaged natural feature, including:

(a) Active steps taken to restore damaged wetlands, streams, protected habitat, or their buffers to the functioning condition that existed prior to an unauthorized alteration; and

(b) Actions performed to re-establish structural and functional characteristics of the critical area that have been lost by alteration, past management activities, or catastrophic events.

SEPA – Washington State Environmental Policy Act, Subchapter 43.21C RCW.

Soil Survey – The most recent soil survey for the local area or county by the National Resources Conservation Service, U.S. Department of Agriculture.

Species – Any group of animals or plants classified as a species or subspecies as commonly accepted by the scientific community.

Species, Endangered – Any wildlife species native to the state of Washington that is seriously threatened with extinction throughout all or a significant portion of its range within the state (WAC 232-12-297, Section 2.4).

Species of Local Importance – Those species of local concern designated by the City in Chapter XX.XX due to their population status or their sensitivity to habitat manipulation.

Species, Priority – Any fish or wildlife species requiring protective measures and/or management guidelines to ensure its persistence at genetically viable population levels as classified by the Washington Department of Fish and Wildlife, including endangered, threatened, sensitive, candidate, and monitor species, and those of recreational, commercial, or tribal importance.

Species, Threatened – Any wildlife species native to the state of Washington that is likely to become an endangered species within the foreseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats (WAC 232-12-297, Section 2.5).

Species, Sensitive – Any wildlife species native to the state of Washington that is vulnerable or declining and is likely to become endangered or threatened throughout a significant portion of its range within the state without cooperative management or removal of threats (WAC 232-12-297, Section 2.6).

Stream – An area where open surface water produces a defined channel or bed, not including irrigation ditches, canals, storm or surface water runoff devices, or other entirely artificial watercourses, unless they are used by salmonids or are used to convey a watercourse naturally occurring prior to construction. A channel or bed need not contain

water year-round, provided there is evidence of at least intermittent flow during years of normal rainfall.

Unavoidable Impacts – Adverse impacts that remain after all appropriate and practicable avoidance and minimization has been achieved.

Washington Administration Code (WAC) – Administrative guidelines implementing the Growth Management Act, WAC 365-190 and WAC 365-195, as amended.

Wetlands – Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands do not include those artificial wetlands intentionally created from non-wetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities, or those wetlands created after July 1, 1990, that were unintentionally created as a result of the construction of a road, street, or highway. Wetlands may include those artificial wetlands intentionally created from non-wetland areas to mitigate the conversion of wetlands.

Wetland Mitigation Bank – A site where wetlands are restored, created, enhanced, or in exceptional circumstances, preserved expressly for the purpose of providing advance mitigation to compensate for future, permitted impacts to similar resources.

Wetland Mosaic – An area with a concentration of multiple small wetlands, in which each patch of wetland is less than one acre; on average, patches are less than 100 feet from each other; and areas delineated as vegetated wetland are more than 50% of the total area of the entire mosaic, including uplands and open water.

Attachment D. Wetlands code comparison.

City of Shoreline	Edmonds CAO (w/2015 Draft Updates)	Issaquah CAO	Burien CAO (w/2015 Draft Updates)	Dept. of Ecology Example CAO	Notes: Best Available Science and other precedents.
Wetland Classification Existing Code: Four categories based on sized and vegeation class. Type I Type II Type III Type IV	Draft Code: Four categories to be updated for consistency with DOE Rating System. Category I Category II Category III Category IV	Existing Code: Based on DOE Rating System. Category I Category II Category III Category IV	Draft Code: Four categories to be updated for consistency with DOE Rating System. Category I Category II Category III Category IV	Based on *Wetlands Guidance for Small Cities - Western Washington Version, Appendix A-Sample Wetlands Chapter* , Updated October 2012. Category I Category II Category III Category IV	• In general, all jurisdictions in Washington are adopting the 4- tiered system developed by DOE, typically with slight modification. • City of Shoreline adopted wetland regulations consistent with DOE system in the Shoreline Master Program in 2013.
Wetland Buffers Existing Code: Type I - 115-150 ft Type II - 75-115 ft Type III - 35-65 ft Type IV - 25-35 ft Range is from standard buffer with reduction down to minimum allowed when buffer mitigation is proposed.	Draft code: to be updated for consistency with DOE buffer guidance. Category I – 75-225 ft Category II – 75-225 ft Category III – 60-225 ft Category IV – 40 ft Category IV less than 1,000 SF may be exempted from avoidance if criteria are met. Range is based on habitat score of wetland. Building Setback from out edge of buffer - 15 ft Provsions for buffer reductions with vegetation enhancement and limitations on how buffer is reduced.	Existing code: based on DOE buffer guidance. Category I – 75-225 ft Category II – 75-225 ft Category III – 50-110 ft Category IV >2,500 SF– 40 ft Category IV less than 2,500 SF - 0 ft Category IV less than 2,500 SF may be altered if mitigation demonstrates no net loss of function and value. Range is based on habitat score of wetland. Building Setback from out edge of buffer - 15 ft Reduction of up to 25% allowed with vegetation enhancement.	Draft code: to be updated for consistency with DOE buffer guidance. Category I – 75-225 ft Category II – 75-225 ft Category III – 60-225 ft Category IV – 40 ft Category III and IV less than 1,000 SF may be exempted from avoidance if criteria are met. Range is based on habitat score of wetland. Building Setback from out edge of buffer - 15 ft Reduction of up to 25% allowed with vegetation enhancement.	**Alternative 1:** Category I – 300 ft Category II – 300 ft Category III – 150 ft Category IV – 50 ft **Alternative 2:** Combines cagetory with intensity of adjacent use for buffers with resulting ranges of Category I - 200-300 ft Category II - 100-200 ft Category III - 50-100 ft Category IV - 3550 ft **Alternative 3:** Combines category, function scores and intensity of proposed landuse for buffers with resulting ranges of: Category I – 50-300 ft Category II – 50-300 ft Category III – 40-150 ft Category IV – 25-50 ft	• "Intensity" classification for wetland buffers in DOE Example Code Alternative 2 refers to "land use intensity." Numerous jurisdictional precedents reflect an opposite correlation between regulated buffer widths and "intensity" of land use: i.e., buffers are typically reduced in size in urban, built-out jurisdictions to accommodate existing development and land uses. • Almost all uses proposed within the City of Shoreline fall in the the High Intensity classification for landuses adjacent to wetlands. Comparable Cities use the example code for small cities that combines category with habitat score. • Many jurisdictions include details on wetland buffer reduction or averaging when accompanied with vegetation enhancement of the remaining buffer area. The DOE example code does not include measures for buffer reduction except where standard buffers would deny reasonable use or averaging would improve wetland protection. BAS supports buffer averaging with buffer enhancement and no less than 25 percent reduction through buffer averaging, unless reasonable use would be denied.

Attachment D. Wetlands code comparison.

City of Shoreline	Edmonds CAO (w/2015 Draft Updates)	Issaquah CAO	Burien CAO (w/2015 Draft Updates)	Dept. of Ecology Example CAO	Notes: Best Available Science and other precedents.
Wetland Mitigation Existing Code: Creation Replacement Ratios Type I - 6:1 Type II - 3:1 Type III - 2:1 Type IV- 1.5:1 Enhancment Ratios Type I - 16:1 Type II - 12:1 Type III - 8:1 Type IV- 6:1	Draft code: to be updated based on DOE mitigation guidance, with modification. Creation/Re-establishment ratios Category I - 4:1 Category II - 3:1 Category III - 2:1 Category IV - 1.5:1 Rehabilitation only Category I - 8:1 Category II - 6:1 Category III - 4:1 Category IV - 3:1 Enhancement only Category I - 16:1 Category II - 12:1 Category III - 8:1 Category IV - 6:1	Existing Code based on DOE mitigation guidance with modificaiton: Creation/Re-establishment ratios Category I - 6:1 to not allowed Category II - 3:1 Category III - 2:1 Category IV, >2,500 SF - 1.5:1 Rehabilitation only Category I - 6:1 to 12:1 Category II - 6:1 Category III - 4:1 Category IV, >2,500 SF - 3:1 Additional standards for combinations of Creation or Re-establishment and Rehabilitation or Enhancement. Category IV, <2,500 SF alteration allowed in wetland if mitigation provided consistent	Draft code: to be updated based on DOE mitigation guidance, with modification. Creation/Re-establishment ratios Category I - 4:1 Category II - 3:1 Category III - 2:1 Category IV - 1.5:1 Rehabilitation only Category I - 8:1 Category II - 6:1 Category III - 4:1 Category IV - 3:1 Enhancement only Category I - 16:1 Category II - 12:1 Category III - 8:1 Category IV - 6:1	Creation/Re-establishment ratios Category I - 6:1 to not allowed Category II - 3:1 Category III - 2:1 Category IV - 1.5:1 Rehabilitation only Category I - 8:1 to case by case Category II - 6:1 Category III - 4:1 Category IV - 3:1 Enhancement only Category I - 16:1 to case by case Category II - 12:1 Category III - 8:1 Category IV - 6:1	• DOE's Example Code Provisions stipulates mitigation ratio increases when: (a) uncertainty about potential success exists; (b) a significant period of time is expected before wetland functioning recovers; (c) mitigation results in a lower category wetland or diminished functions; and (d) wetland impacts were not authorized. •

Attachment D. Wetlands code comparison.

City of Shoreline	Edmonds CAO (w/2015 Draft Updates)	Issaquah CAO	Burien CAO (w/2015 Draft Updates)	Dept. of Ecology Example CAO	Notes: Best Available Science and other precedents.
Wetlands – Permitted Uses Existing code: Exempt activities listed with limited impacts to critical areas. Type I - alteration prohibited subject to the resonable use and sepecial use provisions. Type II, III, and IV - Alterations must be mitigated with no net loss of wetland function and value. Stormwater facilities allowed in buffer if demonstrated that it is benifical to the wetland.	Existing code with minor revisions: Allowed activities listed with minimal impacts to critical areas or restoration activities of limited scope. Category I - prohibited except as allowed in public agency and utilities, reasonable use and variance sections. Category II - water dependant uses allowed with no advers impact, non-water dependant uses prohibited except where cannot be avoided. Category III and IV-unavoidable and necessary impacts allowed with critical area report and mitigation plan.	Existing code: Allowed activities listed with minimal impacts to critical areas or restoration of limited scope. Some require land use permit to demonstrate best practies are being followed. Allowances for sewer corridors where not alternative exists.	Sewer utility corridors may be allowed in certain wetlands and stormwater facilities are allowed consistent with requirements based upon wetland category.	Stormwater management facilities, limited to stormwater dispersion outfalls and bioswales, may be allowed within the outer 25% of the buffer of Category 3 and 4 wetlands only provided that: no other location is feasible; and, facilities do not degrade the function and values of such wetlands.	• Jurisdictions incorporating BAS generally allow specific low impact uses to occur in wetlands or their buffers if criteria are met, sometimes with a permit or critical area report to suppor to demonstrate compliance. □ New requirements to facilitate Low Impact Development design for stormwater management have led Cities to allow for placement of stormwater facilities within the wetland buffers where benfit to the wetland can be demonstrated.

Wetlands / Streams

General Comments	
5/5/15 Community Meeting	1. Hidden Lake - Dredging, Encourage Natural Habitat 2. Place signs to signify critical area (NGPA) 3. Allow low intensity uses (benches) 4. Tree cutting near wetlands for views makes no sense 5. "Higher Protection" i.e. Trees first over views 6. I'd like increased restrictions to protect wetlands we know already exist in areas where there are high densities of target wetland zones where lots of "wetland" spots congregate. 6.a. ^ NOTE ON THIS COMMENT: "Is not supported by science. 7. Best Available Science is not happening 8. Fiberglass inserts for surface water pipes, where does the fiberglass go? 9. Reconnect the Meridian Park wetland with Ronald Bog to bring frogs back to Meridian Park. (They need to be able to migrate to the lake area during dry times) It's not a wetland w/o frogs! 10. Make regulations more strict, to protect the wetlands. 11. Are groups like homeowners associations going to be able to govern their own areas and determined BAS? 12. Is BAS BS? 13. Higher standards + more protection please, our natural world is going to crap!
5/14/15 Community Meeting	14. Code to protect buffers for S&W from pollutants & runoff nearby public & Private 15. Consider prohibiting pesticide use on private property 16. Teach owners to maintain vegetation in buffers - Native -Replace invasives with natives -Timing of projects based on ecology of site. 17. I want to make sure the standards for critical areas are NOT watered down. 18. Teach people how to care for their critical areas. 19. Recognize that critcal areass are not pockets in our city - everything is interconnected 20. Invite property owners / residents / utilities to enance these areas (mitigation) 21. Interdepartmental training about new regs, how it affects each department / importance of critical areas to city 23. Provide primer on specific areas of iterest 24. How to inform before project is designed 25. Education for contractors & developers 26. Average person has no idea how their lives impact critical areas 27. House party education events 28. Protect Blue Heron / Perch Trees

Geologic Hazard Areas

General Comments	
5/5/15 Community Meeting	1. Concern about adjacent properties increasing risk of slide. What can Property owner do? 2. We live at the bottom of a steep slope - I am very concerned about what property owners upslope from me would do to alter their vegetation & possibly increase the possibility of slope-sliding. 3. Value of root mass & structure in slope stabilizing 4. Do not compromise life & property safety for views. 5. Do allow trimming as compromise 6. Expertise on geomorphology 7. Don't count critical area land towards allowable density 8. Trees ARE the view 9. If Point Wells is a critical area and in danger of sliding and is in Snohomish County, what is the recourse for the proepty in King County that may be impacted if a slide occurs and damages King County property? 10. Critical areas should be removed from the square foot calculation when determining number of homes that be built on a site. 11. If an entire lot is in a critical area then no building should be permitted. 12. Do not reduce standard for protection of critical areas 13. Fao.org - International Year of Soil 14. Concerned that dangers cannot be really mitigated. 15. Trees hold banks. They shouldn't be cut for views. 16. consider bioengineering plant contribution to stability. 17. Conern about recommendations of qualified professionals when directed by property owners. 18. Better replacement of hazard trees. 19. Liquefaction areas in Boeing Creek Park. City has Hidden Lake as reservoir for Sound. What happens in houses downstream from earthquake?
5/7/15 Email submission	King Conservation District staff provided a flyer regarding some free upcoming workshops on safe and sustainable Marine Bluff and Shoreline Management solutions. Flyer included as Attachment G. Free technical assistance is available to City of Shoreline Residence. Additional literature available from King Conservation District upon request
5/5/15 Community Meeting	20. Control run-offs driving construction activity. A) Incremental disturbance vs. whole site 21. Requirement to vegetate existing bare geological hazard areas 22. Include code language to cover Liquefaction.
5/11/15 Walk-in resident	23. Landslide in Blue Heron Reserve a couple years ago. Same trees at an angle now. Some slides on bluff side too, but smaller 24. In west end of Eagle reserve concerned about erosion & heard discussion about piping end of stream. 25. Believes that water flow in creeks has increased due to tree removal aggravating slope stability & erosion 26. Would like higher undrestanding of science (?) of bank stability. 27. Would like to see requirement for best practices to be followed in critical areas. 28. How can city protect bluff lots by limiting tree cutting? Or topping in proximity to bluffs to areas of past landslide / erosion? 29. Accurately assess/define steep slope. 30. Require an applicant to provide notice in advance of tree cutting in genreal, but definitely in critical areas.

Geologic Hazard Areas

5/14/15 Resident submittal at meeting	Attacchment F - 5.14.15_Meeting_Submission List of submitted documents: 2015 International Year of Soils - Food and Agriculture Organization of the United Nations. Digging Deeper: How Much Do Roots Contribute to Slope Stability? Where the Water Begins: Land Management Practices for Marine Shoreline & Bluff Property Owners - King Conservation District Puget Sound's Nearshore Habitat Coast Processes on Puget Sound - Coastal Training Program of Washington Random excerpt about Vegetation and Slope Stability (Cannot identify source) Value, Benefits and Limitations of Vegetation in Reducing Erosion - Coastal Training Program of Washington Trees, Soils, Geology, and Slope Stability - Coastal Training Program of Washington Tree Removal on Steep Slopes of Puget Sound Shorelines - Coastal Training Program of Washington Soils & Biodiversity - Food and Agriculture Organization of the United Nations

Fish & Wildlife Habitat / Streams

General Comments	
5/5 Community Meeting	1. Drainage beds that run only when it rains should no necessarily be considered a "wildlife habitiat" 2. Don't want protefction standards lowered 3. Raise standards for protection 4. Value: Species - Eagles, Heron, Fish, Osprey, Crayfish, Frogs, Pileated Wood Pecker, Quail 5. Would it be viable to let go of Hidden Lake? When can we take it out? 6. Surface water management. Fiberglass pipe liners for maintenance? What is impact to critical areas downstream? Over time when it breaks down. 7. Can the Meridian Park wetland be re-connected to the Ronald Bog? Frogs can no longer survince in the MP wetland, since the school grounds interupt their migration path that allows habitat during dry times. What other wildlife in MP wetland will die away during increased droughts? This wetland is dying. 8. What constitutes a riparian zone that should be protected? -Species? -Wildlife -Trees -Habitat for Species
5/14 Community meeting	9. Fund and staff to educate public about critical areas and their benefits as well as how to prevent upstream impacts **See Wetlands/Streams page for generalized stream/wetland/fish&wildlife related comments from this meeting.**
5/7/15 Customer call-in	1. Add stronger definitions for hazard trees and maybe a threshold for removal on tree form. 2. Require review of tree forms by a qualified 3rd party. 3. Define qualified arborist for arborist reports & tree forms for trees in critical areas. - Require TRACE / TRAQ

General Provisions

General Comments	
5/5/15 Westside Meeting	1. Views 2. Reasonable Uses- definition may be too black & white 3. Increase scope / allowed area for removing invasive species 4. Flexibility in mitigation standards / requirements 5. Vegetation management plan - to reduce micromanagement, make process of managing vegetation over time easier and less expensive. 6. Regulations regarding trees are so difficult to comply with that nearly ALL of "certified arborists" on your list are unwilling to help me with tree exemption permits. I've contacted at least 8 of 12 who refused me because the city is too difficul to work with. 7. Hazard mitigation plan 8. BAS manual link on website 9. State Agencies 10. Link to Code & Growth Management Act references 11. "Reasonable Use" should include consideration of views, especially when it is fast-growing deciduous trees are those that block views. Please! 12. Safety of property and lives should be considered 13. Trees ARE the view! 14. The water and the sound are the view. An occasional tree adds depth. 15. Yes if safe protect lives & property - the entire tree does not need to cut down for a view = trim = window Someone should not have to spend unreasonable money to mitigate. 16. Wind Sheer / Comprise views with trimming / Overview of supposly & dangerous hazard trees / protect people & property / Interconnect root / root mat consideration / Hydrolic / Water change areas / high standard BAS / Geom (?) / Upper neighbors recharge / OSO GEER report / 1st safety of property & people / NO private contract of reserves. They are not professionals. 17. PROCESS Currents May 1 publication is too short notice for a may 5 meeting / Critical Areas page on city website should contain links to SMC 20.80, RCW 36.70A So community input can be informed input / Rationale for existing regs should be publicized as well as assumptions. 18. More stringent protections of large evergreen trees; those > 24" in diameter. / A 24"-48" evergreen tree has more value than a 12"-18" tree. I support wildlife as well as providing us with clean air to breath! / Trees help with mitigation of erosion.
5/14/15 Eastside Meeting	19. All termenology should be included in definition section. 20. Easier & better accessibility to info for non-tech people to understand Critical Areas Ordinance. 21. Link webpage to handouts
5/6/15 Email comment	One thought that I had about the use of the phrase "standards for critical area review" is that you might consider using "guidelines for critical area review". I suggest this since you are in the process of trying to put together what should be in a report in general terms and are still working this out. A standard according to Webster's Dictionary is, "something established by authority, custom, or general consent as a model". Using the word "Guideline" may give you a degree of flexibility from the perception standpoint until you get to a report structure that meet your needs and your customer's needs.
5/18/15 Website comment	Since Innis Arden reserves are owned by all homeowners, any permits should require public notice and 30 day review/comment period.

Forests and forest soils: an essential contribution to agricultural production and global food security

Forests and forest soils play a broad, complex and interactive role within the environment

Soils have provided the foundation for trees and entire forests over millions of years. Soil is an important component of forest and woodland ecosystems as it helps regulate important ecosystem processes, such as nutrient uptake, decomposition, and water availability. Soils provide trees with anchorage, water and nutrients. In turn, trees as well as other plants and vegetation, are an important factor in the creation of new soil as leaves and other vegetation rot and decompose.

However, the relationship between soils and forests is much more complex and far-ranging. Soils and forests are intrinsically linked, with huge impacts on each other and on the wider environment. The interactions between forests and forest soils help to maintain the environmental conditions needed for agricultural production. These positive effects are far reaching and ultimately help to ensure a productive food system, improved rural livelihoods and a healthy environment in the face of change.

Forests, forest soils and their interactions carry out key functions that contribute to food security and a healthy environment

1. Climate change: what forests and forest soils do

Carbon emissions are a major contributor to climate change. The world´s forests, in one of their many roles, act as a significant carbon store. 650 billion tonnes of carbon, or nearly one third of the total in terrestrial ecosystems, are captured in forests. Forest soils also store a quantity of carbon equalling that of the global forest biomass, about 45 percent each. An additional ten percent of carbon is found in forest dead wood and litter.

2. Sustainable soil management needs sustainable forest management

The planet needs sustainably managed forests to control soil erosion and to conserve soil.

Tree roots stabilize ridge, hill and mountain slopes and provide the soil with the necessary mechanical structural support to prevent shallow movements of land mass: landslides rarely occur in areas with high forest cover.

Sound forest management practices, including measures to introduce or maintain forest cover on erosion-prone soils and run-off pathways, help control or reduce the risk of soil erosion and shallow landslides.

3. Major ecosystem benefits of forests and soils: clean water and watershed management

By reducing soil erosion and the risk of landslides, sustainably managed forests contribute significantly to the systems providing and maintaining the planet's supplies of clean water, while also ensuring a balanced water cycle.

Forests are also a key component of watershed management – an integrated approach of using natural resources in a geographical area drained by a water course. Watershed management is a very sound way to protect and rehabilitate areas prone to soil degradation and erosion in upland areas. Forest and soil characteristics are among the key parameters assessed in watershed management planning. Moreover, measures to restore and enhance soil fertility, e.g. through reforestation, have many benefits and are therefore an integral part of any watershed management plan.

4. Soil conservation in semi-arid and arid areas starts with forests and trees

Related links

FAO Forestry Department

In arid or semi-arid ecosystems, forests send 90 percent of rainfall back into the atmosphere. But by helping to prevent soil erosion, they act as a crucial protector of soil resources, for example in preventing or reducing salinization. The challenge in arid-zone forests is therefore to optimize the trade-offs, between water yield and soil protection.

5. Forests can reduce mountain soils' sensitivity to degradation

Steep slopes and thin soil make mountain ecosystems extremely vulnerable to erosion. Mountain soils are often degraded and invariably do not provide enough nutrients for plants to grow well. FAO estimates that around 45 percent of the world's mountain area is not or only marginally suitable for growing crops, raising livestock or carrying out forestry activities. The degradation of mountain soil and vegetation cover may happen gradually or rapidly but often takes many years to repair; in some cases it is irreversible.

The challenges that mountain farmers must overcome are many: short vegetation periods, steep slopes, shallow soils and the occurrence of landslides. To survive, they have had to develop different ways of averting or spreading risks, employing complex and diversified farming systems on croplands, pastures and forests. They know that they must make use of different soil types at different altitudes and at different times of the year.

In order to protect our soils, we need to protect our trees and forests

The importance of these effects has often been ignored in the past, with the clearance of tree vegetation and the subsequent loss of millions of hectares of productive land. Furthermore, as forests continue to be cleared-exposing the land to direct attack from wind and rain-soil erosion and land degradation are still undermining agriculture's resource base. In order to protect our soils, we need to protect our trees and forests. Both of these vital resources play pivotal roles in food security and a healthy environment.

11/05/2015

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DIGGING DEEPER How Much Do Roots Contribute to Slope Stability?

Keen observers have long recognized that trees help stabilize soils on steep mountain slopes. Lyell (1853) and Marsh (1864) interpreted associations between forest cutting and mass wasting as evidence that forest clearing accelerated erosion in mountainous terrain. Since Lyell's day, the influence of root reinforcement on shallow landsliding has been well established by studies of landslide erosion under mature forest and in harvested plots, mechanistic studies of root reinforcement, and theoretical analyses based on the infinite-slope stability equation (eq. 5.8), where root strength is considered as part of the cohesion term (Sidle et al., 1985). Although roots contribute to soil strength by providing apparent cohesion and holding the soil mass together, they have a negligible effect on frictional strength. Studies from the western United States, Japan, and New Zealand all indicate that the stability of the soil mantle on steep, soil-mantled slopes depends in part on reinforcement by tree roots and that after the loss of forest cover (either by timber harvest or fire), the decay of tree roots increases the potential for slope instability, especially when soils are partly or completely saturated (Sidle et al., 1985; Bierman et al., 2005).

Root reinforcement may occur through the base of a potential landslide as roots grow into the underlying bedrock or more stable surface materials. Dense, interwoven root networks both reinforce soil and provide lateral reinforcement across potential failure scarps. Burroughs and Thomas (1977) demonstrated a rapid decline in the tensile strength of Douglas-fir roots following timber harvest in western Oregon and central Idaho and indicated the increased potential for landslides when trees were removed. Building on the Burroughs and Thomas approach, Sidle (1992) developed a quantitative model of root-strength reinforcement that combined the decay of roots after timber harvest with the regrowth of new roots [Figure DD5.1]. Although the decay and regrowth times vary for different tree species, a period of low root strength occurs some time between 3 and 20 years following timber harvest or fire. If a big storm occurs in

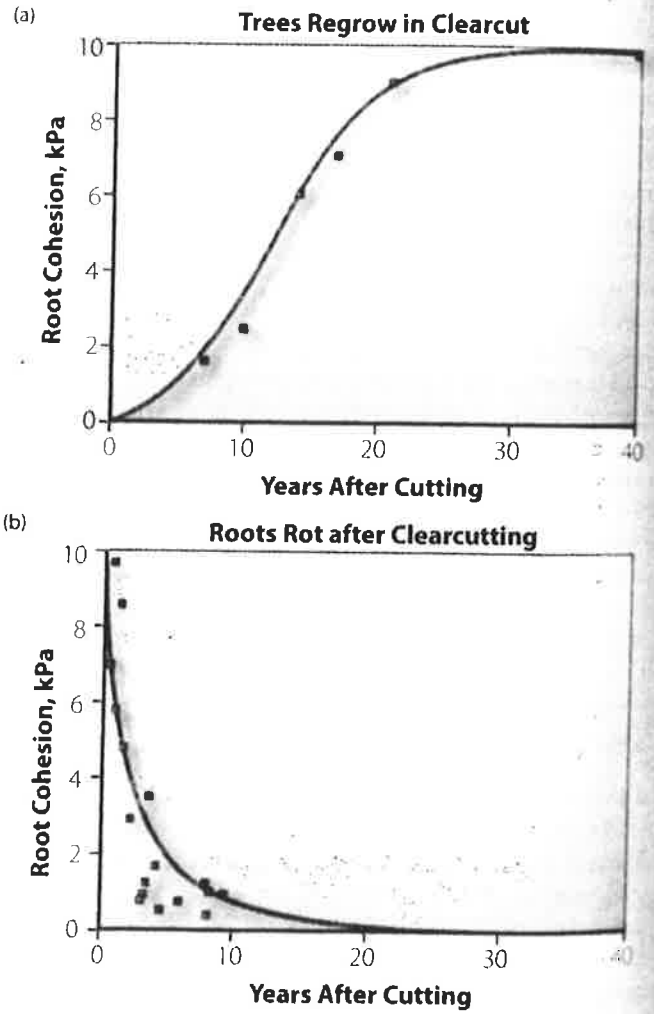

FIGURE DD5.1 Root strength changes over time as (a) trees grow in clearcuts and (b) as roots decay after trees are clear-cut. It takes about a decade after cutting for the dead roots of coastal Douglas fir trees to lose all of their strength and about 20 years for new trees to take root and develop full root strength. Planting seedlings right after harvest is a land-management strategy that reduces the chance of landsliding because new roots are growing as the old ones are decaying. [From Sidle (1992).]

this window and saturates the soil, landslides will likely follow.

Studies comparing the rate of landsliding on forested versus clear-cut slopes have reported a range of effects, from no detectable increase in landslide frequency to more than a ten-fold increase following timber harvest (Sidle et al., 1985). In a study that both analyzed a regional data set of 3200 landslides and intensively monitored a study area, Montgomery et al. (2000) found that storms with 24-hour rainfall recurrence intervals of less than 4 years (common storms) triggered landslides in the decade after timber harvesting in the Oregon Coast Range [**Figure DD5.2**]. Comparison of these postharvest rates of landsliding with the estimated background rate implied that clear-cutting of slopes increased landsliding rates by 3 to 9 times over the natural background. This increase reflected reduced root strength as the dead roots of the cut trees rotted and weakened. Without strong roots, less soil saturation was required to induce slope failure, and thus smaller storms could trigger landslides.

Schmidt et al. (2001) measured root cohesion in soil pits and scarps of landslides triggered during large storms in February and November of 1996 in the Oregon Coast Range. They found a preponderance of broken roots in the margins of recent landslide scarps, indicating that root tensile strength contributed to stabilizing the soil (until the roots snapped) in most locations. They also found that root density, root penetration depth, and the tensile strength varied among species; the tensile strength increased nonlinearly with root diameter. The median lateral cohesion provided by roots in mature natural forest ranged from 26 to 94 kPa. It was much lower in planted, industrial forest stands, ranging from 7 to 23 kPa. In clear-cuts, the lateral root reinforcement was uniformly low, under 10 kPa [**Figure DD5.3**].

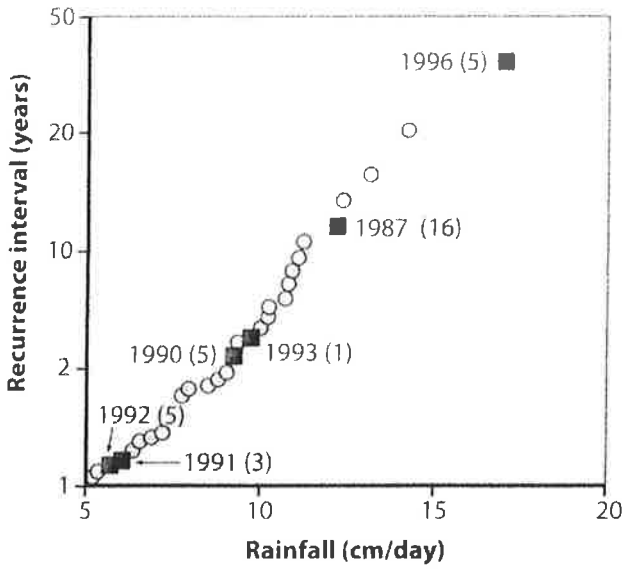

FIGURE DD5.2 Plot of recurrence intervals for 24-hour rainfall events from 1931 through 1996 (yellow circles) in a steep 0.43 km^2 study area that was clear-cut in the 1980s. Storms that occurred after clear-cutting and are known to have generated landslides are shown as blue squares. Numbers in parentheses after years indicate how many landslides occurred. Note that eight landslides occurred in this area during storms having less than 2-year recurrence intervals, all after clear-cutting. Vertical axis is logarithmic. [From Montgomery et al. (2000).]

Similar to Montgomery et al. (2000), Schmidt et al. (2001) found that a persistent reduction in root strength

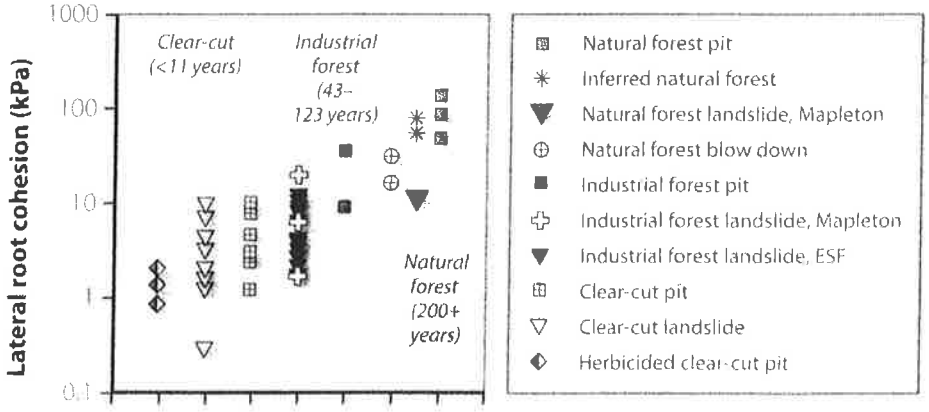

FIGURE DD5.3 In the Oregon Coast Range, not all roots provide the same amount of lateral root cohesion. Roots in clear-cuts do little to stabilize slopes. Industrial forests, those planted and managed for wood products, have roots that provide some stabilization, but the highest apparent root-cohesion values are found in mature, natural forests. [From Schmidt et al. (2001).]

DIGGING DEEPER How Much Do Roots Contribute to Slope Stability? *(continued)*

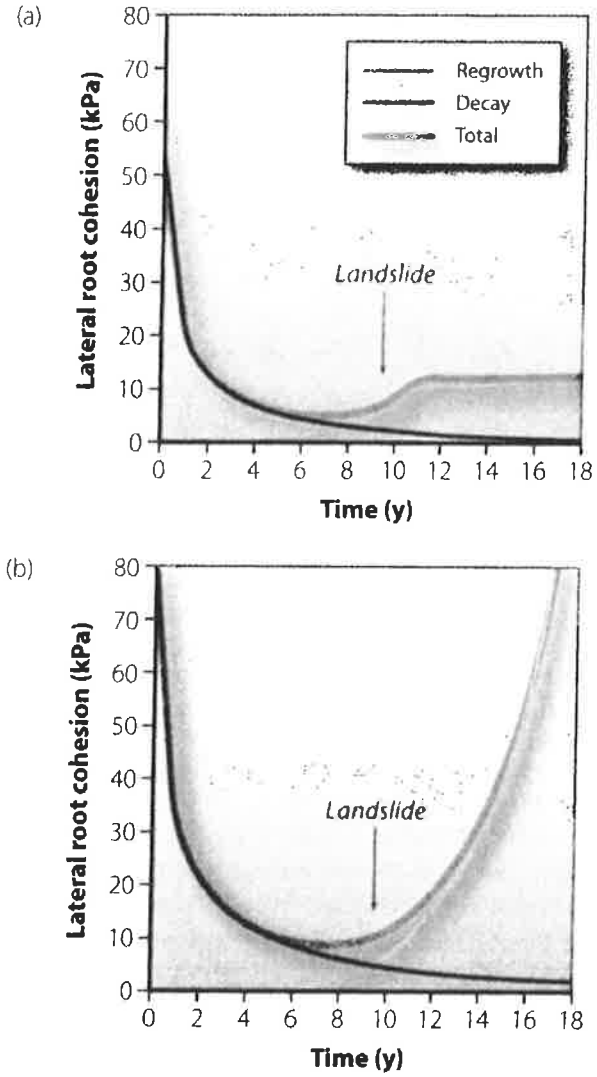

FIGURE DD5.4 Predicted total lateral root cohesion considering contributions from tree regrowth and decay of old roots for two sites that were clear-cut in 1986 and yielded landslides in 1996. Figure (a) represents a site where understory regrowth dominates vegetation. Figure (b) is a site where growth consists of abundant conifers and deciduous trees. [From Schmidt et al. (2001).]

resulting from timber harvest significantly reduced the soil moisture (m in eq. 5.8) required to trigger slope instability. They modeled root decay and regrowth for two sites that were clear-cut in 1986, and then slid in 1996. Both failures occurred close to the predicted root-strength minima, about 10 years after clear-cutting [**Figure DD5.4**].

Root strength varies spatially in a forest, complicating slope-stability modeling. Roering et al. (2003) documented the distribution and characteristics of trees adjacent to 32 shallow landslides in the Oregon Coast Range. Not surprisingly, bigger trees had larger root systems. The diameter of the tree crown and the root network was a function of the tree diameter (and thus tree age), and Roering et al. (2003) quantified root strength in landslide scarps by pulling on roots and measuring the tensile strength at which they broke. Summing the total root strength in each landslide perimeter, they found that root strength correlated with the size, species, condition, and spacing of trees around the landslide scarps; bigger, healthier trees spaced more closely together gave greater root strength. They also found that landslides tended to occur in areas of low root strength and thus that the potential for shallow slope instability was a function of the diversity and distribution of vegetation on potentially unstable slopes. Well-vegetated slopes were more stable.

Root strength can also vary with topographic position. Hales et al. (2009) investigated the spatial variability of root network density and strength in the southern Appalachian Mountains in North Carolina by measuring the distribution and tensile strength of roots from soil pits on topographic noses and hollows. They found that roots from trees on noses had greater tensile strength than those found in hollows, a pattern suggesting that not only does vegetation help stabilize topography but that topography affects vegetation, specifically, root strength (presumably due to differences in soil moisture). Trees on noses provided more effective root cohesion than those in hollows, a pattern that would increase further the propensity for landslides to occur in hollows.

The variability of root reinforcement with tree species, root diameter, tree diameter, topographic position, and time after timber harvest complicates quantitatively predicting the effect of root reinforcement on slope stability. The evidence is convincing that taking trees off slopes reduces root reinforcement and allows soils to fail on slopes more easily, i.e., in smaller precipitation events; however, this effect is difficult to incorporate into landscape-scale slope stability models due to the tremendous spatial variability not only in root strength but in other properties that influence slope stability, such as regolith depth and hydraulic conductivity, and the influence of bedrock fractures on soil saturation. There is no ambiguity in the science indicating that clear-cut slopes, from which trees have been removed, are more likely to fail than similar slopes under mature forest. However, managing timber-harvest-related slope instability is difficult because it is impossible to identify with certainty which potentially unstable slopes will actually fail in a particular storm. [**Figure DD5.5**].

Debris flows off a steep, clear-cut slope, Stillman Creek, Washington. The timber company's application to the State Department of Natural Resources before harvest reported that the site had been inspected and was found to have no potentially unstable slopes. [Photograph by S. Ringman, from *Seattle Times*.]

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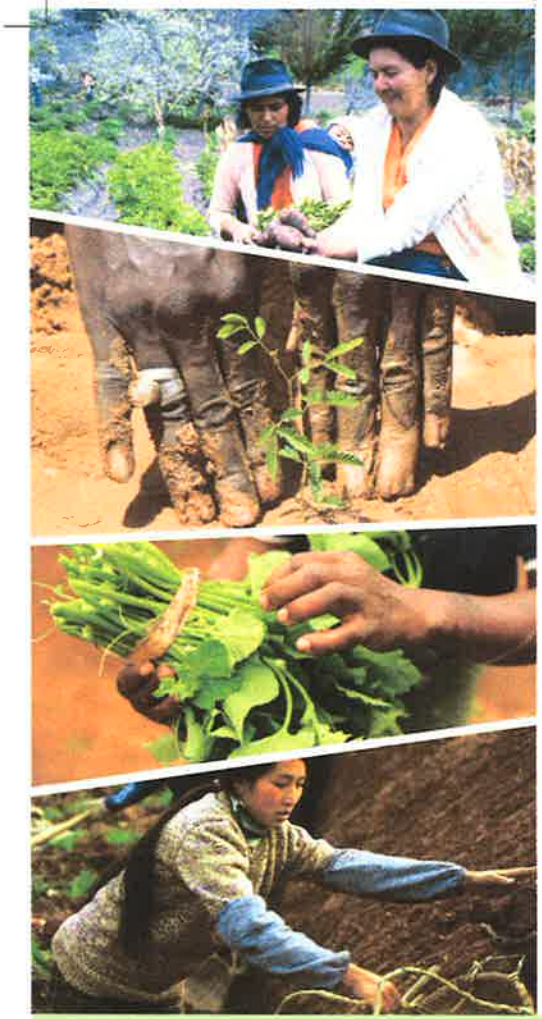
WORKED PROBLEM

Question: Using the infinite-slope model, what is the maximum stable angle for both dry and saturated sand with no cohesion and a friction angle of 37 degrees? How does this stable angle compare to that of more cohesive material such as till or clay?

Answer: For dry cohesionless materials, the maximum stable angle is the friction angle, ϕ, in this case, 37 degrees. For the failure of a fully saturated, cohesionless soil like coarse sand ($FS = 1.0$, $C = 0$, and $m = 1.0$), eq. 5.8 reduces to $\tan\theta = [(\rho_s - \rho_w)/\rho_s] \tan\phi$, which may be approximated by $\tan\theta = 1/2 \tan\phi$ (since for most soils $\rho_s \approx 2\rho_w$). This indicates that sandy slopes steeper than about half the friction angle tend to fail if saturated. Thus, when saturated, cohesionless sand with a friction angle of 37 degrees will fail when the slope is about 23.5 degrees. At higher slopes where $\theta \geq \phi$, cohesionless soils tend to slide even when dry; the soil mantle rarely stays on such steep slopes unless there is significant root reinforcement. Soils with even modest amounts of cohesion can stand at much steeper angles over length scales shorter than typical hillslope lengths. For example, excavations in clay (and other cohesive materials like glacial till) can hold vertical faces of up to several meters in height, as can riverbanks, especially if reinforced by roots that provide apparent cohesion.



The 68th UN General Assembly declared 2015 the International Year of Soils (IYS).

The Food and Agriculture Organization of the United Nations has been nominated to implement the IYS 2015, within the framework of the Global Soil Partnership and in collaboration with Governments and the secretariat of the United Nations Convention to Combat Desertification.

"The International Year of Soils will help us pave the road towards sustainable development for all and by all."

José Graziano da Silva, FAO Director-General

Food and Agriculture Organization of the United Nations
Viale delle Terme di Caracalla - 00153, Rome Italy
soils-2015@fao.org

#IYS2015

www.fao.org/soils-2015

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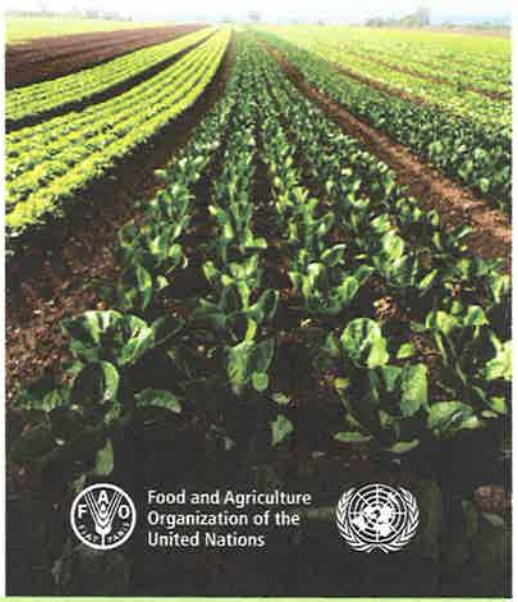
2015 International Year of Soils

healthy soils for a healthy life



Where the Water Begins

Land Management Practices for Marine Shoreline & Bluff Property Owners

King Conservation District
May 31st, June 7th & 21st, 2008

SOUND IDEAS

Puget Sound's Nearshore Habit

What is the nearshore?

Nearshore habitat comprises the beach, the upland adjacent to it and the intertidal area. This habitat forms an essential link in the food web of Puget Sound and is an important fish and wildlife corridor. Shallow marine waters are home to sensitive young fish and shellfish and provide an important feeding area for fish, birds and even mammals.

Muddy shores are best known as habitat for commercial and recreational shellfish such as oysters, geoducks and crabs. Eelgrass beds are among the most important sites where herring schools lay their roe. Small worms, mollusks, crustaceans and forage fish inhabiting muddy shores are prey for young salmon, sole and flounder, as well as resident and migrating shorebirds.

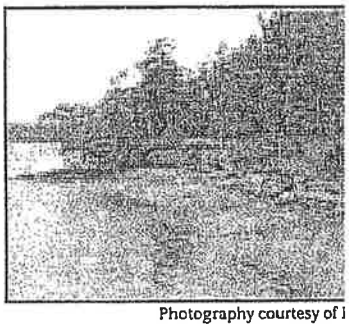
The most common type of shoreline along the inland sea contains a mixture of mud and sand along with coarser gravel and cobbles. This variety of bottom materials supports a great diversity of living creatures: seaweeds clinging to rocks; crab and shrimp scavenging the mud for food; clams burrowed between cobbles; and fish, birds and seals prowling for prey.

What is happening?

Human development has already taken a heavy toll on Puget Sound nearshore habitats. An estimated 58 percent of the original coastal wetlands are gone. Dikes, port development, and commercial and residential building have all impacted these critical areas. Many sand, gravel and cobble shorelines have been dredged, paved or altered by bulkheads. In Seattle and Tacoma, areas which were once expansive intertidal marsh, the losses are almost 100 percent. Despite our heightened awareness, there is a continuing alteration and loss of nearshore habitat, incrementally from one residence to the next.

What should be done?

The Puget Sound Water Quality Action Team is currently working to identify the most significant threats to nearshore habitat. We recognize that the current regulatory system is not working as it should to protect the nearshore. We need better inventory information on the types of nearshore habitats in Puget Sound and the functions they provide. Restoration efforts are needed, particularly in areas that have experienced huge losses of critical habitat.



Photography courtesy of

What can you do?

Whether you live on the sho
or are an occasional visitor,
can be a steward of Puget So
nearshore environment. Vol
with a monitoring group, pic
litter, help with a revegetatic
project or just take the time
back and watch the critters
live along this glorious Soun

State and Local Part

As part of the Action Team, t
following state agencies and
partners are involved in hab
protection activities:

- Department of Natural Resources (inventories nearshore habitat, owns a manages tidelands)
- Department of Ecology (provides technical assist and guidance materials fc Shoreline Management A
- Department of Fish &Wilc (administers Hydraulic Ap Permits and provides tech assistance)
- Local governments (deve and administers shoreline master programs and crit areas ordinances)
- Tribal governments (inve and protects nearshore a reserved land)

adjacent shoreline developments and residential farming and forestry practices further upland.

LARGE COMMERCIAL AND INDUSTRIAL DEVELOPMENT

Regulators expressed concern about the siting of large structures and developments in the nearshore environment. Effects associated with large development projects vary greatly depending on individual project proposals. The dominant concerns include the inability to adequately protect extremely sensitive areas of the shoreline, the lack of information available to substantiate potential impacts to aquatic and nearshore marine resources, and the inability to adequately mitigate for impacts on resources.

Cherry Point, in Whatcom County, was cited as an example of an extremely significant nearshore area where a large development could tremendously impact marine resources. Cherry Point provides approximately half of the spawning ground for herring in Puget Sound. Regulators have long known of the area's importance, but the local land-use plan does not prevent development proposals. Several people interviewed cited Cherry Point as a situation where a permanent protective measure should be taken to protect the resources and preempt development proposals, rather than continuing to battle over individual permits.

VEGETATION REMOVAL

Land clearing occurs with most development projects, but nowhere is it of as much concern as at the water's edge. Clearing vegetation removes a source of shading at the shoreline, decreases the contribution of organic debris into the water and depletes the upland-edge habitat for wildlife species. In areas with steep and eroding bluffs, the native vegetation is usually the best tool for keeping the bluff intact and minimizing erosion.

Some local governments provide guidelines for the removal of vegetation in their shoreline master programs, but most regulators admit it is extremely difficult to enforce. Vegetation that is spared during the construction process is often incrementally removed over time to improve views or expand landscaping structures. Restoring an over-cleared area is difficult unless the landowner is committed to replanting, watering and nurturing new plants.

FAILING ON-SITE SEWAGE SYSTEMS

Failing on-site sewage systems contribute fecal bacteria and nutrients to the nearshore environment in areas of Puget Sound. Some jurisdictions have taken strong measures to locate failing systems while other areas are just beginning to address the issue. Several county officials stated that failing septics and their impact on nearshore water quality are a primary concern, more so than physical alterations to the shoreline.

SHORELINE ARMORING

Many people build artificial structures, such as bulkheads and seawalls, on their shoreline property. Referred to as shoreline armoring, this very common practice is a primary concern of state and some local regulators. While most shoreline managers consider shoreline armoring on residential property a serious problem, many property owners view bulkheads as a necessary addition to waterfront homes to control erosion, maintain real estate values and provide a tidy landscaping feature for the front of their home. Shoreline armoring also occurs with commercial and industrial development projects, although it requires a different permitting process.

Shoreline armoring causes problems for nearshore habitats because it interferes with the coastal erosion process and requires clearing of natural vegetation. The natural process of bluff erosion is critical to maintaining a supply of sediment to the beach. Constructing a bulkhead at the bottom of a feeder bluff cuts off the supply of new sediments, and the continuing wave action and littoral drift can result in localized beach loss and eventually accelerated, localized retreat of the bluff (Macdonald, 1995). Concerns also focus on the permanence of the damage, i.e., the cumulative effects of armoring within a given geographic area, and long-term effects on species that depend on the intertidal zone for portions of their life-cycle. Further information on the relationship of armoring

COASTAL TRAINING PROGRAM Washington

Coastal Processes on Puget Sound

Evolution of Puget Sound shoreline

The Puget Sound region has been shaped by repeated glaciations, the most recent of which filled the Puget Lowland as far south as Olympia about 16,000 years ago. The glaciers shaped the terrain, forming the pervasive north-south ridges as well as the deep troughs that became the Sound itself. The glaciers also brought the glacial till, the sand, and the gravel, that form our soils and our coastal bluffs.

Following the retreat of the ice, changing land levels and changing ocean levels led to a complex *sea level* history, but by about 5000 years ago, sea level reached approximately its current position. Since then, wave action has gradually cut into the steep slopes that surround the Sound, creating both our steep *coastal bluffs* and the bench, or *platform*, on which we find our beaches.

Waves and sediment movement

Winds blowing over the water generate waves. The stronger the wind and the longer the distance of water over which they blow (the fetch), the larger the waves. When waves approach the shore, they begin to steepen and eventually break. Wave action moves beach sediment both up and down the beach, depending on the size and shape of the waves and on the size of the sediment. Some storms can move sand offshore at the same time that they carry gravel to higher points on the beach. Because winter storm waves differ from more gradual summer waves, many beaches show distinct changes from one season to the next - often sandier and broader in summer months, gravelly and steeper in the winter.

Littoral drift and littoral cells

Waves typically approach the shore at an angle, creating *longshore currents* and moving sediment by a process called *littoral drift*. If you have ever observed sand built up on one side of a fallen tree or boat ramp and eroded on the other, you have seen evidence of this process.

Our convoluted shoreline leads to the development of discrete *littoral cells*, in which littoral drift can be mapped. These cells may be several miles in length, or just a few hundred feet. Generally, a littoral cell includes a source area for beach sediment - a stream mouth or an eroding bluff, and an area where sediment accumulates - typically a low-lying *sand spit* or *barrier beach.*

Shoreline erosion

Wave action gradually erodes beaches and the toes of coastal bluffs. Over hundreds of years, steep slopes are formed that are prone to erosion and landsliding when soils become saturated, a large storm strikes at high tide, or an earthquake occurs. Although shoreline erosion tends to occur in short, sudden events, long-term erosion rates on most Puget Sound shorelines are usually less than a few inches per year. Three feet in 30 years might be typical of many shorelines, but rates can vary over short distances.

Eroding coastal bluffs are the primary source of sediment for Puget Sound beaches. Well-intentioned efforts by property owners to prevent shoreline erosion eventually starve beaches of sediment, causing erosion rates to increase elsewhere, leading to the loss of the high tide beach, and modifying beach ecology.

Sand spits and barrier beaches

Where littoral drift accumulates at points along the shore, sand spits and barrier beaches typically form. These low-lying features consist entirely of sand and gravel, are characterized by drift logs and dune grass, and frequently shelter lagoons and salt marshes. These beaches take many forms and represent some of our most prized shoreline -- examples include Dungeness Spit (Sequim), Point Wilson (Port Townsend), Perego's Lagoon (Whidbey Island), and West Point (Seattle). Many have been heavily modified by human development. These beaches are also vulnerable to erosion and changes when natural sources of sediment are cut off by bulkheads or jetties.

Beach Types

Beaches on Puget Sound are incredibly diverse. One can find rocky headlands, steep gravel beaches, and sandy shorelines all within a small area. The composition of a beach is related to wave energy (waves can sort coarse and fine sediment and large waves can move cobbles that small waves cannot), the source of the sediment (beaches supplied by the erosion of coarse gravel bluffs will differ from those fed by erosion of sandy material), and the position of the beach in a littoral cell (boulders and cobble tend to be found near their erosional source, whereas sand can be moved large distances and will accumulate in spits and broad shallow embayments).

Groins and jetties

Groins are structures built across the beach specifically to trap sediment moved by littoral drift. They may be successful in some situations, but are strongly discouraged since they tend to aggravate erosion elsewhere. Any structure, or even a natural feature such as a rock headland, can act as a groin. *Jetties* are larger structures generally built to protect the entrance to a marina or river channel. As with groins, they disrupt the natural flow of beach sediment and can result in significant erosion problems downdrift.

Bulkheads

Bulkheads (or *seawalls*) are structures built along the shore to protect against erosion. They may be constructed to retain and protect fill material placed over the beach or they may be built along an eroding bank to reduce wave erosion. If built correctly, they may reduce wave erosion, but they may not prevent further landslides and erosion from occurring higher on the slope. Seawalls do not stop the beach itself from continuing to erode and may actually exacerbate the loss of the beach by reflecting wave energy downward and by starving the beach of its natural source of sand and gravel.

Recommended reading

John Downing, *The Coast of Puget Sound*, University of Washington Sea Grant, 1983.

Thomas Terich, *Living with the Shore of Puget Sound and the Georgia Strait*, Duke University Press, 1987.

Department of Ecology: Internet Resources

Puget Sound:	http://www.ecy.wa.gov/programs/sea/pugetsound/
Shoreline Air Photos:	http://www.ecy.wa.gov/apps/shorephotos/
Landslides:	http://www.ecy.wa.gov/programs/sea/landslides/
Coastal Maps:	http://www.ecy.wa.gov/programs/sea/SMA/atlas_home.html

Hugh Shipman, coastal geologist, Shorelands and Environmental Assistance Program
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Shallow landslide

Large landslide

Factors Affecting Slides

The occurrence of landslides is governed by numerous factors, though geology, hydrology, and slope steepness are the most significant. Most landslides on Puget Sound occur in response to either heavy precipitation or elevated groundwater conditions (Thorsen, 1987). Different rainfall regimes may lead to different kinds of slides, reflecting the ability of heavy precipitation to saturate shallow soils or of extended wet periods to lead to a rise in regional groundwater levels. During the winter of 1996-1997, two major episodes of landsliding followed heavy rainfalls, a majority of which were relatively shallow failures. In contrast, during the winter of 1998-1999, shallow landslides were infrequent, but prolonged wet conditions led to the reactivation of numerous large, deep-seated landslides (Shipman, 2001). Geologic and hydrologic conditions along with topography and landuse profoundly effect the stability of a given shoreline bluff. The role of earthquakes on the failure of bluffs is poorly understood, however it is generally accepted that a slope that is on the threshold of failure can fail due to the additional stress and strain of a strong seismic event. Recent topographic mapping has identified or confirmed the presence of several large landslide features along the shoreline in close proximity to mapped faults.

Most landslides in the region occur where permeable sand and gravel units lie directly on top of less permeable silts and clays, allowing a perched water table to develop and soils to become locally saturated (Tubbs, 1974). The most common scenario is where advance outwash overlies silt and clay deposits. Groundwater percolates downward in the porous outwash and laterally toward the bluff face along the contact with the finer grained underlying material. When water levels rise, increased pore pressures lead to weakness and failure. Similar geologic conditions exist where glacial sediments overlie bedrock and where recessional outwash is found above impermeable glacial till. Steeper slopes are generally more prone to failure as gravitational stresses are greater, but variations in strength and differences in hydrologic conditions make it difficult to predict landslides based on slope alone. On coastal bluffs, erosion of the toe by wave action ultimately leads to steepening of the slope and the increasing likelihood of failure, but whereas toe erosion is a relatively slow process on most Puget Sound bluffs, landslides typically occur in response to transient increases in groundwater or soil saturation. As a result, wave action and undercutting may set the stage for future slope failures but rarely precipitate landslides.

A line of moisture-loving red alders or willows growing across a slope might reflect colonization of bare ground following a recent slide—or a zone of groundwater seepage marking the junction between an impervious clay layer and overlying sandy soils. In either case, there is a potential for unstable slope conditions that should be investigated further.

Downed trees may reflect diseases such as root rot, shallow rooting and wind-caused blow down, poorly planned tree removal that exposes previously stable trees to new wind stresses, or slope disturbances that undermine the trees' root mass. Curved tree trunks such as shown in Figure 3-5 usually reflect slow, gradual soil creep, while the jumbled appearance of "jackstrawed" trees often results from a slump or earth flow. Dead trees in the latter situation probably indicate the roots were sheared or broken loose during the earth movement.

Banks or bluffs devoid of vegetation typically suggest the site is either too steep to support vegetation (near vertical bluff faces of glacial till, for example), or that recurrent erosion and slumping preclude plant establishment (retreating sandy bluffs, for example). Bare bluffs can also indicate recent or ongoing slope failure due to wave-related toe erosion and upslope slumping (e.g., feeder bluffs).

4.4.2 Vegetation and Slope Stability

The presence or absence of vegetation on the shoreline banks and bluffs of Puget Sound—and how that vegetation is managed during and after site development—usually plays a crucial role in determining local slope stability. Some of the ways in which vegetation cover influences slope stability are illustrated in Figure 4-15.

The presence of vegetation reduces the potential for slope erosion in at least three different ways. First, plant roots, large and small, provide a fibrous web that stabilizes and anchors the soil. Second, plant cover intercepts the falling rain, reducing the direct impact of raindrops on the ground surface and protecting the soil from surface runoff and erosion.

Dense groundcovers, especially grasses, reduce runoff velocity and act as filters trapping soil particles that would otherwise be washed downslope. Thirdly, vegetation, and associated plant litter, the partially decomposed remains of roots, stems and leaves, moderate critical soil moisture relationships. By slowing runoff, vegetation enhances infiltration; associated litter acts like a sponge, holding the moisture and releasing it slowly over an extended period. Plants can also play an important role in dewatering unstable slopes.

4.6 Human Disturbance

Vegetation Management: A Guide for Puget Sound Bluff Property Owners (Menashe, 1993) begins with a daunting scenario of bluff development. The bluff top is cleared and graded, trees are cut to open up the view, and debris pushed over the bluff edge. The home is sited close to the bluff crest to take full advantage of the view. Utility trenches, roof and footing drains, and a septic system are all installed. Grading activities and construction traffic compact the upland soil, reducing its porosity and causing new topsoil to be brought in for landscaping. A stairway is constructed to the beach causing more vegetation to be cleared from the bluff face.

Each of these human disturbances to the natural bluff setting creates or aggravates a potential destabilizing factor that will affect longer-term slope stability. Vegetation clearing eliminates the soil binding action of plant roots. Soil compaction, trenching, and the addition of a septic system, all have the potential to alter surface water runoff and groundwater relationships. The addition of a home and new topsoil each increase the load at the top of the bluff slope. Not surprisingly, this all adds up to a recipe for increased slope erosion, soil slumping, and the potential for a serious landslide.

Figure 4-22 diagrams many of the ways in which bluff top construction can directly and indirectly influence surface and groundwater movements in coastal bluffs—as well as some other causes of bluff instability. Figure 4-23 illustrates some homeowner "solutions" to typical shoreline bluff instability concerns. Clearly, considerable time and resources have gone into protecting the homeowner's investment in shoreline property. Note, however, that property protection has been achieved at the cost of disrupting many of the "landscape

- Beware of recommendations that tree removal for site development is "routine." As Menashe (1993) notes, "...the overwhelming conclusion is, that in the vast majority of cases, vegetation (especially well-rooted, mature trees) helps to stabilize a slope."

- Consider how the tree or shrub species being cut will respond. For example, most conifers will not resprout, but willow, red alder, bigleaf and vine maple often do.

- If trees *must* be removed, try to leave the stumps undisturbed. Their root systems will offer some slope stability and erosion benefits while new replacement growth is developing.

As with tree removal, **tree topping** is strongly discouraged. Despite common arguments promoting topping—it reduces height, protects views, decreases wind resistance—it has been clearly demonstrated to be a poor, shortsighted, and damaging practice (Menashe, 1993). Several practical tree trimming practices are available as successful alternatives to both tree removal and topping. Some of these are illustrated in Figure 5-6.

Menashe (1993) also addresses a variety of other issues relating to shoreline vegetation management:

- The values and limitations of lawns—shallow rooting limits erosion control value (good groundcover for septic drainfields); becomes saturated easily, resulting in ponding or runoff.

- The importance of using deep-rooted groundcovers near the crests of slopes (e.g., salal, Oregon grape, wild rose, etc.), to better reduce surface water runoff and thus soil erosion.

- Avoiding construction damage during development—soil compaction, burial or exposure of tree roots, mechanical injury of trees by heavy equipment.

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Value, Benefits and Limitations of Vegetation in Reducing Erosion

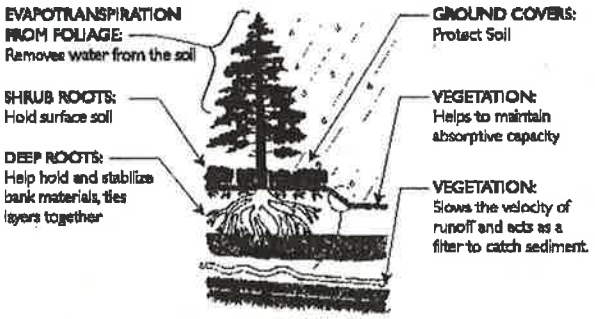
Trees, shrubs, and groundcovers can maintain slopes and reduce erosion from surface water, shallow groundwater and, to some extent, coastal processes. Evergreen trees and other vegetation are most valuable and able to protect soil and remove water during the winter months when deciduous plants are dormant. A diverse mix of both evergreen and deciduous plants provides the greatest protection.

Plants can also have value as sight and sound barriers, discourage access to hazardous areas, and define space in a yard. Native plants enhance wildlife habitat by providing nesting and hiding cover, food, and safe travel corridors. Once established, native plants require little maintenance or care. Species should be chosen for their ease of establishment, adaptability, usefulness, and availability.

Extensive lawns, especially in the vicinity of the bank crest, should be avoided because grass tends to increase surface-water sheetflow during wet conditions when soils are saturated. Low-growing evergreen or perennial plants should be established on the upper crest of the bank.

THE VALUE OF VEGETATION IN STABILIZING SLOPES

FIGURE 1. ROLE OF VEGETATION IN REDUCING EROSION AND STABILIZING SLOPES. (MENASHE, 1993)

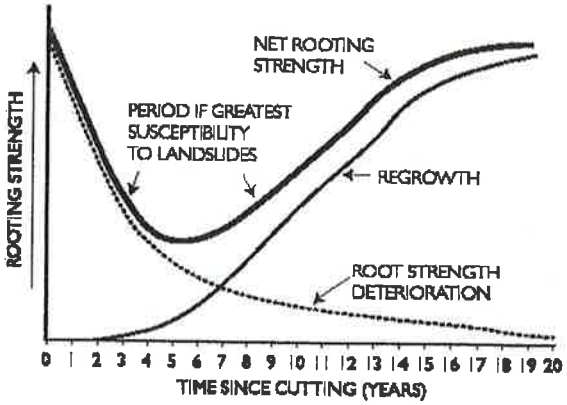


1. Foliage intercepts rainfall, causing absorptive and evaporative losses that reduce surface water runoff and erosion.
2. Evergreen trees and shrubs continue the metabolic activity known as evapo-transpiration, which extracts moisture from the soil, throughout the year. As logging or clearing occurs, water table levels rise, and soils remain saturated for longer periods, reducing soil cohesion and increasing the rate of land slides.
3. Roots reinforce the soil, increasing lateral soil sheer strength and cohesion during saturated conditions. Many slopes can persist beyond their angle of repose and remain stable as a result of the complex root networks within soil blocks.
4. Tree roots anchor soil strata vertically and laterally by means of large-diameter structural roots. These roots may extend well beyond the tree's canopy or crown.
5. Roots, especially the fine feeder roots of trees, shrubs and groundcovers, bind soil particles at the ground surface, reducing their susceptibility to surface erosion and slumpage during saturated soil conditions.
6. Large trees can arrest, retard, or reduce the severity and extent of failures by buttressing a slope. This works in much the same way as retaining walls. In the case of trees, though, the system is to some extent self-repairing, and it becomes progressively stronger over time, whereas engineering structures are strongest when installed and become progressively weaker over time. Obviously, planted trees need adequate time to develop root systems and become effective in stabilizing slopes.

LIMITATIONS OF VEGETATION

The limitations of vegetation in preventing, reducing or arresting slope failures and erosion is often due to previous land management practices such as logging, topographic alterations, increased or channelized surface water flow, and wholesale clearing. Once initiated, slope failures require an expenditure of time, effort, critical planning and money to stabilize them successfully. The use of vegetation in particular requires foresight and several years of monitoring and maintenance until plants are established and effective. Establishment can take up to three years. It can take up to 15 years for shrubby vegetation to develop the values discussed above, even longer for trees to reach sufficient stature to be effective. The impacts of tree cutting on steep slopes can take several years to become apparent, as illustrated in figure 2.

FIGURE 2. CONCEPTUAL GRAPH INDICATING ROOT STRENGTH DETERIORATION AFTER CUTTING (R. SIDLE, 1984)



Landowners need to be aware that not all vegetation provides effective erosion control. Just because it is green does not necessarily mean it works. Such common species as Himalayan blackberry, horsetails, English ivy, and red alder are often present on disturbed slopes and have limited erosion control value. Blackberry and ivy, in particular, tend to discourage more desirable vegetation from becoming established.

In some situations a combination of geotechnical engineering and vegetative techniques are required to assure a practical solution to slope problems. The best time to employ inexpensive relatively vegetative means is before severe failures occur. Note: It should be clearly understood that unusually harsh climatic conditions prior to full development of a vegetative root matrix could result in failure or partial failure of such a slope stabilization system. Landscape contractors should have an understanding of the processes affecting slopes, techniques to be employed to ensure success, and the potential hazards of working on steep slopes in vulnerable areas.

There are several situations where vegetation is relatively or completely ineffective in protecting a slope from failure. These include: (1) lower banks subject to wave attack; (2) areas of deep-seated geologic instability; (3) bluffs near vertical; and (4) unstable areas too wet or dry for vegetation to become established.

RECOMMENDATIONS

Plantings in areas that have not recently been subjected to slope failures are a wise investment. Preventive measures, employed before serious problems occur, are relatively inexpensive. Bear in mind that plantings of more desirable species to replace existing species such as red alder should be well established (2-3 years) before alders are removed, in order to maintain adequate soil-binding benefits within the effective root zone (ERZ) of the cut trees. The ERZ can be approximated as a one-foot radius of lateral root extent for every inch of diameter of the tree's trunk. Preparatory to planting, alders (as well as cherry) can be thinned to a spacing that will not compromise slope integrity during the establishment period. Tree cutting on slopes without replanting can have serious future consequences as illustrated in figure 2.

Proper selection of shrub and tree species for position on the slope will minimize view maintenance requirements while greatly improving slope stability. Care should be taken in selecting species that thrive under site-specific conditions found locally on the slope. These include soil moisture, light/shade, and rooting type.

by continued high-impact development practices. Critical area buffers are inadequate. Wetlands, streams, estuaries, and marine waters continue to be degraded as conversion logging and development proceed.

PART OF THE SOLUTION: EDUCATION

Preserving effective native vegetation complexes is a simple, effective, and easily implemented measure that can be employed immediately at any scale. Educating landowners, equipment operators, contractors, builders, landscape architects, and others should be a high priority. Education relating to the benefits of low impact development practices can be implemented independently of other efforts.

WHY PRESERVE NATIVE VEGETATION?

Vegetation protects soil from erosion and reduces surface water runoff in many ways (see figure 1, Effects of Vegetation in Minimizing Erosion). Live plant foliage and forest litter reduce the impact of rainfall and increase the absorptive capacity of the soil. Stormwater is held onsite and released slowly. Groundcovers intercept and slow rainfall and their roots hold soil particles in place. Groundcovers reduce runoff velocity and filter out suspended soil particles during storms. Shrub and tree roots, especially fibrous feeder roots, provide a restraining web that increases soil cohesion and stabilizes soil. Tree anchoring roots often penetrate deeply into soil blocks, increasing soil shear strength and resisting shallow mass soil movement. Roots also promote soil porosity and permeability. Evapotranspiration by plants reduces soil moisture and delays the onset of saturation and runoff. Native plant communities represent a complex interrelated biotic association of plants, animals, and microorganisms which have adapted to our region's ecological conditions over thousands of years. The ability of these plant communities to provide "passive" watershed protection is phenomenal. Vegetated watersheds exhibit lower peak flows, lower total discharge volumes, and increased lag-time between rainfall and runoff than do watersheds with a high percentage of forest cover removal and impervious surfaces. (See figure 2, Impacts of Urbanization on Stream Flow).

Vegetation also provides wildlife habitat, sight and sound screening, recreational opportunities and

FIGURE 1. EFFECTS OF VEGETATION IN MINIMIZING EROSION (MENASHE, 1993)

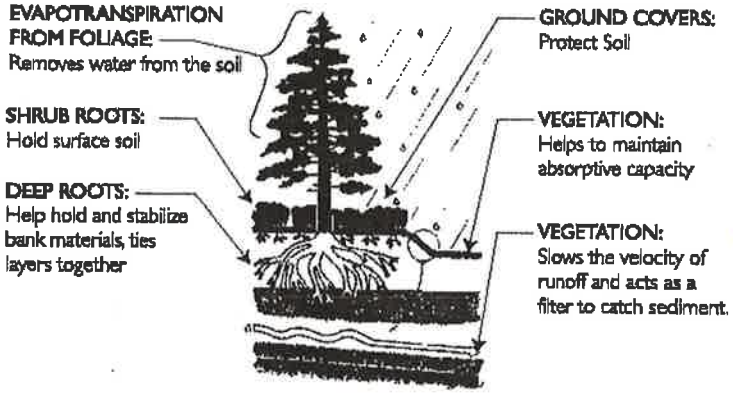
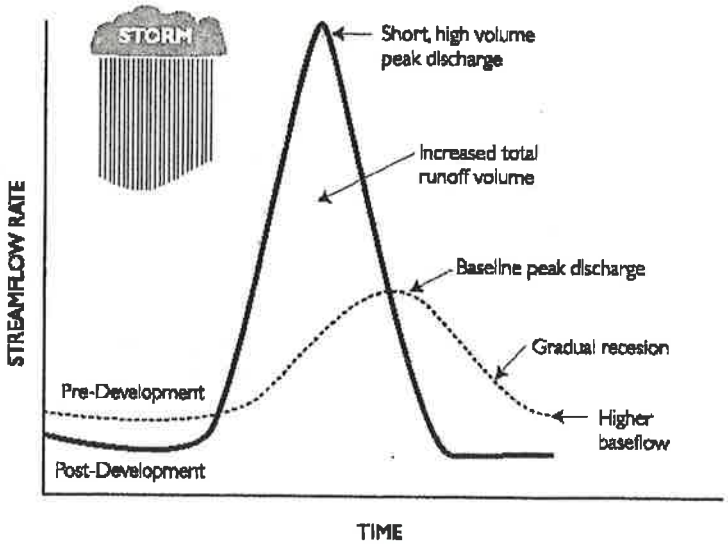


FIGURE 2. IMPACTS OF URBANIZATION ON STREAMFLOW (SCHUELER, 1987)



aesthetic amenities. Site development, landscaping and maintenance costs are lower when vegetation is preserved. Reduction in slash and burnpile volumes contributes to improved air quality and minimized disposal costs.

WHAT VEGETATION IS MOST EFFECTIVE?

The most effective plant communities are multi-age forested assemblages which have a high structural and species diversity. High value sites include those with a wide variety of evergreen and deciduous trees, shrubs and groundcovers. Absence of invasive exotic plants is a plus. The presence of large downed wood is a valuable asset. Valuable understory species include swordfern, salal, evergreen and red huckleberry and Oregon grape.

The least effective plant communities are characterized by minimal structural and species diversity and a high incidence of invasive exotic plants, such as Himalayan blackberry, English ivy, Japanese Knotweed, and Scot's broom. Not all native vegetation provides effective erosion control. Forest lands dominated by red alder and stinging nettle are often indicative of degraded sites and provide few hydrologic benefits.

It is important to "read the land" and at least qualitatively assess the value of the vegetation present. Previous management and land use history often determines what is growing where. Obvious signs of past or recent clearing, grading, soil compaction, and erosion usually indicates a degraded site that may have reduced value in preservation efforts.

Physical characteristics of the site will also dictate what plants are present and the extent of potential runoff problems. Soil, geology, slope, aspect, topography, site hydrology and off-site influences are important factors to evaluate when assessing the value of vegetation's influence on stormwater management.

HOW TO PRESERVE VEGETATION?

Each site is different and offers unique challenges and opportunities for preservation efforts. It is critical to evaluate the site with preservation in mind during the planning stage. Identify high-value natural areas. Locate buildings, roads and infrastructure to avoid impacting valuable areas. During site development, retain healthy, windfirm trees. Fence or otherwise limit entry into preservation areas during construction. Salvage valuable native plants and nurse logs from areas to be cleared. Avoid grade changes near large, well-established trees. Reduce hydrologic modifications. Reduce impervious surfaces and lawn areas. Prohibit dumping of concrete washout and other chemicals on the site.

CONCLUSION:

Extensive clearing and grading are common practices associated with urbanizing areas. Replacement of existing naturally vegetated areas with impervious and semi-impervious surfaces increases stormwater runoff and adversely impacts developing watersheds in a variety of ways. The hidden environmental and economic costs to society of this on-going process of watershed degradation are poorly understood by the general public. Conventional "best management practices" (BMPs) and engineered hydrologic controls are ineffective in mitigating development influences. They are, at best, only a tool in mitigating adverse watershed impacts. They are not a solution.

Preservation of naturally vegetated areas can be a "passive" stormwater management tool that effectively reduces cumulative watershed function deterioration while providing other benefits and amenities.

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TREES, SOILS, GEOLOGY, AND SLOPE STABILITY

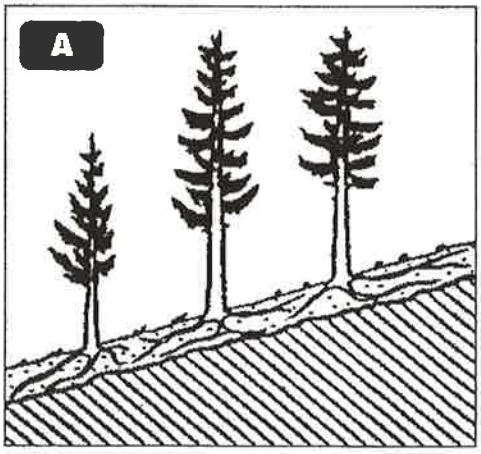
The following drawings and narratives are provided as a very simplified representation of how trees may influence slope stability on Puget Sound marine shorelines. They illustrate several generalized combinations of soil depth, stratigraphy, and tree rooting. The degree to which trees may influence stability on a given slope is a complex function of various specific, interacting physical, biotic, and human-related factors.

Physical factors include slope geometry and gradient, geologic materials, stratigraphy, hydrology, and the local effects of shore processes. Climatic variability can alter the dynamic equilibrium of a slope in significant ways.

The species mix of trees as well as their spacing, age, vigor and health, influence how effectively trees can stabilize slopes. The successional stage and complexity of the associated plant community can be a significant factor. The role of associated vegetation, though significant, in effecting hydrologic conditions, soil formation, and other factors which may influence erosion rates and slope stability is not addressed here.

Forested marine slopes are often barely stable, have adjusted to the various forces acting on them and have developed a delicate equilibrium. They are sensitive to alterations such as view clearing and tree removal, as well as upland site development such as lot clearing and grading. They may also be highly sensitive to cumulative upslope disturbance and local watershed modifications which effect slope hydrology. Disturbances such as logging, roadbuilding, and urbanization in developing watersheds can significantly alter conditions and upset the dynamic equilibrium of slopes, thereby indirectly causing increased landslide activity on previously stable slopes.

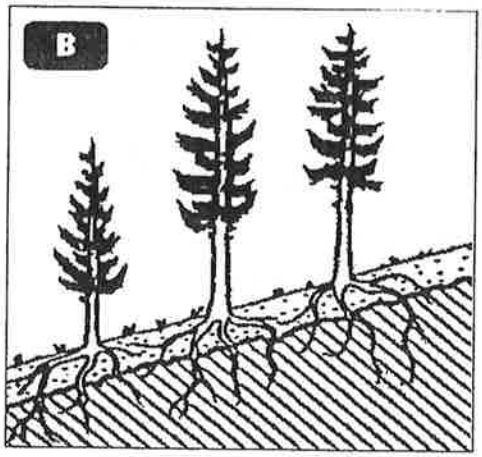
It should be emphasized that the following examples are greatly simplified when compared to actual conditions found on Puget Sound shorelines. For example; our shorelines are often steeper and the subsoils (geologic parent materials) are complex, resulting in erratic concentrations of groundwater, which complicate slope stability assessments.



Type A

Characterized by shallow (less than 3 feet) soils overlaying parent material (competent rock, glacial till, dense silt or clay) which resists root penetration. Surface soils are fully reinforced with tree roots. Lateral rooting, though shallow, often resists slope failures if tree density and distribution is adequate to provide an interconnected root-web matrix. Rooting is plate-like. Roots are at failure plane. Subject to rapid, shallow slides during extreme rain-on-snow events.

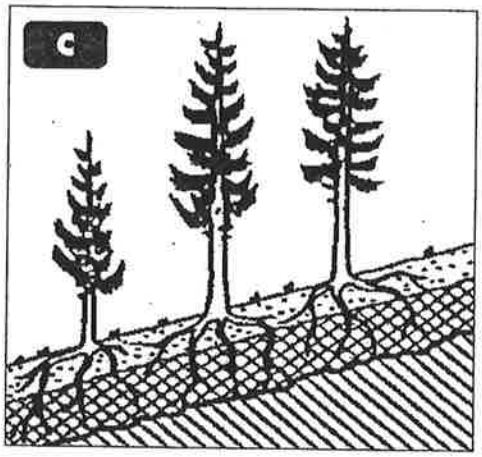
Stabilizing effect of roots: Moderate if not compromised. Tends to become rapidly unstable when disturbed, or subjected to increased hydrological influences. Anchoring - minor. Soil cohesion - high.



Type B

Characterized by shallow (less than 3 feet) soils overlaying parent material (dense sand, glacial till, etc.) which allows significant root penetration. Degree of anchoring into parent material by roots is dependent on the nature of the fractures in the parent material and the predominant tree species. Roots intersect potential failure plane, providing shear resistance.

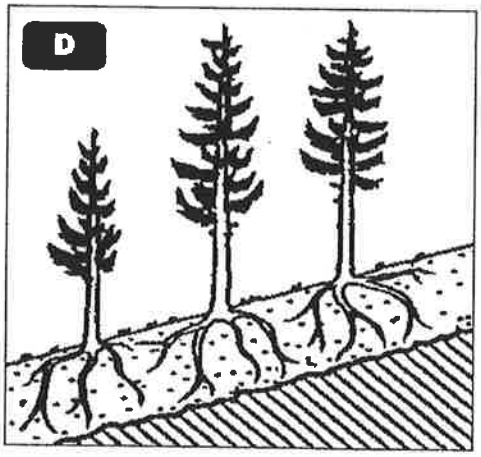
Stabilizing effect of roots: High. Individual trees are stable without a significant dependence on adjacent trees. Both anchoring and soil cohesion benefits are high.



Type C

Characterized by deeper soils (3-12 feet) with a non-distinct transition zone in which soil shear strength increases with depth. Assumptions include: (1) transition zone functions as a drainage moderator, allowing a concentration of groundwater and increased pore-water pressure; (2) failure plane passes through the transition zone; (3) soil zone is more easily penetrated and permeated by roots than in B, above. (Example: sandy loam over loose till over compacted till.)

Stabilizing effect of roots: Anchoring - high.
Soil Cohesion - high.



Type D

Characterized by deep soils where both the failure plane and the soils are deeper than the root zone. The actual depth of the soil for this condition to occur depends on root morphology (depth, spread, etc.) of the particular tree species on the slope. For example, on a slope where Red alder predominates, a relatively shallower soil depth would exhibit Type D conditions, while on a slope forested by Douglas-fir the stabilizing effects would be significantly greater for the same depth.

Stabilizing effect of roots: Anchoring - minor.
Soil Cohesion - moderate.

Illustrations adapted from: Vegetation Influences on Debris Slide Occurrences on Steep Slopes in Japan, Y. Tsukamota and O. Kasakobe. 1984

Prepared for Coastal Training Program by Elliott Menashe (www.greenbeltconsulting.com) 2004

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Tree Removal on Steep Slopes of Puget Sound Shorelines

The mechanical and hydrogeological benefits which trees and other vegetation provide to maintain slope stability and reduce erosion are well documented. Most of the wooded bluffs rimming Puget Sound are in a delicate equilibrium. For example, natural events such as an unusually intense winter rainstorm or human activities such as a concentration of upland runoff or careless logging on the bluff can reduce stability, even trigger landslides. As a planner or permitting agency official, what are your responsibilities regarding tree cutting? Given that there may be downslope impacts, possibly serious hazards to homes or public facilities, do you make decisions regarding tree cutting and/or removal? If so, remember the admonition to physicians: "First, do no harm."

Let's assume that trees have already been cut and downslope residents voice concerns about effects on bank stability. Some questions that may arise:

- Was the cutting authorized by your agency or another agency (e.g., DNR) that has jurisdiction?
- Who owns the land? Property side lines on waterfront/view lots are commonly skewed (Fig. 1). Property boundaries on the face of a bluff are commonly unmarked or inaccessible.
- Who cut the trees or hired the cutter? Timber trespass is not uncommon in such settings. Has a timber trespass occurred?

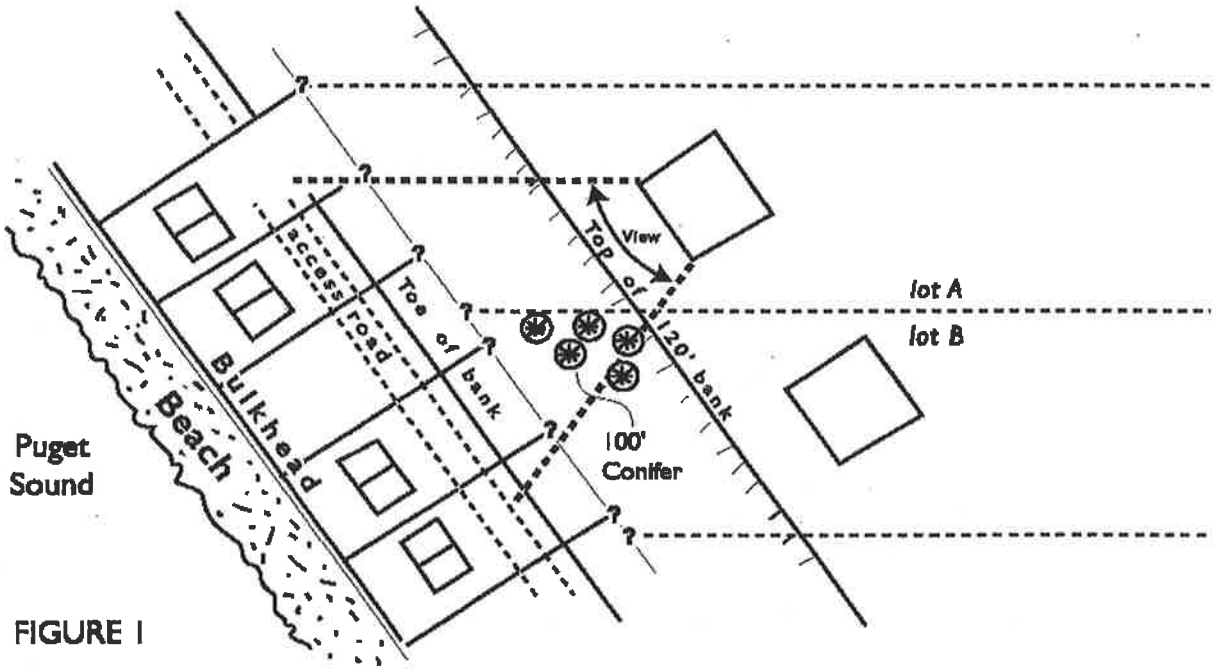


FIGURE 1

Figure 1. Sketch shows a typical scenario for development along shoreline bluffs. Note angle between lot side lines and edge of bank. Trees on lot B partially obscure the view from lot A, a setting ripe for timber trespass and/or legal squabbles. (Skewed property lines where there are no beach homes below can also complicate matters. In cases where wave erosion is at the toe of the bluff, a bulkhead fronting property B would mostly protect the home on lot A.)

Property ownership and cutting responsibility questions are basic to questions of log removal/leave and slope rehabilitation/replanting. As our main focal point here is on removal, an obvious question arises: Who pays for it? A property owner who cuts his or her own trees (after obtaining necessary permits, if any) is obviously responsible for such decisions. What about the rather common situation in such settings of 'timber trespass"? In at least some situations the owner is entitled to triple damages from the illegal cutter. Will the property owner allow access to the site for removal of the downed trees? If so, will that increase his or her liability for accidents or some future slide from their property? Such legal aspects of the problem are not trivial. Economics, including potential liability, may decide what (if anything) is done regarding tree removal, slope rehabilitation, and revegetation.

Upon what can 'damages" for trespass be based? The value of a tree for lumber can be calculated rather precisely on the basis of market factors such as species, size, cost to reach market, and current price. What about aesthetic value? (Some arborists and/or real estate professionals may be able to offer an estimate of the impact of the loss of the trees on property value.) The value of an individual tree or group of trees in relation to their role in maintaining slope stability is even more difficult to quantify, but it is often a significant consideration.

Let's assume that the trees were cut with city or county permission. Assume that the loss of trees will have some detrimental effect on slope stability, both immediately (precipitation interception, transpiration) and long term (loss of root/soil reinforcement, anchoring over time). Assume that the potential for any damage resulting from the instability (e.g., landslides) will be increased by the presence of large woody debris left on the slope. As the planner in the Permit Center who signed off on the cutting, should you insist on removal of the cut trees? (Hint: This slope may slide anyway, whether the logs are removed or not.)

As mentioned, the loss of mature or at least well-established trees has a significant effect on the stability of already marginal slopes. Soil disturbance and the further loss of young trees and brush, as well as the forest floor duff and litter, can further degrade stability. Log removal efforts can seriously disrupt shallow soils and such ground cover. Thus we are faced with two major options: leave the trees where they fell or remove them. Either choice can impact slope stability and legal liability. Logs can be removed with little or no further disturbance of soil and ground cover by what loggers and commercial foresters call "full suspension" techniques.

Logs are lifted, not dragged. This requires specialized heavy equipment both at the top and bottom of a slope (or at least a strong "block" or pulley with a massive anchor at one end). Full suspension can also be achieved by balloons or large helicopters. All such techniques are very expensive and/or impractical or impossible to use in most populated shoreline bluff settings. The 'reach' of a crane from the top or from the base of a bluff is limited, even where such sites are accessible; they are almost useless on bluffs in the 150- to 300-ft range.

Horse logging can minimize soil and underbrush disturbance, but cannot be done on slopes as steep as most of our shoreline bluffs. Tractors and excavators need roads on such slopes, and the logs still must be dragged to the road. Also, the roads themselves leave unstable slopes as well as concentrate storm runoff long after the logging is complete. Thus by process of elimination, we are left with hand labor for removing large woody debris from most steep coastal bluffs.

Assuming that hand labor is the only practical option for removal of downed timber from steep (35+ degree) slopes, let's consider its limitations.

- It is dangerous, hard work, even for the experienced.
- Thus, experienced help can be expensive.
- Amateur do-it-yourself help can be more expensive (i.e., medical, liability)
- There is a limit to the size of material that can be handled (excluding help from gravity, which we are trying to avoid)

Some ways we can minimize these limitations are:

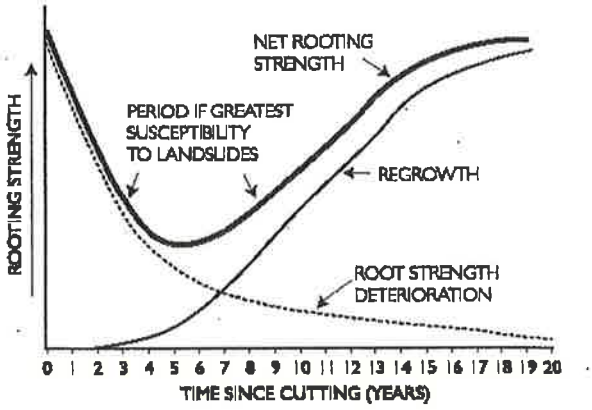
- If there is no hazard (people, structures) below, reconsider. Maybe the logs should be left in place; let nature take its course (i.e., rot and gravity)
- Leave wood in contact with the ground, if possible, to facilitate rotting.
- Work when spring slide hazard is past; remove wood in early fall.
- If a log is oriented within 20 degrees or so of perpendicular to the slope and is supported by a sprouting stump at both ends, leave it.
- Cut (and split?) a log into sizes that can be manhandled.
- Leave tops and limbs smaller than 3- to 4-in. diameter scattered on the slope as ground cover.
- Do not pile tops/limbs, as piles can prevent regrowth (natural or planted) and smother native brush.

In precarious areas directly above a residence, hazards can be minimized by common-sense techniques such as tying a downed tree to a stump before cutting it into logs. Temporary 'cyclone fences' can be strung between standing trees above the downslope home. Experienced woodsmen (for example, cedar cutters) can move wood in ingenious ways with little equipment. Don't try to "fine tune" their plan; every situation of trees, topography, and potential hazard is unique. Perhaps the best conditional constraint would be that no additional disturbance to the slope should occur.

Before ordering removal of large downed trees on a steep slope, the planner/permit official might want to check with their legal counsel. What is at hazard downslope? Do homeowners at the base of the bluff understand the options and potential hazards? For example, a "cartwheel" of firewood from a 3- to 4-ft fir can become lethal if it starts rolling on a steep slope. Who is liable? The wood cutter? The property owner? The agency that ordered or approved the removal? All of the above? (An industrial or commercial downslope property owner might want to make their own plans regarding timber cutting/log removal.)

What about stumps? A stump and its rootball, *if mobilized* into a shallow fast-moving slide (debris avalanche), can add to the future damage potential of the mud and smaller debris. However, removing stumps *will increase* the likelihood of such events. As the roots of many stumps rot, their ability to provide reinforcement and anchoring of the soil/vegetation mat decreases. However, they may still provide that critical role, albeit to a decreasing extent over time, while new trees are getting established. (See figure 2) Generally, stumps of cut trees should not be removed.

FIGURE 2. CONCEPTUAL GRAPH INDICATING ROOT STRENGTH DETERIORATION AFTER CUTTING (R. SIDLE, 1984)



Special mention is warranted for stumps that sprout, thus keeping the stump alive and its roots functioning. Species such as maple, willow, and madrone usually sprout and, after several years, may provide the same slope stabilizing benefits as the standing tree. It is not unusual to see cut-over slopes slide except for the area at and below a single sprouted maple stump. Also, removing a stump on a bluff via hand labor is slow and expensive and creates a bare patch subject to erosion and increased infiltration. Except in isolated instances where a stump is an obvious hazard, they should be left.

If you need to remove large (1-ft+) trees from an area of steep ground (35+ degrees) where property and lives below could be at stake, get a pro. The passing 'blow-hard' who can shrug and walk away from his self-created "accident" won't do. Get a responsible expert (one who is licensed, bonded). That person should be able to tell if a particular site is a 'piece of cake' or will require much finesse. If

the hazard potential is great, you might want a second opinion. As a public official, with your signature on the application, carefully exploring all options may save you and your agency later grief and expense.

Mitigation of damage to the slope from tree cutting and removal of debris should be a routine condition of permitting tree removals. Mitigation specifications should reduce both short- and long-term stability and erosion impacts which are likely to occur as a result of tree removal. Measures such as revegetation with suitable native species are often effective if an agency requires adequate monitoring and project maintenance during the establishment period (3-5 years). Vegetative buffers at the crest of the slope, as well as drainage controls of upland and slope surface-water run-off are also valuable mitigation tools.

Cutting of trees and removal of large woody debris from steep slopes can impact slope stability and have long-term legal ramifications for landowners and permitting agencies. Caution and common sense should be exercised in managing steep, often unstable, marine slopes.

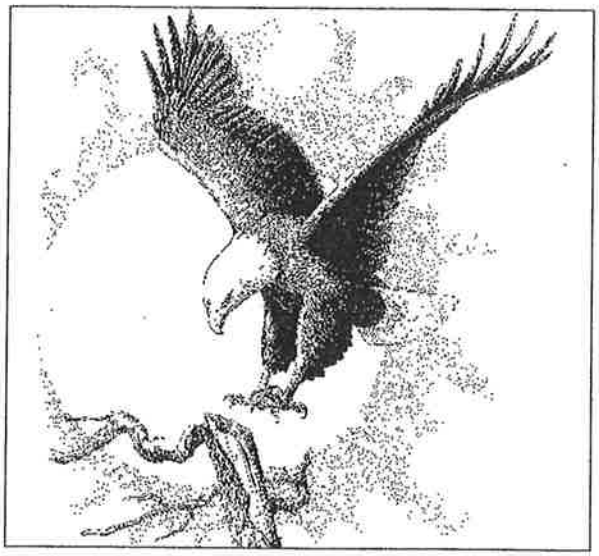


Figure 6. The bald eagle is the Pacific Northwest's largest resident bird of prey, with a wingspan of up to 7½ feet and weights of 8 to 14 pounds. Females are larger than males. (Drawing by Elva Hamerstrom Paulson.)

Ospreys build large nests near water, on top of dead trees or artificial structures that are similar to dead trees, such as utility or nesting poles. They can be found near fresh or salt water, as long as the water can sustain medium-sized fish. As with eagles, ospreys suffered great declines in the past century as a result of DDT and other eggshell-thinning pesticides. Range expansion into formerly occupied areas has been slow due to their strong loyalty to nesting areas. Artificial nest platforms have significantly increased nesting in many areas (Pendleton et.al., 1987).

A variety of hawks including the **Cooper's hawk**, **sharp-shinned hawk**, and **red-tailed hawk** use tall dead trees and branches as places to rest, look for prey, and feed once prey is caught. The tree's height provides the birds with a wide visual range, easy takeoff, and greater attack speed when hunting.

Peregrine falcons are typically found hunting in open areas, especially along marine area bluffs and near other bodies of water that provide habitat for their prey. They are considered a species of special concern by the Department of Fish and Wildlife, and are listed as an at-risk species by the Washington Gap Analysis (see Washington Gap Analysis).

In Washington, peregrine falcons reached a low of four pairs in 1980. In 2000, 56 pairs were counted, doubling the number counted just seven years prior (see WDFW's Priority Species).

Several owl species are seen or heard around wooded marine area bluff properties. The most common species include: The **great horned owl**, **barred owl**, **barn owl**, **western screech owl** and the **northern saw-whet owl**. Visual encounters with owls are relatively rare, because they spend most of the day perched high in trees, inside tree cavities, or in nest boxes.

Adaptable and widespread, the **great blue heron** is found in a wide variety of habitats. When feeding, it is usually seen in slow-moving or calm salt, fresh, or brackish water. Nesting colonies are found in mature forests, on islands, and on or near bluffs that are free of human disturbance and have foraging areas close by. Breeding areas are of concern to Washington Department of Fish and Wildlife biologists. Construction near a colony are particularly damaging, and a 1000-foot buffer zone around colonies is recommended (see WDFW's Priority Species).

Belted kingfishers (Fig. 7) are commonly seen and heard along shorelines in saltwater environments. Kingfishers require sandy vertical banks for nest burrows and clear water so they can see their aquatic prey. The kingfisher nests in burrows dug in sandy banks; two of its toes are fused together and act as a shovel for digging these burrows.

Figure 7. The belted kingfisher is a pigeon-sized bird that is blue-gray above and white below, with a bushy crest, a large, daggerlike bill, and a short tail. (Drawing by Elva Hamerstrom Paulson.)

Pigeon guillemots are seen along many Puget Sound waters. During the breeding season, they can be found on rocky islands and mainland cliffs that are protected from predators, as well as on a variety of man-made structures. The population of pigeon guillemots in Washington is not well known, and has probably declined in recent decades. They are highly vulnerable to oil spills and other pollution, and changing water temperatures. According to breeding bird surveys, the population in Washington has remained stable over the last 35 years. However, availability of suitable banks for nesting is a limiting factor in distribution and abundance.

Woodpeckers, including **flickers** and **sapsuckers** play an important role in wooded bluffs. They eat all life-stages of wood-boring insects that are inaccessible to most other forest birds. Northern flickers, or flickers, eat quantities of carpenter ants.

Holes that woodpeckers create each year for nesting and roosting are used in subsequent years by cavity-nesting songbirds, small owls, ducks, and native squirrels that cannot fully excavate their own nest site.

Clear-cutting forests currently has the most significant impact on **pileated woodpecker** habitat, but pileated woodpeckers are fairly adaptable, which offsets some of the impact from habitat loss. They are, however, currently candidates for endangered species listing by the Washington Department of Fish and Wildlife and are included on the Gap Analysis list of species-at-risk (see Washington Gap Analysis and WDFW's Priority Species for management recommendations).

Northern rough-winged swallows are usually found near water, especially along sandy cliffs or rivers with high, sandy banks and nearby open areas. They also nest in man-made banks. They are the principal bank-nesting swallows in western Washington.

Bank swallows are closely associated with sandy, vertical banks, even those created by human excavation. They adapt well to new surroundings and colonize areas quickly, necessary traits, since the banks in which they nest are often unstable and easily eroded.

Tips for Puget Sound Bluff Property Owners

For people wishing to maintain bird habitat on their property, things to include are:

- Multiple-acre patches of coniferous trees—good nesting areas for hawks and owls.
- Young stands of coniferous trees at various stages of growth—good hunting areas for Cooper's and sharp-shinned hawks.
- Quiet, protected areas away from human activity—good for all songbirds.
- Protected areas near water with big trees—good for all bird species.
- Tall snags (dead or dying trees over 10 feet)—good perch sites and nest sites for cavity nesting birds.
- Tall live trees—good nest and perch sites for several hawk species.
- Hedgerows and thickets bordering fields—good for songbirds and hawks.
- Large unmowed or infrequently mowed grassy areas away from bluffs—good for red-tailed hawks and other species that eat rodents and large insects such as grasshoppers.

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Pendleton et.al., Raptor Management Techniques Manual. Institute for Wildlife Research and the National Wildlife Federation, Science and Research Series No. 10, 1987.

Udvardy, Miklos D. F. Audubon Society Field Guide to North American Birds--Western Region. New

York: Alfred A. Knopf, 1977.

Internet Resources

American Bird Conservancy (Cats Indoors and other programs): www.abcbirds.org

Bald eagle protection rules. WAC 232-12-292 found at: http://www.leg.wa.gov/wac/index.cfm?fusea ction=Section&Section=232-12-292

Seattle Audubon's Birds of Washington State: www.birdweb.org/birdweb/

U.S. Forest Service Wildlife Species Life Form Information: www.fs.fed.us/database/feis/

Washington Gap Analysis: http:// www.fish.washington.edu/naturemapping/wagap/ public_html/

WDFW's Priority Species: http://wdfw.wa.gov/hab/ phsvert.htm#birds.

AMPHIBIANS

The Puget Sound marine area bluffs support **tree-frogs, red-legged frogs, Western toads**, and several species of **salamanders**. Several of these, such as the western toad, are likely declining in portions of their range; however historical or baseline information is often incomplete for this species group. For detailed information on the above-mentioned species, see references below.

Tips for Puget Sound Bluff Property Owners

To provide safe spaces for amphibians on your property:

- Protect existing natural areas to the greatest extent possible. Protect woodlands, wetlands, stream corridors, shorelines, and other wildlife habitat; encourage your friends and neighbors to do the same. Support public acquisition of greenbelts, remnant forests, and other wild areas. Write to legislators and attend public meetings when regulations are being considered.
- Protect buffer areas next to streams, lakes, marine areas, and ponds. The vegetated buffers surrounding these areas protect the ecological functions and value of the breeding habitat, and provide needed upland habitat for amphibians.
- Wherever possible, protect migration paths between uplands and breeding sites. If amphibian migrations to breeding sites cross neighborhood roads, try placing signs to inform local drivers of this crossing. If a new road is to be constructed in migration areas, work for installation of amphibian crossing structures, such as small tunnels under the roadway. Amphibian movements can also be guided by means of drift fences and large logs. If you have an area on your property that is used by migrating amphibians, leave the area as natural as possible.
- Leave a portion of your grass unmowed, especially in areas that adjoin a wet area, forest edge, or any other distinct habitat, as well as any area that is being used by migrating amphibians. If you must mow in these areas, mow at slower speeds and be ready to step on the clutch or brake. Set the mower blades as high as possible, or use a weed-whacker and leave grass 6 inches high.
- Regularly mow any areas you want to keep as lawn to prevent longer grass developing where frogs may hide. Mowing in hot, dry weather will minimize the chances of finding amphibians, and making some disturbances before mowing may encourage frogs to hop out of the way. Don't mow or weed-whack when amphibians are seen during breeding migrations or juvenile dispersal periods.

Preserve leaf litter under trees and shrubs. Such material provides cover and moisture; it also attracts organisms that amphibians eat.

Retain stumps, logs, rootwads, rock piles, and other debris that provides a cool, moist habitat for amphibians. Such habitat features provide much needed cover. All these can be strategically located as "stepping stones" across exposed areas, or to bridge gaps between breeding ponds and woods. To be effective in exposed areas, keep the structures within 15 feet of each other.

With permission from landowners, you could salvage these materials from cleared or logged areas and install them in your landscape, preferably away from busy roads.

Avoid using pesticides and herbicides. Amphibians

Soils and Biodiversity

Soils host a quarter of our planet's biodiversity.

Soil is one of nature's most complex ecosystems: it contains a myriad of organisms which interact and contribute to the global cycles that make all life possible.

Related links: http://www.fao.org/soils-2015/en/;
Date: 08/05/2015
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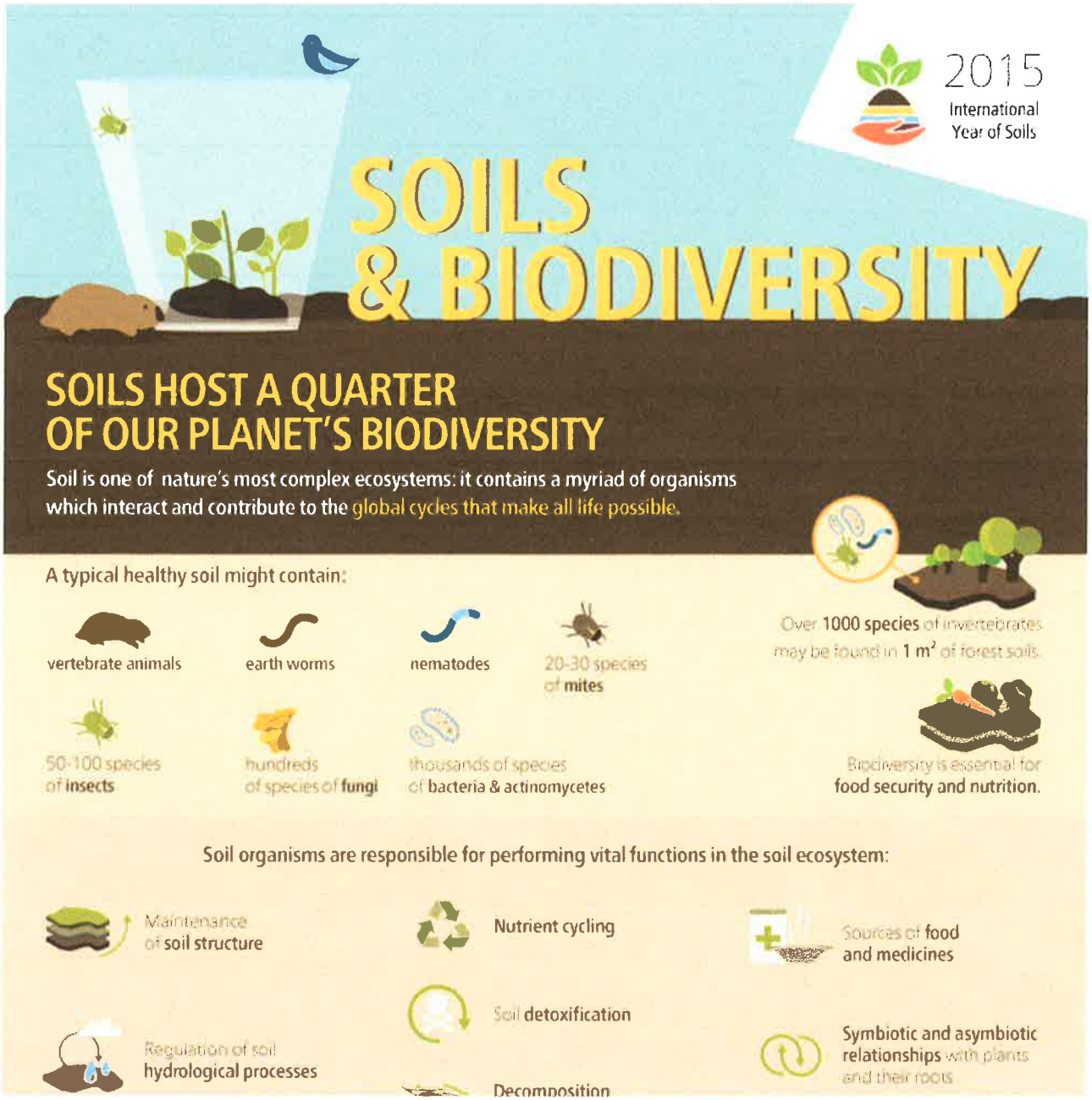


of organic matter

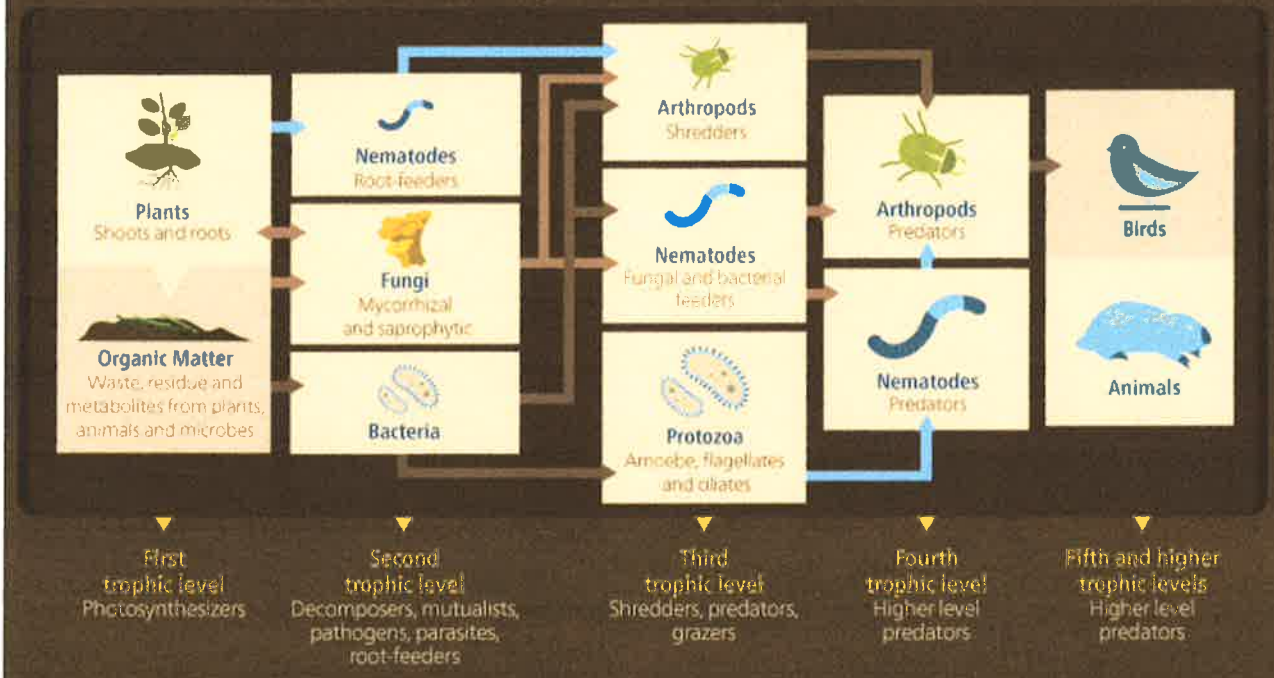
Gas exchanges and carbon sequestration

Suppression of pests, parasites and diseases

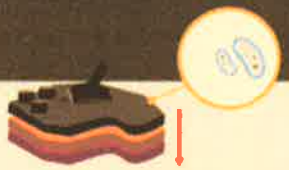
Plant growth control

THE SOIL FOOD WEB

When these diverse soil organisms interact with one another and with the plants and animals in the ecosystem, they form a complex web of ecological activity.



SOIL BIODIVERSITY AND AGRICULTURE



Clearing forested land or grassland for cultivation affects the soil environment and drastically **reduces the number and species of soil organisms.**

The overuse or misuse of agro-chemicals has resulted in environmental degradation, particularly of soil and water resources.

Agricultural systems and agro-ecological practices such as: agroecology, agroforestry, conservation agriculture, organic farming and zero-tillage can sustainably increase farm productivity without degrading the soil and water resources.

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Where the Water Begins

Land Management Practices for Marine Shoreline and Bluff Properties

Is your bluff or beach property eroding or jeopardizing your house? Do you want to manage your vegetation to stabilize your property while maintaining a beautiful view of Puget Sound?

The King Conservation District invites you to attend a ***FREE*** workshop for property owners along the marine shorelines of King County. The workshop will provide participants with an opportunity to learn about the ecological, geological, and vegetation management issues associated with owning property *Where the Water Begins*.

Topics Include:

- Understanding Marine Nearshore and Riparian Ecology
- Recognizing Geologic Hazards
- Using Native Vegetation to Reduce Erosion
- Using Native Vegetation to Improve Fish and Wildlife Habitat

Who Should Attend:

- Beach property owners interested in a stable natural shoreline
- Bluff Property owners interested in reducing the potential for erosion and landslides
- Any marine shoreline or bluff property owner interested in improving fish and wildlife habitat.

Workshop Dates & Locations

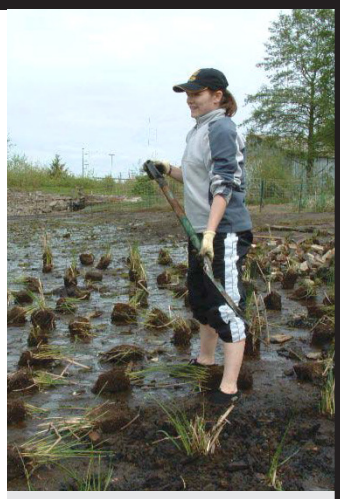
Saturday June 6, 2015
Vashon Maury Island Land Trust, Vashon WA

Saturday June 20, 2015
Discovery Park Visitor Center, Seattle WA

All Workshops
9:00 AM - 12:30 PM (Indoor Session) &
12:30 - 3:30 PM (Optional Lunch & Field Trip)

Facilitators

Kollin Higgins, King County DNRP WLRD
Peter Landry, Sno-Isle Civic-Environmental Learning & Works
Elliott Menashe, Greenbelt Consulting
Brandy Reed, King Conservation District



For additional information, contact Kristen Reichardt 425.282.1927 and *kristen.reichardt@kingcd.org*

To register, call 425.282.1949 or email *signup@kingcd.org*

King Conservation District

Sponsored by:
King Conservation District with funding from the WA Conservaton Commission

Attendance at the workshop is free. Pre-order box lunches will be provided for a fee (~ $12)