

# Chapter 2:

## ASSESSMENT OF CAO FIXED REGULATIONS

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# Chapter 2: ASSESSMENT OF CAO FIXED REGULATIONS

## 2.1 INTRODUCTION

This chapter assesses the proposed Critical Areas Ordinance standards for critical area protection through fixed regulations. Chapter 3 will look at the CAO Rural Stewardship and Farm Planning Options and Chapter 4 will address additional protection for critical areas provided in the Stormwater and Clearing and Grading Ordinances. The combined protection efforts of these three ordinances are considered in the individual assessments along with additional programs that support the protection efforts (see Chapter 5 Institutional Context).

An overview of the CAO fixed regulation provides a summary of the types of regulations: buffers, wildlife habitat conservation areas and wildlife habitat network, mitigation, and restrictions on development to protect public safety. Following the overview the regulations are discussed for each of the critical areas. The purpose of these critical area assessment sections is to assess the regulations to determine if they fall within the acceptable range of protection identified in the scientific literature review (see Best Available Science report). A policy discussion sub-section for each critical area provides information on how hazard, departure, risk, and protection issues were decided. The italicized text comes directly from the ordinance.

### **POLICY DIRECTION:**

The adopted King County Comprehensive Plan directs that the protection of critical area be achieved through a combination of tools, including regulations. In most cases, the regulatory component is but one piece of the management strategy, which includes acquisition, incentives and other tools.

E- 107 The protection of lands where development would pose hazards to health, property, important ecological functions or environmental quality shall be achieved through acquisition, enhancement, incentive programs and appropriate regulations. The following natural landscape features are particularly susceptible and should be protected:

- a. Floodways of 100 year floodplains;
- b. Slopes with a grade of 40 percent or more or landslide hazards that cannot be mitigated;
- c. Wetlands and their protective buffers;
- d. Streams and their protective buffers;
- e. Channel migration hazard areas;
- f. Designated wildlife habitat networks;

- g. Critical Aquifer Recharge Areas;
- h. Marine beaches, wetlands, intertidal and subtidal habitat and riparian zones including bluffs;
- i. Regionally Significant Resource Areas and Locally Significant Resource Areas; and
- j. Fish and Wildlife Habitat Conservation Areas, and other critical habitat areas identified for protection through Water Resource Inventory Area plans.

Inherent in the choice of a management strategy is the fourteen Growth Management

Goals as set forth in the GMA. These are summarized below:

- Focus urban growth in urban areas.
- Reduce sprawl.
- Provide efficient transportation.
- Encourage affordable housing.
- Encourage sustainable economic development.
- Protect property rights.
- Process permits in a timely and fair manner.
- Maintain and enhance natural resource-based industries.
- Retain open space and habitat areas and develop recreation opportunities.
- Protect the environment.
- Encourage citizen participation and regional coordination.
- Ensure adequate public facilities and services.
- Preserve important historic resources.
- Manage shorelines wisely.

## **2.2 OVERVIEW OF THE PROPOSED CRITICAL AREAS ORDINANCE**

The proposed Critical Area Ordinance (CAO) incorporates numerous changes to the existing Sensitive Area Ordinance (K.C.C.21A.24), which was adopted over 10 years ago. Best available science was included in development of proposed CAO regulations to protect the existing functions and values of critical areas per the Growth Management Act (RCW36.70A.172). The proposed CAO increases the protection requirements for aquatic, wetlands, and wildlife areas that

are at risk from development, and revised protection for hazard areas, and aquifer recharge areas. The proposed CAO applies to new land use applications and activities within unincorporated King County; existing land uses are generally not subject to the CAO. The proposed CAO includes tools designed to simplify compliance and provide choices for property owners applying for a change of land use. Depending on proposed land use activities or property location, three options to meet the overall goals of the CAO will be available to landowners: (1) fixed regulations, (2) rural stewardship planning, or (3) farm management planning. This chapter discusses fixed regulations and the following Chapter 3 discusses the planning options. Public agencies and utilities will comply with fixed regulations.

## **Options For CAO Compliance**

### **Types of Regulatory Requirements**

A landowner applying for a building or clearing and grading permit within the Rural Area or unincorporated areas within the UGAs could comply with the CAO by following the fixed regulations. The standard permitting procedure would be followed using the regulations in the proposed CAO. Key fixed regulations in the proposed CAO that apply to one or more critical areas are discussed briefly in this subsection. There are changes in the definitions of critical areas protection terminology. Some of these changes are clarifications of past definitions, whereas others reflect the increased emphasis on natural systems and the best available science that is included in the development of code revisions.

### **Buffers**

Buffers provide protection for a variety of ecological functions. Buffer requirements vary depending on the type of critical area, such as aquatic, wetland, or wildlife areas. Buffers are regulated for width, and types of activities allowed within them. Buffer averaging, according to certain conditions, would be allowed for aquatic areas and wetlands.

Proposed CAO aquatic area buffer requirements vary depending on sub-basin location. In general, larger buffers are required in the Rural Area than are required in the UGA. However, King County will apply the larger buffer standard within UGA, called special urban habitats, in high resource value sub-basins. Where severe channel migration zones have been mapped, aquatic area buffers would be applied to the outside edge of the severe channel migration zone.

Wetland buffer widths would be increased in the proposed CAO to follow the Department of Ecology's Wetland Buffer Rating System. In addition, protections of connections between wetlands in wetland complexes will be required (see the companion report Best Available Science, Chapter 6: Wetlands for further discussion).

### **Wildlife Habitat Conservation Areas and Wildlife Habitat Network**

Proposed regulations protect the wildlife species to the priority given them in the King County Comprehensive Plan (policies E-168 – E-170). Species are divided into groups based on whether their habitat shall or should be protected as directed by the King County Comprehensive Plan. Wildlife habitat conservation areas include regulations for “shall” species. Critical areas and

additional seasonal disturbance restrictions will protect breeding sites for ten priority species. Breeding habitat for species within the “should” category are protected temporarily and through incentive programs. King County protection requirements are defined individually for each of the ten species. See the companion report Best Available Science, Chapter 8 for more information about Wildlife Habitat Conservation Areas.

The Wildlife Habitat Network, mapped in the King County Comprehensive Plan, would continue to be protected as currently regulated in the Sensitive Areas Ordinance.

## **Mitigation**

Wetland mitigation requirements include creation, restoration, or enhancement to replace functions lost through site development and are intended to account for potential mitigation failure. The replacement ratios vary: on-site ratios are lower than off-site ratios, and ratios are lower within basin than out of basin. In certain cases mitigation banking may be allowed. Mitigation of buffer impacts would have to occur on the site. See the companion report Best Available Science, Chapter 9 for more information about wetland mitigation ratios.

Mitigation for aquatic areas (streams, lakes, ponds, and shorelines) must achieve equivalent or greater biological functions than the areas lost to development. Mitigation of impacts to the critical area should be on-site when practical or within the same drainage basin or shoreline reach. Mitigation of buffer impacts must occur on site. Ratios vary depending on a list of factors. See the companion report Best Available Science, Chapter 7 for more information about mitigation in aquatic areas.

Mitigation for wildlife areas (Wildlife Habitat Conservation Areas and the Wildlife Habitat Network) is intended to prevent disturbance to the protected species. On-site mitigation may include management practices, and off-site mitigation is limited to sites that are contiguous to the on-site areas that may enhance the Wildlife Habitat Conservation Area. Mitigation for the wildlife habitat network is intended to achieve equivalent or greater biologic functions including habitat complexity and connectivity functions. Mitigation ratios are described for various on-site and off-site scenarios.

## **Restrictions on Development Activity to Protect Public Safety**

Critical Aquifer Recharge Areas (CARA) will be protected by prohibition of certain land use activities or conditioned through performance standards. CARAs will be designated as classes one or two based on their sensitivity to contamination and use for domestic water supply.

Setbacks from geologically hazardous areas would be required by the proposed CAO to protect public safety. Also to protect public safety, land uses would be limited and compensatory storage required in flood hazard areas. Mapped severe Channel Migration Zones would be regulated as aquatic area buffers (see previous discussion in this section).

## **2.3 FLOOD HAZARD AREA**

A flood hazard area is defined in King County Code 21A.06.475 as follows:

*Flood hazard areas: any area in King County subject to inundation by the base flood or risk from channel migration including, but not limited to, aquatic areas, wetlands, and closed depressions.*

## **Flood Hazard Area Delineation**

Many flood hazard areas are mapped by the Federal Insurance Administration in a scientific and engineering report entitled “The Flood Insurance Study for King County and Incorporated Areas.” When there are multiple sources of flood hazard data for flood plain boundaries, regulatory floodway boundaries, base flood elevations, or flood cross sections, the department may determine which data most accurately delineates the flood hazard area. The department may utilize the following sources of flood hazard data for floodplain boundaries, regulatory floodway boundaries, base flood elevations, or cross sections when determining a flood hazard area:

1. Flood Insurance Rate Maps;
2. Flood Insurance Studies;
3. Preliminary Flood Insurance Rate Maps;
4. Preliminary Flood Insurance Studies;
5. Draft Flood Boundary Work Maps and associated technical reports;
6. Critical area reports prepared in accordance with FEMA standards set forth in 44 C.F.R. Part 65 and consistent with the King County Surface Water Design Manual provisions for floodplain analysis;
7. Letter of Map Amendments;
8. Letter of Map Revisions;
9. Channel migration zone maps and studies; and
10. Historical flood hazard information.

## **Restrictions on Development to Protect Public Safety**

King County is often cited as a national leader in adopting and implementing higher regulatory standards than what is required by the minimum standards required under the National Flood Insurance Program (Federal Emergency Management Agency 2002a.). King County’s higher standards provide greater protection to people and property than the national requirements by requiring safer methods of construction and greater restriction on development within floodplains. The following is an assessment of the proposed CAO, Clearing and Grading and Stormwater regulations.

### **Standard -- Compensatory Storage:**

*Compensatory storage is required. The compensatory storage is required to be hydraulically connected to the source of flooding.*

**Assessment:**

The best available science for floodplain management recognizes that any filling of the floodplain that takes away flood storage must be compensated by removing an equal amount of fill. The proposed CAO exceeds this by requiring that the compensatory storage be provided and also be hydraulically connected to the river or stream. This requirement for hydraulic connection ensures that fish are not stranded in pooled areas that were dug out for compensatory storage. There is little or no information specifically on the impact of compensatory storage on aquatic habitat or species. However, compensatory storage without a hydraulic connection could result in habitat isolation, which may result in fish stranding (Bolton and Shellberg 2001). The NFIP does not require compensatory storage; therefore King County's standard exceeds the NFIP requirements and additionally provides fish habitat.

**Standard -- Zero-Rise in Base Flood Elevation:**

*No rise is allowed in the base flood elevation in the zero-rise floodway except when revisions to FEMA maps are adopted and all the affected property owners agree to the rise. There is a presumption in the zero-rise floodway that there is no increase in base flood elevation for new residential structures that meet specific standards, but only if post and piling construction techniques are used. In the FEMA floodway, development cannot increase the base flood elevation. Substantial improvements of existing farmhouses in the FEMA floodway are assumed to not produce an increase in the base flood elevation only if the existing footprint is not increased.*

**Assessment:**

The application of the King County zero-rise standard usually results in a wider computed floodway than the NFIP standard, which means less development could occur in the floodplain (Federal Emergency Management Agency 2001a.). With less development occurring in the floodplain, there is a lesser impact to aquatic habitats and more habitat is preserved. In addition, fewer people and less property are placed at risk from flooding.

**Standard -- Base Flood Depth and Velocity Analysis:**

*A base flood depth and velocity analysis is required.*

**Assessment:**

By requiring a base flood depth and velocity analysis on new development in the floodplain, King County is assuring that only those structures that can withstand a defined and measurable impact from flood waters would be allowed to be constructed. This would provide a greater level of safety for property owners than what is required by the minimum NFIP standards. This standard may result in less development in the floodplain.

### **Standard -- Construction Standards:**

*All elevated construction must be approved by a registered engineer. All structures must be anchored to prevent flotation. In the zero-rise floodway, post and piling construction techniques are required. However, an alternative to post and piling techniques is allowed if a critical areas report demonstrates there will be no increase to the base flood elevation. Stream bank stabilization structures are required to be consistent with King County guidelines and use bioengineering whenever possible.*

### **Assessment:**

The NFIP does not require that a registered engineer approve elevated construction, so King County's standard assures a higher level of safety. The King County Guidelines for Bank Stabilization Projects is often cited as the best available science on flood protection design that incorporates habitat measures.

### **Standard – Subdivision of Land:**

*Subdivisions, short subdivisions and binding site plans must have 5,000 square feet outside of the flood fringe on every new lot. Channel migration zones boundaries, along with flood boundaries, are required to be shown on plats, short plats, urban planned developments and binding site plans. The recorded documents must include a hazard notice. All newly created lots must establish base flood elevations.*

### **Assessment:**

While King County requires a hazard notice stating that egress and ingress may not be available during flood events, FEMA recommends that new subdivisions be required to have at least one exit that is dry during flooding (Federal Emergency Management Agency 2002). King County meets this standard. This standard would improve the level of safety for people living in these subdivisions by assuring that emergency access is available at all times, even during flooding.

### **Standard – Residential Standards:**

*Residential structures must meet the following standards:*

- (1) the lowest floor must be elevated one foot above the base flood elevation,*
- (2) openings are required in the foundation to allow floodwater to pass,*
- (3) materials and methods must be resistant to flood damage,*
- (4) utilities must be flood-proofed or elevated,*
- (5) in the zero-rise floodway, new residential structures must be out of the FEMA floodway and are only allowed on lots established before 11/27/1990 and that have less than 5,000 square feet, and*



*(6) in the FEMA floodway, new residences structures are prohibited. However, maintenance, repair, replacement or improvement of an existing farmhouse, replacement of a substantially damaged existing residential structure, and maintenance or repair of an historic structure are all allowed if they meet certain standards.*

**Assessment:**

All of these standards for residential construction meet or exceed the recommended standards for protecting people and residential property from flood damage.

**Standard – Nonresidential Standards:**

*Nonresidential structures must meet the following standards:*

*(1) nonresidential structures must meet the residential elevation requirement or be flood-proofed, have the flood-proofing verified by a registered engineer, and place a notice on title that the structure is below flood-proof elevation,*

*(2) openings are required in the foundation to allow floodwaters to pass,*

*(3) materials and methods must be used that are resistant to flood damage,*

*(4) utilities must be flood-proofed or elevated, and*

*(5) in the FEMA floodway, new nonresidential structures are prohibited. However, maintenance or repair of an historic structure is allowed if it meets certain standards.*

**Assessment:**

All of these standards for nonresidential construction meet or exceed the recommended standards for protecting people and nonresidential property from flood damage.

**Standard – Mobile Homes and Mobile Home Parks:**

*Mobile homes must meet the same standards established for residential structures.*

*Mobile home parks, expansion of mobile home parks or repairs to infrastructure in a mobile home park are not allowed unless all mobile homes meet the residential standards.*

**Assessment:**

The standards for mobile homes and mobile home parks meet the minimum standards of the National Flood Insurance Program.

**Standard – Utilities:**

*Utilities must meet the following standards:*

*(1) utilities must be flood-proofed; and*

*(2) in the zero-rise floodway, utilities are allowed only if there is no feasible location outside the zero-rise floodway and any on-site sewage disposal system requires a waiver from the Health Department.*

**Assessment:**

King County standards exceed the standards commonly found in most other jurisdictions in the region (FEMA 2002c.)

**Standard – Critical Facilities:**

*Critical facilities are allowed only when no feasible location is available. Critical facilities must be elevated three feet above base flood elevation. A conditional use permit is required to construct critical facilities. Flood-proofing is required to assure hazardous substances are not released into floodwaters. Access routes must be elevated to or above base flood elevation. In the zero-rise floodway and FEMA floodway, critical facilities are prohibited.*

**Assessment:**

King County’s regulations for protecting critical facilities meet or exceed the minimum standard set under the National Flood Insurance Program, as well as other local jurisdictions.

**Standard – Flood Season Restrictions:**

*In the zero-rise floodway and FEMA floodway, removal of temporary structures and hazardous materials from the floodway is required during flood season.*

**Assessment:**

The National Flood Insurance Program and other jurisdictions do not require the removal of temporary structures and hazardous materials from the floodwater during the wet season. However they do restrict recreational vehicles to not remain for more than 180 days, but do not specify if this is the wet or dry part of the year. Not only does this standard protect people and property from flood hazard, it also protects critical habitats from hazardous materials that can wash into the rivers and streams during high water events.

**Standard – Water-Dependant Structures:**

*In the zero-rise floodway and FEMA floodway, structures that are dependent on the floodway are allowed, such as dams, flood reduction facilities, bank stabilization, storm water conveyance facilities, boat launches, bridge piers and abutments and fish enhancement projects or stream restoration.*

## **Assessment:**

This is consistent with other standards and jurisdictions.

## **POLICY DISCUSSION:**

The adopted King County Comprehensive Plan provides guidance as to the flood hazard management strategy, which is reflected in the adopted Flood Hazard Reduction Plan and implemented partly through development and zoning regulations.

E- 146 The existing flood storage and conveyance functions and ecological values of floodplains, wetlands, and riparian corridors shall be protected, and should, where possible, be enhanced or restored.

E- 147 King County's floodplain land use and floodplain management activities shall be carried out in accordance with the King County Flood Hazard Reduction Plan.

King County has chosen to provide a higher level of safety from flood hazards for people and property. King County is often cited as a national leader in adopting and implementing higher regulatory standards than what is required by the minimum standards required under the National Flood Insurance Program.

## **2.4 CHANNEL MIGRATION ZONE**

### **Classification and Definition**

The channel migration zone, the moderate channel migration hazard area, and the severe channel migration hazard area are defined in the proposed Critical Areas Ordinance (CAO) as follows.

*Channel migration zone: those areas within the lateral extent of likely stream channel movement that are subject to risk due to stream bank destabilization, rapid stream incision, stream bank erosion, and shifts in location of stream channels, as shown on King County's Channel Migration Maps. The channel migration zone is a corridor that includes the present channel, the severe channel migration hazard area and the moderate channel migration hazard area. A channel migration zone does not include those areas that lie behind an arterial road, a public road serving as a sole access route or a regional transportation corridor. A channel migration zone may be excluded from those areas that lie behind a lawfully established flood protection facility that is likely to be maintained by existing programs for public maintenance consistent with designation and classification criteria specified by public rule. When a natural geologic feature will affect channel migration, the channel migration zone width shall be modified to consider such natural constraints.*

*Channel migration hazard area, severe: a portion of the channel migration zone, as shown on King County's Channel Migration Zone maps, that includes the present*

*channel. The total width of the severe channel migration hazard area equals one hundred years times the average annual channel migration rate, plus the present channel width. The average annual channel migration rate shall be as determined in the technical report that is the basis for each Channel Migration Zone map.*

*Channel migration hazard area, moderate: a portion of the channel migration zone, as shown on King County's Channel Migration Zone maps, that lies between the severe channel migration hazard area and the outer boundaries of the channel migration zone.*

## **Discussion of Classification and Definition**

Further information on designation and classification of CMZs and the component areas are provided in the channel migration public rule (King County 1999). Details on CMZ mapping methods and resultant map designations of severe and moderate channel migration hazard areas are described in the technical reports that are the basis for existing King County CMZ maps (Shannon and Wilson 1991; Perkins 1993; Perkins 1996). Study methods are described here for discussion of King County CMZ classification and definition.

A technical report is prepared as the basis for each CMZ map. It includes a description of channel and basin-scale characteristics based on review of existing information and field investigations. A combination of archival studies and field investigation results in a compilation of historic channel locations, from which representative historic channel migration patterns and rates are characterized. An unconstrained outer limit of future channel migration is predicted based on representative historic channel migration patterns and rates, meander amplitudes, the width of the historic meander belt, and potential avulsion sites. Within this unconstrained channel migration zone, channel migration hazard is mapped to identify both severe hazard areas and moderate hazard areas.

The width of the severe channel migration hazard area equals:

100 years X (multiplied by) a representative average annual channel migration rate +  
(plus) the width of the present channel.

The severe hazard area includes the present channel at its center and the time period represented is a prediction of channel migration over the next 100 years. The moderate hazard area is the area between the severe hazard area and the predicted outer boundary of future channel migration. Sites with high potential for avulsion are identified from maps and aerial photos and verified in the field. The river is assumed to shift to all high-potential avulsion sites, then also migrate laterally the distances to severe and moderate hazard boundaries as described above (Perkins 1993, 1996).

Legally constructed infrastructure, levees, and revetments that are publicly maintained and that pose a legitimate barrier to channel migration are identified and the mapped CMZ boundary is modified accordingly (Perkins 1993, 1996). Criteria used to identify those legally constructed facilities as channel migration boundaries for the duration of the design life of the channel migration study include: the length and continuity of the facility, the likelihood of avulsion occurring that would relocate the river to flow behind the facility, and the facility's history of erosion. The professional judgment of County staff who have inspected, maintained, and repaired the facilities also is considered in evaluating each County-maintained facility within a CMZ study area as a potential barrier to channel migration.

Identification of CMZs using this King County definition and delineation method results in a corridor of variable width that includes the severe and moderate channel migration hazard areas and the present channel. It is intended that King County channel migration studies and associated CMZ maps be updated on an approximately 20-year interval (as recommended by Shannon and Wilson 1991).

### ***Lateral extent of CMZ***

Study methods used by King County to document channel change and measure channel migration rates are consistent with and are a strong point relative to study methods described in scientific literature on mapping channel changes (see BAS Volume I, Chapter 4.2.2).

Scientific literature (in BAS Volume I, Chapter 4) identifies the need to select a time period in order to delineate a CMZ. The few examples from the cited literature that discuss specific time periods recognize that the 100-year period is commonly selected, for various reasons. The King County CMZ is composed of the present channel, the severe channel migration hazard area and the moderate channel migration hazard area. The King County severe channel migration hazard area is based on 100 years worth of lateral channel migration. The moderate channel migration hazard area extends landward of the severe hazard area to an outer CMZ boundary based on geomorphic characteristics of the study area such as meander amplitude, meander belt width, and potential for avulsions. The fact that the King County CMZ includes a moderate channel migration hazard area that extends beyond the (100-year-based) lateral extent of CMZ that is more commonly recognized in BAS literature demonstrates that the lateral extent of King County CMZ equals or exceeds and is a strong point relative to CMZ widths described in literature.

### ***Effect of LWD on channel migration***

Scientific literature documents the effect that accumulation of LWD can have on channel hydraulics, channel morphology, sediment accumulation, channel migration, and riparian forest development. LWD is identified as a primary trigger mechanism for avulsions. This literature meets BAS criteria and its general principles are applicable throughout the Pacific Northwest region.

Much of the research on LWD in channels has been conducted in undeveloped, forested watersheds and floodplains. While the general principles reported by such research are globally applicable, some findings keyed to occurrence, density, or distribution of LWD in predominantly undeveloped and forested settings do not appear to be directly applicable to mainstem lowland King County channels outside of the Forest Production District. An example of a globally applicable principal is that sediment deposition behind an accumulation of LWD would be expected to occur and affect channel bed elevation within its local extent of influence. A finding that may apply only to undisturbed areas is that multiple LWD accumulations would cause a systemic change in bed elevation such that channel migration in turn would be affected systemically. Given the present-day densities and distribution of LWD in most King County channels, it does not appear likely that a systemic change in channel bed elevation, and a resulting systemic alteration of channel migration characteristics, would occur in lowland mainstem channels of King County.

King County CMZ studies do not explicitly account for the occurrence, density, or distribution of LWD. However, documentation of changes through time in channel form and location obtained

through comparison of archival and current maps and photos implicitly considers the effects of LWD on channel migration to the extent that LWD is the agent of those channel changes. Also, the role of LWD accumulation as a trigger for avulsions is incorporated in King County CMZ mapping methods because high potential avulsion sites are identified, avulsions are assumed to occur at all such sites (whether triggered by LWD or not), and the associated channel migration hazard is mapped.

It is likely that King County CMZ mapping methods are consistent with approaches described in scientific literature on CMZ mapping. If it is determined that the effect of LWD on channel migration in King County channels must be considered explicitly, then the current King County CMZ mapping methods would need to be modified.

### ***Evaluating levees and revetments as CMZ boundaries***

Each legally constructed and publicly maintained levee, revetment and piece of infrastructure along the channel within a King County CMZ study area is evaluated to determine whether it should be mapped as a boundary to channel migration, based on criteria described in the discussion above. No stability analysis is done in the King County CMZ mapping method to determine how effective these constructed facilities would be in preventing channel migration (FEMA 1999). The subjectivity described by FEMA (1999) in the King County method of “selecting barriers to migrating channels” may refer to the use of professional judgment by King County staff in evaluating each facility.

The King County CMZ method for mapping levees or revetments as boundaries to channel migration is consistent with the procedure for delineating a Disconnected Migration Area described by Rapp and Abbe (2003). In the procedure each bank hardening structure is characterized (e.g., at reconnaissance level to record its extent and composition); a determination is made regarding which structures constitute a legitimate barrier to channel migration during the design life of the CMZ study; and the unconstrained CMZ is modified or scaled back accordingly.

### ***Effects of landslides on channel migration***

King County CMZ studies and maps do not explicitly consider the potential effects of landslides on channel migration, nor explicitly couple hillslope processes with channel migration processes. King County CMZ studies to date do recognize that high terraces and tall cliffs not underlain by competent bedrock could pose a landslide hazard if and when the river channel comes in contact.

Landslide hazard areas, erosion hazard areas and seismic hazard areas currently are mapped and regulated as a sensitive area under existing King County code and would continue to be regulated as a critical area under the proposed CAO. King County’s mapping of landslide, erosion, and seismic hazard areas, when combined with mapping of channel migration zones, should be equivalent to mapping hillslope erosion and fluvial channel migration as coupled processes, per Rapp and Abbe (2003).

If the combination of hazard areas mapping and regulation currently implemented by King County does not adequately couple hillslope and fluvial processes, it may constitute a weakness in its CMZ mapping methods. Still it is likely that King County CMZ mapping methods are consistent with approaches described in the scientific literature on CMZ mapping. More explicit coupling of hillslope and fluvial processes would require modification to the current King County CMZ mapping methods.

## **Restrictions on Development to Protect Public Safety**

The following four restrictions on development apply to the moderate channel migration hazard area, subject to conditions specified in proposed CAO Chapter 21A.24 Section 36. One assessment applies to all four standards.

### **Standard – Maintenance, Repair or Expansion of Structures:**

*Maintenance, repair or expansion of any use or structure is allowed provided the existing structure's footprint is not expanded towards any source of channel migration hazard, unless the applicant can demonstrate to the satisfaction of the department that such location is the least subject to risk.*

### **Standard – New Primary Dwelling Units:**

*New primary dwelling units, accessory dwelling units or accessory living quarters, and required infrastructure, are allowed.*

### **Standard – New Accessory Structures:**

*New accessory structures are allowed, provided that no feasible alternative is available on-site, and the structure is located the farthest practical distance from the migrating channel.*

### **Standard – The Subdivision of Property:**

*The subdivision of property is allowed within the portion of a moderate channel migration hazard area located outside an aquatic areas buffer.*

### **Assessment:**

Scientific literature, cited in the BAS Volume I, Chapter 4, identifies the need to select a time period in order to delineate a CMZ. The few examples from the cited literature that discuss specific time periods recognize that the 100-year period commonly is selected, for various reasons. The King County CMZ is composed of the present channel, the severe channel migration hazard area and the moderate channel migration hazard area. The King County severe channel migration hazard area is based on 100 years worth of lateral channel migration. Since the moderate channel migration hazard area (which is the hazard affected area for this assessment) extends landward of the severe hazard area, the fact that it is delineated and regulated equals or exceeds the (100-year-based) lateral extent of CMZ that is more commonly recognized in BAS literature.

## Allowed Alterations

The following alterations are allowed within the severe channel migration hazard area, subject to conditions specified in proposed CAO Chapter 21A.24 Section 140. One assessment applies to all standards listed.

### Standard – Residential:

- *Maintenance/repair or expansion/replacement of existing residential land uses*
- *Interior remodeling*

### Standard – Non-residential:

- *Construction of non-residential farm structures on non-forested lands*
- *Maintenance/repair or expansion/replacement of existing non-residential land uses*

### Standard – Grading:

- *Grading*
- *Construction of new slope stabilization*
- *Maintenance of existing slope stabilization*

### Standard – Clearing:

- *Clearing*
- *Cutting firewood*
- *Removal of brush*
- *Removal of noxious weeds or invasive vegetation*
- *Use of herbicide or pesticide*

### Standard – Forest practices:

- *Non conversion Class IV-G forest practice*

### Standard – Roads:

- *Maintenance of public road right-of-way structure*
- *Expansion beyond public road right-of-way structure*
- *Repair, replacement or modification within existing right-of-way*
- *Maintenance of driveway, private access road, or farm field access drive*

### Standard – Stream crossings:

- *Maintenance or repair of bridge or culvert*
- *Replacement of bridge or culvert*



- *Expansion of bridge or culvert*

**Standard – Utilities and other infrastructure:**

- *Construction of new:*
  - *utility corridors or facilities*
  - *surface water conveyance system*
  - *flow control and water treatment facilities*
  - *flood protection facilities*
  - *instream structures or instream work*
- *Maintenance, repair, or replacement of:*
  - *utility corridors or facilities*
  - *existing surface water conveyance system*
- *Maintenance or repair of:*
  - *existing wells*
  - *onsite sewage disposal system*
  - *existing flow control and water quality treatment facilities*
  - *existing instream structures*

**Standard – Recreation areas:**

- *Maintenance of outdoor public park facilities, trails and publicly improved recreation areas*

**Standard – Habitat and science projects:**

- *Habitat restoration or enhancement projects*
- *Scientific sampling for salmonids*
- *Drilling and testing for critical areas reports*

**Standard – Agriculture:**

- *Horticulture activities*
- *Grazing livestock*
- *Livestock manure storage facilities*
- *Livestock flood sanctuaries*
- *Construction of agricultural drainage*
- *Maintenance of agricultural drainage*
- *Farm ponds, fish ponds, livestock watering ponds*

**Standard – Other activities:**

- *Excavation of cemetery graves in established and approved cemetery*

- *Maintenance of cemetery graves*
- *Maintenance of lawns, landscaping and gardening for personal consumption*
- *Maintenance of golf courses*

**Assessment:**

As described in the assessment of fixed regulations regarding CMZs (i.e., for the moderate hazard area), the few examples from the cited literature that discuss specific time periods recognize that the 100-year period commonly is selected. The King County severe channel migration hazard area is based on 100 years worth of lateral channel migration, and is therefore consistent with BAS on this topic.

The allowable alterations listed above specify what land uses are allowed within the severe channel migration hazard area. The determination of what land use is allowed in this part of the CMZ is based upon a policy decision rather than a science-based determination, and therefore not restricted by BAS criteria. Although comparable CMZ regulations from other jurisdictions are not necessarily science based, the allowed land uses listed above generally are consistent with those other CMZ regulations.

**Policy Discussion:**

King County has chosen to provide its residents with a high level of protection with regard to Channel Migration Zones. King County’s channel migration zones are based on 100 years of data and will reduce development in these areas that are at risk due to channel migration.

## 2.5 GEOLOGIC HAZARD AREAS

The following assessment of the proposed CAO evaluates the six geologic hazard areas: seismic, erosion, landslides (including steep slopes), volcanic, and coal mine hazard areas. The stated goal of the proposed Critical Areas Ordinance (CAO) standards for geological hazard areas is to “*promote general public safety by regulating development of lands containing physical hazards and to minimize the adverse environmental impacts of development*”. Development standards for each type of geological hazard area are addressed below.

### Restrictions on Development to Protect Public Safety

**Standard – Seismic Hazard Areas Development Standards and Alterations:**

*Development in seismic hazard areas must satisfy building code requirements, with some exemptions based on type or size of development.*

**Assessment:**

Provisions of the proposed CAO for Seismic Hazard Areas are written in accordance with the scientific literature reviewed. The study of earthquakes and seismicity is a relatively mature

science, but the ability to predict location and magnitude of seismic events has not been achieved and is not imminent. Best available science dictates that the impact of seismicity be mitigated to the extent possible via regulatory requirements. Requirements should include preparation of site-specific seismic studies for essential facilities and lifelines and adherence to building codes that require earthquake resistant design and construction.

Other chapters of the proposed CAO provide additional protection for areas that are subject to failure under seismic loading. Buffers that are established adjacent to Landslide Hazard Areas will likewise provide protection during earthquake-induced slope failure. Furthermore, the implementation of Zone 3 building code requirements as developed in California will provide an additional margin of safety for homeowners in King County. The Division of Geology and Earth Resources has very recently received grant funding through the Hazard Mitigation Grant Program (HMGP) following the Nisqually Earthquake of March 2001 (FEMA-1361-DR-WA) to develop statewide liquefaction susceptibility and NEHRP soil-type maps. Regional earthquake hazard maps such as these support hazard mitigation, emergency planning and response, planning of local zoning ordinances, and building code enforcement. (Rebecca Niggeman, written communication.)

### **Standard – Erosion Hazard Areas Development Standards:**

*Clearing is restricted to dry season and only under certain conditions. Further, restrictions contained in other sections of the CAO that limit clearing and grading in geologic hazard areas like Landslide Hazard Areas provide an additional measure of protection against erosion.*

### **Assessment:**

Current and proposed Erosion Hazard Areas standards are generally consistent with best available science. The term “generally consistent with...” is used because King County does not presently evaluate these areas with the same level of detail that is suggested by Houghton and Charman, 1986. However, for purposes of delineating areas of concern (areas that meet the tests for grain-size, land use, etc.), the King County methodology is adequate.

### **Standard – Landslide and Steep Slope Hazard Areas Development Standards:**

*A building setback from the hazard areas is required; the width of the setback shall be 50 feet or as prescribed by a critical area report prepared by a geotechnical engineer or geologist. . Alterations within the hazard area or the setback area may be allowed under certain conditions.*

### **Assessment:**

The Landslide and Steep Slope Hazard Areas provisions of the proposed CAO are consistent with and do not depart from best available science. As indicated above, removal of vegetation can have a dramatic effect on the overall stability of sloping areas and can affect deposition of large woody debris and gravel recruitment processes that contribute to the natural function and health

of stream systems. King County’s clearing restrictions and forestry regulations (as implemented under the State Forest Practices Act) may contribute to the protection of landslide hazard areas.

**Standard – Volcanic Hazard Areas Development Standards:**

*Development within volcanic hazard areas is regulated along the White River (upstream and downstream of the Mud Mountain Dam), Green River and Duwamish River. Specific restrictions and design standards are not implemented or effective until modeling and mapping of volcanic hazard areas are completed.*

**Assessment:**

Of the five geologically hazardous areas that are regulated under the proposed CAO, Volcanic Hazard Areas are the only areas that will not be formally regulated with implemented development standards and zoning. Provisions in the draft language require that “required modeling and mapping of volcanic hazard areas” be completed prior to effective implementation of the section.

Best available science clearly suggests that construction in areas adjacent to volcanoes, particularly within the zones described within the BAS section, should be regulated to guard against the obvious hazards. The Washington State Department of Natural Resources Division of Geology and Earth Resources and the United States Geological Survey have completed the mapping that is required, but the proposed CAO does not adopt that mapping by reference or incorporation.

The referenced modeling is not described though it is referred to in the text as “required.” It is presumed that the modeling will comprise a detailed series of simulations of eruptions and subsequent pyroclastic flows, Lahars, lateral blast events, and the like. These simulations combined with historical information and geologic data and mapping, will allow development of proper zonation around the volcano. Until existing maps are adopted and modeling completed, King County will be unable to properly regulate development and construction in Volcanic Hazard Areas and public and private property remain at risk.

**Standard – Coal Mine Hazard Areas Development Standards:**

*A coal mine hazard assessment is required in these areas and some alterations, depending on type and size of development, are allowed.*

**Assessment:**

Proposed coal mine hazard area standards are consistent with best available science. Coal mine hazard areas are presently identified in King County using all available information including existing surface and subsurface mapping, aerial photography, geophysical methods as applicable, and site-specific special studies.

## Allowed Alterations

### Standard – Landslide and Steep Slope Hazard Area Allowed Alterations:

*Alterations identified in the proposed CAO (K.C.C. 21A.24.140) are allowed within landslide and steep slope hazard areas if the alteration complies with all applicable requirements, standards, and mitigation requirements established in the proposed CAO.*

### Assessment:

Development in landslide and steep slope hazard areas will need to be supported by a critical area report that indicates that the development as proposed will not further destabilize the slope and that the slope will remain stable during and after construction. A qualified engineering geologist or geotechnical engineer who is licensed to practice in the State of Washington will prepare this type of study.

### Policy Discussion

Landslide, and steep slope hazard areas are classified as critical areas on the basis of public safety concerns and as such, the County has chosen to regulate in such a way to reduce the risks to persons and property. Seismic hazard areas are regulated to reduce structural damage and injury by requiring standards that provide a level of protection commensurate with the nature of the soils and slope and the likelihood of damage and injury from an earthquake.

## 2.6 CRITICAL AQUIFER RECHARGE AREA

### Critical Aquifer Recharge Area Classification

*Critical aquifer recharge areas are categorized as follows:*

- A. *Category I critical aquifer recharge areas include those mapped areas determined by King County to be highly susceptible to groundwater contamination and that are located within a sole source aquifer or a wellhead protection area.*
- B. *Category II critical aquifer recharge areas include those mapped areas that King County has determined:*

*Have a medium susceptibility to ground water contamination and are located in a sole source aquifer or a wellhead protection area; or*

*Are highly susceptible to groundwater contamination and are not located in a sole source aquifer or wellhead protection area.*

- C. *Category III critical aquifer recharge areas include those mapped areas that King County has determined have low susceptibility to groundwater contamination and are located over an aquifer underlying an island that is surrounded by saltwater.*

King County’s approach for CARA designation overlays Wellhead Protection Area (WHPA) and Sole Source Aquifer (SSA) delineations on a susceptibility map to prioritize the two most critical areas (Category I and II) to aquifer recharge. This classification system provides simple and robust categories based on aquifer susceptibility and source protection perimeters. This type of mapping is being done throughout the world to protect groundwater (see BAS Volume I, Chapter 6, Section 6.2.2 –Prioritizing Aquifer Recharge Areas).

This classification system could be further refined given additional data. Future efforts in refining the CARA classification could involve updates to King County’s susceptibility methodology and the WHPA delineations. King County’s current susceptibility methodology includes only the “D,” “S,” and, “I” parameters of the DRASTIC method (See BAS Volume I, Chapter 6, Section 6.2.2 – Prioritizing Aquifer Recharge Areas). Inclusion of the “T” or topography parameter would make the classification more useful to quantity-related recharge issues. Additionally, once recharge maps are developed for King County, the “R,” or recharge, parameter could be incorporated with an appropriate local scale factor.

A weakness in the CARA classification is the current method of using an arbitrary fixed radius method for WHPA delineation in Group B and non-compliant Group A wells. Even the compliant Group A wells in King County generally define their WHPAs in two-dimensions using parameters derived from the properties of pumping wells and the aquifer from which they pump. For deep production wells or wells in confined aquifers, this means that some WHPAs are defined using parameters of aquifers hundreds of feet below land surface (below potentially substantial aquitards). The 2-D WHPA delineation method also precludes the effects of any attenuation below the water table and more distant recharge sources available to deeper aquifers. Efforts should be made to map the WHPAs using more sophisticated 3D-wellhead protection modeling. WHPA delineation can overstate risk or give off-target CARA classifications without the use of more sophisticated 3-D methods. It may be appropriate to declassify a CARA if it can be demonstrated that the WHPA delineation is for a deeper aquifer that is not in danger of contamination.

## **Restrictions on Development to Protect Public Safety**

### **Standard: Restricted Activities and Uses**

*The following new uses or activities are not allowed in category I critical aquifer recharge areas:*

- 1. Transmission pipelines carrying petroleum, petroleum products, or anhydrous ammonia;*
- 2. Sand and gravel, and hard rock mining on land that is not zoned for mining as of the effective date of this section;*
- 3. Mining of any type below the upper surface of the ground water;*

4. *Processing, storage, and disposal of radioactive wastes, as defined in chapter 43.200 RCW;*
5. *Hydrocarbon extraction;*
6. *Commercial wood treatment facilities on permeable surfaces;*
7. *Underground storage tanks with hazardous substances, as defined in chapter 70.105 RCW;*
8. *Above-ground storage tanks for hazardous substances, as defined in chapter 70.105 RCW, unless protected with primary and secondary containment areas and a spill protection plan;*
9. *Golf courses;*
10. *Cemeteries;*
11. *Wrecking yards;*
12. *Landfills for hazardous waste, municipal solid waste, or special waste, as defined in K.C.C. chapter 10.04; and*
13. *On lots smaller than one acre, on-site septic systems that are not approved by the Washington state department of health and either:*
  - a. *do not use an up flow media filter system or a proprietary packed-bed filter system; or*
  - b. *are not designed to result in effluent nitrate - nitrogen concentrations below ten milligrams per liter.*

*The following new activities are not allowed in a category II critical aquifer recharge area:*

1. *Mining of any type below the upper surface of the ground water;*
2. *Processing, storage, and disposal of radioactive wastes, as defined in chapter 43.200 RCW;*
3. *Hydrocarbon extraction;*
4. *Commercial wood treatment facilities on permeable surfaces;*
5. *Underground storage tanks with hazardous substances, as defined in chapter 70.105 RCW, that do not have double walls, a vault and monitoring;*
6. *Above-ground storage tanks for hazardous substances, as defined in chapter 70.105 RCW, unless protected with primary and secondary containment areas and a spill protection plan;*
7. *Wrecking yards;*

8. *Landfills for hazardous waste, municipal solid waste, or special waste, as defined in K.C.C. chapter 10.04; and*
9. *On lots smaller than one acre, on-site septic systems that are not approved by the Washington state department of health and either:*
  - a. *do not use an up-flow media filter system or a proprietary packed-bed filter system; or*
  - b. *are not designed to result in effluent nitrate - nitrogen concentrations below ten milligrams per liter.*

*The following new uses and activities are not allowed in a category III critical aquifer recharge area:*

1. *Processing, storage, and disposal of radioactive wastes, as defined in chapter 43.200 RCW;*
2. *Hydrocarbon extraction;*
3. *Commercial wood treatment facilities on permeable surfaces;*
4. *Underground storage tanks with hazardous substances, as defined in chapter 70.105 RCW, that do not have double walls, a vault and monitoring;*
5. *Above ground storage tanks for hazardous substances, as defined in chapter 70.105 RCW, unless protected with primary and secondary containment areas and a spill protection plan;*
6. *Wrecking yards; and*
7. *Landfills for hazardous waste, municipal solid waste, or special waste, as defined in K.C.C. chapter 10.04.*

### **Assessment:**

Prohibiting potentially polluting land-use activities in areas susceptible to contamination is consistent with the BAS for protecting groundwater quality. The potential for a particular land-use activity to pollute the groundwater is difficult to predict. A number of characteristics will affect the potential of a particular activity to pollute the groundwater. First, contaminants that originate as mobile, high liquid volume, areally-limited sources will be more likely to overwhelm the natural attenuation capacity of the unsaturated zone than contaminants that originate from more diffuse sources. This will increase the likelihood of groundwater contamination.

Second, there is also an important difference between those activities in which the contaminant load is an integral design feature (such as on-site septic systems, agriculture, etc) and those where it is an incidental or accidental component (such as pipeline leaks/ruptures, UST failure, etc). When the contaminant release is an integral part of the design, it is easier to predict and mitigate for the contaminant release. Conversely, the probability of an incidental or accidental contaminant load occurring depends on design and regulatory compliance, as well as individual human error, making the potential of a release difficult to predict.



As described in BAS Volume I, Chapter 6, Section 1.3 – Water Quality, all of the activities/sources listed above are potential sources of contamination. While most of these activities are already regulated under other laws, the classes of contaminants associated with hazardous and solid waste landfills, wrecking yards, wood treatment facilities, and metals mining make it wise to take a precautionary approach to the siting of these activities. The hydrocarbon extraction and the processing, storage, and disposal of radioactive waste can also produce very toxic contaminants that make it prudent to restrict these activities within critical areas. Even small volumes of these toxic substances can cause major groundwater quality deterioration.

The protection of groundwater with respect to underground storage tanks and above ground storage tanks has made strides in recent years as the protection measures have increased on the state and federal levels. The uncertainty surrounding vapor phase releases from underground storage tanks (USTs) and the gap in regulatory control on home heating oil tanks makes the restrictions on them prudent at this time. As research on design and leak detection for these systems increases, the regulation may also need to change. The extra protection measures in the ordinance for above ground storage tanks should be sufficient to provide adequate protection.

The proposed ordinance takes the “precautionary” approach recommended in WAC 365-195-920(1) with respect to on-site sewage systems, golf courses, cemeteries, and sand and gravel mining. All of these land uses can pose a threat to groundwater, although their adverse environmental impacts may be adequately mitigated through appropriate technology (modifications in design or best management practices). The literature is not conclusive regarding OSS density issues and more research appears warranted. It may also be appropriate to allow golf courses when BMPs are developed that address all of the outstanding concerns.

Prohibiting land uses on Category III CARAs also takes a precautionary approach. By virtue of being in a low susceptibility area, the risk of polluting the groundwater in Class III CARAs is low for most contamination scenarios. Contaminants that originate from a localized source represent the greatest risk to these low susceptibility areas, so reducing the prohibited activities to only these localized sources of contamination follows the BAS. On the other hand, diffuse sources of contamination represent a very low risk to the aquifer in low susceptibility areas.

### **Standard: Development Proposal Standards**

*The following standards apply to a development proposal in a critical aquifer recharge area if the assessed valuation of proposed improvements, including interior improvements, and excluding required mitigation and frontage improvements, exceeds fifty percent of the assessed value of the existing parcel improvements proposes:*

- 1. An underground storage tank in a category I critical aquifer recharge area shall be properly decommissioned or removed; and*
- 2. An underground storage tank in a category II or III critical aquifer recharge area shall be brought into compliance with current standards, including double walls, a vault, and monitoring or be properly decommissioned or removed.*

*In any critical aquifer recharge area, an abandoned well shall be properly decommissioned.*

*In a critical aquifer recharge area located within the urban growth area, a development proposal for new residential development, including, but not limited to, a subdivision, short subdivision, or single family detached dwelling unit, shall incorporate best management practices included in the King County Surface Water Design Manual into the site design in order to infiltrate stormwater runoff to the maximum extent practicable.*

*A new well proposed in a critical aquifer recharge area located on an island surrounded by saltwater and within two hundred feet of the shoreline shall be tested for chloride levels. The results of the test shall be reported to Seattle-King County public health and to the department of natural resources and parks. If the test results indicate saltwater intrusion may become a problem, the department of natural resources and parks, in consultation with Seattle-King County public health, shall recommend appropriate measures to prevent further degradation resulting from saltwater intrusion.*

### **Assessment:**

These development proposal standards *are consistent* with BAS.

### **Policy Discussion:**

Groundwater is a significant source of potable water for King County residents. On Vashon Island, groundwater is the only source of water available to the residents. King County has determined that while the CARA provisions meet BAS, additional levels of protection and a lower level of risk is appropriate for Vashon Island. The third tier of protection for Vashon Island is in recognition of the lower level of risk appropriate for an island sole source aquifer.

## **2.7 AQUATIC AREAS**

### **Buffers**

**Standards:** The following is a summary of 21A.24.181 of the proposed CAO:

*Overview of the Fixed Buffers: For waters classified as either Type S (Shorelines of the State; RCW 90.58) or Type F (waters not a Type S but that contain fish or fish habitat), the CAO proposes a minimum riparian buffer of 165 feet (50 m) for the Rural Area (i.e., outside Urban Growth Areas (UGA), APD, and FPD) and 115 feet (35 m) for unincorporated UGA areas. For urban waters classified as Special Urban Waters, defined as having high biological and habitat functioning, the rural buffer standard would apply. Buffer widths are variable and would be expanded to include steep slopes, mapped channel migration zones and wetlands. Furthermore, fish-bearing (Type F) waters are conservatively defined as streams 2ft or greater in width and with a sustained gradient of less than 22 percent or lakes and ponds connected to a known fish-bearing water by a stream channel of similar dimensions.*

*For Type N waters (no fish but drains via surface to fish-bearing water) a fixed 65-ft (20 m) buffers would be required, except on Bear Creek, tributary to the Sammamish River, where a 100-ft buffer would be required.*

*For Type O waters (i.e., no fish and no surface connection to a fish-bearing water) a 25 feet (8 m) buffer would be required.*

### **Assessment:**

Much of the logic for the proposed buffers stems from the Tri-County model proposal. Early in the development of the Tri-County model, the proposed total width of the management zone along fish-bearing waters was 300 feet (91 m), roughly equivalent to two site potential tree heights (SPTHs, using the FEMAT 1993 estimate of 150 feet, or 46 m, per SPTH). This distance was broken into a variable width inner “no-touch” zone that was a minimum of 150 feet and that expanded to include channel migration zones, steep slopes, and wetlands. A fixed outer 150-foot-wide zone in which a variety of low impact development activities could occur within certain clearing and impervious area limits bound this inner zone. As a result of linking buffer requirements with forest retention requirements, the Tri-County recommended width for the management zone was reduced to 200 feet composed to two zones: (1) a variable width, “no touch” inner zone (with a minimum 150 feet, or 46 m, distance equal to one SPTH but expanding to include wetlands, steep slopes and CMZs) and (2) a fixed width (50 ft., or 15 m) outer zone in which up to 65 percent forest cover would be retained or enough of the site would remain undeveloped to attain such cover. For salmonid-bearing streams in unincorporated UGAs, the Tri-County model called for a smaller 115 feet (35 m) variable width, “no touch” inner zone and a fixed width 85 feet (26 m) outer zone with enhanced stormwater measures including some required retention of vegetation (but not 65 percent). In both land-use settings, structures and other developments would be placed as far from the inner buffer as possible.

By comparison, for salmonid-bearing habitats, the proposed King County CAO eliminates the outer zone and, for Rural Area habitats, increases the no-touch buffer zone by 15 feet (5 m). The two-zone approach was eliminated to reduce complexity of implementation and to improve the likelihood the standard would be implemented properly. Also, the proposed CAO buffers continue to be coupled with clearing and impervious area restrictions to provide the forest cover/undisturbed vegetation functions that would have otherwise been provided by the outer zone.

*For Type S and F waters, the proposed buffers are consistent with BAS because they are:*

- 1) variable in width to account for a) variability in ecological processes (steep slope erosion and channel migration zones) and b) connectivity with wetlands,
- 2) larger in rural and higher quality urban habitats and where salmonid resource values are higher, and
- 3) within the range of recommended buffers for shade, water temperature and erosion control, removal of sediment and pollution, and large woody debris recruitment, albeit on the low end for the latter function.

The CAO standards are inconsistent with BAS recommendations as follows:

- 1) Somewhat less than full riparian functionality and much less (roughly 55 percent) than what the literature would recommend for microclimate and wildlife (see Wildlife Areas for specific wildlife impacts); and
- 2) Roughly 15 to 25 percent less than one SPTH assuming a good growing site and the dominant trees are 200- to 300-year-old conifers.

For *Type N waters* the proposed buffers are mostly consistent with BAS. They depart from BAS to a small degree because they do not protect the microclimate function. As a result, amphibians and other classes of animals using these waters may suffer. The proposed regulations provide much more protection than is called for under Washington’s Forest and Fish Agreement and the Washington DNR Habitat Conservation Plan, both of which have been subject to scientific review. Additional protection may be warranted for streams in developing landscapes, however, because land development impacts are more intense and permanent than forestry activities. Furthermore, headwater streams do not need woody debris as large as for larger fish-bearing streams because there is not the need for pool formation and hiding cover. Thus their small size and lower ability to transport material means smaller pieces of wood can play a relatively greater role in providing woody debris benefits such as channel stability and nutrient processing.

For *Type O water*, the proposed 25-foot wide buffers are *not* consistent with, and therefore, depart from BAS. Buffers of this width provide relatively little protection for most riparian functions. The extent of these type waters is not known, but where they do exist they likely provide habitat for certain classes of animals other than fish, such as certain amphibians and insects, that are aquatic and do best in fishless environments. Furthermore, the buffer is not consistent with recommendations for pollutant and sediment removal, which in turn may effect water quality of fish-bearing waters that derive some of their flow from Type O waters.

For *Special Urban Waters*, the standards are consistent with BAS. They provide a scientifically based approach to recognizing higher valued and more intact habitat in otherwise highly impacted and constrained landscapes and apply the higher buffer standards in those areas.

### ***Level of Risk to Functions and Values***

For all but microclimate functions, the risk to a function is considered low to moderate. The risk that microclimate protection will not be provided is high. For large woody debris recruitment, the risk is considered moderate. For an overall low-risk approach to buffers, Pollack and Kennard (1998) recommend 250-foot forested buffer widths along perennial streams, and widths equal to one site-potential tree height (at age 300 years—SPTH<sub>300</sub>) along seasonal (intermittent) streams. Riparian forest along non-salmon-bearing channels that flow into salmon habitat is needed to provide appropriate supply regimes of water, sediment, LWD, and other materials. Pollack and Kennard (1998) point to studies and reviews that indicate debris flows and inputs from upstream sources as significant contributors of LWD to channels. Also, to prevent deleteriously high rates of LWD and sediment flow from intermittent and non-fish-bearing channels into salmonid waters, destabilization of steep tributary channels must be avoided (Hartman and Scrivener 1990). However, the Riparian Management Zone widths for such streams can be less than the 1-SPTH (site-potential tree height) distance that Pollack and Kennard (1998) recommend because most of the small, non-salmonid-bearing streams that the King County regulations cover are *lowland* headwater creeks. These creeks have a low gradient and are much less subject to destabilization and debris flows compared with those covered by Pollack and Kennard (1998), which arise

mostly in mountain terrain that falls under Forest Practices regulations. Furthermore, where steep unstable slopes are of concern, larger set-backs will likely be applied primarily for human safety concerns. This should provide more protection than would occur through recommended buffers for resource protection alone.

The proposed systems of buffers are based on the protection of salmonids and their habitat. As such they are considered low risk to salmonids and most classes of plants and animals that are directly associated with their habitat. However, the standards are not intended as “no-impact” and therefore some organisms (such as amphibians) may be impacted. The buffer standards are clearly lower where salmonids are not present. Thus, classes of plants and animals that could experience moderate to high risk of impact are those that are either extremely intolerant of even slight amounts of change and/or those that are highly dependent on microclimate for their persistence, especially those that may be found in Type N and O waters. For example, amphibians, especially giant salamanders and tailed frogs, would be a class of animals that would be expected to suffer if riparian areas become drier. Freshwater mussels and some long-lived species of insects (e.g., certain species of stoneflies) may be good examples of animals relatively intolerant of change.

### ***Level of Uncertainty***

There are at least five issues that create uncertainty about the level risk and cumulative effects associated with the proposed CAO buffer standards. Of the five concerns, all but one would tend to increase risk and cumulative impacts while one (*clearing restriction benefits*) would tend to decrease risk and impact.

- 1) *Natural variability in resource condition and distribution.* By their nature, application of prescribed standards, even those tailored according to a variety of land use and biological factors, run the risk of not fully or adequately addressing local variations in resource conditions or land management needs. There is however, no mechanism for regulations to be increased based on new or better knowledge about local conditions. Thus, the concern from a resource protection standpoint is ensuring *a priori* that the buffers will be adequate in all cases, or at least in those cases considered most important for resource protection. The degree of risk caused by the latter situation is uncertain, but appears to be relatively small for salmonids and not likely to create serious problems for the protection of aquatic areas and species associated with salmonids. This is because many of the risk factors (e.g., presence of steep slopes, wetlands, channel migration zones) have been anticipated and the variable nature of the buffers should accommodate those variations. Further, Lucchetti (2002) found that for endangered chinook salmon and bull trout, arguably the two most critical salmonid species for which to ensure adequate protection, almost all of their habitat under King County jurisdiction will get the highest rural protections.
- 2) *Exceptions and allowed alterations.* Exceptions (i.e., activities that would not require a permit) and allowed alterations (i.e., activities that would be allowed in an aquatic area or a buffer) are a concern because the frequency and geographic extent of occurrence of these activities is unknown creating an unknown – but not zero – level of risk. For a discussion of allowed alterations see separate section below). Exceptions include activities such as house painting and other basic house and landscape maintenance, which are likely very low impacts.

- 3) *Application of standards to situations where they may not apply.* The riparian buffer standards are largely derived from studies and logic that assumes the buffer is already forested. However, in many situations riparian areas have little or no existing forest and what forest is present is often heavily degraded. There is no scientific literature that provides direction for sizing non-forested buffers or buffers in a degraded condition. In addition, there is no legal mechanism to require landowners to mitigate for an existing condition (i.e., after the fact) although some programs (e.g., tax incentives, forest stewardship program) do provide financial incentives and technical assistance for those landowners willing to reforest buffers and other sensitive areas. Thus, until a healthy, mature riparian forest is established, the protected buffers would provide fewer functions and protective benefits than a forested buffer. It may be reasonable to assume that while near term goals may not be attained, long term goals should be served as the natural forest condition recovers, provided land owners follow the regulations and allow riparian forests to regenerate.
- 4) *Agriculture and the limitation agriculture place aquatic habitats. (See separate section on agriculture below.)*
- 5) *Clearing restriction benefits. (See separate section on clearing restrictions below.)* In rural areas, concerns over the size of the buffers may be alleviated by rural restrictions on clearing in rural areas. These restrictions should serve to protect forest or areas that could be forested. Forest at the landscape level can help reduce wind and erosion problems thus reducing reliance on buffers. Depending on the extent of the forest and its contiguity with the buffers, some of the concerns for loss of microclimate could be alleviated.

Buffers are perhaps the most studied scientific concept relative to protection of aquatic resources. Thus, while there remains a degree of uncertainty over the BAS for buffers, it is probably less than for any other element of aquatic resource protection. There is high certainty that buffers are a valuable part of a larger habitat protection and species conservation strategy and no credible source advocates “no or exceedingly small buffers” as part of a strategy for protecting habitats and species from the effects of land use. Depending on goals and objectives and risk tolerance, most recommend from one to two SPTH. Typically, the debate, and therefore the uncertainty, is over how wide for a given type of water, applicability for various types and intensities of land use, and what is the desired vegetative condition of the buffer. This stems from the concern to be efficient and not burden landowners and managers with needlessly wide buffers.

## **Allowed Alterations**

*Overview:* A wide range of activities that could potentially damage aquatic habitats and habitat processes are classified as “allowed alterations” and given special dispensation to occur in aquatic areas or their buffers. These activities include new road crossings and utility lines or maintenance of such infrastructure have the potential to create impact, such as fragmentation of riparian corridors, that is not readily mitigated, if at all. Still, these actions do generally require avoidance and minimization of impact and full mitigation where impact is unavoidable, thus their classification as an “allowed alterations” does not mean they can be implemented without concern for impacts. These activities are allowed because they are considered to be either very low impact, necessary to meet legal requirements (e.g., constitutionally guaranteed property rights), or necessary to efficiently meet other goals of the County. Some of these activities are

limited to maintenance and repair, such as for existing residential land uses, flood control facilities and roads, providing there is no expansion of the use. In some of the potentially more damaging activities, BMPs that guide the timing and type of construction and that provide guidance for site restoration after construction must be followed. Other activities, such as new roads or utility crossings across small streams (< 20 cfs mean annual flow) would be new or significant changes in existing structures and would be subject to proof that there is no feasible alternative. In all but the most innocuous cases, use of BMPs, impact avoidance, and full mitigation of unavoidable impacts would be required.

### **Assessment:**

There is no specific BAS for allowed alterations, *per se*. However, many of the allowed alterations are ongoing or new incursions into buffers and aquatic areas. These incursions would tend to fragment habitats and there is considerable science that shows fragmentation creates barriers to species migration and transport of sediment, nutrient and woody debris. Thus, the standard for allowed alterations is a departure from what the BAS would indicate is protective of aquatic areas and species.

### ***Level of Risk to Functions and Values***

Risk to functions and biological values caused by allowed alterations would be considered potentially moderate to high depending on the frequency and geographic extent of the alterations. The intensity of impact of any individual alteration is generally low, however if they occur at moderate to high frequency and over a large geographic extent the cumulative effect could be high. In some cases, existing impacts and associated risks may be reduced by use of site restoration BMPs (for example, maintenance and repair of flood control facility requires use of native vegetation and LWD). In other situations, such as expansion of an existing road or residential land use, the impact is limited by requirements that limit the size of expansion and that require such expansions occur away from a critical area or its buffer. Most problematic would be new alterations, such as new utility crossing and roads. Proponents of new alterations would be required to show there is no feasible alternative and follow stringent avoidance, minimization, and mitigation requirements. This does not guarantee, however, that they would occur at a low frequency or in a very limited geographic extent.

### ***Level of Uncertainty***

This standard allows many relatively small, but cumulatively significant activities to occur or be created. While it is likely that risk will increase due to this standard, there is a large degree of uncertainty regarding the degree to which overall risk will increase because the number and type of activities is unknown. There is no science of allowed alterations, thus no assessment of uncertainty of BAS on this subject is provided.

## **Mitigation**

See Section 2.9, Wetlands, for an assessment of mitigation that is applicable to other aquatic areas.

## POLICY DISCUSSION:

Buffers are but one tool that King County is proposing in conjunction with clearing restrictions, rural stewardship, and other regulatory and incentive based provisions. Balancing of King County's other responsibilities under the Growth Management Act further influence the widths of buffers proposed. These responsibilities, outlined in the King County Comprehensive Plan are:

- ***Preserve the high quality of life*** by balancing infrastructure needs with social, cultural, educational, recreational, civic, health and safety needs.
- ***Spend money wisely and deliver services efficiently*** by:
  - Concentrating infrastructure investments and service delivery to support the regional development pattern near cities where a full range of local services are located or can be made available;
  - Solving service deficiencies within the County to meet existing service needs and phasing service improvements for the needs of future growth;
  - Looking to King County to provide countywide facilities and services, and;
  - Relying primarily upon cities and special purpose districts as the providers of local facilities and services appropriate to serve those local needs, except where the County is the local service provider (e.g., Rural Area).
- ***Continue our economic prosperity*** by promoting a strong and diverse economy for King County residents through policies and programs that encourage new business opportunities, increase family wage jobs and create a predictable regulatory environment for businesses and citizens.
- ***Increase the housing choices for all residents*** by permitting a wide variety of home styles and by increasing housing opportunities for all residents in locations closer to jobs.
- ***Ensure that necessary transportation facilities and services are available to serve development at the time of occupancy and use*** by targeting road and transit investments where growth is desired and for equitable contributions to the transportation system by new development.
- ***Balance urban uses and environmental protection*** through careful site planning that maximizes developable land while respecting natural systems.
- ***Preserve rural, resource and ecologically fragile areas for future generations*** by maintaining low residential densities in the rural areas and in areas containing regionally and nationally important ecosystems for fish and wildlife and by recognizing that resource lands, such as farms and forests, provide economic, social and environmental benefits.



## 2.8 WILDLIFE AREAS

In the BAS document, literature was reviewed for the particular terrestrial wildlife species that the King County Comprehensive Plan lists for protection. In this document, the code that affords protection to terrestrial wildlife species is assessed. Additionally, for those species and habitats for which the Comprehensive Plan requires protection, a determination of risk to the functions and values of the specific habitat is assigned and discussed.

The analysis that follows was performed under these assumptions: (1) current and future connections across the landscape will continue to allow dynamic interactions and dispersals of individuals and populations; (2) prey species of all evaluated species will maintain relatively stable populations in the face of new development; (3) the ecosystem requirements of each evaluated species will be addressed by consideration of its specific life or breeding needs without consideration of its interdependence across the landscape (all plant and animal species and particular habitat functions that depend on it and that it depends on for survival); and (4) all regulations in the code will be implemented appropriately and in full compliance with the code. Another assumption of this analysis is that existing natural habitats across a large scale (landscape) provide all of the needs of a native species and that other protections in the code (such as aquatic area and wetland buffers) also protect life history needs of wildlife. For example, aquatic area buffers may result in protection of bald eagle foraging needs. Wetland buffers, riparian areas, and forest retention (see Clearing Restriction, Section 4.4) in the rural area will also provide benefits to a variety of wildlife.

### Ten “Shall” Species

For those species the Comprehensive Plan requires the County to protect, their breeding habitat is considered a Wildlife Habitat Conservation Area. Wildlife Habitat Conservation Areas are critical areas, and this means that explicit activities are restricted within these areas. The wildlife habitats that are protected as Wildlife Habitat Conservation Areas are divided into two groups for this assessment:

- (1) Ten “shall” species
- (2) Remaining “shall” species

Ten species are explicitly protected in the code through critical area designation, which focuses primarily on the preservation of the species’ breeding habitats. As mentioned above, these ten species were singled out for explicit language in the CAO because of one or more of the following reasons: (1) they are federally listed as threatened; (2) they are most easily identifiable, or; (3) they are most likely to be encountered in King County nesting in the same location for more than one year. Table 2.1 presents a summary of the current standards in the CAO for ten species that are specifically addressed. The table is presented here so that all standards for the ten wildlife species can be viewed in relation to one another. In the assessment of each species that follows, the standards will be described in full.

Although specific critical area designations for protecting ten priority species are proposed, only their breeding habitat is specifically protected and no specific provisions exist for the protection of alternate breeding habitats. In part, there is an over-arching assumption that other protections

in the code will serve to protect life history needs of wildlife in addition to breeding habitat needs (e.g., riparian zone protections may result in protection of bald eagle foraging needs).

For the ten protected species, certain activities may adversely impact nesting and breeding, such as nearby logging/clearing, development, road building, or recreation, by reducing terrestrial habitat, prey species, or creating visual and noise disturbance. The degree of disturbance will vary depending on the type of land use or activity. Some species might be more tolerant of disturbance than others; however, these differences are intended to be taken into account by the sizes of the critical area. Additionally, some species have been shown to habituate to human activities nearby. In other words, some species will successfully nest despite nearby development. There is a provision in the code that allows for a size reduction of the critical area of certain species if those species are proven to be habituated to human activities. This provision is addressed in the assessment of those species below to which it applies.

**Table 2-1. CAO standards for the protection of ten species.**

Species	Breeding Habitat	Breeding season	Proposed Breeding Critical Area	Proposed Year-round Critical Area	Additional Proposed Restrictions
Bald Eagle	Nest tree	March 15 – April 30	800 feet	400 feet	<ul style="list-style-type: none"> <li>No use of land clearing machinery within 800 feet of the nest tree between January 1 and August 31</li> </ul>
Great Blue Heron	Rookery	January 1 – July 31	924 feet	820 feet	<ul style="list-style-type: none"> <li>If rookery population is in decline<sup>1</sup>, year round critical area is 984 feet</li> </ul>
Marbled Murrelet	Nest tree			.5 miles	
Northern Goshawk	Nest tree			1500 feet	
Osprey	Nest tree	April 1 – September 30	660 feet	230 feet	
Peregrine Falcon	Peregrine falcon eyrie	March 1 – June 30	.5 miles	1000 feet	<ul style="list-style-type: none"> <li>No disturbance on cliff rim above eyrie or immediately below nest cliff</li> <li>No land-clearing activities that result in loud noises, e.g. blasting, chainsaws, heavy machinery, within .5 miles of nest between March 1 and June 30</li> <li>Power lines not allowed within 1000 feet of eyrie</li> <li>Cliff-nesting information not distributed publicly</li> </ul>
Spotted Owl	Nest tree			.7 miles (3700 feet)	

Species	Breeding Habitat	Breeding season	Proposed Breeding Critical Area	Proposed Year-round Critical Area	Additional Proposed Restrictions
Townsend's big-eared bat	Nursery colony	June 1 – October 1	450 feet	450 feet around hibernacula between November 1 and March 31	<ul style="list-style-type: none"> <li>• Building, bridge, tunnel, or other structure used solely for day or night roosting shall not be altered or destroyed between March 1 and November 30</li> <li>• Gates across caves or mines protected because of bat presence shall be designed to allow bats to enter and exit the cave or mine</li> <li>• Human entrance into caves or mines protected because of bat presence shall be prohibited during breeding season.</li> </ul>
Vaux's swift	Nest tree	April 1 – October 31	400 feet	300 feet	
Red-tailed hawk	Nest tree	March 1 – July 31	650 feet	325 feet	

<sup>1</sup>If monitoring data from WDFW or another agency indicate a declining population.

**Bald Eagle Development Standard – Wildlife Habitat Conservation Areas:**

- *The wildlife habitat conservation area for a bald eagle is an area with a four hundred foot radius from an active bald eagle nest. Between March 15 and April 30, no alterations shall be allowed within eight hundred feet of the nest; and*
- *Between January 1 and August 31, no land clearing machinery, such as bulldozers, graders, or other heavy equipment, shall be operated within eight hundred feet of the nest tree.*

**Bald Eagle Standard – Modification of Critical Areas:**

*Upon request of the applicant and based upon a site-specific critical areas report that includes, but is not limited to, an evaluation of the tolerance of the animals occupying the nest to the existing level of development in the vicinity of the nest, the department may approve a reduction of the area around the nest for the bald eagle.*

**Assessment:**

King County will implement standard management recommendations that were developed for the listed species by the U.S. Fish and Wildlife Service and Washington Department of Fish and Wildlife (AC 365-195-190(1)). King County assumes existing WDFW recommendations are consistent with BAS.

No departures from best available science are identified in the CAO. With the protection established by the CAO, bald eagles should not be disturbed as a result of clearing or other activities associated with development.

### ***Level of Risk to Functions and Values***

Based on the proposed CAO standards, there is no risk to the functions and values of bald eagles active breeding habitat.

### ***Level of Uncertainty***

Bald eagle wildlife habitat conservation areas may be reduced in size if an applicant submits a site-specific evaluation that indicates the breeding pair is habituated to human activity. There is a great deal of uncertainty in this approach because reduced “buffers” do increase the risk of nest abandonment.

### **Great Blue Heron Development Standard – Wildlife Habitat Conservation Areas:**

- *The wildlife habitat conservation area for a great blue heron rookery is an area with an eight-hundred-twenty foot radius from the rookery. If the department (DDES) determines that the population of the rookery is declining, the department may require that the radius be increased by up to an additional one-hundred sixty-four feet; and*
- *Between January 1 and July 31, no clearing or grading shall be allowed within nine-hundred-twenty-four feet of the rookery.*

### **Great Blue Heron Standard – Modification of Critical Areas:**

*Upon request of the applicant and based upon a site-specific critical areas report that includes, but is not limited to, an evaluation of the tolerance of the animals occupying the rookery to the existing level of development in the vicinity of the rookery, the department may approve a reduction of the area around the rookery for great blue herons.*

### **Assessment:**

Potential risks to the functions and values of great blue heron habitat areas may occur because of the following elements of the proposed CAO standards. The standards are inconsistent with BAS recommendations, however there is a high level of uncertainty and unknowns in BAS for great blue herons.

No provisions exist in the code for explicitly protecting alternative forested stands in the vicinity of existing great blue heron breeding colonies. If a heron colony needs to relocate, they may not have adequate alternative habitat suitable for nesting. Alternative forest stands may be protected through the 35 percent clearing restriction (see below). However, it is not possible to predict if forest areas retained via this requirement will provide suitable heron nesting habitat.

No provisions exist in the code to explicitly protect great blue heron foraging areas. Foraging areas will be partially protected through aquatic and wetland protections. However, those

protections do not always provide a sufficient protection area to meet the BAS recommendations for herons (at least 328 feet buffer around intensively used foraging areas).

The wildlife conservation areas established in the proposed CAO standards are consistent with recommendations by WDFW. However, the state additionally recommends that activities such as logging or construction should not occur within 3,281 ft (1,000 m) of a colony during the nesting season unless those activities can be shown to have no effect on great blue heron fitness.

Because of the proposed CAO standards inconsistencies with BAS for protection of great blue herons described above, the following ecological functions may be adversely impacted:

**Breeding habitat:** the proposed great blue heron conservation area is 924 ft; therefore, logging and construction may occur within the 3,281 ft that WDFW recommends remain free of logging and construction. It is possible that these types of activity may cause a heron colony to have reduced reproduction or to abandon the nest.

**Alternative breeding habitat:** this habitat may be negatively impacted, because according to BAS, potential rookery sites should be identified and protected to replace shifting colonies, declining colonies, and/or provide habitat for abandoned colonies. Potential rookery sites should be as close to existing rookeries to retain their original (and presumed optimal) geographic setting relative to other colonies and food sources. Because no alternative nesting habitat is specifically protected near active colonies, herons may abandon rookeries that are adjacent to development, and abandonment may result in an overall decrease in the heron population.

**Foraging habitat:** this habitat may be negatively impacted because protection of foraging areas buffers is only partially provided by proposed wetland and aquatic protection regulations (in other words, the buffers around wetland and aquatic areas are not always as large as those recommended for those around great blue heron foraging habitat). A reduction of the function and value of great blue heron foraging habitat may result in herons abandoning the area in search of better foraging habitat.

### ***Level of Risk to Functions and Values***

In the short-term (i.e., 5 years), the proposed species-specific protection regulation is likely to adequately protect existing breeding and foraging habitat, and the risk to the functions and values of great blue heron habitat as a result of the proposed CAO standards is low.

Great blue herons are unique among these nine species in that they are colony nesters. Therefore, the smallest unit of alternate breeding habitat for great blue herons would be a variable-sized forest stand (best available science recommends that several alternative forested stands at least 10 acres with dominant trees at least 56 feet in height be left in the vicinity of existing great blue heron breeding colonies). Additionally, this species requires large areas of habitat for nesting that are free of human intrusion and have substantial buffers (325 feet) near quality foraging areas. With no provisions to specifically secure alternative nesting habitat or protect foraging habitat near colonies with buffers recommended by BAS, and without the large logging and construction buffers recommended by WDFW, under the proposed CAO, the long-term (i.e., 25 yr.) potential risk to the overall heron population associated with implementation of the CAO is estimated to be moderate.

### ***Level of Uncertainty***

In King County, great blue heron colonies currently persist within much smaller conservation areas than those recommended by best available science (in the form of buffers). It is not known if these smaller conservation areas are adequate to protect the colonies in the long term. Nor is it known how many colonies in King County could persist with reduced protected areas. It is unknown whether great blue herons in King County require the large logging and construction buffers recommended by WDFW. Additional research would likely reveal important information regarding the effect and effectiveness of smaller conservation area sizes on great blue heron colonies.

Many recommendations for buffer sizes around heron colonies have been made in the absence of data showing the effects of human disturbance on nesting great blue herons. This lack of information leaves uncertainty regarding habituation of herons to human activity. Great blue heron wildlife habitat conservation areas may be reduced in size if an applicant submits a site-specific evaluation that indicates a heron colony is habituated to human activity. There is uncertainty in this approach because reduced buffers do increase the risk of nest abandonment.

Generally, it is not known what the combined or cumulative impacts of development alongside these protection measures will be, especially in the long term.

### **Marbled Murrelet Development Standard – Wildlife Habitat Conservation Areas:**

*The wildlife habitat conservation area for a marbled murrelet is an area with a one-half mile radius around an active marbled murrelet nest.*

### **Assessment:**

King County will implement standard management recommendations that were developed for the marbled murrelet, a listed species, by the U.S. Fish and Wildlife Service and Washington Department of Fish and Wildlife (WAC 365-195-190(1)). King County assumes existing WDFW recommendations are consistent with BAS. Additional incentive-based protection for marbled murrelet habitat is via old-growth and mature forest protection incentives in the proposed Clearing and Grading Ordinance.

No departures from best available science are identified in the CAO. With the protection established by the CAO, marbled murrelets should not be disturbed as a result of clearing or other activities associated with development.

### ***Level of Risk to Functions and Values***

Based on the CAO, there is no estimation of risk to the functions and values of marbled murrelet active breeding habitat.

### ***Level of Uncertainty***

The level of uncertainty with regards to marbled murrelets locations and protection is moderate. Marbled murrelet nests are not easy to discover; therefore, it is possible some nests remain

unmapped and therefore unprotected. Currently all known marbled murrelets in King County are found in the Forest Production District. It is unlikely any murrelets will establish new nesting sites in rural King County outside the Forest Production District, unless large tracts of mature forest are left intact in the long-term.

### **Northern Goshawk Development Standard – Wildlife Habitat Conservation Areas:**

*The wildlife habitat conservation area for a northern goshawk is an area with a one-thousand-five hundred foot radius around an active northern goshawk nest located outside of the urban growth area.*

### **Northern Goshawk Standard – Modification of Critical Areas:**

*Upon request of the applicant and based upon a site-specific critical areas report that includes, but is not limited to, an evaluation of the tolerance of the animals occupying the nest to the existing level of development in the vicinity of the nest, the department may approve a reduction of the area around the nest for the northern goshawk.*

### **Assessment:**

The northern goshawk is protected outside King County's urban growth area (nests are still protected inside the urban growth area via State and Federal regulations, but no conservation area would be established). Because of the level of existing development and associated land clearing, habitat for the goshawk primarily occurs within the forest production district (which is outside the urban growth area). Because primary goshawk habitat lies in the forest production district, it is not anticipated that existing goshawk populations in King County will be significantly affected by the proposed CAO standards because existing zoning regulations limit development within this region. However, potential risks to the functions and values of northern goshawk habitat areas may occur because of the following elements of the CAO that are in the low range of BAS recommendations for northern goshawks.

The current proposed standard set forth in the code protect the *active* nest tree, but does not specifically protect for alternate nests. Goshawks may use more than one nest during a breeding season; therefore, alternate nests require protection. An area large enough to protect alternate nests is necessary to maintain goshawk populations in King County.

Foraging habitat protection is addressed only through incentives. The goshawk requires large tracts of forested land (as much as 15 mi<sup>2</sup>) to meet its life needs. Forest conditions that secure large tracts of land that support diverse prey populations are not specifically addressed in the code.

Goshawks are not protected inside the Urban Growth Area, and they are not expected to be found nesting there. If goshawk populations occur outside of the forest production district within eastern portions of the County, the following ecological functions may be adversely impacted:

Nesting Habitat: Conservation area designated by the CAO outside the urban growth area (1500 ft radius, or 266 acres) may not include alternate nest sites (in one study, mean number of nests

used in a breeding season was 2.6 +/-0.42). A lack or disruption of alternate nest sites may result in unsuccessful goshawk breeding.

**Foraging Habitat:** Conservation area designated by the CAO outside the urban growth area may not be sufficient to support a prey base for goshawks (home ranges for breeding goshawks range from 235 to 8,649 acres). If sufficient prey is not available, goshawks may abandon area. Additionally, land uses that fragment forests occupied by goshawks may reduce foraging function and value and cause them to abandon the area.

### ***Level of Risk to Functions and Values***

It is unlikely that goshawks are nesting in the rural residential area. Therefore, short- and long-term risk to this species as a result of development in the area affected by the proposed CAO is estimated to be low.

### ***Level of Uncertainty***

It is anticipated that most goshawk populations in King County occur in the Forest Production District, and are therefore outside the area regulated by the proposed CAO. It is assumed, but unverified, that very few goshawks will be impacted by development in King County.

The current wildlife conservation area standard established by the proposed CAO for goshawks is set at 1500 feet (i.e., 1500-ft radius around a nest). Although this size has proven effective in some studies, it has been shown to be inadequate (goshawks were affected by disturbance) in other studies. It is assumed the 1500-ft conservation area is sufficient to protect breeding goshawks, but it is unknown if any breeding goshawks in King County would require a larger protected area to successfully breed. Additionally, it is assumed that replacement nest trees are located nearby and within the conservation area, so that if a nest tree were lost, another could be used as a replacement. It is uncertain if this assumption is true.

Protection needs are still debated among experts. In general, any protection of large, mature to old-growth forest tracts that is realized should be beneficial. However, critical habitat is not well defined for the goshawk in this part of its range (or other parts), and critical habitat must be defined before protection requirements can be better defined. As such, there is uncertainty associated with the current BAS used to evaluate the necessary conservation areas for protection of goshawks.

Home range of non-breeding goshawks is poorly understood but may be larger than those of breeding goshawks. In North America, winter home ranges are unknown. Winter habitat use is so poorly understood that potential impacts of human activities cannot be assessed. Other specific requirements of goshawks are also poorly understood.

Generally, it is not known what the combined or cumulative impacts of development alongside these protection measures will be, especially in the long term.

### **Osprey Development Standard – Wildlife Habitat Conservation Area:**

- *The wildlife habitat conservation area for an osprey is an area with a two-hundred-thirty foot radius around an active osprey nest;*



- *Between April 1 and September 30, no alterations shall be allowed within six hundred sixty feet of the nest tree*

### **Osprey Standard – Modification of critical areas:**

*Upon request of the applicant and based upon a site-specific critical areas report that includes, but is not limited to, an evaluation of the tolerance of the animals occupying the nest to the existing level of development in the vicinity of the nest, the department may approve a reduction of the area around the nest for osprey.*

### **Assessment:**

BAS recommends that at least two dominant live trees and two desirable snags per acre should be reserved as alternative habitat where osprey nests are located along a lake or marine shoreline. Also for these locations, BAS recommends that a minimum of three to five broken-top snags and live trees that are suitable for osprey nesting be located within 722 feet (220 m) of the nest tree. Additional snags and trees up to 2.2 miles (3.5 km) beyond a 1312-ft. (400 m) zone should also be preserved to ensure sufficient nesting habitat. The CAO is inconsistent with BAS by not requiring that this additional nest habitat be protected.

The proposed CAO does not address closing roads within the conservation area. The proposed CAO does not address limiting campsites to outside the conservation area. These are both human activities that may cause frequent nest departure during the critical breeding area for osprey that are not accustomed to human presence.

Based on the CAO's inconsistency with BAS for protection of osprey, the following ecological functions may be adversely impacted:

**Breeding habitat:** Disturbances by traffic or people camping within an osprey conservation area may occur with ospreys that are not habituated to human activity. These activities may cause osprey to leave their nests frequently or for extended periods of time and cause nestlings to die as a result.

**Alternative breeding habitat:** Protection for snags is incentive-based only (via snag protection incentives in the proposed Clearing and Grading Ordinance); however, the CAO does not specifically require that snags be retained. If nest disturbance occurs and no alternative sites are available, osprey will likely abandon the area or fail to reproduce.

### ***Level of Risk to Functions and Values***

With the regulations proposed by the CAO for osprey, in addition to the riparian protections, the 35 percent clearing restriction (see below), and other snag-related incentives, it is estimated that the short- and long-term risk of adverse impacts to existing osprey populations in King County is low.

### ***Level of Uncertainty***

Osprey wildlife habitat conservation areas may be reduced in size if an applicant submits a site-specific evaluation that indicates the breeding pair is habituated to human activity. There is a

great deal of uncertainty in this approach because reduced conservation areas do increase the risk of nest abandonment.

Studies on osprey populations and life history requirements have been conducted at various locations across the United States. Because of the variety of studies that have been conducted, it is assumed that the range described by best available science is equally appropriate for ospreys nesting in King County. However, no studies describing osprey needs in Western Washington have been conducted, so it is possible critical area sizes and activity restrictions are not appropriate for this area.

Generally, it is not known what the combined or cumulative impacts of development alongside these protection measures will be, especially in the long term.

### **Peregrine Falcon Development Standard – Wildlife Habitat Conservation Areas**

- *For an eyrie located on a cliff face, the wildlife habitat conservation area for a peregrine falcon is an area extending for a distance of one thousand feet of the eyrie on the cliff face, the area immediately above the eyrie on the rim of the cliff, and the area immediately below the cliff;*
- *Within one-half mile of the eyrie, between March 1 and June 30, land-clearing activities that result in loud noises, such as from blasting, chainsaws, heavy machinery, are not allowed; and*
- *New power lines shall not be constructed within one-thousand feet of the eyrie.*

### **Peregrine Falcon Standard: Modification of Critical Areas:**

*Upon request of the applicant and based upon a site-specific critical areas report that includes, but is not limited to, an evaluation of the tolerance of the animals occupying the nest to the existing level of development in the vicinity of the nest, the department may approve a reduction of the area around the nest for peregrine falcons.*

### **Assessment:**

The protections in the proposed CAO are based upon WDFW's recommendations (and literature review). The range for activities on the face of the cliff and below the cliff are 0.25 - 0.5 mi, so the protections in the proposed CAO are at the high end of protection. Power lines are recommended in the literature to be 1300-2640 ft away from peregrine nests; the proposed 1000-ft buffer is less than the low end of the range.

Peregrine falcons are known to nest in cities; however, urban areas should not be confused with good breeding habitat. Most peregrines nesting within cities have been transplanted and raised in constructed nest sties. As such, the few birds that take up residence in cities are the exception, not the rule, and if it were assumed that all peregrine falcons could thrive in cities, a rapid decline of the species would likely be observed. That said, birds that nest in cities and similarly developed areas are clearly habituated to a high degree of disturbance. Most peregrines affected by the Critical Areas Ordinance will be found nesting in cliffs in the rural area of the County.

No departures from best available science are identified in the proposed CAO. With the protection established by the CAO, peregrine falcons should not be disturbed as a result of clearing or other activities associated with development.

***Level of Risk to Functions and Values***

Based on the CAO, there is no estimation of risk to the functions and values of peregrine falcon active breeding habitat.

***Level of Uncertainty***

Peregrine falcon wildlife habitat conservation areas may be reduced in size if an applicant submits a site-specific evaluation that indicates the breeding pair is habituated to human activity. There is a great deal of uncertainty in this approach because reduced conservation areas do increase the risk of nest abandonment.

Peregrine falcons nest in areas that are not conducive to development (cliffs and steep slopes). However, they nest in areas that may be frequented by rock climbers. It is unknown if peregrine falcons will be impacted by opportunistic recreational activities that are not associated with a specific proposed development.

Generally, it is not known what the combined or cumulative impacts of development alongside these protection measures will be, especially in the long term.

**Northern Spotted Owl Development Standard – Wildlife Habitat Conservation Areas**

*The wildlife habitat conservation area for a spotted owl is an area with a three-thousand-seven-hundred foot radius from an active spotted owl nest.*

**Assessment:**

King County proposes to implement protection measures for the spotted owl that are currently implemented by U.S. Fish and Wildlife Service and Washington Department of Fish and Wildlife (WAC 365-195-190(1)). This approach assumes that the existing state and federal recommendations are consistent with best available science. Additional incentive-based protection for spotted owl habitat is via old-growth and mature forest protection incentives in the proposed Clearing and Grading Ordinance.

No departures from best available science are identified in the CAO. With the protection established by the CAO, spotted owls should not be disturbed as a result of clearing or other activities associated with development.

***Level of Risk to Functions and Values***

Based on the proposed CAO standards, there is no risk to the functions and values of spotted owl active breeding habitat.

### ***Level of Uncertainty***

The level of uncertainty with regards to spotted owl locations and protection is low. It is assumed all spotted owls in King County have been mapped and already protected with state and federal regulations. Currently all spotted owls in King County are found in the Forest Production District. It is unlikely any owls will establish new nesting sites in rural King County outside the Forest Production District, unless large tracts of mature forest are left intact in the long-term.

### **Townsend's Big-Eared Bat Development Standard - Wildlife Habitat Conservation Areas:**

- *Between June 1 and October 1, the wildlife habitat conservation area for a Townsend's big-eared bat nursery colony shall be an area with a four-hundred-fifty foot radius from the entrance to a cave or mine with an active nursery colony located outside of the urban growth area;*
- *Between November 1 and March 31, the wildlife habitat conservation area for a Townsend's big-eared bat hibernacula shall be an area with a four-hundred-fifty foot radius from the entrance to a cave or mine serving as a winter hibernacula;*
- *A building, bridge, tunnel, or other structure used solely for day or night roosting shall not be altered or destroyed between March 1 and November 30;*
- *A gate across the entrance to a cave or mine that is protected because of bat presence shall be designed to allow bats to enter and exit the cave or mine; and*
- *Human entrance shall be prohibited between May 1 and September 15 into a cave or mine that is protected because of bat presence.*

### **Assessment:**

With the protection established by the CAO, Townsend's big-eared bats are unlikely to be disturbed outside the urban growth area as a result of clearing or other activities associated with development. Based on the CAO, there is an estimation of no risk to the functions and values of Townsend's big-eared bat habitat outside the urban growth area. However, if Townsend's big-eared bats are using caves inside the urban growth area, they will not be afforded the protection of habitat conservation areas.

Additional protection for caves is incentive-based only (via cave protection incentives in the proposed Clearing and Grading Ordinance).

Based on the CAO's inconsistencies with BAS for protection of Townsend's big-eared bats, the following ecological functions may be adversely impacted:

**Breeding habitat:** If Townsend's big-eared bats are using nursery caves inside the urban growth area, they may be negatively impacted by development and as such may abandon their caves if they are disturbed.

**Hibernacula:** If Townsend's big-eared bats are using hibernacula (caves for hibernation) inside the urban growth area, they may be negatively impacted by development and as such may abandon their caves or die from energy exhaustion if they are disturbed.

### ***Level of Risk to Functions and Values***

With the regulations established by the proposed CAO for Townsend's big-eared bats, in addition to the cave protection incentives in the proposed Clearing and Grading Ordinance, it is estimated that the short- and long-term risk of adverse impacts to existing Townsend's big-eared bat populations related to development in King County is low.

### ***Level of Uncertainty***

There is no empirical data available in the literature that indicates the specific size of the conservation area needed around cave entrances to maintain interior microclimates. Therefore, there is uncertainty regarding the level of protection required to protect this species.

Pierson and Rainey (1998) note that so little is known about the foraging requirements of these bats, it is not currently possible to assess potential impacts from various types of habitat alterations. Therefore, there is uncertainty regarding the degree to which negative impacts of foraging habitat might impact these bats.

Currently, there is no population information available for these bats. Therefore, it is not possible to know how often caves with bats will be encountered. Although mines have been mapped in King County, caves have not, so the location of potential habitat (in the form of caves) is unknown. To date, mines have not been surveyed to determine occupancy by Townsend's big-eared bats. Therefore, there is significant uncertainty regarding the level of risk associated with additional development in the vicinity of potential Townsend's big-eared bat habitat.

Generally, it is not known what the combined or cumulative impacts of development alongside these protection measures will be, especially in the long term.

### **Vaux's Swift Development Standard – Wildlife Habitat Conservation Areas:**

- *The wildlife habitat conservation area for Vaux's swifts is an area with a three hundred foot radius from an active Vaux's swift nest located outside of the urban growth area;*
- *Between April 1 and October 31, clearing, grading, or outdoor construction shall not be allowed within four hundred feet of an active or potential nest tree. A standardized species survey approved by the department may be used to demonstrate that the potential nest tree does not contain an active nest;*

### **Assessment:**

Vaux's swifts are protected only outside King County's urban growth area (UGA). If any swifts are actively nesting inside the UGA, they may not be adequately protected (nests are still protected via State and Federal regulations, but no conservation area would be established).

BAS recommends that alternate roosts are necessary for nesting Vaux's swifts. The proposed CAO standard is inconsistent with BAS by not requiring that this alternate nest habitat be protected.

Potential risks to the functions and values of Vaux's swift habitat areas may occur because of the following elements of the proposed CAO standards that are inconsistent with BAS for Vaux's swifts:

Nesting habitat: Vaux's swift may abandon nest sites located inside the UGA. Nesting and alternate nesting opportunities may be lost because the code does not protect alternate roosts. Populations may relocate or decline.

### ***Level of Risk to Functions and Values***

Because Vaux's swifts nest in old-growth snags and stumps, and the greater concentration of such habitat will be found outside the UGA, the likelihood of the species being impacted by development in King County is low. However, it is possible some breeding pairs may currently be nesting inside the UGA that could be impacted by development. With the regulations established by the CAO for Vaux's swifts, it is estimated that the short-term risk to the species is low, because of the low likelihood that their current habitat will be significantly negatively impacted. Long-term risk of adverse impacts to existing Vaux's swift populations in King County is estimated to be moderate, because over time, without established protection of primary roosts in the UGA and alternate roosts outside the UGA, populations are expected to decline.

### ***Level of Uncertainty***

The degree of uncertainty regarding the risk to Vaux's swifts is high. Relatively little is known about this species, including life history requirements. As The Nature Conservancy (2001) remarks:

More detailed information is needed on the impacts of habitat alterations and various forest management activities, response to fire, response to human disturbance, and especially area needs and relationship to landscape patterns. Information is needed on abundance, productivity, dispersal, and survival in relation to habitat and forest management scenarios. Need information on potential use of habitat corridors or watercourses for travel, migration routes, and stopover habitats. More detailed information is especially needed on habitat relationships, status, and threats to the species in Mesoamerica.

The conservation areas established by the CAO are based upon professional judgment (as opposed to empirical evidence), as a specific buffer size necessary to protect a nest from disturbance is not specifically addressed within the literature. Because proposed conservation area requirements were based on professional judgement, their adequacy is unknown. Larger areas may be needed or smaller areas may be adequate.

The distribution of Vaux's swifts in King County is unknown. Protection for alternative nest sites is incentive-based only (via old-growth protection incentives in the proposed Clearing and Grading Ordinance). As such, over time, fewer and fewer nest trees are likely to be available, as it is assumed some old-growth trees will be lost to development.

### **Red-tailed Hawk Development Standard – Wildlife Habitat Conservation Areas:**

- *The wildlife habitat conservation area for a red-tailed hawk is an area with a radius of three-hundred twenty-five feet from an active red-tailed hawk nest located outside of the urban growth area;*

- *Between March 1 and July 31, no clearing and grading shall be allowed within six hundred sixty feet of an active red-tailed hawk nest located outside of the urban growth area; and*
- *Between March 1 and July 31, no disruptive activities such as walking or driving shall be allowed within three hundred twenty-five feet of an active red-tailed hawk nest located outside of the urban growth area.*

### **Red-tailed Hawk Standard: Modification of Critical Areas:**

*Upon request of the applicant and based upon a site-specific critical areas report that includes, but is not limited to, an evaluation of the tolerance of the animals occupying the nest to the existing level of development in the vicinity of the nest, the department may approve a reduction of the area around the nest red-tailed hawks.*

### **Assessment:**

The red-tailed hawk is protected outside King County's urban growth area. Nests within the urban growth area are still protected via State and Federal regulations, but no conservation area would be established.

The proposed CAO does not address limiting human activity such as driving and walking near (within 325 ft) of nests, as is suggested by WDFW.

Based on the CAO's inconsistency with from BAS for protection of red-tailed hawks, the following ecological functions may be adversely impacted:

**Breeding habitat:** Disturbances by traffic or people walking within a red-tailed hawk conservation area may occur with nesting pairs that are not habituated to human activity. These activities may cause the hawks to leave their nests frequently or for extended periods of time and cause nestlings to die as a result.

**Breeding habitat:** In the urban growth area, a lack of protection of the area around the nest tree could cause nest failure or abandonment.

### ***Level of Risk to Functions and Values***

Because much of the County remains undeveloped, and current levels of nesting and foraging habitat will likely not change very much in the next 5 years, the level of risk to the functions and values in the short term is estimated to be low.

It is not possible to estimate the risk posed to red-tailed hawk populations by the CAO in the long term because of the degree of uncertainty (see below).

### ***Level of Uncertainty***

Red-tailed hawks may be the most commonly seen raptors in the region; however, it is unknown what the long-term effects of development will be on their populations. Little data have been collected that indicate the effects of development near nesting birds; therefore, larger conservation areas may be needed or smaller areas may be adequate.

Red-tailed hawk wildlife habitat conservation areas may be reduced in size if an applicant submits a site-specific evaluation that indicates the breeding pair is habituated to human activity. There is a great deal of uncertainty in this approach because reduced conservation areas do increase the risk of nest abandonment.

## **Remaining “Shall” Species**

The remaining species, other than the nine species described above that the Comprehensive Plan directs “shall” be protected (see Tables 8-1 and 8-2 in BAS Volume I report, Chapter 8 Wildlife Areas), are discussed in this section. The breeding habitats of these remaining species are protected as critical areas (Wildlife Habitat Conservation Areas) when they are identified on site.

The state or federal protection requirements for these breeding habitats are to be considered in site planning. With the exception of the pileated woodpecker and the red-tailed hawk, the majority of these species are: (1) not likely to be found in the urban or rural residential portions of King County (areas prone to development) outside of priority habitats; or (2) not known to be actively breeding in the County.

### **Development Standard – Wildlife Habitat Conservation Areas:**

*For any other species whose habitat the King County comprehensive plan requires the County to protect, the department shall require an active breeding site to be protected. The protection shall be based on the Washington State Department of Fish and Wildlife’s Priority Habitat and Species management recommendations, if available.*

### **Assessment:**

If these species are encountered during a site visit, they will be protected based on state and federal management guidelines. Because the protections are based upon state and federal guidelines (or other current literature), it is assumed that breeding habitat protections are consistent with best available science. However, the County has not researched whether breeding habitat protections are adequate to protect the functions and values of all the habitat types required by these species. Therefore, it is unknown if protecting breeding habitat alone will provide for the protection of these species.

At this time, functions and values of wildlife habitat associated with implementation of regulations regarding these species cannot be determined.

### ***Level of Risk to Functions and Values***

At this time, the level of risk associated with implementation of regulations associated with these species cannot be determined.



### ***Level of Uncertainty***

It is assumed that the breeding habitat (nests, etc.) for each of these species will be recognized when present by the staff or volunteer performing site visits; however, there is a high degree of uncertainty as to how effective the staff or volunteers will be at locating the habitat.

## **Wildlife Habitat Network**

The Wildlife Habitat Network is a network of vegetated corridors throughout the County that was designed to link high quality streams, wetlands, and open space lands, and to minimize habitat fragmentation. The goal of the network is to make sure that larger “core” wildlife habitats remain connected across the landscape after development occurs. Travel corridors, in general, are at risk in King County. The Wildlife Habitat Network is one attempt to address this issue. The Wildlife Habitat Network is referenced and mapped in chapter four of the King County Comprehensive Plan. Policies E-175 and E-176 specifically refer to this data layer.

### **Wildlife Habitat Network Standards:**

The standards set forth in the CAO for protection of the Wildlife Habitat Network are lengthy and so are summarized and excerpted here. See KCC 21A.24 Section 56-59.

### **Applicability (excerpt):**

*Segments of the wildlife habitat network that lie in areas to be developed shall be set aside and protected along the designated wildlife habitat network adopted by the King County Comprehensive Plan.*

### **Design Standards (excerpt):**

- *The network shall maintain a width, wherever possible, of three-hundred feet. The network width shall not be less than one-hundred-fifty feet at any point; and*
- *The network shall be contiguous with and include critical area tracts and their areas;*
- *When feasible, the wildlife habitat network shall be sited on the property in order to meet the following conditions:*
  - *Connect isolated critical areas or habitat; and*
  - *Connect with wildlife habitat network, open space tracts or wooded areas on adjacent properties, if present*

### **Allowed Alterations:**

*Within the wildlife critical areas including the Wildlife Habitat Network, certain specified alterations are allowed if they comply with the development standards and all applicable requirements established in King County Code chapter 21A.24 of the proposed CAO. Refer to New Section 7 for a complete listing of allowed alterations within wildlife areas.*

*When proposed allowed alterations subject the functions and values of wildlife areas to greater risk, the risk is estimated below.*

**Assessment:**

Potential risks to the functions and values of the wildlife habitat network may occur because of the following elements of the proposed CAO standards that are in the low range of BAS recommendations:

Terrestrial linkages: these are not protected to the extent recommended by BAS. The Wildlife Habitat Network is intended to provide landscape-level protections for wildlife species. However, the Wildlife Habitat Network was designed to specifically follow existing riparian corridors that are already provided protection under the proposed CAO provisions. In essence, although it does provide some upland corridors that link wetlands and streams, because it is typically associated with riparian corridors, it does not connect much of the high quality upland habitat, which should have corridor links to other habitats within the County. Additionally, within a development, the applicant is allowed to relocate the corridor on the parcel as long as the starting and ending points on the perimeter of the parcel are not altered. The potential therefore exists that various portions of the wildlife habitat network may not capture the best habitat for wildlife species, and as such, the wildlife habitat network may not provide adequate connectivity function for all terrestrial wildlife species.

Because the Wildlife Habitat Network does not connect much of the high-quality upland habitat within the County, it may not provide adequate connectivity for all terrestrial wildlife species. Similarly, if a portion of the network is relocated on a parcel, the corridor through the parcel may not capture the best habitat for wildlife species. Without adequate upland connectivity, the major corridor functions of providing dwelling habitat and serving as a conduit for movement may be at risk.

***Level of Risk to Functions and Values***

Because much of the County remains undeveloped, and current levels of connectivity will likely not change very much in the next 5 years, the level of risk to the functions and values in the short term is estimated to be low.

It is not possible to estimate the risk posed to the Wildlife Habitat Network by the proposed CAO in the long term because of the degree of uncertainty (see below).

***Level of Uncertainty***

It is unknown what lands will be protected in the future that may connect to the network. It is also unknown where new roadways that may functionally sever an otherwise effective corridor may be constructed. The extent that the network will be used effectively for dispersal to areas of useable wildlife habitat is not known. It is assumed that the Wildlife Habitat Network will not function as a “corridor” for all wildlife species. Generally, it is not known what the combined or cumulative impacts of development alongside these protection measures will be, especially in the long term.

## “Should” Species

There are a number of protections established in the code that are not specifically required in the Comprehensive Plan. The plan, for example, identifies that the County “should” protect certain species (see Table 8-2 in Chapter 8 Wildlife Areas, BAS Volume I report). Therefore, although not required to specifically protect their habitats, King County is proposing to implement, through code provisions and incentives, an avenue to preserve priority habitat and avoid direct impacts to active breeding sites of these species. Because these protection mechanisms are not required for these species, an estimation of risk based upon County code is not made.

Species that the Comprehensive Plan indicates should be protected are to be protected when their active breeding habitat is discovered during a site inspection. It is assumed that staff and volunteers will be able to identify breeding sites.

*Active breeding sites are to be protected against destruction or other direct disturbance while [they are] occupied by the species. The protection shall be based on the Washington State Department of Fish and Wildlife’s priority habitat and species management recommendations, if available.* Otherwise, it is assumed that protection will be based upon literature (best available science).

## Allowed Alterations

Within the wildlife critical areas, certain specified alterations are allowed if they comply with the development standards and all applicable requirements established in King County Code chapter 21A.24 of the proposed CAO. Refer to New Section 140 for a complete listing of allowed alterations within wildlife areas.

For many of the alterations allowed in the Wildlife Areas, an exception (subsection D.4) is stated such that no activities occur during the breeding season of protected species. However, the breeding season restriction in subsection D.4 does not apply to horticultural and agricultural activities that have been in continuous existence since the effective date of the ordinance. It is unlikely that any impacts to protected species will change as a result of continuously occurring agricultural activities. It is possible some raptor breeding activities might be interrupted if nesting is initiated during a period just prior to agricultural activities.

For certain allowed alterations in Wildlife Areas, during breeding seasons established in Section 186 of the proposed Critical Areas Ordinance, land clearing machinery shall not be operated within a wildlife habitat conservation area *to the maximum extent practicable* (exception D.4a). This language means that clearing and grading are not strictly prohibited within wildlife habitat conservation areas under certain circumstances: (a) maintenance of public road right-of-way structures; (b) repair, replacement or modification within the existing, maintained, improved road right-of-way or railroad prism; (c) maintenance of driveway or private access road; (d) maintenance or repair of bridge or culvert; and (e) replacement of bridge or culvert. It is unknown how often these types of activities will be required within a wildlife habitat conservation area, nor is it known to what extent heavy machinery will intrude into the areas when this type of work is required.

## Mitigation

In addition to general mitigation requirements specified in Section 21A.24.130 and new sections 152 - 153, mitigation requirements specific to wildlife areas are described in new Section 193. For wildlife habitat conservation areas, mitigation is intended to prevent disturbance to the protected species by on-site and off-site mitigation. On-site mitigation may include management practices, such as timing of the disturbance and mitigation measures, and off-site mitigation is limited to sites that are contiguous to the on-site areas that may enhance the wildlife habitat conservation area. It is not possible to predict the success of mitigation, as each site and situation will be unique.

Mitigation for the wildlife habitat network is intended to achieve equivalent or greater biologic functions including habitat complexity and connectivity functions. Mitigation ratios are described for various on-site and off-site scenarios. Also of note is that to the maximum extent practicable, mitigation projects involving wildlife habitat network restoration should provide replication of the site's historical natural environment including: (1) soil type, conditions and physical features; (2) vegetation diversity and density; and (3) biologic and habitat functions. With these standards in place, the likelihood is high that the functions and values established and maintained by the wildlife habitat network will remain stable in the long term.

## Buffers

Other provisions in the CAO will help protect wildlife habitat, such as streams, water bodies, and wetlands and their associated buffers. For a more complete discussion of aquatic areas, see BAS Volume I, Chapter 7 – Aquatic Areas, and for a discussion of wetlands, see Chapter 9 – Wetlands, BAS report. A very brief summary of some of the benefits afforded by these protections follows.

The diversity of birds and small mammals in wetland and riparian habitats may exceed that found in upland habitats. Wetlands provide required habitat for aquatic-breeding wildlife such as invertebrates, amphibians, and waterfowl. Wetlands also provide essential habitat for rearing or for the adult life stages of numerous species of fish, amphibians, turtles, and some mammals. For many terrestrial species wetlands provide water for drinking and vegetation for food and cover.

Riparian areas protected around aquatic areas and wetlands will provide a number of benefits to aquatic and terrestrial wildlife. Breeding and cover habitat for invertebrates and wildlife with small home ranges may be protected within the fixed buffers. The proposed new CAO wetland categorization, specifically identification of wetland complexes, may reduce these potential risks associated with development by providing the necessary connections and habitats between several wetlands in close proximity. It is also anticipated that habitat areas that are permanently protected within designated critical areas such as aquatic area and wetland buffers will mature over time and develop the attributes of select priority habitats (e.g., mature forest, old-growth, snag rich areas).

## **POLICY DISCUSSION:**

King County has an obligation to protect wildlife species through Federal, State and local regulations. The King County Comprehensive Plan requires a comprehensive approach to protecting wildlife species while balancing other requirements.

## **2.9 WETLANDS**

### **Wetland Classification**

#### **Standard –Wetland Classification:**

*Wetlands are categorized based on the Washington State Wetland Rating System for Western Washington (DOE #93-74, 1993).*

The standard wetland protection proposed for the CAO is in large part based on the Department of Ecology’s classification and rating system for wetlands. Although DOE’s classification system is more comprehensive than King County’s current SAO system, this proposed DOE method is outdated and does not accurately reflect the current state of scientific understanding i.e., BAS of wetland ecology and conservation. Recognizing this weakness DOE is reviewing wetland BAS and concomitantly revising the rating system with expected completion by late 2004 (McMillan pers. com.). King County has tried to overcome weaknesses in the DOE method by augmenting the existing classification-only approach with additional regulations covering wetland complexes, and landscape approaches including clearing and impervious area restrictions.

There are many ways of classifying wetlands for ecological and regulatory purposes with no one method being, or remaining, the optimum method. As scientists learn more about wetland characteristics and functions, classification and ranking methods change accordingly to better protect wetland functions. Currently, the science of classification is moving from the more descriptive historical assessment methods towards newer process-oriented, functional methods. The proposed CAO does not reflect this more comprehensive and empirical approach of classifying wetlands and consequently there is a high certainty that King County’s chosen classification system will not adequately protect certain wetland types (e.g., fragmented wetlands, bogs) or some wetland functions (e.g., wildlife habitat).

In general, the level of risk to wetland functions and values will decrease from existing levels because the proposed CAO standards are more restrictive than the current SAO standards. However, risks remain because additional buffer widths may not provide adequate protection depending on wetland, adjoining area and watershed topography, soils, ground water, surface hydrology and vegetation conditions. The proposed DOE’s ranking and classification system is also based mainly on habitat functions, with little emphasis on other wetland functions, which are important to protect. Hence these other functions may not be protected by fixed buffers to the extent that habitat is protected.

It is difficult to assess the potential effect of implementing the proposed CAO Classification System and its associated buffers on wetland functions, as King County's current information regarding wetland distribution, abundance, and characterization is incomplete. This fact is especially true for smaller wetlands and for forested wetlands, which are difficult to find through remote sensing techniques. There is little information regarding the functions that wetlands provide. Reasonably reliable habitat classification data exists (Cowardin et al., 1979) for most large, open water wetlands and select other wetlands that were surveyed in the past. Specific data on wetland habitat condition and data on other wetland functions are unavailable because formalized functional analysis did not exist during King County's historical wetland surveys in the late 1980s. Since these surveys, adjoining area and watershed development suggest that wetlands may be much different than twenty years ago. As a result, much of King County's assessment of wetland functions is based on historical descriptions and extrapolations, augmented by more recent remote sensing interpretations. Site-specific data can be gleaned from some project (e.g., development, restoration) specific reports, however, the overall lack of critical data necessary to assess specific wetland functions results in uncertainty when assessing the adequacy of fixed buffers for protecting wetland functions, and other standards, in the proposed CAO.

In summary, the chosen wetland rating system poses risks to wetland protection because it does not identify, consider, or rank the multiple functions that wetlands may exhibit. Included are relatively few and are biased towards habitat characteristics. Therefore the associated fixed-buffer widths and mitigation measures that are based on classification and rating may fail to adequately protect those functions not identified. Without adequate information on the additional functions needing protection, the level of risk remains high.

## Buffers

### Standard – Minimum Buffer Widths:

*Minimum buffer widths of 300, 200, 100, and 50 ft. shall protect Category I-IV wetlands, respectively, in rural areas or within the Urban Growth Area if not a subdivision, short subdivision, urban planned development or binding site plan, with the exception of permitted alterations.*

*Minimum buffer widths of 100, 50, 50, and 25 ft. shall protect Category I-IV wetlands, respectively, within the Urban Growth Area provided a functional assessment of the wetland and buffers is provided and approved. Restoration and enhancement will be required to restore the wetlands and its buffer to a fully functioning condition.*

### Assessment:

This standard for minimum buffer widths in rural areas is within the range of recommendations in the BAS literature, while the standard in urban areas are lower and depart from the larger buffers suggested by BAS. However, BAS also indicates that wetland protection by fixed buffer widths alone may be insufficient. Specifically, fixed buffers are essential but inadequate to protect wetland functions because the buffers may not encompass the processes that drive respective wetland functions. Moreover, fixed buffers also allow development and other disturbances to completely encircle wetlands, thereby isolating such wetlands and segregating them from other

wetlands, aquatic habitats, and from essential upland habitats. Eventually such isolation leads to a shift in their wildlife and possibly the alteration of hydrology and other wetland functions.

Under ideal geologic, soil, and vegetation conditions, BAS suggests the recommended fixed buffers may be sufficiently wide to protect water quality of Category I and II wetlands in rural areas or Category I wetlands that have been enhanced per the report requirements in the urban areas. Buffers adjoining Category III, and IV wetlands in rural areas and Category II, III and IV in urban areas are at the narrow width limit for protecting wetlands from anthropogenic water quality impacts. Moreover, proposed buffers widths are insufficient to protect unique wetland vegetation and fragile wildlife that are sensitive to microclimatological changes associated with clearing or altering adjoining land. Proposed buffers may also not protect certain features of wetland hydrology and groundwater interactions, as these functions (given all conditions being equal) are proportional to buffer widths.

### ***Level of Risk to Function and Values***

In general, most wetland functions may be at some risk by only protecting wetlands in rural areas with standard, fixed 50 to 300 ft. wide buffers. Wetlands in urban areas will be at high risk for most or all wetland functions even with the enhanced buffer approach with the possible exception of water quality enhancement under unique conditions. Water quality enhancement functions on level terrain and for a well-vegetated, grass, shrub, and tree buffers, would exhibit the least level of risk. For wetlands greater than 500 feet from each other (i.e., non-complex wetlands), the greatest risk would be to maintain the full suite of wildlife functions as fixed buffers may not provide sufficient habitat for wetland species if development encircles wetlands. This level of risk in the rural area would be more difficult to judge because narrower buffers than in the urban area provide less remaining habitat and greater edge effect, although enhancement of the buffer itself could provide habitat features of benefit to some wildlife. Clearly, it would depend on the condition of the adjoining area, as a high quality, narrow rural buffer would not benefit from enhancement and would only be detrimentally impacted by narrower widths.

The risk of declines and local extinctions of native species increases as wetlands get physically isolated from each other by roads, development, and other potential barriers to migration. These risks would be greatest for amphibian and mammal populations as development, agriculture, forest practices, roads and other actions encircle entire wetlands, thereby isolating them from life-support habitat found at other wetlands and in upland watershed locations. The risk of declines would accelerate as populations become increasingly smaller from deterministic (e.g., pollution), and random (e.g., drought, freezing), and inbreeding. The risk to amphibians, birds, small mammals may also increase with urbanization beyond fixed buffers as bullfrogs, rats, cats, and dog populations increase and roam through buffers to prey on, or “play” with vulnerable wetland wildlife. The risk is highest in the urban areas where buffer widths are inadequate to provide protection from non-native wildlife.

BAS also suggests that the proposed maximum 300-ft buffer for rural areas is inadequate in most situations to protect microclimate (wind, humidity, temperature, soil moisture, etc.) within these and narrower buffers. Microclimate can not be protected in the urban area, even with the maximum 100-foot buffers for wetlands. Hence the existing soil conditions (e.g., organics, bacteria, mycorrhizal associates and fungi of decomposition) and vegetation associations in the buffer (mosses, herbs) most likely will change in proportion to buffer width. Often these climatological and soil changes enable non-indigenous species to outcompete and replace the

original biota. The risk to wetland groundwater and hydrological functions will vary widely depending on geology, soils, vegetation, topography and watershed size and condition. Therefore, the risk to wetland functions by the proposed buffers is conjectural, although with all things being equal, the least risk occurs to either of these two functions, microclimate and hydrology, when the buffers are largest and the greatest risk occurs in the urban areas.

### ***Level of Uncertainty***

Specific information relative to urbanization impacts to wetlands in King County does not exist regarding the optimum widths of buffers adjacent to wetlands and their respective effectiveness in protecting wetland functions. The best information covers buffer widths required to protect water quality enhancement functions of streams but even this data is mostly extrapolated from agricultural and silvicultural studies. Some data exists on the widths of various stream buffers and their wildlife following clearcutting of adjacent forests however these studies are relatively recent and therefore have not yet monitored wildlife for sufficient lengths of time. Moreover, clearcutting and subsequent reforestation impacts are significantly different than the permanent primary and secondary impacts of urbanization. Consequently, there is a high degree of uncertainty regarding the ability of 50-300-ft. buffer widths in rural areas to protect wetland hydrology, groundwater interchange, and fish, wildlife and habitat functions of specific wetlands from adjoining area and watershed urbanization. In contrast for wetlands in general within an urbanizing area, BAS suggests that wetland functions will definitely decline with only fixed buffers of 25 to 100 ft.

### **Standard – Buffer Averaging:**

*Minimum buffer widths may be modified on a case-by-case basis. There would be no net loss of buffer area and the buffer width is not reduced to less than 75 percent of the standard buffer width.*

### **Assessment:**

Buffer averaging is consistent with BAS if implemented to increase widths and wetland functions at specific sites and concurrently not harm functions from reduced widths elsewhere. For this select situation, there would be equal total buffer area and a net increase in select functions, a goal supported by BAS.

### ***Level of Risk to Function and Values***

Buffer averaging provides the opportunity to decrease the level of risk to wetland functions if buffer widths are reduced where they are not necessary and increased where they would be beneficial. However, buffer averaging could pose an increased risk to functions if averaging increased buffers for one function at the expense of another. For example, at a wetland with low flood control function and high wildlife function, buffer averaging to increase the flood control function could pose a risk to wildlife function.



### ***Level of Uncertainty***

The implementation of ecologically supported buffer averaging may prove difficult without standardized empirically and scientifically accepted methods of consistently identifying and determining functions. In general, wetland ecologists do not have the tools to trade off buffer widths with a high degree of certainty unless adequate information has been obtained. Any certainty that does exist depends on function to be gained by increasing buffers. Consequently, the certainty of improved water quality enhancement function by wider grass, shrub, and tree buffer is greater than the certainty of improving groundwater recharge or wildlife functions. Clearly, it would take considerable studies of groundwater recharge capacities, including the presence and flow of aquifers, to reduce the uncertainty in providing groundwater interchange functions within an enlarged buffer. Finally, the increase in wetland buffers allowed by buffer averaging might only marginally benefit functions. For example, wildlife may additionally be protected from adjoining noises and other disturbances by wider buffer widths at certain locations but most likely will not benefit appreciably by the relatively small increases in habitat from buffer averaging.

### **Standard – Grazed and Tilled Wet Meadows:**

*Existing grazing and tilling activities may continue in wet meadows.*

### **Assessment:**

Wet meadows exhibit the ability to provide significant groundwater recharge, flood control, water quality enhancement, and wildlife functions depending on their vegetation, morphometry, soil porosity and subsurface geology. BAS suggests that grazing in wet meadows is compatible with BAS if best management practices (BMPs) are used (see Chapter 3, Section 3.2 Farm Planning). For example, if meadows are used for nesting or foraging by waterfowl and waterbirds, grazing may only be permitted at times when wildlife is not present or at locations where livestock will not harm wildlife.

### ***Level of Risk to Function and Values***

The timing and density of grazing can significantly increase the risk to wet meadow functions, particularly to water quality and wildlife functions. The timing of grazing is controlled by the proposed BMPs therefore the risk from livestock may be low if animal units, timing and other aspects of meadow use are appropriate for the site. High livestock numbers however, can result in high nutrient concentrations within meadows and in runoff, potentially causing large algal blooms, anoxic conditions (of detriment to macrophytes, invertebrates, waterfowl and other taxa) and other eutrophic situation in nearby wetlands and other aquatic areas. Overgrazing may also lead to increase soil compaction, soil erosion and other disturbances leading to higher water quality and associated ecological risks from sediment runoff.

### ***Level of Uncertainty***

Compliance with BMPs would provide important certainty to protecting wet meadows from overgrazing and other detrimental agricultural effects. Storage sheds barns and additional

residences however may continue to be built on wet meadows reducing or eliminating the functions the replaced wet meadows may have been serving.

## Mitigation

### Standard – Mitigation Ratios:

*Under special situations mitigation ratios shall be used to mitigate adverse impacts and will vary based on wetland location and category.*

### Assessment:

The proposed CAO provides restoration and replacement ratios for wetland impacts and losses that are based on “best professional judgement”, as there are no scientific studies that identify empirically determined mitigation ratios. The NRC (2001) references studies that imply a ‘1.5 to 1’ ratio of ‘mitigation to lost acreage’ would be needed to equal the area lost (if all other permit conditions are met including functional equivalency). However, these ratios are often additionally adjusted to reflect temporal loss of wetland functions, functional values of the impact site, and other factors. Specifically, replacement ratios increase proportionately with the length of time it takes to reach equivalent function. Higher ratios are also suggested for replacing pristine wetlands with higher functional values than that for mitigating severely degraded wetlands, which essentially reflects scientific uncertainties in replicating certain kinds of wetlands. King County’s proposed mitigation ratios are within the ratio range of BAS by requiring equivalent or greater function for impacts. However, King County ratios may be lower than what is implied by BAS when recognizing and considering the temporal lag in replacement of wetland functions. It is also lower than BAS in situations where equivalent or greater function is not possible, as for example, when replacing a mature forested wetland with a new shrub-scrub wetland.

The proposed CAO standard also differs from BAS in that it is based on wetland category, with the assumption that wetland category is a surrogate for function which may not necessarily be the case. BAS further notes that preferences for on-site and in-kind mitigation should not be automatic, but rather based on an analytical assessment method of the wetland needs in the watershed, and the potential for the compensatory wetland to persist over time (NRC 2001). Although King County has considered similar functional criteria in their mitigation process no formalized assessment tool is currently proposed.

### ***Level of Risk to Function and Values***

Mitigating for lost wetland acreage is difficult and highly risky. Functional replacement is even more difficult and requires extensive training, information gathering and monitoring. BAS indicates that mitigated wetlands have not yet succeeded in replacing lost acreage or functions with any predictability. Consequently the risk to replacement of wetland acreage and their functions and values remains high. Mitigation has not met the “no-net loss of area, function and values” goal in King County’s Comprehensive Plan and if past performance is an indicator of future success the risks remain high. Wetland enhancement and restoration, regardless of proposed ratio, as mitigation for wetland losses always results in a decline of wetland acreage.

The risks of replacing lost functions and values depend at least on two factors: (1) the availability of restoration sites; and (2) the complexity of functions and values required to be replaced. If restoration sites are unavailable within the same basin as the impacted wetland then the risk is high that some of the irreplaceable functions that the wetland provided (e.g., groundwater interactions, habitat for wildlife, vegetation, recreation etc.) will be lost to that basin. It also remains uncertain whether flood control, water quality enhancement and other wetland functions that are lost by permitted activities can adequately be replaced through engineered projects. Regardless, a loss of functions remains between the time the permitted wetland is altered and the mitigated wetland provides the full capacity of the suite of functions of the original wetland.

### ***Level of Uncertainty***

The level of uncertainty in wetland mitigation in general does not lie in the ratios. Rather, to a large degree, success lies in the extent of project planning, construction, monitoring, and overall oversight. Consequently, with proper funding and other resources the uncertainty of success can be decreased and minimized regardless of ratios.

### **Standard – Mitigation Banking:**

*The department may approve mitigation in advance of unavoidable adverse impacts to wetlands caused by the development activities through an approved wetland mitigation bank.*

### **Assessment:**

Wetland mitigation banking is a valuable compensatory mitigation tool to stem the loss of wetland functions and values. Mitigation Banking has been implemented in other regions in the U.S. and in Washington is being used by the Department of Transportation (WSDOT). King County has one mitigation bank. As recommended in the BAS literature, banks are established and fully functional prior to permitted losses at existing sites. In practice however, credits are released incrementally as hydrological performance and other developmental and functional stages are attained. When done carefully and according to specified standards such as those developed in the King County Mitigation Banking Rules, mitigation banking may successfully implement siting as recommended by BAS literature. The replacement of small, marginal wetlands of low, single function such as small totally isolated wetlands and those adjacent to roads and highways with larger wetlands of higher and potentially multiple functions is consistent with BAS. Nevertheless, concerns regarding replacement ratios (see previous section), in-kind versus out-of-kind replacement and bank siting when projects are permitted that harm or destroy higher quality wetlands remain. Although BAS suggests that a wide diversity of banks, bank sizes and bank functions should be created, the economy of scale benefits may not be realized unless banks are of certain minimum size and in certain economically-determined locations. The proposed CAO provides the flexibility to mitigate with a diversity of bank sizes and functions and hence there is no departure from BAS. In practice however, market forces result in larger, easily constructed wetland types. Finally, mitigation banks are relatively new and have not been monitored long enough to ecologically assess their success or failures. Although wetland losses are mitigated by mitigation banking, empirically determined success of specific targeted goals for hydrology, water quality, vegetation, and wildlife functions are limited to only a few sites and not commonly undertaken.

### ***Level of Risk to Function and Values***

Decreases in total wetland acreage always occur when wetland enhancement and restoration mitigate wetland acreage loss. Otherwise mitigation banking poses a low level of risk as full functions are required to be demonstrated at the bank site prior to loss of any wetland functions at the permitted site. Currently however, restoration is not ideal, and credits are released prior to full wetland mitigation resulting in loss of wetland acreage and functions. Moreover, wetlands may not be replaced within the watershed in which they are situated; thereby posing risks to the remaining watersheds for unreplaced transferred functions. Risks of lost functions may accrue in areas of high mitigation pressure such as in urban areas as mitigation for lost functions moves elsewhere.

### ***Level of Uncertainty***

Generally there is less compliance uncertainty with mitigation banks than other wetland restoration programs because of their larger size and diverse institutional oversight. Larger sites also provide a greater economy of scale than smaller projects and potentially enables a more carefully thought out process considering all aspects of project design, construction and monitoring presumably leading to greater certainty in success. Uncertainty increases with respect to bank complexity and habitat types with permanent, smaller seasonal and semi-permanently flooded banks being difficult to create. Scientific uncertainty remains high regarding the best method for achieving overall functional benefits.

## **Allowed Alteration**

### **Standards – Development Standards and Alterations:**

*Alterations identified in the proposed CAO (K.C.C. 21A.24.) are allowed within a wetland or wetland buffer if the alteration complies with all applicable requirements, standards, and mitigation requirements established in the proposed CAO.*

### **Assessment:**

The County allows numerous actions that allow activities within a wetland or wetland buffer. For some situations, these allowed alterations might be inconsistent with recommendations suggested by BAS. These include some rural activities and the building of roads, utilities, and other necessary infrastructure. Data to the extent to which these activities influence wetland functions and are adequately mitigated is unavailable. Tree removal in buffers, for whatever reason, influences water budgets through transpiration and nutrient storage as mentioned in the literature review. The removal of trees and other vegetation influences microclimate, which in turn influences remaining plants and wildlife. Incrementally, and collectively these exemptions continue to erode the wetland base in King County and therefore reduce the multiple functions they may provide.

Reasonable Use Exemptions also may enable encroachment on wetlands and their functions if no other on-site development possibilities are available. Consequently, the non-mitigated exemptions and allowed alterations are not consistent with BAS for wetland protection if they

lead to incremental, cumulative losses in wetland area, functions and values. Conditions on allowed alterations may lessen these impacts but do not mitigate for their losses.

### ***Level of Risk to Functions and Values***

Individually departures under exemptions and allowed alterations are small and may seem not to pose any risk. Collectively however, they contribute to the cumulative loss of wetland functions and values because for the most part, these losses are permitted without mitigation. Consequently the immediate risk to wetlands may be small and localized although cumulatively over many years the risks increase and spread over larger areas. For many allowed alterations such as the construction of large roads and powerline corridors the impacts to wetland functions and values may not be mitigatable. For example, the groundwater interchange and wildlife functions of roads cannot readily be mitigated on site or replaced elsewhere. Roads and utility corridors may result in permanent habitat loss, reduced habitat quality and permanently fragment wildlife habitat resulting in smaller isolated populations and therefore increased risks of extinction. Roads additionally kill wildlife through animal vehicle collisions or harm animals through altered wildlife behavior. Roads and utility corridors also indirectly pose high risk to wetlands because of their large direct and indirect watershed and landscape effects.

In summary, BAS indicates that permitted activity whether residential, non-residential, silvicultural, agricultural or infrastructure related may have negative impacts on wetlands and their functions. In King County, some of these impacts do not have to be mitigated, and for the ones that do have to be mitigated, information indicates that the existing mitigation strategy is not working. Without specific assessments of departures, we should assume that larger projects and cumulatively smaller projects might continue to lead to wetland aerial and functional loss.

### ***Level of Uncertainty:***

Data on the number of exemptions and allowed alterations and their influence on wetland acreages and functions and values are unavailable. Hence the prevalence of risk to wetland functions and values remain undetermined. Conditions on allowed alterations may lessen these impacts but impacts nevertheless occur. There is little uncertainty in the ongoing and cumulative loss of wetland functions and values from unmitigated permitted activities.

## **POLICY DISCUSSION:**

Buffers are one tool that King County is proposing in conjunction with clearing restrictions, rural stewardship, and other regulatory and incentive based provisions. The adopted King County Comprehensive Plan provides guidance as to the management strategy for protection of wetland functions:

E- 132 King County's overall goal for the protection of wetlands is no net loss of wetland functions within each drainage basin. Acquisition, enhancement, regulations, and incentive programs shall be used independently or in combination with one another to protect and enhance wetland functions.

E- 133 Development adjacent to wetlands shall be sited such that wetland functions are protected, an adequate buffer around the wetlands is provided, and significant adverse impacts to wetlands are prevented

The proposed ordinance requires that within the Urban Growth Area the applicant complete a critical area report showing that the wetland and its adjoining buffer are fully functioning, or have a restoration/ enhancement plan that will be implemented to achieve a fully functioning wetland and buffer.

Balancing of King County's other responsibilities under the Growth Management Act further influence the widths of buffers proposed, particularly within the Urban Growth Area. These responsibilities, outlined in the King County Comprehensive Plan are:

- ***Preserve the high quality of life*** by balancing infrastructure needs with social, cultural, educational, recreational, civic, health and safety needs.
- ***Spend money wisely and deliver services efficiently*** by:
  - Concentrating infrastructure investments and service delivery to support the regional development pattern near cities where a full range of local services are located or can be made available;
  - Solving service deficiencies within the County to meet existing service needs and phasing service improvements for the needs of future growth;
  - Looking to King County to provide countywide facilities and services, and;
  - Relying primarily upon cities and special purpose districts as the providers of local facilities and services appropriate to serve those local needs, except where the County is the local service provider (e.g., Rural Area).
- ***Continue our economic prosperity*** by promoting a strong and diverse economy for King County residents through policies and programs that encourage new business opportunities, increase family wage jobs and create a predictable regulatory environment for businesses and citizens.
- ***Increase the housing choices for all residents*** by permitting a wide variety of home styles and by increasing housing opportunities for all residents in locations closer to jobs.
- ***Ensure that necessary transportation facilities and services are available to serve development at the time of occupancy and use*** by targeting road and transit investments where growth is desired and for equitable contributions to the transportation system by new development.
- ***Balance urban uses and environmental protection*** through careful site planning that maximizes developable land while respecting natural systems.
- ***Preserve rural, resource and ecologically fragile areas for future generations*** by maintaining low residential densities in the rural areas and in areas containing regionally and nationally important ecosystems for fish and wildlife and by recognizing that resource lands, such as farms and forests, provide economic, social and environmental benefits.

With regard to grazed wet meadows and other agricultural practices, the proposed ordinance exempts existing agricultural activities. To apply standards retroactively would not only be detrimental to existing agricultural enterprises but also inconsistent with how other existing activities are regulated by this ordinance. In addition, King County Comprehensive Plan policies support ongoing agricultural activities as part of a diverse landscape.

R- 503 King County shall promote and support forestry, agriculture, mining and other resource-based industries as a part of a diverse, regional and sustainable economy.

R- 504 Well-managed forestry and agriculture practices are encouraged because of their multiple benefits, including natural resource protection.