City of Kent Shoreline Master Program September 2009

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Kent Shoreline Master Program

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A. History of the SMA

In 1969, the Washington State Supreme Court decided in the case of *Wilbur v. Gallagher* (77 Wn.2d 302), commonly known as the "Lake Chelan Case," that certain activities along shorelines were contrary to the public interest. The court findings required that the public interest be represented in the proper forum for determining the use of shoreline properties. The ramifications of this decision were significant in that developers, environmentalists, and other interested parties began to recognize—although probably for different reasons—the need for a comprehensive planning and regulatory program for shorelines.

Wilbur v. Gallagher was a case primarily involving property rights. It was decided at a time of heightened environmental awareness. At the same time, Congress was considering environmental legislation and subsequently passed a number of laws relating to protection of the environment including the National Environmental Policy Act (1969) and the Coastal Zone Management Act (1972). "Earth Day" and the concept of "spaceship earth" were part of the American scene. "Conservationists" had become "environmentalists" and some had even gone so far as to call themselves "ecologists." Whatever the name or concept, concern for fragile ecological areas became important, along with the rights associated with property ownership.

Voters of the state, seeing the failure of the Seacoast Management Bill in the state legislature, validated an initiative petition commonly titled the "Shoreline Protection Act." The state legislature, choosing between adoption of the people's initiative petition or its own alternative, passed into law the "Shoreline Management Act of 1971" (SMA) effective June 1, 1971, which contained the provision for both statutes to be deferred to the electorate in the November 1972 election. The election issue required that voters respond to two questions: (1) Did they favor shoreline management? and (2) Which alternative management program did they prefer? Most Washington voters favored both shoreline management and the legislature's alternative (providing greater local control), by an approximately 2-to-1 margin. It is important to keep in mind that the SMA was a response to a people's initiative and was ratified by the voters, giving the SMA a populist foundation as well as an environmental justification.

The SMA's paramount objectives are to protect and restore the valuable natural resources that shorelines represent and to plan for and foster all "reasonable and appropriate uses" that are dependent upon a waterfront location or that offer opportunities for the public to enjoy the state's shorelines. With this clear mandate, the SMA established a planning and regulatory program to be initiated at the local level under State guidance.

This cooperative effort balances local and state-wide interests in the management and development of shoreline areas by requiring local governments to plan (via shoreline

master programs) and regulate (via permits) shoreline development within SMA jurisdiction. (See "Geographic Applications of the SMA" below.) Local government actions are monitored by the Washington Department of Ecology (Ecology), which approves new or amended shoreline master programs (SMPs), reviews substantial development permits, and approves Conditional Use permits and variances.

After the SMA's passage in 1971, Ecology adopted Chapter 173-18 WAC to serve as a standard for the implementation of the SMA and to provide direction to local governments and Ecology in preparing SMPs. Two hundred forty-seven cities and counties have prepared SMPs based on that WAC chapter. Over the years, local governments, with the help of Ecology, developed a set of practices and methodologies, the best of which were collected and described in the 1994 *Shoreline Management Guidebook*.

In 1995, the state legislature passed Engrossed Substitute House Bill 1724, which included several RCW amendments to better integrate the Growth Management Act (GMA), the Shoreline Management Act, and the State Environmental Policy Act (SEPA). The bill also directed Ecology to review and update the state SMA guidelines every five years. In response, Ecology undertook a primarily in-house process to prepare a new WAC chapter (also referred to in this *SMP* as the "Guidelines"). After meeting with a series of advisory committees and producing a number of informal drafts, Ecology formally proposed a new WAC rule for the SMA in April 1999. Subsequently, in 2003, the Legislature further clarified the integration of the SMA and GMA.

The rule was appealed and then-Governor Gary Locke and former Attorney General Christine Gregoire cosponsored a year-long mediation effort in 2002 that culminated in a third draft, which was issued for public comment in July 2002. That proposal had the endorsement of the Association of Washington Business, the Washington Aggregates & Concrete Association, the Washington Environmental Council (WEC) and other environmental organizations – all of whom were parties to the lawsuit.

Ecology received about 300 comments on the version proposed in 2003. Seventeen changes were made in response to those comments, to clarify language and to delete obsolete or duplicative references. The final version was adopted December 17, 2003.

The City's Shoreline Master Program was most recently amended in 2004, although major substantive amendments have not occurred since 1999. Areas of the shoreline were designated as Urban-River Resources (applied to the Green River), Urban-Stream Corridor (applied to Soos Creek), and Urban-Lake Residential (applied to Lake Meridian).

B. Implementation of the SMA

RCW 90.58.020 clearly states how the Shoreline Management Act shall be implemented in the following statement:

"The legislature finds that the shorelines of the state are among the most valuable and fragile of its natural resources and that there is great concern throughout the state relating to their utilization, protection, restoration, and preservation. In addition it finds that ever

increasing pressures of additional uses are being placed on the shorelines necessitating increased coordination in the management and development of the shorelines of the state. The legislature further finds that much of the shorelines of the state and the uplands adjacent thereto are in private ownership; that unrestricted construction on the privately owned or publicly owned shorelines of the state is not in the best public interest; and therefore, coordinated planning is necessary in order to protect the public interest associated with the shorelines of the state while, at the same time, recognizing and protecting private property rights consistent with the public interest. There is, therefore, a clear and urgent demand for a planned, rational, and concerted effort, jointly performed by federal, state, and local governments, to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines.

It is the policy of the state to provide for the management of the shorelines of the state by planning for and fostering all reasonable and appropriate uses. This policy is designed to insure the development of these shorelines in a manner which, while allowing for limited reduction of rights of the public in the navigable waters, will promote and enhance the public interest. This policy contemplates protecting against adverse effects to the public health, the land and its vegetation and wildlife, and the waters of the state and their aquatic life, while protecting generally public rights of navigation and corollary rights incidental thereto.

The legislature declares that the interest of all of the people shall be paramount in the management of shorelines of statewide significance. The department, in adopting guidelines for shorelines of statewide significance, and local government, in developing master programs for shorelines of statewide significance, shall give preference to uses in the following order of preference which:

- (1) Recognize and protect the statewide interest over local interest;
- (2) Preserve the natural character of the shoreline;
- (3) Result in long term over short term benefit;
- (4) Protect the resources and ecology of the shoreline;
- (5) Increase public access to publicly owned areas of the shorelines;
- (6) Increase recreational opportunities for the public in the shoreline;
- (7) Provide for any other element as defined in RCW 90.58.100 deemed appropriate or necessary.

In the implementation of this policy the public's opportunity to enjoy the physical and aesthetic qualities of natural shorelines of the state shall be preserved to the greatest extent feasible consistent with the overall best interest of the state and the people generally. To this end uses shall be preferred which are consistent with control of pollution and prevention of damage to the natural environment, or are unique to or dependent upon use of the state's shoreline. Alterations of the natural condition of the shorelines of the state, in those limited instances when authorized, shall be given priority for single family residences and their appurtenant structures, ports, shoreline recreational uses including but

not limited to parks, marinas, piers, and other improvements facilitating public access to shorelines of the state, industrial and commercial developments which are particularly dependent on their location on or use of the shorelines of the state and other development that will provide an opportunity for substantial numbers of the people to enjoy the shorelines of the state. Alterations of the natural condition of the shorelines and shorelands of the state shall be recognized by the department. Shorelines and shorelands of the state shall be recognized by the department. Shorelines and shorelands of the state shall be appropriately classified and these classifications shall be revised when circumstances warrant regardless of whether the change in circumstances occurs through man-made causes or natural causes. Any areas resulting from alterations of the natural condition of the shorelines and shorelands of the state no longer meeting the definition of "shorelines of the state" shall not be subject to the provisions of chapter 90.58 RCW.

Permitted uses in the shorelines of the state shall be designed and conducted in a manner to minimize, insofar as practical, any resultant damage to the ecology and environment of the shoreline area and any interference with the public's use of the water."

C. Geographic Applications of the SMA

As defined by the Shoreline Management Act of 1971, shorelines include certain waters of the state plus their associated "shorelands." At a minimum, the waterbodies designated as shorelines of the state are streams whose mean annual flow is 20 cubic feet per second (cfs) or greater and lakes whose area is greater than 20 acres. Shorelands are defined as:

"those lands extending landward for 200 feet in all directions as measured on a horizontal plane from the ordinary high water mark; floodways and contiguous floodplain areas landward 200 feet from such floodways; and all wetlands and river deltas associated with the streams, lakes, and tidal waters which are subject to the provisions of this chapter...Any county or city may determine that portion of a onehundred-year-floodplain to be included in its SMP as long as such portion includes, as a minimum, the floodway and the adjacent land extending landward two hundred feet therefrom... Any city or county may also include in its SMP land necessary for buffers for critical areas (RCW 90.58.030)"

In addition, rivers with a mean annual cfs of 1,000 or more are considered shorelines of statewide significance.

The lateral extent of the shoreline jurisdiction shall be determined for specific cases based on the location of the ordinary high water mark (OHWM), floodway, and presence of associated wetlands.

The City's shoreline boundaries have been updated (subject to City Council and Ecology approval) concurrent with this assessment. Several changes have been made to the maps based on new information regarding associated wetlands and waterbody size (area and flow). Lake Fenwick, the Green River Natural Resources Area (GRNRA) pond, Springbrook Creek, Jenkins Creek, and the Mill Creek Auburn floodway are new additions

to shoreline jurisdiction. During the review of aerial photographs, GIS mapping, and a field visit, it was determined that Lake Fenwick is larger than 20 acres (just over 23). GIS mapping also shows that the combined area of the two primary GRNRA cells is slightly more than 50 acres. As part of the shoreline jurisdiction assessment, Springbrook Creek, Big Soos Creek and Jenkins Creek were reviewed. Recent USGS mapping of the 20 cfs cut-off points and USGS field notes identified small areas of Springbrook and Jenkins Creeks that meet shoreline criteria. The extent of Big Soos Creek shoreline jurisdiction did not change appreciably. While Mill Creek Auburn does not reach 20 cfs, it is located within the Green River's floodway and is therefore located within shoreline jurisdiction. The shoreline jurisdiction in Kent is identified in Figure 1. Wetlands are not shown on this map, however. Chapter 2 Section B.1 designates associated wetlands and those within the 100-year floodplain as the Natural-Wetlands Environment. The City of Kent Wetland Inventory Maps identifies all wetlands in the City and the 100-year floodplain is identified on the Flood Hazard Areas map in the Shoreline Inventory and Analysis Report.

1. Applicable Area

The City of Kent is located in south King County. The City is surrounded by seven incorporated cities (Des Moines, Auburn, SeaTac, Tukwila, Federal Way, Renton and Covington), with pockets of unincorporated King County to the northeast, east and south. Interstate 5 (I-5) and State Route (SR) 167 pass through the City from north to south at the western and central portions of the City.

The applicable area for this shoreline master program includes all land currently within the City's proposed shoreline jurisdiction, as well as minimal treatment of shorelines in the PAA currently regulated under King County's SMP. The latter includes the south half of Lake Fenwick, all of Panther Lake, and portions of the Green River at the south end of the City. The PAA shoreline area, although minimally discussed in this report, will continue to be regulated by King County's recently updated SMP until they are annexed by the City of Kent.



Figure 1. Shoreline Management Act jurisdiction in the City of Kent.

D. How the Shoreline Master Program is Used

The City of Kent Shoreline Master Program is a planning document that outlines goals and policies for the shorelines of the City, and also establishes regulations for development occurring within shoreline jurisdiction.

In order to preserve and enhance the shorelines of the City of Kent, it is important that all development proposals relating to the shoreline are evaluated in terms of the City's Shoreline Master Program, and the City Shoreline Administrator is consulted. The Shoreline Administrator for the City of Kent is the Planning Director or his/her designee.

The Shoreline Management Act (SMA) defines for local jurisdictions the content and goals that should be represented in the Shoreline Master Programs developed by each

community; within these guidelines, it is left to each community to develop the specific regulations appropriate to that community. Pursuant to the Guidelines, shorelines of the state that meet the criteria established in WAC 173-26-211 are given a shoreline environment designation. The purpose of the shoreline designation system is to ensure that land use, development, or other activity occurring within the designated shoreline jurisdiction is appropriate for that area and that consideration is given to the special requirements of that environment.

The Kent Shoreline Master Program addresses a broad range of uses that could be proposed in the shoreline area. This breadth is intended to ensure that the Kent shoreline area is protected from activities and uses that, if unmonitored, could be developed inappropriately and could cause damage to the ecological system of the shoreline, displace "preferred uses" as identified in Chapter 90.58 RCW, or cause the degradation of shoreline aesthetic values. The Kent Shoreline Master Program provides the regulatory parameters within which development may occur. In addition, it identifies those uses deemed unacceptable within Kent shoreline jurisdiction, as well as those uses which may be considered through a discretionary permit such as a Conditional Use Permit or Shoreline Variance.

1. When Is a Permit Required?

A Shoreline Substantial Development Permit (SSDP) is required when a development or activity meets the definition of "substantial development" contained within Chapter 6 of this SMP. Substantial development is discussed in more detail in Section 7.B of this SMP. A development or activity is exempt if it meets the criteria listed in WAC 173-27-040. Some development may require a Shoreline Conditional Use Permit, if listed as such in the Use Tables contained in Section 5.B of this SMP; or a Shoreline Variance. Shoreline Conditional Use Permits and Shoreline Variances are discussed in more detail in Sections 7 C and D, respectively. However, <u>ALL</u> new development, uses, and activities must comply with the policies and regulations set forth in the City of Kent Shoreline Master Program, including those developments, uses, and activities that are exempt from permits. Review under the State Environmental Policy Act (SEPA) may also be required.

"Development," is defined by the Shoreline Management Act of 1971 as:

A use consisting of the construction or exterior alteration of structures; dredging, drilling; dumping; filling; removal or any sand, gravel, or minerals; bulkheading; driving of piling; placing of obstructions; or any project of a permanent or temporary nature which interferes with the normal public use of the surface of the waters of the state subject to Chapter 90.58 RCW at any state of water level (RCW 90.58.030(3d)).

This definition indicates that the "development" regulated by the Shoreline Management Act includes not only those activities that most people recognize as "development," but also those activities that citizens may do around their own home. While the impact of these potential "developments" may seem inconsequential at first, they may have unwanted and damaging affects on the river ecology, the property of others, and the shoreline aesthetics.

Projects that are identified as "developments," but not "substantial developments," do not require a shoreline Substantial Development Permit; however, they must still comply with all applicable regulations in the City's Shoreline Master Program, including Critical Areas Regulations. In addition, some developments may require a Shoreline Conditional Use Permit or Shoreline Variance from the Shoreline Master Program's provisions, although they do not meet the definition of "substantial development."

"Substantial development" is any "development" where the total cost or fair market value exceeds five thousand dollars (\$5,000), or any development that materially interferes with the normal public use of the water or shoreline of the state. The five thousand dollar (\$5,000) threshold will be adjusted for inflation by the office of financial management every five years, beginning July 1, 2007, based upon changes in the consumer price index during that time period. Under the Shoreline Management Act, some types of development are exempt from the requirement to apply for and receive a permit before beginning work per RCW 90.58.030(3)(e). A complete list of developments and uses that are not considered "substantial development."

2. The Permit Process

The City's Shoreline Administrator can help determine if a project is classified as a substantial development, determine if a permit is necessary or if a project is exempt from permit requirements, and identify which regulations in the SMP may apply to the proposed project. The Administrator can also provide information on the permit application process and how the SMP process relates to, and can coordinate with, the State Environmental Policy Act (SEPA) process.

3. The Shoreline Permit

There are three types of permits: the Substantial Development Permit, the Shoreline Conditional Use Permit, and the Shoreline Variance. All of these permits use the same application form; however, they are processed slightly differently and have different criteria for approval. Shoreline Exemptions require City review to determine whether the proposal is indeed exempt from shoreline permits, and whether the proposal meets the policies and regulations of the Shoreline Master Program. Requests for Shoreline Exemption are made on a separate application form.

Requests for a Shoreline Substantial Development Permit are reviewed by the Shoreline Administrator. Requests for a Shoreline Variance or Shoreline Conditional Use Permit require review by the City of Kent Hearing Examiner (per Section 12.01.040 KCC, as amended). There may be instances where a Shoreline Conditional Use Permit or Shoreline Variance may be approved without the need for a Substantial Development Permit. The Hearing Examiner will hold a public hearing on the proposal and approve, approve with conditions, or deny the application. The Hearing Examiner's decision is final, unless an appeal is filed pursuant to the procedures described in Section 7.B.3. Requests for Shoreline Conditional Use Permits and Shoreline Variances require final approval by DOE.

A map of the shoreline jurisdiction is presented in Appendix A and descriptions of the various shoreline designations are presented in Chapter 2 of this SMP.

4. Relationship of this Shoreline Master Program to Other Plans

In addition to compliance with the provisions of the Shoreline Management Act of 1971, the Kent Shoreline Master Program (SMP) must be mutually consistent with local plans and policy documents, specifically, the Kent Comprehensive Plan and the City's Critical Areas Regulations (Section 11.06 KCC). The Kent SMP must also be mutually consistent with the regulations developed by the City to implement its plans, such as the zoning code and subdivision code, as well as building construction and safety requirements.

Submitting an application for a shoreline development, use, or activity does not exempt an applicant from complying with any other local, county, state, regional, or federal statutes or regulations, which may also be applicable to such development or use.

A. Introduction

The Shoreline Management Act (Chapter 90.58 RCW) and Shoreline Guidelines (Chapter 173-26 WAC) provide for shoreline environment designations to serve as a tool for applying and tailoring the general policies of the SMA to local shorelines. Shoreline environment designations provide a means of adapting broad policies to shoreline subunits while recognizing different conditions and valuable shoreline resources, and a way to integrate comprehensive planning into SMP regulations. In accordance with WAC 173-26-211, the following shoreline environment designation provisions apply; including purpose, designation criteria, and management policies. Where there is a contradiction between the matrices and another SMP text provision, the text provision shall apply.

All areas not specifically assigned a shoreline environment designation shall be designated "Urban Conservancy - Low Intensity" (UC-LI).

B. Shoreline Environment Designation Maps

The Shoreline Environment Designation Maps can be found in Appendix A. Pursuant to RCW 90.58.040, the maps illustrate the shoreline environment designations that apply to all shorelines of the state within the City of Kent's jurisdiction. The lateral extent of the shoreline jurisdiction shall be determined for specific cases based on the location of the ordinary high water mark (OHWM), floodway, and presence of associated wetlands. The maps should be used in conjunction with the Environment Designation tables in Section C below. In the event of a mapping error, the City will rely upon the boundary descriptions and the criteria in Section C below.

C. Policies and Regulations

1. "Natural-Wetlands" (N-W) Environment

a. Purpose

The purpose of the "Natural-Wetlands" environment is to protect and restore all wetlands associated with shoreline areas by applying the City of Kent Critical Areas Regulations. These systems require development restrictions to maintain the ecological functions and ecosystem-wide processes.

b. Designation Criteria

A "Natural-Wetlands" environment designation will be assigned to all wetlands in shoreline jurisdiction except for those wetlands within the Green River Natural Resources Area, which are designated "Urban Conservancy-Open Space."

c. Management Policies

Uses

- 1. Any use that would substantially degrade the ecological functions or natural character of the designated wetland area should be prohibited.
- 2. New land division, development or shoreline modification that would reduce the capability of the wetlands to perform normal ecological functions should not be allowed.
- 3. Uses that are consumptive of physical, visual, and biological resources should be prohibited.

Access and Improvements

- 4. Access may be permitted for scientific, historical, cultural, educational, and low-intensity water-oriented recreational purposes such as nature study that do not impact ecological functions, provided that no significant ecological impact on the area will result.
- 5. Physical alterations should only be considered when they serve to protect or enhance a significant, unique, or highly valued feature that might otherwise be degraded or destroyed or for public access where no significant ecological impacts would occur.

Implementing Regulations

6. The ecological resources in the Natural-Wetlands environment should be protected through the provisions in the Critical Areas section of this SMP.

2. "High-Intensity" (H-I) Environment

a. Purpose

The purpose of the "High-Intensity" environment is to provide for high-intensity water-oriented commercial, transportation, and industrial uses while protecting existing ecological functions and restoring ecological functions in areas that have been previously degraded. Because the Green River shoreline has been diked and offers few, if any, opportunities for water-dependent uses, a "High-Intensity" designation is also used for appropriate lands that are either separated from the shoreline or are not suitable for water-oriented use.

b. Designation Criteria

A "High-Intensity" environment designation will be assigned to shorelands designated for commercial or industrial use in the Comprehensive Plan if they currently support or are suitable and planned for high-intensity commercial, industrial, or institutional uses that either include, or do not detract from the potential for water oriented uses, shoreline restoration and/or public access.

c. Management Policies

Uses

1. In regulating uses in the "High-Intensity" environment, first priority should be given to water-dependent uses. Second priority should be given to water-related and water-enjoyment uses. Given the fact that commercial navigation on the Green River is limited by the channel configuration, nonwater-oriented uses may be allowed on shorelands separated from the shoreline by other properties, such as the Green River Trail corridor, and where public access improvements and/or shoreline restoration is included as part of the development. Nonwater-oriented uses may also be permitted where water-dependent uses, public access, and shoreline restoration is infeasible, as determined by the City's Shoreline Administrator.

The City's Shoreline Administrator will consult the provisions of this SMP and determine the applicability and extent of ecological restoration and/or public access required. The extent of ecological restoration shall be that which is reasonable given the specific circumstances of development in the "High-Intensity" environment.

2. Developments in the "High-Intensity" environment should be managed so that they enhance and maintain the shorelines for a variety of urban uses, with priority given to water-dependent, water-related, and water-enjoyment uses.

Public Access and Aesthetics

- 3. Existing public access ways should not be blocked or diminished.
- 4. Aesthetic objectives should be actively implemented by means such as sign control regulations, appropriate development siting, screening and architectural standards, and maintenance of natural vegetative buffers. These objectives may be implemented either through this SMP or other City ordinances.
- 5. In order to make maximum use of the available shoreline resource and to accommodate future water-oriented uses, shoreline restoration and/or public access, the redevelopment and renewal of substandard, degraded, obsolete urban shoreline areas should be encouraged.

d. Specific Environment Designations

The following table (Table 1.) assigns areas within shoreline jurisdiction as a "High Intensity" environment. See attached Shoreline Environment Designation Maps (Appendix A).

Environment Designation	Sub-Unit	Begins (parcel No.)	Ends (parcel No.)
High Intensity with an Urban Conservancy – Open Space parallel environment for the trail corridor, including the new section of trail between S 266 th St and S 259 th St.	GR B-1. Industrial area north of the river from commercial lot east of Central Ave, generally west and north to Foster Park	Eastern edge of 3462800260	Western edge of 0006600017 (or City boundary)
High Intensity	GR B-2. Industrial area south of the river just east of the Valley Freeway (SR 167)	Eastern edge of 0004400005 (or City boundary)	Western edge of 0200000110 (or edge of SR 167)
High Intensity with an Urban Conservancy – Open Space parallel environment for the trail corridor	GR B-3. Industrial area north of the river just east of the Valley Freeway (SR 167) located between Foster Park and Riverview Park	Eastern edge of 2611000200	Western edge of 2611000190 (or SR 167)
High Intensity with a parallel environment Urban Conservancy – Open Space for the trail corridor.	GR B-4. Small mixed use area north of the river between the Valley Freeway (SR 167) and SR 181.	Eastern edge 2422049114 and 5436200843 Western boundary of SR 181	Southern edge of 2422049178
High Intensity with a parallel environment of Urban Conservancy – Open Space for the Green River Trail corridor.	GR B-5. Industrial area located along Russell Rd. north of S. 228 th St and south of the GRNRA	Southern edge of 0006200023 (S 228 St)	Southern edge of 0006200018
High Intensity with a parallel environment of Urban Conservancy – Open Space for the Green River Trail corridor.	GR B-5. Small industrial area located along Russell Rd. adjacent to the GRNRA.	Southern edge of 0006200017	Northern edge of 1022049016
High Intensity with a parallel environment of Urban Conservancy – Open Space for the Green River Trail corridor.	GR B-6. Industrial area along east side of the river north of S 200 th St.	Southern edge of 7888800210 (Russell Rd S, S 200 St)	Western edge of 7888800090
High Intensity	GR B-7. Industrial and commercial area east of SR 181 and south of SW 43 rd St	Southern edge of 6407600130	Northern edge of 0000200017 (SW 43 St)
High Intensity	GR PAA-B-1. Shorelands in the potential annexation area (PAA) generally south of the river and west of the Valley Freeway (SR 167)	Southern edge of 0004400031	Western edge of 2522046666

Table 1. High Intensity Environment Designation Descriptions

Environment Designation	Sub-Unit	Begins (parcel No.)	Ends (parcel No.)
High Intensity	Springbrook Creek – this area has a parallel designation of UC-OS for the Springbrook Creek Greenbelt.	3623049018	1253710010

3. "Urban Conservancy–Open Space" (UC-OS) Environment

a. Purpose

The purpose of the "Urban Conservancy-Open Space" environment is to protect and "restore", as defined in this SMP, ecological functions in urban and developed settings, while allowing public access and a variety of park and recreation uses.

b. Designation Criteria

An "Urban Conservancy-Open Space" environment designation will be assigned to shorelands that are within public and private parks and natural resource areas, including golf courses, the Green River Natural Resource Area, the Green River Trail and park lands on Lake Meridian, Lake Fenwick, and Springbrook Creek. Lands planned for park uses or resource conservation areas with no other commercial or residential land uses should also be designated "Urban Conservancy-Open Space."

c. Management Policies

Uses

- 1. Water-oriented recreational uses should be given priority over nonwateroriented uses. Water-dependent recreational uses should be given highest priority.
- 2. Commercial activities enhancing the public's enjoyment of publically accessible shorelines may be appropriate.
- 3. Water-dependent and water-enjoyment recreation facilities that do not deplete the resource over time, such as boating facilities, angling, wildlife viewing trails, and swimming beaches, are preferred uses, provided significant ecological impacts to the shoreline are avoided or mitigated.
- 4. Development that hinders natural channel movement in channel migration zones should not be allowed (refer to the Channel Migration Zone Map, Figure No. 10.2 in the Inventory and Analysis Report).

Ecological Restoration and Public Access

3. During development and redevelopment, all reasonable efforts, as determined by the City, should be taken to restore ecological functions.

- 4. Standards should be established for shoreline stabilization measures, vegetation conservation, water quality, and shoreline modifications within the "Urban Conservancy-Open Space" designation to ensure that new development does not further degrade the shoreline and is consistent with an overall goal to improve ecological functions and habitat.
- 5. Public access and public recreation objectives should be implemented whenever feasible and significant ecological impacts can be mitigated.

d. Specific Environment Designations

The following table (Table 2.) assigns areas within shoreline jurisdiction as an "Urban Conservancy – Open Space" environment. See also the attached maps.

Environment Designation	Sub-Unit	Begins (parcel No.)	Ends (parcel No.)
Urban Conservancy – Open Space.	The Green River Trail receives a parallel designation for much of the Green River	NA	NA
Urban Conservancy – Open Space.	GR A-2. Foster Park is on the north side of the river generally west of the railroad line and east of the Valley Freeway (SR 167)	2611000200 (includes trail portion of 2611000190)	2611000200
Urban Conservancy – Open Space	GR A-5. The Riverbend Golf Complex	Western edge of 2322049011 (includes portions of 2322046666)	Northeastern edge of 2322049027
Urban Conservancy –Open Space	GR A-6. Golf course and open space on the south and west side of the river from the city limits south of W. Meeker St. to the industrial area north of the golf complex	City limits (located in 2322049029)	Southern boundary of 2222049176
Urban Conservancy – Open Space	GR B5. Part of this sub-unit is the horticultural center and nursery for the GRNRA so is designated UC- Open Space.	Southern edge of 0006200018	Southern edge of 0006200017
Urban Conservancy – Open Space	GR A-8. Green River Natural Resource Area	Southern edge of 1022049196	Southern edge of 1122049065

Environment Designation	Sub-Unit	Begins (parcel No.)	Ends (parcel No.)
Urban Conservancy – Open Space	GR A-9. Valley Floor Community Park	Northern edge of S 212 St (southern edge of 1122049008)	Northern edge of 1122049008
Urban Conservancy – Open Space	GR A-10. Green River Trail north of S 212 th St and south of Russell Road	Northern edge of S 212 St (southern edge of 6600210330	Southern edge of Russell Rd S
Urban Conservancy – Open Space	GR A-11. Future North Green River Park on the east shoreline just south of the City limits.	Includes 0000200044	Includes 0000200044
Urban Conservancy – Open Space	GR A-3. Riverview Park is on the north and east side of the river just west of the Valley Freeway (SR 167)	2522049001 Includes 2522046666	Southern boundary of 2422049178
All areas located in the North Green River Park are Urban Conservancy – Open Space. All areas that are designated US are Urban Conservancy – Low Intensity	GR PAA-A-1. Area within the PAA and City Limits north and east of the river at the eastern most area of the Green River shorelands within the City and PAA	On west side of river: 3022059054	On west side of river: North of S 277 St (south edge of 3122056666)
Urban Conservancy – Open Space	Lake Meridian - Unit A – Open Space -Lake Meridian Park	Western edge of parcel number 6648500840	Northern edge of parcel number 2622059044
Urban Conservancy – Open Space	Lake Fenwick – Unit A – Open Space	Eastern edge of parcel number 2722049057	Southern edge of parcel number 2722049042 (City boundary) and Includes: Parcel number 2622049045
Urban Conservancy – Open Space	Green River Natural Resource Area	Includes those areas of the following parcels in shoreline jurisdiction: 1122049005, 1122049083, 1122049015, 1122049017, 1122049025,	Includes those areas of the following parcels in shoreline jurisdiction: 1122049064, 0006200001, 0006200018, 1122049026
Urban Conservancy – Open Space	Jenkins Creek	3622059152	3622059152

Environment Designation	Sub-Unit	Begins (parcel No.)	Ends (parcel No.)
Urban Conservancy – Open Space	Springbrook Creek Greenbelt	Western edge of parcel number 1253710060	The northwest corner of parcel number 1253720016
Urban Conservancy – Open Space	Lands acquired by the City of Kent for parks and recreation uses after the adoption of the SMP.	To be determined	To be determined

4. "Urban Conservancy–Low Intensity" (UC-LI) Environment

a. Purpose

The purpose of the "Urban Conservancy-Low Intensity" environment is to protect and restore ecological functions in low intensity settings, while allowing a variety of low impact uses, such as nurseries, low intensity residential and agriculture support uses.

b. Designation Criteria

An "Urban Conservancy-Low Intensity" environment designation will be assigned to shorelands appropriate and planned for development that are not generally suitable for water-dependent uses and that lie in lands designated as "Urban Separator," "Agricultural Resource," and "Agricultural Support" in the Comprehensive Plan, with any of the following characteristics:

- 1. They are suitable for low impact uses;
- 2. They are flood plains or other areas that should not be more intensively developed;
- 3. They have potential for ecological restoration;
- 4. They retain important ecological functions, even though partially developed; or
- 5. They are designated for low impact development.

c. Management Policies

Uses

- 1. Water-oriented uses should be given priority over nonwater-oriented uses. For shoreline areas adjacent to commercially navigable waters, water-dependent uses should be given highest priority.
- 2. Uses in the "Urban Conservancy–Low Intensity" environment should be limited to those which are non-consumptive (i.e., do not deplete over time) of the shoreline area's physical and biological resources and uses that do not substantially degrade ecological functions or the rural or natural character of

the shoreline area. Shoreline habitat restoration and environmental enhancement are preferred uses.

- 3. Agricultural practices, when consistent with provisions of this chapter, may be allowed. Except as a Conditional Use, nonwater-oriented commercial and industrial uses should not be allowed.
- 4. Where allowed, commercial uses should include substantial shoreline restoration and public access.
- 5. Water-dependent and water-enjoyment recreation facilities that do not deplete the resource over time, such as boating facilities, angling, wildlife viewing trails, and swimming beaches, are preferred uses, provided significant ecological impacts to the shoreline are avoided or mitigated.
- 6. Developments and uses that would substantially degrade or permanently deplete habitat or the physical or biological resources of the area or inhibit stream movement in channel migration zones should not be allowed. (Refer to the Channel Migration Zone Map, Figure No. 10.2 in the Inventory and Analysis Report).

Ecological Management and Restoration

7. During development and redevelopment, all reasonable efforts should be taken to restore ecological functions. Where feasible, restoration should be required of all nonwater-dependent development on previously developed shorelines.

The City's Shoreline Administrator will consult the provisions of this SMP and determine the applicability and extent of ecological restoration required. The extent of ecological restoration shall be that which is reasonable given the specific circumstances of development in the "Urban Conservancy – Low Intensity" environment.

- 8. Regulatory standards should be established for shoreline stabilization measures, vegetation conservation, water quality, and shoreline modifications within the "Urban Conservancy-Low Intensity" designation to ensure that new development does not further degrade the shoreline and is consistent with an overall goal to improve ecological functions and habitat.
- 9. Where appropriate, standards for landscaping and visual quality should be included.

Shoreline Modification and Development Impacts

10. Construction of new structural shoreline stabilization and flood control works should not be allowed except where there is a documented need to protect public safety, an existing structure or ecological functions and mitigation is applied (See Chapter 4: Shoreline Modification Provisions). New development should be designed and located to preclude the need for structural shoreline stabilization or flood control.

- 11. Development of the area within shoreline jurisdiction should be limited to a maximum of 12 percent total impervious surface area, unless an alternative standard is developed based on scientific information that meets the provisions of this chapter and protects shoreline ecological functions.
- 12. New shoreline stabilization, flood control measures, vegetation removal, and other shoreline modifications should be designed and managed to ensure that the natural shoreline functions are protected and restored over time. Shoreline ecological restoration should be required of new nonwater-dependent development or redevelopment where the shoreline ecological functions have been degraded.
- 13. Activities or uses that would strip the shoreline of vegetative cover, cause substantial erosion or sedimentation, or adversely affect wildlife or aquatic life should be prohibited.
- 14. Preservation of ecological functions should be balanced with public access and recreation objectives and should have priority over development objectives whenever a conflict exists.

d. Specific Environment Designations

The following table (Table 3.) assigns areas within shoreline jurisdiction as an "Urban Conservancy – Low Intensity" environment. See also the attached shoreline designation maps (Appendix A).

Environment Designation	Sub-Unit	Begins (parcel No.)	Ends (parcel No.)
Urban Conservancy – Low Intensity	GR A-1. Open space area on the east side of the river to the north and south of South 277 th Street bounded by the City limits	3122059021	3122059008
Urban Conservancy – Low Intensity. A portion of this area is a designated wetland and is therefore protected under the Critical Area Ordinance.	GR A-4. Undeveloped area on south river bank with tributary west of Valley Fwy (SR 167)	Eastern boundary of 2522049023 (includes portion of 2522046666)	Northern boundary of 2522049019
Urban Conservancy – Low Intensity	GR A-7. Open space on the west side of the river from Cottonwood Grove Park to the residential area approximately 2,400' north of S 228 th Street	Eastern edge of 0002000021	Northern edge of 1022049210

 Table 3.
 Urban Conservancy – Low Intensity Environment Designation

 Descriptions
 Provide the second second

Environment Designation	Sub-Unit	Begins (parcel No.)	Ends (parcel No.)
All areas located in the North Green River Park are Urban Conservancy – Open Space. All areas that are designated US are Urban Conservancy – Low Intensity	GR PAA-A-1. Area within the PAA and City Limits north and east of the river at the eastern most area of the Green River shorelands within the City and PAA	On west side of river: 3022059054	On west side of river: North of S 277 St (south edge of 3122056666)
Urban Conservancy - Low Intensity	GR D-1. South of the river just west of Valley Freeway (SR 167)	Southern boundary of 2522049014	City boundary in 2422049089
Urban Conservancy – Low Intensity	GR D-2. Agricultural activities on the west side of the river from Riverbend Golf Course to Cottonwood Grove Park	Southern boundary of2222049176	Western edge of 2322049006
Urban Conservancy –Low Intensity	GR D-4. Agricultural lands north of Valley Floor Community Park	Southern edge of 1122049007	Northern edge of 0222049017 (City boundary)
Urban Conservancy –Low Intensity	Big Soos Creek Unit D		
Urban Conservancy – Low Intensity	Panther Lake – Unit A – Open Space	Southern edge of 6623400360	Southern edge of 0422059023
Urban Conservancy – Low Intensity	Panther Lake – Unit A – Open Space	Western edge of 0422059149	Eastern edge of 0422059068
Urban Conservancy – Low Intensity	Green River/Mill Creek Auburn Floodway	As mapped based on the Flood Hazard Areas map in the Inventory & Analysis Report	As mapped based on the Flood Hazard Areas map in the Inventory & Analysis Report

5. "Shoreline Residential" (SR) Environment

a. Purpose

The purpose of the "Shoreline Residential" environment is to accommodate residential development and appurtenant structures that are consistent with this chapter. An additional purpose is to provide appropriate community access and recreational uses.

b. Designation Criteria

A "Shoreline Residential" environment designation will be assigned to City of Kent's shorelands if they are predominantly single-family or multifamily residential development or are planned for residential development.

c. Management Policies

Uses

- 1. Commercial development should be limited to water-oriented uses and not conflict with the residential character of lands in the "Shoreline Residential" environment.
- 2. Water-oriented recreational uses should be allowed.
- 3. Adequate land area and services should be provided.
- 4. Land division and development should be permitted only 1) when adequate setbacks or buffers are provided to protect ecological functions and 2) where there is adequate access, water, sewage disposal, and utilities systems, and public services available and 3) where the environment can support the proposed use in a manner which protects or restores the ecological functions.
- 5. Development standards for setbacks or buffers, shoreline stabilization, vegetation conservation, critical area protection, and water quality should be established to protect and, where significant ecological degradation has occurred, restore ecological functions over time.
- 6. Multi-family development and subdivisions of land into more than four parcels should provide community access for residents of that development.
- 7. New residential development should be located and designed so that future shoreline stabilization is not required.

d. Specific Environment Designations

The following table (Table 4.) assigns areas within shoreline jurisdiction as a "Shoreline Residential" environment. See also the attached maps.

Environment Designation	Sub-Unit	Begins (parcel No.)	Ends (parcel No.)
Shoreline Residential for the residential area and Urban Conservancy – Open Space for the trail corridor.	GR C-1. Residential area north and west side of the Green River east of Central Ave	Eastern edge of 9183706000	Western edge of 2890600000
Shoreline Residential with a parallel designation of Urban Conservancy – Open Space for the trail portion of the sub-unit.	GR C-2. Residential area on north side of the river from SR 181 to the golf course at Russell Rd	Eastern edge of 5436200843 and 2422049114	Western edge of 2322046666, 2322049049
Shoreline Residential with a parallel designation of Urban Conservancy – Open Space for the trail portion of the sub-unit.	GR C-3. Residential area on east side of River from James Street north to S 228 th Street	Southern edge of 1085670000	Northern edge of 00062200016
Shoreline Residential	GR C-4. Residential area on west side of River south of S 216 Street	Southern edge of 1022049206	Northern edge of 1022049015 (South of S 216 St)
Shoreline Residential.	GR D-3. Agricultural area on west side of river south of S. 212 th Street	Southern edge of 1122049011 (S 216 St)	Northern edge of 2632000070 (S 212 St)
Shoreline Residential with a parallel designation of Urban Conservancy - Open Space for the trail portion.	GR C-5. RV camp- ground (KOA) on east side of the river south of S. 212 th St. and north of the GRNRA.	Southern edge of 1122049065	Northern edge of 1122049065 (S 212 St)
Shoreline Residential	Lake Meridian – Unit C	Southern edge of parcel number 2622059066	Western edge of parcel number 6648500840
Shoreline Residential	Lake Fenwick – Unit C - Residential	Northern boundary of parcel number 4016800009	Northern boundary of parcel number 2622049038
Shoreline Residential	Lake Fenwick – Unit C - Residential	Southern edge of parcel number 2722049071	Western edge of parcel number 2722049202
Shoreline Residential	Panther Lake – Unit C – Residential	Eastern edge of 0522059040	Southern edge of 6623400360

 Table 4.
 Shoreline Residential Environment Designation Descriptions

Environment Designation	Sub-Unit	Begins (parcel No.)	Ends (parcel No.)
Shoreline Residential	Panther Lake – Unit C – Residential	Northern edge of 6624037777	Eastern edge of 0422059068

6. "Aquatic" Environment

a. Purpose

The purpose of the "Aquatic" environment is to protect, restore, and manage the unique characteristics and resources of the areas waterward of the ordinary high water mark.

b. Designation Criteria

An "Aquatic" environment designation will be assigned to shoreline areas waterward of the ordinary high-water mark.

c. Management Policies

- 1. New over-water structures should be prohibited except for water-dependent uses, public access, or ecological restoration.
- 2. The size of new over-water structures should be limited to the minimum necessary to support the structure's intended use.
- 3. In order to reduce the impacts of shoreline development and increase effective use of water resources, multiple uses of over-water facilities should be encouraged.
- 4. Provisions for the "Aquatic" environment should be directed towards maintaining and restoring habitat for aquatic species.
- 5. Uses that cause significant ecological impacts to critical freshwater habitats should not be allowed. Where those uses are necessary to achieve the objectives of RCW 90.58.020, their impacts shall be mitigated according to the sequence defined in Chapter 3 Section B.4.
- 6. Shoreline uses and modifications should be designed and managed to prevent degradation of water quality and alteration of natural hydrographic conditions.
- 7. Abandoned and neglected structures that cause adverse visual impacts or are a hazard to public health, safety, and welfare should be removed or restored to a usable condition consistent with this SMP.
A. Introduction

General policies and regulations are applicable to all uses and activities (regardless of shoreline environment designation) that may occur along the City's shorelines.

This chapter is broken up into twelve different topic headings and is arranged alphabetically. Each topic begins with a discussion of background SMP issues and considerations, followed by general policy statements and regulations. The intent of these provisions is to be inclusive, making them applicable over a wide range of environments as well as particular uses and activities.

B. Policies and Regulations

1. Universally Applicable Policies and Regulations

a. Applicability

The following regulations describe the requirements for all shoreline uses and modifications in all shoreline environment designations.

b. Policies

- 1. The City should periodically review conditions on the shoreline and conduct appropriate analysis to determine whether or not other actions are necessary to protect and restore the ecology to ensure no net loss of ecological functions, protect human health and safety, upgrade the visual qualities, and enhance residential and recreational uses on the City's shorelines. Specific issues to address in such evaluations include, but are not limited to:
 - a. Water quality.
 - b. Conservation of aquatic vegetation (control of noxious weeds and enhancement of vegetation that supports more desirable ecological and recreational conditions).
 - c. Upland vegetation.
 - d. Changing visual character as a result of new residential development, including additions, and individual vegetation conservation practices.
 - e. Shoreline stabilization and modifications.
- 2. The City should keep records of all project review actions within shoreline jurisdiction, including shoreline permits and letters of exemption.

- 3. Where appropriate, the City should pursue the policies of this SMP in other land use, development permitting, public construction, and public health and safety activities. Specifically, such activities include, but are not limited to:
 - a. Water quality and storm water management activities, including those outside shoreline jurisdiction but affecting the shorelines of the state.
 - b. Aquatic vegetation management.
 - c. Health and safety activities, especially those related to sanitary sewage.
 - d. Public works and utilities development.
- 4. The City should involve affected federal, state, and tribal governments in the review process of shoreline applications.

c. Regulations

- 1. All proposed shoreline uses and development, including those that do not require a shoreline permit, must conform to the Shoreline Management Act, Chapter 90.58 RCW, and to the policies and regulations of this SMP.
- 2. All new shoreline modifications must be in support of an allowable shoreline use that conforms to the provisions of this SMP. Except as otherwise noted, all shoreline modifications not associated with a legally existing or an approved shoreline use are prohibited.
- 3. Shoreline uses, modifications, and conditions listed as "prohibited" shall not be eligible for consideration as a shoreline variance or shoreline Conditional Use permit. See Chapter 5 for Shoreline Use Regulations, including exemptions, variances, Conditional Uses, and nonconforming uses.
- 4. The "policies" listed in this SMP will provide broad guidance and direction and will be used by the City in applying the "regulations." The policies, taken together, constitute the Shoreline Element of the Kent Comprehensive Plan.
- 5. Where provisions of this SMP conflict, the provisions most directly implementing the objectives of the Shoreline Management Act, as determined by the City, shall apply unless specifically stated otherwise.
- 6. The regulations of Chapters 2, 4, 5 and sections 2, and 4 through 12 of Chapter 3 in this SMP shall not apply to those land areas that are outside shoreline jurisdiction as of the date of adoption of this SMP but which do fall within shoreline jurisdiction due solely to a human-constructed shoreline restoration project, pursuant to the provisions of Washington State House Bill 2199 Chapter 405, 2009 Laws. That is, if a shoreline restoration project causes the expansion of shoreline jurisdiction onto a neighboring property or portion of the subject property, then SMP regulations noted above do not apply to the area of expanded jurisdiction. However, if the area newly falling into shoreline jurisdiction is a critical area, then the critical area provisions of this SMP do apply.
- 7. All private development along the Green River must be set back from the Green River OHWM according to the following:

- a. Where there is an existing levee or where flood control measures are planned (generally on the north and east banks of the river), private development, including buildings, building additions and pavements shall be set back sufficiently to allow for the construction of levee improvements. In most areas, this setback will be 140' from the OHWM. The City may increase or decrease the required setback according to the design of the levee improvements at the particular stretch of river in question. New public development associated with levee construction, including trail, public access, recreation spaces, and environmental restoration improvements may be located within this setback.
- b. Where there is no levee and no public plans to construct or improve a levee (generally on the south and west banks of the river), all new private development shall be set back 150' from the OHWM. New public development such as road improvements and environmental restoration may be constructed within this setback provided they meet the requirements of this SMP.

2. Archaeological and Historic Resources

a. Applicability

The following provisions apply to archaeological and historic resources that are either recorded at the State Historic Preservation Office and/or by local jurisdictions or have been inadvertently uncovered. Archaeological sites located both in and outside shoreline jurisdiction are subject to Chapter 27.44 RCW (Indian graves and records) and Chapter 27.53 RCW (Archaeological sites and records) and shall comply with Chapter 25-48 WAC as well as the provisions of this chapter.

b. Policies

1. Due to the limited and irreplaceable nature of the resource, public or private uses, activities, and development should be prevented from destroying or damaging any site having historic, cultural, scientific or educational value as identified by the appropriate authorities and deemed worthy of protection and preservation.

c. Regulations

- 1. All shoreline permits shall contain provisions which require developers to immediately stop work and notify the City if any phenomena of possible archaeological value are uncovered during excavations. In such cases, the developer shall be required to provide for a site inspection and evaluation by a professional archaeologist to ensure that all possible valuable archaeological data are properly salvaged or mapped.
- 2. Permits issued in areas known to contain archaeological artifacts and data shall include a requirement that the developer provide for a site inspection and evaluation by an archaeologist. The permit shall require approval by the City

before work can begin on a project following inspection. Significant archaeological data or artifacts shall be recovered before work begins or resumes on a project.

- 3. Significant archaeological and historic resources shall be permanently preserved for scientific study, education and public observation. When the City determines that a site has significant archaeological, natural, scientific or historical value, a Substantial Development Permit shall not be issued which would pose a threat to the site. The City may require that development be postponed in such areas to allow investigation of public acquisition potential and/or retrieval and preservation of significant artifacts.
- 4. In the event that unforeseen factors constituting an emergency as defined in RCW 90.58.030 necessitate rapid action to retrieve or preserve artifacts or data identified above, the project may be exempted from the permit requirement of these regulations. The City shall notify the State Department of Ecology, the State Attorney General's Office and the State Historic Preservation Office of such a waiver in a timely manner.
- Archaeological sites located both in and outside the shoreline jurisdiction are subject to RCW 2744 (Indian Graves and Records) and RCW 2753 (Archaeological Sites and Records) and shall comply with WAC 25-48 as well as the provisions of this SMP.
- 6. Archaeological excavations may be permitted subject to the provisions of this program.
- 7. Identified historical or archaeological resources shall be included in park, open space, public access and site planning, with access to such areas designed and managed so as to give maximum protection to the resource and surrounding environment.
- 8. Clear interpretation of historical and archaeological features and natural areas shall be provided when appropriate.
- 9. The City will work with affected tribes and other agencies to protect Native American artifacts and sites of significance and other archaeological and cultural resources as mandated by Chapter 27.53 RCW.

3. Critical Areas

Critical areas in shoreline jurisdiction are regulated by the Critical Areas Regulations, Ordinance No. 3805 (08/15/06), codified under Chapter 11.06 KCC, which is herein incorporated into this SMP except as noted below.

Exceptions to the applicability of the Critical Areas Regulations in shoreline jurisdiction are provided below.

1. If provisions of the Critical Areas Regulations and other parts of the SMP conflict, the provisions most protective of the ecological resource shall apply, as determined by the City.

- 2. Provisions of the Critical Areas Regulations that are not consistent with the Shoreline Management Act, Chapter 90.85 RCW, and supporting Washington Administrative Code chapters shall not apply in shoreline jurisdiction, as follows:
 - a. The provisions of the Critical Areas Regulations do not extend shoreline jurisdiction beyond the limits specified in this SMP. For regulations addressing critical area buffer areas that are outside shoreline jurisdiction, see Critical Areas Regulations, Chapter 11.06 KCC.
 - b. Provisions of the Critical Area Regulations that include a "reasonable use determination" shall not apply within shoreline jurisdiction. Specifically, Section 11.06.90 KCC, as amended does not apply.
 - c. Provisions of the Critical Areas Regulations relating to variance procedures and criteria do not apply in shoreline jurisdiction. Within shoreline jurisdiction, the purpose of a variance permit is strictly limited to granting relief from specific bulk, dimensional or performance standards set forth in the SMP where there are extraordinary circumstances relating to the physical character or configuration of property such that the strict implementation of the SMP will impose unnecessary hardships on the applicant or thwart the policies set forth in RCW 90.58.020. Specifically, Section 11.06.100 KCC shall not apply. Variance procedures and criteria have been established in this SMP, Chapter 7 Section D and in Washington Administrative Code WAC 173-27-170.4. Environmental Impacts.
 - d. Exemption 11, describing exceptions for approved plats and legally created lots in Section 11.06.040 KCC, shall not apply.
 - e. The Critical Areas Regulations refer to all shorelines identified in the SMP as Type 1 Waters and defers all setbacks for Type 1 Waters to the Kent SMP (Section 11.06.680 KCC). Since the Critical Areas Regulations were adopted, new waterbodies were added to the SMP, including a portion of both Springbrook Creek and Jenkins Creek. The portion of Springbrook Creek that is identified in this SMP shall be a Type 1 water rather than subject to the valley stream buffer per Section 11.06.680 KCC.

4. Environmental Impacts

a. Applicability

The following policies and regulations apply to all uses and development in shoreline jurisdiction that are not within the jurisdiction of the Critical Areas Regulations as addressed in Section B.3 above.

b. Policies

1. In implementing this SMP, the City should take necessary steps to ensure compliance with Chapter 43.21C RCW, the Washington State Environmental Policy Act of 1971, and its implementing guidelines.

2. All significant adverse impacts to the shoreline should be avoided or, if that is not possible, minimized to the extent feasible and provide mitigation to ensure no net loss of ecological function.

c. Regulations

- 1. All project proposals, including those for which a shoreline permit is not required, shall comply with Chapter 43.21C RCW, the Washington State Environmental Policy Act.
- 2. Projects that cause significant ecological impacts, as defined in Definitions, are not allowed unless mitigated according to the sequence in subsection c. 4 below to avoid reduction or damage to ecosystem-wide processes and ecological functions.
- 3. Projects that cause significant adverse impacts, other than significant ecological impacts, shall be mitigated according to the sequence in subsection c.4 below.
- 4. The City will set mitigation requirements or permit conditions based on impacts identified per this SMP. In order to determine acceptable mitigation, the City Shoreline Administrator may require the applicant to provide the necessary environmental information and analysis, including a description of existing conditions/ecological functions and anticipated shoreline impacts, along with a restoration plan outlining how proposed mitigation measures would result in no net loss of shoreline ecological functions.

When applying mitigation to avoid or minimize significant adverse effects and significant ecological impacts, the City will apply the following sequence of steps in order of priority, with (a) being top priority:

- a. Avoiding the impact altogether by not taking a certain action or parts of an action;
- b. Minimizing impacts by limiting the degree or magnitude of the action and its implementation by using appropriate technology or by taking affirmative steps to avoid or reduce impacts;
- c. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
- d. Reducing or eliminating the impact over time by preservation and maintenance operations;
- e. Compensating for the impact by replacing, enhancing, or providing substitute resources or environments; and
- f. Monitoring the impact and the compensation projects (from subsection e. above) and taking appropriate corrective measures.
- 5. Exception to the sequencing noted above: The City may provide for or allow mitigation of an environmental impact through a comprehensive mitigation program such as a mitigation banking program if such mitigation measures will result in a greater benefit in terms of ecological functions and values.

Such a program must be based on a comprehensive analysis of ecological systems such as provided by the analysis and restoration plan accomplished as part of this SMP.

6. All shoreline development shall be located and constructed to avoid locallyspecific significant adverse impacts to human health and safety.

5. Flood Hazard Reduction and River Corridor Management

a. Applicability

The provisions in this section apply to those areas within shoreline jurisdiction lying along the Green River floodplain corridor, including rivers, streams, associated wetlands in the floodplain, and river deltas.

The provisions in this section are intended to address two concerns especially relevant to river shorelines:

- 1. Protecting human safety and minimizing flood hazard to human activities and development.
- 2. Protecting and contributing to the restoration of ecosystem-wide processes and ecological functions found in the applicable watershed or sub-basin.

b. Policies

- 1. The City should implement a comprehensive program to manage the City's riparian corridors that integrates the following City ordinances and activities:
 - a. Regulations in this SMP.
 - b. The City's Critical Area Regulations.
 - c. The City's zoning code.
 - d. The City's Drainage Master Plan, Surface Water Design Manual, and implementing regulations.
 - e. The City's participation in the National Flood Insurance Program and compliance with the State's floodplain management law at Chapter 86.16. RCW.
 - f. The construction or improvement of new public facilities, including roads, dikes, utilities, bridges, and other structures.
 - g. The ecological restoration of selected shoreline areas.
- 2. In regulating development on shorelines within SMA jurisdiction, the City should endeavor to achieve the following:
 - a. Maintenance of human safety.
 - b. Protection and, where appropriate, the restoration of the physical integrity of the ecological system processes, including water and sediment transport and natural channel movement.

- c. Protection of water quality and natural groundwater movement.
- d. Protection of fish, vegetation, and other life forms and their habitat vital to the aquatic food chain.
- e. Protection of existing legal uses and legal development (including nonconforming development) unless the City determines relocation or abandonment of a use or structure is the only feasible option or that there is a compelling reason to the contrary based on public concern and the provisions of the SMA.
- f. Protection of recreation resources and aesthetic values, such as point and channel bars, islands, and other shore features and scenery.
- g. When consistent with the provisions a. through f. above, provide for public access and recreation, consistent with Chapter 3 Section B.7.
- 3. The City should undertake flood hazard planning, where practical, in a coordinated manner among affected property owners and public agencies and consider entire drainage systems or sizable stretches of rivers, lakes, or marine shorelines. This planning should consider the off-site erosion and accretion or flood damage that might occur as a result of stabilization or protection structures or activities. Flood hazard management planning should fully employ nonstructural approaches to minimizing flood hazard to the extent feasible.
- 4. The City should give preference to and use nonstructural solutions over structural flood control devices wherever feasible, including prohibiting or limiting development in historically flood-prone areas, regulating structural design and limiting increases in peak storm water runoff from new upland development, public education, and land acquisition for additional flood storage. Structural solutions to reduce shoreline hazard should be allowed only after it is demonstrated that nonstructural solutions would not be able to reduce the hazard.

Where structural solutions are rebuilt, fish-friendly structures such as setback levees should be used. In the Lower Green River, every opportunity should be taken to set back levees and revetments to the maximum extent practicable.

- 5. In designing publicly financed or subsidized works, the City should provide public pedestrian access to the shoreline for low-impact outdoor recreation.
- 6. The City should encourage the removal or breaching of dikes to provide greater wetland area for flood water storage and habitat; provided, such an action does not increase the risk of flood damage to existing human development.

c. Regulations

1. New development must be consistent with "a" through "d" below in addition to the provisions of this SMP. In cases of inconsistency, the provisions most protective of shoreline ecological functions and processes shall apply:

- a. The City's Flood Hazard Regulations, Chapter 14.09 KCC.
- b. The flood insurance study for King County, Washington, prepared by FEMA in accordance with Chapter 86.16 RCW and the National Flood Insurance Program.
- c. The City's Surface Water Utility Regulations, Chapter 7.05 KCC, as amended.
- d. Conditions of Hydraulic Project Approval, issued by Washington State Department of Fish and Wildlife, which may be incorporated into permits issued for flood protection.
- 2. New structural flood hazard reduction measures, including dikes, levees, and overflow channels, may be allowed only when consistent with Chapter 14.09 KCC and all of the following can be demonstrated:
 - a. The project does not further restrict natural channel movement, except that flood hazard reduction measures that protect an existing building, roadway, bridge, or utility line may be installed, provided the measure is placed as close to the existing structure as possible;
 - b. Other, nonstructural measures would not be feasible or adequate;
 - c. The measures are necessary to protect existing development or new public development, such as a roadway, that cannot be located further from the stream channel; and
 - d. Shoreline vegetation necessary to provide ecological functions is protected or restored.
- 3. New flood hazard reduction measures, including dikes and levees, may be constructed to protect properties as part of a shoreline environmental restoration project, such as the breaching of a dike to create additional wetlands.
- 4. Otherwise allowed shoreline modifications in the 100-year floodplain and flood hazard reduction measures shall employ the type of construction or measure that causes the least significant ecological impacts. When authorizing development within the 100-year floodplain, the City will require that the construction method with the least negative significant ecological impacts be used. For example, the City will not allow rock revetments to be used for erosion control if a "softer" approach using vegetation plantings and engineered woody debris placement is possible.
- 5. Existing hydrological connections into and between water bodies, such as streams, tributaries, wetlands, and dry channels, shall be maintained. Where feasible, obstructed channels shall be re-established as a condition of nonwater-dependent uses, development in the 100-year floodplain, and structural flood hazard reduction measures.
- 6. Re-establishment of native vegetation waterward of a new structure on the Green River is required where feasible. The City Shoreline Administrator

may require re-establishment of vegetation on and landward of the structure if it determines such vegetation is necessary to protect and restore ecological functions.

- 7. Designs for flood hazard reduction measures and shoreline stabilization measures in river corridors must be prepared by qualified professional engineers (or geologists or hydrologists) who have expertise in local riverine processes.
- 8. Structural flood hazard reduction projects that are continuous in nature, such as dikes or levees, shall provide for public access unless the City determines that such access is not feasible or desirable according to the criteria in Chapter 3.Section B.7., "Public Access."
- 9. Shoreline modification and development standards shall be as outlined in the matrices in Chapter 4 and Chapter 5 for allowable uses and modification and development standards such as setbacks and clearing and grading within each shoreline environment designation.
- 10. Bridges, culverts, and other river, stream, and waterway crossings shall be designed and constructed so they do not restrict flood flows such that flood elevations are increased. Where a bridge, culvert, or other waterway crossing replaces an existing crossing, the replacement structure shall not increase flood heights over those caused by the original structure.
- 11. The removal of gravel for flood control may be allowed only if a biological and geomorphological study demonstrates a long-term benefit to flood hazard reduction, no net loss of ecological functions, and extraction is part of a comprehensive flood management solution.

6. Parking

a. Applicability

Parking is the temporary storage of automobiles or other motorized vehicles. Except as noted the following provisions apply only to parking that is "accessory" to a permitted shoreline use. Parking as a "primary" use and parking which serves a use not permitted in the shoreline jurisdiction is prohibited.

b. Policies

- 1. Parking should be planned to achieve optimum use. Where possible, parking should serve more than one use (e.g. serving recreational use on weekends, commercial uses on weekdays).
- 2. Where feasible, parking for shoreline uses should be provided in areas outside shoreline jurisdiction.
- 3. Low-impact parking facilities, such as permeable pavements, are encouraged.

c. Regulations

- 1. Parking as a primary use or that serves a use not permitted in the applicable shoreline environment designation shall be prohibited over water and within shoreline jurisdiction.
- 2. Parking in shoreline jurisdiction must directly serve a permitted shoreline use.
- 3. Parking facilities shall be designed and landscaped to minimize adverse impacts upon the adjacent shoreline and abutting properties. A minimum of 15 feet of Type II landscaping, as defined in Section 15.07.050 KCC, as amended, between the parking and the shoreline shall be provided. Landscaping shall consist of native vegetation and plant materials approved by the City Shoreline Administrator and shall be planted before completion of the parking area in such a manner that plantings provide effective screening between parking and the water body within five years of project completion. The City Shoreline Administrator may modify landscaping requirements to account for reasonable safety and security concerns.
- 4. Parking facilities serving individual buildings on the shoreline shall be located landward, if feasible, to minimize adverse impacts on the shoreline.
- 5. Parking facilities for shoreline activities shall provide safe and convenient pedestrian circulation within the parking area and to the shorelines.
- 6. Parking facilities shall provide adequate facilities to prevent surface water runoff from contaminating water bodies, as per the most recent edition of the City of Kent Surface Water Design Manual.
- 7. Lighting associated with parking lots shall be beamed, hooded, or directed to minimize and avoid illumination of the water, setback areas, wetlands, and other wildlife habitat areas.
- 8. See Chapter 5 Section B. Development Standards Matrix, for setback requirements.

7. Public Access

a. Applicability

Shoreline public access is the physical ability of the general public to reach and touch the water's edge and the ability to have a view of the water and the shoreline from upland locations. Public access facilities may include picnic areas, pathways and trails, floats and docks, promenades, viewing towers, bridges, boat launches, and improved street ends. The City of Kent has extensively and comprehensively planned for and implemented public access plans for its shorelines.

The City of Kent has numerous and varied public access facilities along its shorelines. The City and King County have established a regional trail with park and recreation facilities following nearly the entire Green River, and many existing developments along the Green River also include public access points.

There are public parks and public access facilities including docks, floating walkways and boat launches on both Lake Meridian and Lake Fenwick. The Green River Natural Resources Area includes extensive wildlife viewing areas, including two view towers and the Interurban Trail along its southern edge. Along Springbrook Creek two undeveloped City owned park properties connect to the Springbrook Greenbelt, containing a user-made trail, and Gary Grant Soos Creek Park is located on Big Soos Creek. A public boat launch and fishing access is located on Panther Lake as well as an informal street-end access point. These public access facilities, along with identified future public land acquisition, are sufficient to meet public access needs along the shorelines.

In addition to the above examples, comprehensive documentation of existing parks and recreation facilities, public access points and trails are identified and mapped in detail in the Park & Open Space Element of the City's Comprehensive Plan. This element also identifies future park acquisition and development needs. Similarly, chapter 4 of the Shoreline Inventory & Analysis Report identifies existing and potential public access sites for each of the City's shoreline waterbodies. The City's public access planning process provided by these documents provides more effective public access than individual project requirements for public access, as provided for in WAC 173-26-221(4)(d)(iii)(A).

b. Policies

- 1. Public access should be considered in the review of all private and public developments with the exception of the following:
 - a. One- and two-family dwelling units; or
 - b. Where deemed inappropriate due to health, safety and environmental concerns.
- 2. Developments, uses, and activities on or near the shoreline should not impair or detract from the public's access to the water or the rights of navigation.
- 3. Public access should be provided as close as possible to the water's edge without causing significant ecological impacts and should be designed in accordance with the Americans with Disabilities Act.
- 4. Opportunities for public access should be identified on publicly owned shorelines. Public access afforded by shoreline street ends, public utilities and rights-of-way should be preserved, maintained and enhanced.
- 5. Public access should be designed to provide for public safety and comfort and to minimize potential impacts to private property and individual privacy. There should be a physical separation or other means of clearly delineating public and private space in order to avoid unnecessary user conflict.
- 6. Public views from the shoreline upland areas should be enhanced and preserved. Enhancement of views should not be construed to mean excessive removal of existing native vegetation that partially impairs views.

- 7. Public access and interpretive displays should be provided as part of publicly funded restoration projects where significant ecological impacts can be avoided.
- 8. City parks, trails and public access facilities adjacent to shorelines should be maintained and enhanced in accordance with City and County plans.
- 9. Commercial and industrial waterfront development should be encouraged to provide a means for visual and pedestrian access to the shoreline area wherever feasible.
- 10. The acquisition of suitable upland shoreline properties to provide access to publicly owned shorelands should be encouraged.
- 11. The City should acquire and develop waterfront property on Panther Lake, in the event of annexation, to provide public access to the shoreline.

c. Regulations

- 1. Shoreline substantial development (including land division into more than four lots and PUDs) or conditional uses, either of which fronts directly on the shoreline, shall provide physical public access where any of the following conditions are present:
 - a. Where a development or use will interfere with an existing public access way. Impacts to public access may include blocking access or discouraging use of existing on-site or nearby accesses.
 - b. Where the development is proposed by a public entity or on public lands unless such access is shown to be incompatible due to reasons of safety, security, or impact to the shoreline environment or where more effective public access is identified in the City's Comprehensive Parks & Recreation Plan or the Park & Open Space Element of the City's Comprehensive Plan.

The shoreline permit file shall describe the impact, the required public access conditions, and how the conditions address the impact. Mitigation for public access impacts shall be in accordance with the definition of mitigation and mitigation sequencing in Chapter 3 Section B.4.

- 2. For multi-family development and subdivisions of land into more than four parcels, public access need not be provided, however, community access for residents of that development shall be provided.
- 3. Shoreline substantial development (including land division into more than four lots and PUDs) or conditional uses shall minimize impact to public views of shoreline waterbodies from public land or substantial numbers of residences.
- 4. Public access provided by shoreline street ends, public utilities and rights-ofway shall not be diminished (This is a requirement of RCW 35.79.035 and RCW 36.87.130).

- 5. Public access sites shall be connected directly to the nearest public street or public right-of-way and shall include provisions for physically impaired persons, where feasible.
- 6. Required public access sites shall be fully developed and available for public use at the time of occupancy of the use or activity.
- 7. Public access easements and permit conditions shall be recorded as a covenant against the title and/or on the face of a plat or short plat as a condition running contemporaneous with the authorized land use. Said recording with the County Assessor's Office shall occur prior to permit approval (section 58.17.110 RCW).
- 8. Minimum width of public access easements shall be 20 feet, unless the City Shoreline Administrator determines that undue hardship would result. In such cases, easement width may be reduced only to the minimum extent necessary to relieve the hardship.
- 9. The standard state approved logo or other approved signs that indicate the public's right of access and hours of access shall be constructed, installed and maintained by the applicant in conspicuous locations at public access sites. Signs may control or restrict public access as a condition of permit approval.
- 10. Future actions by the applicant, successors in interest, or other parties shall not diminish the usefulness or value of the public access provided.
- 11. Public access facilities may be developed over water provided that all ecological impacts are mitigated to achieve no net loss of ecological functions.

8. Shorelines of State-Wide Significance

a. Applicability

The Shoreline Management Act of 1971 designated certain shoreline areas as shorelines of state-wide significance. Within the City of Kent's jurisdiction, The Green River is a shoreline of state-wide significance. Shorelines thus designated are important to the entire state. Because these shorelines are major resources from which all people in the state derive benefit, this jurisdiction gives preference to uses which favor long-range goals and support the overall public interest.

b. Policies

In implementing the objectives of RCW 90.58.020 for shorelines of statewide significance, the City will base decisions in preparing and administering this SMP on the following policies in order of priority, 1 being the highest and 6 being lowest.

- 1. Recognize and protect the state-wide interest over local interest.
 - a. Solicit comments and opinions from groups and individuals representing state-wide interests by circulating the SMP, and any proposed amendments affecting shorelines of state-wide significance, to state

agencies, adjacent jurisdictions, citizen's advisory committees and local officials and state-wide interest groups.

- b. Recognize and take into account state agencies' policies, programs and recommendations in developing and administering use regulations and in approving shoreline permits.
- c. Solicit comments, opinions and advice from individuals with expertise in ecology and other scientific fields pertinent to shoreline management.
- 2. Preserve the natural character of the shoreline.
 - a. Designate and administer shoreline environments and use regulations to protect and restore the ecology and environment of the shoreline as a result of man-made intrusions on shorelines.
 - b. Upgrade and redevelop those areas where intensive development already exists in order to reduce adverse impact on the environment and to accommodate future growth rather than allowing high intensity uses to extend into low-intensity use or underdeveloped areas.
 - c. Protect and restore existing diversity of vegetation and habitat values, wetlands and riparian corridors associated with shoreline areas.
 - d. Protect and restore habitats for State-listed "priority species."
- 3. Support actions that result in long-term benefits over short-term benefits.
 - a. Evaluate the short-term economic gain or convenience of developments relative to the long-term and potentially costly impairments to the natural shoreline.
 - b. In general, preserve resources and values of shorelines of state-wide significance for future generations and restrict or prohibit development that would irretrievably damage shoreline resources.
- 4. Protect the resources and ecology of the shoreline.
 - a. All shoreline development should be located, designed, constructed and managed to avoid disturbance of and minimize adverse impacts to wildlife resources, including spawning, nesting, rearing and habitat areas and migratory routes.
 - b. Actively promote aesthetic considerations when contemplating new development, redevelopment of existing facilities or general enhancement of shoreline areas.
 - c. Shoreline development should be managed to ensure no net loss of ecological functions.
- 5. Increase public access to publicly owned areas of the shoreline.
 - a. Give priority to developing paths and trails to shoreline areas, linear access along the shorelines, especially to the maintenance and

enhancement of the Green River Trail, which is a regional recreational and transportation resource.

- b. Locate development landward of the ordinary high water mark so that access is enhanced.
- 6. Increase recreational opportunities for the public on the shoreline.
 - a. Plan for and encourage development of facilities for recreational use of the shoreline.
 - b. Reserve areas for lodging and related facilities on uplands well away from the shorelines with provisions for nonmotorized access to the shoreline.

9. Signage

a. Applicability

A sign is defined as a device of any material or medium, including structural component parts, which is used or intended to be used to attract attention to the subject matter for advertising, identification or informative purposes. The following provisions apply to any commercial or advertising sign directing attention to a business, professional service, community, site, facility, or entertainment, conducted or sold either on or off premises.

b. Policies

- 1. Signs should be designed and placed so that they are compatible with the aesthetic quality of the existing shoreline and adjacent land and water uses.
- 2. Signs should not block or otherwise interfere with visual access to the water or shorelands.

c. Regulations

- 1. Prohibited Signs: The following types of signs are prohibited:
 - a. Off-premises detached outdoor advertising signs.
 - b. Commercial signs for products, services, or facilities located off-site.
 - c. Spinners, streamers, pennants, flashing lights and other animated signs used for commercial purposes. Highway and railroad signs are exceptions.
 - d. Signs placed on trees or other natural features, unless the City's Shoreline Administrator finds that these signs are necessary for public safety reasons.
- 2. Allowable Signs: The following types of signs may be allowed in all shoreline environments:
 - a. Water navigational signs, and highway and railroad signs necessary for operation, safety and direction.

- b. Public information signs directly relating to a shoreline use or activity. Public information signs shall include public park signs, public access identification signs, and warning signs.
- c. Off-premise, free-standing signs for community identification, information, or directional purposes.
- d. National, site and institutional flags or temporary decorations customary for special holidays and similar events of a public nature.
- e. Temporary directional signs to public or quasi-public events if removed within 10 days following the event.
- 3. All signs shall be located and designed to avoid interference with vistas, viewpoints and visual access to the shoreline.
- 4. Over-water signs, signs on floats or pilings, and signs for goods, services, or businesses not located directly on the site proposed for a sign are prohibited.
- 5. Lighted signs shall be hooded, shaded, or aimed so that direct light will not result in glare when viewed from surrounding properties or watercourses.
- 6. Signs shall not exceed 32 square feet in surface area. On-site freestanding signs shall not exceed 6 feet in height. When feasible, signs shall be flush-mounted against existing buildings.
- 7. Temporary or obsolete signs shall be removed within 10 days of elections, closures of business, or termination of any other function. Examples of temporary signs include: real estate signs, directions to events, political advertisements, event or holiday signs, construction signs, and signs advertising a sale or promotional event.
- 8. Signs that do not meet the policies and regulations of this section B.9 shall be removed or shall conform within two years of the adoption of this SMP.
- 9. No signs shall be placed in a required view corridor.

10. Utilities (Accessory)

a. Applicability

Accessory utilities are on-site utility features serving a primary use, such as a water, sewer or gas line connecting to a residence. Accessory utilities do not carry significant capacity to serve other users and are considered a part of the primary use. They are addressed in this section because they concern all types of development and have the potential to impact the quality of the shoreline and its waters.

b. Policies

1. Accessory utilities should be properly installed so as to protect the shoreline and water from contamination and degradation to ensure no net loss of ecological functions.

- 2. Accessory utility facilities and rights-of-way should be located outside of the shoreline area to the maximum extent possible. When utility lines require a shoreline location, they should be placed underground.
- 3. Accessory utility facilities should be designed and located in a manner which preserves the natural landscape and shoreline ecological processes and functions and minimizes conflicts with present and planned land uses.

c. Regulations

- 1. In shoreline areas, accessory utility transmission lines, pipelines and cables shall be placed underground unless demonstrated to be infeasible. Further, such lines shall utilize existing rights-of-way and/or bridge crossings whenever possible. Proposals for new corridors in shoreline areas involving water crossings must fully substantiate the infeasibility of existing routes.
- 2. Accessory utility development shall, through coordination with government agencies, provide for compatible multiple uses of sites and rights-of-way. Such uses include shoreline access points, trails and other forms of recreation and transportation systems, providing such uses will not unduly interfere with utility operations or endanger public health and safety.
- 3. Sites disturbed for utility installation shall be stabilized during and following construction to avoid adverse impacts from erosion and, where feasible, restored to pre-project configuration and replanted with native vegetation.
- 4. Utility discharges and outfalls shall be located, designed, constructed, and operated in accordance with best management practices to ensure degradation to water quality is kept to a minimum.
- 5. Utilities that need water crossings shall be placed deep enough to avoid the need for bank stabilization and stream/riverbed filling both during construction and in the future due to flooding and bank erosion that may occur over time. Boring is a preferred method of utility water crossing over open trenching.

11. Vegetation Conservation

a. Applicability

The following provisions apply to any activity that results in the removal of or impact to shoreline vegetation, whether or not that activity requires a shoreline permit. Such activities include clearing, grading, grubbing, and trimming of vegetation. These provisions also apply to vegetation protection and enhancement activities. They do not apply to forest practices managed under the Washington State Forest Practices Act. See Chapter 6 for definitions of "significant vegetation removal," "ecological functions," "clearing," "grading," and "restore."

b. Policies

- 1. Vegetation within the City shoreline areas should be enhanced over time to provide a greater level of ecological functions, human safety, and property protection. To this end, shoreline management activities, including the provisions and implementation of this SMP, should be based on a comprehensive approach that considers the ecological functions currently and potentially provided by vegetation on different sections of the shoreline, as described in Chapter 5 of the June 30, 2009 City of Kent Final Shoreline Inventory and Analysis Report.
- 2. This SMP in conjunction with other City development regulations should establish a coordinated and effective set of provisions and programs to protect and restore those functions provided by shoreline vegetation.
- 3. Aquatic weed management should stress prevention first. Where active removal or destruction is necessary, it should be the minimum to allow water-dependent activities to continue, minimize negative impacts to native plant communities, and include appropriate handling or disposal of weed materials.
- 4. The removal of invasive or noxious weeds and replacement with native vegetation should be encouraged. Removal of noxious or invasive weeds should be conducted using the least-impacting method feasible, with a preference for mechanical rather than chemical means.

c. Regulations

For All Shoreline Environments:

- 1. In order to create a new lot partially or wholly within shoreline jurisdiction, the applicant must demonstrate that development can be accomplished without significant vegetation removal within the required SMP setback area. The City's Shoreline Administrator may make exceptions to this standard for water dependent development and for development in the High Intensity environment only.
- 2. New development, including clearing and grading, shall minimize significant vegetation removal in shoreline jurisdiction to the extent feasible. In order to implement this regulation, applicants proposing development that includes significant vegetation removal, clearing, or grading within shoreline jurisdiction must provide, as a part of a substantial development permit or a letter of exemption application, a site plan, drawn to scale, indicating the extent of proposed clearing and/or grading. The City's Shoreline Administrator may require that the proposed development or extent of clearing and grading be modified to reduce the impacts to ecological functions.
- 3. Vegetation restoration of any shoreline that has been disturbed or degraded shall use native plant materials with a diversity and type similar to that which originally occurred on-site unless the City's Shoreline Administrator finds that native plant materials are inappropriate or not hardy in the particular situation.

- 4. In addressing impacts from significant vegetation removal, the City's Shoreline Administrator will apply the mitigation sequence described in Chapter 3 Section B.4.
- 5. Where shoreline restoration is required, the vegetation plantings shall adhere to the following specifications, unless the City's Shoreline Administrator finds that another method is more appropriate:

Property owners must prepare, and agree to adhere to, a shoreline vegetation management plan prepared by a qualified professional and approved by the Shoreline Administrator that:

- a. Requires the preparation of a revegetation plan;
- b. Requires the native vegetation to consist of a mixture of trees, shrubs and groundcover and be designed to improve habitat functions;
- c. Includes appropriate limitations on the use of fertilizer, herbicides and pesticides as needed to protect water quality; and
- d. Includes a monitoring and maintenance program.

This plan shall be recorded with the King County assessor's office as a covenant against the real property and a copy shall be provided to the Shoreline Administrator.

- 6. A condition of all development shall be that those areas within the required SMP setback area that have been cleared or where significant vegetation removal has occurred and that are not otherwise occupied by approved structures or uses shall be revegetated with native vegetation. The City's Shoreline Administrator may require replanting of previously cleared areas or removal of invasive or noxious weeds and replanting with native vegetation as part of mitigation of ecological impacts.
- 7. Snags and living trees (i.e., large cottonwoods) shall not be removed within the required SMP setback area unless an arborist determines them to be extreme hazards and likely to fall into a park use area, or unless removal is part of an approved development that includes mitigation for impacts to ecological functions. Snags and living trees within the setback which do not present an extreme hazard shall be retained. Selective pruning of trees for safety and view protection is allowed. The City may make exceptions to this standard for water dependent development and for development in the High Intensity environment, or where the City determines that the removal of such vegetation is in the public interest and is consistent with the goals of the Shoreline Management Act as stated in section 90.58.020 RCW.

For Shorelines in the Urban Conservancy-Open Space and Urban Conservancy-Low Intensity Environments

8. For properties within areas planned for residential development within the Urban Conservancy–Open Space or Urban Conservancy–Low Intensity environments, new development that will cause significant vegetation removal within the required setbacks specified in Chapter 3 Section B.1.c.7 and

Chapter 5 Sections B and C.8 shall not be allowed except where the dimensions of existing lots or parcels are not sufficient to accommodate permitted primary residential structures outside of the vegetation conservation area or where the denial of reasonable use would result in a takings. In these instances the City's Shoreline Administrator will apply the mitigation sequence in Chapter 3 Section B.4 to minimize ecological impacts. Generally, this will mean placing the development away from the shoreline as far as possible, locating the development to avoid tree cutting, and modifying building dimensions to reduce vegetation removal.

- 9. The enhancement of vegetation shall be a condition of all nonwater-dependent development, dike or levee construction, and shoreline modifications in the Urban Conservancy environments, except where the City's Shoreline Administrator finds that:
 - a. Vegetation enhancement is not feasible on the project site. In these cases the City's Shoreline Administrator may require off-site vegetation enhancement that performs the same ecological functions. Enhancement opportunities on the same waterbody shall be explored first, prior to consideration of enhancement opportunities in the same basin or watershed.
 - b. The restoration of ecological processes and functions can be better achieved through other measures such as the removal of channel constraints.
 - c. Sufficient native vegetation already exists.
- 10. Minor vegetation removal may be done to provide for development and maintenance of public access and trails on public property provided impacts are mitigated.

For Shorelines in the High-Intensity Environment

- 11. The impacts due to significant vegetation removal shall be mitigated according to the sequence described in Chapter 3 Section B.4.
- 12. A condition of all development shall be that those shorelands on the site not occupied by structures, shoreline uses, or human activities shall be revegetated, in accordance with subsection c.5 above. Vegetation within the required setbacks specified in Chapter 3 Section B.1.c.7 and Chapter 5 Section B of the shoreline, to the extent the setback extends onto the subject development site, must be native vegetation or species approved by the City's Shoreline Administrator.

For Shorelines in the Shoreline Residential Environment

13. Development is subject to requirements in Chapter 5 Section C.8, "Residential Development."

For Shorelines in the Aquatic Environment

- 14. Aquatic weed control shall only occur when native plant communities and associated habitats are threatened or where an existing water dependent use is restricted by the presence of weeds. Aquatic weed control shall occur in compliance with all other applicable laws and standards.
- 15. The control of aquatic weeds by hand pulling, mechanical harvesting, or placement of aqua screens, if proposed to maintain existing water depth for navigation, shall be considered normal maintenance and repair and therefore exempt from the requirement to obtain a shoreline substantial development permit.
- 16. The control of aquatic weeds by derooting, rotovating or other method which disturbs the bottom sediment or benthos shall be considered development for which a substantial development permit is required, unless it will maintain existing water depth for navigation in an area covered by a previous permit for such activity, in which case it shall be considered normal maintenance and repair and therefore exempt from the requirement to obtain a substantial development permit.
- 17. Where large quantities of plant material are generated by control measures, they shall be collected and disposed of in an appropriate, identified upland location.
- 18. Use of herbicides to control aquatic weeds shall be prohibited except for those chemicals specifically approved by the Department of Ecology for use in aquatic situations and where no reasonable alternative exists and weed control is demonstrated to be in the public's interest. Application of herbicides for the control of aquatic weeds requires approval from the Department of Ecology. The City's Shoreline Administrator must be notified of all herbicide usage in aquatic areas and supplied with proof of approval from the Department of Ecology. Additionally, all herbicides shall be applied by a licensed professional.

12. Water Quality and Quantity

a. Applicability

The following section applies to all development and uses in shoreline jurisdiction that affect water quality, as defined below.

1. As used in this SMP, "water quality" means the physical characteristics of water within shoreline jurisdiction, including water quantity and hydrological, physical, chemical, aesthetic, recreation-related, and biological characteristics. Where used in this SMP, the term "water quantity" refers only to development and uses regulated under this chapter and affecting water quantity, such as impermeable surfaces and storm water handling practices. Water quantity, for purposes of this SMP, does not mean the withdrawal of groundwater or diversion of surface water pursuant to RCW 90.03.250 through 90.03.340.

Because the policies of this SMP are also policies of the City's comprehensive plan, the policies also apply to activities outside shoreline jurisdiction that affect water quality within shoreline jurisdiction, as determined by the City's Shoreline Administrator. However, the regulations apply only within shoreline jurisdiction.

b. Policies

- 1. All shoreline uses and activities should be located, designed, constructed, and maintained to avoid significant ecological impacts that alter water quality, quantity, or hydrology.
- 2. The City should require reasonable setbacks, buffers, and storm water storage basins and encourage low-impact development techniques and materials to achieve the objective of lessening negative impacts on water quality.
- 3. All measures for controlling erosion, stream flow rates, or flood waters through the use of stream control works should be located, designed, constructed, and maintained so that net off-site impacts related to water do not degrade the existing water quality and quantity.
- 4. As a general policy, the City should seek to improve water quality, quantity (the amount of water in a given system, with the objective of providing for ecological functions and human use), and flow characteristics in order to protect and restore ecological functions and ecosystem-wide processes of shorelines within Shoreline Management Act jurisdiction. The City should implement this policy through the regulation of development and activities, through the design of new public works, such as roads, drainage, and water treatment facilities, and through coordination with other local, state, and federal water quality regulations and programs. The City should implement the 2002 City of Kent Surface Water Design Manual, as updated and adopted by City ordinance.
- 5. All measures to treat runoff in order to maintain or improve water quality should be conducted on-site before shoreline development creates impacts to water.
- 6. Shoreline use and development should minimize the need for chemical fertilizers, pesticides or other similar chemical treatments to prevent contamination of surface and ground water and/or soils, and adverse effects on shoreline ecological functions and values.

c. Regulations

1. All shoreline development, both during and after construction, shall avoid or minimize significant ecological impacts, including any increase in surface runoff, through control, treatment, and release of surface water runoff so that water quality and quantity are not adversely affected. Control measures include, but are not limited to, low impact development techniques, dikes, catch basins or settling ponds, oil interceptor drains, grassy swales, planted buffers, and fugitive dust controls.

- 2. All development shall conform to local, state, and federal water quality regulations, provided the regulations do not conflict with this SMP.
- 3. Uses and development that require the application of pesticides, herbicides, fertilizers and other chemicals that could adversely affect water quality (except for those chemicals specifically approved by the Department of Ecology for use in aquatic situations) are prohibited in shoreline jurisdiction.
- 4. The application of pesticides or herbicides in shoreline jurisdiction is prohibited except for those products specifically approved for use by the Department of Ecology in aquatic situations, and then only if used according to approved methods of and standards for application.

A. Introduction and Applicability

Shoreline modifications are structures or actions which permanently change the physical configuration or quality of the shoreline, particularly at the point where land and water meet. Shoreline modification activities include, but are not limited to, structures such as revetments, bulkheads, levees, breakwaters, docks, and floats. Actions such as clearing, grading, landfilling, and dredging are also considered shoreline modifications.

Generally, shoreline modification activities are undertaken for the following reasons:

- 1. To prepare a site for a shoreline use
- 2. To provide shoreline stabilization or shoreline protection
- 3. To support an upland use

The policies and regulations in this chapter are intended to prevent or mitigate the adverse environmental impacts of proposed shoreline modifications. General provisions, which apply to all shoreline modification activities, are followed by provisions tailored to specific shoreline modification activities. This chapter provides policies and regulations for shoreline modification features including shoreline stabilization measures and docks and floats.

If a shoreline development entails more than one shoreline modification, then all of the regulations pertaining to each type of modification apply.

Even though a shoreline modification may not require a shoreline substantial development permit, it must still conform to the regulations and standards in this SMP. The City requires that a property owner contemplating a shoreline modification contact the City's Shoreline Administrator and apply for a "letter of exemption". No shoreline modification shall be undertaken without either a shoreline permit or a letter of exemption.

B. Shoreline Modification Matrix

The following matrix (Table 5) is the shoreline modification matrix. The matrix provides the permitted, conditional, and prohibited uses in all shoreline environmental designations. The numbers in the matrix refer to footnotes which may be found immediately following the matrix. These footnotes provide additional clarification or conditions applicable to the associated modification. Where there is a conflict between the matrix and the written provisions in this Chapter, the written provisions shall apply.

		1				
 P = May be permitted C = May be permitted as a conditional use only X = Prohibited; the use is not eligible for a variance or conditional use permit N/A = Not applicable 	Natural-Wetlands	High-Intensity	Urban Conservancy - Open Space	Urban Conservancy - Low Intensity	Shoreline Residential	Aquatic
Shoreline stabilization:						
Environmental restoration/enhancement	Р	Р	Р	Р	Р	Р
Bioengineering	С	Р	Р	Р	Р	С
Revetments	Х	Р	С	С	Р	С
Bulkheads	Х	Р	С	С	Р	С
Breakwaters/jetties/rock weirs/groins	Х	Х	Х	Х	Х	Х
Dikes, levees	Х	Р	Р	Р	С	С
Clearing and Grading	Х	Р	Р	Р	Р	NA
Dredging	N/A	N/A	N/A	N/A	N/A	С
Hazardous waste cleanup	Р	Р	Р	Р	Р	Р
Fill ¹	Х	Р	Р	P ³	P ³	C ²
Piers, docks ⁴	Х	Р	Р	Р	Р	Р
Moorage piles and mooring buoys	Х	Х	Х	Х	Х	Х

Table 5. Shoreline Modification Matrix

All shoreline modifications are subject to other provisions in this SMP. See, especially, Section C "Policies and Regulations" below.

Shoreline Modification Matrix Notes:

- 1. Fill in the floodplain must meet all federal, state, and local flood hazard reduction regulations.
- 2. Fill in aquatic areas for the purposes of shoreline ecological restoration may be allowed as a permitted use if the Shoreline Administrator determines that there will be an increase in desired ecological functions.
- 3. Disposal of dredge material within a channel migration zone shall require a conditional use permit (refer to the Channel Migration Zone Map, Figure No. 10.2 in the Inventory and Analysis Report).
- 4. New non-public piers and docks are prohibited on the Green River.

C. Policies and Regulations

1. General Policies and Regulations

a. Applicability

The following provisions apply to all shoreline modification activities whether such proposals address a single property or multiple properties.

b. Policies

- 1. Structural shoreline modifications should be allowed only where they are demonstrated to be necessary:
 - a. To support or protect an allowed primary structure or a legally existing shoreline use that is in danger of loss or substantial damage, or;
 - b. For reconfiguration of the shoreline to mitigate impacts or enhance the shoreline ecology.
- 2. The adverse effects of shoreline modifications should be reduced, as much as possible, and shoreline modifications should be limited in number and extent.
- 3. Allowed shoreline modifications should be appropriate to the specific type of shoreline and environmental conditions in which they are proposed.
- 4. The City should take steps to assure that shoreline modifications individually and cumulatively do not result in a net loss of ecological functions, as stated in WAC 173-26-231. This is to be achieved by preventing unnecessary shoreline modifications, by giving preference to those types of shoreline modifications that have a lesser impact on ecological functions, and by requiring mitigation of identified impacts resulting from shoreline modifications.
- 5. Where applicable, the City should base decisions on available scientific and technical information and a comprehensive analysis of site-specific conditions provided by the applicant, as stated in WAC 173-26-231
- Impaired ecological functions should be enhanced where feasible and appropriate while accommodating permitted uses, as stated in WAC 173-26-231. As shoreline modifications occur, the City will incorporate all feasible measures to protect ecological shoreline functions and ecosystem-wide processes.
- In reviewing shoreline permits, the City should require steps to reduce significant ecological impacts according to the mitigation sequence in WAC 173-26-201(2)(e).

c. Regulations

1. All shoreline modification activities must be in support of a permitted shoreline use or to provide for human health and safety. Shoreline modification activities which do not support a permitted shoreline use are

considered "speculative" and are prohibited by this SMP, unless it can be demonstrated that such activities are necessary to protect human health and safety, ecological functions, and the public interest.

- 2. Structural shoreline modification measures shall be permitted only if nonstructural measures are unable to achieve the same purpose or are not feasible (See Chapter 6 for definition of "feasible"). Nonstructural measures considered shall include alternative site designs, increased setbacks, drainage improvements, relocation of proposed structures, and vegetation enhancement.
- 3. Stream channel modification (i.e., realignment) shall be prohibited as a means of shoreline stabilization or shoreline protection, unless it is the only feasible alternative and includes environmental enhancement.
- 4. All new shoreline development shall be located and designed to prevent or minimize the need for shoreline modification activities.
- 5. Proponents of shoreline modification projects shall obtain all applicable federal and state permits and shall meet all permit requirements.
- 6. Shoreline modification materials shall be only those approved by the City and applicable state agencies. No toxic (e.g.: creosote) or quickly degradable materials (e.g., plastic or fiberglass that deteriorates under ultraviolet exposure) shall be used.
- 7. In channel migration zones, natural geomorphic and hydrologic processes shall not be limited and new development shall not be established where future shoreline modifications will be required and shall include appropriate protection of ecological function (refer to the Channel Migration Zone Map, Figure No. 10.2 in the Inventory and Analysis Report).

2. Shoreline Stabilization (Including Bulkheads)

a. Applicability

Shoreline stabilization includes actions taken to address erosion impacts to property, dwellings, businesses, or essential structures caused by manmade processes such as boat wakes and natural processes, such as current, flood, wind, or wave action. These include structural and nonstructural methods.

Nonstructural methods include building setbacks, relocation of the structure to be protected, erosion and ground water management, planning and regulatory measures to avoid the need for structural stabilization.

Structural methods include "hard" and "soft" structural stabilization measures.

<u>Hard Structural Shoreline Stabilization means</u> erosion control practices using hardened structures that armor and stabilize the shoreline from further erosion. Hard structural shoreline stabilization typically uses concrete, boulders, dimensional lumber or other materials to construct linear, vertical or near-vertical faces. These include bulkheads, rip-rap, groins, and similar structures.

<u>Soft Structural Shoreline Stabilization means</u> erosion control and restoration practices that contribute to restoration, protection or enhancement of shoreline ecological functions. Soft shoreline stabilization typically includes a mix of gravels, cobbles, boulders, logs and native vegetation placed to provide stability in a non-linear, sloping arrangement. On lakes such as Lake Meridian, Lake Fenwick and Panther Lake, non-structural and "soft" structural stabilization measures can be cost-effective and practicable solutions.

Generally, the harder the construction measure, the greater the impact on shoreline processes, including sediment transport, geomorphology, and biological functions.

WAC 173-27-040(2)(b) defines normal maintenance and repair of existing structures and notes that many maintenance and repair activities are exempt from the requirement for a shoreline substantial development permit. As indicated in that section, normal maintenance and repair actions are <u>not</u> exempt from substantial development permits if they "cause substantial adverse effects to shoreline resources or the environment." Additions to or increases in size of existing shoreline stabilization measures shall be considered new structures.

Some shoreline stabilization measures for single family residences may be exempt from a shoreline substantial development permit in accordance with WAC 173-27-040(2). However, such measures must comply with the provisions of this SMP.

b. Policies

- 1. Non-structural stabilization measures are preferred over "soft" structural measures. "Soft" structural shoreline stabilization measures are strongly preferred over hard structural shoreline stabilization Proposals for hard and soft structural solutions, including bulkheads, should be allowed only when it is demonstrated that nonstructural methods are not "feasible", as defined in Chapter 6. Hard structural shoreline stabilization measures should be allowed only when it is demonstrated that soft structural measures are not feasible.
- 2. Bulkheads and other structural stabilizations should be located, designed, and constructed primarily to prevent damage to existing development and minimize adverse impacts to ecological functions.
- 3. New development requiring bulkheads and/or similar protection should not be allowed. Shoreline uses should be located in a manner so that bulkheads and other structural stabilization are not likely to become necessary in the future.
- 4. Shoreline modifications individually and cumulatively shall not result in a net loss of ecological functions. This is to be achieved by giving preference to those types of shoreline modifications that have a lesser impact on ecological functions and requiring mitigation of identified impacts resulting from shoreline modifications.

c. Regulations

New Development

- 1. New development shall, where feasible, be located and designed to eliminate the need for concurrent or future shoreline stabilization. New non-water dependent development that would require shoreline stabilization that would cause significant adverse impacts to adjacent or down-current properties or restrict channel migration in Channel Migration Zones is prohibited. (Refer to the Channel Migration Zone Map, Figure No. 10.2 in the Inventory and Analysis Report).
- 2. New development, including single-family residences, that includes structural shoreline stabilization will not be allowed unless all of the conditions below are met:
 - a. The need to protect the development from damage due to erosion caused by natural processes, such as currents, waves, and by manmade processes such as boat wakes, is demonstrated through a geotechnical report.
 - b. The erosion is not being caused by upland conditions, such as loss of vegetation and drainage.
 - c. Nonstructural measures, such as placing the development farther from the shoreline, planting vegetation, low impact development measures, or installing on-site drainage improvements, are not feasible or not sufficient.
 - d. The structure will not result in a net loss of shoreline ecological functions.
- 3. New development on steep slopes or bluffs shall be set back sufficiently to ensure that shoreline stabilization will not be needed during the life of the structure, as demonstrated by a geotechnical analysis by a geotechnical engineer or related professional licensed and in good standing in the State of Washington.

New or expanded shoreline stabilization measures

- 4. New stabilization measures are not allowed except to protect or support an existing or approved development, as necessary for human safety, for the restoration of ecological functions, or for hazardous substance remediation pursuant to Chapter 70.105D RCW. The construction of a bulkhead for the primary purpose of retaining or creating dry land that is not specifically authorized as a part of the permit is prohibited.
- 5. New or replacement structural shoreline stabilization measures are allowed on Green River shorelines for necessary flood hazard reduction provided that all feasible steps are taken to minimize adverse impacts to the natural environment. The structures must be in conformance with a City-approved flood hazard reduction program.
- 6. New or enlarged structural shoreline stabilization measures for an existing development or residence shall not be allowed unless there is conclusive evidence, documented by a geotechnical analysis (see definition in Chapter 6), that the structure is in danger from shoreline erosion caused by currents,

waves, or boat wakes. Normal sloughing, erosion of steep bluffs, or shoreline erosion itself, without a scientific or geotechnical analysis by a licensed geotechnical engineer or related licensed professional, is not demonstration of need. The geotechnical report must include estimates of erosion rates and damage within three years and must evaluate on-site drainage issues and address drainage problems away from the shoreline edge before considering structural shoreline stabilization. The project design and analysis must also evaluate vegetation enhancement and low impact development measures as a means of reducing undesirable erosion.

- 7. "Hard" structural shoreline stabilization measures, such as bulkheads, are not allowed unless the applicant can demonstrate through a geotechnical analysis that "soft" structural measures such as vegetation or beach enhancement, or nonstructural measures, such as additional building setbacks, are not feasible.
- 8. Where structural shoreline stabilization measures are demonstrated to be necessary, as described in subsections c.6 and 7 above, the size of stabilization measures shall be limited to the minimum necessary. The City's Shoreline Administrator may require that the proposed structure be altered in size or design or impacts otherwise mitigated. Impacts to sediment transport shall be avoided or minimized.
- 9. The City's Shoreline Administrator will require mitigation of adverse impacts to shoreline functions in accordance with the mitigation sequence defined in Chapter 3 Section B.4 of the General Provisions. The City's Shoreline Administrator may require the inclusion of vegetation conservation, as described in Chapter 3 Section B.11, as part of shoreline stabilization, where feasible. In order to determine acceptable mitigation, the City's Shoreline Administrator may require the applicant to provide necessary environmental information and analysis, including a description of existing conditions/ecological functions and anticipated shoreline impacts, along with a restoration plan outlining how proposed mitigation measures would result in no net loss of shoreline ecological functions.
- 10. Shoreline stabilization measures that incorporate ecological restoration through the placement of rocks, gravel or sand, and native shoreline vegetation may be allowed. Soft shoreline stabilization that restores ecological functions may be permitted waterward of the OHWM.
- 11. Following completion of shoreline modification activities, disturbed shoreline areas shall be restored to pre-project conditions to the greatest extent possible. Vegetation conservation measures, including the planting of native vegetation along the shoreline, are a condition of all new bulkhead and replacement construction. Plantings shall consist of native grasses, shrubs, and trees as approved by the City's Shoreline Administrator in keeping with preexisting or typical naturally occurring bank vegetation. Vegetation shall be fully reestablished within three years. All revegetation projects shall include a program for monitoring and maintenance. Areas which fail to adequately

reestablish vegetation shall be replanted with approved plants until the plantings are viable.

12. New or expanded shoreline stabilization measures in channel migration zones require a thorough analysis performed by a licensed geologist with an appropriate specialty license and fluvial geomorphic experience, in addition to a professional engineer, to ensure that the measure does not interfere with fluvial hydrological and geomorphological processes normally acting in natural conditions. (Refer to the Channel Migration Zone Map, Figure No. 10.2 in the Inventory and Analysis Report).

Replacement and Repair

- 13. An existing shoreline stabilization structure shall not be replaced with a similar structure unless there is need to protect primary structures from erosion caused by currents or waves and a nonstructural measure is not feasible. At the discretion of the City's Shoreline Administrator, the demonstration of need does not necessarily require a geotechnical report by a geotechnical engineer or related professional licensed and in good standing in the State of Washington. The replacement structure shall be designed, located, sized, and constructed to minimize harm to ecological functions. Replacement walls or bulkheads shall not encroach waterward of the OHWM or existing structures unless the residence was occupied prior to January 1, 1992, and there are overriding safety or environmental concerns. In such cases, the replacement structure shall abut the existing shoreline stabilization structure.
- 14. When an existing bulkhead is being repaired or replaced by construction of a vertical wall fronting the existing wall, it shall be constructed no farther waterward of the existing bulkhead than is necessary for construction of new footings. When a bulkhead has deteriorated such that an OHWM has been established by the presence and action of water landward of the bulkhead, then the replacement bulkhead must be located at or near the actual OHWM.

Design of Shoreline Stabilization Measures

- 15. Bulkhead design and development shall conform to all other applicable City and state agency policies and regulations, including the Washington State Department of Fish and Wildlife criteria governing the design of bulkheads.
- 16. Gabions (wire mesh filled with concrete or rocks) are prohibited, except as a Conditional Use where it is determined that gabions are the least environmentally disruptive method of shoreline stabilization.
- 17. Stairs and other allowed structures may be built as integral to a bulkhead but shall not extend waterward of the bulkhead or structure unless it is necessary to access the shoreline or a use or structure is otherwise allowed over water.
- 18. Bulkheads shall be designed to permit the passage of surface or ground water without causing ponding or over-saturation of retained soil/materials of lands above the OHWM.

- 19. Adequate toe protection and proper footings shall be provided to ensure bulkhead stability without relying on additional riprap.
- 20. Materials and dimensional standards:
 - a. New bulkheads and other shoreline stabilization structures shall not be constructed higher than 24 inches (twenty-four inches) above the OHWM or, if the bulkhead is set back from the shoreline, 24 inches above grade at the base of the bulkhead or structure. On steep slopes, new bulkheads may be built taller than 24 inches high if necessary to meet the existing slope. Replacement bulkheads may be built to the height of the original bulkhead.

Exception: The City's Shoreline Administrator may waive this provision for flood hazard minimization measures conforming to this SMP.

- b. While structural materials are not the preferred method of shoreline stabilization, if structural shoreline measures are allowed according to subsections c.6 and 7 above, the following are examples of acceptable materials for shoreline stabilization structures, listed in order of preference from top to bottom:
 - i. Large stones, with vegetation planted in the gaps. Stones should not be stacked steeper than 2 horizontal to 1 vertical slope.
 - ii. Timbers or logs. Note the prohibition against toxic wood treatments.
 - iii. Stacked masonry units (e.g., interlocking cinder block wall units).
 - iv. Cast-in-place reinforced concrete.
- c. The following materials are not acceptable for shoreline stabilization structures:
 - i. Degradable plastics and other nonpermanent synthetic materials.
 - ii. Sheet materials, including metal, plywood, fiberglass, or plastic.
 - iii. Broken concrete, asphalt, or rubble.
 - iv. Car bodies, tires or discarded equipment.
- 21. Fill behind bulkheads shall be limited to an average of 1 cubic yard per running foot of bulkhead. Any filling in excess of this amount shall be considered landfill and shall be subject to the provisions for landfill and the requirement for obtaining a shoreline substantial development permit.

Bioengineering

- 22. Bioengineering projects shall use native trees, shrubs, and grasses or ground cover, unless such an approach is not feasible.
- 23. All bioengineering projects shall include a program for monitoring and maintenance.

3. Over-Water Structures - Including Piers and Docks, Floats, Boardwalks and Boating Facilities

a. Applicability

Over-water structures for moorage, boat-related, and other direct water-dependent uses or development, including docks, piers, boat launches, and swimming/diving platforms, public access boardwalks, fishing piers and viewpoints, in shoreline areas shall be subject to the following policies and regulations.

b. Policies

- 1. Moorage associated with a single-family residence is considered a waterdependent use provided that it is designed and used as a facility to access watercraft.
- 2. New moorage, excluding docks accessory to single family residences, should be permitted only when the applicant/proponent has demonstrated that a specific need exists to support the intended water-dependent or public access use.
- 3. To minimize continued proliferation of individual private moorage, reduce the amount of over-water and in-water structures, and reduce potential long-term impacts associated with those structures, shared moorage facilities are preferred over single-user moorage. New subdivisions of more than two (2) lots and new multifamily development of more than two (2) dwelling units should provide shared moorage.
- 4. Docks, piers, and other water-dependent use developments including those accessory to single family residences, should be sited and designed to avoid adversely impacting shoreline ecological functions or processes, and should mitigate for any unavoidable impacts to ecological functions.
- 5. Moorage and other water-dependent use developments should be spaced and oriented in a manner that minimizes hazards and obstructions to public navigation rights and corollary rights thereto such as, but not limited to, fishing, swimming and pleasure boating.
- 6. Moorage and other water-dependent use developments should be restricted to the minimum size necessary to meet the needs of the proposed use. The length, width and height of over-water structures and other developments regulated by this section should be no greater than that required for safety and practicality for the primary use.
- 7. Moorage and other water-dependent use developments should be constructed of materials that will not adversely affect water quality or aquatic plants and animals in the long term.

c. Regulations

General Regulations for Private and Public Structures

- 1. All new, reconstructed, repaired, or modified over-water structures shall be allowed only in support of an allowed water dependent use and must comply with all other regulations as stipulated by State and Federal agencies.
- 2. All moorage and other over-water structures shall be designed and located so as not to constitute a hazard to navigation or other public uses of the water.
- 3. Proposed private over-water structures which do not comply with the dimensional standards contained in this chapter may only be approved if they obtain a variance.
- 4. No portion of the deck of a pier shall, during the course of the normal fluctuations of the elevation of the waterbody, protrude more than five (5) feet above the OHWM.
- 5. Docks, piers, and other developments for water-dependent uses shall be located at least ten (10) feet from the extended side property lines, except for joint-use structures which may abut property lines provided the adjacent property owners have mutually agreed to the structure location in a contract recorded with the King County Recorder's Office and provided to the City of Kent Planning Department with the appropriate applications for the structure.
- 6. No residential use may occur over water, including houseboats, live-aboards, or other single- or multi-family dwelling units.
- 7. Only piers and ramps are permitted in the first 30 feet of the OHWM. All floats, ells and fingers must be at least 30 feet waterward of the OHWM.
- 8. All pier and dock dimensions shall be minimized to the maximum extent feasible. The proposed length must be the minimum necessary to support the intended use.
- 9. No skirting is permitted on any structure except to contain or protect floatation material.
- 10. All piers, docks, floats, and similar structures shall float at all times on the surface of the water or shall be of fixed-pile construction. Floating structures shall at no time rest on the lake substrate.
- 11. All over-water structures and other water-dependent use developments shall be constructed and maintained in a safe and sound condition. Abandoned or unsafe structures shall be removed or repaired promptly by the owner.
- Lighting associated with overwater structures shall be beamed, hooded or directed to avoid causing glare on adjacent properties or waterbodies. Illumination levels shall be the minimum necessary for safety.
- 13. Piles, floats and other over water structures that are in direct contact with water or over water shall not be treated or coated with herbicides, fungicides,

paint, or pentachlorophenol. Use of wood members treated with arsenate compounds or creosote is prohibited.

- 14. Temporary moorages shall be permitted for vessels used in the construction of shoreline facilities. The design and construction of temporary moorages shall be such that upon termination of the project, the aquatic habitat in the affected area can be returned to its original (pre-construction) condition within one (1) year at no cost to the environment or the public.
- 15. Covered moorage, boathouses, or other walled covered moorage are prohibited.
- 16. If a dock is provided with a safety railing, such railing shall not exceed 36 inches in height and shall be an open framework that does not unreasonably interfere with shoreline views of adjoining properties.
- 17. Moorage facilities shall be marked with reflectors, or otherwise identified to prevent unnecessarily hazardous conditions for water surface users during the day or night. Exterior finish shall be generally non-reflective.

New Private Piers

- 18. A new private pier or dock may be permitted on lots owned for residential or for private recreational use, provided:
 - a. The applicant has demonstrated a need for moorage.
 - b. The applicant has demonstrated to the satisfaction of the Shoreline Administrator that a shared or joint-use pier is not feasible.
 - i. On lots with less than fifty (50) feet of waterfront, joint-use piers shall be required, except when both lots abutting the subject lot have legal pre-existing piers or docks and the applicant provides written verification from the owners of the adjacent lots that they will not consent to a shared use agreement. Only in this case may the lot with less than fifty (50) feet of waterfront be permitted an individual pier.
 - ii. On waterfront lots subdivided to create additional waterfront lots, upland lots with waterfront access rights, or lots with waterfront multifamily development, joint-use piers shall be required. One jointuse pier is allowed per 60 feet of shoreline frontage.
 - c. No more than one (1) pier for each single-family residence or private recreational lot is permitted.
- 19. A new, joint-use pier may be permitted on a community recreation lot shared by a number of waterfront or upland lots provided the applicant has demonstrated a need for moorage or other allowed water-dependent use.
- 20. New floating docks located within the first 30 feet of shoreline measured waterward of the OHWM are prohibited. Piers that terminate in a waterward float are allowed provided that the landward edge of the float is over water with a depth of eight (8) feet or more and is at least 30 feet waterward of the OHWM. All float tubs shall be fully encapsulated.
- 21. Development Standards for New Piers
 - a. Length.
 - i. The maximum waterward intrusion of any portion of the pier shall be the point where water depth reaches 12 feet as measured from the ordinary high water mark. If the water depth reaches 12 feet within 40 feet of the OHWM, then a 40-foot pier may be allowed. In no case may a pier be shorter than 40 feet or longer than 100 feet. (Note: The 12-foot depth is to accommodate the 3- to 4-foot fluctuation in water depth caused by storm water management practices.)
 - ii. The maximum length of ells, fingers and floats is 20 feet. Additionally, the maximum extent of all piers, docks and floats as measured parallel to the shoreline shall not be greater than 50% of the lot width measured along the shoreline.
 - b. Width.
 - i. The maximum width of a pier walkway is four (4) feet for the first 30 feet waterward of the OHWM and six (6) feet for the remainder of the walkway.
 - ii. The maximum width of ells and floats is six (6) feet.
 - iii. Any additional fingers must be no wider than two (2) feet.
 - iv. The maximum width of a ramp connecting a pier to a float is four (4) feet.
 - c. Area. Surface coverage of private residential piers, including all floats, ramps, ells and fingers, shall be limited to the following:
 - i. Four hundred twenty (420) square feet for a single property owner;
 - ii. Six hundred sixty (660) square feet for a joint-use structure utilized by two residential property owners; or
 - iii. Seven hundred forty (740) square feet for a joint-use structure utilized by three or more residential property owners.
 - d. Decking: All new piers must be fully grated. Decking shall have a minimum open space of 40%, and shall result in at least 60% ambient light beneath the pier.
 - e. Piles. Piles shall be either maximum 5-inch-diameter steel or 5-inchdiameter untreated wood, and shall be spaced a minimum of 12 feet apart except when shown not to be feasible for site-specific engineering or design considerations.
 - f. Pier Spacing. Piers, including fingers, ells, floats, boatlifts, or canopies, shall be spaced a minimum of 20 feet from adjacent piers or 10 feet from the side yard, whichever distance provides the maximum separation between piers.



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Figure 2. Development dimensional standards for new private piers.

Replacement of Existing Private Pier or Dock

- 22. Proposals involving replacement of the entire private pier or dock, or 50 percent or more of the pier-support piles can be replaced up to 100% of the size of the existing pier or dock and shall comply with the following standards:
 - a. Decking: All replacement piers must be fully grated as described in subsection c.21.d. above.
 - b. Replacement piles must be sized as described above under 22.e, and must achieve the minimum 12-foot spacing to the extent allowed by site-specific engineering or design considerations.

Additions to Private Pier or Dock

- 23. Additions to existing piers or docks may be permitted under the following circumstances:
 - a. When additional length is required to reach 10 feet of water depth as measured at the ordinary high water mark (OHWM);
 - b. When a single-use pier is converted to a joint-use pier; or
 - c. When the addition of an ell or finger will increase safety and usability.
- 24. When proposed additions to a private residential pier result in a pier that does not exceed the maximum total square footage allowances, the addition must comply with the dimensional and material standards described above in subsection c.21.
- 25. When proposed additions to a private residential pier result in a pier that exceeds the maximum total square footage allowances described above, the addition may be approved as a Variance and subject to the following provisions:
 - a. The applicant must remove any in-water structures rendered obsolete by the addition;
 - b. The additional length of walkway or ell must be 4 feet wide;

- c. The decking on any pier element (i.e. pier walkway, ell, float, etc.) exceeding 8 feet in width must be fully grated as described in subsection c.21.d. above; and
- d. Any proposed new piles must comply with standards under subsection c.21.e. above.

Repair of Existing Private Pier or Dock

- 26. Repair proposals which replace less than 50 percent of the existing piersupport piles must comply with the following:
 - a. If the width of pier element is wider than 8 feet in the area where the piles will be replaced, the decking that would be removed in order to replace the piles shall be replaced with grated decking as described in subsection c.21.d. above.
 - b. Replacement piles must be sized as described above under subsection c.21.e. above, and must achieve the minimum 12-foot spacing to the extent allowed by site-specific engineering or design considerations.
- 27. Repair proposals which replace 50 percent or more of the decking on any pier element (i.e. pier walkway, ell, float etc.) greater than 8 feet wide must use grated decking for the entire portion of that element that is wider than 8 feet as described in subsection c.21.d. above.
- 28. Other repairs to existing legally established moorage facilities where the nature of the repair is not described in the above subsections shall be considered minor repairs and are permitted, consistent with all other applicable codes and regulations.
- 29. If the cumulative repair proposed over a three-year period exceeds thresholds established in subsection c.22 above, the current repair proposal shall be reviewed under subsection c.22 above.

Boatlifts, Boatlift Canopies, and Covered Moorage

- 30. Boatlifts and boatlift canopies may be permitted as an accessory to residential development provided that:
 - a. Boatlifts are movable equipment employed to temporarily lift boats above the water for protection and storage. Residential piers may have one boatlift per single-family lot having legal use of the structure.
 - b. All lifts are placed as far waterward as feasible and safe, within the limits of the dimensional standards for docks in this chapter.
 - c. Boatlift canopies must not be constructed of permanent structural material. The bottom of a boatlift canopy is elevated above the boatlift to the maximum extent practicable, the lowest edge of the canopy must be at least 4 feet above the ordinary high water mark, and the top of the canopy must not extend more than 4 feet above the adjacent pier.

- d. Boatlift canopies must be made of translucent fabric material.
- e. Any platform lifts are fully grated.
- f. The lifts and canopies comply with all other regulations as stipulated by State and Federal agencies.
- g. Covered moorage. No covered pier, covered float, or other covered structure is permitted waterward of the ordinary high water mark.

Boat Launches

- 31. The maximum waterward intrusion of any portion of any launching ramp or lift station shall be the point where the water depth is eight (8) feet below the ordinary high water mark.
- 32. Boat ramps are only permitted for public access, public or joint recreational uses, and emergency access. Any asphalt or concrete launch that solidly covers the substrate below the ordinary high water mark are not permitted accessory to private residential uses.
- 33. Launching rails are prohibited.

Recreational Floats/Swim Platforms

- 34. A maximum of eight new recreational floats/swim platforms are allowed on Lake Meridian, as of the date of adoption of this SMP. No new recreational floats/swim platforms are allowed on Lake Fenwick or Panther Lake. All new recreational floats on Lake Meridian are subject to the following:
 - a. New floats/platforms shall be up to a maximum of 150 square feet.
 - b. New floats shall be located:
 - i. In water with a depth of 10 feet or more measured from ordinary high water mark at the landward end of the float and may be located up to a maximum waterward distance of 150 feet, whichever is reached first.
 - ii. So as not to constitute a hazard to navigation or other public use of the water.
 - c. Floats/platforms shall be designed and intended for swim use or other nonmotorized, but water-oriented, use.
 - d. Height. Floats/platforms must be built so that the deck surface is one (1) foot above the water's surface and they must have reflectors for nighttime visibility.
 - e. Retrieval lines shall not float at or near the surface of the water.
 - f. All float tubs shall be fully encapsulated.
- 35. Existing recreational floats/swim platforms on all lakes may be repaired and/or replaced subject to the standards in 34.b f. above in addition to the following:

a. Replacement floats shall be of the same size as the existing float up to a maximum of 150 square feet.

Public Over-Water Structures - including Docks and Piers

- 36. Existing public over-water structures such as docks, piers, or boardwalks may be repaired and/or replaced in the same location as the existing structure.
- 37. Public over-water structures may be expanded in size subject to the following:
 - a. The existing structure is not large enough to support the intended use.
 - b. The applicant must remove any in-water structures rendered obsolete by the expansion.
 - c. Piles. Piles shall be either maximum 6-inch-diameter galvanized steel or 6-inch-diameter untreated wood, and shall be spaced a minimum of 12 feet apart except when shown not to be feasible for site-specific engineering or design considerations.
 - d. At no point shall any new portion of the pier exceed 12 feet in width. Areas of pier over 8 feet in width shall provide grating for the remaining width, up to 12 feet maximum.
 - e. The length of the pier is the minimum necessary to accommodate the intended public usage of the pier.
- 38. New public docks or piers may be permitted if increased public usage of existing structures has required the need for additional overwater cover.
- 39. New public over-water structures shall be subject to the standards under 37c. through 37e.

4. Fill

a. Applicability

Fill is the addition of soil, sand, rock, gravel, sediment, earth retaining structure, or other material to an area waterward of the OHWM, in wetlands, or on shorelands in a manner that raises the elevation or creates dry land. Any fill activity conducted within shoreline jurisdiction must comply with the following provisions.

b. Policies

- 1. Fills waterward of OHWM should be allowed only when necessary to support allowed water-dependent or public access uses, cleanup and disposal of contaminated sediments, and other water-dependent uses that are consistent with this SMP.
- 2. Shoreline fill should be designed and located so there will be no significant ecological impacts and no alteration of local currents, surface water drainage, channel migration, or flood waters which would result in a hazard to adjacent life, property, and natural resource systems.

c. Regulations

- 1. Fill waterward of OHWM requires a Conditional Use Permit and may be permitted only when:
 - a. In conjunction with a water-dependent or public use permitted by this SMP;
 - b. In conjunction with a levee, bridge, or navigational structure for which there is a demonstrated public need and where no feasible upland sites, design solutions, or routes exist; or
 - c. As part of an approved shoreline restoration project.
- 2. Waterward of OHWM, pile or pier supports shall be utilized whenever feasible in preference to fills. Fills for approved road development in floodways or wetlands shall be permitted only if pile or pier supports are proven not feasible.
- 3. Fills are **prohibited** in floodplains where they would alter the hydrologic characteristics, flood storage capacity, or inhibit channel migration that would, in turn, increase flood hazard or other damage to life or property. Fills are **prohibited** in floodway, except when approved by Conditional Use permit and where required in conjunction with a proposed water-dependent or other use specified in Regulation No. 2 above.
- 4. Fill shall be permitted only where it is demonstrated that the proposed action will not:
 - a. Result in significant ecological damage to water quality, fish, shellfish, and/or wildlife habitat; or
 - b. Adversely alter natural drainage and circulation patterns, currents, river flows or significantly reduce flood water capacities.
 - c. Alter channel migration, geomorphic, or hydrologic processes.
- 5. Environmental cleanup action involving excavation/fill, as authorized by the City's Shoreline Administrator, may be permitted.
- 6. Sanitary fills shall not be located in shoreline jurisdiction.
- 7. Fills waterward of the ordinary high water mark that are for the purpose of restoring ecological functions are a permitted use and do not require a conditional use permit.

5. Dredging and Disposal

a. Applicability

Dredging is the removal or displacement of earth or sediment (gravel, sand, mud, silt and/or other material or debris) from a stream, river, lake, marine water body, or associated marsh, bog or swamp. Activities which may require dredging include the construction and maintenance of navigation channels, levee construction, recreation facilities, boat access, and ecological restoration.

Dredge material disposal is the depositing of dredged materials on land or into water bodies for the purpose of either creating new or additional lands for other uses or disposing of the by-products of dredging.

b. Exemptions

Pursuant to WAC 173-27-040, dredging or dredge disposal actions may be exempt from the requirement for a shoreline substantial development permit, but may still require a conditional use or variance permit.

c. Policies

- 1. Dredging operations should be planned and conducted to minimize interference with navigation and adverse impacts to other shoreline uses, properties, and values.
- 2. When allowed, dredging and dredge material disposal should be limited to the minimum amount necessary.
- 3. Disposal of dredge material within a channel migration zone shall be discouraged. (Refer to the Channel Migration Zone Map, Figure No. 10.2 in the Inventory and Analysis Report).

d. Regulations

<u>General</u>

- 1. Dredging and dredge disposal shall be permitted only where it is demonstrated that the proposed actions will not:
 - a. Result in significant or ongoing damage to water quality, fish, and shoreline habitat;
 - b. Adversely alter natural drainage and circulation patterns, currents, river flows, channel migration processes or significantly reduce flood water capacities; or
 - c. Cause other significant ecological impacts.
- 2. Proposals for dredging and dredge disposal shall include all feasible mitigating measures to protect marine habitats and to minimize adverse impacts such as turbidity, release of nutrients, heavy metals, sulfides, organic material or toxic substances, dissolved oxygen depletion, disruption of food chains, loss of benthic productivity and disturbance of fish runs and important localized biological communities.
- 3. Dredging and dredge disposal shall not occur in wetlands, except as authorized by Conditional Use permit as a shoreline restoration project.
- 4. Dredging and dredge disposal shall be carefully scheduled to protect biological productivity (e.g. fish runs, spawning, benthic productivity, etc.) and to minimize interference with fishing activities.

- 5. Dredging and dredge disposal shall be prohibited on or in archaeological sites that are listed on the Washington State Register of Historic Places until such time that they have been released by the State Archaeologist.
- 6. Dredging shall utilize techniques which cause minimum dispersal and broadcast of bottom material.
- 7. Dredging shall be permitted only:
 - a. For navigation or navigational access and recreational access;
 - b. In conjunction with a water-dependent use of water bodies or adjacent shorelands;
 - c. As part of an approved habitat improvement project;
 - d. To improve water quality;
 - e. In conjunction with a bridge, navigational structure or wastewater treatment facility for which there is a documented public need and where other feasible sites or routes do not exist;
 - f. To improve water flow or manage flooding only when consistent with an approved flood/storm water comprehensive management plan; or
 - g. To clean up contaminated sediments.
- 8. When dredging is permitted, the dredging shall be the minimum necessary to accommodate the proposed use.
- 9. New dredging activity is prohibited:
 - a. In shoreline areas with bottom materials which are prone to significant sloughing and refilling due to currents, resulting in the need for continual maintenance dredging, except by Conditional Use permit; and
 - b. In habitats identified as critical to the life cycle of officially designated or protected fish, shellfish or wildlife.
- 10. Dredging for the primary purpose of obtaining material for landfill is prohibited.
- 11. New development shall be located and designed to avoid or minimize the need for new or maintenance dredging where feasible.
- 12. Maintenance dredging of established navigation channels, public access facilities and basins is restricted to maintaining previously dredged and/or existing authorized location, depth, and width.

Regulations -- Dredge Material Disposal

- 13. Depositing clean dredge materials in water areas shall be allowed only by Conditional Use permit for one or more of the following reasons:
 - a. For wildlife habitat improvement or shoreline restoration; or
 - b. To correct problems of material distribution adversely affecting fish and wildlife resources.

- 14. Where the City's Shoreline Administrator requires, revegetation of land disposal sites shall occur as soon as feasible in order to retard wind and water erosion and to restore the wildlife habitat value of the site. Native species and other compatible plants shall be used in the revegetation.
- 15. Proposals for disposal in shoreline jurisdiction must show that the site will ultimately be suitable for a use permitted by this SMP.
- 16. The City's Shoreline Administrator may impose reasonable limitations on dredge disposal operating periods and hours and may require provision for buffers at land disposal or transfer sites in order to protect the public safety and other lawful interests from unnecessary adverse impacts.
- 17. Disposal of dredge material within a channel migration zone shall require a conditional use permit. (Refer to the Channel Migration Zone Map, Figure No. 10.2 in the Inventory and Analysis Report).

6. Shoreline Restoration and Ecological Enhancement

a. Applicability

Shoreline restoration and ecological enhancement are the improvement of the natural characteristics of upland or submerged shoreline using native materials. The materials used are dependent on the intended use of the restored or enhanced shoreline area. An Ecological Restoration Plan accompanies this SMP and recommends ecological enhancement and restoration measures.

b. Policies

- 1. The City should consider shoreline enhancement as an alternative to structural shoreline stabilization and protection measures where feasible.
- 2. All shoreline enhancement projects should protect the integrity of adjacent natural resources including aquatic habitats and water quality.
- 3. Where possible, shoreline restoration should use maintenance-free or low-maintenance designs.
- 4. The City should pursue the recommendations in the shoreline restoration plan prepared as part of this SMP update. The City should give priority to projects consistent with this plan.
- 5. Shoreline restoration and enhancement should not extend waterward more than necessary to achieve the intended results.

c. Regulations

1. Shoreline enhancement may be permitted if the project proponent demonstrates that no significant change to sediment transport or river current will result and that the enhancement will not adversely affect ecological processes, properties, or habitat.

- 2. Shoreline restoration and enhancement projects shall use best available science and management practices.
- 3. Shoreline restoration and enhancement shall not significantly interfere with the normal public use of the navigable waters of the state without appropriate mitigation.
- 4. Shoreline restoration and ecological enhancement projects may be permitted in all shoreline environments, provided:
 - a. The project's purpose is the restoration of natural character and ecological functions of the shoreline, and
 - b. It is consistent with the implementation of a comprehensive restoration plan approved by the City's Shoreline Administrator, or the City's Shoreline Administrator finds that the project provides an ecological benefit and is consistent with this SMP.

7. Dikes and Levees

a. Applicability

Dikes and levees are manmade earthen embankments utilized for the purpose of flood control, water impoundment projects, or settling basins.

b. Policies

- 1. Dikes and levees should be constructed or reconstructed only as part of a comprehensive flood hazard reduction program
- 2. Environmental enhancement measures should be a part of levee improvements.

c. Regulations

- 1. Dikes and levees shall be designed, constructed, and maintained in accordance with Washington State Department of Fish and Wildlife Hydraulic Project Approval, federal levee criteria, and in consideration of resource agency recommendations.
- 2. Dikes and levees shall protect the natural processes and resource values associated with streamways and deltas, including, but not limited to, wildlife habitat.
- 3. Dikes and levees shall be limited in size to the minimum height required to protect adjacent lands from the projected flood stage.
- 4. Dikes and levees shall not be placed in the floodway, except for current deflectors necessary for protection of bridges and roads.
- 5. Public access to shorelines should be an integral component of all levee improvement projects. Public access shall be provided in accordance with public access policies and regulations contained herein. New dikes or levees

must not impede or diminish public access on the Green River Trail. Fisherman access should be combined with levee maintenance access.

- 6. Dikes and levees shall only be authorized by Conditional Use permit and shall be consistent with the 2006 King County Flood Hazard Management Plan, as amended.
- 7. Dikes and levees shall be set back at convex (inside) bends to allow streams to maintain point bars and associated aquatic habitat through normal accretion, if feasible.
- 8. Proper diversion of surface discharge shall be provided to maintain the integrity of the natural streams, wetlands, and drainages.
- 9. Underground springs and aquifers shall be identified and protected.
- 10. Where feasible, the construction, repair, or reconstruction of dikes or levees shall include environmental restoration. The Kent Restoration Plan accompanying this SMP provides guidance the City's Shoreline Administrator will use in determining the amount and type of restoration required.

A. Introduction

The provisions in this section apply to specific common uses and types of development to the extent they occur within shoreline jurisdiction.

B. Shoreline Use and Development Standards Matrices

The following matrices (Table 6 and Table 7) indicate the allowable uses and some of the standards applicable to those uses and modifications. Where there is a conflict between the matrices and the written provisions in Chapters 3, 4, or 5 of this SMP, the written provisions shall apply. The numbers in the matrices refer to footnotes which may be found immediately following the matrix. These footnotes provide additional clarification or conditions applicable to the associated use or shoreline environment designation.

 P = May be permitted C = May be permitted as a conditional use only X = Prohibited; the use is not eligible for a variance or conditional use permit¹¹ N/A = Not applicable SHORELINE USE 	Natural-Wetlands	High-Intensity	Urban Conservancy - Open Space ¹²	Urban Conservancy - Low intensity ¹²	Shoreline Residential	Aquatic ¹³
Agriculture	Х	P ¹⁰	P ¹⁰	Р	P ¹⁰	Х
Aquaculture	Х	Х	Х	Х	Х	Х
Boating facilities ¹⁴	Х	Р	Р	Х	Р	Р
Commercial:						
Water-dependent	Х	Р	P^1	P ⁹	Х	Х
Water-related, water-enjoyment	Х	Р	P^1	P ⁹	Х	Х
Nonwater-oriented	Х	C^4	Х	C ^{4,9}	Х	Х
Flood hazard management	Х	Р	Р	Р	Р	С
Forest practices	Х	Х	Х	Х	Х	Х
Industrial:						
Water-dependent	Х	Р	Х	Х	Х	Х

Table 6. Shoreline Use Matrix

 P = May be permitted C = May be permitted as a conditional use only X = Prohibited; the use is not eligible for a variance or conditional use permit¹¹ N/A = Not applicable SHORELINE USE 	Natural-Wetlands	High-Intensity	Urban Conservancy - Open Space ¹²	Urban Conservancy - Low intensity ¹²	Shoreline Residential	Aquatic ¹³
Water-related, water-enjoyment	Х	Р	Х	Х	Х	Х
Nonwater-oriented	Х	P^4	Х	Х	Х	Х
In-stream structures	С	С	С	С	С	С
Mining	Х	Х	Х	Х	Х	Х
Parking (accessory)	Х	Р	P ²	P^2	Р	Х
Parking (primary, including paid)	Х	Х	Х	Х	Х	Х
Recreation:						
Water-dependent	P^3	Р	Р	Р	Р	Р
Water-enjoyment	P^3	Р	Р	Р	Р	Х
Nonwater-oriented	Х	P^4	P^4	C^4	Р	Х
Single-family residential	Х	Х	Х	P ⁸	Р	Х
Multifamily residential	Х	Р	Х	С	Ρ	Х
Land subdivision	Р	Р	P⁵	С	Р	Х
Signs:						
On premises	Х	Ρ	P^6	С	Х	Х
Off premise	Х	Х	Х	Х	Х	Х
Public, highway	Х	Р	Р	Р	Х	Х
Solid waste disposal	Х	Х	Х	Х	Х	Х
Transportation:						
Water-dependent	Х	Р	Р	Р	С	Р
Nonwater-oriented	Х	Р	С	С	Р	C ⁷
Roads, railroads	C ⁷	Р	P^7	P^7	Р	C ⁷
Utilities (primary)	C ⁷	Р	P ⁷	P^7	Р	C ⁷

Use Matrix Notes:

- 1. Park concessions, such as small food stands, cafes, and restaurants with views and seating oriented to the water, and uses that enhance the opportunity to enjoy publicly accessible shorelines are allowed.
- 2. Accessory parking is allowed in shoreline jurisdiction only if there is no other feasible option, as determined by the City.
- 3. Passive activities, such as nature watching and trails, that require little development with no significant adverse impacts may be allowed.

- 4. Nonwater-oriented uses may be allowed as a permitted use where the City determines that waterdependent or water-enjoyment use of the shoreline is not feasible due to the configuration of the shoreline and water body or due to the underlying land use classification in the comprehensive plan.
- 5. Land division is only allowed where the City determines that it is for a public purpose.
- 6. Signs are allowed for public facilities only.
- 7. Roadways and public utilities are allowed if there is no other feasible alternative, as determined by the City, and all significant adverse impacts are mitigated.
- 8. Residences are allowed in shoreline jurisdiction only if it is not feasible, as determined by the City, to locate the building on the portion of the property outside shoreline jurisdiction.
- 9. Commercial uses are only permitted as part of a residential PUD of at least 100 acres, located within an SR zone, or at least 10 acres for residential PUDs located in other zones. Commercial uses shall be limited to those uses permitted by Title 15 KCC, as amended, in the neighborhood convenience commercial district.
- 10. Crop and tree farming only. See Section 15.04.130 KCC, as amended.
- 11. For the treatment of existing nonconforming development, see Chapter 7 Section E.
- 12. Development in channel migration zones is allowed only by conditional use permit where it can be shown that such development would not prevent natural channel migration. (Refer to the Channel Migration Zone Map, Figure No. 10.2 in the June 9, 2009 Final Shoreline Inventory and Analysis Report).
- 13. Uses noted as allowed in the Aquatic environment are allowed only if allowed in the adjacent upland environment.
- 14. Marinas are prohibited.

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DEVELOPMENT STANDARDS ^{1,5} (See also section cited in parentheses)	Natural-Wetlands	High-Intensity	Urban Conservancy - Open Space	Urban Conservancy - Low Intensity	Shoreline Residential	Aquatic
Commercial Development (Ch. 5 Sec. C.4)	1	1		[1	
Water-dependent setback	N/A	0	0	0	N/A	N/A
Water-related, water-enjoyment setback ⁴	N/A	30' ²	30' ²	50' ²	N/A	N/A
Nonwater-oriented setback ⁴	N/A	70' ²	70' ²	100' ²	N/A	N/A
Industrial Development (Ch. 5 Sec. C.5)						
Water-dependent (Ch. 5. Sec C.5.c.9)	N/A	0	N/A	N/A	N/A	N/A
Water-related and water-enjoyment ⁴ (Ch. 5 Sec.C.5.c.9)	N/A	50' ²	N/A	N/A	N/A	N/A
Nonwater-oriented ⁴ (Ch. 5. Sec. C.5.c.9)	N/A	100' ²	N/A	N/A	N/A	N/A
Accessory Parking (Ch. 3 Sec. B.6)						
Setbacks ⁴	N/A	70' ²	70' ²	70' ²	N/A ³	N/A
Recreational Development						
Water-dependent park structures setback	N/A	0	0	0	N/A	N/A
Water-related, water enjoyment park structures setback	N/A	20'	20'	20'	N/A	N/A
Nonwater-oriented park structures setback ⁴ (Ch. 5 Sec. C.7.c.4)	N/A	70' ²	70' ²	70' ²	N/A	N/A
Miscellaneous						
New agricultural activities setback (Ch. 5 Sec. C.2.c.4)	N/A	20' ²	20' ²	20' ²	20' ²	N/A
Residential Development ⁴	See regulations in Ch. 5 Sec. C.8.c					

Table 7. Shoreline Development Standards Matrix

Other provisions in this SMP also apply.

Development Standards Matrix Notes:

- 1. See Chapter 3 Section B.1.c.7 for setbacks to accommodate future Green River levee reconstruction.
- 2. The City may reduce this dimension if it determines that the type of development allowed within this SMP and other municipal, state, and federal codes cannot be accommodated within the allowed site development area by reconfiguring, relocating, or resizing the proposed development. Where the City reduces a requirement, compensatory mitigation, such as vegetation enhancement or shoreline armoring removal, must be provided as determined by the City.
- 3. See regulation 5.C.8.c for residential development standards.

- 4. The setback for all development, except water dependent development, on the Green River not separated from the shoreline by a levee is 150 feet.
- 5. For height regulations, see Chapter 15.04 KCC, as amended, for the underlying zoning district.

C. Shoreline Use Policies and Regulations

1. General Policies and Regulations

a. Applicability

The following provisions apply to all uses in shoreline jurisdiction.

b. Policy

- 1. The City should give preference to those uses that are consistent with the control of pollution and prevention of damage to the natural environment, or are unique to or dependent upon uses of the state's shoreline areas.
- 2. The City should ensure that all proposed shoreline development will not diminish the public's health, safety, and welfare, as well as the land or its vegetation and wildlife, and should endeavor to protect property rights while implementing the policies of the Shoreline Management Act.
- 3. The City should reduce use conflicts by prohibiting or applying special conditions to those uses which are not consistent with the control of pollution and prevention of damage to the natural environment or are not unique to or dependent upon use of the state's shoreline. In implementing this provision, preference should be given first to water-dependent uses, then to water-related uses and water-enjoyment uses.
- 4. The City should encourage the full use of existing urban areas before expansion of intensive development is allowed.

c. Regulations

- 1. Developments that include a mix of water-oriented and nonwater-oriented uses may be considered water-oriented provided the City's Shoreline Administrator finds that the proposed development does give preference to those uses that are consistent with the control of pollution and prevention of damage to the natural environment, are dependent on a shoreline location, or enhance the public's ability to enjoy the shoreline.
- 2. All uses not explicitly covered in the SMP require a conditional use permit. The City's Shoreline Administrator should impose conditions to ensure that the proposed development meets the policies of this SMP.
- 3. All development and uses must conform to all of the provisions in the SMP.
- 4. All development and uses shall conform to the shoreline use matrix and the development standards matrix in Section B of this chapter unless otherwise stated in this chapter.

- 5. In channel migration zones, natural geomorphic and hydrologic processes shall not be limited and new development shall not be established where future stabilization will be required. (Refer to the Channel Migration Zone Map, Figure No. 10.2 in the June 9, 2009 Final Shoreline Inventory and Analysis Report).
- 6. As described in WAC 173-26-221 (3) (c), appropriate development may be allowed in areas landward of Green River Road because the road prevents active channel movement and flooding. This area is therefore not within a channel migration zone (refer to Channel Migration Zone Map, Figure No. 10.2 in the Inventory and Analysis Report).

2. Agriculture

a. Applicability

Agriculture includes, but is not limited to, the commercial production of horticultural, viticultural, floricultural, dairy, apiary, vegetable, or animal products or of berries, grain, hay, straw, turf, seed, or Christmas trees not subject to the excise tax imposed by RCW 84.33.100 thorough 84.33.140; finfish in upland hatcheries, or livestock, that has long-term commercial significance.

Uses and shoreline modifications associated with agriculture that are identified as separate use activities in this program, such as industry, shoreline stabilization, and flood hazard management, are subject to the regulations established for those uses in addition to the standards established in this section for agriculture.

b. Policies

- 1. The creation of new agricultural lands by diking, draining, or filling marshes, channel migration zones, and associated marshes, bogs, and swamps should be prohibited.
- 2. A vegetative buffer should be maintained between agricultural lands and water bodies or wetlands in order to reduce harmful bank erosion and resulting sedimentation, enhance water quality, reduce flood hazard, and maintain habitat for fish and wildlife.
- 3. Animal feeding operations, retention and storage ponds, and feedlot waste and manure storage should be located out of shoreline jurisdiction and constructed to prevent contamination of water bodies and degradation of the adjacent shoreline environment.
- 4. Appropriate farm management techniques should be utilized to prevent contamination of nearby water bodies and adverse effects on valuable plant, fish, and animal life from fertilizer and pesticide use and application.
- 5. Where ecological functions have been degraded, new development should be conditioned with the requirement for ecological restoration to ensure no net loss of ecological functions.

The City's Shoreline Administrator will consult the provisions of this SMP and determine the applicability and extent of ecological restoration. The extent of ecological restoration shall be that which is reasonable given the specific circumstances of an agricultural development.

c. Regulations

- 1. Agricultural development shall conform to applicable state and federal policies and regulations, provided they are consistent with the Shoreline Management Act and this SMP to ensure no net loss of ecological function.
- 2. New manure lagoons, confinement lots, feeding operations, lot wastes, stockpiles of manure solids, aerial spraying, and storage of noxious chemicals are prohibited within shoreline jurisdiction.
- 3. A buffer of natural or planted permanent native vegetation not less than 20 feet in width, measured perpendicular to the shoreline, shall be maintained between areas of new development for crops, grazing, or other agricultural activity and adjacent waters, channel migration zones, and marshes, bogs, and swamps. The City's Shoreline Administrator shall determine the extent and composition of the buffer when the permit or letter of exemption is applied for.
- 4. Stream banks and water bodies shall be protected from damage caused by concentration and overgrazing of livestock. Provide fencing or other grazing controls to prevent bank compaction, bank erosion, or the overgrazing of or damage to buffer vegetation. Provide suitable bridges, culverts, or ramps for stock crossing.
- 5. Agricultural practices shall prevent and control erosion of soils and bank materials within shoreline areas and minimize siltation, turbidity, pollution, and other environmental degradation of watercourses and wetlands.
- 6. Existing and ongoing agricultural uses may be allowed within a channel migration zone or floodway provided that no new restrictions to channel movement occur.
- 7. See Chapter 3 Section B.12.c.3-4 for water quality regulations related to the use of pesticides, herbicides, and fertilizers.

3. Boating Facilities

a. Applicability

Boating facilities include dry storage and wet-moorage types; boat launch ramps; covered moorage; boat houses; mooring buoys; and marine travel lifts. See also Chapter 4 Section C.3for residential and public pier and dock structures.

Accessory uses found in boating facilities may include fuel docks and storage, boating equipment sales and rental, wash-down facilities, fish cleaning stations,

repair services, public launching, bait and tackle shops, potable water, waste disposal, administration, parking, groceries, and dry goods.

There are uses and activities associated with boating facilities but that are identified in this section as separate uses (e.g., Commercial Development and Industrial Development, including ship and boat building, repair yards, utilities, and transportation facilities) or as separate shoreline modifications (e.g., piers, docks, bulkheads, breakwaters, jetties and groins, dredging, and fill). These uses are subject to the regulations established for those uses and modifications in addition to the standards for boating facilities established in this section.

This section does not apply to residential moorage serving an individual single-family residence. Chapter 4 Section C.3 does apply to single-family residential docks and piers.

b. Policies

- 1. Boating facilities should be located, designed, and operated to provide maximum feasible protection and restoration of ecological processes and functions and all forms of aquatic, littoral, or terrestrial life—including animals, fish, shellfish, birds, and plants—and their habitats and migratory routes. To the extent possible, boating facilities should be located in areas of low biological productivity.
- 2. Boating facilities should be located and designed so their structures and operations will be aesthetically compatible with the area visually affected and will not unreasonably impair shoreline views. However, the need to protect and restore ecological functions and to provide for water-dependent uses carries higher priority than protection of views.
- 3. Boat launch facilities should be provided at appropriate public access sites.
- 4. Existing public moorage and launching facilities should be maintained.

c. Regulations

- 1. It is the applicant's responsibility to comply with all other applicable state agency policies and regulations, including, but not limited to: the Department of Fish and Wildlife criteria for the design of bulkheads and landfills; Federal Marine Sanitation standards (EPA 1972) requiring water quality certification from the U.S. Army Corps of Engineers (Section 10); U.S. Army Corps of Engineers dredging standards (Section 404); and state and federal standards for the storage of fuels and toxic materials.
- 2. New boating facilities shall not significantly impact the rights of navigation on the waters of the state.

Location

3. Boating facilities shall not be located where their development would reduce the quantity or quality of critical aquatic habitat or where significant ecological impacts would necessarily occur.

- 4. Public launch ramps shall, where feasible, be located only on stable shorelines where:
 - a. Water depths are adequate to eliminate or minimize the need for offshore channel construction dredging, maintenance dredging, spoil disposal, filling, beach enhancement, and other river, lake, harbor, and channel maintenance activities.
 - b. There is adequate water mixing and flushing, and the facility is designed so as not to retard or negatively influence flushing characteristics.
 - c. Adverse flood channel capacity or flood hazard impacts are avoided.

Design/Renovation/Expansion

5. Boating facilities shall be designed to avoid or minimize significant ecological impacts. The City's Shoreline Administrator shall apply the mitigation sequence defined in Chapter 3 Section B.4 in the review of boating facility proposals. On degraded shorelines, the City's Shoreline Administrator may require ecological restoration measures to account for environmental impacts and risks to the ecology to ensure no net loss of ecological function.

The City's Shoreline Administrator will consult the provisions of this SMP and determine the applicability and extent of ecological restoration required. The extent of ecological restoration shall be that which is reasonable given the specific circumstances of the proposed boating facility.

- 6. Boating facility design shall:
 - a. Provide thorough flushing of all enclosed water areas and shall not restrict the movement of aquatic life requiring shallow water habitat.
 - b. Minimize interference with geohydraulic processes and disruption of existing shoreline ecological functions.
- 7. Dry moorage shall require a Conditional Use permit.
- 8. The perimeter of parking, dry moorage, and other storage areas shall be landscaped to provide a visual and noise buffer between adjoining dissimilar uses or scenic areas. See Chapter 15.07 KCC, as amended, for landscape requirements.
- 9. Moorage of floating homes is prohibited.
- 10. New covered moorage is prohibited.

Boat Launches

- 11. Launch ramps shall be permitted only on stable, non-erosional banks, where no or a minimum number of current deflectors or other stabilization structures will be necessary.
- 12. Boat ramps shall be placed and kept as flush as possible with the foreshore slope to permit launch and retrieval and to minimize the interruption of hydrologic processes.

4. Commercial Development

a. Applicability

Commercial development means those uses that are involved in wholesale, retail, service, and business trade. Examples include hotels, motels, grocery markets, shopping centers, restaurants, shops, offices, and private or public indoor recreation facilities. Commercial nonwater-dependent recreational facilities, such as sports clubs and amusement parks, are also considered commercial uses. This category also applies to institutional and public uses such as hospitals, libraries, schools, churches and government facilities.

Uses and activities associated with commercial development that are identified as separate uses in this program include Mining, Industry, Boating Facilities, Transportation Facilities, Utilities (accessory), and Solid Waste Disposal. Piers and docks, bulkheads, shoreline stabilization, flood protection, and other shoreline modifications are sometimes associated with commercial development and are subject to those shoreline modification regulations in Chapter 4 in addition to the standards for commercial development established herein.

b. Policies

- 1. Multi-use commercial projects that include some combination of ecological restoration, public access, open space, and recreation should be encouraged in the High-Intensity Environment consistent with the City's Comprehensive Plan.
- 2. Where possible, commercial developments are encouraged to incorporate Low Impact Development techniques into new and existing projects.

c. Regulations

- 1. Water-oriented commercial developments may be permitted as indicated in Chapter 5 Section B, "Shoreline Use and Development Standards Matrices."
- Nonwater-oriented commercial developments may be permitted only where they are either separated from the shoreline by a structural levee designed to minimize flood hazard <u>or</u> where all three (3) of the following can be demonstrated:
 - a. A water-oriented use is not reasonably expected to locate on the proposed site due to topography, incompatible surrounding land uses, physical features, or the site's separation from the water.
 - b. The proposed development does not usurp or displace land currently occupied by a water-oriented use and will not interfere with adjacent water-oriented uses.
 - c. The proposed development will be of appreciable public benefit by increasing ecological functions together with public use of or access to the shoreline.
- 3. Commercial development shall be designed to avoid or minimize ecological impacts, to protect human health and safety, and to avoid significant adverse

impacts to surrounding uses and the shoreline's visual qualities, such as views to the waterfront and the natural appearance of the shoreline. To this end, the City's Shoreline Administrator may adjust the project dimensions and setbacks (so long as they are not relaxed below minimum standards without a shoreline variance permit) or prescribe operation intensity and screening standards as deemed appropriate.

4. All new commercial development proposals will be reviewed by the City's Shoreline Administrator for ecological restoration and public access requirements consistent with Chapter 3 Section B.7. When restoration or public access plans indicate opportunities exist, the City's Shoreline Administrator may require that those opportunities are either implemented as part of the development project or that the project design be altered so that those opportunities are not diminished.

All new water-related and water-enjoyment development shall be conditioned with the requirement for ecological restoration and public access unless those activities are demonstrated to be not feasible. (See definition of "feasible.")

All new nonwater-oriented development, where allowed, shall be conditioned with the requirement to provide ecological restoration and public access.

The City's Shoreline Administrator will consult the provisions of this SMP and determine the applicability and extent of ecological restoration and/or public access required. The extent of ecological restoration shall be that which is reasonable given the specific circumstances of a commercial development.

- 5. All commercial loading and service areas shall be located or screened to minimize adverse impacts to the shoreline environment (including visual impacts, such as a view of loading doors or trash receptacles from the Green River Trail) and public access facilities, including the Green River Trail. At a minimum, parking and service areas shall be screened from the Green River Trail by a 15' strip of Type II landscaping as defined in Section 15.07.050 KCC, as amended, that is able to provide a full visual screen within 5 years of planting. The City Shoreline Administrator may modify these landscaping requirements to account for reasonable safety and security concerns.
- 6. All new nonwater-oriented commercial development located adjacent to the Green River Trail shall provide the following:
 - A minimum of 15' of Type II landscaping (as defined in Section 15.07.050 KCC, as amended) between the building and the shoreline. A sight obscuring fence is not required.
 - b. A minimum of 20 ft² of transparent windows for every 50 lineal feet of building façade adjacent to the Green River Trail. The intent of this standard is to provide passive surveillance along the trail to promote safety and security.

The City Shoreline Administrator may modify these landscaping requirements to account for legitimate safety and security concerns.

- 7. Commercial development and accessory uses must conform to the setback and height standards established in Section B "Development Standards Matrix" in this Chapter.
- 8. Low Impact Development (LID) techniques shall be incorporated where appropriate.

5. Industry

a. Applicability

Industrial developments and uses are facilities for processing, manufacturing, and storing of finished or semi-finished goods. Included in industry are such activities as log storage, log rafting, petroleum storage, hazardous waste generation, transport and storage, ship building, concrete and asphalt batching, construction, manufacturing, and warehousing. Excluded from this category and covered under other sections of the SMP are boating facilities, piers and docks, mining (including on-site processing of raw materials), utilities, solid waste disposal, and transportation facilities.

Shoreline modifications and other uses associated with industrial development are described separately in this SMP. These include dredging, fill, transportation facilities, utilities piers and docks, bulkheads, breakwaters, jetties and groins, shoreline stabilization and flood protection, and signs. They are subject to their own regulations in Chapter 4 in addition to the provisions in this chapter.

b. Policies

- 1. Ecological restoration should be a condition of all nonwater-oriented industrial development.
- 2. Where possible, industrial developments are encouraged to incorporate Low Impact Development techniques into new and existing projects.

c. Regulations

- 1. The amount of impervious surface shall be the minimum necessary to provide for the intended use. The remaining land area shall be landscaped with native plants according to Chapter 3 Section B.11.c.5.
- 2. Water-dependent industry shall be located and designed to minimize the need for initial and/or continual dredging, filling, spoil disposal, and other harbor and channel maintenance activities.
- 3. Storage and disposal of industrial wastes is prohibited within shoreline jurisdiction; PROVIDED, that wastewater treatment systems may be allowed in shoreline jurisdiction if alternate, inland areas have been adequately proven infeasible.

- 4. At new or expanded industrial developments, the best available facilities practices and procedures shall be employed for the safe handling of fuels and toxic or hazardous materials to prevent them from entering the water, and optimum means shall be employed for prompt and effective cleanup of those spills that do occur. The City's Shoreline Administrator may require specific facilities to support those activities as well as demonstration of a cleanup/spill prevention program.
- 5. Display and other exterior lighting shall be designed, shielded, and operated to avoid illuminating the water surface.
- 6. All industrial loading and service areas shall be located or screened to minimize adverse impacts to the shoreline environment (including visual impacts) and public access facilities, including the Green River Trail. At a minimum, parking and service areas shall be screened from the Green River Trail by a 15' strip of Type II landscaping as defined in Section 15.07.050 KCC, as amended, that is able to provide a full visual screen within 5 years of planting. The City Shoreline Administrator may modify these landscaping requirements to account for reasonable safety and security concerns.
- 7. All new industrial development located adjacent to the Green River Trail shall provide the following:
 - A minimum of 15' of Type II landscaping (as defined in Section 15.07.050 KCC, as amended) between the building and the shoreline. A sight obscuring fence is not required.
 - b. A minimum of 20 ft² of transparent windows for every 50 lineal feet of building façade adjacent to the Green River Trail. The intent of this standard is to provide passive surveillance along the trail to promote safety and security.

The City Shoreline Administrator may modify these landscaping requirements to account for reasonable safety and security concerns.

- 8. Low Impact Development (LID) techniques shall be incorporated where appropriate.
- 9. Ship and boat building and repair yards shall employ Best Management Practices (BMPs) concerning the various services and activities they perform and their impacts on the surrounding water quality. Standards for BMPs are found in the 2002 City of Kent Surface Water Design Manual, as amended.
- 10. See Section B "Development Standards Matrix" of this Chapter for setback requirements. See also setback requirements in Chapter 3 Section B.1.c.7 to accommodate levee construction on the Green River.

6. In-Stream Structures

a. Applicability

In-stream structures are constructed waterward of the OHWM and either cause or have the potential to cause water impoundment or diversion, obstruction, or modification of water flow. They typically are constructed for hydroelectric generation and transmission (including both public and private facilities), flood control, irrigation, water supply (both domestic and industrial), recreational, or fisheries enhancement.

In Kent, the only in-stream structures applicable are for water treatment or environmental restoration purposes, such as water treatment at the Green River Natural Resources Area.

b. Policies

1. In-stream structures should provide for the protection, preservation, and restoration of ecosystem-wide processes, ecological functions, and cultural resources, including, but not limited to, fish and fish passage, wildlife and water resources, shoreline critical areas, hydrogeological processes, and natural scenic vistas. Within the City of Kent, in-stream structures should be allowed only for the purposes of environmental restoration or water quality treatment.

c. Regulations

- 1. In-stream structures are permitted only for the purposes of environmental restoration, water quality management, or maintenance of water levels.
- 2. The City's Shoreline Administrator may require that projects with in-stream structures include public access, provided public access improvements do not create adverse environmental impacts or create a safety hazard.

7. Recreational Development

a. Applicability

Recreational development includes public and commercial facilities for recreational activities such as hiking, photography, viewing, and fishing, boating, swimming, bicycling, picnicking, and playing. It also includes facilities for active or more intensive uses, such as parks, campgrounds, golf courses, and other outdoor recreation areas. This section applies to both publicly and privately owned shoreline facilities intended for use by the public or a private club, group, association or individual.

Recreational uses and development can be part of a larger mixed-use project. For example, a resort will probably contain characteristics of, and be reviewed under, both the "Commercial Development" and the "Recreational Development" sections. Primary activities such as boating facilities, resorts, subdivisions, and hotels are not addressed directly in this category.

Uses and activities associated with recreational developments that are identified as separate use activities in this SMP, such as "Boating Facilities," "Piers and Docks," "Residential Development," and "Commercial Development," are subject to the regulations established for those uses in addition to the standards for recreation established in this section.

Commercial indoor nonwater-oriented recreation facilities, such as bowling alleys and fitness clubs, are addressed as commercial uses.

b. Policies

- 1. The coordination of local, state, and federal recreation planning should be encouraged to satisfy recreational needs. Shoreline recreational developments should be consistent with all adopted park, recreation, and open space plans.
- 2. Recreational developments and plans should promote the conservation of the shoreline's natural character, ecological functions, and processes
- 3. A variety of compatible recreational experiences and activities should be encouraged to satisfy diverse recreational needs.
- 4. Water-dependent recreational uses, such as angling, boating, and swimming, should have priority over water-enjoyment uses, such as picnicking and golf. Water-enjoyment uses should have priority over nonwater-oriented recreational uses, such as field sports.
- 5. Recreation facilities should be integrated and linked with linear systems, such as hiking paths, bicycle paths, easements, and scenic drives.
- 6. Where appropriate, nonintensive recreational uses may be permitted in floodplain areas. Nonintensive recreational uses include those that do not do any of the following:
 - a. Adversely affect the natural hydrology of aquatic systems.
 - b. Create any flood hazards.
 - c. Damage the shoreline environment through modifications such as structural shoreline stabilization or vegetation removal.
- 7. Opportunities to expand the public's ability to enjoy the shoreline in public parks through dining or other water enjoyment activities should be pursued.

c. Regulations

1. Water-oriented recreational developments and mixed-use developments with water-oriented recreational activities may be permitted as indicated in Chapter 5 Section B, "Shoreline Use and Development Standard Matrices." In accordance with this matrix and other provisions of this SMP, nonwater-oriented recreational developments may be permitted only where it can be demonstrated that all of the following apply:

- a. A water-oriented use is not reasonably expected to locate on the proposed site due to topography, surrounding land uses, physical features, or the site's separation from the water.
- b. The proposed use does not usurp or displace land currently occupied by a water-oriented use and will not interfere with adjacent water-oriented uses.
- c. The proposed use and development will appreciably increase ecological functions or, in the case of public projects, public access.
- 2. Accessory parking shall not be located in shoreline jurisdiction unless all of the following conditions are met:
 - a. The City's Shoreline Administrator determines there is no other feasible option,
 - b. The parking supports a water-oriented use, and
 - c. All adverse impacts from the parking in the shoreline jurisdiction are mitigated.
- 3. All new recreational development proposals will be reviewed by the City's Shoreline Administrator for ecological restoration and public access opportunities. When restoration or public access plans indicate opportunities exist for these improvements, the City's Shoreline Administrator may require that those opportunities are either implemented as part of the development project or that the project design be altered so that those opportunities are not diminished.

All new nonwater-oriented recreational development, where allowed, shall be conditioned with the requirement to provide ecological restoration and, in the case of public developments, public access. The City's Shoreline Administrator shall consult the provisions of this SMP and determine the applicability and extent of ecological restoration and public access required.

- 4. Nonwater-oriented structures, such as restrooms, recreation halls and gymnasiums, recreational buildings and fields, access roads, and parking areas, shall be set back from the OHWM at least 70 feet unless it can be shown that there is no feasible alternative.
- 5. See Chapter 3 Section 12.c.3-4 for water quality regulations related to the use of pesticides, herbicides, and fertilizers.

8. Residential Development

a. Applicability

Residential development means one or more buildings, structures, lots, parcels or portions thereof which are designed for and used or intended to be used to provide a place of abode, including single-family residences, duplexes, other detached dwellings, floating homes, multi-family residences, mobile home parks, residential subdivisions, residential short subdivisions, and residential planned unit development, together with accessory uses and structures normally applicable to residential uses, including, but not limited to, garages, sheds, tennis courts, swimming pools, parking areas, fences, cabanas, saunas, and guest cottages. Residential development does not include hotels, motels, or any other type of overnight or transient housing or camping facilities.

Single family residences are a preferred use under the Shoreline Management Act when developed in a manner consistent with this Shoreline Master Program.

b. Policies

- 1. Residential development should be prohibited in environmentally sensitive areas including, but not limited to, wetlands, steep slopes, floodways, and buffers.
- 2. The overall density of development, lot coverage, and height of structures should be appropriate to the physical capabilities of the site and consistent with the comprehensive plan.
- 3. Recognizing the single-purpose, irreversible, and space consumptive nature of shoreline residential development, new development should provide adequate setbacks or open space from the water to provide space for community use of the shoreline and the water, to provide space for outdoor recreation, to protect or restore ecological functions and ecosystem-wide processes, to preserve views, to preserve shoreline aesthetic characteristics, to protect the privacy of nearby residences, and to minimize use conflicts.
- 4. Adequate provisions should be made for protection of groundwater supplies, erosion control, stormwater drainage systems, aquatic and wildlife habitat, ecosystem-wide processes, and open space.
- 5. Sewage disposal facilities, as well as water supply facilities, shall be provided in accordance with appropriate state and local health regulations.
- 6. New residences should be designed and located so that shoreline armoring will not be necessary to protect the structure. The creation of new residential lots should not be allowed unless it is demonstrated the lots can be developed without:
 - a. Constructing shoreline stabilization structures (such as bulkheads).
 - b. Causing significant erosion or slope instability.
 - c. Removing existing native vegetation within 20 feet of the shoreline.

c. Regulations

Properties within Shoreline Jurisdiction on Lakes

1. A summary of regulations for residential properties within shoreline jurisdiction is presented in Table 8 below. Refer to written provisions within this section for exceptions and more detailed explanations. See also Chapter 3 Section B.11 for vegetation conservation provisions.

Table 8. Shoreline Regulations for Residential Properties on Lakes

	Regulation:
Standard Minimum Building Setback from OHWM	75 feet ¹
Standard Minimum Deck Setback from OHWM	50 feet
Maximum Impervious Surface	35%

¹ Standard 2.a.i. discussed below requires the averaging of the setbacks of adjacent dwelling units with a minimum setback of 75 feet.

- 2. New residential development, including new structures, new pavement, and additions, within shoreline jurisdiction on lakes shall adhere to the following standards:
 - a. Setbacks:
 - i. Buildings: Set back all covered or enclosed structures the average of the setbacks of existing houses on adjacent lots on both sides of the subject parcel, with a minimum setback of 75 feet from the OHWM. Where the City's Shoreline Administrator finds that an existing site does not provide sufficient area to locate the residence entirely landward of this setback, the City's Shoreline Administrator may allow the residence to be located closer to the OHWM, provided all other provisions of this SMP are met and impacts are mitigated.
 - ii. Patios and decks: Uncovered patios or decks that are no higher than 2' above grade may extend a maximum of 25 feet into the building setback, up to within 50 feet of the OHWM. See Section d. below for exception to this requirement.



Figure 3. Standard setback from residential development on lakes.

b. Maximum amount of impervious surface: The maximum amount of impervious surface for each lot, including structures and pavement (including gravel surfaces) shall be no greater than 35 percent of the total lot area above OHWM.

In calculating impervious surface, pavers on a sand bed may be counted as 50 percent impervious and wood decks with gaps between deck boards may be counted as permeable if over bare soil or loose gravel. Pervious concrete and asphalt may be counted as per manufacturer's specifications. To calculate the net impervious surface, multiply the area of the pavement by the percentage of imperviousness.

The City may determine the percentage of imperviousness for pavements, such as compacted gravel, that are not specified here.



Maximum amount of impervious surface is 35%. With a 13,000 square foot lot (65'x200'), 4,550 square feet of combined impervious surface is allowed.

Figure 4. Illustration of maximum impervious surface.

c. Incentives to provide shoreline vegetation. The maximum amount of impervious surface area can be increased if native vegetation, including trees and shrubs, is included along the shoreline. For every five feet of vegetation depth (measured perpendicular to the shoreline) added along the OHWM, the percentage of total impervious surface area can increase by 2 percent, up to a maximum of 50 percent for total impervious surface area. Twenty-five percent of the native vegetated area may be left open for views and access.

All property owners who obtain approval for increase in the impervious surface cover in exchange for planting native vegetation must prepare, and agree to adhere to, a shoreline vegetation management plan prepared by a qualified professional and approved by the Shoreline Administrator that:

- i. Requires the native vegetation to consist of a mixture of trees, shrubs and groundcover and be designed to improve habitat functions,
- ii. Includes appropriate limitations on the use of fertilizer, herbicides and pesticides as needed to protect lake water quality, and
- iii. Includes a monitoring and maintenance program.

This plan shall be recorded as a covenant against the property after approval by the Shoreline Administrator. A copy of the recorded covenant shall be provided to the Shoreline Administrator.

- d. If there is no bulkhead, or if a bulkhead is removed, a small waterfront deck or patio can be placed along the shoreline provided:
 - i. Waterfront deck or patio covers less than 25 percent of the shoreline frontage (width of lot measured along shoreline) and native vegetation covers a minimum of 75 percent of the shoreline frontage.
 - ii. Within 25 feet of the shoreline, for every 1 square foot of waterfront deck or patio, 3 square feet of vegetated area shall be provided along the shoreline.
 - iii. The total area of the waterfront deck or patio along the shoreline shall not exceed 400 square feet.
 - iv. The deck or patio is set back 5 feet from the OHWM.
 - v. The deck or patio is no more than 2 feet above grade and is not covered

All property owners who obtain approval for a waterfront deck or patio in exchange for removing a bulkhead and retaining or planting native vegetation must prepare, and agree to adhere to, a shoreline vegetation management plan prepared by a qualified professional and approved by the Shoreline Administrator that:

- i. Requires the preparation of a revegetation plan
- ii. Requires the native vegetation to consist of a mixture of trees, shrubs and groundcover and be designed to improve habitat functions,
- iii. Includes appropriate limitations on the use of fertilizer, herbicides and pesticides as needed to protect lake water quality, and
- iv. Includes a monitoring and maintenance program.

This plan shall be recorded as a covenant against the property after approval by the Shoreline Administrator. A copy of the recorded covenant shall be provided to the Shoreline Administrator.

Lots with no bulkhead or if bulkhead is removed



Deck must be set back 5' from OHWM

Figure 5. Waterfront deck bonus for lots with no bulkhead or if bulkhead is removed.

3. For new development on previously undeveloped lots, any existing native vegetation shall be retained along the shoreline to 20 feet from the OHWM. If little or no native vegetation exists on the previously undeveloped lot, native vegetation shall be planted along the shoreline to 20 feet from the OHWM. 25 percent of the required vegetated area can be cleared or thinned for view maintenance and waterfront access, provided 75 percent of the area remains vegetated. Invasive species may be removed, vegetation trimmed, and trees "limbed up" from the bottom to eye level to provide views. In the 25 percent cleared area, pathways for access to the water are allowed.

Property owners must prepare, and agree to adhere to, a shoreline vegetation management plan prepared by a qualified professional and approved by the Shoreline Administrator that:

- a. Requires the preparation of a revegetation plan
- b. Requires the native vegetation to consist of a mixture of trees, shrubs and groundcover and be designed to improve habitat functions,
- c. Includes appropriate limitations on the use of fertilizer, herbicides and pesticides as needed to protect lake water quality, and
- d. Includes a monitoring and maintenance program.

This plan shall be recorded as a covenant against the property after approval of the Shoreline Administrator. A copy of the recorded covenant shall be provided to the Shoreline Administrator.

Property owners who provide more native vegetation than the minimum required can apply any additional vegetation over 20 feet to take advantage of the incentives described in subsection c.2.c above. For example, if 30 feet of vegetation is provided, 10 feet can be applied to the calculations described in subsection c.2.c above, for a total increase in impervious surface area of 4%.

New development on previously undeveloped lots



Figure 6. Standards for new development on previously undeveloped lots.

- a. Maximum building footprint area: See Section 15.04.170 KCC, as amended.
- b. Height: See Section 15.04.170 KCC, as amended.
- c. Also see regulations for "Shoreline Stabilization" and "Docks and Floats" in Chapter 4 for those structures.
- 4. For the purposes of maintaining visual access to the waterfront, the following standards apply to accessory uses, structures, and appurtenances for new and existing residences.
 - a. Fences:
 - i. Fences within 75 feet of the OHWM shall be no more than 4 feet high when separating two residential lots.
 - ii. Fences within 75 feet of the OHWM shall be no more than 6 feet high when separating a residential lot from public lands or community park.
 - iii. Fences aligned roughly parallel to the shoreline and within 75 feet of the OHWM shall be no more than 4 feet high and shall be set back at least 25 feet from the OWHM.
 - iv. Fences along a property line running roughly perpendicular to the shoreline may extend to the OHWM.
 - v. The opaque portions (e.g., boards or slats) of a fence must not cover more than 60 percent of the fence. That is, when looking at a fence, not more than 60 percent of it may be opaque and at least 40 percent of the fence must be open. Chain link fences are not permitted within 75 feet of the OHWM.



Figure 7. Fence standards for residential development on lakes.

- b. Garages and pavements for motorized vehicles (drives and parking areas) shall be set back at least 75 feet from the OHWM.
- 5. Accessory uses and appurtenant structures not addressed in the regulations above shall be subject to the same conditions as primary residences.
- 6. The creation of new residential lots within shoreline jurisdiction on lakes shall be prohibited unless the applicant demonstrates that all of the provisions of this SMP, including setback and size restrictions, can be met on the proposed lot. Specifically, it must be demonstrated that:
 - a. The residence can be built in conformance with all applicable setbacks and development standards in this SMP.
 - b. Adequate water, sewer, road access, and utilities can be provided.
 - c. The intensity of development is consistent with the City's comprehensive plan.
 - d. The development will not cause flood or geological hazard to itself or other properties.

In addition, new residential development on new lots that contain intact native vegetation shall conform to the regulations of c.3. above. (See also Vegetation Conservation standards section in Chapter 3 Section 11).

- 7. The storm water runoff for all new or expanded pavements or other impervious surfaces shall be directed to infiltration systems in accordance with the City of Kent Surface Water Design Manual, as amended.
- 8. See the Chapter 3 Section B.11 for regulations related to clearing, grading, and conservation of vegetation.

Residential Properties within Shoreline Jurisdiction on Rivers and Streams

- 9. Table 9 below is a summary of regulations for Residential Properties within shoreline jurisdiction on rivers or streams:
 - Table 9.
 Regulations for Residential Properties within Shoreline Jurisdiction on Rivers or Streams

 Regulation:

Standard Minimum Building Setback	
Green River	140 feet ¹
Big Soos Creek	200 feet ²
Springbrook Creek	NA ³
Jenkins Creek	NA ³
Standard Minimum Deck Setback	120 feet
Standard Maximum Height	See Kent Zoning Code

¹ This setback is established on the Green River to allow for levee reconstruction and accompanying shoreline restoration. Buildings existing prior to the adoption of this SMP are considered an allowed and conforming use (see 10.a.i below).

² The City's Shoreline Administrator may reduce this setback on lots existing prior to the adoption of this SMP if it finds that such a setback prevents the development of a single-family residence (see 10.a.ii below).

- ³ Springbrook Creek and Jenkins Creek do not have residential properties along the shoreline, nor does the zoning allow for future residential structures.
- 10. New residential development within shoreline jurisdiction on rivers and streams shall adhere to the following standards:
 - a. Setbacks:
 - i. Buildings on the Green River: All covered or enclosed structures shall be set back a minimum of 140 feet to allow for levee reconstruction and environmental restoration. The City's Shoreline Administrator may revise this setback in accordance with levee reconstruction design. (See Chapter 3 Section B.1.c.7)
 - ii. Buildings on Big Soos Creek: Set back all covered or enclosed structures a minimum of two hundred (200) feet inland from the OHWM. Where the City's Shoreline Administrator finds that an existing site does not provide sufficient area to locate the residence entirely landward of the setback, the City's Shoreline Administrator may allow the residence to be located closer to the OHWM, provided all other provisions of this SMP are met and impacts are mitigated.
 - iii. Patios and decks: Uncovered patios or decks no higher than 2 feet above grade may extend up to within 120 feet of the OHWM.
 - b. Maximum building footprint area: See Section 15.04.170 KCC, as amended.
- c. Maximum amount of impervious surface: See Section 15.04.170 KCC, as amended.
- d. Height: See Section 15.04.170 KCC, as amended.
- 11. Also see regulations for "Shoreline Stabilization" and "Docks and Floats" in Chapter 4 for those structures.
- 12. For the purposes of maintaining visual access to the waterfront, the following standards apply to accessory uses, structures, and appurtenances for new and existing residences.
 - a. Fences: All streams shall have a wildlife-passable fence installed at the edge of the required SMP setback. Fencing shall consist of split rail cedar fencing (or other nonpressure treated materials approved by the City's Shoreline Administrator). The fencing shall also include sensitive area signage at a rate of one (1) sign per lot, or one (1) sign per one hundred (100) feet and along public right-of-way, whichever is greater.
 - b. Garages and pavements for motorized vehicles (drives and parking areas) shall be set back at least 200 feet from the OHWM.
- 13. The storm water runoff for all new or expanded pavements or other impervious surfaces shall be directed to infiltration systems in accordance with the City of Kent Surface Water Design Manual.
- 14. The creation of new residential lots within shoreline jurisdiction on rivers and streams shall be prohibited unless the applicant demonstrates that all of the provisions of this SMP, including setback and size restrictions, can be met on the proposed lot. Specifically, it must be demonstrated that:
 - a. The residence can be built in conformance with all applicable setbacks and development standards in this SMP.
 - b. Adequate water, sewer, road access, and utilities can be provided.
 - c. The intensity of development is consistent with the City's comprehensive plan.
 - d. The development will not cause flood or geological hazard to itself or other properties.

In addition, new residential development on new lots that contain intact native vegetation shall conform to the regulations of c.3. above. (See also Chapter 3 Section B.11).

15. See Chapter 3 Section B.11 for regulations related to clearing, grading, and conservation of vegetation.

9. Transportation

a. Applicability

Transportation facilities are those structures and developments that aid in land and water surface movement of people, goods, and services. They include roads and highways, bridges and causeways, bikeways, trails, railroad facilities, airports, heliports, and other related facilities.

The various transport facilities that can impact the shoreline cut across all environmental designations and all specific use categories. The policies and regulations identified in this section pertain to any project, within any environment, that is effecting some change in present transportation facilities.

b. Policies

- 1. Circulation system planning on shorelands should include systems for pedestrian, bicycle, and public transportation where appropriate. Circulation planning and projects should support existing and proposed shoreline uses that are consistent with the SMP.
- 2. Trail and bicycle paths should be encouraged along shorelines and should be constructed in a manner compatible with the natural character, resources, and ecology of the shoreline.
- 3. When existing transportation corridors are abandoned, they should be reused for water-dependent use or public access.

c. Regulations

General

- 1. Development of all new and expanded transportation facilities in shoreline jurisdiction shall be consistent with the City's comprehensive plan and applicable capital improvement plans.
- 2. All development of new and expanded transportation facilities shall be conditioned with the requirement to mitigate significant adverse impacts consistent with Chapter 3 Section B.4 of this SMP. Development of new or expanded transportation facilities that cause significant ecological impacts shall not be allowed unless the development includes shoreline mitigation/restoration that increases the ecological functions being impacted to the point where:
 - a. Significant short- and long-term risks to the shoreline ecology from the development are eliminated.
 - b. Long-term opportunities to increase the natural ecological functions and processes are not diminished.

If physically feasible, the mitigation/restoration shall be in place and functioning prior to project impacts. The mitigation/restoration shall include a monitoring and adaptive management program that describes monitoring and enhancement measures to ensure the viability of the mitigation over time.

Location

- 3. New nonwater-dependent transportation facilities shall be located outside shoreline jurisdiction, if feasible. In determining the feasibility of a nonshoreline location, the City's Shoreline Administrator will apply the definition of "feasible" in Chapter 6 and weigh the action's relative public costs and benefits, considered in the short- and long-term time frames.
- 4. New transportation facilities shall be located and designed to prevent or to minimize the need for shoreline protective measures such as riprap or other bank stabilization, fill, bulkheads, groins, jetties, or substantial site grading. Transportation facilities allowed to cross over water bodies and wetlands shall utilize elevated, open pile, or pier structures whenever feasible. All bridges must be built high enough to allow the passage of debris and provide three feet of freeboard above the 100-year flood level.
- 5. Roads and railroads shall be located to minimize the need for routing surface waters into and through culverts. Culverts and similar devices shall be designed with regard to the 100-year storm frequencies and allow continuous fish passage. Culverts shall be located so as to avoid relocation of the stream channel.
- 6. Bridge abutments and necessary approach fills shall be located landward of wetlands or the OHWM for water bodies without wetlands; provided, bridge piers may be permitted in a water body or wetland as a conditional use.

Design/Construction/Maintenance

- 7. All roads and railroads, if permitted parallel to shoreline areas, shall provide buffer areas of compatible, self-sustaining vegetation. Shoreline scenic drives and viewpoints may provide breaks periodically in the vegetative buffer to allow open views of the water.
- 8. Development of new and expanded transportation facilities shall include provisions for pedestrian, bicycle, and public transportation where appropriate as determined by the City's Shoreline Administrator. Circulation planning and projects shall support existing and proposed shoreline uses that are consistent with the SMP.
- 9. Transportation and primary utility facilities shall be required to make joint use of rights-of-way and to consolidate crossings of water bodies if feasible, where adverse impact to the shoreline can be minimized by doing so.
- 10. Fills for development of transportation facilities are prohibited in water bodies and wetlands; except, such fill may be permitted as a Conditional Use when all structural and upland alternatives have been proven infeasible and the transportation facilities are necessary to support uses consistent with this SMP.
- 11. Development of new and expanded transportation facilities shall not diminish but may modify public access to the shoreline.

- 12. Waterway crossings shall be designed to provide minimal disturbance to banks.
- 13. All transportation facilities shall be designed, constructed, and maintained to contain and control all debris, overburden, runoff, erosion, and sediment generated from the affected areas. Relief culverts and diversion ditches shall not discharge onto erodible soils, fills, or sidecast materials without appropriate BMPs, as determined by the City's Shoreline Administrator.
- 14. All shoreline areas disturbed by construction and maintenance of transportation facilities shall be replanted and stabilized with native, drought-tolerant, self-sustaining vegetation by seeding, mulching, or other effective means immediately upon completion of the construction or maintenance activity. Such vegetation shall be maintained by the agency or developer constructing or maintaining the road until established. The vegetation restoration/replanting plans shall be as approved by the City's Shoreline Administrator.

Green River

- 15. New transportation and utility improvements near the Green River shall be set back sufficiently, as determined by the City's Shoreline Administrator, to accommodate planned levee and shoreline restoration improvements.
- 16. Along the Green River shoreline:
 - a. Roads extending along the shoreline shall be developed as scenic boulevards for slow-moving traffic;
 - b. Roads extending along the shoreline shall provide a trail system separated from the roadway;
 - c. All lots and buildings must have road access without using scenic and recreational roads as defined by the Green River Corridor Plan.
 - d. Development shall not include street connections to scenic and recreational roads;
 - e. Development shall not force or encourage traffic from the proposed development to use a scenic or recreational road for access; and
 - f. Development shall not force or encourage property outside the proposed development to use a scenic or recreational road for access.
 - g. Development consistent with this SMP may be allowed landward of Green River Road because the road prevents active channel movement and flooding and therefore is not within the channel migration zone.

10. Utilities

a. Applicability

Utilities are services and facilities that produce, transmit, carry, store, process, or dispose of electric power, gas, water, sewage, communications, oil, and the like.

The provisions in this section apply to primary uses and activities, such as solid waste handling and disposal, sewage treatment plants and outfalls, public high-tension utility lines on public property or easements, power generating or transfer facilities, and gas distribution lines and storage facilities. See Chapter 3 Section B.10, "Utilities (Accessory)," for on-site accessory use utilities.

Solid waste disposal means the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid or hazardous waste on any land area or in the water.

Solid waste includes solid and semisolid wastes, including garbage, rubbish, ashes, industrial wastes, wood wastes and sort yard wastes associated with commercial logging activities, swill, demolition and construction wastes, abandoned vehicles and parts of vehicles, household appliances and other discarded commodities. Solid waste does not include sewage, dredge material, agricultural wastes, auto wrecking yards with salvage and reuse activities, or wastes not specifically listed above.

b. Policies

- 1. New utility facilities should be located so as not to require extensive shoreline protection works.
- 2. Utility facilities and corridors should be located so as to protect scenic views, such as views of the Green River from the Green River Trail. Whenever possible, such facilities should be placed underground, or alongside or under bridges.
- 3. Utility facilities and rights-of-way should be designed to preserve the natural landscape and to minimize conflicts with present and planned land uses.

c. Regulations

- 1. All utility facilities shall be designed and located to minimize harm to shoreline ecological functions, preserve the natural landscape, and minimize conflicts with present and planned land and shoreline uses while meeting the needs of future populations in areas planned to accommodate growth. The City's Shoreline Administrator may require the relocation or redesign of proposed utility development in order to avoid significant ecological impacts.
- 2. Utility production and processing facilities, such as power plants or parts of those facilities that are nonwater-oriented shall not be allowed in shoreline areas unless it can be demonstrated that no other feasible option is available. In such cases, significant ecological impacts shall be avoided.
- 3. Transmission facilities for the conveyance of services, such as power lines, cables, and pipelines, shall be located to cause minimum harm to the shoreline and shall be located outside of the shoreline area where feasible. Utilities shall be located in existing rights-of-way and utility easements whenever possible. New or expanded utilities installed near the Green River shall be set

back and designed to accommodate planned levee and shoreline restoration improvements.

- 4. Development of pipelines and cables on shorelines, particularly those running roughly parallel to the shoreline, and development of facilities that may require periodic maintenance or that cause significant ecological impacts shall not be allowed unless no other feasible option exists. When permitted, those facilities shall include adequate provisions to protect against significant ecological impacts.
- 5. Restoration of ecological functions shall be a condition of new and expanded nonwater-dependent utility facilities.

The City's Shoreline Administrator will consult the provisions of this SMP and determine the applicability and extent of ecological restoration required. The extent of ecological restoration shall be that which is reasonable given the specific circumstances of utility development.

- 6. Utility development shall, through coordination with local government agencies, provide for compatible, multiple uses of sites and rights-of-way. Such uses include shoreline access points, trail systems and other forms of recreation and transportation, providing such uses will not unduly interfere with utility operations, endanger public health and safety or create a significant liability for the owner.
- 7. New solid waste disposal sites and facilities are prohibited. Existing solid waste disposal and transfer facilities in shoreline jurisdiction shall not be added to or substantially reconstructed.
- 8. New electricity, communications and fuel lines shall be located underground, except where the presence of bedrock or other obstructions make such placement infeasible or if it is demonstrated that above-ground lines would have a lesser impact. Existing above ground lines shall be moved underground during normal replacement processes.
- 9. Transmission and distribution facilities shall cross areas of shoreline jurisdiction by the shortest, most direct route feasible, unless such route would cause significant environmental damage.
- 10. Utility developments shall be located and designated so as to avoid or minimize the use of any structural or artificial shoreline stabilization or flood protection works.
- 11. Utility production and processing facilities shall be located outside shoreline jurisdiction unless no other feasible option exists. Where major facilities must be placed in a shoreline area, the location and design shall be chosen so as not to destroy or obstruct scenic views, and shall avoid significant ecological impacts.
- 12. All underwater pipelines transporting liquids intrinsically harmful to aquatic life or potentially injurious to water quality are prohibited, unless no other feasible alternative exists. In those limited instances when permitted by

Conditional Use, automatic shut-off valves shall be provided on both sides of the water body.

- 13. Filling in shoreline jurisdiction for development of utility facility or line purposes is prohibited, except where no other feasible option exists and the proposal would avoid or minimize adverse impacts more completely than other methods. Permitted crossings shall utilize pier or open pile techniques.
- 14. Power-generating facilities shall require a Conditional Use permit.
- 15. Clearing of vegetation for the installation or maintenance of utilities shall be kept to a minimum and upon project completion any disturbed areas shall be restored to their pre-project condition.
- 16. Telecommunication towers, such as radio and cell phone towers, are specifically prohibited in shoreline jurisdiction.
- 17. Utilities that need water crossings shall be placed deep enough to avoid the need for bank stabilization and stream/riverbed filling both during construction and in the future due to flooding and bank erosion that may occur over time. Boring, rather than open trenching, is the preferred method of utility water crossing.

CHAPTER 6 **Definitions**

Accessory use. Any structure or use incidental and subordinate to a primary use or development.

Adjacent lands. Lands adjacent to the shorelines of the state (outside of shoreline jurisdiction).

Administrator. The City of Kent Planning Director or his/her designee, charged with the responsibility of administering the Shoreline Master Program.

Anadromous. Fish species, such as salmon, which are born in fresh water, spend a large part of their lives in the sea, and return to freshwater rivers and streams to spawn.

Appurtenance. A structure or development which is necessarily connected to the use and enjoyment of a single-family residence and is located landward of the ordinary high water mark and also of the perimeter of any wetland. On a state-wide basis, normal appurtenances include a garage, deck, driveway, utilities, fences and grading which does not exceed two hundred fifty cubic yards and which does not involve placement of fill in any wetland or waterward of the ordinary high water mark. (WAC 173-27-040(2)(g))

Aquatic. Pertaining to those areas waterward of the ordinary high water mark.

Aquaculture. The cultivation of fish, shellfish, and other aquatic animals or plants, including the incidental preparation of these products for human use.

Archaeological. Having to do with the scientific study of material remains of past human life and activities.

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

Average grade level. See "base elevation."

Base elevation. The average elevation of the approved topography of a parcel at the midpoint on each of the four sides of the smallest rectangle that will enclose the proposed structure, excluding eaves and decks.

Beach. The zone of unconsolidated material that is moved by waves and wind currents, extending landward to the shoreline.

Beach enhancement/restoration. Process of restoring a beach to a state more closely resembling a natural beach, using beach feeding, vegetation, drift sills and other nonintrusive means as applicable.

Berm. A linear mound or series of mounds of sand and/or gravel generally paralleling the water at or landward of the ordinary high water mark. Also, a linear mound used to screen an adjacent activity, such as a parking lot, from transmitting excess noise and glare.

Bioengineering. The use of biological elements, such as the planting of vegetation, often in conjunction with engineered systems, to provide a structural shoreline stabilization measure with minimal negative impact to the shoreline ecology.

Biofiltration system. A stormwater or other drainage treatment system that utilizes as a primary feature the ability of plant life to screen out and metabolize sediment and pollutants. Typically, biofiltration systems are designed to include grassy swales, retention ponds and other vegetative features.

Bog. A wet, spongy, poorly drained area which is usually rich in very specialized plants, contains a high percentage of organic remnants and residues, and frequently is associated with a spring, seepage area, or other subsurface water source. A bog sometimes represents the final stage of the natural process of eutrophication by which lakes and other bodies of water are very slowly transformed into land areas.

Buffer or buffer area. See definition in the Critical Areas Regulations, Ordinance No. 3805, codified as Section 11.06.160 KCC.

Building height. See definition in Section 15.02.065 KCC, as amended.

Building Setback. An area in which structures, including but not limited to sheds, homes buildings, and awnings shall not be permitted within, or allowed to project into. It is measured horizontally upland from and perpendicular to the ordinary high water mark.

Bulkhead. A solid wall erected generally parallel to and near the ordinary high water mark for the purpose of protecting adjacent uplands from waves or current action.

Buoy. An anchored float for the purpose of mooring vessels.

Channel. An open conduit for water, either naturally or artificially created; does not include artificially created irrigation, return flow, or stockwatering channels.

Channel Migration Zone (CMZ). The area along a river within which the channel(s) can be reasonably predicted to migrate over time as a result of natural and normally occurring hydrological and related processes when considered with the characteristics of the river and its surroundings. For locations of CMZ, refer to the Channel Migration Zone Map, Figure No. 10.2 in the June 9, 2009 Final Shoreline Inventory and Analysis Report.

City. The City of Kent Washington.

Clearing. The destruction or removal of vegetation ground cover, shrubs and trees including root material removal and topsoil removal.

Compensatory Mitigation. See definition in the Critical Areas Regulations, Ordinance No. 3805, codified as Section 11.06.180 KCC.

Comprehensive Plan. Comprehensive plan means the document, including maps adopted by the city council, that outlines the City's goals and policies related to management of growth, and prepared in accordance with RCW 36.70A. The term also includes adopted subarea plans prepared in accordance with RCW 36.70A.

Conditional use. A use, development, or substantial development which is classified as a Conditional Use; or a use development, or substantial development that is not specifically classified within the SMP and is therefore treated as a Conditional Use.

Covered moorage. Boat moorage, with or without walls, that has a roof to protect the vessel.

Critical Areas Regulations. Refers to the City of Kent's Critical Areas Regulations, Ordinance No. 3805, codified under Chapter 11.06 KCC.

Current deflector. An angled stub-dike, groin, or sheet-pile structure which projects into a stream channel to divert flood currents from specific areas, or to control downstream current alignment.

Department of Ecology. The Washington State Department of Ecology.

Development. A use consisting of the construction or exterior alteration of structures; dredging; drilling; dumping; filling; removal of any sand, gravel, or minerals; bulkheading; driving of piling; placing of obstructions; or any project of a permanent or temporary nature which interferes with the normal public use of the surface of the waters of the state subject to Chapter 90.58 RCW at any stage of water level. (RCW 90.58.030(3)(d).)

Development regulations. The controls placed on development or land uses by the City of Kent, including, but not limited to, zoning ordinances, Critical Areas Regulations, all portions of a shoreline master program other than goals and policies approved or adopted under Chapter 90.58 RCW, planned unit development ordinances, subdivision ordinances, and binding site plan ordinances, together with any amendments thereto.

Dock. A structure which abuts the shoreline and is used as a landing or moorage place for craft. A dock may be built either on a fixed platform or float on the water. See also "development" and "substantial development."

Dredging. Excavation or displacement of the bottom or shoreline of a water body.

Ecological functions (or shoreline functions). The work performed or role played by the physical, chemical, and biological processes that contribute to the maintenance of the aquatic and terrestrial environments that constitute the shoreline's natural ecosystem.

Ecosystem-wide processes. The suite of naturally occurring physical and geologic processes of erosion, transport, and deposition and specific chemical processes that shape landforms within a specific shoreline ecosystem and determine both the types of habitat and the associated ecological functions.

EIS. Environmental Impact Statement.

Emergency. An unanticipated and imminent threat to public health, safety, or the environment which requires immediate action within a time too short to allow full compliance with the SMP. Emergency construction is construed narrowly as that which is necessary to protect property and facilities from the elements. Emergency construction does not include development of new permanent protective structures where none previously existed. Where new protective structures are deemed by the Administrator to be the appropriate means to address the emergency situation, upon abatement of the emergency situation the new structure shall be removed or any permit which would have been required, absent an emergency, pursuant to Chapter 90.58 RCW or this SMP, shall be obtained. All emergency construction shall be consistent with the policies of Chapter 90.58 RCW and this SMP. As a general matter, flooding or seasonal events that can be anticipated and may occur but that are not imminent are not an emergency. (RCW 90.58.030(3eiii).)

Enhancement. Alteration of an existing resource to improve or increase its characteristics, functions, or processes without degrading other existing ecological functions.

Environment designation(s). See "shoreline environment designation(s)."

Erosion. The wearing away of land by the action of natural forces.

Exemption. Certain specific developments listed in WAC 173-27-040 are exempt from the definition of substantial developments and are therefore exempt from the substantial development permit process of the SMA. An activity that is exempt from the substantial development provisions of the SMA must still be carried out in compliance with policies and standards of the SMA and the local SMP. Conditional Use and variance permits may also still be required even though the activity does not need a substantial development permit. (RCW 90.58.030(3e); WAC 173-27-040.) (See also "development" and "substantial development.")

Fair market value. The open market bid price for conducting the work, using the equipment and facilities, and purchase of the goods, services, and materials necessary to accomplish the development. This would normally equate to the cost of hiring a contractor to undertake the development from start to finish, including the cost of labor, materials, equipment and facility usage, transportation, and contractor overhead and profit. The fair market value of the development shall include the fair market value of any donated, contributed, or found labor, equipment, or materials.

Feasible. An action, such as a development project, mitigation, or preservation requirement, is feasible when it meets all of the following conditions:

- (a) The action can be accomplished with technologies and methods that have been used in the past, or studies or tests have demonstrated that such approaches are currently available and likely to achieve the intended results.
- (b) The action provides a reasonable likelihood of achieving its intended purpose.
- (c) The action does not physically preclude achieving the project's primary intended use.

In cases where these regulations require certain actions unless they are infeasible, the burden of proving infeasibility is on the applicant.

In determining an action's infeasibility, the City may weigh the action's relative public costs and public benefits, considered in the short- and long-term time frames.

Fill. The addition of soil, sand, rock, gravel, sediment, earth retaining structure, or other material to an area waterward of the ordinary high water mark, in wetlands, or on shorelands in a manner that raises the elevation or creates dry land.

Floats. An anchored, buoyed object.

Floodplain. A term that is synonymous with the one hundred-year floodplain and means that land area susceptible to inundation with a one percent chance of being equaled or exceeded in any given year. The limit of this area shall be based upon flood ordinance regulation maps or a reasonable method which meets the objectives of the SMA.

Floodway. Those portions of the area of a river valley lying streamward from the outer limits of a watercourse upon which flood waters are carried during periods of flooding that occur with reasonable regularity, although not necessarily annually, said floodway being identified, under normal condition, by changes in surface soil conditions or changes in types or quality of vegetative groundcover condition. The floodway shall not include those lands that can reasonably be expected to be protected from flood waters by flood control devices maintained by or maintained under license from the federal government, the state, or a political subdivision of the state.

Gabions. Structures composed of masses of rocks, rubble or masonry held tightly together usually by wire mesh so as to form blocks or walls. Sometimes used on heavy erosion areas to retard wave action or as foundations for breakwaters or jetties.

Geologically hazardous areas. Lands or areas characterized by geologic, hydrologic, and topographic conditions that render them susceptible to varying degrees of potential risk of landslides, erosion, or seismic or volcanic activity; and areas characterized by geologic and hydrologic conditions that make them vulnerable to contamination of groundwater supplies through infiltration of contaminants to aquifers.

Geotechnical report (or geotechnical analysis). A scientific study or evaluation conducted by a qualified expert that includes a description of the ground and surface hydrology and geology, the affected land form and its susceptibility to mass wasting, erosion, and other geologic hazards or processes, conclusions and recommendations regarding the effect of the proposed development on geologic conditions, the adequacy of the site to be developed, the impacts of the proposed development, alternative approaches to the proposed development, and measures to mitigate potential site-specific and cumulative impacts of the proposed development, including the potential adverse impacts to adjacent and down-current properties. Geotechnical reports shall conform to accepted technical standards and must be prepared by qualified engineers or geologists who are knowledgeable about the regional and local shoreline geology and processes. If the project is in a Channel Migration Zone, then the report must be prepared by a professional with specialized experience in fluvial geomorphology in addition to a professional engineer. (Refer to the Channel Migration Zone Map, Figure No. 10.2 in the June 9, 2009 Final Shoreline Inventory and Analysis Report).

Grade. See "base elevation."

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

Grassy Swale. A vegetated drainage channel that is designed to remove various pollutants from storm water runoff through biofiltration.

Guidelines. Those standards adopted by the Department of Ecology into the Washington Administrative Code (WAC) to implement the policy of Chapter 90.58 RCW for regulation of use of the shorelines of the state prior to adoption of shoreline master programs. Such standards also provide criteria for local governments and the Department of Ecology in developing and amending shoreline master programs. The Guidelines may be found under WAC 173-26.

Habitat. The place or type of site where a plant or animal naturally or normally lives and grows.

Height. See "building height."

Hydrological. Referring to the science related to the waters of the earth including surface and ground water movement, evaporation and precipitation. Hydrological functions in shoreline include, water movement, storage, flow variability, channel movement and reconfiguration, recruitment and transport of sediment and large wood, and nutrient and pollutant transport, removal and deposition.

KCC. Kent City Code, including any amendments thereto.

Letter of exemption. A letter or other official certificate issued by the City to indicate that a proposed development is exempted from the requirement to obtain a shoreline permit as provided in WAC 173-27-050. Letters of exemption may include conditions or other provisions placed on the proposal in order to ensure consistency with the Shoreline Management Act and this SMP.

Littoral. Living on, or occurring on, the shore.

Littoral drift. The mud, sand, or gravel material moved parallel to the shoreline in the nearshore zone by waves and currents.

Low Impact Development (LID)Technique. A stormwater management and land development strategy applied at the parcel and subdivision scale that emphasizes conservation and use of onsite natural features integrated with engineered, small-scale hydrologic controls to more closely mimic pre-development hydrologic functions. Additional information may be found in the City of Kent Surface Water Design Manual, as amended, in addition to the 2005 Puget Sound Action Team LID Manual, as amended.

May. Refers to actions that are acceptable, provided they conform to the provisions of this SMP and the SMA.

Mitigation (or mitigation sequencing). The process of avoiding, reducing, or compensating for the environmental impact(s) of a proposal, including the following, which are listed in the order of sequence priority, with (a) being top priority.

- (a) Avoiding the impact altogether by not taking a certain action or parts of an action.
- (b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation by using appropriate technology or by taking affirmative steps to avoid or reduce impacts.
- (c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- (d) Reducing or eliminating the impact over time by preservation and maintenance operations.
- (e) Compensating for the impact by replacing, enhancing, or providing substitute resources or environments.
- (f) Monitoring the impact and the compensation projects and taking appropriate corrective measures.

Moorage facility. Any device or structure used to secure a boat or a vessel, including piers, docks, piles, lift stations or buoys.

Moorage pile. A permanent mooring generally located in open waters in which the vessel is tied up to a vertical column to prevent it from swinging with change of wind.

Multi-family dwelling (or residence). A building containing two or more dwelling units, including but not limited to duplexes, apartments and condominiums.

Must. A mandate; the action is required.

Native Plants or Native Vegetation. These are plant species indigenous to the Puget Sound region that could occur or could have occurred naturally on the site, which are or were indigenous to the area in question..

Nonconforming development. A shoreline use or structure which was lawfully constructed or established prior to the effective date of this SMP provision, and which no longer conforms to the applicable shoreline provisions.

Nonpoint pollution. Pollution that enters any waters of the state from any dispersed land-based or water-based activities, including, but not limited to, atmospheric deposition, surface water runoff from agricultural lands, urban areas, or forest lands, subsurface or underground sources, or discharges from boats or marine vessels not otherwise regulated under the National Pollutant Discharge Elimination System program.

Nonwater-oriented uses. Those uses that are not water-dependent, water-related, or water-enjoyment.

Normal maintenance. Those usual acts to prevent a decline, lapse, or cessation from a lawfully established condition. See also "normal repair."

Normal protective bulkhead. Those structural and nonstructural developments installed at or near, and parallel to, the ordinary high water mark for the sole purpose of protecting an existing single-family residence and appurtenant structures from loss or damage by erosion.

Normal repair. To restore a development to a state comparable to its original condition, including, but not limited to, its size, shape, configuration, location, and external appearance, within a reasonable period after decay or partial destruction, except where repair causes substantial adverse effects to shoreline resource or environment. (WAC 173-27-040.) See also "normal maintenance" and "development."

Off-site replacement. To replace wetlands or other shoreline environmental resources away from the site on which a resource has been impacted by a regulated activity.

OHWM. See "ordinary high water mark."

Ordinary high water mark (OHWM). That mark that will be found by examining the bed and banks and ascertaining where the presence and action of waters are so common and usual, and so long continued in all ordinary years, as to mark upon the soil a character distinct from that of the abutting upland, in respect to vegetation as that condition exists on June 1, 1971, as it may naturally change thereafter, or as it may change thereafter in accordance with permits issued by the City or the Department of Ecology. (RCW 90.58.030(2)(b)).

Periodic. Occurring at regular intervals.

Person. An individual, partnership, corporation, association, organization, cooperative, public or municipal corporation, or agency of the state or local governmental unit however designated. (RCW 90.58.030(1d).)

Pier element. Sections of a pier including the pier walkway, the pier float, the ell, etc.

Provisions. Policies, regulations, standards, guideline criteria or designations.

Public Access. Public access is the ability of the general public to reach, touch, and enjoy the water's edge, to travel on the waters of the state, and to view the water and the shoreline from adjacent locations. (WAC 173-26-221(4)).

Public interest. The interest shared by the citizens of the state or community at large in the affairs of government, or some interest by which their rights or liabilities are affected such as an effect on public property or on health, safety, or general welfare resulting from a use or development.

RCW. Revised Code of Washington.

Residential development. Development which is primarily devoted to or designed for use as a dwelling(s).

Restore. To significantly re-establish or upgrade shoreline ecological functions through measures such as revegetation, removal of intrusive shoreline structures, and removal or treatment of toxic sediments. To restore does not mean returning the shoreline area to aboriginal or pre-European settlement condition.

Revetment. Facing of stone, concrete, etc., built to protect a scarp, embankment, or shore structure against erosion by waves or currents.

Riparian. Of, on, or pertaining to the banks of a river.

Riprap. A layer, facing, or protective mound of stones placed to prevent erosion, scour, or sloughing of a structure or embankment; also, the stone so used.

Riverbank. The upland areas immediately adjacent to the floodway, which confine and conduct flowing water during non-flooding events. The riverbank, together with the floodway, represents the river channel capacity at any given point along the river.

Runoff. Water that is not absorbed into the soil but rather flows along the ground surface following the topography.

Sediment. The fine grained material deposited by water or wind.

SEPA (State Environmental Policy Act). SEPA requires state agencies, local governments and other lead agencies to consider environmental factors when making most types of permit decisions, especially for development proposals of a significant scale. As part of the SEPA process an EIS may be required to be prepared and public comments solicited.

Setback. A required open space, specified in this SMP, measured horizontally upland from and perpendicular to the ordinary high water mark.

Shall. A mandate; the action must be done.

Shorelands. All lands within Shoreline Management Act jurisdiction lying upland or higher in elevation of the OHWM.

Shoreline Administrator. City of Kent Planning Director or his/her designee charged with the responsibility of administering the Shoreline Master Program.

Shoreline areas (and shoreline jurisdiction). The same as "shorelines of the state" and "shorelands" as defined in RCW 90.58.030.

Shoreline environment designation(s). The categories of shorelines established to provide a uniform basis for applying policies and use regulations within distinctively different shoreline areas. Shoreline environment designations include: Aquatic, High Intensity, Urban Conservancy – Low Intensity, Urban Conservancy – Open Space, and Shoreline Residential.

Shoreline functions. See "ecological functions."

Shoreline jurisdiction. The term describing all of the geographic areas covered by the SMA, related rules and this SMP. See definitions of "shorelines", "shorelines of the state", "shorelines of state-wide significance" and "wetlands." See also the "Shoreline Management Act Scope" section in the "Introduction" of this SMP.

Shoreline Management Act (SMA). The Shoreline Management Act of 1971, Chapter 90.58 RCW, as amended.

Shoreline master program, master program, or *SMP*. This Shoreline Master Program ,as adopted by the City of Kent and approved by the Washington Department of Ecology.

Shoreline modifications. Those actions that modify the physical configuration or qualities of the shoreline area, usually through the construction of a physical element such as a dike, breakwater, dock, weir, dredged basin, fill, bulkhead, or other shoreline structures. They can include other actions, such as clearing, grading, or application of chemicals.

Shoreline permit. A substantial development, Conditional Use, revision, or variance permit or any combination thereof.

Shoreline property. An individual property wholly or partially within shoreline jurisdiction.

Shoreline restoration, or *ecological restoration*. The re-establishment or upgrading of impaired ecological shoreline processes or functions. This may be accomplished through measures including, but not limited to, revegetation, removal of intrusive shoreline structures, and removal or treatment of toxic materials. Shoreline restoration does not imply a requirement for returning the shoreline area to aboriginal or pre-European settlement conditions.

Shoreline sub-unit. An area of the shoreline that is defined by distinct beginning points and end points by parcel number or other legal description. These sub-units are assigned environment designations to recognize different conditions and resources along the shoreline.

Shorelines. All of the water areas of the state, including reservoirs, and their associated shorelands, together with the lands underlying them; except (i) shorelines of state-wide significance; (ii) shorelines on areas of streams upstream of a point where the mean annual flow is twenty cubic feet per second or less and the wetlands associated with such upstream areas; and (iii) shorelines on lakes less than twenty acres in size and wetlands associated with such small lakes.

Shorelines of the state. The total of all "shorelines" and "shorelines of state-wide significance" within the state.

Shorelines Hearings Board (SHB). A six member quasi-judicial body, created by the SMA, which hears appeals by any aggrieved party on the issuance of a shoreline permit, enforcement penalty and appeals by local government on Department of Ecology approval of shoreline master programs, rules, regulations, guidelines or designations under the SMA.

Shorelines of state-wide significance. A select category of shorelines of the state, defined in RCW 90.58.030(2)(e), where special policies apply.

Should. The particular action is required unless there is a demonstrated, compelling reason, based on policy of the Shoreline Management Act and this SMP, against taking the action.

Sign. A board or other display containing words and/or symbols used to identify or advertise a place of business or to convey information. Excluded from this definition are signs required by law and the flags of national and state governments.

Significant ecological impact. An effect or consequence of an action if any of the following apply:

- (a) The action measurably or noticeably reduces or harms an ecological function or ecosystemwide process.
- (b) Scientific evidence or objective analysis indicates the action could cause reduction or harm to those ecological functions or ecosystem-wide processes described in (a) of this subsection under foreseeable conditions.
- (c) Scientific evidence indicates the action could contribute to a measurable or noticeable reduction or harm to ecological functions or ecosystem-wide processes described in (a) of this subsection as part of cumulative impacts, due to similar actions that are occurring or are likely to occur.

Significant vegetation removal. The removal or alteration of native trees, shrubs, or ground cover by clearing, grading, cutting, burning, chemical means, or other activity that causes significant ecological impacts to functions provided by such vegetation. The removal of invasive, non-native, or noxious weeds does not constitute significant vegetation removal. Tree pruning, not including tree topping, where it does not affect ecological functions, does not constitute significant vegetation removal.

Single-family residence. A detached dwelling designed for and occupied by one family including those structures and developments within a contiguous ownership which are a normal appurtenance.

SMA. The Shoreline Management Act of 1971, Chapter 90.58 RCW, as amended.

Storm water. That portion of precipitation that does not normally percolate into the ground or evaporate but flows via overland flow, interflow, channels, or pipes into a defined surface water channel or constructed infiltration facility.

Stream. A naturally occurring body of periodic or continuously flowing water where: a) the mean annual flow is greater than twenty cubic feet per second and b) the water is contained within a channel. See also "channel."

Structure. That which is built or constructed, or an edifice or building of any kind or any piece of work composed of parts joined together in some definite manner, and includes posts for fences and signs, but does not include mounds of earth or debris.

Subdivision. The division or redivision of land, including short subdivision for the purpose of sale, lease or conveyance.

Substantial development. Any development which meets the criteria of RCW 90.58.030(3)(e). See also definition of "development" and "exemption".

Substantially degrade. To cause damage or harm to an area's ecological functions. An action is considered to substantially degrade the environment if:

- (a) The damaged ecological function or functions significantly affect other related functions or the viability of the larger ecosystem; or
- (b) The degrading action may cause damage or harm to shoreline ecological functions under foreseeable conditions; or
- (c) Scientific evidence indicates the action may contribute to damage or harm to ecological functions as part of cumulative impacts.

Sub-unit. For the purposes of this SMP, a sub-unit is defined as an area of the shoreline that is defined by distinct beginning points and end points by parcel number or other legal description. These sub-units are assigned environment designations to recognize different conditions and resources along the shoreline.

Swamp. A depressed area flooded most of the year to a depth greater than that of a marsh and characterized by areas of open water amid soft, wetland masses vegetated with trees and shrubs. Extensive grass vegetation is not characteristic.

Terrestrial. Of or relating to land as distinct from air or water.

Transportation Facilities. A structure or development(s), which aids in the movement of people, goods or cargo by land, water, air or rail. They include but are not limited to highways, bridges, causeways, bikeways, trails, railroad facilities, ferry terminals, float plane – airport or heliport terminals, and other related facilities.

Upland. Generally described as the dry land area above and landward of the ordinary high water mark.

Utility. A public or private agency which provides a service that is utilized or available to the general public (or a locationally specific population thereof). Such services may include, but are not limited to, storm water detention and management, sewer, water, telecommunications, cable, electricity, and natural gas.

Utilities (Accessory). Accessory utilities are on-site utility features serving a primary use, such as a water, sewer or gas line connecting to a residence. Accessory utilities do not carry significant capacity to serve other users.

Variance. A means to grant relief from the specific bulk, dimensional, or performance standards set forth in this SMP and not a means to vary a use of a shoreline. Variance permits must be

specifically approved, approved with conditions, or denied by the City's Hearing Examiner and the Department of Ecology.

Vessel. Ships, boats, barges, or any other floating craft which are designed and used for navigation and do not interfere with normal public use of the water.

Visual Access. Access with improvements that provide a view of the shoreline or water, but do not allow physical access to the shoreline.

WAC. Washington Administrative Code.

Water-dependent. A use or a portion of a use which cannot exist in any other location and is dependent on the water by reason of the intrinsic nature of its operations. Examples of water-dependent uses may include fishing, boat launching, swimming, and storm water discharges.

Water-enjoyment. A recreational use or other use that facilitates public access to the shoreline as a primary characteristic of the use; or a use that provides for recreational use or aesthetic enjoyment of the shoreline for a substantial number of people as a general characteristic of the use and which through location, design, and operation ensures the public's ability to enjoy the physical and aesthetic qualities of the shoreline. In order to qualify as a water-enjoyment use, the use must be open to the general public and the shoreline-oriented space within the project must be devoted to the specific aspects of the use that fosters shoreline enjoyment. Primary water-enjoyment uses may include, but are not limited to:

- Parks with activities enhanced by proximity to the water.
- Docks, trails, and other improvements that facilitate public access to shorelines of the state.
- Restaurants with water views and public access improvements.
- Museums with an orientation to shoreline topics.
- Scientific/ecological reserves.
- Resorts with uses open to the public and public access to the shoreline; and any combination of those uses listed above.

Water-oriented use. A use that is water-dependent, water-related, or water-enjoyment, or a combination of such uses.

Water quality. The physical characteristics of water within shoreline jurisdiction, including water quantity, hydrological, physical, chemical, aesthetic, recreation-related, and biological characteristics. Where used in this SMP, the term "water quantity" refers only to development and uses regulated under SMA and affecting water quantity, such as impervious surfaces and storm water handling practices. Water quantity, for purposes of this SMP, does not mean the withdrawal of ground water or diversion of surface water pursuant to RCW 90.03.250 through 90.03.340.

Water-related use. A use or portion of a use which is not intrinsically dependent on a waterfront location but whose economic viability is dependent upon a waterfront location because:

- (a) The use has a functional requirement for a waterfront location such as the arrival or shipment of materials by water or the need for large quantities of water; or
- (b) The use provides a necessary service supportive of the water-dependent uses and the proximity of the use to its customers makes its services less expensive and/or more convenient.

Weir: A structure generally built perpendicular to the shoreline for the purpose of diverting water or trapping sediment of other moving objects transported by water.

Wetland or wetlands. Defined in the City of Kent Critical Areas Regulations, Ordinance No. 3805, codified under Section 11.06.530 KCC.

Wetland Category. Defined in the City of Kent Critical Areas Regulations, Ordinance No. 3805, codified under Section 11.06.533 KCC.

Wetland Delineation. Identification of a wetland boundary pursuant to the Wetland Delineation Manual as defined and described in the City of Kent Critical Areas Regulations, Ordinance No. 3805, codified under Sections 11.06.230 KCC and 11.06.590 KCC.

Wetlands Rating System. Defined in the City of Kent Critical Areas Regulations, Ordinance No. 3805, codified under Section 11.06.580 KCC.

Zoning. The system of land use and development regulations and related provisions of the Kent City Code, codified under Title 15 KCC, as amended.

In addition, the definitions and concepts set forth in RCW 90.58.030, as amended, and implementing rules shall also apply as used herein.

A. Purpose and Applicability

The purpose of this chapter is to establish an administrative system designed to assign responsibilities for implementation of this SMP and to outline the process for review of proposals and project applications. All proposed shoreline uses and development, including those that do not require a shoreline permit, must conform to the Shoreline Management Act and to the policies and regulations of this SMP. Where inconsistencies or conflicts with other sections of the Kent City Code occur, this section shall apply.

B. Substantial Development

Any person wishing to undertake substantial development within the shoreline shall submit materials as required under Chapter 12.01 KCC, as amended and shall apply to the Administrator for a shoreline permit, as required in this chapter and Chapter 90.58 RCW.

For the purposes of this chapter, the terms "development" and "substantial development" are as defined in RCW 90.58.030 or as subsequently amended.

1. Exemptions from a Substantial Development Permit

Certain developments are exempt from the requirement to obtain a substantial development permit. Such developments still may require a variance or Conditional Use permit, and all development within the shoreline is subject to the requirements of this SMP, regardless of whether a substantial development permit is required. Developments which are exempt from requirement for a substantial development permit are identified in WAC 173-27-040 or as subsequently amended.

2 Substantial Development Permit Process

- a. Applicants shall apply for shoreline substantial development, variance, and conditional use permits on forms provided by the City.
- b. Shoreline substantial development permits are a Process II application and shall be processed and subject to the applicable regulations of Chapter 12.01 KCC, as amended. Shoreline conditional use permits and variances are classified as Process III applications and shall be subject to the requirements of Chapter 12.01 KCC, as amended.
- c. Public notice. A notice of application shall be issued for all shoreline permit applications as provided for in Chapter 12.01 KCC, as amended, excepting that

the public comment period for the notice of application for a shoreline permit shall be not less than thirty (30) days, per WAC 173-27-1 10(2)(e).

- d. Application review. The Administrator shall make decisions on applications for substantial development permits, and recommendations on applications for conditional use and variance permits based upon: (1) the policies and procedures of the Shoreline Management Act and related sections of the Washington Administrative Code; and (2) this SMP.
- e. Hearing Examiner action. The Hearing Examiner shall review an application for a shoreline variance and shoreline conditional use permit and make decisions based upon: (1) this SMP; (2) the policies and procedures of the Shoreline Management Act and related sections of the Washington Administrative Code; (3) written and oral comments from interested persons; (4) reports from the Administrator; and (5) Chapters 2.32 and 12.01 KCC, as amended.
- f. Filing with Department of Ecology. All applications for a permit or permit revision shall be submitted to the Department of Ecology, as required by WAC 173-27-130 or as subsequently amended.

After City approval of a Conditional Use or variance permit, the City shall submit the permit to the Department of Ecology for the Department's approval, approval with conditions, or denial, as provided in WAC 173-27-200. The Department shall transmit its final decision to the City and the applicant within thirty (30) calendar days of the date of submittal by the City.

- g. Hold on Construction. Each permit issued by the City shall contain a provision that construction pursuant to the permit shall not begin and is not authorized until twenty-one (21) days from the date of filing with the Department of Ecology, per WAC 173-27-190 or as subsequently amended. "Date of filing" of the City's final decision on substantial development permits differs from date of filing for a Conditional Use permit or variance. In the case of a substantial development permit, the date of filing is the date the City transmits its decision on the permit to the Department of Ecology. In the case of a variance or Conditional Use permit, the "date of filing" means the date the Department of Ecology's final order on the permit is transmitted to the City.
- h. Duration of permits. Construction, or the use or activity, shall commence within two (2) years after approval of the permits. Authorization to conduct development activities shall terminate within five (5) years after the effective date of a shoreline permit. The Administrator may authorize a single extension before the end of either of these time periods, with prior notice to parties of record and the Department of Ecology, for up to one (1) year based on reasonable factors.
- i. Compliance with permit conditions. When permit approval includes conditions, such conditions shall be satisfied prior to occupancy or use of a structure or prior to commencement of a nonstructural activity.

3. Appeals

a. Shoreline Hearings Board. Any decision made by the Administrator on a substantial development permit, or by the Hearing Examiner on a Conditional Use or variance permit shall be final unless an appeal is made. Persons aggrieved by the grant, denial, rescission or modification of a permit may file a request for review by the Shoreline Hearings Board in accordance with the review process established by RCW 90.5 8.180 or as subsequently amended, and with the regulations of the Shoreline Hearings Board contained in Chapter 46 1-08 WAC or as subsequently amended. The request for review must be filed with the Hearings Board within twenty-one (21) days of the date of filing, as defined in subsection 2.g above.

C. Conditional Use Permits

1. Shoreline Conditional Use Permits

- a. Purpose. The purpose of a Conditional Use permit is to allow greater flexibility in varying the application of the use regulations of this SMP in a manner consistent with the policies of RCW 90.58.020. In authorizing a conditional use, special conditions may be attached to the permit by the City or the Department of Ecology to prevent undesirable effects of the proposed use and/or to assure consistency of the project with the Shoreline Management Act and this SMP. Uses which are specifically prohibited by this SMP may not be authorized pursuant to WAC 173-27-160.
- b. Process and Application. Shoreline conditional use permits are a Process III application per Chapter 12.01 KCC, as amended.
- c. Uses are classified as conditional uses if they are (1) specifically designated as Conditional Uses elsewhere in this SMP, or (2) are not specifically classified as a Permitted or Conditional Use in this SMP but the applicant is able to demonstrate consistency with the requirements of WAC 173-27-160 and the requirements for conditional uses in section C.2 below.
- d. In the granting of all Conditional Use permits, consideration shall be given to the cumulative impact of additional requests for like actions in the area. For example, if conditional use permits were granted to other developments in the area where similar circumstances exist, the total of the conditional uses shall also remain consistent with the policies of the Shoreline Management Act and shall not produce substantial adverse effects to the shoreline environment.

2. Shoreline Conditional Use Permit Criteria

Shoreline Conditional Use permits may be granted, provided the applicant can satisfy the criteria for granting conditional use permits as set forth in WAC 173-27-160 or as subsequently amended.

D. Variances

1. Shoreline Variances

- a. Purpose. The purpose of a variance permit is strictly limited to granting relief from specific bulk, dimensional, or performance standards set forth in this SMP and where there are extraordinary circumstances relating to the physical character or configuration of property such that the strict implementation of this SMP would impose unnecessary hardships on the applicant or thwart the Shoreline Management Act policies as stated in RCW 90.58.020. In all instances where a variance is granted, extraordinary circumstances shall be shown and the public interest shall suffer no substantial detrimental effect. Variances from the use regulations of this SMP are prohibited.
- b. Application. Shoreline variances are classified as Process III applications per Chapter 12.01 KCC, as amended.

2. Shoreline Variance Criteria

Shoreline variance permits may be authorized, provided the applicant can demonstrate satisfaction of the criteria for granting shoreline variances as set forth in WAC 173-27-170.

3. Revisions to Permits

See WAC 173-27-100 for additional information regarding revisions to permits. When an applicant seeks to revise a shoreline substantial development, conditional use, or variance permit, the City shall request from the applicant detailed plans and text describing the proposed changes in the permit. If the Administrator determines that the proposed changes are within the scope and intent of the original permit, the revision may be approved, provided it is consistent with Chapter 173-27 WAC, the SMA, and this SMP. "Within the scope and intent of the original permit" means the following:

- a. No additional over-water construction will be involved except that pier, dock, or float construction may be increased by five hundred square feet or ten percent from the provisions of the original permit, whichever is less.
- b. Lot coverage and height may be increased a maximum of 10 percent from provisions of the original permit, provided that revisions involving new structures not shown on the original site plan shall require a new permit.
- c. Landscaping may be added to a project without necessitating an application for a new permit if consistent with the conditions attached to the original permit and with this SMP.
- d. The use authorized pursuant to the original permit is not changed.
- e. No additional significant adverse environmental impact will be caused by the project revision.

f. The revised permit shall not authorize development to exceed height, lot coverage, setback, or any other requirements of this SMP except as authorized under a variance granted as the original permit or a part thereof.

If the revision, or the sum of the revision and any previously approved revisions, will violate the criteria specified above, the City shall require the applicant to apply for a new substantial development, conditional use, or variance permit, as appropriate, in the manner provided for herein.

E. Nonconforming Uses

Nonconforming development shall be defined and regulated according to the provisions of WAC 173-27-080; excepting that if a nonconforming development is damaged to the extent of one hundred percent of the replacement cost of the original development, it may be reconstructed to those configurations existing immediately prior to the time the development was damaged. In order for this replacement to occur, application must be made for permits within six months of the date the damage occurred, and all restoration must be completed within two years of permit issuance.

F. Documentation of Project Review Actions and Changing Conditions in Shoreline Areas

The City will keep on file documentation of all project review actions, including applicant submissions and records of decisions, relating to shoreline management provisions in this SMP.

G. Amendments to This Shoreline Master Program

If the City or Department of Ecology determines it necessary, the City will review shoreline conditions and update this SMP within seven years of its adoption.

H. Severability

If any provision of this SMP, or its application to any person, legal entity, parcel of land, or circumstance is held invalid, the remainder of this SMP, or its application to other persons, legal entities, parcels of land, or circumstances shall not be affected.

I. Enforcement

See Chapter 1.04 KCC, as amended for additional information regarding the City's enforcement regulations.

1. Violations

- a. It is a violation of this SMP for any person to initiate or maintain or cause to be initiated or maintained the use of any structure, land or property within the shorelines of the City without first obtaining the permits or authorizations required for the use by this Chapter.
- b. It is a violation of this SMP for any person to use, construct, locate, or demolish any structure, land or property within shorelines of the City in any manner that is not permitted by the terms of any permit or authorization issued pursuant to this SMP, provided that the terms or conditions are explicitly stated on the permit or the approved plans.
- c. It is a violation of this SMP to remove or deface any sign, notice, or order required by or posted in accordance with this SMP.
- d. It is a violation of this SMP to misrepresent any material fact in any application, plans or other information submitted to obtain any shoreline use or development authorization.
- e. It is a violation of this SMP for anyone to fail to comply with any other requirement of this SMP.

2. Duty to Enforce

- a. It shall be the duty of the Administrator to enforce this Chapter. The Administrator may call upon the police, fire, health, or other appropriate City departments to assist in enforcement.
- b. Upon presentation of proper credentials, the Administrator or duly authorized representative of the Administrator may, with the consent of the owner or occupier of a building or premises, or pursuant to lawfully issued inspection warrant, enter at reasonable times any building or premises subject to the consent or warrant to perform the duties imposed by this SMP.
- c. This SMP shall be enforced for the benefit of the health, safety and welfare of the general public, and not for the benefit of any particular person or class of persons.
- d. It is the intent of this SMP to place the obligation of complying with its requirements upon the owner, occupier or other person responsible for the condition of the land and buildings within the scope of this SMP.
- e. No provision of or term used in the SMP is intended to impose any duty upon the City or any of its officers or employees which would subject them to damages in a civil action.

3. Investigation and Notice of Violation

a. The Administrator or his/her representative shall investigate any structure, premises or use which the Administrator reasonably believes does not comply with the standards and requirements of this SMP.

b. If after investigation the Administrator determines that the SMP's standards or requirements have been violated, the Administrator shall follow the enforcement provisions of Chapter 1.04 Kent City Code, as amended.

A. Introduction

A jurisdiction's Shoreline Master Program applies to activities in the jurisdiction's shoreline area. Activities that have adverse effects on the ecological functions and values of the shoreline must provide mitigation for those impacts. By law, the proponent of that activity is not required to return the subject shoreline to a condition that is better than the baseline level at the time the activity takes place. How then can the shoreline be improved over time in areas where the baseline condition is severely, or even marginally, degraded?

Section 173-26-201(2)(f) WAC of the Shoreline Master Program Guidelines¹ says:

"master programs shall include goals and policies that provide for restoration of such impaired ecological functions. These master program provisions shall identify existing policies and programs that contribute to planned restoration goals and identify any additional policies and programs that local government will implement to achieve its goals. These master program elements regarding restoration should make real and meaningful use of established or funded nonregulatory policies and programs that contribute to restoration of ecological functions, and should appropriately consider the direct or indirect effects of other regulatory or nonregulatory programs under other local, state, and federal laws, as well as any restoration effects that may flow indirectly from shoreline development regulations and mitigation standards."

However, degraded shorelines are not just a result of pre-Shoreline Master Program activities, but also of unregulated activities and exempt development. The new Guidelines also require that "[1]ocal master programs shall include regulations ensuring that exempt development in the aggregate will not cause a net loss of ecological functions of the shoreline." While some actions within shoreline jurisdiction are exempt from a permit, the Shoreline Master Program should clearly state that those actions are not exempt from compliance with the Shoreline Management Act or the local Shoreline Master Program. Because the shoreline environment is also affected by activities taking place outside of a specific local master program's jurisdiction (e.g., outside of city limits, outside of the shoreline area within the city), assembly of out-of-jurisdiction actions, programs and policies can be essential for understanding how the City fits into the larger watershed context. The latter is critical when establishing realistic goals and objectives for dynamic and highly inter-connected environments.

¹ The Shoreline Master Program Guidelines were prepared by the Washington Department of Ecology and codified as WAC 173-26. The Guidelines translate the broad policies of the Shoreline Management Act (RCW 90.58.020) into standards for regulation of shoreline uses. See <u>http://www.ecy.wa.gov/programs/sea/sma/guidelines/index.html</u> for more background.

As directed by the Guidelines, the following discussions provide a summary of baseline shoreline conditions, lists restoration goals and objectives, and discusses existing or potential programs and projects that positively impact the shoreline environment. Finally, anticipated scheduling, funding, and monitoring of these various comprehensive restoration elements are provided. In total, implementation of the Shoreline Master Program (with mitigation of project-related impacts) in combination with this Restoration Plan (for restoration of lost ecological functions that occurred prior to a specific project) should result in a net improvement in the City of Kent's shoreline environment in the long term.

In addition to meeting the requirements of the Guidelines, this Restoration Plan is also intended to support the City's or other non-governmental organizations' applications for grant funding, and to provide the interested public with contact information for the various entities working within the City to enhance the environment.

B. Shoreline Inventory Summary

1. Introduction

The City conducted a comprehensive inventory of its shoreline jurisdiction in 2008. The purpose of the shoreline inventory was to facilitate the City of Kent's compliance with the State of Washington's Shoreline Management Act (SMA) and updated Shoreline Master Program Guidelines. The inventory describes existing physical and biological conditions in the shoreline area within City limits, including recommendations for restoration of ecological functions where they are degraded. The full *Final Shoreline Inventory and Analysis Report* is summarized below.

2. Shoreline Boundary

As defined by the Shoreline Management Act of 1971, shorelines include certain waters of the state plus their associated "shorelands." Shorelands are defined as:

"those lands extending landward for 200 feet in all directions as measured on a horizontal plane from the ordinary high water mark; floodways and contiguous floodplain areas landward 200 feet from such floodways; and all wetlands and river deltas associated with the streams, lakes, and tidal waters which are subject to the provisions of this chapter...Any county or city may determine that portion of a one-hundred-year-floodplain² to be included in its master program as long as such portion includes, as a minimum, the floodway and the adjacent land extending landward two hundred feet therefrom (RCW 90.58.030)"

² According to RCW 173-220-030, 100-year floodplain is "that land area susceptible to being inundated by stream derived waters with a one percent chance of being equaled or exceeded in any given year. The limit of this area shall be based upon flood ordinance regulation maps or a reasonable method which meets the objectives of the act;"

In addition, rivers with a mean annual cfs of 1,000 or more are considered shorelines of statewide significance.

Shorelands in the City of Kent include only areas within 200 feet of the ordinary high water mark of shoreline jurisdiction waters and any associated wetlands within shoreline jurisdiction. Waters identified within jurisdiction include the Green River, Green River Natural Resources Area (GRNRA), Lake Meridian, Jenkins Creek, Big Soos Creek, Springbrook Creek and the north half of Lake Fenwick. Panther Lake, the south half of Lake Fenwick, and portions of the Green River at the south end of the City, which are all located outside the City limits in the City's Potential Annexation Area (PAA), are also identified.

3. Inventory

The shoreline inventory is divided into seven main sections: Introduction, Current Regulatory Framework Summary, Elements of the Shoreline Inventory, Shoreline-Specific Conditions, Analysis of Ecological Functions and Ecosystem-wide Processes, Land Use Analysis, and Shoreline Management Recommendations. Several segments were established for each of the waterbodies within jurisdiction, and have been delineated based on existing land use and current location within either the City or the PAA. The areas within the PAA that are currently regulated by King County's SMP include all of Panther Lake, the south half of Lake Fenwick, and portions of the Green River at the south of the City limits.

a. Land Use and Physical Conditions

1. <u>Existing Land Use</u>: Land uses within the City of Kent shoreline area vary depending on the location within the city. Generally, land uses are defined by various intensities, which include open space, high intensity, residential and agricultural. While it is expected that some of the industrial areas along the Green River Valley may redevelop over time, a majority of the land use changes will be limited to new residential development on vacant lands and infill development.

The City's shoreline is zoned into multiple land use categories, most predominately industrial along the valley floor and single-family residential in the upland areas. The Green River's shoreline has a variety of uses, including parks, trails and open spaces, large scale industrial uses such as warehouses and office buildings, residential areas consisting of single and multi-family housing, and agricultural activities. Lands surrounding Lake Meridian, Lake Fenwick and Panther Lake are primarily residential land uses, with some open space areas. Big Soos Creek is primarily undeveloped shoreline, as is Jenkins Creek, which is part of the City's watershed. The shoreline of Springbrook Creek is entirely surrounded by industrial uses.

2. <u>Parks and Open Space/Public Access</u>: The City provides fairly continuous public access along the Green River with a network of parks, trails, and open spaces. The public access sites provide for a number of activities, including fishing, swimming, boating, biking and picnicking. Although there are a few

gaps in the open space connections to the river, the majority of the corridor is well-served by public access opportunities.

The Green River Trail is a substantial element of public recreation and open space, and runs along 10 miles of the river within shoreline jurisdiction. Parks located along the trail provide parking and public access for trail users. The parks along the corridor include: Briscoe Park, Three Friends Fishing Hole, Valley Floor Community Park, Anderson Park, Green River Natural Resources Area, Van Doren's Landing Park, BMX Park, Russell Woods Park, Cottonwood Grove, Riverbend Golf Complex, Old Fishing Hole, Riverview Park, Foster Park and North Green River Park.

There are also a number of other public access areas within shoreline jurisdiction. These include Lake Meridian Park, Lake Fenwick, Green River Natural Resources Area (GRNRA) and Panther Lake. Shoreline areas along Springbrook, Big Soos, and Jenkins Creeks have no public access.

- Lake Meridian Park is a 16-acre park located on the southeast tip of a primarily residential lake. The park provides a boat launch, swimming and fishing areas. Future public access along the lake is limited due to the residential build-out of shoreline.
- Lake Fenwick Park, located on the northern half of the lake, is 140 acres and provides a boat launch, swimming, picnic areas, fishing, trails and a disc golf course.
- The GRNRA is a 304-acre wildlife refuge park that serves both as a stormwater detention and enhanced wetland facility. The park provides a trail system, viewing towers, and bike paths.
- Panther Lake, located in King County and within the City's PAA, has one public boat launch located on the southwestern shoreline. However, the lake is almost completely covered by water lilies which severely limit recreational opportunities.
- Big Soos Creek does not have any public access within the shoreline area. However, upstream of the 20 cfs cutoff point the Gary Grant Soos Creek Park, owned by King County, surrounds the majority of the creek. This 500-acre park provides access to the 7-mile Soos Creek Trail, and also provides picnic areas.
- Springbrook Creek does not have public access within the shoreline area other than a viewing opportunity from SW 43rd Street. Upstream from the 20 cfs cutoff point is the 5-acre Springbrook Greenbelt.
- Jenkins Creek public access is strictly prohibited, as this area is part of the City's protected watershed, Armstrong Springs.
- 3. <u>Shoreline Modifications</u>: The Green River shoreline is one of the most heavily modified river systems in the Puget Sound region. As early as the 1850s, early settlers altered habitats in the lower river valley. A series of levees, diversion dams, and bank hardening activities permanently altered and diverted water from historic flow patterns. Through the City of Kent, over 80 percent of the riverbanks are lined with levees or revetments. These prevent natural geomorphic processes from occurring.

Big Soos Creek does not have any shoreline modifications within the City of Kent. However, modifications have occurred at both SR 516 and SR 18 highway crossings, each bordering the City. The SR 516 span, estimated at 80 feet long, has a gravel bar on the east side of the creek under the bridge, and bridge footings are likely armored to prevent erosion. Two SR 18 bridge spans modify Soos Creek shoreline areas immediately downstream (south) of Kent shoreline jurisdiction. Modifications include floodplain clearing, placement of road embankment fill, armoring, footings, pilings, and the bridge spans. The south span has no pilings and the stream banks are armored with quarry spalls. The north span includes some concrete piling supports outside of the active channel and the banks are lined with only gravelly soils. The floodplain has also been constricted considerably at the SR 18 crossing location.

Lake Meridian has been altered with a variety of armoring and alteration types, including piers, boatlifts, boathouses, and moorage covers. It is estimated that 50 percent of the shoreline is armored, primarily along the southwest shore, and 90 percent of private residences have a dock. The largest pier on the lake is owned by the City at Lake Meridian Park.

Lake Fenwick has very minimal shoreline modification within City jurisdiction. Approximately 350 linear feet of shoreline is armored, mostly in scattered short sections associated with a small fishing pier, the boardwalk trail crossing and a boat launch. Additional armoring is found along the shoreline adjacent to the parking lot, with vertical timbers and with inset steps for lake access. Other access points with no vegetation are armored with either timbers or boulders. Small gravel is found along the boat launch area with pre-cast concrete slabs in the water. In the PAA portion of the lake, several of the single-family homes found along the lake have a small floating dock and/or minor shoreline armoring.

The GRNRA pond complex, which serves as a flood and stormwater facility, is a constructed facility with weirs and culverts.

Springbrook Creek passes underneath SW 43rd Street in a large corrugated metal culvert. The banks for a short distance on either side of the culvert inlet are armored with angular boulders. The channel itself is a deep, excavated, canal-like feature.

Jenkins Creek does not have any shoreline modifications within Kent's jurisdiction. However, extensive channel modifications exist less than one-half mile within the City of Covington at the Bonneville Power Administration property, as well as culverts and other modifications farther upstream.

Panther Lake does not appear to have any shoreline modifications, with the exception of the public boat launch.

The full shoreline inventory includes a more in-depth of discussion of the above topics, as well as information about transportation, stormwater and wastewater utilities, impervious surfaces, and historical/archaeological sites, among others.

b. Biological Resources and Critical Areas

With the exception of Lake Fenwick, Panther Lake and short stretches of Big Soos and Jenkins Creeks, the shoreline area itself within the City of Kent is generally deficient in high-quality biological resources and critical areas, primarily because of the extensive residential and commercial development and their associated shoreline modifications. The highest-functioning shoreline area is the Jenkins Creek segment, which has a natural shoreline and is protected for the City of Kent's watershed. Landslide hazard areas are located along the East and West Hill areas, specifically along short stretches of the Green River, along the northwest end of Lake Meridian, and entirely around Lake Fenwick. Virtually the entire valley floor is a seismic hazard area.

Wetlands mapped within shoreline jurisdiction include large wetland areas and scattered small patches along the Green River corridor, many of which are located within developed industrial and manufacturing areas. Wetland areas include the following:

- Over 70 acres of wetland along Big Soos Creek
- Small wetlands located around the Lake Meridian fringe and along the south end
- The western shoreline of Lake Fenwick
- Wetlands of the GRNRA
- Springbrook Greenbelt
- Panther Lake and surrounding fringe areas

Important non-shoreline streams in the City include Mill Creek and Garrison Creek, both tributaries to the Green River, and a second Mill Creek that is tributary to Springbrook Creek. These streams are used by salmon, but have been impacted extensively by basin development, resulting in increased peak flows, unstable and eroding banks, loss of riparian vegetation, and fish and debris passage barriers. These changes have altered their contributions of sediment, organic debris, and invertebrates into the Green River. These systems continue to be targeted for restoration by one or more local or regional restoration groups.

WDFW mapping of Priority Habitat and Species (WDFW 2007) also indicates the presence of other Fish and Wildlife Habitat Conservation Areas within and adjacent to the shoreline area. These include pileated woodpecker breeding areas, historic and current bald eagle nest locations, bull trout, Chinook salmon, chum salmon, coho salmon, pink salmon, sockeye salmon, steelhead, cutthroat trout, wetlands, urban natural open space, and riparian zones.

C. Restoration Goals and Objectives

According to the *Green/Duwamish and Central Puget Sound Watershed (WRIA 9) Near-Term Action Agenda For Salmon Habitat Conservation*, the Green/Duwamish watershed
suffers from detrimental conditions for fish and fish habitat due to major engineering changes, land use changes which have resulted in direct and indirect impacts to salmon habitat, and water quality which has declined due to wastewater and industrial discharges, erosion, failing septic systems and the use of pesticides (WRIA 9 Steering Committee 2002). The June 30, 2009 City of Kent *Final Shoreline Inventory and Analysis Report* provides supporting information that validates these claims specifically in the City's shoreline jurisdiction. The *WRIA 9 Near Term Action Agenda* established three high priority watershed goals for salmon conservation and recovery:

- "Protect currently functioning habitat primarily in the Middle Green River watershed and the nearshore areas of Vashon/Maury Island.
- Ensure adequate juvenile salmon survival in the Lower Green River, Elliot Bay/Duwamish, and Nearshore subwatersheds. Meeting this goal involves several types of actions, including protecting currently functioning habitat, restoring degraded habitat, and maintaining or restoring adequate water quality and flows.
- Restore access for salmon (efficient and safe passage for adults and juveniles) to and from the Upper Green River subwatershed."

The following recommended policy for the lower Green River subwatershed, including Kent, is also taken from the *Salmon Habitat Plan: Making our Watershed Fit for a King* (Steering Committee 2005).

• In the Lower Green River, every opportunity should be taken to set back levees and revetments to the maximum extent practicable. Habitat rehabilitation within the Lower Green River corridor should be included in all new developments and re-developments that occur within 200 feet of the river.

The WRIA 9 restoration goals, in combination with the results of the City's *Final Shoreline Inventory and Analysis Report*, the direction of Ecology's *Shoreline Master Program Guidelines*, and the City's commitment to support the *Salmon Habitat Plan: Making our Watershed Fit for a King*, are the foundation for the following goals and objectives of the City of Kent's restoration strategy. Although the *Green/Duwamish and Central Puget Sound Watershed (WRIA 9) Near-Term Action Agenda For Salmon Habitat Conservation* and the *Salmon Habitat Plan: Making our Watershed Fit for a King* are salmon-centered, pursuit of improved performance in ecosystem-wide processes and ecological functions that favors salmon generally captures those processes and functions that benefit all fish and wildlife.

- Goal 1 Maintain, restore or enhance watershed processes, including sediment, water, wood, light and nutrient delivery, movement and loss.
- Goal 2 Maintain or enhance fish and wildlife habitat during all life stages and maintain functional corridors linking these habitats.
- Goal 3 Contribute to conservation and recovery of chinook salmon and other anadromous fish, focusing on preserving, protecting and restoring habitat with the intent to recover listed species, including sustainable, genetically diverse, harvestable populations of naturally spawning chinook salmon.

1. System-wide restoration objectives

- a. Improve the health of shoreline waterbodies by managing the quality and quantity of stormwater runoff, consistent at a minimum with the latest Washington Department of Ecology Stormwater Management Manual for Western Washington. Make additional efforts to meet and maintain state and county water quality standards in contributing systems.
- b. Increase quality, width and diversity of native vegetation in protected corridors and shorelines adjacent to stream and lake habitats to provide safe migration pathways for fish and wildlife, food, nest sites, shade, perches, and organic debris. Strive to control non-indigenous plants or weeds that are proven harmful to native vegetation or habitats.
- c. Continue to work collaboratively with other jurisdictions and stakeholders in WRIA 9 to implement the Salmon Habitat Plan: Making our Watershed Fit for a King.
- d. Base local actions and future projects, ordinances, and other appropriate local government activities on the best available science presented in the WRIA 9 scientific foundation and habitat management strategy.
- e. Use the comprehensive list of actions, and other actions consistent with the Plan, as a source of potential site-specific projects and land use and public outreach recommendations.
- f. Use the start-list to guide priorities for regional funding in the first ten years of Plan implementation, and to implement start-list actions through local capital improvement projects, ordinances, and other activities.
- g. Seek federal, state, grant and other funding opportunities for various restoration actions and programs independently or with other WRIA 9 jurisdictions and stakeholders.
- h. Develop a public education plan to inform private property owners in the shoreline area and in the remainder of the City about the effects of land management practices and other unregulated activities (such as vegetation removal, pesticide/herbicide use, car washing) on fish and wildlife habitats.
- i. Develop a chemical reduction plan which focuses on reducing the application of fertilizers, herbicides, and pesticides near shoreline waterbodies or tributary streams and otherwise emphasizes only their localized use.
- j. Where feasible, protect, enhance, and restore riparian areas surrounding wetlands where functions have been lost or compromised.

2. Green River restoration objectives

a. Improve the health of the Green River and its tributary streams by identifying hardened and eroding streambanks, and correcting to the extent feasible with bioengineered stabilization solutions.

- b. Improve the health of the Green River by removing or setting back flood and erosion control facilities whenever feasible to improve natural shoreline processes. Where levees and revetments cannot be practically removed or set back due to infrastructure considerations, maintain and repair them using design approaches that maximize the use of native vegetation and large woody debris (LWD).
- c. Improve the health of the Green River and its tributary streams by increasing LWD recruitment potential through plantings of trees, particularly conifers, in the riparian corridors. Where feasible, install LWD to meet short-term needs.
- d. Improve the health of the Green River by reestablishing and protecting side channel habitat.
- e. Where feasible, re-establish fish passage to Green River tributary streams.

3. Lakeshore restoration objectives

- a. Decrease the amount and impact of overwater and in-water structures through minimization of structure size and use of innovative materials.
- b. Participate in lake-wide efforts to reduce populations of non-native aquatic vegetation.
- c. Where feasible, improve the health of lake shorelines by removing bulkheads and utilizing bioengineering or other soft shoreline stabilization techniques to improve aquatic conditions.

D. List of Existing and Ongoing Projects and Programs

The following series of existing projects and programs are generally organized from the larger watershed scale to the City-scale, including City projects and programs and finally non-profit organizations that are also active in the City of Kent area. Many of these site-specific projects are mapped in Appendix C.

1. Water Resource Inventory Area (WRIA) 9 Participation

The City was one of 16 members of the WRIA 9 Forum, which participated in financing and developing the *Salmon Habitat Plan: Making Our Watershed Fit for a King*. The Plan includes the City of Kent's implementation commitment in the form of City Council Resolution 1714, approved November 15, 2005 (Appendix B).

The City's preparation of the Shoreline Inventory and Analysis Report for City of Kent's Shorelines: Green River, Big Soos Creek, Lake Meridian, Lake Fenwick, Green River Natural Resources Area Pond, Springbrook Creek, and Jenkins Creek (The Watershed Company 2008) and this Shoreline Restoration Plan are important steps toward furthering the goals and objectives of the WRIA 9 Plan. In its Resolution, the City committed to, among other things, "using the scientific foundation and the habitat management strategy as the basis for local actions recommended in the plan for future projects, ordinances, and other appropriate local government activities." The City's Resolution also states that the City will use the "Proposed Actions and Policies to Achieve a Viable Salmonid Population, and other actions consistent with the Plan, as a source of potential site specific projects and land use and public outreach recommendations." The City's Shoreline Master Program update relies heavily on the science included in the WRIA 9 Salmon Habitat Plan: Making Our Watershed Fit for a King report and related documents, and incorporates recommended projects and actions from the WRIA 9 documents.

The Salmon Habitat Plan: Making Our Watershed Fit for a King (Steering Committee 2005), which was adopted by the City, lists a number of programs that can and do occur in Kent, as well as across the entire watershed, and that would contribute to the recovery of habitat basin-wide. The 16 WRIA-wide (WW) actions listed in the Plan and in Table 10 below are programmatic in nature and range from public education and stewardship to incentives to regulations and regulatory enforcement. The status of the City's projects and programs that support each of these actions is provided in Table 10.

Program WW-No.	Program	Kent Implementation
1	Conduct Shoreline Stewardship Workshops and Outreach	Ongoing. The City has recently discussed soft shoreline stabilization and shoreline planting with local residents around Lake Meridian during a community meeting and city-wide open houses related to the Shoreline Master Program update.
2	Increase/Expand Water Conservation Incentive Programs	The City provides rebates for water-efficient washing machines and toilets. Water conservation education includes: a water festival targeting 4th and 5th grade students, ad campaigns, pamphlets, free aerators and shower timers. Improvements to the City's website for water conservation are planned.
3	Increase/Expand Natural Yard Care (NYC) Programs for Landscapers	Homeowners have been the City's initial target efforts - no progress to date on landscapers.
4	Increase/Expand the Natural Yard Care Program for Single Family Homeowners	The City currently targets two neighborhoods / year (~2,000 - 4,000 homeowners) for a series of three, 2-hour workshops on NYC. Over 400 households attended workshops in 2008.
5	Promote the Planting of Native Trees	City sponsoring "2009 Trees in 2009" native plant education program targeting grade school kids for 10th consecutive year. Kids are taught the importance of trees, then given native bare-root plants to take care of for 6 months and then plant in a City park or at home. Also, Parks and Public Works sponsor numerous volunteer native planting events on

 Table 10.
 WRIA-wide Programs Recommended to Support Habitat and Status of Implementation in Kent

Program WW-No.	Program	Kent Implementation	
		City property and require native plant landscaping on all restoration projects.	
6	Promote Better Volunteer Carwash Practices	The City encourages the use of car-wash kits (inserts in storm drains with pump to direct effluent to sanitary sewer) during charity carwash events. City staff supplies the car- wash kits and also assist with setup and operation.	
7	Increase Public Awareness about What Healthy Streams and Rivers Look Like and How to Enjoy Recreating on Them	The City is a partner in an annual Water Festival for elementary students which presents a diverse amount of topics related to water resources. Salmon habitat and resource protection topics are included.	
8	Increase Involvement of Volunteers in Habitat Stewardship	Parks and Public Works actively recruit volunteers for native plant revegetation and maintenance projects and are considering implementing volunteer habitat steward training program	
9	Green/Duwamish Volunteer Revegetation Program	King County led effort	
10	Support/Expand the Natural Resource/Basin Steward Programs	King County led effort. The City of Kent works with the Green River Steward on restoration projects as well as other programs.	
11	Expand existing incentives and develop new incentives for property owners to protect salmon habitat.	p The proposed SMP includes incentives for homeowners to plant along the shoreline of Lake Meridian, which contains kokanee salmon.	
12	Improve Enforcement of Existing Land Use and Other Regulations	The City updated code enforcement regulations in May 2008 (Ordinance 3881) increasing efficiency and prompt resolution of code violations.	
13	Increase Use of Low Impact Development (LID) and Porous Concrete	The City is anticipating updating its Surface Water Design Manual in 2009 to comply with DOE's manual. The update will include LID techniques, the extent of which is unknown at this time. Policy 12.b(2) in Chapter 3 of the proposed SMP encourages the use of LID techniques. The City also recently adopted a Cottage Housing Demonstration Ordinance which offers a density bonus in exchange for using LID techniques, including porous concrete. This will only allow up to two cottage developments, but will likely lead to adoption of a permanent ordinance. While it's only one type of development, it's a first step in demonstrating the feasibility and benefits of LID techniques in Kent.	
14	Provide Incentives for Developers to Follow Built Green [™] Checklist Sections Benefiting Salmon	The City does not yet provide incentives for Built Green, but will be pursuing development of a program and policies as budget and staff	

Program WW-No.	Program	Kent Implementation	
		availability allow in the future. The City offers discounts on its stormwater utility fee for sites that operate infiltration facilities to manage stormwater runoff.	
15	Develop a Coordinated Acquisition Program for Natural Areas	The City has targeted parcels for acquisition in the Drainage Master Plan and WRIA 9 Salmon Habitat Plan that will improve habitat conditions as well as drainage and flood storage.	
16	Develop Salmon Restoration Tools Consistent with Agricultural Land Uses	King County administered program	

The following recommended project actions are taken from the 2005 *Salmon Habitat Plan: Making Our Watershed Fit for a King* for the lower Green River subwatershed, including Kent.

 Table 11.
 WRIA-wide Programs Recommended to Support Habitat, and Status of Their Implementation in Kent

WRIA 9 Project	Kent Implementation Status	
WRIA 9 Project Kent Implementation Status Project(s) LG-7 - Lower Mill Creek, Riverview (Formerly Green River) Park, Hawley Road Levee, Lower Mullen Slough, and Lower Mill Creek Restoration Between RM 21.3 and 24 (Both Banks): This suite of projects would be coordinated on lands that are adjacent to and/or share a floodplain. Overall goals are to restore habitat along the mainstem and lower sections of Mill Creek and Mullen Slough by: • Creating off-channel habitat for rearing and flood refugia and over-wintering habitat; • Reconnecting mainstem and tributaries with portions of the floodplain; • Setting back levees to improve bank conditions and create shallow water vegetated benches; • Installing anchored large woody debris; and • Controlling invasive plant species and planting with native plants.		
Engineers. Sub-projects include:	, <u>3</u> ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
Lower Mill Creek Floodplain Wetland and Off-Channel Habitat Rehabilitation - This project includes restoration of the lower 0.3 miles of Mill Creek and adjacent segments of the currently armored riverbank. The project would include excavation of off-channel habitat on the right bank of Mill Creek and reshaping the stream banks and the mainstem left bank of the Green River. This would create a more complex channel and aquatic edge habitat that includes off-channel habitat and large woody debris. Nine acress of off-channel and riparian habitat would be created adjacent to lower Mill Creek and approximately 1,600 lineal feet of lower Mill Creek would be restored. [Note: this project originated from the Green/Duwamish Ecosystem Restoration Project list]	The City is currently completing a feasibility study and 30% design for floodplain wetlands and off channel habitat restoration. The original side channel design proved to not be feasible. The current feasibility report is analyzing an alternative that will provide off-channel habitat during high river flows, enhance riparian habitat, increase low flow rearing habitat for juvenile salmonids, increase wetland areas and increase floodplain storage. The 30% design and feasibility report will be completed in February 2009. See http://www.govlink.org/watersheds/9/plan-implementation/SRFB-mill-creek.aspx) Project No. 1 on the Restoration Opportunities map (Appendix C)	
Riverview (Formerly Green River) Park - This project is located opposite from the mouth of Mill Creek, on the right bank of the Green River. The project would provide summer	In 2008, the U.S. Army Corps of Engineers completed a design evaluation report which provided a background on the project history, evaluated alternatives and designs, and provided	

WRIA 9 Project	Kent Implementation Status		
rearing habitat and high flow winter refuge	recommendations on the selected alternatives based		
through excavation of an off channel area	on cost and habitat value. From this report, design		
combined with placement of large woody	plans will be completed in 2009 with construction		
debris and revegetation. Land is in public	anticipated in 2010.		
ownership and belongs to the City of Kent.			
[Note: this project is also identified as No. 12	See http://www.govlink.org/watersheds/9/plan-		
by the Duwamish/Green River Ecosystem	implementation/SRFB-riverview-park.aspx		
Restoration Project]			
	Project No. 2 on the Restoration Opportunities map (Appendix C)		
Hawley Revetment - This project would set	This project is part of the City's long-range plan –no		
back the over-steepened Hawley Revetment	progress to date.		
between river miles 23.5 and 23.3, in order to			
achieve a more stable slope angle, create a	Project No. 3 on the Restoration Opportunities map		
low, vegetated bench, and allow the placement	(Appendix C)		
of large woody debris. Land is in public			
ownership and is immediately downstream of			
Riverview Park.			
Lower Mullen Slough (Prentice Nursery	King County is leading this effort.		
Reach) at RM 21.4 (Left Bank) - This project	Project No. 4 on the Restarction Opportunities man		
would improve fish passage and create a	(Appendix C)		
flaws in the Green Biver mainstern by restering	(Appendix C)		
the mouth of Mullon Slough and connecting it			
with a nearby pend to create a new flatter			
aradient meandering outlet. Actions include			
improving the channel to eliminate a summer			
low flow fish passage blockage, clearing the			
site of unnatural debris and Himalayan			
blackberry planting riparian vegetation placing			
large woody debris, and constructing dendritic.			
branched channels for improved water			
circulation and habitat diversity.			
Mullen Slough (Slough Mile 1.8-0.3) - Habitat	King County is leading this effort.		
for rearing and providing refuge from high flows			
in the Green River mainstem would be created	Project No. 5 on the Restoration Opportunities map		
by this project. Restoration along the slough	(Appendix C)		
would include channel meandering, large			
woody debris placement, and riparian			
plantings. This project site is upstream from the			
Prentice Nursery Reach project (previous sub-			
project) and includes about 90 acres from			
Highway 516 to the head of the slough.			
Lower Mill Creek Future Project - The City of	This project is part of the City's long-range plan.		
Kent has proposed an additional setback of the			
levee near the mouth of Mill Creek and four	Project No. 6 on the Restoration Opportunities map		
acres of riparian planting.			
Project LG-9 - Rosso Nursery Ott-Channel	I ne City of Kent received a Salmon Recovery		
Renabilitation and Riparian Restoration	Funding Board grant to acquire the LG-9 site, but has		
Detween Rivi 20.0 and 20 (Left Dank). This	Since italistened inose anocaled junus to the Lower Green Piver Property Acquisition (described below)		
Project would renabilitate flabiliat at the KOSSO			
constructing an outlet at PM 20.1 Actions would	Project No. 7 on the Postoration Opportunities man		
include removing fill, excavating off-channel flood	(Appendix C)		

WRIA 9 Project	Kent Implementation Status	
refugium for juvenile rearing habitat, and planting		
native wetland and riparian vegetation.		
Lower Green River Property Acquisition: The	Two of the three parcels were purchased in 2008.	
City of Kent transferred funds allocated to purchase	The third will be purchased in 2009. Additional grant	
of the LG-9 site to purchase of three different	funds have been awarded for the next phase which	
parcels located north of SR 516 on the south side	will include a feasibility study and 30% design. The	
of the Green River. While this project is not	project will be called Downey Farmstead Restoration.	
technically a numbered project identified in the		
WRIA plan, it is consistent with the objectives of the	Project No. 8 on the Restoration Opportunities map	
WRIA 9 plan.	(Appendix C)	
Project LG-10 - Mainstern Maintenance (Including	the Boeing Levee Setback and Habitat	
hy those projects, while providing stable back and low	abilat along the Lower Green River would be improved	
by these projects, while providing stable bank and level	vee conditions to protect significant numan	
Flood Control Zono District and the U.S. Army Corpo	of Engineers. The majority of the banks in this portion	
of the river have been hardened, and trees and other	fish friendly features have been removed to make the	
river flow without impediment. Piprap or rock bank pr	otections have reduced fish habitat along this stretch of	
the river Sub-projects in the City of Kent or its LIGA	include.	
Boeing Setback and Restoration Between	King County Flood Control District project	
RM 18 and 17.1 (Right Bank) - Actions		
include reshaping the bankline between the	Project No. 9 on the Restoration Opportunities map	
upstream end of the Christian Brothers	(Appendix C)	
Revetment and South 212th Street, widening		
the channel cross-section, restoring channel		
complexity and meanders, creating a two stage		
channel, excavating low benches and alcoves,		
installing large woody debris, and planting		
native riparian vegetation. The proposed		
project is within City of Kent open space, which		
has a 200-foot buffer with restricted		
development.		
Russell Road Upper, Lower and Lowest	The City has begun analyzing right-of-way needs for	
Setback and Restorations: Implement fish	the project and is in the process of identifying funding	
friendly, bio-engineered solutions to levee	sources.	
maintenance problems. Set back the levee to		
enable habitat rehabilitation, including	Projects No. 10-12 on the Restoration Opportunities	
resnaping the bankline, widening the channel	map (Appendix C)	
cross-section, restoring the channel complexity		
installing large weedy debris, and planting		
native vegetation		
Project I G-12: - Briscoe Off-Channel Habitat	With cooperation from the City of Kent, this project	
Rehabilitation Between RM 16.1 and 15.8 (Right	would involve removing the armoring on the Briscoe	
Bank)	meander shoreline, excavating a flood refugium for	
Damy	iuvenile salmonid rearing habitat, installing large	
	woody debris, and planting native riparian vegetation	
	An existing (landlocked) levee on the eastern	
	boundary of the park would provide continued flood	
	protection.	
Project LG-13: - Acquisition, Levee Setback,	King County Flood Control District project – partially	
and Habitat Rehabilitation Between RM 15.3 and	completed.	
14.7 (Right Bank): Actions include acquiring		
additional right of way along the river-ward edge of	Project No. 13 on the Restoration Opportunities map	
the business park parking lot between River Miles	(Appendix C)	
15.3 and14.7 (right bank); setting back the		

WRIA 9 Project	Kent Implementation Status
oversteepened levee; creating bench habitat, installing large woody debris; and planting native riparian vegetation. This project would extend downstream from a levee setback project completed in the early 2000s.	

2. Green-Duwamish Ecosystem Restoration Project

A couple of the projects above in Table 11 were originally identified by the Green-Duwamish Ecosystem Restoration Project (ERP), a cooperative effort between 16 local governments, Indian Tribes, the State of Washington, NOAA Fisheries Service, the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, and many other organizations and private citizens. The ERP generated a list of 45 projects, 29 of which were ultimately incorporated into the *Salmon Habitat Plan: Making Our Watershed Fit for a King*. Funding for ERP implementation comes from a federal authorization of \$113 million under the Water Resources Development Act of 2000. Two projects related to Meridian Creek and the Lake Meridian outlet were part of the ERP and have already been implemented (see discussion in Chapter 8 Section D.12 below). One ERP project in shoreline jurisdiction that was not identified in the WRIA 9 report is described below in Table 12. Another ERP project is the restoration and enhancement of salmonid rearing and refuge habitat in Garrison Creek (a tributary of Springbrook Creek), which indirectly is an enhancement of the Springbrook Creek shoreline.

 Table 12.
 Green-Duwamish
 Ecosystem
 Restoration
 Project
 projects
 associated
 with

 Shorelines, in the City of Kent not part of the Salmon Habitat Plan:
 Making Our
 Watershed Fit for a King.
 Watershed Fit for a King.

ERP Project	Kent Implementation Status
Project No. 21 - Lake Meridian Outlet Relocation : The project goal is to improve instream habitat and anadromous fish habitat between Lake Meridian and Soos Creek. The project would construct a channel through a forested area. The current outlet is located adjacent to a two lane road.	Phase I of the project is complete. Phase II will construct 2,100 feet of stream channel connecting Lake Meridian to Soos Creek. Phase III will restore approximately 3 acres of wetlands associated with the current stream channel. Phase II and III are anticipated to be complete in 2009.
	Project No. 14 on the Restoration Opportunities map (Appendix C)

3. King County Flood Control District

The King County Flood Control District (District) was established in 2007 and expanded on the functions of the former Green River Flood Control Zone District. The District's main function is to improve flood protection within the County and it

has a significant list of proposed capital improvement projects aimed at maintaining and improving that protection.

The City of Kent participates in the District through the Advisory and Technical Committees, which provide recommendations to the Board of Supervisors, which is the King County Council. The Mayor of the City of Kent has a permanent seat on the Advisory Committee, and staff represent the City on the Technical Committee.

In the Green River watershed, many of the proposed projects are located along the banks of the Green and overlap with projects that are listed within the WRIA 9 Salmon Habitat Plan as well as the Green-Duwamish Ecosystem Restoration Project. These overlapping projects, which are named by their historical levee names in the King County Flood Control District list of Capital Improvement Projects, are located within the areas designated as Mainstem Maintenance Projects in the Salmon Habitat Plan and Green-Duwamish Ecosystem Restoration Project.

Other District Green River levee projects in Kent proposed to be constructed within the next six years include the Briscoe Levee Setback and the Horseshoe Bend Levee Improvements. These projects, although not included in the programs listed above, can provide significant improvement to the shoreline of the Green River. These projects will provide for additional floodplain function and storage as well as salmon and other fish habitat. The projects can also allow for removal of invasive non-native plant species along the riverbanks and replanting with native species. The native species can provide additional shade for the river, which, in the long term, will help to decrease summertime river water temperatures.

4. Comprehensive Plan Policies

The City of Kent adopted a major update to its Comprehensive Plan on 4 May 2006 pursuant to Growth Management Act requirements. The updated Comprehensive Plan contains a number of general and specific goals and policies that direct the City to permit and condition development in such a way that the natural environment is preserved and enhanced. Specific relevant goals include (see the Comprehensive Plan for policies associated with each goal):

- Goal LU-21 Foster recognition of the significant role played by natural features and systems in determining the overall environmental quality and livability of the community.
- Goal LU-22 Coordinate with appropriate individuals and entities to create a longterm, sustainable relationship among local and regional natural resource protection entities, for future growth and economic development, through enhancement of wildlife, fisheries, and recreational opportunities; protection of cultural resources; protection of water quality in wetlands, aquifers, lakes, streams, and the Green River; provision of open space and screening to reduce impacts of development; protection of environmentally sensitive areas to preserve life, property, water quality and fish and wildlife habitat; and retention

of the unique character and sense of place provided by the City's natural features.

- Goal LU-23 Protect and enhance environmentally sensitive areas via the adoption of City regulations and programs which encourage well-designed land use patterns such as clustering and planned unit development. Use such land use patterns to concentrate higher urban land use densities and intensity of uses in specified areas in order to preserve natural features such as large wetlands, streams, geologically hazardous areas, and forests.
- Goal LU-24 Encourage well designed, compact land use patterns to reduce dependency on the automobile, and thereby improve air and water quality and conserve energy resources. Establish mixed-use commercial, office, and residential areas to present convenient opportunities for travel by transit, foot and bicycle
- Goal LU-25 Ensure that the City's environmental policies and regulations comply with state and federal environmental protection regulations regarding air and water quality, hazardous materials, noise and wildlife and fisheries resources and habitat protection. Demonstrate support for environmental quality in land use plans, capital improvement programs, code enforcement, implementation programs, development regulations, and site plan review to ensure that local land use management is consistent with the City's overall natural resource goals.
- Goal LU-26 Protect and enhance natural resources for multiple benefits, including recreation, fish and wildlife resources and habitat, flood protection, water supply, and open space.
- Goal LU-27 Ensure that uses, densities, and development patterns on lands adjacent to the shorelines of the Green River are compatible with shoreline uses and resource values, and support the goals and policies of the City of Kent's Shoreline Master Program and the Green-Duwamish Watershed Nonpoint Action Plan.
- Goal LU-28 Regulate development in environmentally critical areas to prevent harm, to protect public health and safety, to preserve remaining critical areas, and enhance degraded critical areas in the City.
- Goal LU-31 Establish Urban Separators to protect environmentally sensitive areas, including lakes, streams, wetlands, and geologically unstable areas such as steep slopes, to create open space corridors that provide environmental, visual, recreational and wildlife benefits within and between urban growth areas, and to take advantage of unusual

landscape features such as cliffs or bluffs and environmentally unique areas.

- Goal CD-18 Provide adequate, safe, well-located public open spaces, parks facilities, and access to features of the natural environment.
- Goal-CD-19 Protect the natural landscapes, which characterize Kent.
- Goal CD-20 Encourage environmental sensitivity and low-impact development principles in the design and construction of all projects.
- Goal CD-21 Promote renewable resource use and energy-efficiency in site and architectural design.
- Goal CD-22 Promote Low-Impact Development and limited disturbance of natural hydrological systems, so that water quantity and quality are protected throughout the development process and occupation of the site.
- Goal P&OS-1 Designate critical wildlife habitat resources and areas.
- Goal P&OS-2 Preserve and provide access to significant environmental features, where such access does not cause harm to the environmental functions associated with the features.

Techniques suggested by the various policies to protect the natural environment include requiring setbacks from sensitive areas, preserving habitats for sensitive species, preventing adverse alterations to water quality and quantity, promoting low impact development, preserving existing native vegetation, educating the public, and mitigating necessary sensitive area impacts, among others.

5. Critical Areas Regulations

The City of Kent Critical Areas Regulations can be found in Kent City Code Chapter 11.06. The City adopted a revised Critical Areas Ordinance (CAO) in August 2006 consistent with best available science and all other requirements of the GMA. The updated regulations are based on "best available science," and provide a high level of protection to critical areas in the City, particularly for streams and wetlands. The updated regulations categorize streams into three types based on documented salmonid fish use and size (for lakes and ponds), with standard buffers ranging from 40 feet for Type 3 waters to 100 feet for Type 2 waters. The code refers to the SMP for buffers of Type 1 streams (shorelines). A standard buffer width of 50 feet is set for valley streams in "industrialized areas adjacent to portions of Mill Creek, Garrison Creek, and Springbrook Creek on the valley floor." Standard wetland buffers now range from 50 to 225 feet and are classified using the Department of Ecology's latest Washington State Rating System for Western Washington. Management of the City's critical areas using these regulations should help insure that ecological functions and values are not degraded, and impacts to critical areas are mitigated. These Critical Areas Regulations are one important tool that will help the

City meet its restoration goals. The City's Critical Areas Regulations are adopted by reference into the Shoreline Master Program to regulate critical areas found within the shoreline area.

6. Stormwater Management and Planning

The *City of Kent 2002 Surface Water Design Manual*, Chapter 5 of the Kent Construction Standards, adopts by reference the 1998 *King County Surface Water Design Manual*. In the future, the City will update its *Surface Water Design Manual* as part of the NPDES Phase II permit requirement. Both Ecology's 2005 *Stormwater Management Manual for Western Washington* and *King County's 2005 Surface Water Design Manual* will be evaluated as the NPDES Phase II permit requires that the City use minimum requirements that are equivalent to Ecology's manual.

Some of the goals identified in the City's Drainage Master Plan, include:

- Identify opportunities for habitat restoration along the City's stream and river corridors including potential land acquisition or easement needs to implement those actions
- Define drainage problems and recommend solutions that will reduce planning area flood hazards and associated public safety risks, provide economic incentives for continued growth, improve water quality, improve or restore fish passage, and enhance stream and wetland habitats; integrate Low Impact Development (LID) components into implementation of those solutions where technically feasible

In January 2007, Ecology approved the City's NPDES Phase II permit. The NPDES Phase II permit is required to cover the City's stormwater discharges into regulated lakes and streams. Under the conditions of the permit, the City must protect and improve water quality through public education and outreach, detection and elimination of illicit non-stormwater discharges (e.g., spills, illegal dumping, wastewater), management and regulation of construction site runoff, management and regulation of runoff from new development and redevelopment, and pollution prevention and maintenance for municipal operations.

7. Public Education

The City of Kent's Comprehensive Plan identifies four policy statements based on the goals of environmental public involvement (excerpted below). These items help guide City staff and local citizen groups in developing mechanisms to educate the public and broaden the interest in protecting and enhancing local environmental resources.

Goal LU-21 Foster recognition of the significant role played by natural features and systems in determining the overall environmental quality and livability of the community.

- Pol 21.1 Educate City staff, developers, and other citizens on the interaction between natural features and systems, such as wetlands, streams, and geologically hazardous areas, and human activities.
- Goal LU-22 Coordinate with appropriate individuals and entities to create a longterm, sustainable relationship among local and regional natural resource protection entities, for future growth and economic development, through enhancement of wildlife, fisheries, and recreational opportunities; protection of cultural resources; protection of water quality in wetlands, aquifers, lakes, streams, and the Green River; provision of open space and screening to reduce impacts of development; protection of environmentally sensitive areas to preserve life, property, water quality and fish and wildlife habitat; and retention of the unique character and sense of place provided by the City's natural features.
- Pol 22.1 Provide incentives for environmental protection and compliance with environmental regulations. Foster greater cooperation and education among City staff, developers, and other citizens. Determine the effectiveness of incentives by establishing monitoring programs.
- Goal LU-25 Ensure that the City's environmental policies and regulations comply with state and federal environmental protection regulations regarding air and water quality, hazardous materials, noise and wildlife and fisheries resources and habitat protection. Demonstrate support for environmental quality in land use plans, capital improvement programs, code enforcement, implementation programs, development regulations, and site plan review to ensure that local land use management is consistent with the City's overall natural resource goals.
- Pol 25.2 Provide to property owners and prospective property owners general information concerning natural resources, critical areas, and associated regulations. Ensure developers provide site-specific environmental information to identify possible on- and off-site constraints and special development procedures.
- Pol 25.10 Work cooperatively with tribal, federal, state and local jurisdictions, as well as major stakeholders, to conserve and work towards recovery of ESA-listed threatened and endangered species.

As part of the City of Kent's efforts to abide by these goals and policies, the City supports several volunteer efforts, such as the Kent Parks Foundation, Adopt-A-Park, Releaf, Eagle Scout Projects, Make A Difference Day, Youth Tree Program, and other programs in cooperation with non-profit groups and agencies (discussed in greater detail below). The City also has developed many educational brochures that discuss conservation, sustainability, and Green Building practices.

8. Kent Parks Foundation

According to the City of Kent website, the Kent Parks Foundation "provides an opportunity to ensure that Kent remains a beautiful, healthy, and caring place to raise our children and enjoy our lives." The Foundation is a 501(c)(3) non-profit public charity which purpose is "to develop assets for the community that the Parks Department serves," including by "preserving our environment." The Foundation has an annual Gift Catalog that includes a list of needs in individual parks with the associated cost. Individuals can select a specific need in a specific park and make a tax-deductible donation to address that need. For a few of the parks in the 2008 Gift Catalog, listed items include interpretive signs and native plants. In future years, the Foundation could include additional items for parks that address shoreline restoration opportunities outlined in this Restoration Plan.

Contact Information: http://www.ci.kent.wa.us/parks/index.aspx?id=1448

9. Other Kent Parks Programs

The City's Parks, Recreation & Community Services Department have several other programs that could be leveraged to enact additional restoration projects to benefit shoreline conditions, including Adopt-A-Park, Eagle Scout and Girl Scout Gold Award Projects, and the Youth Tree Education Program. All of these programs enable volunteers to donate time and energy to improving the park system.

<u>Contact Information</u>: Jeff Watling, Director of Parks & Recreation, Kent Parks, Recreation and Community Services, <u>jwatling@ci.kent.wa.us</u>

a. Adopt-A-Park

The City's Adopt-A-Park program, developed in the mid-1980s, is a program that encourages environmental stewardship and maintenance of the City's park, trails and open space system through a community partnership program of volunteer groups, local businesses, individuals and Parks staff. Projects developed through the Adopt-A-Park program include park beautification efforts, litter control, trail development and maintenance and other special City-initiated projects. These efforts ensure that the City's parks, trails and open spaces remain safe and enjoyable for all Kent residents and park users.

b. Releaf

Releaf is a community volunteer event sponsored by Kent Parks, Recreation and Community Services that focuses on the reforestation and re-vegetation of parks, open spaces and wildlife habitat throughout the City. Releaf 2008 was located at Clark Lake Park, in which the goal was to enhance the buffer areas around the lake through re-vegetation, which in-turn will provide for riparian habitat enhancement for salmon, as well as the removal of invasive species around the lake. The City's past Releaf efforts have been held along the Green River, as well as Lake Fenwick.

c. Eagle Scouts

Eagle Scouts, the highest advancement rank in Scouting, have provided many services to the City's parks system. To date, over 130 projects have been completed within the City by Eagle Scouts. The Parks, Recreation & Community Services Department maintains a list of project ideas that Eagle Scout candidates may chose from. Potential projects include the installation of park benches, fencing, boardwalks, trail improvements, and landscaping improvements. Some specific projects along waterbodies include along Clark Lake Park (invasive plant removal) and Lake Fenwick (fencing, gravel installation, kiosk for environmental signs).

d. Make A Difference Day

Make A Difference Day, held on the fourth Saturday in October every year, is a national event of volunteerism in which community volunteers of all ages work on projects within their community. The City of Kent has participated in the program for 13 years and each year the project varies. Projects may include planting trees and shrubs, resurfacing trails and playgrounds, installing playground equipment, or enhancing riparian areas. In 2008, the event was held at Clark Lake Park.

e. Youth Tree Education Program

The City's Youth Tree Education Program, developed in 2000, involves the City's youth and Parks and Public Works staff in planting trees throughout the City's parks. Each year, City staff members visit local Kent schools and teach students the proper way to plant trees. The students are then given a native tree or shrub to plant at their school and then monitor the growth. At the end of the school year, many of the plants and trees end up at a local park or along the Green River.

f. Best Management Practices

The City of Kent incorporates a series of best management practices (BMPs) for weed and pest control, water management, plant installation and care, turf care and aquatic area maintenance and invasive control. Primarily, BMPs are used for parks, trails and open spaces along the Green River. BMPs include hand-pulling weeds when practicable and removing underwater invasives using mechanical methods. Chemical applications are applied only as needed and consistent with a permit from the Washington Department of Ecology.

The City's *Surface Water Design Manual* adopts King County's *Surface Water Design Manual*, which includes both permanent and temporary BMPs for stormwater collection and control methods.

10. Public Works Engineering Programs

The Public Works Engineering Department holds two or three volunteer events per year that organize groups, organizations and individuals to dedicate their time in restoring riparian, wetland and open space areas throughout the City. Volunteer groups from Puget Sound businesses include REI and Starbucks and the Eagle Scouts are regularly involved. Past restoration efforts have been organized along the Green River, the GRNRA, Lake Fenwick and Lake Meridian.

The Public Works Engineering Department sponsors Natural Yard Care Workshops that are held two times per year in two different neighborhoods. These workshops educate residents about natural gardening and lawn care techniques that promote chemical and pesticide-free methods.

The Department also sponsors the Water Festival, held annually in March at a local community college campus, in which approximately 1,600-1,800 4th to 6th grade students are taught by professionals about water conservation, watersheds, wetlands, salmon habitats, wildlife, and other related topics. Many of the topics are done through hands-on activities. This event involves five school districts in South King County and typically involves presenters from several local agencies. Special presenters have included the Seattle Aquarium, local weathermen, NASA officials, and the Governor.

Contact Information: City of Kent Public Works Engineering, (253) 856-5500

11. Adopt-A-Stream Foundation

During a two-year period in the 1990s, the City of Kent contracted with the Adopt-A-Stream Foundation (AASF) to conduct Streamkeeper Field Training workshops for local educators and area residents interested in local streams. AASF's task was to educate the audience how to conduct watershed inventories and how to monitor physical, biological and chemical characteristics of local streams. The City's Public Works Department was responsible for tracking students and providing them with long-term support.

<u>Contact Information</u>: Tom Murdoch, tomm@streamkeeper.org, <u>http://www.streamkeeper.org/</u>

12. Recent Kent Restoration Projects

a. Springbrook Creek

In 2004, the City restored approximately 6,200 LF (3,100 LF each side) of habitat along both banks of the creek and another 1,240 LF along the west bank just north of S. 188th Street (Project No. 15 on the Restoration Opportunities map (Appendix C)). Restoration along the lower 3,100 LF enhanced a minimum of 30'-width of stream-bank and included 28 multi-trunked woody debris structures installed with anchors along both sides of the stream. Over 11,000 shrubs and trees were

planted within these areas. Additional restoration upstream of S. 188th Street was completed as mitigation during construction of businesses along the creek channel in 2005-06. Native trees and shrubs are dominant between S. 180th Street upstream to E. Valley Highway, although some reed canarygrass and blackberry are still present.

b. GRNRA

Created in 1996, this complex serves as a stormwater detention facility, flood control, public education and wildlife habitat project in the Green River Valley. Over 800,000 CY of material was excavated and moved to the western portion of the site during construction. Most of the excavated area became the large, 35-acre detention lagoon, sized to completely control a 100-year flood event in Mill Creek. The eastern, 18-acre pond was primarily designed to naturally treat stormwater by forcing the water to slow down and take a long, circuitous path around the central peninsula where the water could naturally be filtered by thousands of wetland plants.

Native trees, shrubs, wetland emergents and some herbaceous plants have been planted per the GRNRA Landscape Master Plan to improve onsite habitat conditions. The landscape plan has been adaptively managed over the course of several years. To date, approximately 250,000 native plants have been installed on the site, including approximately equal numbers of wetland emergents and trees/shrubs. Onsite habitat conditions have improved greatly during this planting effort (Project No. 16 on the Restoration Opportunities map (Appendix C)).

c. Lake Meridian Outlet Realignment Project

This project involves realigning the lake outflow of Lake Meridian through a forested area to improve fish habitat on its way to Big Soos Creek (Project No. 14 on the Restoration Opportunities map (Appendix C)). The current outlet creek flows through a series of wetland and detention basins within a highly developed commercial and residential neighborhood.

This realignment, also known as Cow Creek, is funded through the U.S. Army Corps of Engineers, WRIA 9 funding and the City of Kent as part of the Green/Duwamish Ecosystem Restoration Program. The project is broken up into three phases. Phase 1, which was completed in 2007, included improvements such as a weir for flow control, a box culvert, a new pedestrian bridge, and enhancement of the existing outlet of Lake Meridian. Phase 2 consists of a 2,500foot new channel that will meander through open space and existing wetlands on its way to Big Soos Creek. Large woody debris, riparian plantings, spawning gravel and backwater areas will be created to provide habitat for fish and other wildlife. An access road for BPA will also be constructed at the eastern edge of the new channel. Phase 3 includes installation of a flow splitter that will allow water to be diverted to the new channel as well as allow some of the water to continue to the existing wetlands and detention areas to the south. Three acres of wetlands along this channel will be enhanced with native plantings, soil amendments, and addition of woody debris. Phase 2 is fully funded and is expected to begin in 2009. Phase 3, if funded, would begin in 2009-10, with full project completion in 2010.

d. Lake Fenwick Grass Carp Introduction

In June 2009, the City will introduce triploid grass carp to Lake Fenwick to control a Brazilian elodea infestation (Project No. 17 on the Restoration Opportunities map (Appendix C)). In all, approximately 77 percent of the surveyed shallow areas were affected by this invasive species. Brazilian elodea can be so dense that fish movement is limited; forage areas are reduced; and predators and prey have reduced visibility, hampering foraging and escape from predators. Dense stands of elodea can also uptake dissolved oxygen, reducing dissolved oxygen to lethal levels for fish (Tetra Tech 2002). The effectiveness of the grass carp at controlling elodea, a preferred food plan, will be monitored by the City. A weed rake will be used to sample along predetermined aquatic transects with the results compared to 2001 diver surveys along these same transects.

13. Comprehensive Site-Specific Restoration Opportunities

Many of the projects and programs listed above in Sections 4.1, 4.2, 4.3 and 4.12 are site-specific and are included on the map located in Appendix C. Each of these projects is given an identifying map number indicated on the following table (Table 13), with a corresponding reference as appropriate to the originating Green-Duwamish Ecosystem Restoration Project (ERP) number or WRIA 9 *Salmon Habitat Plan: Making Our Watershed Fit for a King* project number (Steering Committee 2005). In some cases, these are overlapping projects with each other or the King County Flood Control District.

Map No.	Name	ERP	WRIA 9 Plan	KCFCD	Comments
1	Lower Mill Creek Restoration		LG-7		
2	Riverview Park	P-17	LG-7		
3	Hawley Road Levee		LG-7		
4	Lower Mullen Slough (Prentice Nursery)	P-11	LG-7		King County Taking the Lead per WRIA 9 plan
5	Mullen Slough	P-12	LG-7		King County Taking the Lead
6	Lower Mill Creek Future Project		LG-7		

 Table 13.
 WRIA-wide Programs Recommended to Support Habitat, and Status of Their Implementation in Kent

Map No.	Name	ERP	WRIA 9 Plan	KCFCD	Comments
7	Rosso Nursery		LG-9		
8	Lower Green River Acquisition		objectives		
9	Boeing Levee Setback		LG-10	Х	
10	Russell Road Upper Setback and Restoration		LG-10	х	
11	Russell Road Lower Setback and Restoration		LG-10	х	
12	Russell Road Lowest Setback and Restoration		LG-10	х	
13	Acquisition, Levee Setback and Rehabilitation		LG-13	Х	
14	Lake Meridian Outlet Relocation	P-21			Recent Kent Project
15	Springbrook Creek				Recent Kent Project
16	Green River Natural Resource Area				Recent Kent Project
17	Lake Fenwick Grass Carp				To be completed in June 2009

E. List of Additional Projects and Programs to Achieve Local Restoration Goals

The following additional projects and programs are generally organized from the larger watershed scale to the City-scale, including City projects and programs and finally non-profit organizations that are also active in the City of Kent area.

1. Unfunded WRIA 9 or ERP Projects

The Hawley Revetment project (LG-7), listed in Table 11, is currently part of the City's long range plan, but is not yet funded. Per the Salmon Habitat Plan, this project would set back the over-steepened Hawley Revetment between river miles 23.5 and 23.3, in order to achieve a more stable slope angle, create a low, vegetated bench, and

allow the placement of large woody debris. Land is in public ownership and is immediately downstream of Riverview Park.

Several of the ERP projects are currently unfunded or underfunded and the City continues to identify funding sources.

2. Other Recommended Projects

The following is partially developed from a list of opportunity areas identified within the *Final Shoreline Analysis Report*, with additional expansion of the Green River discussion. The list of potential projects was created after assessing field conditions, and is intended to contribute to improvement of impaired functions.

a. Green River

The following summary of factors for decline in the lower Green River subwatershed is excerpted from The *Salmon Habitat Plan: Making Our Watershed Fit for a King* (Steering Committee 2005):

Urbanization, water diversions, levees, and revetments on the mainstem have gradually lowered the floodplain and resulted in disconnection of off-channel habitats such as sloughs and adjacent wetlands from the mainstem. Juvenile fish migrating downstream have few places to take refuge from high flows.

The river is starved of large woody debris and consequently lacks associated instream habitat complexity, such as pools and riffles. Low flows, associated with water withdrawals and the diversion of the White River, have exacerbated low flow conditions and contributed to adult salmon migration problems. The loss of mature native riparian vegetation has been accompanied by extensive amounts of non-native plants. These same human activities and developments have caused chronic water quality problems, particularly in the tributary streams.

Additional factors of decline related to harvest, hatchery operations, and the Howard A. Hanson Dam are not within the City's sphere of influence.

As mentioned previously, the *Salmon Habitat Plan: Making our Watershed Fit for a King* (Steering Committee 2005) includes the following specific policy for the lower Green River.

In the Lower Green River, every opportunity should be taken to set back levees and revetments to the maximum extent practicable. Habitat rehabilitation within the Lower Green River corridor should be included in all new developments and re-developments that occur within 200 feet of the river.

Given the City's commitment to implementing the *Salmon Habitat Plan* and recent events related to the Corps' and FEMA's assessment of the Green River levee, the City is now in a position to effect or enable the above policy on a large scale over a 10- to 20-year period. The *Salmon Habitat Plan* references King

County's *Guidelines for Bank Stabilization Projects in the Riverine Environments of King County* (King County 1993), which includes the following generic graphic of a possible levee setback with riparian vegetation.



Figure 8. Potential levee cross-section. Image modified by The Watershed Company

Implementation of levee upgrades for the entire stretch of the Green River in the City is likely to be implemented by one or more entities, either led by or collaborating with the City, including King County and the Corps. A key barrier to rapid implementation is funding, which will need to be supplied by the City, the Corps, King County, and possibly other state or federal funding sources. A second impediment is space. The City of Kent contains a mix of land uses along the river, including agricultural, industrial, residential, and commercial. Many of these are set back more than 200 feet from the river's ordinary high water mark, but others are as close as 60 feet. The following figure is a potential cross-section for the City of Kent levee that requires a minimum of 140 feet to implement. The cross-section includes space for a "floodplain bench," sloped levee face, 16-footwide levee top to accommodate the Green River Trail, and the sloped upland face of the levee.



Figure 9. Illustration of proposed new levee design with plantings and trail.

The proposed floodplain bench has several purposes, including increasing the flood storage capacity (and reducing the flood elevation), increasing levee stability, and providing improved riparian habitat for fish and wildlife. The national Corps policy limits vegetation to grasses on and adjacent to levees. However, the Seattle District has obtained a Regional Variance that provides a great deal of flexibility. The floodplain bench and the streambank below the bench provide opportunities for establishment of traditional riparian vegetation and placement of large woody debris. Much of the current levee structure is vegetated with grasses and invasive weeds, primarily Himalayan blackberry. There are scattered pockets of trees and shrubs (cottonwoods, willows, some conifers) on and landward of the levee, which provide some shade depending on size and orientation.

Under the Regional Variance and per Doug Weber at the U.S. Army Corps of Engineers, any standard native riparian vegetation may be installed on the floodplain bench, including cottonwoods, alders, willows, and conifers, limited only by suitability of the species to hydrologic and soil conditions of the bench. Rows of willows, dogwoods, or other suitable species can be incorporated into the levee from the OHWM and upwards, concentrated at the water's edge. Grasses and small shrubs can be on the face of the levee above the bench. Large woody debris is allowed, so long as it is on the benches or engineered into the base of the levee. The toe of the levee needs to still remain inspectable, but the Corps indicated that is a judgment call. Where an upgraded levee does not have sufficient room for installing a floodplain bench, the willow lifts are generally kept near the water's edge, where hydrology conditions are suitable.

The National Marine Fisheries Service (NOAA Fisheries) issued a Biological Opinion (BiOp) on 22 September 2008 on FEMA's implementation of the National Flood Insurance Program in Washington state. This BiOp has implications for alteration of the existing levee system along the Green River, and possibly development of upland areas landward of the levee. Any improvements to the levee system must be conducted in such a way that listed fish species and their habitats are not adversely affected through further degradation of the current baseline condition. During phone conversations in Fall 2008, Ryan Ike of FEMA indicated that FEMA is not planning to issue any vegetation standards or establish prescriptive setbacks in reaction to the BiOp, and the Corps indicated that it would not be changing its policies in the short term either. All of the agencies will continue to discuss the issues and the application of the BiOp.

b. Big Soos Creek

The Kent stretch of Big Soos Creek could be enhanced by vegetation planting with a buffer of native trees and shrubs, particularly conifer species, as well as placement of large woody debris to enhance in-stream fish habitat.

c. Lake Meridian

<u>General</u>: Investigate potential for control of Eurasian watermilfoil through chemical, mechanical or biological control methods. The City's IAPMP (Tetra Tech 2002) recommended placement of bottom barriers (burlap sheets) in localized areas. This work has not yet been conducted.

<u>Residential</u>: Many residential shoreline properties on Lake Meridian have the potential for improvement of ecological functions through: 1) reduction or modification of shoreline armoring, 2) reduction of overwater cover and in-water structures (grated pier decking, pier size reduction, pile size and quantity reduction, moorage cover removal), 3) improvements to nearshore native vegetative cover, or 4) reductions in impervious surface coverage.

<u>Lake Meridian Park</u>: Several opportunities exist to improve habitat conditions along the shoreline. These include: reduction of overwater cover by the existing pier through the installation of deck grating, removing or minimizing the impacts of shoreline armoring; and supplementation of nearshore native vegetation to improve habitat conditions.

d. Lake Fenwick

Lake Fenwick's shoreline armoring could be modified to support public access while stabilizing the banks using bioengineering techniques. Additionally, the Brazilian elodea problem should be addressed through the use of grass carp, which will be introduced in June 2009 (see Chapter 8 Section D.12.d above). This should significantly reduce, or eliminate, the noxious weed in the lake.

e. GRNRA

The Public Works Department should continue to manage the GRNRA and implement the Landscape Master Plan for the site.

f. Springbrook Creek

Some enhancement of the buffer has occurred on both banks of Springbrook Creek within the shoreline area; several small conifer plantings were noted during December 2007 and February 2008 site visits (see Chapter 8 Section D.12.c). Additional plantings of native trees and shrubs would improve the wildlife corridor, and provide additional shade and organic debris to the stream. Landscape debris was noted in the buffer as well; adjacent businesses could be educated regarding appropriate disposal of lawn clippings and other landscape items.

g. Jenkins Creek

The Jenkins Creek shoreline area will benefit most from continued preservation and protection of the remaining functions. As previously mentioned, the City has installed some riparian enhancement plantings in the buffer.

h. Panther Lake

Panther Lake was assigned a Category H restoration designation based on King County's shoreline inventory and characterization model. Category H applies to those shorelines with a "Low" basin function and a "Medium" reach function. The appropriate restoration strategy according to this methodology is to focus on enhancement and creation.

The non-native lily infestation in Panther Lake is adversely affecting lake habitat by creating a monoculture and excluding native plants, and is limiting lake access even by canoes. One shoreline property owner also noticed a "rotten" smell (Johnson 2007), which is likely caused by decomposition of large volumes of organic material, reduced circulation in the lake resulting from the dense lily cover, and breakdown of muck soils. Some mechanical or chemical control of the lily problem may be necessary.

Residential shoreline properties on Panther Lake have the potential to provide improvement of ecological functions through improvements to nearshore native vegetative cover.

3. Public Education/Outreach

Chapter 7 of the WRIA 9 Salmon Habitat Plan: Making our Watershed Fit for a King (Steering Committee 2005) identifies 17 WRIA-wide ("watershed-wide") actions that could contribute to the recovery of ecosystem health. These actions range from public education and stewardship to incentives to regulations and regulatory enforcement. Specific public education and stewardship efforts listed in the report include:

- Conduct Shoreline Stewardship Workshops and Outreach
- Increase/Expand Water Conservation Incentive Programs
- Increase/Expand Natural Yard Care Programs for Landscapers
- Increase/Expand the Natural Yard Care Program for Single Family Homeowners
- Promote the Planting of Native Trees
- Promote Better Volunteer Carwash Practices
- Increase Public Awareness about What Healthy Streams and Rivers Look Like and How to Enjoy Recreating on Them
- Increase Involvement of Volunteers in Habitat Stewardship

- Green/Duwamish Volunteer Revegetation Program
- Support/Expand the Natural Resource/Basin Steward Programs
- Expand/Improve Incentives Programs
- Improve Enforcement of Existing Land Use and Other Regulations
- Increase Use of Low Impact Development and Pourous Concrete
- Provide Incentives for Developers to Follow Built GreenTM Checklist Sections Benefiting Salmon
- Develop a Coordinated Acquisition Program for Natural Areas

Specific details about these public education, outreach and stewardship programs may be found at <u>ftp://dnr.metrokc.gov/dnr/library/2005/kcr1876/CHAPTERS/Ch7-Actions.pdf</u>.

4. Other Environmental Organizations

Although the following organizations include Kent in their general service areas, they have indicated that they are not currently actively engaged in specific activities or programs that affect Kent's shorelines, nor do they have any plans in the area. However, that does not preclude them from playing an active role in the future, particularly if any of the City's residents or business owners solicit assistance from or become members in these organizations.

- Washington Trout
- Rainier Audubon Society

F. Proposed Implementation Targets and Monitoring Methods

As previously noted, the City's shoreline area is occupied by industrial, commercial, agricultural, multi- and single-family residences, and public recreation/open space areas. Therefore, efforts should be made to improve shoreline ecological function through the promotion of restoration and healthy practices at all levels, from large-scale industrial users to single-family property owners. The City of Kent already has a very active environmental community with a restoration and education focus. Continued improvement of shoreline ecological functions on the shoreline requires a more comprehensive watershed approach, which combines the upstream projects and programs along the City's lakefronts.

The following table (Table 14) outlines a possible schedule and funding sources for implementation of a variety of efforts that could improve shoreline ecological function, and are described in previous sections of this report.

	Restoration Project/Program	Schedule	Funding Source or Commitment
4.1	WRIA 9 Participation	Ongoing	The City is an active member of the WRIA 9 Forum. Membership at this time entails a commitment of staff time.
4.2	ERP Implementation	Ongoing	The City of Kent participates in the Green-Duwamish ERP Committee to identify projects to be programmed each year.
4.3	King County Flood Control District	Ongoing	City of Kent participates in the District through the Advisory and Technical Committees
4.4	Comprehensive Plan Policies	Revised in May 2006	The City makes a substantial commitment of staff time in the course of project and program reviews to determine consistency and compliance with the recently updated Comprehensive Plan. The next Comprehensive Plan update will occur in 2012.
4.5	Critical Areas Regulations	Revised in August 2006	The City makes a substantial commitment of staff time in the course of project and program reviews to determine consistency and compliance with their recently updated Critical Areas Regulations.
4.6	Stormwater Planning	Ongoing	Currently, staff time and materials are the only City resource commitments. The City currently follows its 2002 Kent Surface Water Design Manual, which is an addendum to the 1998 King County Surface Water Design Manual. In the future, the City will update its Surface Water Design Manual as part of the NPDES Phase II permit requirement. The City is also involved in the update of their Drainage Master Plan, which goals includes flood reduction, water quality improvements and aquatic habitat improvements. Work is ongoing as part of a five-year compliance plan for mandatory activities prescribed by the NPDES phase II municipal stormwater permit.
4.7	Public Education	Ongoing	Currently, staff time and materials are provided in developing public education and outreach efforts, which are highlighted in Comprehensive Plan policy statements based on the goals of environmental public involvement. These items help guide City staff and local citizen groups in developing mechanisms to educate the public and broaden the interest in protecting and enhancing local environmental resources.
4.8	Kent Parks Foundation	Ongoing	The Kent Parks Foundation is a 501(c)(3) public charity that subsists on donations.

 Table 14. Implementation Schedule and Funding for Restoration Projects, Programs and Plans.

Restoration Project/Program		Schedule	Funding Source or Commitment
4.9	Other Kent Parks Programs		Currently staff time materials and an unspecified
4.10	Public Works Engineering Programs	Ongoing	amount of funding support these programs.
4.11	Adopt-A-Stream	As funds and opportunity allow	The City does not have authority over or a formal relationship with this organization. This organization is either a source of grant funds for restoration projects, is an advocate for specific restoration projects, independently obtains grants for restoration projects, or is a partner in implementing restoration or education projects.
5.1	Unfunded WRIA 9 or ERP Projects	As funds and opportunity allow	The City Council passed a resolution in 2005 expressing its approval and support for the Salmon Habitat Plan: Making our Watershed Fit for a King (Steering Committee 2005). Projects will be funded by the City, partnering agencies and non-profit organizations, and grants as projects and funding opportunities arise. The City continues to identify funds for the implementation of the WRIA 9 and ERP projects in the City of Kent
5.2	Recommended Projects	As funds and opportunity allow	Projects identified in this section would likely be implemented either when grant funds are obtained, when partnerships are formed between the City and other agencies or non-profit groups, or as may be required by the Critical Areas Regulations and the Shoreline Master Program during project-level reviews by the City.
5.3	Public Education/ Outreach	As funds and opportunity allow	On-going and future education efforts should be coordinated with the City and partnering agencies, including funding sources (grant funding, monetary donations, volunteer hours)

City planning staff will track all land use and development activity, including exemptions, within shoreline jurisdiction, and will incorporate actions and programs of the Parks and Public Works departments as well. A report will be assembled that provides basic project information, including location, permit type issued, project description, impacts, mitigation (if any), and monitoring outcomes as appropriate. Examples of data categories might include square feet of non-native vegetation removed, square feet of native vegetation planted or maintained, reductions in chemical usage to maintain turf, linear feet of eroding stream bank stabilized through plantings, linear feet of shoreline armoring removed or modified levees, or number of fish passage barriers corrected. The report would also

update Tables 10, 11 and 12 above, and outline implementation of various programs and restoration actions (by the City or other groups) that relate to watershed health.

The staff report will be assembled to coincide with Comprehensive Plan updates and will be used, in light of the goals and objectives of the Shoreline Master Program, to determine whether implementation of the SMP is meeting the basic goal of no net loss of ecological functions relative to the baseline condition established in the Shoreline Analysis Report (The Watershed Company 2008). In the long term, the City should be able to demonstrate a net improvement in the City of Kent's shoreline environment.

Based on the results of this assessment, the City may make recommendations for changes to the SMP.

G. Restoration Priorities

The process of prioritizing actions that are geared toward restoration of the City's shoreline areas involves balancing ecological goals with a variety of site-specific constraints. Briefly restated, the City's environmental protection and restoration goals include 1) protecting watershed processes, 2) protecting fish and wildlife habitat, and 3) contributing to chinook conservation efforts. Constraints that are specific to Kent include a heavily confined and leveed Green River shoreline area, a highly developed shoreline along Lake Meridian with predominantly private ownership, and heavy commercial development along Springbrook Creek. While other areas may already offer fairly good ecological functions (Big Soos Creek, Lake Fenwick, Jenkins Creek, and the GRNRA), they tend to include opportunities to further enhance ecological functions. These goals and constraints were used to develop a hierarchy of restoration actions to rank different types of projects or programs associated with shoreline restoration. Programmatic actions, like continuing WRIA 9 involvement and conducting outreach programs to local residents, tend to receive relatively high priority opposed to restoration actions involving private landowners. Other factors that influenced the hierarchy are based on scientific recommendations specific to WRIA 9, potential funding sources, and the projected level of public benefit.

Although restoration project/program scheduling is summarized in the previous section (Table 14), the actual order of implementation may not always correspond with the priority level assigned to that project/program. This discrepancy is caused by a variety of obstacles that interfere with efforts to implement projects in the exact order of their perceived priority. Some projects, such as those associated with riparian planting, are *relatively* inexpensive and easy to permit and should be implemented over the short and intermediate term despite the perception of lower priority than projects involving extensive shoreline restoration or large-scale capital improvement projects. Straightforward projects with available funding should be initiated immediately for the worthwhile benefits they provide and to preserve a sense of momentum while permitting, design, site access authorization, and funding for the larger, more complicated, and more expensive projects are under way.

1. Priority 1 – Levee Modifications and Floodplain Reconnection

Because of the isolation of the Green River floodplain from the Green River by the levee, floodplain habitats, including off-channel and side channel habitats, are typically described as the most diminished types of salmonid fish habitat relative to the pristine condition. The lack of these habitat types is a limiting factor for chinook salmon recovery. As discussed above, the historic use and prevalence of levees has greatly diminished the habitat value of extended floodplains. Restoration of these areas has been found to be one of the most beneficial of all types of stream and river enhancements. Projects in this category include the WRIA 9 recommended projects listed in Table 11:

- Project(s) LG-7 Lower Mill Creek, Riverview (Formerly Green River) Park, Hawley Road Levee, Lower Mullen Slough, and Lower Mill Creek Restoration Between RM 21.3 and 24 (Both Banks)
- Project LG-9 Rosso Nursery Off-Channel Rehabilitation and Riparian Restoration Between RM 20.8 and 20 (Left Bank) [being implemented by City as "Lower Green River Property Acquisition" in nearby locations]
- Project LG-10 Mainstem Maintenance (including the Boeing Levee Setback and Habitat Rehabilitation) Between RM 20.5 and 16.3
- Project LG-13 Acquisition, Levee Setback, and Habitat Rehabilitation Between RM 15.3 and 14.7 (Right Bank)

Priority 2 – Continue Water Resource Inventory Area (WRIA) 9 Participation

Of basic importance is the continuation of ongoing, programmatic, basin-wide programs and initiatives such as the WRIA 9 Forum. Continue to work collaboratively with other jurisdictions and stakeholders in WRIA 9 to implement the *2005 Salmon Habitat Plan: Making our Watershed Fit for a King* (Habitat Plan). This process provides an opportunity for the City to keep in touch with its role on a basin-wide scale and to influence habitat conditions beyond its borders, which, in turn, come back to influence water quality and quantity and habitat issues within the City.

3. Priority 3 –Improve Water Quality and Reduce Sediment and Pollutant Delivery

Although most of the streams and their basins located within the City are outside of shoreline jurisdiction, their impacts to shoreline areas should not be discounted. Many of these streams have the potential to provide fish and wildlife habitat. They are also a common receiving body for non-point source pollution, which in turn delivers those contaminants to shoreline waterbodies.

Watershed-wide programmatic actions listed in the Habitat Plan include four actions focused on addressing water quality and stormwater controls:

- Program WW-11: Expand/Improve incentives Programs
- Program WW-12: Improve Enforcement of Existing Land Use and Other Regulations
- Program WW-13: Increase Use of Low Impact Development and Porous Concrete
- Program WW-14: Provide Incentives for Developers to Follow Built Green[™] Checklist Sections Benefiting Salmon

These recommendations emphasize the use of low impact development techniques, on-site stormwater detention for new and redeveloped projects, and control of point sources that discharge directly into surface waters. They involve protecting and restoring forest cover, riparian buffers, wetlands, and creek mouths by revising and enforcing Critical Areas Regulations and Shoreline Master Programs, incentives, and flexible development tools.

Priority 4 – Reconnect Fish Passage to Green River Tributaries

Expanding available fish habitat and rearing opportunities for anadromous fish is a high priority for the City. One of the key mechanisms is to improve fish passage by reconnecting mainstem river habitat to local tributaries.

The City is currently involved with improving fish habitat within the outlet from Lake Meridian (Lake Meridian Outlet Realignment Project). This project involves realigning the lake outflow of Lake Meridian, otherwise known as Cow Creek, through a forested area to improve fish habitat on its way to Big Soos Creek. This project currently is funded through Phase 2 of 3, with Phase 2 expected to begin in 2009.

Recommended projects from the Habitat Plan include:

• Project(s) LG-7 - Lower Mill Creek, Riverview (Formerly Green River) Park, Hawley Road Levee, Lower Mullen Slough, and Lower Mill Creek Restoration Between RM 21.3 and 24 (Both Banks)

5. Priority 5 – Public Education and Involvement

Public education and involvement has a high priority in the City. While this is especially important for areas directly affected by residential development (i.e. Lake Meridian) or floodplain and levee management (i.e. Green River), it has already resulted in vast improvements to the GRNRA and Green River projects. Opportunities for restoration outside of residential property are extensive along most shoreline areas in the City. Only Lake Meridian is highly impacted by residential development. Therefore, in order to achieve the goals and objectives set forth in this Chapter 8, "Restoration Plan," most of the restoration projects (except for those on Lake Meridian) would likely occur on public property. Thus, providing education opportunities and involving the public is key to success, and would possibly entail coordinating the development of a long-term Public Education and Outreach Plan to gain public support.

6. Priority 6 – Acquisition of Shoreline Property for Preservation, Restoration, or Enhancement Purposes

The City should explore opportunities to protect natural areas or other areas with high ecological value via property acquisition. Mechanisms to purchase property would likely include collaboration with other stakeholder groups including representatives from local government, businesses and the general public in order to develop a prioritized list of actions. Such a coordinated effort is listed as a watershed-wide programmatic action in the Habitat Plan:

• Program WW-15: Develop a Coordinated Acquisition Program for Natural Areas

The Habitat Plan also includes the following specific acquisition project:

• Project LG-13 - Acquisition, Levee Setback, and Habitat Rehabilitation Between RM 15.3 and 14.7 (Right Bank)

Priority 7 – Improve Riparian Vegetation, Reduce Impervious Coverage

Similar to Priority 3, Section G.3 above, to improve water quality and reduce sediment and pollutant delivery, improved riparian vegetation and reduction in impervious surfaces are emphasized throughout the Habitat Plan. All of the specific projects listed in Table 11 (LG No. 3, 4, 7, 9, 10, and 13) include some form of protecting and improving riparian vegetation. Watershed-wide programmatic actions also described in the Habitat Plan include many references to improving vegetative conditions and reducing impervious surface coverage. Specific reference to planting vegetation is listed in Program WW-5: Promote the Planting of Native Trees.

In addition to the items listed in the Habitat Plan, Section E.2 above lists many areas where improvements to riparian vegetative cover and reductions in impervious surfaces are warranted.

8. Priority 8 – Reduce Shoreline and Bank Armoring, Create or Enhance Natural Shoreline and Streambank Conditions

The preponderance of shoreline armoring and its association with impaired habitat conditions, specifically for juvenile chinook salmon, has been identified as one of the key limiting factors along the Green River (Kerwin and Nelson 2000). While it is recognized that levees and revetments cannot practically be removed in all

circumstances, considerations should be made to maintain and repair them using design approaches that incorporate native vegetation and large woody debris. Improvements to levees and revetments are discussed in Priority 1, Section G.1 above.

It is also recognized that reduction in shoreline armoring along lakes is also important (i.e. Lake Meridian and Lake Fenwick). While no specific lake project sites have been identified under this restoration priority, emphasis should be given to future project proposals that involve or have the potential to restore shoreline areas to more natural conditions. The City should explore ways in which to team with local property owners, whether through financial assistance, permit expedition, or guidance, to restore multiple contiguous lots.

9. Priority 9 – Reduction of In-water and Over-water Structures

Reduction of in- and over-water cover by piers, docks, and other boat-related structures is one mechanism to improve shoreline ecological functions. While not necessarily prevalent along the Green River, pier and docks are extensive along Lake Meridian with nearly 90 percent of all parcels having a pier or dock. The Washington Department of Fish and Wildlife already regulates the size and materials for in- and over-water structures throughout the State and generally recommends finding ways to reduce both the size and density of these structures. Although no specific project sites to reduce in-water and over-water structures within residential areas are identified here, future project proposals involving reductions in the size and/or quantity of such structures should be emphasized. Such future projects may involve joint-use pier proposals or pier reconstruction and may be provided with an expedited permit process.

10. Priority 10 - Reduce Aquatic Invasive Weeds in Lakes

While not specifically listed in the Habitat Plan, reduction of aquatic invasive weeds from the City's lakes is emphasized in Section E.2. All three lakes (Lake Fenwick, Lake Meridian, and Panther Lake) have experienced growth of non-native and often invasive aquatic vegetation. Problem species include Eurasian watermilfoil, Brazilian elodea and water lily. Future mechanisms to control weed growth range from possible substrate blankets (Lake Meridian) to introduction of grass carp (Lake Fenwick). Not only are aquatic weeds a problem for boats and swimmers, but they also tend to reduce dissolved oxygen to lethal levels for fish, hampering foraging opportunities.

11. Priority 11 – City Zoning, Regulatory, and Planning Policies

City policies and development regulations are listed as being of lower priority in this case simply because they have been the subject of a thorough review and have

recently been updated accordingly. Notably, the City's Critical Areas Ordinance was recently updated (August 2006) consistent with the Best Available Science for critical areas, including those within the shoreline area.

The City received its final National Pollutant Discharge Elimination System (NPDES) Phase II permit in January 2007 from Department of Ecology. The NPDES Phase II permit is required to include the City's stormwater discharges into regulated lakes and streams. Under the conditions of the permit, the City must protect and improve water quality through public education and outreach, detection and elimination of illicit non-stormwater discharges (e.g., spills, illegal dumping, wastewater), management and regulation of construction site runoff, management and regulation of runoff from new development and redevelopment, and pollution prevention and maintenance for municipal operations.

Watershed-wide programmatic actions listed in the Habitat Plan include three actions focused on regulatory mechanisms to restore ecological functions:

- Program WW-11: Expand/Improve Incentives Programs
- Program WW-12: Improve Enforcement of Existing Land Use and Other Regulations
- Program WW-14: Provide Incentives for Developers to Follow Built Green[™] Checklist Sections Benefiting Salmon

H. References

City of Kent. 2006 City of Kent Comprehensive Plan.

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- WRIA 9 Steering Committee. 2005. Salmon Habitat Plan: Making Our Watershed Fit for a King. August, 2005. <u>http://dnr.metrokc.gov/wrias/9/HabitatPlan.htm</u>.
- WRIA 9 Steering Committee. 2002. Green/Duwamish and Central Puget Sound Watershed (WRIA 9) Near-Term Action Agenda For Salmon Habitat Conservation. May 2002. <u>http://dnr.metrokc.gov/wrias/9/NTAA.htm</u>

Email correspondence. Tom Murdoch, Director, Adopt-A-Stream Foundation. June 2, 2008.

- Email correspondence. Lori Flemm, Superintendent of Parks & Open Space, Kent Parks, Recreation and Community Services. November 2008
- Personal interview. Beth Tan, P.E., Environmental Engineer III, City of Kent Public Works Environmental Engineering, November 6, 2008
- Personal interview. Matt Knox, Environmental Biologist, City of Kent Public Works Environmental Engineering. November 6, 2008
- Personal interview. Shawn M. Gilbertson, Environmental Engineer II, NPDES, City of Kent Public Works Engineering, November 6, 2008.
APPENDIX A: Shoreline Environment Designation Maps

















APPENDIX B Council Resolution No. 1714 Ratifying the WRIA Salmon Habitat Plan

Resolution No. 1714

["Beginning August 1, 2004"]

CFN= 1038 - Public Works Passed -11/15/05 WRIA 9 Chinook Salmon Conservation Plan

RESOLUTION NO. 1714

A **RESOLUTION** of the city council of the city of Kent, Washington, ratifying, with conditions, the Water Resource Inventory Area (WRIA) 9 Salmon Habitat Plan.

RECITALS

A. In March 1999, the National Oceanic and Atmospheric Administration (NOAA) Fisheries listed the Puget Sound Chinook salmon evolutionary significant unit as a threatened species under the Endangered Species Act (ESA).

B. Under ESA Section 4(f), NOAA Fisheries (for Chinook salmon) and USFWS (for Bull Trout) are required to develop and implement recovery plans to address the recovery of the species.

C. An essential ingredient for the development and implementation of an effective recovery program is coordination and cooperation among federal, state, and local agencies, tribes, businesses, researchers, non-governmental organizations, landowners, citizens, and other stakeholders as required.

D. Shared Strategy for Puget Sound, a regional non-profit organization, has assumed a lead role in the Puget Sound response to develop a recovery plan for submittal to NOAA Fisheries mid the USFWS.

E. Shared Strategy intends that its recovery plan will include commitments from participating jurisdictions and stakeholders.

F. Local jurisdictions have authority over some habitat-based aspects of Chinook survival through land use and other policies and programs; and the state and tribes, who are the legal co-managers of the fishery resource, are responsible for addressing harvest and hatchery management in WRIA 9.

G. In WRIA 9, habitat actions to significantly increase Chinook productivity trends are advisable and may be necessary, in conjunction with other recovery efforts, to avoid extinction hi the near term and restore WRIA 9 Chinook to viability in the long term.

H. As it balances the complexity of accommodating and encouraging growth as it addresses protection of critical areas, the city values ecosystem health; water quality improvement; flood hazard reduction; open space protection; and maintaining a legacy for future generations, including commercial, tribal, and sport fishing, quality of life, and cultural heritage.

I. The city supports cooperation at the WRIA level to set common priorities for actions among partners, efficient use of resources and investments, and distribution of responsibility for actions and expenditures.

J. Seventeen (17) local governments in WRIA 9 jointly funded development of *The WRIA 9 Steering Committee Proposed Green / Duwamish and Central Puget Sound Watershed Salmon Habitat Plan* (the Plan), published August 10, 2005, following public input and review. K. While the Plan recognizes that salmon recovery is a long-term effort, it focuses on the next 10 years and includes a scientific framework, a start-list of priority actions and comprehensive action lists, an adaptive management approach, and a funding strategy.

L. The city has consistently implemented habitat restoration and protection projects, and addressed salmon habitat through its land use and public outreach policies and programs over the past five years.

M. It is important to provide jurisdictions, the private sector, and the public with certainty and predictability regarding the course of salmon recovery actions that the region will be taking in the Green / Duwamish and Central Puget Sound Watershed.

N. If insufficient action is taken at the local and regional level, it is possible that the federal government could list Puget Sound Chinook salmon as an endangered species, thereby decreasing local flexibility.

NOW THEREFORE, THE CITY COUNCIL OF THE CITY OF KENT, WASHINGTON, DOES HEREBY RESOLVE AS FOLLOWS:

RESOLUTION

<u>SECTION 1.</u> - <u>Ratification.</u> The city hereby conditionally ratifies *The WRIA 9* Steering Committee Proposed Green / Duwamish and Central Puget Sound Watershed Salmon Habitat Plan, dated August 10, 2005 (the Plan). The Plan is incorporated into this resolution by this reference, and the city clerk will keep a copy of this ordinance and the Plan in his or her files and make it available for review. Ratification is intended to convey the city's approval and support for the following: 1. **Purpose:** The purpose of the Plan is to restore habitat used by Chinook salmon, hill **trout**, and other salmonids in the Green / Duwamish and Central Puget Sound Watershed.

- 2. Goals: The goals of the Plan are to:
 - a. Protect and restore physical, chemical, and biological processes and the freshwater, marine, and estuarine habitats on which salmonids depend;
 - b. Protect and restore habitat connectivity where feasible;
 - c. Protect and improve water quality and quantity conditions to support healthy salmonid populations; and
 - d. Provide an implementation plan that supports salmon recovery.

3. Continuing to work collaboratively with other jurisdictions and stakeholders in the Green / Duwamish and Central Puget Sound Watershed (WRIA 9) to implement the Plan.

4. Using the scientific foundation and the habitat management strategy as the basis for local actions recommended in the plan for future projects, ordinances, and other appropriate local government activities.

5. Adopting an adaptive management approach to Plan implementation and funding to address uncertainties and ensure cost-effectiveness by tracking actions, assessing action effectiveness, learning from results of actions, reviewing assumptions and strategies, making corrections where needed, and communicating progress. Developing and implementing a cost-effective regional monitoring program as part of the adaptive management approach.

6. Using the Proposed Actions and Policies to Achieve a Viable Salmonid Population, and other actions consistent with the Plan, as a source of potential site specific projects and land use and public outreach recommendations. Jurisdictions, agencies, and stakeholders can implement these actions at any time.

7. Using the Watershed-Wide Programs and Subwatershed-specific Policies, Programs and Priority Projects list to guide priorities for regional funding in the first ten years of Plan implementation, and implementing these actions through local capital improvement projects, ordinances, and other activities. The list of policies, programs and projects will be revised over time, as new opportunities arise and as more is learned through adaptive management.

8. Using an adaptive approach to funding the Plan through both local sources and by working together (within WRIA 9 and Puget Sound) to seek federal, state, grant, and other funding opportunities.

9. Forwarding the Plan to appropriate federal and state agencies through Shared Strategy for Puget Sound, to be included in the Puget Sound Chinook salmon recovery plan.

<u>SECTION 2.</u> - <u>Implementation</u>. The city recognizes that negotiation of commitments and assurances/conditions with appropriate federal and state agencies will be an iterative process. Full implementation of this Plan is dependent on the following:

1. NOAA Fisheries will adopt the Plan, as an operative element of its ESA Section 4(f) recovery plan for Puget Sound Chinook salmon.

2. NOAA Fisheries and USFWS will:

a. take no direct enforcement actions against the City under the ESA for implementation of actions recommended in or consistent with the Plan;

b. endorse the Plan and its actions, and defend the City against legal challenges by third parties; and

c. reduce the regulatory burden for City activities recommended in or consistent with the Plan that require an ESA Section 7 consultation.

3. Federal and state governments will:

a. provide funding and other monetary incentives to support Plan actions and monitoring activities;

b. streamline permitting for projects implemented primarily to restore salmonid habitat or where the actions are mitigation that further Plan implementation;

c. offer programmatic permitting for local jurisdiction actions that are consistent with the Plan;

d. support the monitoring and evaluation framework;

e. incorporate, to the best of the government's ability, actions and guidance from the Plan in future federal and state transportation and infrastructure planning and improvement projects; and

f. to the extent feasible, direct mitigation resources toward Plan priorities.

SECTION 3. - **Obligation.** This resolution does not obligate the city council to future appropriations beyond current authority. Although the city is committed to furthering the work of WRIA 9 and the Plan, it also must balance its other goals and priorities, beyond funding limitations, under the state Growth Management Act to further economic development, enhance and accommodate growth, and protect property rights. As a result, this council action to ratify the Plan is conditioned on the city's fulfillment of these other needs and demands as well.

In particular, the city maintains a primarily aquifer-based water supply system, and the city will not implement any Plan requirement or goal if doing so would threaten or harm the city's ability to provide a safe, secure, and adequate water supply to its citizens, including future population increases, whether due to annexation or additional growth through infill. <u>SECTION 4.</u> - <u>Severability.</u> If any section, subsection, paragraph, sentence, clause or phrase of this resolution is declared unconstitutional or invalid for any reason, such decision shall not affect the validity of the remaining portions of this resolution.

<u>SECTION 5.</u> - <u>Ratification.</u> Any act consistent with the authority and prior to the effective date of this resolution is hereby ratified and affirmed.

<u>SECTION 6.</u> - <u>Effective Date.</u> This resolution shall take effect and be in force immediately upon its passage.

PASSED at a regular open public meeting by the city council of the city of Kent, Washington, this <u>15th</u> day of <u>November</u> 2005.

ATTEST:

BRENDA JACOBER, CITY CLERK

APPROVED AS

APPENDIX C Restoration Plan Map



FINAL

Cumulative Impacts Analysis Component of the Shoreline Master Program Update for the City of Kent



Prepared for: City of Kent Planning Services 400 W Gowe Street Kent, WA 98032

September 2009

Prepared by:



CITY OF KENT

ARMSTRONG SPRINGS 17975 SE.275 PLACE

FINAL REPORT

CUMULATIVE IMPACTS ANALYSIS COMPONENT OF THE SHORELINE MASTER PROGRAM UPDATE FOR THE CITY OF KENT

PROJECT TITLE: SHORELINE MASTER PROGRAM UPDATE TASK 4.1: CUMULATIVE IMPACTS ANALYSIS

Prepared for:



City of Kent Planning Services 400 W Gowe Street Kent, Washington 98032

Prepared by:



750 6th Street South Kirkland, WA 98033



1904 3rd Ave, Suite 725 Seattle, Washington 98101



This report was funded in part through a grant from the Washington Department of Ecology.

September 2009

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CITY OF KENT SHORELINE MASTER PROGRAM UPDATE CUMULATIVE IMPACTS ANALYSIS

1. INTRODUCTION

1.1 Shoreline Management Act Requirements

The Shoreline Management Act guidelines require local shoreline master programs to regulate new development to "achieve no net loss of ecological function." The guidelines (WAC 173-26-186(8)(d)) state that, "To ensure no net loss of ecological functions and protection of other shoreline functions and/or uses, master programs shall contain policies, programs, and regulations that address adverse cumulative impacts and fairly allocate the burden of addressing cumulative impacts."

The guidelines further elaborate on the concept of net loss as follows:

"When based on the inventory and analysis requirements and completed consistent with the specific provisions of these guidelines, the master program should ensure that development will be protective of ecological functions necessary to sustain existing shoreline natural resources and meet the standard. The concept of "net" as used herein, recognizes that any development has potential or actual, short-term or long-term impacts and that through application of appropriate development standards and employment of mitigation measures in accordance with the mitigation sequence, those impacts will be addressed in a manner necessary to assure that the end result will not diminish the shoreline resources and values as they currently exist. Where uses or development that impact ecological functions are necessary to achieve other objectives of RCW 90.58.020, master program provisions shall, to the greatest extent feasible, protect existing ecological functions and avoid new impacts to habitat and ecological functions before implementing other measures designed to achieve no net loss of ecological functions." [WAC 173-206-201(2)(c)]

In short, updated SMPs shall contain goals, policies and regulations that prevent degradation of ecological functions relative to the existing conditions as documented in that jurisdiction's characterization and analysis report. For those projects that result in degradation of ecological functions, the required mitigation must return the resultant ecological function back to the baseline. This is illustrated in the figure below. The jurisdiction must be able to demonstrate that it has accomplished that goal through an analysis of cumulative impacts that might occur through implementation of the updated SMP. Evaluation of such cumulative impacts should consider:

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



Source: Department of Ecology

As outlined in the *Shoreline Restoration Plan* prepared as part of this SMP update, the SMA also seeks to restore ecological functions in degraded shorelines. This cannot be required by the SMP at a project level, but Section 173-26-201(2)(f) of the Guidelines says: "master programs shall include goals and policies that provide for restoration of such impaired ecological functions." See the *Shoreline Restoration Plan* for additional discussion of SMP policies and other programs and activities in Kent that contribute to the long-term restoration of ecological functions relative to the baseline condition.

1.2 Methodology

Using the information, both textual and graphic, developed and presented in the *Final Shoreline Inventory and Analysis*, this cumulative impacts analysis was prepared consistent with direction provided in the Shoreline Master Program Guidelines as described above. To the extent that existing information was sufficiently detailed and assumptions about possible new or redevelopment could be made with reasonable certainty, the following analysis is quantitative. However, in many cases information about existing conditions and/or redevelopment potential was not available at a level that could be assessed quantitatively or the analysis would be unnecessarily complex to reach a conclusion that could be derived more simply. Further,

ecological function does not have an easy metric. For these reasons, much of the following analysis is more qualitative.

2. EXISTING CONDITIONS

The following summary of existing conditions is based on the *Final Shoreline Inventory and Analysis Report*. This discussion has been divided by waterbody and by proposed shoreline environment designations (see Appendix A of the SMP for a map of environment designations). Environment designations include Urban Conservancy – Open Space (UC-OS), Urban Conservancy – Low Intensity (UC-LI), Shoreline Residential (SR), High Intensity (HI), Natural Wetlands (NW), and Aquatic designations. The Shoreline Analysis Report includes an in-depth discussion of the topics below, as well as information about transportation, stormwater and wastewater utilities, impervious surfaces, and historical/archaeological sites, among others.

2.1 Green River

The Green River shoreline has a variety of uses, including parks, trails and open spaces (typically designated UC-OS); large scale industrial uses such as warehouses and office buildings (typically designated HI), residential areas consisting of single- and multi-family housing (typically designated SR), and agricultural activities (typically designated UC-LI, including the large area of floodway associated with the Mill Creek Auburn/Green River interaction). In addition, there are a number of wetlands associated with the Green River shoreline as a result of their presence in the floodplain. These wetlands are all designated Natural-Wetlands (NW). Land use conditions in each Green River segment can be found in Tables 7 through 10 in the Final Shoreline Inventory and Analysis Report. The performance of functions in the Green River shoreline is extremely variable, relating primarily to the presence or absence of levees and development throughout the corridor. Higher functioning areas in the City and the PAA, such as in the Horsehead Bend area and southward, have more open space, fewer levees, more vegetation, and less development. Detailed information about existing functions, including a performance rating of individual Green River functions, can be found in the Final Shoreline Inventory and Analysis Report, Sections 5.1 (Tables 14a and 14b) and 6.1, as well as on maps found in Appendix C (Figures 17a-c) of that report.

2.2 Big Soos Creek

The Big Soos Creek shoreline area in the City of Kent affects only five parcels within the City. Three of the parcels each contain a single-family residence (although jurisdiction generally encompasses only the yard areas of the properties, not the residences themselves), the fourth is part of King County's Soos Creek Park, and the fifth is owned by WSDOT. The collective performance of functions in the Big Soos Creek shoreline is mapped Medium High (see Figure 17d in Appendix C of the *Final Shoreline Inventory and Analysis Report*), because of its extensive vegetation, low level of shoreline modification, and low level of development. Based on the planned land use and the relatively high function level, the Big Soos Creek shoreline is designated as UC-LI. Detailed information about existing functions, including a performance rating of individual Big Soos Creek functions, can be found in the *Final Shoreline Inventory and Analysis Report*, Sections 5.2 (Table 15) and 6.2.

2.3 Lake Meridian

The Lake Meridian shoreline contains two major land uses: 1) Lake Meridian Park, which occupies a roughly 1,400-foot stretch of shoreline at the southeast corner of the lake (designated UC-OS); and 2) residential development, primarily single-family homes and a mobile home park (designated SR). The residential shoreline was mapped as collectively having Low Medium function because of its extensive development, low level of vegetation, and high percentage of overwater structures and armoring (see Figure 17e in Appendix C of the *Final Shoreline Inventory and Analysis Report*). The park earned a higher Medium rating for its low level of development and some natural space. Detailed information about existing functions, including a performance rating of individual Lake Meridian functions, can be found in the *Final Shoreline Inventory and Analysis Report*, Sections 5.3 (Table 16) and 6.3.

2.4 Lake Fenwick

Similar to Lake Meridian, the Lake Fenwick shoreline contains two major land uses: 1) Lake Fenwick Park, which occupies a roughly 700-foot stretch of shoreline along the west shore of the lake, and other forested open space (designated UC-OS); and 2) residential development, primarily single-family homes, located primarily on the northeast corner and southwest corner of the lake in the PAA (designated SR). The park and much of the residential shoreline was mapped as collectively having Medium High function because of its extensive vegetation and low level of alteration (see Figure 17f in Appendix C of the *Final Shoreline Inventory and Analysis Report*). The park earned a High rating for the same reasons, and because of the absence of shoreline modifications. Detailed information about existing functions, including a performance rating of individual Lake Fenwick functions, can be found in the *Final Shoreline Inventory and Analysis Report*, Sections 5.4 (Table 17) and 6.4, as well as on maps found in Appendix C of that report.

2.5 Green River Natural Resources Area Pond

The Green River Natural Resources Area (GRNRA) pond is a City-owned and managed water quality management facility that includes extensive habitat enhancement and wildlife viewing activities, as well as associated wetlands. The facility includes two human-constructed ponds connected by a weir that constitute an approximately 55-acre lake. The GRNRA pond and associated shorelands received a comprehensive Medium High ecological function rating because of its high habitat value and low level of development (see Figure 17b in Appendix C of the *Final Shoreline Inventory and Analysis Report*). However, the pond management and structures reduce its value. As restoration continues on the site, the GRNRA pond and shorelands will continue to improve in function. The entire shoreline area, including shorelands, is designated UC-OS. Detailed information about existing functions, including a performance rating of individual GRNRA functions, can be found in the *Final Shoreline Inventory and Analysis Report*, Sections 5.5 (Table 18) and 6.5.

2.6 Springbrook Creek

Most of the Springbrook Creek shoreline jurisdiction is zoned, planned and developed for Industrial use. However, narrow corridors between the stream and the adjacent developments are vegetated, and have been enhanced by the City. The developed area is designated as HI and the vegetated corridors are designated UC-OS. Overall, Springbrook Creek shoreline was rated Low because of the proximity of adjacent development and presence of armoring and culvert at the north end (see Figure 17c in Appendix C of the *Final Shoreline Inventory and Analysis Report*). Detailed information about existing functions, including a performance rating of individual Springbrook Creek functions, can be found in the *Final Shoreline Inventory and Analysis Report*, Sections 5.6 (Table 19) and 6.6.

2.7 Jenkins Creek

The Jenkins Creek shoreline consists solely of the City's Armstrong Springs municipal watershed area. There are no structures located on the property within shoreline jurisdiction, and the shoreland area is a mix of upland and wetland forest. The Jenkins Creek shoreline received a collective High ecological function rating because of its high habitat value and low level of development (see Figure 17d in Appendix C of the *Final Shoreline Inventory and Analysis Report*). The entire shoreline area is designated UC-OS. Detailed information about existing functions, including a performance rating of individual Jenkins Creek functions, can be found in the *Final Shoreline Inventory and Analysis Report*, Sections 5.7 (Table 20) and 6.7.

2.8 Panther Lake

Panther Lake has been inventoried and analyzed by King County as part of its SMP update. The entire lake is in unincorporated King County, and within the City's PAA. King County gave the lake an overall High ecological function rating on the east shore, and a Medium High rating on the rest of the lake that has a higher level of modification related to low-density residential use (see Figure 17g in Appendix C of the *Final Shoreline Inventory and Analysis Report*). The low-density residential and critical areas/open space lands are designated as UC-LI. The remainder of the shoreline containing higher-density residential uses, most of which are outside of shoreline jurisdiction, is designated as SR. Detailed information about existing functions, including a performance rating of individual Panther Lake functions, can be found in the *Final Shoreline Inventory and Analysis Report*, Sections 5.8 (Table 21) and 6.8.

3. DEVELOPMENT POTENTIAL

Each waterbody was grossly divided into units (see Figures 3a-3h in the *Final Shoreline Inventory and Analysis Report*) at a reach or similar scale anticipated to match somewhat closely with the future development of the environment designations. For the most part, the unit breaks do correspond closely with a given environment designation, although additional complexity was added during environment designation development to divide Urban Conservancy into two designations and to recognize parallel environments, which are common along the Green River where the trail parallels development.

3.1 Green River

The following table is an excerpt of material included in Chapter 6 of the *Final Shoreline Inventory and Analysis Report*.

Sub-Unit	Likely Changes in Land Use				
Green River Unit A – Open Space (Ge	nerally Aligned with the Urban Conservancy – Open Space or				
Urban Conservancy – Low Intensity D	Urban Conservancy – Low Intensity Designations)				
A-1. Open space area on the east	This area is designated as Urban Separator (US), so therefore				
side of the river to the north and	may redevelop with low density residential or clustered				
south of South 277th Street bounded	residential with the possibility of some low intensity commercial.				
by the City limits					
A-2. Foster Park is on the north side	There are no likely changes in land use, except for minor park				
of the river generally west of the	improvements and potentially some environmental restoration.				
railroad line and east of the Valley	The City should consider changing the land use designation to				
Freeway (SR 167)	Open Space because it currently has an industrial designation.				
A-3. Riverview Park is on the north	I here are no likely changes in land use, except for minor park				
and east side of the river just west of	improvements and potentially some environmental restoration.				
(ne valley Freeway (SR 167)	Land use shange in this gras is unlikely because most of the				
A-4. Undeveloped area on south	shoreland area is also a stream corrider. This area is				
Valley Fwy (SR 167)	designated AG-S however so some low intensity commercial				
	development may occur				
A-5. The Riverbend Golf Complex	This area is unlikely to change as this is designated as OS				
	(Open Space) in the Comprehensive Plan.				
A-6. Golf course and open space on	The area that is designated OS (Open Space) is unlikely to				
the south and west side of the river	change, but the area designated US (Urban Separator) has the				
from the city limits south of W.	potential to be redeveloped unless the land use designation is				
Meeker St. to the industrial area	changed.				
north of the golf complex					
A-7. Open space on the west side of	This area is designated as Urban Separator (US), so therefore				
the river from Cottonwood Grove	may redevelop with low-density residential or clustered				
Park to the residential area	residential with the possibility of some low-intensity commercial.				
approximately 2,400° north of S					
228th Street	This area is unlikely to shange as it is in public symporphis and				
	used for water quality and natural resource purposes. The area				
Alea	is designated OS				
A-9 Valley Floor Community Park	The park is likely to remain a park, but will likely develop with				
	more active uses, although perhaps not within shoreline				
	iurisdiction. There are opportunities to increase public access				
	and increase opportunities for water-dependent recreational				
	uses when this park is improved. Environmental restoration				
	should also be considered.				
A-10. Green River Trail north of S	The Green River Trail corridor is unlikely to develop as it is				
212th St and south of Russel Road	designated OS. The underdeveloped industrial land may				
	develop, but it is outside shoreline jurisdiction.				
A-11. Future North Green River	This area is unlikely to change land uses. The only changes				
Park on the east shoreline just south	might include some park improvements.				
of the City limits.					
PAA-A-1. Area within the PAA and	The area that is designated OS (Open Space) is unlikely to				
City Limits north and east of the river	change, but the area designated US (Urban Separator) has the				
at the easternmost segment of the	potential to be redeveloped to low density residential or clustered				
Green River shorelands within the	residential unless the land use designation is changed				
City and PAA					

Table 1.	Likely changes in	Green River lar	nd use by sub-unit.
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Sub-Unit	Likely Changes in Land Use					
Green River Unit B – High Intensity (G	enerally Aligned with the High Intensity Designation)					
B-1. Industrial area north of the river from commercial lot east of Central Ave, generally west and north to Foster Park	With the Industrial land use designation and predominance of industrial activities, it is likely that underdeveloped shoreline properties (approximately 1,000 feet of shoreline) will, over time, convert to large- to moderate-scale industrial uses.					
B-2. Industrial area south of the river just east of the Valley Freeway (SR 167)	With the Industrial land use designation and predominance of industrial activities, it is unlikely that property in this area will change use.					
B-3. Industrial area north of the river just east of the Valley Freeway (SR 167) located between Foster Park and Riverview Park	With the Industrial land use designation and predominance of industrial activities, it is unlikely that property in this area will change use.					
B-4. Small industrial area north of the river between the Valley Freeway (SR 167) and SR 181.	With the Mixed Use (MU) land use designation and predominance of industrial activities, it is unlikely that property in this area will change use.					
B-5. Industrial area located along Russell R. north of S. 228 th St and south of the GRNRA	With the Industrial land use designation and predominance of industrial activities, it is unlikely that property in this area will change use. Russell Road is located in shoreline jurisdiction in this area. The comprehensive plan designation is OS (Open Space) in the Green River Trail corridor area.					
B-6. Industrial area along east side of the river north of S 200 th St.	It is unlikely that these relatively new facilities will change in the foreseeable future.					
B-7. Industrial and commercial area east of SR 181 and south of SW 43 rd St	The commercial parcel will likely develop in the near future. It is also likely that the single-family residence will redevelop into an industrial use at some point in the future. The hotel is unlikely to change because it appears to be a fairly new building.					
PAA-B-1. Shorelands in the potential annexation area (PAA) generally south of the river and west of the Valley Freeway (SR 167)	This area is designated Industrial in King County's Comprehensive Plan so it is likely to remain in industrial use.					
Green River Unit C – Residential (Gen	erally Aligned with the Shoreline Residential Designation)					
C-1. Residential area north and west side of the Green River east of Central Ave	The Comprehensive Plan designation is Medium Density Multifamily and Mobile Home Park. There are no likely land use changes because the current land uses fit the comprehensive plan.					
C-2. Residential area on north side of the river from one property west of SR 181 to the golf course at Russell Rd	There is little likelihood of a change in land use because the residences are relatively new and they are consistent with the MDMF (Medium Density Multifamily) land use designation.					
C-3. Residential area on east side of River from James Street north to S. 228 th Street	There is little likelihood of a change in land use because the residences are relatively new and they are consistent with the LDMF (Low Density Multifamily) land use designation.					
C-4. Residential area on west side of River south of S 216 Street	There will be approximately 1,000 feet of new residential development with perhaps about 20 new homes in this segment. These new homes will all be separated from the shoreline by the existing frontage road, Frager Road.					
C-5. Recreational Vehicle (RV) Campground (KOA) on east side of the river south of S. 212 th St. and north of the GRNRA	This use is somewhat an anomaly in this area and so may change in spite of the current comprehensive plan designation. Because of the industrial uses around it, it may be developed as industrial although the GRNRA is a local amenity and so multifamily housing might be a possibility.					
Sub-Unit	Likely Changes in Land Use					
---	---	--	--	--	--	--
Green River Unit D – Agricultural (Generally Aligned with the Urban Conservancy — Low Intensit						
D-1. South of the river just west of	This area is designated as AG-S and AG-R, so some					
Valley Freeway (SR 167)	agricultural-related low intensity commercial development may occur.					
D-2. Agricultural activities on the west side of the river from Riverbend Golf Course to Cottonwood Grove Park	This area is designated as Urban Separator (US), so therefore may redevelop with low density residential or clustered residential with the possibility of some low intensity commercial.					
D-3. Agricultural area on west side of river south of S. 212 th Street	This area is being redeveloped into single-family houses. Since this area comprises approximately 2,000 linear feet of shoreline, it is conceivable that 20 to 40 new dwelling units might fall within shoreline jurisdiction. They would be separated from the shoreline by a frontage road.					
D-4. Agricultural lands north of Valley Floor Community Park	This area is designated US (Urban Separator) and AG-R, so therefore may redevelop with low density residential or clustered residential with the possibility of some low intensity commercial					

3.2 Big Soos Creek

This area is designated "Urban Separator," so therefore may redevelop with low-density residential or clustered residential with the possibility of some low-intensity commercial if part of a Planned Unit Development.

3.3 Lake Meridian

Unit A - Open Space (corresponding to the UC-OS environment designation) is unlikely to change because Lake Meridian Park is designated as OS (Open Space) in the Comprehensive Plan. The wetland area south of SR 516 currently designated in the City's Comprehensive Plan for single-family development is owned by the City of Kent and should likely be re-designated as Open Space. Unit C - Residential (corresponding to the SR environment designation) has a few lots that are either underdeveloped or could possibly be subdivided, although the effect on the overall land use would be minimal. The most likely development consists of modifications related to shoreline stabilization and piers and other overwater structures.

3.4 Lake Fenwick

Changes in land use around Lake Fenwick are unlikely within Kent jurisdiction or in the lands designated as "King Co. Other Parks/Wilderness" (corresponding to environment designations of SR and UC-OS). However, the residential-designated area within the PAA has the potential to redevelop and possibly increase in density (corresponding to an environment designation of SR).

3.5 Green River Natural Resources Area Pond

Changes in land uses are unlikely. This site is in public ownership and used for water quality and natural resource purposes (corresponding to an environment designation of UC-OS). There is a small utility property within shoreline jurisdiction.

3.6 Springbrook Creek

No changes in land use are anticipated as the adjacent land is fully developed (environment designation of HI) or protected (environment designation of UC-OS).

3.7 Jenkins Creek

No changes in land use are anticipated, as this land is protected for water supply purposes.

3.8 Panther Lake

The north, northeast, and southern tip of the lake are within the Urban Separator land use classification. This area may therefore redevelop with low-density residential or clustered residential with the possibility of some low intensity commercial (corresponding to the UC-LI environment designation). On the west side of the lake, in the area with a residential land use designation, there is approximately 1,200 linear feet within shoreline jurisdiction that is currently underdeveloped and therefore has the potential to develop into residential uses (corresponding to SR environment designation). The development pattern will likely be similar to the residential development along the southwest corner of the lake.

4. **PROTECTIVE SMP PROVISIONS**

4.1 Environment Designations

The first line of protection of the City's shorelines is the environment designation assignments (see map in Appendix A of the SMP). The Natural-Wetlands environment is the most restrictive, followed by the two Urban Conservancy environments (Open Space and Low Intensity). Only a few uses are allowed outright in either of these environments (primarily water-oriented uses), and several others are allowed only in special circumstances related to provision of public access or to enable restoration or as conditional uses. In some respects, the Shoreline Residential environment is as restrictive or more restrictive than the two Urban Conservancy environments. The most permissive environment is High-Intensity, which has only been assigned to those areas along the Green River and Springbrook Creek that are already developed with commercial or other uses. Most often, the High-Intensity environment is separated from the shoreline by a parallel Urban Conservancy-Open Space designation.

Tables 2 and 3 (Tables 6 and 5, respectively, in the SMP) below identify the prohibited and allowed uses and modifications in each of the shoreline environments, and clearly show a hierarchy of higher-impacting uses and modifications being allowed in the already highly altered shoreline environments, with uses more limited in the less developed areas. This strategy helps to minimize cumulative impacts by concentrating development activity in lower functioning areas that are not likely to experience function degradation with incremental increases in new development.

Table 2.	Shoreline Use Matrix	(Table 6 in Chapter 5.B.	of the Shoreline Master Program)
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 P = May be permitted C = May be permitted as a conditional use only X = Prohibited; the use is not eligible for a variance or conditional use permit¹² N/A = Not applicable SHORELINE USE 	Natural-Wetlands	High-Intensity	Urban Conservancy - Open Space	Urban Conservancy - Low intensity	Shoreline Residential	Aquatic
Agriculture	Х	P^{10}	P ¹⁰	Р	P ¹⁰	Х
Aquaculture	Х	Х	Х	Х	Х	Х
Boating facilities ¹⁴	Х	Р	Р	Х	Р	Р
Commercial:						
Water-dependent	Х	Р	P^1	P ⁹	Х	Х
Water-related, water-enjoyment	Х	Р	P^1	P ⁹	Х	Х
Nonwater-oriented	Х	C ⁴	Х	C ^{4, 9}	Х	Х
Flood hazard management	Х	Р	Р	Р	Р	С
Forest practices	Х	Х	Х	Х	Х	Х
Industrial:						
Water-dependent	Х	Р	Х	Х	Х	Х
Water-related, water-enjoyment	Х	Р	Х	Х	Х	Х
Nonwater-oriented	Х	P⁴	Х	Х	Х	Х
In-stream structures	С	С	С	С	С	С
Mining	Х	Х	Х	Х	Х	Х
Parking (accessory)	Х	Р	P^2	P^2	Р	Х
Parking (primary, including paid)	Х	Х	Х	Х	Х	Х
Recreation:						
Water-dependent	P^3	Р	Р	Р	Р	Р
Water-enjoyment	P^3	P	P	P	Р	Х
Nonwater-oriented	Х	P ⁴	P ⁴	C ⁴	Р	Х
Single-family residential	Х	Х	Х	P ⁸	Р	Х
Multifamily residential	Х	Р	Х	С	Р	Х
Land subdivision	Р	Р	P٥	С	Р	Х
Signs:						
On premises	Х	Р	P٥	С	Х	Х
Off premise	Х	Х	Х	Х	Х	Х
Public, highway	Х	Р	Р	Р	Х	Х
Solid waste disposal	Х	Х	Х	Х	Х	Х
Transportation:						
Water-dependent	Х	Р	Р	Р	С	P
Nonwater-oriented	X	Р	C	C	Р	C'
Roads, railroads	C'	Р	P'	P'	Р	C'
Utilities (primary)	C′	Р	Ρ'	Ρ'	Р	C'

Use Matrix Notes:

1. Park concessions, such as small food stands, cafes, and restaurants with views and seating oriented to the water, and uses that enhance the opportunity to enjoy publicly accessible shorelines are allowed.

2. Accessory parking is allowed in shoreline jurisdiction only if there is no other feasible option, as determined by the City.

3. Passive activities, such as nature watching and trails, that require little development with no significant adverse impacts may be allowed.

- 4. Nonwater-oriented uses may be allowed as a permitted use where the City determines that waterdependent or water-enjoyment use of the shoreline is not feasible due to the configuration of the shoreline and water body or due to the underlying land use classification in the comprehensive plan.
- 5. Land division is only allowed where the City determines that it is for a public purpose.
- 6. Signs are allowed for public facilities only.
- 7. Roadways and public utilities are allowed if there is no other feasible alternative, as determined by the City, and all significant adverse impacts are mitigated.
- 8. Residences are allowed in shoreline jurisdiction only if it is not feasible, as determined by the City, to locate the building on the portion of the property outside shoreline jurisdiction.
- 9. Commercial uses are only permitted as part of a residential PUD of at least 100 acres, located within an SR zone, or at least 10 acres for residential PUDs located in other zones. Commercial uses shall be limited to those uses permitted by Title 15 KCC, as amended, in the neighborhood convenience commercial district.
- 10. Crop and tree farming only. See Section 15.04.130 KCC, as amended.
- 11. For the treatment of existing nonconforming development, see Chapter 7 Section E.
- 12. Development in channel migration zones is allowed only by conditional use permit where it can be shown that such development would not prevent natural channel migration. (Refer to the Channel Migration Zone Map, Figure No. 10.2 in the June 9, 2009 Final Shoreline Inventory and Analysis Report).
- 13. Uses noted as allowed in the Aquatic environment are allowed only if allowed in the adjacent upland environment.
- 14. Marinas are prohibited.

Table 3.	Shoreline	Modification	Matrix	(Table	5	in	Chapter	4.B.	of	the	Shoreline	Master
	Program)											

 P = May be permitted C = May be permitted as a conditional use only X = Prohibited; the use is not eligible for a variance or conditional use permit¹² N/A = Not applicable SHORELINE MODIFICATIONS	Natural-Wetlands	High-Intensity	Urban Conservancy - Open Space	Urban Conservancy - Low Intensity	Shoreline Residential	Aquatic
Shoreline stabilization:						
Environmental restoration/enhancement	Р	Р	Р	Р	Р	Р
Bioengineering	С	Р	Р	Р	Р	С
Revetments	Х	Р	С	С	Р	С
Bulkheads	Х	Р	С	С	Р	С
Breakwaters/jetties/rock weirs/groins	Х	Х	Х	Х	Х	Х
Dikes, levees	Х	Р	Р	Р	С	С
Clearing and Grading	Х	Р	Р	Р	Р	NA
Dredging	N/A	N/A	N/A	N/A	N/A	С
Hazardous waste cleanup	Р	Р	Р	Р	Р	Р
Fill ¹	Х	Р	Р	P ³	P ³	C ²
Piers, docks ⁴	Х	Р	Р	Р	Р	Р
Moorage piles and mooring buoys	Х	Х	Х	Х	Х	Х

Shoreline Modifications Matrix Notes:

1. Fill in the floodplain must meet all federal, state, and local flood hazard reduction regulations.

2. Fill in aquatic areas for the purposes of shoreline ecological restoration may be allowed as a permitted use if the City determines that there will be an increase in desired ecological functions.

3. Disposal of dredge material within a channel migration zone shall require a conditional use permit (refer to the Channel Migration Zone Map, Figure No. 10.2 in the Inventory and Analysis Report).

4. New non-public piers and docks are prohibited on the Green River.

4.2 General Goals, Policies and Regulations

The SMP contains numerous general policies, with supporting regulations (see SMP), intended to protect the ecological functions of the shoreline and prevent adverse cumulative impacts. These policies are summarized below.

- Critical areas within shoreline jurisdiction will be regulated per the critical areas regulations, which were developed using best available science (see **3.B.3** of the SMP and Chapter 11.06 of the KCC).
- All new development should provide adequate setbacks to protect or restore ecological functions and ecosystem-wide processes, consistent with the critical areas regulations.
- All significant adverse impacts to the shoreline should be avoided or, if that is not possible, minimized to the extent feasible (see **3.B.4**).
- Protect and, where appropriate, restore the physical integrity of ecological processes, including water and sediment transport and natural channel movement (**3.B.5.b.2.b**).
- Vegetation within the City shoreline areas should be enhanced over time to provide a greater level of ecological functions, human safety, and property protection (**3.B.11.b.1**).
- Protect water quality and natural groundwater movement (**3.B.12.b** and **3.B.5.b.2.c**).
- Protect fish, vegetation, and other life forms and their habitat vital to the aquatic food chain (**3.B.5.b.2.d**).

Setbacks have been established by environment designation and for specific uses as follows:

 Table 4.
 Development Standards Matrix (Table 7 in Chapter 5.B. of the Shoreline Master Program)

DEVELOPMENT STANDARDS ^{1, 5} (Regulatory citation in parentheses)	Natural-Wetlands	High-Intensity	Urban Conservancy - Open Space	Urban Conservancy - Low Intensity	Shoreline Residential	Aquatic
Commercial Development (Ch. 5 Sec. C.4)						
Water-dependent setback	N/A	0	0	0	N/A	N/A
Water-related, water-enjoyment setback ⁴	N/A	30' ²	30' ²	50' ²	N/A	N/A
Nonwater-oriented setback ⁴	N/A	70' ²	70' ²	100' ²	N/A	N/A
Industrial Development (Ch. 5 Sec. C.5)						
Water-dependent (Ch. 5. Sec C.5.c.9)	N/A	0	N/A	N/A	N/A	N/A
Water-related and water-enjoyment ⁴ <i>(Ch. 5 Sec.C.5.c.9)</i>	N/A	50' ²	N/A	N/A	N/A	N/A

DEVELOPMENT STANDARDS ^{1, 5} (Regulatory citation in parentheses)	Natural-Wetlands	High-Intensity	Urban Conservancy - Open Space	Urban Conservancy - Low Intensity	Shoreline Residential	Aquatic
Accessory Parking (Ch. 3 Sec. B.6)						
Setbacks ⁴	N/A	70' ²	70' ²	70' ²	N/A ³	N/A
Recreational Development						
Water-dependent park structures setback	N/A	0	0	0	N/A	N/A
Water-related, water-enjoyment park structures setback	N/A	20'	20'	20'	N/A	N/A
Nonwater-oriented park structures setback ⁴ (Ch. 5 Sec. C.7.c.4)	N/A	70' ²	70' ²	70' ²	N/A	N/A
Miscellaneous						
New agricultural activities setback (Ch. 5 Sec. C.2.c.4)	N/A	N/A	N/A	20' ²	N/A	N/A
Residential Development ⁴		See reg	ulations ir	n Ch. 5 Se	c. C.8.c	

Development Standards Matrix Notes:

1. See Chapter 3 Section B.1.c.7 for setbacks to accommodate future Green River levee reconstruction.

2. The City may reduce this dimension if it determines that the type of development allowed within this SMP and other municipal, state, and federal codes cannot be accommodated within the allowed site development area by reconfiguring, relocating, or resizing the proposed development. Where the City reduces a requirement, compensatory mitigation, such as vegetation enhancement or shoreline armoring removal, must be provided as determined by the City.

3. See regulation 5.B.8.c for residential development standards.

4. The setback for all development, except water-dependent development, on the Green River not separated from the shoreline by a levee is 150 feet.

5. For height regulations, see Chapter 15.04 KCC, as amended, for the underlying zoning district.

4.3 General Cumulative Impacts Assessment

The following table (Table 5) summarizes for each environment designation and corresponding waterbody the existing conditions, anticipated development, relevant Shoreline Master Program (SMP) and other regulatory provisions, and the expected net impact on ecological function. Certain special topics are discussed and analyzed in greater detail in Chapter 5 following the table. The discussion of existing conditions is based on the *Final Shoreline Inventory and Analysis Report*, and additional analysis needed to perform this assessment. The *Final Shoreline Inventory and Analysis Report* includes a more in-depth discussion of the topics below, as well as information about transportation, stormwater and wastewater utilities, impervious surfaces, and historical/archaeological sites, *among others*. Jenkins Creek is not included in the table as it is a protected watershed area and owned and managed by the City of Kent for drinking water.

In addition to the environment designations discussed in the following tables, the following designations will apply to those applicable areas of shoreline jurisdiction:

<u>"Natural-Wetlands" Environment</u> - The purpose of the "Natural-Wetlands" environment is to protect and restore all wetlands associated with shorelines by applying the City of Kent Critical Areas regulations. These systems require development restrictions to maintain the ecological

functions and ecosystem-wide processes. A "Natural-Wetlands" environment designation will be assigned to all wetlands in shoreline jurisdiction.

<u>"Aquatic" Environment</u> - The purpose of the "Aquatic" environment is to protect, restore, and manage the unique characteristics and resources of the areas waterward of the ordinary high water mark. An "Aquatic" environment designation will be assigned to shoreline areas waterward of the ordinary high-water mark.

The critical areas regulations and the prohibition of most uses and modifications in the Natural-Wetlands environment ensure no net loss of ecological functions in this environment. Aquatic environment impacts are discussed in other sections below.

4.4 Shoreline Restoration Plan

As discussed above, one of the key objectives that the SMP must address is "no net loss of ecological shoreline functions necessary to sustain shoreline natural resources" (Ecology 2004). However, SMP updates seek not only to maintain conditions, but to improve them:

"...[shoreline master programs] include planning elements that when implemented, serve to improve the overall condition of habitat and resources within the shoreline area of each city and county (WAC 173-26-201(c))."

The guidelines state that "master programs shall include goals, policies and actions for restoration of impaired shoreline ecological functions. These master program provisions should be designed to achieve overall improvements in shoreline ecological functions over time, when compared to the status upon adoption of the master program" (WAC 173-26-201(2)(f)). Pursuant to that direction, the City has prepared a Shoreline Restoration Plan, which is a non-regulatory chapter of the SMP (Chapter 8).

Practically, it is not always feasible for shoreline developments and redevelopments to achieve no net loss at the site scale, particularly for those developments on currently undeveloped properties or a new pier or bulkhead. The Restoration Plan, therefore, can be an important component in making up that difference in ecological function that would otherwise result just from implementation of the SMP. The Restoration Plan represents a long-term vision for restoration that will be implemented over time, resulting in incremental improvement over the existing conditions.

The Shoreline Restoration Plan identifies a number of project-specific opportunities for restoration on both public and private properties inside and outside of shoreline jurisdiction, and also identifies ongoing City programs and activities, non-governmental organization programs and activities, and other recommended actions consistent with a variety of watershed-level efforts (Sections 8.D and 8.E, see Appendix C in the SMP for the site-specific restoration opportunities map).

Table 5. General Cumulative Impacts Assessment.

Shoreline Segment	Existing Conditions	Likely Development / Functions or Processes Potentially Impacted	Effect of SMP Provisions	Effect of Other Development and Restoration Activities / Programs	Net Effect
HIGH INTENSITY					
Green River (all or portions of segments B1-7 and PAA-B1 as described in SMP Section 2.C.2.d and Appendix A of the SMP)	These segments include areas generally dominated by commercial and industrial uses. This includes industrial areas just east and west of SR 167 (near SE 259 th St.), along Russell Road between I-5 and SR 167, and near Briscoe Park (just south of S 180 th St.). Uses are generally one-story buildings surrounded by surface parking lots. A majority of the buildings are separated from the shoreline by the Green River Trail corridor and Urban Conservancy – Open Space environment designation.	 Future Development: It is likely that underdeveloped shoreline properties (approximately 1,000 feet of shoreline) will, over time, convert to large- to moderate-scale industrial uses. Remaining areas are built-out and thus unlikely to undergo extensive redevelopment. Functions/Processes Impacted: Hydrology: Because of the position of the potential new development relative to the river and the levee, potential impacts are generally related to indirect effects of new impervious surface and stormwater management on hydrologic processes (see Table 14a of the <i>Final Shoreline Inventory and Analysis Report</i>). Per the analysis in Table 14a of the <i>Final Shoreline Inventory and Analysis Report</i>, hyporheic function currently is low because of past hydromodifications to the system. Vegetation and habitat: Upland and aquatic habitat and vegetation functions related to the Green River shoreline would be largely unaffected by new and redevelopment. The function of all leveed Green River segments is likely to improve over time with implementation of levee improvements. Even in the most constrained portions of the High- Intensity environment, the reconstructed levee would likely include improved riparian vegetation on the waterward side, large woody debris, and possibly reduced bank slope or an increased levee setback. Reconstruction of levees to include benches can allow overbank flooding of the bench, thus contributing to restoration of ecological functions that protect and improve water quality and wildlife habitat. 	 SMP policies for the "High Intensity" environment (see Section 2.C.2 in the SMP) state that: "Developments in the 'High-Intensity' environment should be managed so that they enhance and maintain the shorelines for a variety of urban uses, with priority given to water-dependent, water-related, and water-enjoyment uses." "In order to make maximum use of the available shoreline resource and to accommodate future water-oriented uses, shoreline restoration and/or public access, the redevelopment and renewal of substandard, degraded, obsolete urban shoreline areas should be encouraged." All private development would be subject to 140- or 150-foot setbacks depending upon whether a levee is present (140 feet if a levee is present and 150 feet if no levee is present) (SMP Section 3.B.1.c.7). All HI-designated areas and associated new and redevelopment on the Green River are located landward of the existing levee. The SMP (and by reference the critical areas regulations) prohibits projects that "cause significant ecological impacts unless mitigated according to" standard mitigation sequencing outlined in Section 3.B.4.c.4. SMP Sections 3.B.5 (Flood Hazard Reduction and River Corridor Management) and 3.B.12 (Water Quality and Quantity) have a number of provisions that will minimize adverse modifications to the river channel that might further impair water quality or water movement through the system. The Commercial Development standards (Section 5.C.4.c.4) stipulate that "All new commercial development proposals will be reviewed by the City for ecological restoration and public access opportunities exist, the City may require that those opportunities are either implemented as 	 Any in- or over-water (including wetlands) proposals would require review not only by the City of Kent, but also by the Washington Department of Fish and Wildlife (WDFW), the U.S. Army Corps of Engineers (Corps), and/or the Washington Department of Ecology. Each of these agencies is charged with regulating and/or protecting streams, lakes, and wetlands, and would impose certain design or mitigation requirements on applicants. A project that includes stream, lake, or wetland fill would require Corps review and permitting. For similar projects along the Green River, a Biological Evaluation would be prepared to assess project impacts on listed fish and wildlife, and that document would be routed to U.S. Fish and Wildlife Service and National Marine Fisheries Service for Endangered Species Act review. These agencies would also impose certain design and mitigation requirements on a proposed project to minimize adverse impacts. As mentioned in the <i>Final Shoreline Inventory and Analysis Report</i>, the City currently uses its 2002 <i>Kent Surface Water Design Manual</i>, which is an addendum to the <i>1998 King County Surface Water Design Manual</i>. The City will be updating its <i>Surface Water Design Manual</i> as part of the NPDES Phase II permit requirement. Both Ecology's 2005 <i>Stormwater Management Manual for Western Washington</i> and <i>King County's 2005 Surface Water Design Manual</i> will be evaluated as the NPDES Phase II permit requires that the City use minimum requirements that are equivalent to Ecology's manual. Use of the current and future updated stormwater runoff impacts and mitigate any potential remaining adverse affects. The Natural Resources section of the Land Use chapter of the City of Kent's Comprehensive Plan contains a number of general and specific goals and policies that direct the City to permit and 	Because of the developed nature of this environment and redevelopment pressures, unmitigated new development has the potential to further degrade the baseline condition. Strict implementation of the SMP and the critical areas regulations will be needed to minimize impacts, and is expected to result in the long-term improvement in ecological function. Specifically, requirements for stormwater management, minimization of impervious surface, and installation of native vegetation will help minimize and mitigate impacts. Further the planned implementation of the Green River levee reconstruction and numerous other projects under WRIA 9, the Green/Duwamish Ecosystem Restoration Project, and the King County Flood Control District, ensure that ecological function will be substantially improved in the long-term.

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

Shoreline Segment	Existing Conditions	Likely Development / Functions or Processes Potentially Impacted	Effect of SMP Provisions	Effect of Other Development a Activities / Programs
	been installed by the City in the narrow strip of park land that parallels the creek on the east side.	may support improved water quality.		
URBAN CONSER	· VANCY – OPEN SPACE			
Green River (all or portions of segments A2-3, A5-6, A8-11 and PAA-A1, as well as parallel designations in segments B1, B3-5, C1-3, and C5 as described in SMP Section 2.C.3.d and as shown in Appendix A of the SMP)	These segments contain land areas in shoreline jurisdiction dominated by natural areas, trails, opens spaces, and parks. These areas include Foster Park, Riverview Park, the Riverbend Golf Complex, the Green River Natural Resources Area, Valley Floor Community Park, the Green River Trail, and the future North Green River Park.	 Future Development: The only "development" likely is related to passive recreation improvements or restoration activities. Functions/Processes Impacted: Any new actions would either have no or negligible effect on ecological functions or would contribute to restoration of ecological functions. Similar to Green River shoreline areas designated High Intensity, the function of all leveed Green River segments is likely to improve over time with implementation of levee improvements. Reconstructed levees would likely include improved riparian vegetation on the waterward side, large woody debris, and reduced bank slope or an increased levee setback. Reconstruction of levees to include benches can allow overbank flooding of the bench, thus contributing to restoration of ecological functions that protect and improve water quality and wildlife habitat. Further, all private development would be subject to 140- or 150-foot setbacks depending upon whether a levee is present (140 feet if a levee is present). However, public development (roads and trails) could be located within the setback. 	 SMP policies for the "Urban Conservancy – Open Space" environment (SMP Section 2.C.3) state that: "Water-oriented recreational uses should be given priority over nonwater-oriented uses. Water-dependent recreational uses should be given highest priority." "Standards should be established for shoreline stabilization measures, vegetation conservation, water quality, and shoreline modifications within the 'Urban Conservancy-Open Space' designation to ensure that new development does not further degrade the shoreline and is consistent with an overall goal to improve ecological functions and habitat." The SMP (and by reference the critical areas regulations) prohibits projects that "cause significant ecological impacts unless mitigated according to" standard mitigation sequencing outlined in Section 3.B.4.c.4. The most active floodplain/floodway areas in the UC-OS environment with potential for alteration are found in the southern portion of the City, in the Horsehead Bend area. SMP Section 4.C.4.c generally prohibits fills in the floodplain or floodway, except in special circumstances, thereby protecting basic hydrologic functions and processes. Further, the Recreational Development regulations (SMP Section 5.C.7.c.3) stipulate that "All new recreational development proposals will be reviewed by the City for ecological restoration and public access plans indicate opportunities exist for these improvements, the City may require that those opportunities are either implemented as part of the development project or that the project design be altered so that those opportunities are not 	Same as items #1-4 above in H River. In addition to levee restoration, are planned in UC-OS segment Projects map in Appendix C of t descriptions located in SMP Se and 8.E.2.a). In addition, the City Parks, Rect Services Department engages is restoration and outreach activiti SMP Section 8.D.9 .

and Restoration	Net Effect
igh Intensity for Green several WRIA 9 projects s (see Restoration the SMP, and ctions 8.D.13, 8.E.1, reation & Community n a number of es that are described in	The substantial presence of critical areas in this environment, combined with the limited pressure for any substantial new or re- development and the provisions of the SMP, ensures that environmental conditions in this environment will not be degraded relative to existing baseline. In fact, long-term plans for implementation of the Green River levee reconstruction and numerous other projects under WRIA 9, the Green/Duwamish Ecosystem Restoration Project, and the King County Flood Control District, ensure that ecological function will be substantially improved in the long-term.

Shoreline Segment	Existing Conditions	Likely Development / Functions or Processes Potentially Impacted	Effect of SMP Provisions	Effect of Other Development and Restoration Activities / Programs	Net Effect
			diminished." This is expected to result in moderate to substantial shoreline function improvements over time.		
Lake Meridian (all of segment A as described in SMP Section 2.C.3.d and as shown in Appendix A of the SMP)	This segment is made up entirely of Lake Meridian Park, which occupies a roughly 1,400-foot stretch of shoreline at the southeast corner of the lake. The shoreline is primarily free of shoreline armoring, although it does contain the largest pier on the lake.	Future Development: The only "development" likely in Lake Meridian Park is related to passive recreation improvements or restoration activities (such as the recent outlet work). Functions/Processes Impacted: Any new actions would either have no effect on or contribute to restoration of ecological functions.	Same as above for Urban Conservancy – Open Space on the Green River, excluding the floodplain/floodway discussion.	Same as items #1-3 above in High Intensity for Green River. Phase I of the Lake Meridian Outlet Relocation project was recently completed by the City at the mouth of Lake Meridian, and Phases II and III will be completed in 2009 to restore the connection to Big Soos Creek (see Restoration Opportunities map in Appendix C of the SMP, and descriptions located in Sections 8.D.2 and 8.D.12.c). The City Parks, Recreation & Community Services Department engages in a number of restoration and outreach activities that are described in SMP Section 8.D.9 .	The substantial presence of critical areas (stream outlet, adjacent wetlands) in this environment, combined with the limited pressure for any substantial new or re- development and the provisions of the SMP, ensures that environmental conditions in this environment will not be degraded relative to existing baseline.
Springbrook Creek (see SMP Section 2.C.3.d for segment description and Appendix A of the SMP for map)	This segment contains two narrow bands of riparian vegetation between the stream and the adjacent paved developed sites.	Future Development:No development isplanned in these riparian corridors. The onlyanticipated activity is possibly furtherrestoration and maintenance of nativeplantings.Functions/Processes Impacted:Any newactions would either have no net effect on orcontribute to restoration of ecologicalfunctions.	The Vegetation Conservation regulations in SMP Section 3.B.11 and the Critical Areas regulations adopted by reference effectively protect these narrow riparian corridors from adverse alterations.	Same as items #1-3 above in High Intensity for Green River. In 2004, the City restored habitat along Springbrook Creek stream banks, in and upstream of shoreline jurisdiction (see Restoration Opportunities map in Appendix C of the SMP, and description located in Section 8.D.12.a). As this vegetation continues to mature, the functions that vegetation provides will increase – including shade, organic input, possible large woody debris recruitment, and habitat for birds.	Conditions are expected to improve over time in this small segment as vegetation matures. No adverse alterations are anticipated.
Lake Fenwick (all or portions of segment A as described in SMP Section 2.C.3.d and as shown in Appendix A of the SMP)	This segment is made up entirely of two separate segments of Lake Fenwick Park on the north side of the lake. Lake Fenwick has very minimal shoreline modification, mostly in scattered short sections associated with a small fishing pier, the boardwalk trail crossing and a boat launch. Additional armoring is found along the shoreline adjacent to the parking lot, with vertical timbers and with inset steps for lake access.	 <u>Future Development:</u> The only future "development" likely in Lake Fenwick Park is related to passive recreation improvements, maintenance, or restoration activities. <u>Functions/Processes Impacted</u>: Any new actions would either have no net effect on or contribute to restoration of ecological functions. Most of the activity is expected to be related to repairs and improvements to existing structures. 	Same as above for Urban Conservancy – Open Space on the Green River	Same as items #1-3 above in High Intensity for Green River. To control an infestation of the highly aggressive aquatic plant Brazilian elodea, the City is introducing grass carp to the lake. If successful, the grass carp introduction will improve water quality and aquatic habitat (see Restoration Opportunities map in Appendix C of the SMP, and description located in Section 8.D.12.d). In addition, the City Parks, Recreation & Community Services Department engages in a number of restoration and outreach activities that are described in the SMP Section 8.D.9 .	The substantial presence of critical areas (stream outlet, adjacent wetlands) in this environment, combined with the limited pressure for any substantial new or re- development and the provisions of the SMP, ensures that environmental conditions in this environment will not be degraded relative to existing baseline. Further, successful control of Brazilian elodea should improve aquatic habitat.

Shoreline Segment Ex	existing Conditions	Likely Development / Functions or Processes Potentially Impacted	Effect of SMP Provisions	Effect of Other Development and Restoration Activities / Programs	Net Effect
Ot no an tim Sn alc are co wa	Other access points with o vegetation are rmored with either mbers or boulders. Small gravel is found long the boat launch rea with pre-cast oncrete slabs in the vater.				
URBAN CONSERVAN	NCY – LOW INTENSITY				
Green River (all or portions of A1, A4, A7, D1-2, D4 and PAA-A1 as described in SMP Section 2.C.4.d and as shown in Appendix A of the SMP)	This segment consists f agricultural and gricultural support ses. Agricultural areas re primarily pasture and, and a large area at he south end of the City urrounding Mill Creek auburn is within Green River/Mill Creek- ssociated oodway/floodplain.	 Future Development: These areas have the potential to redevelop with low-density residential or low-intensity commercial (commercial is only allowed as part of a PUD; the site must be 100 acres in the SR-1 zone). UC-LI areas that are located in floodways are unlikely to have any new developments, and would be restricted to maintenance of existing primarily agricultural and some residential structures and uses. Functions/Processes Impacted: Development of the Urban Conservancy – Low Intensity segments currently in agriculture likely has the greatest potential development in other shoreline areas and environments. Hydrology: Possible impacts to hydrologic processes via indirect effects of new impervious surface and stormwater management associated with low-density residential are the primary concern. In addition, several of the UC-LI segments are unleveed with high quality riparian vegetation (mostly in the PAA south of Horsehead Bend within North Green River Park). Activities that would remove that functioning vegetation corridor would have substantial adverse impacts to aquatic and upland habitat: Substantial areas of new impervious surface are possible, replacing vegetation (even if only seasonal crops). However, many of the UC-LI 	 SMP polices for the "Urban Conservancy – Low Intensity" environment (SMP Section 2.C.4) state that: "Uses in the 'Urban Conservancy–Low Intensity' environment should be limited to those which are non-consumptive (i.e., do not deplete over time) of the shoreline area's physical and biological resources and uses that do not substantially degrade ecological functions or the rural or natural character of the shoreline area. Shoreline habitat restoration and environmental enhancement are preferred uses." "Where allowed, commercial uses should include substantial shoreline restoration and public access." "Preservation of ecological functions should have priority over public access, recreation, and development objectives whenever a conflict exists." The same comments as for High Intensity regarding stormwater management and mitigation sequencing apply here as well. The most active floodplain/floodway areas in the UC- LI environment with potential for alteration are found in the southern portion of the City, in the agricultural area on the south side of the river west of SR 167. SMP Section 4.C.4.c generally prohibits fills in the floodplain or floodway, except in special circumstances, thereby protecting basic hydrologic functions and processes. Further, the Commercial Development standards 	Same as items #1-4 above in High Intensity for Green River. In addition to levee projects on the Green River, one other WRIA 9 project on Lower Mill Creek will be implemented by the City (see Table 11 and Appendix C in the SMP, as well as Section 8.D.1). The project would provide off-channel habitat during high river flows, enhance riparian habitat, increase low flow rearing habitat for juvenile salmonids, increase wetland areas and increase floodplain storage.	While there is pressure for new development on the Green River, SMP provisions, including setbacks, Restoration Plan project implementation; and levee reconstruction ensure that environmental conditions in this environment will not be degraded relative to existing baseline over the long term. It will be critical to evaluate projects on a site-specific and project-specific basis, however, and utilize the available impact minimization and protective provisions of the SMP.

City of Kent Cumulative Impacts Analysis

Shoreline Segment	Existing Conditions	Likely Development / Functions or Processes Potentially Impacted	Effect of SMP Provisions	Effect of Other Development and Restoration Activities / Programs	Net Effect
		 segments are located along leveed portions of the Green River, reducing the potential direct adverse affects of riparian vegetation related to loss of organic inputs, large woody debris, water quality filtration, etc. As previously mentioned large areas of UC-LI are in the floodway and habitat- altering modifications are not expected. Similar to Green River shoreline areas designated High Intensity, the function of all leveed Green River segments is likely to improve over time with implementation of levee improvements. Reconstructed levees would likely include improved riparian vegetation on the waterward side, large woody debris, and reduced bank slope or an increased levee setback. Reconstruction of levees to include benches can allow overbank flooding of the bench, thus contributing to restoration of ecological functions that protect and improve water quality and wildlife habitat. 	(SMP Section 5.C.4.c.4) stipulate, "All new commercial development proposals will be reviewed by the City for ecological restoration and public access opportunities. When restoration or public access plans indicate opportunities exist, the City may require that those opportunities are either implemented as part of the development project or that the project design be altered so that those opportunities are not diminished." This is expected to result in moderate to substantial shoreline function improvements over time. However, it is not certain without detailed site- and project-specific information whether that restoration would offset the impacts of an agriculture conversion to commercial or residential use. Residential Development is required to direct runoff to infiltration or detention/ treatment systems, which minimizes hydrologic and water quality impacts from those uses (SMP Section 5.C.8.c.13). Depending on the type of agricultural use being converted to residential use, water quality may improve because of a reduction or change in the type and/or method of chemical (pesticide, herbicide, fertilizer) application.		
Big Soos Creek (see Appendix A of the SMP for map)	Three of the five parcels in this segment contain single-family residences, the fourth is part of King County's Soos Creek Park, and the fifth is owned by WSDOT for stormwater facilities. Most of the shoreline area is wetland and floodplain.	Future Development:The segment may redevelop with low-density residential or clustered residential with the possibility of some low-intensity commercial.Functions/Processes Impacted:Because the residential setback on Big Soos Creek is 200 feet and much of the shoreline area is wetland and/or floodplain, any redevelopment is unlikely to have significant adverse affects on function. Very little further alteration of the shoreline area is expected.	Same as above for Urban Conservancy – Low Intensity on the Green River. Further, the residential setback on Big Soos Creek is 200 feet (SMP Section 5.C.8.c.9).	Any proposed alteration of shoreline that directly impacts wetlands or the stream would be reviewed by state and federal government agencies as well, adding an additional layer of impact and mitigation review and oversight.	Limited redevelopment pressure, critical areas regulations, and SMP provisions ensure that any development in shoreline jurisdiction of Big Soos Creek would not result in net loss of ecological function.
Panther Lake (all of segment A as described in SMP Section 2.C.4.d and as shown in Appendix A of the SMP)	This segment consists of low-density residential parcels in the northern and eastern portions of the lake and a small segment in the extreme southern portion of the lake. Panther Lake does not appear to have any shoreline modifications, with the	Future Development: This area may redevelop with low density residential, clustered residential, or possibly some low intensity commercial uses.Functions/Processes Impacted:Given the large percentage of Panther Lake shoreline that is wetland, new development within shoreline jurisdiction is expected to be limited. New developments will be reviewed and	Same as above for UC – Low Intensity on the Green River.	Effects from other local regulations are unknown at this time. Panther Lake is currently only in Kent's PAA, and is subject to King County's SMP. However, similar to the above information, direct wetland or lake impacts would also be regulated by state and federal agencies.	It is expected that King County's SMP will meet State requirements for no net loss of ecological function.

Shoreline Segment	Existing Conditions	Likely Development / Functions or Processes Potentially Impacted	Effect of SMP Provisions	Effect of Other Development and Restoration Activities / Programs	Net Effect
	exception of the public boat launch.	permitted by King County under its updated SMP (adoption pending). Some impervious surface increases and some vegetation removal, however, is still likely and would have adverse affects potentially on water quality and habitat.			
SHORELINE RES	IDENTIAL				
Green River (all or portions of C1- 6 and D3 as described in SMP Section 2.C.5.d and as shown in Appendix A of the SMP)	This segment is composed of primarily multi-family residential units, along with the KOA RV campground and a small amount of small-lot single-family homes.	Future Development: Redevelopment of residential uses is possible. The potential for significant new development is very limited due to the extent of existing development. Functions/Processes Impacted: It's not likely that redevelopment would cause direct impacts or contribute to cumulative impacts because of its location on the opposite side of levees and trails. The levees and trails are located in other environment designations.	 SMP policies for the "Shoreline Residential" environment (SMP Section 2.C.5) state that: "Land division and development should be permitted only 1) when adequate setbacks or buffers are provided to protect ecological functions and 2) where there is adequate access, water, sewage disposal, and utilities systems, and public services available and 3) where the environment can support the proposed use in a manner which protects or restores the ecological functions." "New residential development should be located and designed so that future shoreline stabilization is not required." The same comments as for High Intensity regarding stormwater management and mitigation sequencing apply here as well. Residential Development is required to direct runoff to infiltration or detention/ treatment systems, which minimize hydrologic and water quality impacts from those uses (SMP Section 5.C.8.c.13). All private development would be subject to 140- or 150-foot setbacks depending upon whether a levee is present (140 feet if a levee is present and 150 feet if no levee is present) (SMP Section 3.B.1.c.7). All SR-designated areas and associated new and redevelopment on the Green River are located landward of the existing levee. 	Any proposed alteration of shoreline that directly impacts wetlands or the river would be reviewed by state and federal government agencies as well, adding an additional layer of impact and mitigation review and oversight.	New and redevelopment has the potential to degrade the baseline condition. However, the combined, strict implementation of the SMP and the critical areas regulations should minimize impacts. If mitigation for potential setback reductions includes removal of substantial shoreline hardening and/or supplementation of native shoreline plantings, ecological function in developed residential areas could improve in the long term.
Lake Meridian (all of segment C as described in SMP Section 2.C.5.d and as	This segment is dominated by single- family homes, along with a mobile home park occupying	Future Development:This segment hasseveral lots that are either underdeveloped orcould possibly be subdivided.Functions/Processes Impacted:	The applicable SMP policies for the "Shoreline Residential" environment are provided above in the Shoreline Residential – Green River discussion. The same comments as for High Intensity – Green	Any proposed alteration of shoreline that directly impacts wetlands or the lake would be reviewed by state and possibly federal government agencies as well, adding an additional layer of impact and mitigation	New and redevelopment has the potential to degrade the baseline condition. However, the combined, strict implementation of the

Shoreline Segment	Existing Conditions	Likely Development / Functions or Processes Potentially Impacted	Effect of SMP Provisions	Effect of Other Development and Restoration Activities / Programs	Net Effect
shown in Appendix A of the SMP)	approximately 300 feet of shoreline. Lake Meridian has been altered with a variety of armoring and alteration types, including piers, boatlifts, boathouses, and moorage covers. Approximately 90 percent of private residences have a dock.	described above, new development is typically accompanied by impervious surface increases and vegetation removal. On Lake Meridian, these alterations may degrade upland and aquatic wildlife habitat, and reduce lake water quality (if driveway runoff was directed untreated to the lake). Additional impacts could occur with associated new pier development (discussed separately below in Section 5.2).	 River regarding stormwater management and mitigation sequencing apply here as well. Provisions for runoff management in the Residential Development section are the same as listed above under Shoreline Residential – Green River. A detailed discussion of effects of SMP provisions related to residential setbacks is presented below in Section 5.1. The regulations in SMP Section 5.C.8.c provide for a protective setback of 75 feet, and allowances for reductions that could occur only when paired with substantial restoration elements related to vegetation or shoreline hardening. A detailed discussion of effects of SMP provisions related to residential piers is presented below in Section 5.2. The regulations in SMP Section 4.C.3.c contain strict dimensional and materials standards. New and replacement shoreline stabilization is more likely on Lake Meridian than any of the other shoreline waterbodies. The regulations contained within SMP Section 4.C.2.c will considerably reduce the potential for new hard shoreline stabilization, and will likely result over time in conversions of existing hard structural stabilization to soft structural stabilization (see more detailed discussion below in Section 5.3). 	review and oversight.	SMP and the critical areas regulations should minimize impacts. Lake Meridian has the most intense residential development along the shoreline compared to other waterbodies. Detailed assessment of the most common impacting activities is provided in Sections 5.1, 5.2 and 5.3 below. If mitigation for potential setback reductions includes removal of substantial shoreline hardening and/or supplementation of native shoreline plantings, ecological function in developed residential areas could improve in the long term.
Lake Fenwick (all of segments C and PAA-C as described in SMP Section 2.C.5.d and as shown in Appendix A of the SMP)	This segment includes approximately 700 feet of primarily undeveloped shoreline at the northeast corner of the lake which is in single- family ownership and the remaining southern portions of the lake shoreline which is dominated by single- family parcels. Several of the single-family homes found along the lake have a small floating dock and/or minor shoreline armoring.	Future Development: Residential parcels have the potential to redevelop and possibly increase in density. Functions/Processes Impacted: Except for a small section of Shoreline Residential environment separated from the lake by UC- OS, this segment is limited to the PAA and is governed by King County's SMP. Some impervious surface increases and some vegetation removal are likely and could have adverse affects on water quality and habitat.	 The applicable SMP policies for the "Shoreline Residential" environment are provided above in the Shoreline Residential – Green River discussion. The same comments as for High Intensity – Green River regarding stormwater management and mitigation sequencing apply here as well. Provisions for runoff management in the Residential Development section are the same as listed above under Shoreline Residential – Green River. 	Unknown at this time. This segment of Lake Fenwick is currently mostly in Kent's PAA, and is subject to King County's SMP.	It is expected that King County's SMP will meet State requirements for no net loss of ecological function.

Shoreline Segment	Existing Conditions	Likely Development / Functions or Processes Potentially Impacted	Effect of SMP Provisions	Effect of Other Development and Restoration Activities / Programs	Net Effect
Panther Lake (all of segment C as described in SMP Section 2.C.5.d and as shown in Appendix A of the SMP)	This segment is made up of two separate areas of single-family development, along a majority of the western portion of shoreline and small section in the southeast corner of the lake. Panther Lake does not appear to have any residential shoreline modifications.	Future Development: There is approximately 1,200 linear feet that is currently underdeveloped and therefore has the potential to develop into residential uses. Functions/Processes Impacted: New developments will be reviewed and permitted by King County under its updated SMP (adoption pending). Some impervious surface increases and some vegetation removal is likely and could have adverse affects on water quality and habitat.	Any development proposals or activities would be reviewed by King County under its new SMP until such time as the City annexes this area.	Unknown at this time. Panther Lake is currently only in Kent's PAA, and is subject to King County's SMP.	It is expected that King County's SMP will meet State requirements for no net loss of ecological function.

City of Kent Cumulative Impacts Analysis

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5. "SHORELINE RESIDENTIAL" DEVELOPMENT IMPLICATIONS

In addition to the cumulative analysis presented in the tables above, this section will expand on several key areas of development/functions associated with redevelopment of the "Shoreline Residential" environment designation on Lake Meridian.

5.1 Residential Setbacks on Lake Meridian

With the possible exception of limited additional residential lands being acquired for public open space, land use in the Shoreline Residential environment is not expected to change over the next 20 years, although new residential development and substantial remodels are anticipated. Typically, development of vacant lots into residential uses would result in replacement of pervious, vegetated areas with impervious surfaces and a landscape management regime that often includes chemical treatments of lawn and landscaping. However, there are only a few lots which are underdeveloped that have this potential. These actions can have multiple effects on shoreline ecological functions, including:

- Reduction in ability of site to improve quality of waters passing through the untreated vegetation and healthy soils.
- Potential contamination of surface water from chemical and nutrient applications.
- Increase in surface water runoff due to reduced infiltration area and increased impervious surfaces, which can lead to excessive soil erosion and subsequent in-lake sediment deposition.
- Elimination of upland habitat occupied by wildlife that use riparian areas.

The original Shoreline Master Program had a minimum residential setback of 25 feet, although it could be increased to as much as 75 feet depending on the location of the adjacent residences (Table 6). Under the proposed SMP (Chapter 5, Residential Development), the minimum standard shoreline setback for lakefront properties will be 75 feet. A setback of greater than 75 feet will apply to those parcels with adjacent properties that have setbacks greater than 75 feet.

Table 6.	Comparison	of setbacks	between	the original	and proposed	SMP.
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Shoreline Environment	Original SMP	Proposed SMP
Urban – Lake Residential (proposed Shoreline Residential)	25 ft standard (if there are no adjacent residences)	75 ft standard (if there are no adjacent residences)
	Otherwise, average of adjacent setbacks; no greater than 75 ft	Otherwise, average of adjacent setbacks; no less than 75 ft.

Using a subset of existing data¹ from Lake Meridian, the average residential setback from the OHWM is 99.5 feet. Using the same data, the average lot is approximately 322 feet deep. A more detailed breakdown of the existing setbacks within this subset of Lake Meridian Shoreline Residential environment is provided in Table 7.

Measure	Number of Waterfront Parcels	Percentage of Waterfront Parcels
Structures < 75 ft from OHWM (non-conforming)	6	15
Structures \geq 75 ft. and \leq 100 ft. from OHWM	20	50
Structures > 100 ft. from OHWM	13	32.5
Undeveloped Lots	1	2.5
Total Waterfront Parcels Studied	40	

Table 7.	Existing shoreline	setback data	for Lake Meridian.
	Exacting officiation		Earro mornalam

For urban shorelines, the condition of nearshore environments, the amount of impervious surfaces, and the extent of chemical usage on lawns and landscaping, are better indicators of shoreline health than the amount of space between the shoreline and a structure. Currently most of that space for much of the shoreline, whether it is 20 feet or 100 feet wide, is mowed lawn with some ornamental landscaping, much of it presumably treated routinely or occasionally with pesticides, herbicides or fertilizers.

The significance of impervious surfaces on a lake environment where water quantity is not really a factor is very diminished given the residential uses. Single-family or multi-family homes generally have clean roof and sidewalk runoff, and driveways whether 50 square feet or 5,000 square feet are typically pollution-generating surfaces only to the extent that vehicle-related pollutants are deposited on them. Most single-family homes have between two and four vehicles, regardless of the driveway area and thus the correlation between driveway area and amount of pollution is not strong. An impervious surface standard has been set at 35% for single-family lots, with provisions for increasing that coverage to 50% with provision of substantial native vegetation along the shoreline. Those properties that choose to reduce their setback by using the shoreline enhancement incentive would be required to adhere to a shoreline vegetation management plan. The plan requires:

- The preparation of a shoreline revegetation plan;
- That native vegetation consist of a mixture of trees, shrubs, and groundcover designed to improve habitat functions;
- Limitations on the use of fertilizer, herbicides and pesticides as needed to protect lake water quality; and
- A monitoring and maintenance program.

¹ Forty (40) of the existing parcels were sampled, thirty-nine of which contained an existing residence. Ten (10) parcels each were selected from four separate quadrants of the lake (southeast, southwest, northwest, and northeast).

Relative to the existing condition, the implementation of the impervious surface increase measures would increase the amount of native vegetation (benefiting terrestrial and aquatic species) and decrease the amount of pesticides/herbicides entering the lakes. Over time, ecological functions will improve through implementation of the impact minimization and compensation measures that are part of approved impervious surface increases.

It is important that the impervious surfaces be separated from the waterbody to the extent that those surfaces replace vegetation, which can have a variety of ecological benefits. The setback provisions described above continue to maintain separation between the homes and the lake, leaving the nearshore area available for vegetation. However, because of the setback averaging limit, it is difficult to evaluate exactly where the average setback may fall after 20 years of development and redevelopment.

In summary, new residences and substantial remodels/additions are expected in the Shoreline Residential environment over the next 20 years. The protective setback and other measures in the SMP, including a requirement for shoreline vegetation when lot coverage exceeds 35%, will maintain or improve ecological functions of the shoreline over the long term, thereby resulting in no net loss of shoreline ecological function within the environment.

5.2 Overwater Structures

Overwater structures encompass a variety of uses, from in-water structures, such as fixed-pile piers, floating docks and platforms, to moorage covers, such as canopies and boathouses with associated boatlifts. It is difficult to determine exactly how many waterfront properties do not have a pier or pier access, particularly as many piers are located near property lines and thus it is possible that those may be shared with the adjacent property. Piers can adversely affect ecological functions and habitat in the following ways:

- Alter patterns of light transmission to the water column, affecting macrophyte growth and altering habitat for and behavior of aquatic organisms, including juvenile salmon.
- Interfere with long-shore movement of sediments, altering substrate composition and development.
- Contribute to contamination of surface water from chemical treatments of structural materials.

Table 8 outlines some of the primary differences between the original and proposed SMP (see Draft SMP Chapter 4, Over-Water Structures) provisions for piers.

 Table 8.
 Comparison of key differences between original and proposed SMP provisions for new over-water structures.

Pier Feature	Original SMP	Proposed SMP
Length	120 ft	100 ft
Width	No larger than 50% of	4-ft walkway (first 30-ft)
	the lot width	6-ft remainder of pier
		6-ft ell
		2-ft finger

Pier Feature	Original SMP	Proposed SMP		
		4-ft ramp connecting to pier		
Deck material	No specification	All new and replacement piers must be fully grated.		
Size	800 ft ²	420 ft ² single-family residence		
		660 ft ² joint-use by 2 residences		
		740 ft ² joint-use by 3+ residences		

Under the proposed SMP, new piers will be smaller and narrower than piers approved under the original SMP. New and replacement piers will also include light-transmitting decking material, which will reduce the effect of the overwater cover. Nevertheless, if new piers were the <u>only</u> pier-related activity in Lake Meridian, ecological function would still marginally decline. The decline would be due to an unavoidable net increase in in-water structures and overwater cover that cannot be mitigated.

However, pier repair and pier maintenance activities are more common, and it is anticipated that pier replacement proposals may become even more common as existing piers degrade or do not meet the property owner's needs in their current configuration or location. Under the proposed SMP, existing piers could be replaced at the same size as the existing pier, as long as the entire replacement pier contained light-transmitting decking material.

The Washington Department of Fish and Wildlife (WDFW) is typically requiring piers that are both smaller in overall size than average existing piers and also narrower in the nearshore area. However, WDFW will, on a case-by-case basis, consider replacement piers at the same size as the original pier if it can be thoroughly shown that the applicant has demonstrated a need for the pier, and that proper mitigation sequencing has been followed (avoidance, minimization, and mitigation). Grated decking is a mitigating factor that WDFW encourages. Any new or replacement pier would require a Hydraulic Project Approval (HPA) from WDFW, on whose guidelines the proposed SMP pier provisions are partially based. The combined effects of the City's proposed SMP and permit approvals from WDFW will likely result in a reduction over time of the net amount of overwater coverage, and an increase in the amount of light-transmitting decking.

A quantitative analysis is provided below (Table 9), based partially on Lake Meridian lake-wide trends and assumptions. This analysis assumes that 9 of the 12 existing properties on Lake Meridian without piers will add piers within the next 20 years. Also assumed is that 15 percent of all existing piers and 25 percent of the existing platforms will need replacement over the same time period. Assuming that all new and replacement pier structures will be fully grated, that replacement pier structures can be replaced at the same size as the existing pier, and that there may be up to eight new floating platforms, the total area of overwater structure may decline by 5.0 percent over this time period.

Table 9.	Comparison	of build-out	conditions	for overwate	r structures.
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Pier Feature	Existing	Build-Out	Net Change	% Change
Number of Piers	125	134 ¹	+9	+7.2
Average Length (ft)	60.5	$60.5 - 63.2^2$	0 - 2.7	+4.4

Pier Feature	Existing	Build-Out	Net Change	% Change
Average Width (ft)	6.9	6.7 ³	-0.2	-2.9
Average Area of piers (ft ²)	511.2	505.1 ⁴	-61	-1.2
Total square footage of piers (ft ²)	63,905.5	59,584.3 ⁵	-4,321.2	-6.8
Total square footage of floating platforms (ft ²)	2,504.0	3,711.8 ⁶	+1,207.8	+48.2
Total square footage of covered moorage (ft ²)	4,859.0	4,373.5 ⁷	-485.5	-10.0
Total square footage of overwater structures (ft ²)	71,268.5	67,669.6	-3,598.9	-5.0

¹ Assumes that 9 of 12 existing properties without piers will construct a new pier over the next 20 years.

² Range based on 9 new piers at either 60.5 feet (current average) or 100 feet (maximum allowed without a variance)

³Assumes 9 new piers at 4 feet wide and replacement piers at 6.9 feet wide (current average).

⁴ Assumes 9 new piers at 420 ft² each and 15 percent replacement of existing piers over 20 years (assumes replacement piers to be replaced at the same size - 511.2 ft² average).

⁵ Assumes 9 new piers and 15 percent replacement piers are fully grated (grating is calculated to have 60 percent open space).

⁶ Assumes 25 percent of existing platforms will be replaced with new 150 ft² platforms, plus there may be up to eight new 150 ft² platforms.

⁷ Assumes that 10 percent of existing covered moorage will be removed over 20 years.

5.3 Shoreline Stabilization

New bulkheads typically have the following effects on ecological functions:

- Reduction in nearshore habitat quality for juvenile salmonids and other aquatic organisms. Specifically, shoreline complexity and emergent vegetation that provide forage and cover may be reduced or eliminated. Elimination of shallow-water habitat may also increase vulnerability of juvenile salmonids to aquatic predators.
- Reduction of natural sediment recruitment from the shoreline. This recruitment is necessary to replenish substrate and preserve shallow water conditions.
- Increase in wave energy at the shoreline if shallow water is eliminated, resulting in increased nearshore turbulence that can be disruptive to juvenile fish and other organisms.

Under the proposed SMP (see SMP Section 4.C.2), new shoreline stabilization would only be allowed once it has been determined that there is "the need to protect the development from destruction due to erosion caused by natural processes, such as currents, and waves, and boat wakes..." It must be demonstrated in a study prepared by a qualified professional that the proposed stabilization is the least harmful method to the environment. Replacement bulkheads must be installed in the same location as the existing bulkhead, or farther landward. Under no circumstances would a replacement bulkhead be allowed to encroach farther waterward. Finally, all shoreline stabilization and modification proposals must avoid impacts to the maximum extent practicable, and when impacts are unavoidable, must mitigate those impacts to achieve no net loss of ecological functions. Independent of regulations by other regulatory agencies, the proposed SMP ensures that shoreline stabilization projects will not degrade the baseline condition.

The WDFW has jurisdiction over new shoreline stabilization projects, and repairs or modifications to existing shoreline stabilization. As part of WDFW's efforts to minimize and compensate for shoreline stabilization-related impacts, they encourage implementation of native shoreline enhancement for new shoreline stabilization projects. Further, they also strongly promote shoreline restoration and additional impact compensation measures for many bulkhead modification projects, including placement of gravel at the toe of the bulkhead to create shallow-water habitat, angling the bulkhead face landward to reduce wave turbulence, and shifting the bulkhead as far landward as feasible.

It is estimated that less than 8 percent of the existing lots on Lake Meridian are undeveloped. Therefore, the need for new shoreline stabilization is limited. As mentioned above, it must be demonstrated that there is a need to protect a proposed development from damage due to erosion caused by natural processes, such as currents, waves, or boat wakes.

The proposed SMP includes incentives for the removal of existing bulkheads. Those properties that remove bulkheads may be allowed a small waterfront deck or patio placed along the shoreline. Revegetation or preservation of existing vegetation along the shoreline is required at a 3:1 ratio based upon the size of the deck or patio. Removal of a bulkhead and installation of a deck/patio and shoreline vegetation requires adherence to the shoreline vegetation management plan provisions outlined in Section 3.1.

Over time, the combined effects of the City's proposed SMP, and permit approvals from the WDFW will likely result in a reduction over time of the net amount of hardened shoreline at the ordinary high water mark, an increase in shallow-water habitat, and an increase in shoreline vegetation.

6.0 NET EFFECT ON ECOLOGICAL FUNCTION

As described above in Chapter 4 and 5, the proposed SMP provides a substantially increased level of protection to shoreline ecological functions relative to the existing SMP. On its own, the proposed SMP, which includes the Shoreline Restoration Plan, is expected to protect and improve shorelines within the City of Kent while accommodating the reasonably foreseeable future shoreline development, resulting in no net loss of shoreline ecological function, and may improve ecological functions over time (see Section 3.0). State and federal regulations, acting in concert with this SMP, will provide further assurances of improved shoreline ecological functions over time.

As discussed above, major elements of the SMP that ensure no net loss of ecological functions fall into generally five categories: 1) environment designations (**Chapter 2**), 2) general provisions (**Chapter 3**), 3) shoreline modification provisions (**Chapter 4**), 4) shoreline use provisions (**Chapter 5**), and 5) Shoreline Restoration Plan (**Chapter 8**).

1. <u>Environment designations</u>: The Final Shoreline Inventory and Analysis Report provided the information necessary to assign environment designations by segment to each of the shoreline waterbodies (see **Chapter 2**). Shoreline uses and modifications were then individually determined to be either permitted (as substantial developments or conditional uses) or prohibited in each of those environment designations. The most uses and

modifications are allowed in descending order of potential impact in the High Intensity, Urban Conservancy – Low Intensity, Shoreline Residential, and Urban Conservancy – Open Space environments. The only uses allowed in the Natural-Wetlands environment are related generally to restoration, scientific studies and passive recreation, pursuant to the Critical Areas regulations adopted by reference in SMP **Section 3.B.3**).

- <u>General provisions</u>: Chapter 3 contains a number of regulations on a variety of topics that contribute to protection and restoration of ecological functions, including Section 3.B.4 (Environmental Impacts), Section 3.B.5 (Flood Hazard Reduction and River Corridor Management), Section 3.B.11 (Vegetation Management), and Section 3.B.12 (Water Quality and Quantity).
- <u>Shoreline modification provisions</u>: Chapter 4 contains a number of regulations on a variety of topics that contribute to protection and restoration of ecological functions, including Section 4.C.2 (Shoreline Stabilization), Section 4.C.2 (Overwater Structures), and Section 4.C.6 (Shoreline Restoration and Ecological Enhancement). All of these shoreline modification regulations emphasize minimization of size of structures, and use of designs that do not degrade and may even enhance shoreline functions.
- 4. <u>Shoreline use provisions</u>: Regulations in **Chapter 5** focus on exclusion of uses that are incompatible with the existing land use and ecological conditions, and emphasize appropriate location and design of the various uses. These regulations also emphasize avoidance and minimization of ecological impacts via appropriate setbacks, protection and enhancement of vegetation, reduction of impervious surfaces and use of innovative designs such as LID techniques that do not degrade and may even enhance shoreline functions.
- 5. <u>Shoreline Restoration Plan</u>: The Shoreline Restoration Plan (**Chapter 8**) identifies a number of project-specific opportunities for restoration on both public and private properties inside and outside of shoreline jurisdiction, and also identifies ongoing City programs and activities, non-governmental organization programs and activities, and other recommended actions consistent with a variety of watershed-level efforts. The City is a very active agent for restoration along the City's shoreline waterbodies.

Of particular note is the SMP's consideration and facilitation of future plans to reconstruct the Green River levees in an environmentally beneficial way.

Given the above provisions of the SMP, including the Shoreline Restoration Plan, and the location of most existing and potential new and redevelopment relative to the Green River levee; the setback, shoreline modification and overwater structure provisions that apply to Lake Meridian; the absence of anticipated development or redevelopment on the Green River Natural Resources Area pond, Jenkins Creek, and Springbrook Creek; the residential setback and presence of critical areas along Big Soos Creek; and finally the limited expectation for new developments in the City portions of Lake Fenwick, **no net loss of ecological functions is projected in the City of Kent's shorelines**. As previously mentioned, Panther Lake, which is entirely within the City's PAA, is highly encumbered by critical areas, and has been evaluated

by King County as part of its SMP update, is also anticipated to experience no net loss of ecological functions under either King County's or the City's SMP.

FINAL

SHORELINE INVENTORY & ANALYSIS REPORT

FOR THE CITY OF KENT'S SHORELINES: Green River, Big Soos Creek, Lake Meridian, Lake Fenwick, Green River Natural Resources Area Pond, Springbrook Creek, and Jenkins Creek



CITY OF KENT GRANT NO. G0800311







FINAL

SHORELINE INVENTORY and ANALYSIS REPORT for City of Kent's Shorelines: Green River, Big Soos Creek, Lake Meridian, Lake Fenwick, Green River Natural Resources Area Pond, Springbrook Creek, and Jenkins Creek

Project: Comprehensive Shoreline Master Program Update

- Task 2: Shoreline Inventory
- Task 3: Shoreline Analysis & Characterization

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9 June 2009

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1.0 INTRODUCTION

1.1 BACKGROUND AND PURPOSE

The City of Kent (City) obtained a grant from the Washington Department of Ecology (Ecology) in 2007 to conduct a comprehensive Shoreline Master Program (SMP) update. The first steps of the update process are to inventory and characterize the City's shorelines as defined by the state's Shoreline Management Act (SMA) (RCW 90.58). The inventory and characterization were conducted according to direction provided in the Shoreline Master Program Guidelines and project Scope of Work promulgated by Ecology, and include areas within current City limits and minimally the established Potential Annexation Areas (PAAs). This shoreline inventory and characterization will describe existing conditions and assess ecological functions and ecosystemwide processes operating in the shoreline jurisdiction. This analysis will serve as the baseline from which future development actions in the shoreline will be measured. The Guidelines require that the City demonstrate that its updated SMP yields "no net loss" in shoreline ecological functions relative to the baseline due to its implementation. Ideally, the SMP in combination with other City and regional efforts will ultimately produce a net improvement in shoreline ecological functions.

A list of potential information sources was compiled and an information request letter was distributed to potential interested parties and agencies that may have relevant information (Appendix A). Collected information was supplemented with other resources such as City documents, scientific literature, personal communications, aerial photographs, internet data, and a brief physical inventory of the City's shorelines.

1.2 SHORELINE JURISDICTION

As defined by the Shoreline Management Act of 1971, shorelines include certain waters of the state plus their associated "shorelands." At a minimum, the waterbodies designated as shorelines of the state are streams whose mean annual flow is 20 cubic feet per second (cfs) or greater and lakes whose area is greater than 20 acres. Shorelands are defined as:

"those lands extending landward for 200 feet in all directions as measured on a horizontal plane from the ordinary high water mark; floodways and contiguous floodplain areas landward 200 feet from such floodways; and all wetlands and river deltas associated with the streams, lakes, and tidal waters which are subject to the provisions of this chapter...Any county or city may determine that portion of a one-hundred-year-floodplain to be included in its master program as long as such portion includes, as a minimum, the floodway and the adjacent land extending landward two hundred feet therefrom... Any city or county may also include in its master program land necessary for buffers for critical areas (RCW 90.58.030)"

In addition, rivers with a mean annual cfs of 1,000 or more are considered shorelines of statewide significance.
The City's Shoreline Master Program was most recently amended in 2004, although major substantive amendments have not occurred since 1999. Areas of the shoreline were designated as Urban-River Resources (applied to the Green River), Urban-Stream Corridor (applied to Soos Creek), and Urban-Lake Residential (applied to Lake Meridian) (see Figures 1a¹ and 2).

The City's shoreline boundaries have been updated (subject to City Council and Ecology approval) concurrent with this assessment (Figure 1b). Several changes have been made to the maps based on new information regarding associated wetlands, waterbody size (area and flow), and location of floodways and floodplains. Lake Fenwick, the Green River Natural Resources Area (GRNRA) pond, Springbrook Creek, and Jenkins Creek are new additions to shoreline jurisdiction. A large area of floodway and contiguous floodplain associated with the junction of Mill Creek Auburn² and the Green River has also been included in shoreline jurisdiction. Other mapped floodways along the Green River have not been added to shoreline jurisdiction, consistent with RCW 90.58.030(2)(vi)(g), which excludes those floodways that are not flooded with reasonable regularity. The Green River levee system effectively prevents flooding of a "reasonable regularity" in all mapped floodway areas but for the Mill Creek Auburn/Green River confluence. Neither of the Mill Creeks contain sufficient flows to meet shoreline jurisdiction criteria.

During the review of aerial photographs, GIS mapping, and a field visit, it was determined that Lake Fenwick is larger than 20 acres (just over 23). GIS mapping also shows that the combined area of the two primary GRNRA cells is slightly more than 50 acres. As part of the shoreline jurisdiction assessment, Springbrook Creek, Big Soos Creek and Jenkins Creek were reviewed. Recent USGS mapping of the 20 cfs cut-off points and USGS field notes identified small segments of Springbrook and Jenkins Creeks that meet shoreline criteria. The extent of Big Soos Creek shoreline jurisdiction did not change appreciably. Except for changes related to addition of the extensive Green River/Mill Creek Auburn floodway, a description of the changes and jurisdiction assessment process and results is included in Appendix B.

1.3 STUDY AREA

The City of Kent is located in south King County. The City is surrounded by six incorporated cities (Des Moines, Auburn, SeaTac, Tukwila, Federal Way, Renton and Covington), with pockets of unincorporated King County to the northeast, east and south. Interstate 5 (I-5) and State Route (SR) 167 pass through the City from north to south at the western and central portions of the City.

The study area for this report includes all land currently within the City's proposed shoreline jurisdiction, as well as minimal treatment of shorelines in the PAA currently regulated under King County's SMP (Figure 1b). The latter includes the south half of Lake Fenwick, all of Panther Lake, and portions of the Green River at the south end of the City. The lineal feet of

¹All figures are included in Appendix C at the end of this report.

² The City includes two Mill Creeks. One of the Mill Creeks flows south from the City of Auburn and joins the Green River, and is referenced in this report as Mill Creek Auburn. The second Mill Creek originates within the City of Kent, and generally traverses the City from southeast to northwest, joining Springbrook Creek just inside City limits. The second Mill Creek is referred to as Mill Creek Kent.

shoreline subject to the City's updated SMP encompasses approximately 124,337 lineal feet (23.5 miles) of stream, river and lakeshore (each bank of the streams is counted separately). The PAA shoreline area, although minimally discussed in this report, will continue to be regulated by King County's recently updated SMP until they are annexed by the City of Kent. That area encompasses approximately 31,466 lineal feet (6.0 miles) of shoreline.

1.4 DUWAMISH/GREEN RIVER WATERSHED (WRIA 9)

1.4.1 Geographic Context

Located within Water Resource Inventory Area (WRIA) 9, the Duwamish/Green River is 93 miles long with a drainage area of 566 square miles in King County. The river headwaters in the Cascade Mountains about 30 miles northeast of Mount Rainier and flows north and west into the Duwamish River before entering Puget Sound at Elliott Bay in Seattle. The Green River watershed is further divided into five discrete sub-watersheds (Exhibit 1). While the part of the Soos Creek subbasin within the City is considered to be part of the Middle Green, all of the Green River mainstem within the City of Kent lies within the Lower Green River Sub-watershed. Shoreline characteristics along the Green River mainstem in Kent are strongly influenced, however, by ecological processes at work in the Middle and Upper Green River subwatersheds as well.



Exhibit 1. Overview of the Green River watershed and its subwatershed boundaries. (http://dnr.metrokc.gov/wlr/watersheds/green/pdf/green-river-watershed-map.pdf)

1.4.2 Historic Geology, Topography, and Drainage Patterns

The Lower Green River Subwatershed is composed of continental glacial till, while the underlying geology of the Upper and Middle Green River Subwatersheds is characterized by Puget Group hard rock (Furstenberg et al. 1996). Landscape characteristics in the Green River basin were heavily influenced by glacial erosion that occurred during the Pleistocene Epoch, from about 1 million years to approximately 12,000 years ago (Booth 1994; Collins et al. 2003; Collins and Sheikh 2005). During this glaciation, the Puget Lobe of the Cordilleran ice sheet created a number of north-south trending trough-like valleys that are prominent landscape features throughout the Puget Sound region today (Booth 1994; Booth et al. 2003). In lower valley segments of the Puget Lowland (such as in the Lower Green River Subwatershed), these troughs typically have a low gradient with valley bottom widths that are quite broad (3-5 km). A significant portion of the City of Kent is situated within one of these broad, north-south oriented, glacially formed valley bottom areas.

Following the Pleistocene Epoch glacial erosion described above, the Green River valley floor at Kent was part of the prehistoric Duwamish Embayment, an inlet of Puget Sound. At that time, the shoreline of Puget Sound was approximately 15 miles south of the where Kent now exists. Then, around 5,000 years ago, the valley was subjected to the Osceola Mudflow, which swept down from the slopes of Mount Rainier through the valley of the White River. This major geological event covered the lowlands from Enumclaw to approximately 4 miles north of Auburn with mudflow deposits up to 75 feet thick, well into the present Lower Green River subwatershed (Mullineaux 1970). The lower Green River valley has also been affected by a subsequent series of mid-Holocene lahars emanating from Mt. Rainier (Dragovich et al. 1994; Zehfuss et al. 2003). The combined effect of these events was that enormous volumes of sediment were deposited in the lower Duwamish River valley, eventually filling in the prehistoric Duwamish Embayment to form a broad lowland valley characterized by meandering river channels and extensive wetlands. As the valley filled with sediment, the mouth of the river moved northwards to its present location approximately 15 miles north of Kent. In total, the fill resulted in an increase in river length of about 31 miles. Post-glacial fluvial sedimentation during the Holocene Epoch further affected the local topography and landscape features of the Green River valley (Collins et al. 2003; Collins and Sheikh 2005). The Green River meandered through the broad, low gradient glacial valley, gradually mobilizing and depositing sediments that formed natural levees on either side of the river's meander belt. The distance between these natural levees was much narrower than the glacially formed valley bottom width, which resulted in a complex of broad, frequently flooded wetland areas that occupied the low-lying margins within the floodplain (Perkins 1993; Collins and Sheikh 2005). A large portion of Kent now occupies the broad, low-lying valley bottom, which was formerly the site of the frequently flooded wetland complex adjacent to the Green River meander belt.

Water from smaller tributaries such as Springbrook Creek entering the valley from the east, unable to reach the Green River mainstem due to the natural levees, historically fed into the wetland complexes and gradually moved north, carving small north-south channels through the wetlands before discharging to the Black River (north of Kent) and eventually flowing back into the Green River mainstem. The wetland complexes in present-day Kent were also periodically augmented and recharged by floodwaters coming down from the upper White River and Green River basins (Collins and Sheikh 2005). Because of the complex channel network and frequent

overbank flooding, the Green River mainstem and the wetland complex formerly occupying the low-lying areas of the valley bottom were hydrologically linked.

1.4.3 Major Land Use Changes and Current Shoreline Condition

The Green River mainstem is one of the most hydrologically altered large river systems in the Puget Sound ecosystem. A combination of historic events has dramatically affected the hydrology of the Duwamish/Green River basin. Foremost among these events were the diversion of the White River in 1906 into the Puyallup River for flood control purposes, followed in 1916 by diversion of the Cedar/Black River into Lake Washington to facilitate navigation through the Ship Canal (Exhibit 2). The Green/Duwamish estuary has been largely eliminated over time with the growth of the City of Seattle and associated waterfront development activities. Over 97 percent of the historic estuary area has been either filled, armored, or dredged, and the lower Duwamish River is now a highly industrial area with few natural habitat features (Kerwin and Nelson 2000). Construction of Tacoma Water's Headworks Diversion Dam in 1911 and the Howard A. Hanson Dam (HHD) in 1962 have also resulted in major hydrologic flow modifications and water withdrawals in the watershed (Grette and Salo 1986).



Exhibit 2. Duwamish drainage, before 1900 and after 1916.

In addition to these major events, construction of flood control levees, agricultural development, and urbanization in Kent as well as other Subwatersheds within the watershed has also had a cumulative effect on the flow regime in the Duwamish/Green River watershed. As a result of these alterations, approximately 70 percent of the historic watershed has been diverted out of the Duwamish/Green River basin, and over 90 percent of the historic floodplain has been isolated from the river ecosystem by flood control structures (Kerwin and Nelson 2000).

The clearing of mature forest vegetation over large areas of the watershed, and increasing amounts of impervious and compacted or hardened surfaces has reduced the infiltration capacity of the landscape, thereby increasing runoff rates and the magnitude and frequency of peak flows in the tributary streams. Such peak flow increases have not generally occurred along the Green River mainstem, however, due to the construction and operation of HHD and the diversion of the entire White River out of the watershed. Overall, the Green River has undergone extensive development and numerous hydromodifications.

1.4.4 ESA Listings

The Green River basin is inhabited by three federally listed species of salmonids: 1) chinook salmon of the Puget Sound Evolutionary Significant Unit (ESU), (Reaffirmed as Threatened, U.S. Federal Register, 28 June 2005), 2) bull trout of the Coastal-Puget Sound Distinct Population Segment (DPS), (threatened, U.S. Federal Register, 1 November 1999), and 3) steelhead of the Puget Sound DPS (U.S. Federal Register, 11 May 2007). Puget Sound-Strait of Georgia coho salmon also occur in the basin and are listed as a Species of Concern (U.S. Federal Register, 15 April 2004), indicating that they are under less active consideration for formal listing. An ESU of Pacific salmon is considered to be a distinct population segment (DPS) and thus a "species" under the Endangered Species Act.

The Green River basin also contains formally designated critical habitat for Puget Sound chinook salmon and Coastal-Puget Sound bull trout. Critical habitat for chinook salmon includes the Upper, Middle, and Lower Green River Subwatersheds (Watershed Codes 17110013, i-iii) of the Puget Sound ESU (U.S. Federal Register, 2 September 2005), and critical habitat for bull trout of the Coastal-Puget Sound DPS is mapped as the portions of the Green River generally downstream from Auburn, which is in Critical Habitat Unit 28 – Puget Sound (U.S. Federal Register, 26 September 2005). Critical habitat has not yet been proposed or designated for Puget Sound steelhead. No other federally listed fish species are designated for the Green River basin, including the City of Kent or its PAA.

2.0 CURRENT REGULATORY FRAMEWORK SUMMARY

2.1 CITY OF KENT

The Shoreline Management Act of 1971 brought about many changes for local jurisdictions, including the City of Kent. With the goal "to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines," the City's Shoreline Master Program was developed to help regulate shoreline development in an ecologically sensitive manner with special attention given to public access. A major update of the SMP was completed in 1999 (Ordinance 3458), with a minor amendment in 2004 (Ordinance 3751). The Goals and Policies of the SMP are incorporated into the Comprehensive Plan as Appendix C.

Most of the uses, developments, and activities regulated in the City's SMP (Kent City Code 11.04, Ordinance 3458) are also subject to the City's Comprehensive Plan, the Kent City Code, the International Building Code and various other provisions of city, state and federal laws. The applicant must comply with all applicable laws prior to commencing any use, development, or activity. Kent ensures consistency between the SMP and other City codes, plans and programs

by reviewing each for consistency during periodic updates of the City's Comprehensive Plan as required by State statute.

Title 15, Zoning, of the Kent City Code (KCC), Ordinance 2404, as amended, establishes specific and detailed regulations for most of the uses, development, and activities regulated in the SMP. Title 15 and the SMP are intended to operate together to produce coherent and thorough shoreline regulations. In all cases, uses, developments, and activities must comply with both the KCC and the SMP. If there is a conflict between the two, the more restrictive applies.

The City adopted a revised Critical Areas Ordinance (CAO) in August 2006 consistent with best available science and all other requirements of the GMA. All activities which currently require a Substantial Development Permit (SDP), Conditional Use Permit (CUP) or Variance under the SMP are reviewed under the City's CAO for consistency. As stated above, if there is a conflict between the CAO and SMP, the regulations that offer the greatest environmental protection apply. The City will either adopt the existing CAO by reference into its updated SMP, excluding non-applicable provisions, or it will include relevant sections of the existing CAO, perhaps with minor modifications, as a full appendix to the SMP.

In 1995, the City adopted its first Comprehensive Plan pursuant to Growth Management Act requirements and completed a major update of the Kent Comprehensive Plan in 2004 (City of Kent 2004a). The most recent amendments went into effect in 2006. The KCC is consistent with and implements the Comprehensive Plan.

The following table (Table 1) summarizes nine years of shoreline permit applications submitted to the City of Kent. This summary likely underestimates shoreline activity, as some shoreline exemptions may not have been entered into the City's permit tracking system.

		Pi	er				σ "	i		Permi	t Type	
Year	# of Cases	Extension/ Mod.	New/ Replace	Bulkhead Mod.	Bulkhead Mod. New Bulkhead Upland	Upland Structure	Other Uplan Dev. / Parks	Roads, Utilities & Levee Repa	SDP	SCUP	Variance	Exemption
Green F	River											
1999	2						1	1	2			
2000	3					1		2			1	2
2001	5					1		4	4			1
2002	5						2	3	1		1	3
2003	2							2		1		1
2004	2						2		2			
2005	7					2		2	3			2
2006	6					2		4	3		1	2
2007	5		1				3	1	3	1		1

 Table 1.
 Shoreline Permit History in the City of Kent Since 1999.

		Pier 5		<u>ر</u> م	Ŀ.	Permit Typ		t Type				
Year	# of Cases	Extension/ Mod.	New/ Replace	Bulkhead Mod.	New Bulkhead	New Bulkhead Upland Structure	Other Uplar Dev. / Park	Roads, Utilities & Levee Repa	SDP	SCUP	Variance	Exemption
Lake Me	eridia	n										
1999	1	1										1
2001	7	2	4	1								7
2006	3		2				1					3
2007	1		1						1			
Big Soc	os Cre	ek		•						•		
2007	1							1				1
TOTAL	50	3	8	1	0	6	9	20	19	2	3	24

SDP = Shoreline Substantial Development, SCUP = Shoreline Conditional Use Permit

2.2 STATE AND FEDERAL REGULATIONS

State and federal regulations most pertinent to development in the City's shorelines include the federal Endangered Species Act, the federal Clean Water Act, the state Shoreline Management Act, and the State Hydraulic Code. Other relevant federal laws include the National Environmental Policy Act, Anadromous Fish Conservation Act, Clean Air Act, and the Migratory Bird Treaty Act. Other relevant state laws include the Growth Management Act, State Environmental Policy Act, tribal agreements and case law, Watershed Planning Act, Water Resources Act, Salmon Recovery Act, and the Water Quality Protection Act. A variety of agencies (e.g., U.S. Army Corps of Engineers, National Marine Fisheries Service, U.S. Fish and Wildlife Service, Washington Department of Ecology, Washington Department of Fish and Wildlife) are involved in implementing these regulations, but review by these agencies of shoreline development in most cases would be triggered by in- or over-water work, discharges of fill or pollutants into the water, or substantial land clearing. Depending on the nature of the proposed development, state and federal regulations can play an important role in the design and implementation of a shoreline project, ensuring that impacts to shoreline functions and values are avoided, minimized, and/or mitigated. With the comprehensive SMP update, the City will strive to ensure that Kent's SMP regulations are consistent with other agencies' requirements and explore ways to streamline the shoreline permitting process. A summary of some of the key regulations and agency responsibilities follows.

<u>Shoreline Management Act:</u> The Shoreline Management Act (SMA) was adopted in 1972 with the "overarching goal... 'to prevent the inherent harm in an uncoordinated and piecemeal development of the state's shorelines.' The SMA emphasizes accommodation of reasonable and appropriate uses, protection of shoreline environmental resources and protection of the public's right to access and use the shorelines" (http://www.ecy.wa.gov/programs/sea/sma/st_guide/ intro.html). Ecology is responsible for developing and overseeing implementation of Shoreline Master Program Guidelines, which provide direction to local governments regarding development and implementation of local Shoreline Master Programs. While cities and counties

are the primary regulators under the Shoreline Management Act, Ecology has final approval authority over the local government's SMP. As mentioned above, Ecology also reviews and has final approval over Shoreline Conditional Use and Shoreline Variance permits processed under the local jurisdiction's SMP.

<u>Clean Water Act</u>: The federal Clean Water Act has a number of programs and regulatory components, but of particular relevance to Mercer Island is the National Pollutant Discharge Elimination System (NPDES) program. In Washington State, the Department of Ecology has been delegated the responsibility by the U.S. Environmental Protection Agency for managing implementation of this program. The City is actively engaged in compliance with the NPDES Phase II Municipal Stormwater General Permit requirements, which addresses stormwater system discharges to surface waters (see Section 3.3.3 below).

<u>Section 404</u>: Section 404 of the federal Clean Water Act provides the Corps, under the oversight of the U.S. Environmental Protection Agency, with authority to regulate "discharge of dredged or fill material into waters of the United States, including wetlands" (http://www.epa.gov/owow/ wetlands/pdf/reg_authority_pr.pdf). The extent of the Corps' authority and the definition of fill have been the subject of considerable legal activity. As applicable to the City of Kent's shoreline jurisdiction, however, it generally means that the Corps must review and approve most activities in streams and wetlands. These activities may include wetland fills, stream and wetland restoration, and culvert installation or replacement, among others. Similar to SEPA requirements, the Corps is interested in avoidance, minimization, restoration, and compensation of impacts.

<u>Federal Endangered Species Act (ESA)</u>: Section 9 of the ESA prohibits "take" of listed species. Take has been defined in Section 3 as: "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." The take prohibitions of the ESA apply to everyone, so any action of the City that results in a take of listed fish or wildlife would be a violation of the ESA and exposes the City to risk of lawsuit. Per Section 7 of the ESA, activities with potential to affect federally listed or proposed species and that either require federal approval, receive federal funding, or occur on federal land must be reviewed by the National Marine Fisheries Service (NOAA Fisheries) and/or U.S. Fish and Wildlife Service (USFWS) via a process called "consultation." As previously mentioned, a Corps permit under Section 10 of the Rivers and Harbors Appropriation Act is required for projects in the Green River.

<u>Section 401 Water Quality Certification</u>: Section 401 of the federal Clean Water Act allows states to review, condition, and approve or deny certain federal permitted actions that result in discharges to state waters, including wetlands. In Washington, the Department of Ecology is the state agency responsible for conducting that review, with their primary review criterion of ensuring that state water quality standards are met. Actions within streams, lakes or wetlands within the shoreline zone that require a Section 10 or Section 404 permit (see above), will also need to be reviewed by Ecology.

<u>Hydraulic Code</u>: Chapter 77.55 RCW (the Hydraulic Code) gives the Washington Department of Fish and Wildlife (WDFW) the authority to review, condition, and approve or deny "any construction activity that will use, divert, obstruct, or change the bed or flow of state waters." As

applicable to the City of Kent's shoreline jurisdiction, however, it generally means that WDFW must review and approve most activities in streams and lakes. These activities may include stream alteration, culvert installation or replacement, pier and bulkhead repair or construction, among others. WDFW can condition projects to avoid, minimize, restore, and compensate adverse impacts.

3.0 ELEMENTS OF THE SHORELINE INVENTORY

The following discussion identifies each of the required inventory elements, sources of information for each element, and provides a City-wide or shoreline-wide narrative for each element, as well as segment-specific discussions, as needed.

Green River: The basic character of the river (morphology, levees) does not change as it passes through Kent City limits. However, just outside City limits at the south end, the PAA contains only one short section of levee. The land use distribution along the Green River shoreline is very patchy. Based on land use, the right bank (facing downstream) can be divided into twelve segments and the left bank can be divided into ten segments. For purposes of discussion, these are grouped by land use. For example, the open space/urban separator lands are discussed together although they may be distributed among several non-contiguous segments; in this way, many separate segments can be discussed at once. This system leads to the following four discussion units for some elements of the Green River (illustrated on Figures 3a-3c):

Unit A – Open Space: contains land areas in shoreline jurisdiction generally dominated by Parks and Open Space (OS) and Urban Separator (US) designated lands.

Unit B – High Intensity: contains land areas in shoreline jurisdiction generally dominated by Commercial (C) and Industrial (I) designated lands.

Unit C – Residential: contains land areas in shoreline jurisdiction generally dominated by Single Family (SF), Medium Density Multifamily (MDMF), Mobile Home Park (MHP), and Low Density Multifamily (LDMF) designated lands.

Unit D – Agricultural: contains land areas in shoreline jurisdiction generally dominated by Agricultural Resource (AG-R) and Agricultural Support (AG-S) designated lands.

Small amounts of other land uses may be present in each unit. Portions of the Green River are also in the City's PAA, and have been assessed by King County as part of its SMP update.

<u>Big Soos Creek</u>: Soos Creek's biological and land use character are generally consistent in the City. The entire shoreline area is zoned Urban Separator, and contains primarily critical areas and other vegetated areas. No segments or discussion units are established.

<u>Lake Meridian</u>: Lake Meridian has two distinct land use patterns and is therefore divided into two segments (A – Open Space and C – Residential) (see Figure 3e).

<u>Lake Fenwick</u>: Within the City, Lake Fenwick is divided into two segments based on land use (A - Open Space and C - Residential) (see Figure 3f). A portion of Lake Fenwick is also in the

City's PAA. The PAA has been assessed by King County as part of its SMP update, and was divided into two units (Fen1 and Fen2) based on existing function and level of alteration. Fen1 covers the southeast shore and Fen2 encompasses the residential area on the south and southwest shores. These areas are grouped as PAA-C (they are developed as or planned for residential use) on Figure 3f.

Green River Natural Resources Area Pond: The biological and land use character of the Green River Natural Resources Area Pond (GRNRA Pond) is generally consistent in the City.. Virtually the entire area is ponds or wetlands managed as a combination natural park and stormwater facility. No segments or discussion units are established.

Springbrook Creek: Springbrook Creek's surrounding land use is dominated by industrial use, with two narrow City-owned open space parcels between each bank of the stream and the industrial uses. Given the small area of total Springbrook Creek shoreline and its simplicity, the shorelands were not split into segment units.

Jenkins Creek: Jenkins Creek's biological and land use character are dominated by one use in the City (protected municipal watershed area), so no segments or discussion units are established.

Panther Lake: All of Panther Lake is in the City's PAA and has been assessed by King County as part of its SMP update. The lake has two distinct land use patterns and is therefore divided into two segments (A – Open Space and C – Residential) (see Figure 3g).

Segment	Approximate Length (feet / miles)	Approximate Area (acres / sq. miles)
City of Kent		
Green River (City)	87,242/16.5	526.5/0.82 ¹
Green River (PAA)	22,018/4.2	107.4/0.17
Big Soos Creek	2,417/0.5	10.4/0.02
Lake Meridian	15,660/3.0	76.0/0.12
Lake Fenwick (City)	3,989/0.8	22.07/0.03
Lake Fenwick (PAA)	3,081/0.6	15.5/0.02
GRNRA Pond	11,931/2.3	185.2/0.29
Springbrook Creek	813/0.2	4.0/.01
Jenkins Creek	2,285/0.4	12.4/.02
Panther Lake PAA	6,368/1.2	63.5/0.10
TOTAL	155,803/29.5	1,023.0/1.60

Table 2. Shoreline Planning Segments.

¹ This number does not include the large area of shoreline jurisdictional floodway located near the confluence of Mill Creek Auburn and the Green River.

3.1 LAND USE PATTERNS

Understanding the land use conditions in shoreline areas is an important component of master programs for two key reasons.

First, the Shoreline Management Act (SMA), Chapter 90.58 RCW, establishes policy, giving preference to uses that are unique to or dependent upon a shoreline location. Consequently, WAC 173-26-201(2)(d) calls for master program provisions to give higher priority to the following types of uses, in the order presented below:

- 1. Areas for protecting and restoring ecological functions.
- 2. Water-dependent and associated water-related uses.
- 3. Other water-related and water-enjoyment uses.
- 4. Single-family residential uses where they are appropriate and can be developed without significant impact to ecological functions and displacement of water-dependent uses.
- 5. Non-water-oriented uses where the uses described in 1-4 above are inappropriate or where non-water-oriented uses demonstrably contribute to the objectives of the SMA.

Therefore, WAC 173-26-201(3)(c) directs local governments to inventory:

"[s]horeline and adjacent land use patterns and transportation and utility facilities, including the extent of existing structures, impervious surfaces, vegetation and shoreline modifications in shoreline jurisdiction. Special attention should be paid to identification of water-oriented uses and related navigation, transportation and utility facilities."

Using this regulatory direction, the City looked for shoreline areas with development and redevelopment potential because such sites have the most potential for introducing water-oriented uses, shoreline restoration, and public access.

A second important reason for inventorying shoreline and adjacent land uses is that this information is critical for assigning environment designations as called for in WAC 173-26-211. As noted in WAC 173-26-211(3) the SMP and the comprehensive plan must be mutually consistent and shoreline and adjacent land use is very relevant to the criteria for individual environments in the WAC section.

Land use patterns were derived from GIS mapping from the City's most recent Comprehensive Plan (Figures 3a-h), from review of aerial photography from 2005, and from field inventory work. Rather than providing a quantified tabulation of adjacent land uses, the land use inventory focuses on the shoreline conditions relative to SMA objectives, most specifically, the Preferred Use Doctrine of RCW 90.58.020. To better describe existing land uses along the various shorelines within the City of Kent, the shorelines are divided into the following land use categories: open space, high intensity, residential, and agricultural.

The variety of land uses and conditions identified on Kent's shorelands will be discussed in Chapter 4. This information will be a strong determining factor in assigning environment designations to various shoreline segments.

3.2 TRANSPORTATION

Specific transportation facilities are described in greater detail for each shoreline in Chapter 4.0. In general, information about transportation facilities was derived from the City's map of *Proposed Functional Classifications of Public Roads* (City of Kent 2006), the City's *Six Year Transportation Improvement Program 2008-2013* (City of Kent 2007), aerial photographs, and other map resources.

3.3 UTILITIES

There are two primary utilities with the ability to directly and indirectly impact State shorelines: wastewater and stormwater. Drinking water and irrigation are additional water-consumption uses that are minimally discussed below. Additional wastewater and stormwater utility information is described in greater detail for each shoreline in Chapter 4.0 and illustrated on Figures 4a-4h and 5a-5h.

3.3.1 Drinking/Irrigation Water

Most of the City's drinking water is from groundwater resources located east of the City limits in the Covington and Maple Valley areas. Several wells are also located inside City limits. The City is also a partner in the Tacoma Second Supply Pipeline, operated and maintained by the City of Tacoma's water utility, which captures water from the headwater areas of the Green River between Chinook and Snoqualmie Passes. The City of Tacoma prepared and is implementing a Habitat Conservation Plan to minimize and mitigate impacts to listed fish and wildlife species that result directly and indirectly from the water supply activities (http://www.ci.tacoma.wa.us/water/WaterSystem/habitat.htm). The City also provides drinking water through municipal wells within and outside of City limits, only one of which is located in shoreline jurisdiction, Armstrong Springs located adjacent to Jenkins Creek near Covington (Mactutis, pers. comm., 6 June 2008).

The City's Riverbend Golf Course has a water right to pump water directly from the Green River for irrigation, and the privately owned Teufel Nursery just to the north and across the river also has water rights to pump water directly from the Green River for irrigation.

Water quantity issues and water rights will not be addressed in detail in this report. Because water is considered a public resource, water withdrawals are regulated by the Washington Department of Ecology and typically require a water right. Water withdrawals can have adverse affects on shoreline functions and values. For example, some withdrawals can alter flow patterns in a manner that reduces the availability and quality of in-stream habitat or reduces the availability of water for riparian vegetation. The City of Kent and the City of Tacoma have a number of programs to encourage conservation of water by users, including rebates for installation of water-saving toilets and washing machines, free water conservation devices, and educational opportunities such as the annual water festival.

3.3.2 Wastewater Utilities

The City provides sewer services to most of the incorporated City of Kent, some unincorporated areas of southern King County, and a small portion of the City of SeaTac. The City of Kent provides mostly gravity sewage collection and interceptor systems, and includes nine sewage lift

stations. The King County Department of Natural Resources and Parks Wastewater Treatment Division has responsibility for major interceptors and sewage treatment/disposal facilities for the City of Kent. King County Department of Natural Resources and Parks Wastewater Treatment Division (formerly known as Metro) treats wastewater from the City of Kent's sewer utility at the South Treatment Plant. The treatment plant, located in Renton, discharges into Puget Sound after providing primary, secondary, and disinfection treatments.

The portions of the City not served by Kent are in the Soos Creek Water & Sewer District's (eastern parts of City) or the Midway Sewer District's (west of I-5) service areas. Although the Big Soos Creek shoreline in the City of Kent is within the Soos Creek Water & Sewer District, most of the properties are still on septic. The Midway Sewer District collects wastewater from much of its Kent service area, treats it at its Des Moines Creek Wastewater Treatment Plant, and then discharges treated (primary, secondary and disinfection) wastewater into Puget Sound (PACE and URS Corporation 2000). The Midway Sewer District boundaries do not include any areas within shoreline jurisdiction.

Discharges from the treatment plants are regulated by the Washington Department of Ecology under National Pollutant Discharge Elimination System (NPDES) permits, which include performance standards and monitoring requirements.

3.3.3 Stormwater Utilities

The City of Kent's Storm and Surface Water Utility (KCC 7.05) was established for constructing, operating, maintaining, repairing, improving, and replacing drainage facilities. There are several drainage basins comprised within the Utility, some of which drain into Lake Fenwick, Clark Lake, Lake Meridian, and Big Soos Creek, and then ultimately discharge into the Green River and thus affect shoreline conditions. Other parts of the storm drainage system in the western part of the City discharge into stream systems that drain west into Puget Sound. There are several outfalls directly into the shoreline area, and many more that discharge just outside of shoreline jurisdiction, but subsequently flow into the shoreline area (see Figures 5a-5h). The City of Kent's *Drainage Master Plan* is currently undergoing an update. Some of the goals included in the Plan are outlined below:

Flood Reduction – minimize existing flooding and prevent increase in future flooding through construction of projects that address existing problems, increased inspection and rehabilitation of the existing system, and increased public education.

Water Quality Improvement - increase efforts to maintain and improve water quality by increasing public education (source control), identifying pollution "hot spots" for possible water quality treatment and by examining City practices and facilities to identify where water quality improvements could be achieved.

Aquatic Habitat – increase efforts to slow the decline of aquatic habitat and create improved conditions that will sustain existing fish populations. Combine hydrological controls, such as regional detention, with in-stream habitat improvement projects within watersheds that currently support fish populations.

NPDES Phase II Permit – evaluate the city's stormwater programs with the Department of Ecology's NPDES Phase II permit requirements.

The City received its final National Pollutant Discharge Elimination System (NPDES) Phase II permit in January 2007 from Ecology. The NPDES Phase II permit is required to cover the City's stormwater discharges into regulated lakes and streams. Under the conditions of the permit, the City must protect and improve water quality through public education and outreach, detection and elimination of illicit non-stormwater discharges (e.g., spills, illegal dumping, wastewater), management and regulation of construction site runoff, management and regulation of runoff from new development and redevelopment, and pollution prevention and maintenance for municipal operations.

The City conducts all of the above at some level already, but additional effort may be needed to document activities and to alter or upgrade programs to meet permit requirements. The City has various programs to control stormwater pollution through maintenance of public facilities, inspection of private facilities, water quality treatment requirements for new development, source control work with businesses and residents, and spill control and response. Monitoring may be required as part of an illicit discharge detection and elimination program, for certain construction sites, or in waterbodies with a Total Maximum Daily Load (TMDL) Plan for particular pollutants. General water quality monitoring was not required in the first five-year term of the Phase II permit. General water quality monitoring concerns include a) stormwater quality, b) effectiveness of best management practices, and c) effectiveness of the stormwater management program.

For surface water control, treatment, and regulation, the City currently follows its 2002 *Kent Surface Water Design Manual*, which is an addendum to the *1998 King County Surface Water Design Manual*. In the future, the City will update its *Surface Water Design Manual* as part of the NPDES Phase II permit requirement. Both Ecology's 2005 *Stormwater Management Manual for Western Washington* and *King County's 2005 Surface Water Design Manual* will be evaluated as the NPDES Phase II permit requires that the City use minimum requirements that are equivalent to Ecology's manual.

Discharges into the tributary streams can have a significant impact on in-stream habitat complexity, peak flow magnitude and duration, bank stability, substrate composition, and a number of other parameters. The water quality impact of stormwater inputs is also significant. Stormwater runoff carries pesticides, herbicides and fertilizers applied to lawns and sports fields; hydrocarbons and metals from vehicles; and sediments from construction sites, among other things. All of these things can harm fish and wildlife, their habitats, and humans.

3.4 IMPERVIOUS SURFACES

Impervious surface is relevant to shoreline functions because of the relationship between impervious surfaces and stormwater runoff. In a number of ways, vegetated areas slow the movement and reduce the quantity of runoff that makes its way into streams and other waterbodies. Increases in impervious surface coverage, and the consequent reduction in soil infiltration, have been correlated with increased velocity, volume and frequency of surface water flows. This hydrologic shift alters sediment and pollutant delivery to streams and other receiving bodies (Booth 1998; Arnold and Gibbons 1996). Increased surface water flows associated with impervious surface coverage of suburban areas (20-30%) has been linked to decreased bank stability and increased erosion (May et al. 1997). Rainwater can evaporate off of vegetation without ever reaching the ground, infiltrate into the soils where it is taken up by vegetation and evapotranspirated, infiltrate into the soils to recharge groundwater, or move slowly over the surface or subsurface into a waterbody. Impervious surfaces replace vegetation and speed the movement of runoff into waterbodies while increasing the volume of the runoff, and may pick up pollutants in the process.

Table 3 lists separate calculations for impervious surfaces with buildings (single-family building roof lines) and other impervious surfaces. Commercial and multi-family buildings (included as "other impervious area") were updated recently; single-family sites have not been updated since 1999.

Shoreline	Single-Family Impervious Area (Acres)	Other Impervious Area (Acres)	Total Impervious Area (Acres)	Total % Impervious Area
Green River (City)	2.18	77.02	79.19	15
Green River (PAA)	0.65	0	0.65	0.6
Soos Creek	0.12	0.22	0.33	3.2
Lake Meridian	7.15	7.48	14.63	19.2
Lake Fenwick (City)	0.01	0.59	0.60	2.7
Lake Fenwick (PAA)	0.44	0	0.44	2.8
GRNRA	0	1.66	1.66	0.9
Panther Lake (PAA)	1.02	0	1.02	1.6
Springbrook Creek	0	1.87	1.87	46.6
Jenkins Creek	0	0	0	0

Table 3. Known Impervious Surface in Shorelands Associated with each Shoreline.

3.5 SHORELINE MODIFICATIONS

Shoreline modifications are anthropogenic alterations to natural lakeshores, stream and river banks, and nearshore environments, and may include such features as levees, bridges, road embankments, utility crossings, bulkheads, docks or piers, a variety of armoring types (some associated with fill), and other in-water structures such as boatlifts, boathouses, and moorage covers. These sorts of modifications alter the functions of lake and stream channel edges; change erosion, sediment movement, and channel migration patterns; affect the distribution of aquatic vegetation; alter flow dynamics; impact floodplain processes; and are often accompanied by upland vegetation loss. Information about shoreline modifications was derived from several WRIA 9 products (maps and habitat studies), aerial photographs, and brief site visits. Known shoreline modifications are described in greater detail for each shoreline in Chapter 4.0 and illustrated on Figures 7a-7e.

3.6 EXISTING AND POTENTIAL PUBLIC ACCESS SITES

Public access includes the ability of the general public to reach, touch, and enjoy the water's edge, to travel on the waters of the state, and to view the water and the shoreline from adjacent locations.

WAC 173-26-221(4)(c) states that:

"Local governments should plan for an integrated shoreline area public access system that identifies specific public needs and opportunities to provide public access... This planning should be integrated with other relevant comprehensive plan elements, especially transportation and recreation."

To support this planning, WAC 173-26-201(3)(c) calls for local governments to inventory existing and potential shoreline public access sites, including public rights-of-way and utility corridors. Because shoreline access includes visual access, important views of the water from shoreline areas were also identified.

Information about public access sites in the City was drawn from site visits, aerial photographs, the City's Parks, Recreation and Community Services Department staff and websites, and the City's land use and parks maps. The Green River, Lake Meridian and Lake Fenwick shorelines each have at least one major park that provides physical access to the water for boating or other water enjoyment activities, such as swimming and fishing. Trail systems along the Green River, Green River Natural Resources Area pond, and Lake Fenwick also provide for more passive enjoyment of the shoreline. The Springbrook Creek shoreline area lacks developed public access, other than passive views from a road crossing. However, a park is located upstream of the 20 cfs cutoff point, which contains a user-made trail connecting to two narrow parcels within jurisdiction that are owned by the City. These parcels contain the remaining Springbrook Creek buffer between the stream and the industrial development, and are undeveloped. In order to protect the City's public water supply, Jenkins Creek also has no public access. Existing and potential public access opportunities are described in greater detail for each shoreline in sections of Chapter 4.0 and illustrated in Figures 8a-8h.

3.7 CRITICAL AREAS

The inventory of critical areas was based on a wide range of information sources. A complete listing of citations used to compile information on critical areas is included in Section 8.0, References, at the end of this study. The City's critical areas mapping includes geologically hazardous areas (erosion, steep slope and seismic hazards), wetlands, streams, and critical aquifer recharge areas. This information was supplemented with maps or reports obtained from the Washington Department of Fish and Wildlife (WDFW), Washington Department of Natural Resources (DNR), Ecology, National Marine Fisheries Service, and U.S. Fish and Wildlife Service. Soils mapped by the Natural Resource Conservation Service (NRCS) are shown on Figure 9. Soil types classified as "hydric," or saturated, are indicative of wetland soils. The City's aquifer recharge areas (Figure 12) were identified by the City based largely on NRCS soil information.

Critical areas are described in greater detail for each shoreline in Chapter 4.0 and illustrated on Figures 10 through 14.

3.7.1 Geologically Hazardous Areas

The City's geologic hazard areas are by definition:

lands or areas characterized by geologic, hydrologic, and topographic conditions that render them susceptible to varying degrees of potential risk of landslides, erosion, or seismic or volcanic activity; and areas characterized by geologic and hydrologic conditions that make them vulnerable to contamination of groundwater supplies through infiltration of contaminants to aquifers (KCC 11.06.320).

The regulations address four types of hazards: erosion, landslide, seismic, and volcanic (Figures 13.1-13.3). Erosion hazard areas are designated based on the soils classification in the *Soil Survey, King County Area, Washington* (USDA 1973) as having a moderate to severe, severe, or very severe erosion hazard potential. Landslide hazards are defined based on the presence of one of nine listed conditions, including slopes steeper than 40 percent with a vertical relief of at least 10 feet and soils listed by *Soil Survey, King County Area, Washington* (USDA 1973) as having a "severe" limitation for building site development. The City has mapped steep slopes and soils, but many of the other criteria are investigated on a site-specific basis so a comprehensive map of landslide hazard areas does not exist. King County has mapped landslide hazards as part of its *2003 King County Regional Hazard Mitigation Plan* (http://www.ci.kent.wa.us/emergency/KentHazards/map_landslide_14.pdf). The determination of seismic hazard areas is based on mapping by others of soils and slopes that have a strong liquefaction potential during an earthquake. Although the City has not created its own map of the volcanic hazard areas, the City has adopted a map prepared by the U.S. Geological Survey (Exhibit 3) and also references King County's map prepared as part of its *2003 King County Regional Hazard Mitigation Plan*.

The following summaries of basic geologic hazard history and risk in the City are excerpted from the *City of Kent Comprehensive Emergency Management Plan – Hazard Identification and Emergency Analysis* (2004b).

<u>Landslides</u>. The topography of the Kent area has historically made the area prone to minor landslides. For the most part these incidents have been in remote locations causing little to no damage. In recent years, however, there has been an increase in the number of residential structures located in areas susceptible to this condition. Heavy snowstorms in December 1996 and January 1997 were followed by a warming trend that caused quick melting, runoff, and flooding. This period was then followed by rain. This led to over 100 slides in King County over the subsequent two-month period. Fissures and sand volcanoes were discovered on sand bars along the Green River following the Nisqually Earthquake on February 28, 2001. Most recently, sliding of both the East and West hills has produced incidents that range from the complete destruction of structures, to the loss of hillside view property.



Exhibit 3. Volcano hazards from Mount Rainier, Washington: Pyroclastic-flow hazard zone and inundation zone for Case I, II and III lahars.

<u>Liquefaction</u>. Western Washington and the Kent area have a long history of documented earthquake activity, being located in an area known as the Pacific Ring of Fire. Various local soils and geologic factors affect how the Kent area will fare during an earthquake. The Kent valley is composed of soft materials such as mud, artificial fill and layers of sand and clay that can amplify ground shaking and make overall damage more intense. Soft soils tend to liquefy during an earthquake creating a condition known as "liquefaction." This condition can result in local areas experiencing severe damage, especially where the ground fails (or liquefies) under buildings, pipelines or bridges. Landslides and rock falls may be triggered on steep slopes.

Because the Kent valley contains the largest concentration of older buildings and lies on soil prone to liquefaction, it is likely that this area would be the most heavily damaged in the event of an earthquake. An earthquake of significant magnitude could also cause enough damage to Howard [A.] Hanson Dam and Mud Mountain Dam to create a serious flood hazard in City of Kent Shoreline areas.

<u>Volcanic Eruption</u>. A volcanic event in the Cascade Mountains may occur on[c]e or twice in a lifetime. The Kent area is close enough to be directly affected by eruptions from any one of five volcanoes. We are susceptible to a variety of hazardous situations during a volcanic eruption; perhaps of greatest concern is the threat of large mud flows causing damage to either the Mud Mountain or the Howard A. Hanson Dam¹. Seismic intensities great enough to damage these dams would be of equal concern.

Geologic evidence shows major lahar and debris flows have filled the Green River valley in the past, although recent models put the Kent area at a minor risk. The overall effects of a major eruption could possibly produce an incident of disaster that could only be compared to the devastation of a major earthquake.

Tephra and ash fall from a volcanic eruption could pose health concerns for residents as well as damage property, interrupt transportation, and disrupt industry and the local commerce.

Earthquake. Western Washington and the Kent area have a long history of documented earthquake activity. Kent is geographically located in an area known as the Pacific Ring of Fire. The same geologic events that result in the creation of volcanoes and volcanic events may also generate notable earthquakes. Western Washington is framed by the Pacific, North American, and Juan de Fuca plates... [G]eologic factors affect how the Kent area will fare during an earthquake. The Kent valley is composed of soft materials such as mud, artificial fill and layers of sand and clay that can amplify ground shaking and make overall damage more intense. Soft soils tend to liquefy during an earthquake creating a condition known as "liquefaction." This condition can result in local areas experiencing severe damage, especially where the ground fails (or liquefies) under buildings, pipelines or bridges. Landslides and rock falls may be triggered on steep slopes.

3.7.2 Flood Hazard Areas

For all practical purposes, "frequently flooded areas" or "areas of special flood hazard" are those areas within the 100-year floodplain and any other areas subject to flooding (WAC 365-195-090(4)) (Figures 10.1 and 10.2). The City of Kent regulates these areas via its Flood Hazard Regulations (KCC 14.09), which are part of Title 14, Buildings and Construction Code.

The following summary of basic flood hazard history and risk in the City is excerpted from the City of Kent Comprehensive Emergency Management Plan – Hazard Identification and Vulnerability Analysis (2004b).

Of all possible natural hazards, Kent is most prone to flooding. There are two types of flooding which could conceivably occur in this area:

1) Riverine flooding: Floods which occur because of prolonged rain, melting snow or both. The first element leading to a potential Riverine flood is a heavy, fresh snow in the mountains. If a weather front with warm winds,

¹ It should be noted that the Howard A. Hanson Dam is on the Green River, which does not drain any volcanic peak and is therefore not subject to mudflows from a volcanic eruption.

usually from the southeast, and heavy rainfall follow the snow before it has a chance to settle and solidify, a flood potential exists.

2) Flash flooding and surface flooding: Several factors contribute to flash flooding. The two key elements are rainfall intensity and duration. Topography, soil conditions, urbanization and ground cover also play important roles. Flash flooding occurs within a few minutes to a few hours of excessive rainfall, a dam or levee failure, or a sudden release of water held by an ice or log jam. In addition, localized surface or "urban" flooding occurs as the result of drainage systems that are incapable of carrying exceptional volumes of snowmelt and heavy rain runoff.

The first flooding type is the most likely to occur, with the second being possible as the result of dam or other flood control system failure, such as the Green River levee system.

The Kent Valley was historically inundated by large floods until the construction of the Howard A. Hanson Dam. Since operation commenced in 1962, the dam, in combination with the levee systems also constructed along the Green River, have prevented that degree of flooding and limited flood damages.

Historical flooding from the White River would merge with the Stuck River and spill water to the north and south. The original path of the White River flowed north to the Duwamish valley through Kent, but nature transferred the course to the Puget Sound into Commencement Bay. Mud Mountain Dam was erected in 1948 to prevent massive flooding in South King County and North Pierce County.

The City of Kent experiences flooding to some degree nearly every year, most likely occurring during "flood season" between the months of October and March when rains are the heaviest. The major problems have been lowland flooding and road closures as a result of standing water... The City of Kent has adopted King County's Flood Management Plan, participates in the [King County Flood Control Zone District], and has adopted Flood Hazard Regulations (KCC 14.09) to address impacts of potential development in flood areas. The pending update to the City's Critical Areas Ordinance will address recent state and federal legislation.¹

The City of Kent and King County Flood Insurance Studies provide additional information about winter flooding events. According to these studies, most floods occur primarily during the winter as a result of heavy rainfall, with snowmelt only contributing secondarily. Urbanization has cumulatively accelerated the amount of runoff reaching the valley floor. During periods of excessive precipitation, surface and subsurface runoff from the steep valley walls cause groundwater elevations in the valley floor to rise significantly. This creates open ponding in topographically depressed areas throughout Kent. This condition is further aggravated by floodflows and corresponding high-water elevations on the Green River, which prevent natural drainage of subsurface and surface water. In other areas, the overlying soils are generally less pervious than the deeper sands, and runoff collects in ponds perched above the water table.

¹ This update was completed in 2005. The City of Kent's *Surface Water Design Manual* also addresses stormwater runoff impacts from new development and redevelopment.

Although not specifically listed as shoreline waterbodies in either jurisdiction, Mill Creek Kent and Mill Creek Auburn pose significant flooding problems in the City of Kent. Intermittent flood hazard areas follow the Creek downstream through the City until the confluence with Springbrook Creek, which is the upstream limit of Springbrook Creek shoreline jurisdiction. These Mill Creek Kent-associated flood hazard areas are upstream of Springbrook Creek, but are not otherwise related to Springbrook Creek and are therefore not part of shoreline jurisdiction.

Mill Creek Auburn has a very significant floodway and floodplain in its lower reach (see Figure 10.1). After it crosses SR 167, it, together with Mullen Slough, becomes a significant storage area floodplain involving backwater from the Green River. Not only a floodplain, it is also designated as a storage floodway, which carries significant restriction on building. Because the Mill Creek Auburn flooding is so tightly related to Green River flows, the floodway and contiguous floodplain areas are considered to be in shoreline jurisdiction.

Implementation of the City's Flood Hazard Regulations will likely be affected by the recent proposal of the Federal Emergency Management Agency (FEMA) to expand its map of the 100-year floodplain to include the entire Kent valley due to FEMA's assumption that the Green River levees would fail in a 100-year flood event. The City believes FEMA's draft map makes incorrect assumptions, and thus has appealed the draft. Where appropriate, river and stream shoreline-specific flood hazard discussions are included below in the Floodplain discussions in Chapter 4.0.

3.7.3 Wetlands

The City's wetland inventory map was updated in 2001 based on field assessments, and was modified in 2004 to incorporate additional wetland delineations that had been submitted to the City. Wetland mapping within portions of the PAA outside of the City's study area is derived from King County GIS as well as consultant investigations. Both mapping efforts used a combination of soils mapping, aerial photographs, National Wetland Inventory maps, submitted reports, and some field inventory (Figure 11). Soils mapped by the NRCS are shown on Figure 9. Soil types classified as "hydric" are indicative of wetland soils. Nine hydric soil types were mapped in portions of shoreline jurisdiction in the City limits and the PAA: Briscot silt loam, Norma silt loam, Oridia silt loam, Puget silty clay loam, Renton silt loam, Seattle muck, Snohomish silt loam, Tukwila muck, and Woodinville silt loam. Mapped wetlands and mapped hydric soils have a high level of overlap.

3.7.4 Streams

Information regarding streams tributary to or originating in the shoreline waterbodies was gathered from WDFW's Priority Habitats and Species (PHS) maps and reports (WDFW 2007), WRIA 9 map products (King County DNR 2001), and other agency resources.

3.7.5 Other Fish and Wildlife Habitat Conservation Areas

Fish and Wildlife Habitat

In addition to the shoreline waterbodies themselves, significant fish and wildlife habitats in the City's shorelines include wetlands and the upland forest areas surrounding Lake Fenwick, Jenkins Creek, and partially Big Soos Creek. Otherwise, most of the shoreline areas are altered

by residential, agricultural, commercial or industrial development. These land uses do provide differing levels of habitat for different species, but those habitat types are not limiting in the watershed and the species served are highly adaptable to urban environments and may be introduced. Some agricultural areas and arguably golf courses do provide valuable habitat for migrating birds, but only because they replicate to some extent floodplain marshes.

Special Status Species

Special status species are species that are listed or proposed for listing under the State or Federal Endangered Species Act or that are identified by WDFW as State Priority Species. All game and food fishes, including salmon, trout, and char, are considered to be Priority Species by the WDFW. In addition, Coastal-Puget Sound bull trout and Puget Sound steelhead trout are listed as threatened by the USFWS and Puget Sound chinook salmon are listed as threatened by NOAA Fisheries. Specific information on fish occurrence and habitat use within the City was provided by the PHS data (WDFW 2007); *Washington State Salmon and Steelhead Stock Inventory* (SASSI) (WDFW 2002); the SASSI Bull Trout/Dolly Varden Appendix (WDFW 1998); the Catalog of Washington Streams and Salmon Utilization, Volume 1, Puget Sound Region (Williams et al. 1975); the Habitat Limiting Factors and Reconnaissance Assessment Report (Kerwin and Nelson 2000); Salmon Habitat Plan: Making Our Watershed Fit for a King (Green/Duwamish and Central Puget Sound Watershed Water Resource Inventory Area (WRIA 9) Steering Committee [Steering Committee] 2005); the WRIA 9 Strategic Assessment Report – Scientific Foundation for Salmonid Habitat Conservation (King County 2005); and additional sources as cited in the text.

Although other sensitive species are likely to occur in the City's shoreline areas, according to WDFW, the following special status species are known to occur in one or more of the City of Kent's shorelines:

- Bald Eagles (*Haliaeetus leucocephalus*) (nesting and/or foraging in Green River, Lake Fenwick, Panther Lake, Lake Meridian, Big Soos Creek)
- Pileated Woodpecker (*Dryocopus pileatus*) (Lake Fenwick)
- Bull Trout (*Salvelinus confluentus*) (Green River)
- Chinook Salmon (Oncorhynchus tshawytscha) (Green River, Big Soos Creek)
- Chum Salmon (*O. keta*) (Green River)
- Coho Salmon (*O. kisutch*) (Green River, Big Soos Creek)
- Pink Salmon (O. gorbuscha) (Green River)
- Sockeye Salmon (O. nerka) (Green River)
- Steelhead (O. mykiss) (Green River, Big Soos Creek)
- Cutthroat Trout (O. clarki) (Green River, Big Soos Creek)

Relevant species are described in greater detail for each shoreline in Chapter 4.0. Special status species locations, except for fish distribution, are not mapped in order to protect nesting sites and other sensitive use areas.

3.7.6 Critical Aquifer Recharge Areas

The City of Kent has mapped critical aquifer recharge areas. As noted in its critical areas regulations, "critical aquifer recharge areas (CARAs) are those areas with a critical recharging

effect on aquifers used for potable water as defined by WAC 365-190-030(2). CARAs have prevailing geologic conditions associated with infiltration rates that create a high potential for contamination of groundwater resources or contribute significantly to the replenishment of groundwater." There are only five CARA polygons mapped in the City of Kent. The only two shoreline management areas overlapped by CARAs are the full Big Soos Creek shoreline in the City and the northern and southern quarters of Lake Meridian (Figure 12).

There are five uses specifically prohibited in CARAs: 1) landfills, 2) underground injection wells, 3) mining, 4) wood treatment facilities, 5) Storage, processing, or disposal of radioactive substances, 6) private wells, and 7) other uses ("Activities that would significantly reduce the recharge to aquifers currently or potentially used as a potable water source or activities that would significantly reduce the recharge to aquifers that are a source of significant base flow to a regulated stream") (KCC 11.06.800). Certain other uses with aquifer contaminant potential (e.g., storage tanks, vehicle repair facilities) must comply with specific regulations contained in KCC 11.06.790.

3.8 FLOODPLAIN AND CHANNEL MIGRATION ZONE

3.8.1 Floodplain

Floodplain boundaries for the Green River, Big Soos Creek, Springbrook Creek and Jenkins Creek were developed from the published and adopted FEMA FIRM maps, and further revised using data developed by King County in early 2008 in response to preliminary maps developed by FEMA in 2007 (Figures 10.1 and 10.2). Lake Meridian, Lake Fenwick, and the Green River Natural Resources Area pond do not have floodplains, although the GRNRA pond is in the Green River floodplain per FEMA's draft map.

3.8.2 Channel Migration Zone

According to definitions in Ecology's Shoreline Master Program Guidelines (WAC 173-26-020), "'Channel migration zone (CMZ)' means the area along a river within which the channel(s) can be reasonably predicted to migrate over time as a result of natural and normally occurring hydrological and related processes when considered with the characteristics of the river and its surroundings." In other words, river and stream channels can move, or migrate, laterally across their floodplains. Channel migration can occur gradually, as a river erodes one bank and deposits sediment along a point bar on the other, or can occur as an abrupt shift of the channel to a new location. Such abrupt shifts are called avulsions, which may happen during a single flood event. The highest rates of channel migration typically occur in zones of rapid sediment deposition, such as where steep rivers flow out of foothills onto flatter floodplains to form an alluvial fan.

Channel migration poses a potential and sometimes underestimated risk to public health and safety. It represents a different type of flood hazard than getting inundated by overbank flow, and can endanger properties and structures located outside of the regulatory floodplain and thus thought to be safe. It may be the least recognized and yet most destructive type of damage that results from flooding. Erosion caused by channel migration can undermine houses, roads, and infrastructure, wash away property, and even threaten lives (http://www.kingcounty.gov/environment/waterandland/flooding/maps/migration.aspx).

In Kent, channel migration zone discussions are relevant for the Shoreline streams and rivers, which include the Green River, Big Soos Creek, Springbrook Creek and Jenkins Creek. Channel migration zones do not typically apply to lakes. No formal channel migration zone study has been done on any of the creeks in the City of Kent, but King County completed a partial study of the Green River in 1993 and updated the associated map in 1999. See Chapter 4.0 for a discussion of the channel migration zones of the Green River and the City's Shoreline streams.

3.9 HISTORICAL OR ARCHAEOLOGICAL SITES

The Washington State Office of Archaeology and Historic Preservation (OAHP) WISAARD website was searched to identify known historical or archaeological features (http://www.oahp. wa.gov/gis/INDEX.CFM). Four sites were identified, all in the Green River shoreline. Site description and general information about Native American use of the Green River is provided in Section 4.1.8.

3.10 OTHER AREAS OF SPECIAL INTEREST

Areas of special interest not included in the other elements of the inventory, such as rapidly developing waterfronts, eroding shorelines, or other degraded sites with potential for ecological restoration were identified based on the references described above and during the field reconnaissance of the study area.

3.10.1 Lake Aquatic Invasive Species

Noxious weeds of Washington State are non-native, invasive plants defined by law as a plant that when established is highly destructive, competitive, or difficult to control by cultural or chemical practices (RCW 17.10). These plants have been introduced intentionally and unintentionally by human actions. Most of these species were brought in without any natural enemies, such as insects or diseases, to help keep their populations in check. As a result, these plants can often multiply rapidly (Ecology and Washington State Department of Agriculture 2004). Species of aquatic noxious weeds found in Lake Fenwick and/or Lake Meridian are listed in Table 4. The two most common invasive species that are impacting the lakes are Brazilian elodea and Eurasian watermilfoil. Information about presence in each lake can be found in Chapter 4.0.

Table 4.	Aquatic noxious weeds found in Lakes Meridian and Fenwick.
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Common Name	Scientific Name	Growth Habitat	Documented Presence	King County Noxious Weed Classification ¹
Eurasian watermilfoil	Myriophyllum spicatum	Submergent	Lake Meridian	Non-designated
White water lily	Nymphaea odorata	Submergent	Lake Meridian	Non-designated
Brazilian elodea	Egeria densa	Submergent	Lake Fenwick	Class B
Purple loosestrife	Lythrum salicari	Emergent	Lake Meridian	Blass B

¹ Class B – control required in King County

Non-designated – control recommended but not required in King County

Impacts

The introduction of any non-native species has an effect on native species and habitats, although it is often difficult to predict those effects. However, there is a growing number of non-native aquatic plant and animal species whose current or potential impacts on native species and habitats are known to be significant. Potential threats may be evidenced by the degree of negative impact these species have upon the environment, human health, industry and the economy (WDFW 2001). Potential negative impacts include:

- loss of biodiversity;
- alterations in nutrient cycling pathways;
- decreased habitat value of infested waters;
- decreased water quality;
- decreased recreational opportunities;
- increased safety concerns for swimmers; and
- decreased property values.

Control

The Washington Department of Fish and Wildlife has set guidelines for aquatic plant control and removal in the pamphlet *Aquatic Plants and Fish.*¹ This serves as the Hydraulic Project Approval (HPA) for any project that is conducted solely for the removal or control of such aquatic noxious weeds, provided that the project is carried out as described in the pamphlet. Mechanical and physical means of removal and control of aquatic noxious weeds are discussed in the pamphlet (more information can be found on WDFW's website). Mechanical and physical methods of removal discussed in the *Aquatic Plants and Fish* pamphlet include hand pulling, hand tools, bottom barrier, weed roller, mechanical cutters, and harvesters. Some mechanical methods may require an individual HPA. If the project calls for any use of herbicides, additional permits are required through Ecology.

Ecology currently issues coverage for aquatic herbicide use under the National Pollutant Discharge Elimination System (NPDES) permit to qualified applicants. The applicant must be a licensed pesticide applicator (WAC 16-228-1545) in the state of Washington and have an aquatic endorsement (WAC 16-228-1545 3[t]). The applicant must agree to comply with all requirements of the permit, including posting public notices, adhering to timing restrictions, complying with the specific application restrictions for each herbicide product, conducting monitoring, performing sampling and analytical procedures, and reporting and recordkeeping (Ecology 2006).

As of 2006, there are seven aquatic herbicides approved for the management of noxious aquatic plants in lakes, rivers, and streams. The characteristics and recommended usage of these herbicides are summarized in Table 5.

^{1 1} The online version of the Aquatic Plants and Fish pamphlet is for informational purposes only and copies of it do not satisfy the requirement to have a copy of the Aquatic Plants and Fish pamphlet on the job site when conducting aquatic plant control operations. An official copy must be obtained from WDFW.

Aquatic Herbicide Name	Type of Herbicide	Targeted Species and Recommended Usage		
Glyphosate	Systemic broad spectrum, non- selective herbicide	Floating plants, not submerged plants		
Fluridone	Broad spectrum, slow-acting systemic herbicide	Eurasian watermilfoil and Brazilian elodea		
2,4-Dichlorophenoxyacetic acid, dimethyl-amine salt	Liquid formulation; fast-acting, systemic, selective herbicide	Selective to Eurasian watermilfoil and Brazilian elodea		
Endothall - Dipotassium Salt	Fast-acting, non-selective contact herbicide	Short term (one season) control of a variety of aquatic plants		
Diquat bromide	Fast-acting, non-selective contact herbicide	Short term (one season) control of a variety of submersed aquatic plants		
Triclopyr	Fast-acting, systemic, selective herbicide	Selective to Eurasian watermilfoil		
Imazapyr	Systemic broad spectrum, slow- acting herbicide	Floating plants, not submerged plants		
All aquatic herbicides may only be used by an approved licensed herbicide applicator (Ecology; http://www.ecy.wa.gov/programs/wq/plants/management/aqua028.html)				

Table 5.	Aquatic herbicides approved for use in Washington State waters to control nuisance
	weeds.

Depending on the herbicide used, it may take several days to weeks or several treatments during a growing season before the herbicide controls or kills treated plants. Rapid-acting herbicides like endothall and diquat may cause low oxygen conditions to develop as plants decompose. Low oxygen can cause fish kills. Additional information about invasive aquatic plants and methods of control can be found in the Water Quality section of Ecology's website.

There is often a fine line between whether or not control is biologically necessary or justifiable. Depending on the method of control chosen, there could be disturbance of the substrate, reduction in benthic invertebrates (which are an important food source), and increased risk of spread of the invasive species to other areas. Depending on the condition of the sediments, substrate disturbance can result in acute, although temporary, increases in turbidity and may re-introduce pollutants bound to the sediments back into the water column. In addition, reductions in aquatic vegetation, whether native or non-native, reduce primary productivity, which is the foundation of the lake food chain. This could result in reduced fish production at the top of the food chain (Kahler et al. 2000). However, control of invasive aquatic vegetation may be biologically justifiable where the plants are so dense that dissolved oxygen (DO) levels fall to suboptimal or even lethal levels (2-4 mg/L). DO levels drop below dense surface mats because light is blocked to the submerged aquatic vegetation which produces the majority of the oxygen to the water column. Much of the oxygen produced by the surface mats of vegetation is lost to the atmosphere. Decomposition of submerged dead material also depletes the water column of oxygen. In addition, dense vegetation can reduce wave action at the surface, which would

otherwise help oxygenate the water. Reduced wave action can also contribute to increased water temperature, as the cooler water from deep areas does not flush the warmer, vegetated shallow areas. Warmer water holds less oxygen than cold water.

3.10.2 Water-Oriented Uses

According to Ecology's SMP Guidelines (173-26-020 WAC), "water-oriented use means a use that is water-dependent, water-related, or water-enjoyment, or a combination of such uses." Aside from City parks in shoreline jurisdiction and private and public piers/boat launches on Lake Meridian, no other water-oriented uses have been identified in shoreline jurisdiction. Park-related water-oriented uses are discussed in Chapter 4.0 under the *Existing and Potential Public Access* headings and piers are discussed in Chapter 4.0 under the *Shoreline Modifications* headings.

3.10.3 Toxic or Hazardous Waste Sites

The Department of Ecology regulates certain activities and sites that have potential for adverse environmental impacts, such as sites that use or store hazardous wastes or toxics. Listing as a regulated site does not necessarily mean that the activity occurring on the site is polluting, but that at the very least it has potential for damages and requires some level of monitoring or reporting.

The following sites in or close to the Green River shoreline were mapped on Ecology's Facility/Site Atlas (http://apps.ecy.wa.gov/Website/facsite/viewer.htm) as being active sites regulated by Ecology.

- Julius Rosso Wholesale Nursery Co: This site reportedly contained a leaking underground storage tank, presumably cleaned up prior to Ecology listing the site as inactive in 1998. This site is located on the west side of the Green River, east and west of Frager Road. [This site is inactive, but the City has conducted its own studies of the eastern site when investigating potential for a City purchase of the property. That study "revealed some areas that potentially could have some contamination from vehicle maintenance and repair." In addition, a City consultant indicated that fill material used on the western site could have been contaminated with vehicle fluids (Mactutis, pers. comm., 22 May 2008).
- B&B Partnership Area BB5: This property has been an active voluntary "State Cleanup Site" since 1997. The property is located in a portion of the PAA off of 88th Avenue South, south and west of the Green River.
- Truesoups: This site, located off of 79th Avenue South on the north side of the Green River, has been active since 2005. Because the site stores 10,000 pounds or more of a hazardous chemical or 500 pounds or less, depending on the chemical, of an extremely hazardous chemical on site at any one time, it is required to report annually.
- Kent City Public Works City Shops: The site, located on South 240th Street east of the Green River, has three regulated activities: underground storage tanks (contain regulated substances and has a tank volume of ten percent or more beneath the surface of the ground), leaking underground storage tanks (undergoing clean-up), and general hazardous waste management.

- La Croix Industry Inc.: This fabrication site, located on the east side of the Green River on South 226th Street, is a hazardous waste generator.
- Toys R Us Inc.: This warehouse facility located on the east side of the Green River on Russell Road South is regulated for underground storage tanks and hazardous chemical storage (similar to Truesoups, above).
- Sunset Press Inc: This commercial printing facility, located on the east side of the Green River on 58th Place SE, is a hazardous waste generator.
- Ralcorp Frozen Bakery Products: This business, located on the east side of the Green River on South 190th Street, is a regulated hazardous chemical storage facility.
- West Valley Business Park: This development, located on 72nd Avenue South on the east side of the Green River, is undergoing toxics clean-up.
- Coatings Unlimited Inc. Kent: This facility, located on the east side of the Green River on 68th Avenue South, is regulated in three categories related to hazardous waste generation or use.

The following sites in or close to the Springbrook shoreline were mapped on Ecology's Facility/Site Atlas as being active sites regulated by Ecology.

- Royal Reprographics Inc.: This facility, located on the east side of Springbrook Creek, stores 10,000 pounds or more of a hazardous chemical or 500 pounds or less, depending on the chemical, of an extremely hazardous chemical on site at any one time.
- King Command Foods Inc.: This meat packing facility, located on the west side of Springbrook Creek, stores 10,000 pounds or more of a hazardous chemical or 500 pounds or less, depending on the chemical, of an extremely hazardous chemical on site at any one time. The facility was also issued a water-quality-related enforcement action in 2003.

The following site in or close to the Lake Meridian shoreline was mapped on Ecology's Facility/Site Atlas as being an active site regulated by Ecology.

• Covington Chevron and Car Wash: This facility, located on SE 272nd Street, has underground storage tanks that contain regulated substances.

3.11 OPPORTUNITY AREAS

Ecology's *Shoreline Master Program Guidelines* (173-26 WAC) includes the following definition:

"Restore," "Restoration" or "ecological restoration" means the reestablishment or upgrading of impaired ecological shoreline processes or functions. This may be accomplished through measures including but not limited to re-vegetation, removal of intrusive shoreline structures and removal or treatment of toxic materials. Restoration does not imply a requirement for returning the shoreline area to aboriginal or pre-European settlement conditions.

Consistent with Ecology's definition, use of the word "restore," or any variations, in this document is not intended to encompass actions that re-establish historic conditions. Instead, it encompasses a suite of strategies that can be approximately delineated into four categories: creation (of a new resource), restoration (of a converted or substantially degraded resource), enhancement (of an existing degraded resource), and protection (of an existing high-quality resource).

There is a critical distinction between restoration and mitigation. Mitigation will require applicants whose shoreline proposals will have adverse impacts to complete actions to mitigate those impacts or provide compensation in other ways for losses of ecological function. Degraded wetland buffers are required to be restored under the City's CAO. The City can encourage applicants to implement restoration actions that will improve ecological functions relative to the applicant's pre-project condition. As stated in WAC 173-26-201(2)(c):

It is intended that local government, through the master program, along with other regulatory and nonregulatory programs, contribute to restoration by planning for and fostering restoration and that such restoration occur through a combination of public and private programs and actions. Local government should identify restoration opportunities through the shoreline inventory process and authorize, coordinate and facilitate appropriate publicly and privately initiated restoration projects within their master programs. The goal of this effort is master programs which include planning elements that, when implemented, serve to improve the overall condition of habitat and resources within the shoreline area of each city and county."

The Opportunity Areas discussions in Chapter 4 present options for "restoration" that would improve ecological functions (Figure 16). For example, enhancement of riparian vegetation, reductions or modifications to shoreline hardening, minimization of in- and over-water structures, and improvements to fish passage would each increase one or more ecological parameters of the City's shoreline. The City or City residents could implement these options voluntarily or, depending on specific project details, they could be required measures to mitigate adverse impacts of new shoreline projects.

Opportunity areas were initially identified during the compilation of the reference materials described above, review of recent aerial photographs, and several brief site visits in Fall 2007. More detailed descriptions of each segment can be found in Section 4.0. Generally, restoration opportunities which have been identified are focused on City property, including parks and open spaces. Many other restoration opportunities exist throughout the City on private property. These opportunities would include many of the same issues as listed above, but would likely occur only through voluntary means or through re-development proposals.

A Restoration Plan document will be prepared in 2008 as a later phase of the Shoreline Master Program update process, consistent with WAC 173-26-201(2)(f). The Restoration Plan will "include goals, policies and actions for restoration of impaired shoreline ecological functions.

These master program provisions should be designed to achieve overall improvements in shoreline ecological functions over time, when compared to the status upon adoption of the master program." The Restoration Plan will mesh the specific potential projects identified in this report, with regional or City-wide efforts and programs of the City, watershed groups, and environmental organizations that contribute or could potentially contribute to improved ecological functions of the shoreline. The City's *2008-2013 Capital Improvement Program* report also includes some projects that will be discussed in greater detail in the Shoreline Restoration Plan.

The Salmon Habitat Plan: Making Our Watershed Fit for a King (Steering Committee 2005), which was adopted by the City, lists a number of programs that can and do occur in Kent, but also across the entire watershed, that would contribute to the recovery of habitat basin-wide. The 16 WRIA-wide (WW) actions listed in the Plan are programmatic in nature and range from public education and stewardship to incentives to regulations and regulatory enforcement (Table 6).

Program WW-#	Program
1	Conduct Shoreline Stewardship Workshops and Outreach
2	Increase/Expand Water Conservation Incentive Programs
3	Increase/Expand Natural Yard Care Programs for Landscapers
4	Increase/Expand the Natural Yard Care Program for Single Family Homeowners
5	Promote the Planting of Native Trees
6	Promote Better Volunteer Carwash Practices
7	Increase Public Awareness about What Healthy Streams and Rivers Look Like and How to Enjoy Recreating on Them
8	Increase Involvement of Volunteers in Habitat Stewardship
9	Green/Duwamish Volunteer Revegetation Program
10	Support/Expand the Natural Resource/Basin Steward Programs
11	Expand existing incentives and develop new incentives for property owners to protect salmon habitat.
12	Improve Enforcement of Existing Land Use and Other Regulations
13	Increase Use of Low Impact Development and Porous Concrete
14	Provide Incentives for Developers to Follow Built Green™ Checklist Sections Benefiting Salmon
15	Develop a Coordinated Acquisition Program for Natural Areas
16	Develop Salmon Restoration Tools Consistent with Agricultural Land Uses

Table 6. WRIA-wide Programs Recommended to Support Habitat

The following recommended policy for the lower Green River subwatershed, including Kent, is also taken from the *Salmon Habitat Plan: Making our Watershed Fit for a King* (Steering Committee 2005).

• In the Lower Green River, every opportunity should be taken to set back levees and revetments to the maximum extent practicable. Habitat rehabilitation within the Lower Green River corridor should be included in all new developments and re-developments that occur within 200 feet of the river.

4.0 SHORELINE-SPECIFIC CONDITIONS

4.1 GREEN RIVER

4.1.1 Land Use Patterns

The shoreline of the Green River is split into four key land use categories: Open Space, High Intensity, Residential, and Agricultural. Figures 3a-3c shows the location of these land use categories along the Green River, and Tables 7, 8, 9 and 10 describe them in greater detail.

Unit A – Open Space

This category contains land areas in shoreline jurisdiction generally dominated by Parks and Open Space (OS) and Urban Separator (US) land use designations as set forth in the Comprehensive Plan. The Green River Trail follows along the Green River throughout the City of Kent. In areas where the trail is the only use within Shoreline Jurisdiction, the area was designated in Unit A for open space. In areas where the trail is only a portion of the land use, the area was designated for the other dominant use in the area.

The land uses in this unit are natural areas, trails, open spaces, and parks. A complete list of parks and open spaces is provided in Section 4.1.5.



Riverbend Golf Complex



Green River Trail

Table 7. Existing land uses by sub-unit in Green River Unit A – Open Space.

Sub-Unit	Existing Use
A-1. Open space area on the east side of the river to the north and south of South 277 th Street bounded by the City limits	This area is currently designated as US (Urban Separator) in the comprehensive plan and consists of a combination of open land and forested land.
A-2. Foster Park is on the north side of the river generally west of the railroad line and east of the Valley Freeway (SR 167)	Foster Park is a 4-acre greenbelt with walking trails and picnic areas providing visual access to the Green River.
A-3. Riverview Park is on the north and east side of the river just west of the Valley Freeway (SR 167)	Riverview Park is a 14-acre undeveloped park that is located on the Green River.
A-4. Undeveloped area on south river bank with tributary west of	This segment consists of a vegetated open area with a small tributary entering the Green River. This segment is approximately

Sub-Unit	Existing Use
Valley Fwy (SR 167)	500' in length. This area is currently designated AG-S and agricultural activities lie along the outermost margin of the jurisdictional boundaries. The City of Kent purchased this property in 2007 for salmon habitat and floodplain restoration.
A-5. The Riverbend Golf Complex	This segment includes Riverbend Golf Complex separated from the shoreline by approximately 30-80 feet of Green River Trail corridor.
A-6. Golf course and open space on the south and west side of the river from the city limits south of W. Meeker St. to the industrial area north of the golf complex	Riverbend Golf Complex is designated OS (Open Space) and Old Fishing Hole Park is designated US (urban separator).
A-7. Open space on the west side of the river from Cottonwood Grove Park to the residential area approximately 2,400' north of S 228 th Street	This area consists of heavily vegetated open space and a frontage road along the shoreline.
A-8. Green River Natural Resource Area	This segment includes approximately 3,500 linear feet of Green River Natural Resources Area (GRNRA) frontage, which includes public water quality facilities, wildlife habitat, and passive recreation trails and views to the west. The GRNRA is largely surrounded by large-scale industrial uses. The Green River Trail occupies the first 75-150' of shorelands adjacent to the shoreline.
A-9. Valley Floor Community Park	This park is primarily undeveloped. There is an old agricultural building and a frontage road within shorelands.
A-10. Green River Trail north of S 212 th St and south of Russel Road	The 200-ft shoreline jurisdiction is within the Green River Trail corridor in this area and is designated OS (Open Space). Adjacent to this corridor (outside jurisdiction) is underdeveloped industrial land.
A-11. Future North Green River Park on the east shoreline just south of the City limits.	Primarily passive park with tree cover. The Green River Trail runs along the shoreline.
PAA-A-1. Area within the PAA and City Limits north and east of the river at the easternmost segment of the Green River shorelands within the City and PAA	This segment consists of primarily undeveloped open space and the North Green River Park (currently in King County jurisdiction). There are a few residential lots separated from the shoreline by 94 th Pl. S. There is also a large wetland.

Unit B - High Intensity

This category contains land areas in shoreline jurisdiction generally dominated by Commercial (C) and Industrial (I) designated lands. Some Mixed Use (MU) areas are also included.

The commercial uses in the Green River jurisdiction are generally one-story commercial buildings surrounded by surface parking lots. The industrial uses in this area are characterized by self-contained light industry such as warehousing.



Typical industrial development along the Green River

Table 8.	Existing land uses by	sub-unit in Green Riv	er Unit B – High Intensity.

Sub-Unit	Existing Use
B-1. Industrial area north of the river from commercial lot east of Central Ave, generally west and north to Foster Park	This area consists of large-scale industrial uses separated from the shoreline by the Green River Trail corridor. There are some scattered residential lots and underutilized parcels.
B-2. Industrial area south of the river just east of the Valley Freeway (SR 167)	This area consists of large-scale industrial uses and has a land use designation of I (Industrial).
B-3. Industrial area north of the river just east of the Valley Freeway (SR 167) located between Foster Park and Riverview Park	This segment includes large-scale industrial uses with I (Industrial) land use designations.
B-4. Small industrial area north of the river between the Valley Freeway (SR 167) and SR 181.	Industrial activities are separated from the shoreline by the Green River Trail corridor.
B-5. Industrial area located along Russell R. north of S. 228 th St and south of the GRNRA	Approximately 2,600 linear feet of this segment has a majority of the shoreline jurisdiction within the Green River Trail corridor, which is designated OS (Open Space). In this area, there is only a small portion of the shoreline jurisdiction within industrial use, which is designated I (Industrial). For approximately 1,100 linear feet of the shoreline, industrial use dominates. This area is also surrounded by the GRNRA to the east.
B-6. Industrial area along east side of the river north of S 200 th St.	This area consists of industrial buildings, warehouses and office buildings typical of lands designated industrial. The industrial uses are separated from the shoreline by the Green River Trail corridor.
B-7. Industrial and commercial area east of SR 181 and south of SW 43 rd Street	A small buffer and SR 181 are adjacent to the river in this area. The east side of SR 181 is designated as Commercial and Industrial. The northern corner of this area has a land use classification of Commercial (C). The parcel looks like it had a commercial building on it at one point, but it is currently vacant. The rest of the area has a land use classification of Industrial (I). A hotel and a single-family residence are the existing uses in this area.
PAA-B-1. Shorelands in the potential annexation area (PAA) generally south of the river and west of the Valley Freeway (SR 167)	This segment consists primarily of a wrecking yard and other open industrial uses.

Unit C – Residential

This category contains land areas in shoreline jurisdiction generally dominated by Single Family (SF 4.5, SF 8), Low Density Multifamily (LDMF), Medium Density Multifamily (MDMF), and Mobile Home Park (MHP) designated lands.

The single-family area on the west side of the river south of South 212th Street is characteristic of single-family development in the Green River shoreline jurisdiction, with fairly small-lot single-family homes.

The multifamily development south of South 228th Street on the east side of the Green River and the multifamily development south of SR 516 and west of SR 181 that follows the loop of Frager Road are both characteristic of townhouse-style multifamily development within the Green River shoreline jurisdiction.

A few mobile home parks also exist within shoreline jurisdiction.



Example of residential development along the Green River with the Green River Trail.

Table 9.	Existing land uses b	y sub-unit in Green	River Unit C -	Residential.
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Sub-Unit	Existing Use
C-1. Residential area north and west side of the Green River east of Central Ave	This segment includes multifamily residential development separated by the greenbelt and trail for the first 800 feet. The segment then includes multifamily residential and mobile home courts, separated by the roughly 40- to 60-foot-wide Green River Trail corridor.
C-2. Residential area on north side of the river from one property west of SR 181 to the golf course at Russell Rd	This segment consists of approximately 6,500 linear feet of multi-family residences separated from the shoreline by 150' wide Green River Trail and open space corridor. The houses are relatively new town house and low-rise multi-family type residences.
C-3. Residential area on east side of River from James Street north to S 228 th Street	This segment consists of approximately 4,000 linear feet of multifamily residential residences separated from the shoreline by 100' wide Green River Trail and open space corridor. The residences are relatively new town house and low-rise multi-family type residences.
C-4. Residential area on west side of River south of S 216 Street	This segment consists of approximately 1,200 linear feet of single- family residences separated from the shoreline by a frontage road. The residences are relatively new. North of the existing residences is a stretch approximately 5,000' long of generally vacant land that is zoned and platted for new single-family residences. North of that is

Sub-Unit	Existing Use
	approximately another 1,000' of large lot single-family residences.
C-5. Recreational Vehicle (RV) Campground (KOA) on east side of the river south of S. 212 th St. and north of the GRNRA	This segment consists of a small KOA campground that allows recreational vehicles designated MHP (mobile home park) in the Comprehensive Plan. The development is not fully used and it is separated from the shoreline by the Green River Trail corridor and Russell Road.

Unit D – Agricultural.

This category contains land areas in shoreline jurisdiction generally dominated by Agricultural Resource (AG-R) and Agricultural Support (AG-S) designated lands. The agricultural areas that exist within the Green River's shoreline jurisdiction are primarily pasture land

	Table 10.	Existing land u	uses by sub-unit in	Green River Unit	D – Agricultural.
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Sub-Unit	Existing Use
D-1. South of the river just west of Valley Freeway (SR 167)	This segment consists of agriculture uses for about 2,400 linear feet within the shoreline jurisdiction. The majority of this area is designated as AG-S (Agricultural Support), with a small area designated AG-R (Agricultural Resource) in the northwest corner of the segment. This segment continues a considerable distance to the south because of the inclusion of joint Mill Creek Auburn/Green River floodway/floodplain in shoreline jurisdiction.
D-2. Agricultural activities on the west side of the river from Riverbend Golf Course to Cottonwood Grove Park	This segment includes agricultural activities including green houses. This area is designated US (urban separator) in the comprehensive plan.
D-3. Agricultural area on west side of river south of S. 212 th Street	This area consists of agricultural uses separated from the shoreline by a frontage road. It is undergoing single-family residential development.
C-4. Residential area on west side of River south of S 216 Street	This segment consists of approximately 1,200 linear feet of single-family residences separated from the shoreline by a frontage road. The residences are relatively new. North of the existing residences is a stretch approximately 5,000' long of generally vacant land that is zoned and platted for new single-family residences. North of that is approximately another 1,000' of large lot single-family residences.
D-4. Agricultural lands north of Valley Floor Community Park	This segment consists primarily of agricultural activities.

4.1.2 Transportation

There are 13 major crossings of the Green River within City limits and the PAA:

- Freeways: SR 167, SR 18, and SR 516
- Principal arterials: South 212th Street, SR 181, East Valley Road
 Minor arterials: South 200th Street/Russell Road South, South 228th Street, West Meeker Street, South 277th Street (PAA)
- Industrial collector arterial: 78th Avenue South (PAA)

• Railroads: Union Pacific Railroad, Burlington Northern Santa Fe Railroad

In addition, there are four small bridge crossings: one connecting the two sides of the Riverbend Golf Complex near West Meeker Street, a pedestrian bridge connecting east and west river trails near the Green River Natural Resources Area, a pedestrian bridge below SR 516, and a small bridge in the PAA just south of South 277th Street. Several roads parallel the river for relatively long distances, including Frager road on the west/south sides of the river, Russell Road on the east/north sides of the river, and Green River Road in the PAA. Otherwise, numerous smaller roads approach the shoreline or parallel it for short distances, and the Green River Trail parallels the river, often on both sides.

The City's *Six Year Transportation Improvement Program 2008-2013* describes four project segments in the Green River shoreline:

- 1. West Meeker Street Widening Phase I (Project 30): Project 30 will widen and improve West Meeker Street from 64th Avenue South to the Green River Bridge.
- 2. West Meeker Street Widening Phase II (Project 31): Project 31 will widen West Meeker Street between Lake Fenwick Road and the east side of the existing bridge. A major project element will be the construction of a new bridge.
- 3. SR 167 Corridor Plan (Project 38): The City of Kent will be supporting the planning and design of the SR 167 improvement project, which will address capacity problems that adversely affect the City's roadways. Ultimately, SR 167 will have an additional lane in each direction, likely resulting in bridge expansion over the Green River.
- 4. Central Avenue South Pavement Rehabilitation (Project 20): Project 20 will rehabilitate the road surface from the Green River bridge north to East Willis Street and make "minor storm drainage improvements" (undefined).

4.1.3 Wastewater and Stormwater Utilities

Wastewater Utilities

All Green River shoreline areas within the City are provided with sewer service by the City. There are numerous sewer lines near the outer edge of shoreline jurisdiction and just outside of shoreline jurisdiction (Figures 4a-4c). There are three City force main crossings of the Green River: one west of the Green River Natural Resources Areas, one at South 212th Street, and one at South 231st Way. In addition, a 24-inch King County Metro force main crosses the Green River at West Meeker Street, a 72-inch force main crosses just east of SR 167, and a 54-inch force main crosses at South 277th Street. Additional sewer line connections are proposed that would cross the river or otherwise cross or parallel shoreline jurisdiction.

Stormwater Utilities

According to the City's map of surface drainage facilities, approximately 26 stormwater outfalls are located within Green River shoreline jurisdiction (Figures 5a-5c). It appears that much of the stormwater flow in the area is initially routed away from the Green River, and funneled into
ditches and streams that ultimately lead to the Green River, often, but not always, via detention and treatment facilities.

4.1.4 Shoreline Modifications

The mainstem Green/Duwamish River, including the portion of the Lower Green River flowing through Kent, is among the most hydrologically and habitat-altered of the large river systems flowing into Puget Sound. Changes in the landscape began when early Euro-American settlers began changing the landscape when they settled the lower basin beginning sometime around 1850. These early settlers began altering the habitats of the lower river valley in the vicinity of what is now Kent and Tukwila, and bank hardening projects probably started with the first railroad bridges in 1867. Levee construction was initiated before 1875, the White River was diverted into the Puyallup River basin in 1906, the Cedar/Black River¹ was diverted into Lake Washington in 1916, the City of Tacoma water diversion dam was finished in 1913, and Howard A. Hanson Dam was completed in 1962. Most of the Duwamish estuary had been filled by 1940. Currently, runoff from 70 percent of the historic floodplain is no longer connected due to these diversions and the construction of flood protection structures, including Howard A. Hanson Dam (Kerwin and Nelson 2000).

A systematic, programmatic approach for the hydromodification of the Green River was put forth by Colonel Howard A. Hanson of the U.S. Army Corps of Engineers in his landmark publication, "More Land for Industry" (Hanson 1957). This document promoted an incremental, systematic scheme for the channelization and dredging of the Duwamish estuary and for permanent flood containment throughout the Lower Green River valley by means of a massive levee construction program and the construction of the Howard A. Hanson Dam. Prior to 1961, the historic agricultural levee system along the Green River was constructed and maintained by King County through acquisition of easements and construction of a vast, unwieldy array of levees and revetments financed by municipal bonds. These levees were constructed by King County crews employing draglines to clear and shape the bank, place riprap, and remove logs and stumps from the river channel. The program was active from the early 1960s through the mid- to late 1970s.

Systematic suppression of riparian plant growth was also undertaken in order to comply with eligibility guidelines for local levee systems to be included in the federal levee flood damage rehabilitation program administered by the U.S. Army Corps of Engineers under Public Law (PL) 84-99. County compliance with this federal de-vegetation requirement was informally suspended in 1989, and formally addressed in the 1993 King County Council-adopted King County Flood Hazard Reduction Plan (FHRP), Policies FHR-10 and G-7 (King County 1993). Project-by-project consideration of these policies with respect to Green River levee maintenance has resulted in incremental establishment of riparian shrub communities on several levee segments along the lower river, and to the formal disqualification of these same segments from eligibility for federal rehabilitation assistance to repair flood damages (Kerwin and Nelson 2000).

¹ The Black River, which formerly drained south Lake Washington to the Green River, now only exists in a remnant channel section.

In 1960, the Green River Flood Control Zone District was created with the concurrence of the Cities of Auburn, Kent, Renton and Tukwila. This district is a quasi-municipal corporation and independent taking authority of the state, with the goal of operating, maintaining and repairing river flood protection facilities and pump stations within the lower Green River watershed. The King County Department of Natural Resources serves as the lead agency of the District.

In 2006, the County Council adopted the King County Flood Hazard Management Plan, which identifies a number of steps to be taken to address flooding issues in King County. Following the adoption of that plan, in 2007, the King County Flood Control Zone District was established. According to the District's web site, this agency "will be instrumental in addressing the backlog of maintenance and repairs to levees and revetments, acquiring repetitive loss properties and other at-risk floodplain properties, and improving countywide flood warning and flood prediction capacity". It is chartered as an independent special purpose district of the State, as authorized by RCW 86.15.

The Lower Green River borders or flows through the City of Kent roughly between RM 14.5 and RM 28. In the Lower Green River sub-watershed, over 80 percent of the riverbanks are lined with levees or revetments, and these levees typically line both banks of the river at any given location (see Figures 7a-7c). The primary function of revetment construction is the mechanical armoring of natural riverbank soils against slumping, sloughing, scour and downstream transport of eroded materials, all to protect the stability of the adjoining lands. Though these structures (artificially) maintain bank stability and prevent erosion, they also prevent many natural geomorphic processes from occurring, including channel migration, avulsion, braiding, large woody debris (LWD) recruitment, and the formation of undercut banks. The continuance of these processes is needed to provide and maintain important habitat for salmonids. The channel migration zone along the Lower Green River has effectively been eliminated, in large part due to the construction of the levee system (Kerwin and Nelson 2000).

4.1.5 Existing and Potential Public Access Sites

The City of Kent provides fairly continuous public access to the Green River through public parks, greenbelts, and trails. The existing public access sites provide for a number of water-oriented uses including water-dependent uses such as fishing, swimming, and boat launching. They also provide for water-related and water-enjoyment uses such as trails, picnic areas, and playfields that benefit from the visual connection to the water. A majority of the open spaces along the river are connected by trails or greenbelts, providing an interconnected system of open space and access to the Green River. There are a few gaps in the open space connections where potential trail continuations could be pursued. Undeveloped public spaces also have the potential to improve public access to the Green River.

Beginning at the northern City limits, the following public properties provide public access to the Green River:

• <u>Green River Trail</u>: The Green River Trail is a 10-mile walking/biking trail that runs south from Briscoe Park and connects numerous parks and greenbelts along the Green River. The trail provides public access for fishing, as well as picnic areas and benches. There are numerous points of access along the trail throughout the City limits. A number of the parks located along the Green River provide parking areas and access for trail users.

Also of note is that the Green River Trail is part of a regional trail system with connections to the Interurban Trail and northward to the Mountains to Sound Greenway, the Elliott Bay Trail, and the Burke-Gilman Trail. While portions of the northern trail links are not yet constructed, the system will ultimately make the Green River shoreline accessible to cyclists from vast portions of the County.

- <u>Briscoe Park</u>: Briscoe Park is a 7-acre park that has trails, fishing areas, a hand carried boat launch, as well as picnic areas and a playfield.
- <u>Three Friends Fishing Hole (Gateway Park)</u>: This 3-acre park provides access to the Green River Trail, a fishing area, and a picnic area.
- <u>Valley Floor Community Park</u>: This park is a 50-acre undeveloped open space. It has great potential to provide both physical and visual access to the Green River.
- <u>Anderson Park</u>: Anderson Park is a very small park that provides visual access to the Green River. The park includes picnic tables and a drinking fountain.
- <u>Green River Natural Resources Area</u>: This 304-acre site is a combined stormwater detention and enhanced wetland facility that provides a rich diversity of wildlife habitat. In addition, it provides both visual and physical public access to the Green River through bike and walking trails.
- <u>Van Doren's Landing Park:</u> This 10-acre park includes trails, fishing areas, a hand-carried boat launch in addition to playfields and picnic areas.
- <u>BMX Park</u>: This half-acre bike park provides visual access to the Green River.
- <u>Russell Woods Park</u>: Russell Woods Park is a 3.38-acre park that provides entry onto the Green River Trail and includes fishing areas.
- <u>Cottonwood Grove</u>: Cottonwood Grove is a small park that provides visual access to the Green River.
- <u>Riverbend Golf Complex</u>: The Green River runs through the 167-acre Riverbend Golf Complex. The golf complex provides visual access to the river.
- <u>Old Fishing Hole</u>: The Old Fishing Hole is a 5.7-acre park that provides fishing areas and public docks.
- <u>Riverview Park</u>: Riverview Park is a 14 acre undeveloped park that is located on the Green River.
- <u>Foster Park</u>: This 4-acre greenbelt has walking trails and picnic areas and provides visual access to the Green River.

• <u>North Green River Park</u>: This 169.1-acre King County Park provides visual access to the Green River in addition to numerous recreational opportunities including soccer fields, garden plots, and trail access.

4.1.6 Critical Areas

Geologically Hazardous Areas

Except for seismic hazard areas, geologically hazardous areas in the Green River shoreline are limited to very small areas at the intersection of the valley floor with the toe of the East Hill and West Hill areas (Figures 13.1-13.3). These junctures contain steep slopes (>40%) and landslide-type soils. Virtually the entire valley floor is a seismic hazard area.

Wetlands

The City's wetland map shows a number of very large wetland areas and numerous smaller wetlands that still remain along the Green River and scattered throughout the Green River floodplain (as preliminarily mapped by FEMA) (Figure 11). The City has not classified these wetlands, but aerial photograph examination shows that they are of a wide variety of types, ranging from high-quality forested wetlands along the West Hill foothills and in other scattered patches to actively farmed wetlands. Many of the wetlands appear to have little to no buffer and are completely surrounded by development and roads. A large proportion of the wetlands appear to be hydrologically connected to other wetlands by a network of ditches, many of them likely meeting wetland criteria as well. Although the City does not regulate wetlands in man-made ditches, the U.S. Army Corps of Engineers may regulate them in some circumstances. The higher-quality wetlands are generally located in lands designated by the Comprehensive Plan as either Urban Separator (US) or Parks and Open Space (OS). The most impacted wetlands are in areas planned and developed for industrial and manufacturing uses.

Streams

Several streams pass through the City of Kent's Green River shoreline management area and discharge into the Green River within the City (Figure 14). These include left (west) bank tributaries of Mill Creek Auburn (Auburn, WRIA 09-0051), Mullen Slough (WRIA 09-0045), an unnamed creek (WRIA 09-0041), and Johnson Creek (WRIA 09-0038). Springbrook Creek (WRIA 09-0005) and its tributary, Mill Creek Kent, flow through the City on the east side of the Green River, but do not pass through any Green River shoreline areas. However, the section of Springbrook Creek extending for approximately 450 feet downstream of the Mill Creek Kent confluence to the City limits at S. 180th Street is designated as a shoreline water in its own right. Springbrook Creek joins the Green/Duwamish River to the north of the City via the Black River pump station. Information regarding each of these streams was gathered from WDFW's Priority Habitats and Species (PHS) maps and reports (WDFW 2007) and WRIA 9 map products (King County DNR 2000). Of these streams, Mill Creek Auburn, Mullen Slough, and streams in the Springbrook Creek basin are known to support fish use, including chinook (juvenile use at the mouths) and coho salmon and cutthroat trout.

Other Fish and Wildlife Habitat Conservation Areas

<u>Priority Habitat</u>: The Green River shoreline contains several priority habitat types as identified by WDFW (2007): urban natural open space, wetlands, and riparian zones. These habitat areas

are shown on Figure 14 and in general are the only areas of Green River shoreline that have diverse, native vegetation communities with multi-story structure. Several of the palustrine wetlands mapped by WDFW have been replaced with residential or industrial developments. The majority of other undeveloped areas in the Green River shoreline are either agricultural land or narrow corridors along the river that contain the levee and trail. Upland habitat conditions in these corridors are largely Himalayan blackberry, non-native landscaping, other weeds, or mowed grass. Patches of trees, primarily red alder and black cottonwood, can be found in some areas along the river.

The highest-quality riparian habitat associated with the City along the Green River is found in the PAA at the south end of the City upstream of Horsehead Bend. The levee protection is intermittent, allowing a slightly more meandering natural channel compared to downstream areas already within City limits. Wider, wooded buffers are accommodated between the river and the adjacent agricultural lands and open space.

<u>Special Status Species</u>: The *Washington State Salmon and Steelhead Stock Inventory* (SASSI) (WDFW 2002) distinctly identifies one chinook, two chum, one coho, and two steelhead stocks as spawning in the Green River basin. One bull trout stock has also been identified as inhabiting the basin (WDFW 1998), and the basin is used by sea-run coastal cutthroat trout as well. Given that the sections of the Green River within City of Kent Shoreline jurisdiction are fairly low in the basin, most of the fish comprising these anadromous stocks must pass through the City's jurisdiction at least twice to successfully complete their life cycles.

Chinook salmon are relatively abundant in the Green River basin, in large part due to the presence of the state salmon hatchery on Green River tributary Soos Creek. Chinook escapement from 1986 to 2003 ranged between approximately 2,500 and 21,400 fish (WDFW 2002).

Although no bald eagle nests are mapped or known in the Green River shoreline area, they are likely to forage in the river. Bald eagles would prey on adult salmonids, as well as concentrations of waterfowl.

4.1.7 Floodplain and Channel Migration Zone

Floodplain

The combined effects of the levees along the river through the City and the construction of the Howard A. Hanson Dam, which was completed in 1962, have prevented flooding from the Green River in most areas. The last high-flow event on the Green River that exceeded the USGS flood elevation of 64 feet (at gage 12113000, near Auburn) was in November 1959. Approximately \$1.5 million in damages was reported in that event, and agricultural lands were either buried under sand deposits left behind by flood waters or had their topsoils removed by the flood (Stein 2001a). Prior to that, historic photographs show flooding in Kent for nine out of 40 years, between 1906 and 1946 (Collins and Sheikh 2005).

FEMA's draft map of the revised Green River floodplain (dated 28 September 2007) includes the entire Kent valley due to FEMA's assumption that the Green River levees would fail in a 100-year flood event. The City believes FEMA's draft map makes incorrect assumptions, and thus

appealed the draft in early 2008, in cooperation with King County and other Green River valley cities. The appeal was based on the March 2008 King County "Lower Green River Mapping Study," which revised FEMA's draft 2007 map. The 2008 King County appeal map was accepted by FEMA and is anticipated to be incorporated into the new preliminary Flood Insurance Rate Maps. The resulting floodway and floodplain boundaries in the City of Kent are shown on Figures 10.1 and 10.2. Adoption of a final Green River floodplain map would likely not occur until after SMP adoption. As previously mentioned, not all of the King County-mapped floodways are considered shoreline jurisdiction under the SMA definition of floodway. The only jurisdictional floodway/floodplain area is that associated with the Mill Creek Auburn/Green River interaction.

Channel Migration Zone

As mentioned in Section 3.8.2, King County completed the *Green River Channel Migration Study* in 1993 and updated the associated map in 1999 (Figure 10.2¹). Of note, the mapped channel migration zone (CMZ) extends upstream from approximately RM 25.4 in Kent, near the Central Avenue South crossing just downstream of Horsehead Bend. As such, no channel migration zone is mapped for most of the Green River length through the City (extending downstream from approximately RM 25.4 to the City limits near RM 15.8) because it is assumed that the existing flood control levees closely lining the banks will be maintained to prevent such migration. Small areas of the City adjoining the river upstream of RM 25.4 are, however, within the mapped CMZ. These include areas along the right bank of the river (facing downstream) near Horsehead Bend and the South 277th Street crossing. In addition, potentially annexed areas (PAAs) extending roughly between 86th Avenue South and South 277th Street along both sides of the river include mapped CMZ areas. Channel migration zones associated with the City are mapped as either moderate hazard or severe hazard areas.

Levees had already been constructed along the mainstem Green River in the lower Green River sub-watershed by the time the earliest maps of the river channel were produced in 1907, so it is difficult to determine the historic extent of the CMZ along the river through most of the City (Kerwin and Nelson 2000). Old meander scars suggest the channel would have had access to the entire valley bottom at some time in the past and the CMZ, depending on time scale, may have encompassed the entire width of the valley. Over 90 percent of the channel in the lower Green River sub-watershed is now confined between levees, however, and the channel alignment has changed little since 1907 (Kerwin and Nelson 2000). Hence there is now effectively no channel migration zone associated with the river in the lower Green River sub-watershed, which encompasses nearly all of the City of Kent.

4.1.8 Historical or Archaeological Sites

According to the Office of Archeology and Historic Preservation's (OAHP) WISAARD (Washington Information System for Architectural and Archaeological Records Data) website, there are four sites of historical interest located in the City of Kent's Green River shoreline area.

¹ Note: The CMZ area shown on King County iMap on the north side of Horseshoe Bend is incorrect and does not match the 1993 King County Channel Migration Study. Per page 41 of the study, the Green River levee is considered a fixed boundary beyond which channel migration will be prevented (pers. comm. Terry Butler, King County, May 19, 2009).

<u>Maddocksville Landing</u>: Maddocksville Landing, named after Moses Maddocks who staked his claim to the site in 1861, was the site of one of the first settlements in the White River Valley (http://www.dahp.wa.gov/gis/pdfs/284.pdf). It is located just downstream of Van Doren's Landing Park on the east bank of the river. Mr. Van Doren operated a ferry landing at this site, which received goods, people and mail. The "landing" consisted only of a sandy river bank, now vegetated by Himalayan blackberry; no structures could be constructed because of flood events. The site is listed on the Washington Heritage Register.

<u>Alvord's Landing</u>: Thomas and Julia Alvord established Alvord's Landing in 1860, the farthest upstream accessible landing to steamers (http://www.dahp.wa.gov/gis/pdfs/285.pdf). It is located in south Kent, east of SR 167 and just north of South 262nd Street. Similar to Maddocksville Landing, the "landing" consisted only of a sandy river bank, now vegetated by Himalayan blackberry. According to the registration documents, this landing was "very significant in the development of that agricultural area." The site is listed on the Washington Heritage Register.

Langston's Landing: Langston's Landing was established in 1867 on the riverbank at the west end of what is now Willis Street, just west of SR 167 (http://www.dahp.wa.gov/gis/pdfs/ 286.pdf). Langston's Landing currently has no structures or other indicators of its historical use as a regionally important ferry site between the east and west banks and as a landing for stern wheel river boats that dropped off goods and supplies. The "landing" consisted only of a sandy river bank, now vegetated by Himalayan blackberry; no structures could be constructed because of flood events. The site is listed on the Washington Heritage Register.

The Green River and the landings provided an important connection between the Green River valley settlers and the City of Seattle. Produce from the farms was delivered to Seattle for sale, at first by canoe and later by steamers, and important goods not produced on the farms could be purchased.

<u>Neely House</u>: Original construction on the home of David F. Neely occurred in 1885, with subsequent additions in 1900 and 1954 (http://www.dahp.wa.gov/gis/pdfs/422.pdf). It is one of the oldest houses in Kent, constructed during a time when settlers were first arriving in the valley from the East. The City of Kent Parks and Community Services Department owns and manages the house, and completed major renovations in 1999 and 2000 (http://www.ci.kent.wa.us/ kentcommons/rooms/neelysoameshouse.asp). The house and grounds are open to the public and can be rented for special events.

Although the entire Green (White) River valley was likely inhabited or utilized by Native Americans at least 7,000 years ago, and even earlier, the subsequent modification of the Green River channel and the deposition of sediment by the river during flood events has limited the number of discovered sites in the Kent area (Forsman and Lewarch 2001). The Green River valley was used for fishing, hunting, and root- and berry-gathering. In what is now Renton, archeologists have identified former hunting, fishing, and wapato-harvest camps (Forsman and Lewarch 2001). Similar camps are expected to have been present in Kent "on old river levees adjacent to abandoned river channels." However, no camps have yet been found in Kent. The native peoples were named based on their village, but are now known collectively as the

Muckleshoot tribe. One of the Kent-area communities was named Steq, and was the birthplace of Chief Seattle's mother (Forsman and Lewarch 2001).

The first European settlers came to the valley in the mid-1800s to farm the rich floodplain soils. At first, relations were cordial as the Native Americans were eager to trade. However, as the settlers took up more land and tightened river access, tensions built. Other Puget Sound tribes were signing treaties and being relocated to reduce conflict. The Green River valley populations resisted, and the Seattle Indian Wars began in 1855 after the Native Americans killed nine people. Troops quelled the fighting and the Green River tribes relocated to a King County reservation (Stein 2001b).

4.1.9 Opportunity Areas

WRIA 9 Projects

The following policy statement and recommended project actions (see Figure 16) are taken directly from the 2005 *Salmon Habitat Plan: Making Our Watershed Fit for a King* for the lower Green River subwatershed, including Kent. The lower Green River subwatershed extends from River Mile 11 to River Mile 32, including those reaches adjoining Kent roughly between River Miles 14 and 26. Only those projects in or bordering the City of Kent are described below. As stated in the *Salmon Habitat Plan*, this policy and these project actions are intended to:

- Protect and restore habitat that provides refugia (particularly side channels, off channels, and tributary access) and habitat complexity (particularly pools) for juvenile salmon over a range of flow conditions and at a variety of locations (e.g., mainstem channel edge, river bends, and tributary mouths);
- Enhance natural sediment recruitment (particularly spawning gravels) by reconnecting sediment sources to the river.

<u>Policy LG-1</u>: In the Lower Green River, every opportunity should be taken to set back levees and revetments to the maximum extent practicable. Habitat rehabilitation within the Lower Green River corridor should be included in all new developments and re-developments that occur within 200 feet of the river.

<u>Project LG-3 - Horsehead Bend Off-Channel Habitat Restoration at RM 26 (Left Bank)</u>: This project would excavate an off-channel habitat through a terrace in a manner that would avoid potential fish stranding. The channel would be approximately 950 linear feet in length and would follow the old river channel, terminating at a depression located on the east side of the terrace. The project also would rehabilitate floodplain wetland habitat, plant native riparian vegetation, and add large woody debris. [Note: this project is also identified as #19 by the Duwamish/Green River Ecosystem Restoration Project]

<u>Project LG-4 - Horseneck Off-Channel Habitat Restoration at RM 25.9 (Left Bank)</u>: This project would excavate backwater off-channel flood refugium to create juvenile salmonid rearing habitat, restore floodplain wetland habitat, add large woody debris, and plant native wetland and riparian vegetation at the Horsehead/Horseneck site.

<u>Project(s)</u> LG-7 - Lower Mill Creek, Riverview (Formerly Green River) Park, Hawley Road Levee, Lower Mullen Slough, and Lower Mill Creek Restoration Between RM 21.3 and 24 (Both Banks): This suite of projects would be coordinated on lands that are adjacent to and/or share a floodplain. Overall goals are to restore habitat along the mainstem and lower sections of Mill Creek [Auburn] and Mullen Slough by:

- Creating off-channel habitat for rearing and flood refugia and over-wintering habitat;
- Reconnecting mainstem and tributaries with portions of the floodplain;
- Setting back levees to improve bank conditions and create shallow water vegetated benches;
- Installing anchored large woody debris; and
- Controlling invasive plant species and planting with native plants.

These projects are being coordinated by the City of Kent, King County, and the U.S. Army Corps of Engineers. Sub-projects include:

Lower Mill Creek Floodplain Wetland and Off-Channel Habitat Rehabilitation	This project includes restoration of the lower 0.3 miles of Mill Creek [Auburn] and adjacent segments of the currently armored riverbank. The project would include excavation of off-channel habitat on the right bank of Mill Creek [Auburn] and reshaping the stream banks and the mainstem left bank of the Green River. This would create a more complex channel and aquatic edge habitat that includes off- channel habitat and large woody debris. Nine acres of off-channel and riparian habitat would be created adjacent to lower Mill Creek [Auburn] and approximately 1,600 lineal feet of lower Mill Creek [Auburn] would be restored.
Riverview (Formerly Green River) Park	This project is located opposite from the mouth of Mill Creek [Auburn], on the right bank of the Green River. The project would provide summer rearing habitat and high flow winter refuge through excavation of an off channel area combined with placement of large woody debris and revegetation. Land is in public ownership and belongs to the City of Kent. [Note: this project is also identified as #12 by the Duwamish/Green River Ecosystem Restoration Project]
Hawley Revetment	This project would set back the over-steepened Hawley Revetment between river miles 23.5 and 23.3, in order to achieve a more stable slope angle, create a low, vegetated bench, and allow the placement of large woody debris. Land is in public ownership and is immediately downstream of Riverview Park.
Lower Mullen Slough (Prentice Nursery Reach) at RM 21.4 (Left Bank)	This project would improve fish passage and create a natural habitat for rearing and refuge from high flows in the Green River mainstem by restoring the mouth of Mullen Slough and connecting it with a nearby pond to create a new flatter-gradient meandering outlet. Actions include improving the channel to eliminate a summer low flow fish passage blockage, clearing the site of unnatural debris and

Himalayan blackberry, planting riparian vegetation, placing large woody debris, and constructing dendritic, branched channels for improved water circulation and habitat diversity.

- Mullen Slough (Slough Mile 1.8-0.3) Habitat for rearing and providing refuge from high flows in the Green River mainstem would be created by this project. Restoration along the slough would include channel meandering, large woody debris placement, and riparian plantings. This project site is upstream from the Prentice Nursery Reach project (previous sub-project) and includes about 90 acres from Highway 516 to the head of the slough.
- Lower Mill Creek The City of Kent has also proposed an additional setback of the levee near the mouth of Mill Creek [Auburn] and four acres of riparian planting.

<u>Project LG-9</u> - Rosso Nursery Off-Channel Rehabilitation and Riparian Restoration Between RM 20.8 and 20 (Left Bank): This project would rehabilitate habitat at the Rosso Nursery site between river miles 20.8 and 20.0 by constructing an outlet at RM 20.1. Actions would include removing fill, excavating off-channel flood refugium for juvenile rearing habitat, and planting native wetland and riparian vegetation. The City of Kent received a Salmon Recovery Funding Board grant to acquire the site, but [has since transferred those allocated funds to purchase of three different parcels located north of SR 516 on the south side of the Green River. This effort is titled "The Lower Green River Property Acquisition"].

<u>Project LG-10</u> - Mainstem Maintenance (including the Boeing Levee Setback and Habitat <u>Rehabilitation)</u> Between RM 20.5 and 16.3: Fish habitat along the Lower Green River would be improved by these projects while providing stable bank and levee conditions to protect significant human infrastructure and development. They are being coordinated by local jurisdictions, the Green River Flood Control Zone District, and the U.S. Army Corps of Engineers. The majority of the banks in this portion of the river have been hardened and trees and other fish-friendly features have been removed to make the river flow without impediment. Riprap or rock bank protections have reduced fish habitat along this stretch of the river. Sub-projects include:

Boeing Setback and Restoration Between RM 18 and 17.1 (Right Bank)	Actions include reshaping the bankline between the upstream end of the Christian Brothers Revetment and South 212th Street, widening the channel cross-section, restoring channel complexity and meanders, creating a two stage channel, excavating low benches and alcoves, installing large woody debris, and planting native riparian vegetation. The proposed project is within City of Kent open space, which has a 200-foot buffer with restricted development.
Carrot Patch Setback and Russell Road Restorations	Implement fish friendly, bio-engineered solutions to levee maintenance problems. Set the levee back to enable habitat rehabilitation, including reshaping the bankline, widening the channel cross section, restoring channel complexity and meanders,

excavating low benches, installing large woody debris, and planting native riparian vegetation.

<u>Project LG-12 - Briscoe Off-Channel Habitat Rehabilitation Between RM 16.1 and 15.8 (Right Bank)</u>: With cooperation from the City of Kent, this project would involve removing the armoring on the Briscoe meander shoreline, excavating a flood refugium for juvenile salmonid rearing habitat, installing large woody debris, and planting native riparian vegetation. An existing (landlocked) levee on the eastern boundary of the park would provide continued flood protection.

<u>Project LG-13: - Acquisition, Levee Setback, and Habitat Rehabilitation Between RM 15.3 and 14.7 (Right Bank)</u>: Acquire additional right of way along the river-ward edge of the business park parking lot between River Miles 15.3 and 14.7 (right bank), set back the oversteepened levee, create bench habitat, install large woody debris, and plant native riparian vegetation. This project would extend downstream from a levee setback project completed in the [early 2000s].

4.2 BIG SOOS CREEK

The Big Soos Creek basin is approximately 70 square miles and contains three major hydrogeomorphic settings (Kerwin and Nelson 2000). As delineated by Kerwin and Nelson (2000), the City's shoreline segment of Big Soos Creek is in the headwaters "on a rolling glacial outwash plain" and has a "very low gradient (>1%) unconfined channel with low velocity flows." Based on a site visit to this segment of Big Soos Creek, the mapping and characterization seem accurate. Big Soos Creek only meets shoreline jurisdictional criteria (minimum 20 cfs mean annual flow) for a short distance into the City limits, all occurring between the SR 18 and SR 516 (SE Kent Kangley Road) crossings.



View of Big Soos Creek facing downstream from the SR 516 crossing.

4.2.1 Land Use Patterns

The Big Soos Creek shoreline affects only five parcels within the City. Three of the parcels each contain a single-family residence, the fourth is part of King County's Soos Creek Park, and the fifth is owned by WSDOT (Figure 3d). The site contains a three-celled stormwater detention pond and wetland mitigation, which drain to Big Soos Creek. Lands surrounding Big Soos Creek tributaries are undeveloped, except for a portion of shorelands that lie in platted residential lots and extend into large backyards of nearby residences.

4.2.2 Transportation

There are no stream crossings of the Big Soos Creek shoreline within City limits. State Route 18 crosses Big Soos Creek just downstream of the City limits and Kent Kangley Road/SR 516 (a principal arterial) appears to mark the upstream limit of the Big Soos Creek shoreline in the City. The City's *Six Year Transportation Improvement Program 2008-2013* does not identify any transportation projects in the Big Soos Creek shoreline area.

4.2.3 Wastewater and Stormwater Utilities

Wastewater Utilities

The Big Soos Creek shoreline area is part of the Soos Creek Water & Sewer District's service area. According to King County iMAP, only one of the shoreline parcels is served by public sewer service; the remaining properties in shoreline jurisdiction have private septic systems.

Stormwater Utilities

The City's map of surface drainage facilities does not show any storm sewers or detention facilities in the City's Big Soos Creek shoreline jurisdiction. However, a multi-celled facility on WSDOT property is located outside of Big Soos Creek shoreline jurisdiction just north of SR 18, with one cell extending into shoreline jurisdiction and draining ultimately into Big Soos Creek.

4.2.4 Shoreline Modifications

There are no known shoreline modifications within the Big Soos Creek shoreline area within City limits, though modifications have occurred at both the SR 516 and SR 18 highway crossings, each immediately bordering the City. As previously mentioned, the upstream (north) shoreline limit is SR 516, which bridges the stream. Though the SR 516 span is fairly long, estimated at around 80 feet, it nonetheless imposes a significant constriction on the floodplain at that location. A gravelly bar is present on the east side of the stream under the bridge, and the bridge footings are likely armored to prevent erosion and undermining, although this was not specifically observed.

Two SR 18 bridge spans modify Soos Creek shoreline areas immediately downstream (south) of areas under Kent shoreline jurisdiction. These modifications include floodplain clearing and the placement of road embankment fill, armoring, footings, pilings, and the bridge spans themselves. The south span has no pilings, and the stream banks at that location are armored with quarry spalls. In contrast, the north span includes some concrete piling supports outside of the active channel and the banks are lined only with gravelly soils. The floodplain of Soos Creek has also been constricted considerably at the SR 18 crossing location.

4.2.5 Existing and Potential Public Access Sites

There is no public access to the Big Soos Creek shoreline area. However, upstream of the 20 cfs cutoff point, the vast majority of Big Soos Creek is surrounded by Gary Grant Soos Creek Park, a King County-owned park. This park is over 500 acres and provides access to the Soos Creek Trail. While the park does not provide public access for water-dependent activities, it does provide opportunities for water-related and water-enjoyment activities such as picnic areas and access to the 7-mile long Soos Creek Trail.

4.2.6 Critical Areas

Geologically Hazardous Areas

City maps do not show any geologically hazardous areas in the Big Soos Creek shoreline. However, landslide-type soils, steep slopes, and seismic hazards flank the creek farther upstream where the channel is more confined (Figures 12-13.3).

Wetlands

City, King County, and WDFW PHS (2007) wetland mapping all show that much of the Big Soos Creek shoreline area within the City limits is wetland (Figure 11). Based on aerial photos and a brief site visit, the wetland is forested with young willows, red alder, and black cottonwood and contains large emergent patches of reed canarygrass.

Streams

No mapped or known streams discharge into the Big Soos Creek shoreline within City limits. Little Soos Creek joins Big Soos Creek in Covington from the east, between discontinuous sections of the City through which Big Soos Creek runs.

Other Fish and Wildlife Habitat Conservation Areas

<u>Priority Habitats</u>: WDFW mapping of Priority Habitat and Species classifies the riparian wetland as a Priority Habitat and maps it as palustrine (WDFW 2007). To be considered a "Priority" wetland, it must have met the following criteria in WDFW's estimation: "Comparatively high fish and wildlife density, high fish and wildlife species diversity, important fish and wildlife breeding habitat, important fish and wildlife seasonal ranges, limited availability, high vulnerability to habitat alteration."

Vegetation mapping by King County Department of Natural Resources shows the west side of the stream to be primarily "shrub" (likely Himalayan blackberry and Scotch broom based on aerial photos and a brief site visit) and "young deciduous" on the east side of the stream (Kerwin and Nelson 2000). The vegetation maps do not distinguish between upland and wetland vegetation types. Some of the "young deciduous" areas, however, are identified on other maps as wetland, and contain willows, red alder, dogwood and rose.

<u>Priority Species</u>: The only Priority species identified in this section of Big Soos Creek are fish species, including: chinook and coho salmon, steelhead, and resident cutthroat trout (WDFW 2007). Coho salmon were observed on redds just downstream of SR 516 on 10 December 2007. A great blue heron colony is mapped farther upstream outside of shoreline jurisdiction.

4.2.7 Floodplain and Channel Migration Zone

The Big Soos Creek 100-year floodplain and floodway are encompassed by shoreline jurisdiction (see Figure 10). Based on the maps, no upland structures are found within the floodplain in City limits. The north edge of shoreline jurisdiction is the crossing of the stream by SE 272nd Street (SR 516/Kent Kangley Road); the floodplain narrows at that crossing. Outside of City limits downstream, the floodplain narrows down under SR 18 and then expands again to the south. At present, the channel is free to migrate within the valley bottom, except as pinched downstream by the SR 18 crossing.

4.2.8 Opportunity Areas

There are no known shoreline modifications within the Big Soos Creek shoreline area within the City limits. As previously described, the footings of the SR 516 span just upstream of shoreline jurisdiction are likely armored. However, vegetation on properties west of the stream, including private properties and what appears to be a WSDOT-owned area on the north side of SR 18, could be enhanced in order to develop a functioning buffer of native trees and shrubs, particularly conifer species such as Douglas-fir and western red cedar.

Placement of additional in-stream large woody debris would also serve to enhance in-stream fish habitat. Some in-stream woody debris is present, but is primarily derived from the smaller willow and other deciduous trees which presently predominate within the floodplain. Beavers are active throughout the area and have utilized much of this material to construct a number of dams of various sizes and in various states of repair. Fish habitat along Big Soos Creek in the area would benefit from the placement of various configurations of larger, longer-lasting conifer logs to scour substantive pools and provide complex cover habitat for fish within those pools.

4.3 LAKE MERIDIAN

The Lake Meridian watershed area is 742 acres, and includes a tributary stream at the north end that originates approximately one-half mile to the northwest. The lake itself is approximately 150 acres, and drains at the southeast corner to the east and then south, joining Big Soos Creek outside of City limits. According to King County's basin condition evaluation model, it ranks "medium." "Medium" condition basins are designated because they are "Areas with either high or moderate development intensity and moderate or low in significant biological value."

As part of the U.S. Army Corps of Engineers *Duwamish/Green River Ecosystem Restoration Project* (identified as project #23), the outlet of Lake Meridian has been modified to reduce lake flooding and provide better flow control out of the lake into the outlet stream, locally known as Cow Creek. Lake Meridian was once known as Cow Lake. A second phase of the project may be constructed in Summer 2008, and will consist of approximately 2,500 feet of new channel construction from the improved outlet northeast through Soos Creek Park to Big Soos Creek. A flow-splitter will ensure that sufficient flow is maintained through the old Cow Creek channel to maintain hydrology in existing wetlands.



Typical residential development on Lake Meridian



View of Lake Meridian Park pier

4.3.1 Land Use Patterns

Lake Meridian is split into two land use categories: Unit A - Open Space and Unit C - Residential (Figure 3e). The Unit A area consists of Lake Meridian Park, which occupies a roughly 1,400-foot stretch of shoreline at the southeast corner of the lake. Unit C consists of residential development, which occupies the rest of the lake. Single-family homes (designated SF-3 and SF-6 in the Comprehensive Plan) are the dominant residential type, except for an approximately 300-foot segment at the extreme northwest end of the lake occupied by a mobile home park. Additionally, associated wetlands surrounded by single-family residences extend south of Kent-Kangley Road.

4.3.2 Transportation

The primary roadway passing through the Lake Meridian shoreline is SR 516 (Kent-Kangley Road), located at the south end of the lake. A small portion of 148th Avenue SE is in shoreline jurisdiction, as well as a few minor residential access roads. The City's *Six Year Transportation Improvement Program 2008-2013* does not identify any transportation projects in the Lake Meridian shoreline area.

4.3.3 Wastewater and Stormwater Utilities

Wastewater Utilities

The Lake Meridian shoreline area is part of the Soos Creek Water & Sewer District's service area (Figure 4e). All of the developed residential properties with Lake Meridian frontage were connected to the sewer system in 1974 (Metro 1977 cited in Verhey and Mueller 2000). However, an analysis of the Lake Meridian drainage basin completed by the City in 2007 found that 72 improved parcels were not yet connected to the public sewer system, and are managing their wastewater with on-site septic systems (Knox, pers. comm., 21 May 2008).

Stormwater Utilities

At least 11 stormwater outfalls into Lake Meridian or into minor tributaries just upstream of the lake were noted on the City's map of surface drainage features (Figure 5e). Two detention facilities at the edge of the associated wetland at the south end of the lake appear to collect stormwater from surrounding residential areas, and these ponds likely drain into the associated

wetland after detention and treatment. A third pond appears to collect runoff from the park next to the outlet stream (Cow Creek).

4.3.4 Shoreline Modifications

The most common shoreline modifications on Lake Meridian are anthropogenic alterations to the natural lake edge and nearshore environments, and primarily include a variety of armoring types (some associated with fill), piers, and other in-water structures such as boatlifts, boathouses, and moorage covers. These sorts of modifications alter the function of the lake edge, change erosion and sediment movement patterns, affect the distribution of aquatic vegetation, and are often accompanied by upland vegetation loss.

Mapping of shoreline armoring and piers was not conducted as part of this study. However, studies conducted by King County (Verhey and Mueller 2001) and Peratrovich, Nottingham & Drage, Inc. (PN&D 2001) for the City of Kent contain discussions of piers and shoreline armoring in Lake Meridian.

Shoreline Armoring

Shoreline armoring can have many justifications, but often the intent of bulkheads is to:

- protect shoreline property by reducing wave impacts and decreasing erosion,
- increase or maintain lawn areas, and/or
- coordinate style of neighboring shoreline properties.

Possible erosion forces on the lake edge include wind-driven waves during storms and boatdriven waves. Lake Meridian is one of a few King County lakes that allows motorized boat use. Boating regulations on the lake prohibit waterskiing within 300 feet of shore, except for shorestarts from private property and starts 200 feet from the park shore. In addition, all other boating activities exceeding 8 miles per hour must be at least 200 feet from shore. Many of the bulkheads on the lake may also have been constructed to facilitate placement of fill upland of the bulkhead, raising the elevation of the land to minimize flooding during winter months.

Aerial photos, field observation, and the PN&D (2001) and Verhey and Mueller (2001) studies indicate several shoreline condition types: vegetated, grass to water's edge, sand, gravel, and bulkheads (either boulder, wood or concrete). Shoreline condition as reported by the property owners is outlined in Table 11.

	Grass	Sand	Gravel	Rock/Other (Armored)		
% of Respondents	22	3	40	30		

Verhey and Mueller (2001) estimated a shoreline armoring of 50 percent on Lake Meridian. They additionally noted that shoreline armoring is concentrated on the southwest shore, corresponding with steeper upland slopes descending to the water's edge. Although PN&D (2001) did not observe substantial erosion at the toe of or behind bulkheads during its field work,

60 percent of questionnaire respondents indicated that they had experienced shoreline erosion at their properties. Nearly half of the respondents felt erosion was due to high lake levels in winter and nearly half also believed erosion was occurring as a result of boat activity. PN&D (2001) noted that some bulkheads may not be counter-sunk deep enough to prevent scour at the bulkhead toe. Specific shoreline functions and the related effects of shoreline modifications are discussed in greater detail in Chapter 5.0.

Piers

The two Lake Meridian studies (Verhey and Mueller 2001; PN&D 2001) report total pier numbers of 154 and 137, respectively. Ninety percent of questionnaire respondents stated they have a dock, 7 percent indicated they do not have a dock, and 18 percent have a boatlift (PN&D 2001). Although specific information on dock material could not be located, it is probable that many of the piers were constructed using components treated with chemicals that are no longer approved for in-water use because of their potential to have adverse affects on water and sediment quality.

The most substantial pier on the lake is the City's pier at Lake Meridian Park. Relatively wide concrete floats surround the beach, forming a safe swimming area. Most of the private residential piers are likely a mix of fixed-pile piers and floating docks, typically constructed of wood. The docks are aging; 68 percent of respondents reported that their docks were constructed prior to 1990 (PN&D 2001). Pier repair and replacement proposals are likely to increase in the future, providing opportunity to minimize pier-related impacts and eliminate some sources of chemicals.

For additional discussion of the potential biological impacts of cover and structure, see Chapter 5.

4.3.5 Existing and Potential Public Access Sites

Lake Meridian is a primarily residential lake with a small park located on the southeast tip of the lake. Lake Meridian Park is a 16-acre park that provides public access to Lake Meridian in the form of a boat launch, designated swimming areas, and designated fishing areas (Figure 8e). The park also includes picnic areas, trails, and play equipment. The boat launch at Lake Meridian Park was recently replaced and widened with pre-cast concrete planks. Three floats were added to improve ease of access. A second, WDFW-owned boat launch is located adjacent to the east edge of the park. Because the shoreline of the lake is primarily built-out with residential development, there is little potential for future public access sites.

4.3.6 Critical Areas

Geologically Hazardous Areas

Potential erosion hazard areas are mapped around virtually the entire lake (see Figures 13.1-13.3). Seismic hazard areas are also identified at the north and south ends of the lake, generally corresponding to wetland areas. Finally, a landslide hazard area is identified at the northwest end of the lake in an area with particularly steep slopes.

Flood Hazard Areas

Lake Meridian does not have a mapped flood hazard area. However, Lake Meridian has had a history of reported congestion at the outlet and winter flooding problems. Still, lake water level fluctuations are normally fairly modest ranging from typical low summer levels of around 374.5 feet to high typical winter levels of 375.5 feet or only about one foot of fluctuation during the normal annual cycle. A 10-year high lake level is estimated at 376.2 feet and the 100-year at 376.4, or still less than 2 feet of fluctuation for even the most extreme of circumstances (MGS Engineering Consultants, Inc. 2004). Reported damage to structures appears to be limited primarily to docks and some shoreline erosion. However, as noted by PN&D (2001), many docks are improperly constructed such that even average summer lake levels damage them. No studies were found that indicated that flooding damages residences or upland park facilities. Reconfiguration of the outlet completed in Summer 2007 may reduce some of the Lake Meridian winter flooding.

Wetlands

Three known wetland systems are found along Lake Meridian (Figure 11), as well as a sporadic fringe of emergent and aquatic bed wetland in and along the nearshore. The two larger wetlands at the south end of the lake are mixed scrub-shrub and forested wetlands, dominated by willows, hardhack, rose, dogwood, red alder and cottonwood.

Streams

Springs at the north end of the lake coalesce into a small stream that enters the lake along the west edge of the mobile home park.

The alignment of "Cow" Creek, the outlet stream from Lake Meridian (formerly Cow Lake), has been severely altered and its condition has been degraded with respect to its usefulness as fish and wildlife habitat. Emanating from the lake, the outlet stream currently flows across City of Kent Park property, crosses under 152nd Way SE, flows through undeveloped King County park property for approximately 600 feet, and then runs south through the Cascade Villa Mobile Home Park wetland. The present alignment of the "creek" continues within roadside ditches for nearly a mile along 152nd Way SE. More than 30 culvert crossings are present along this existing alignment, between the outlet of the lake and its confluence with Big Soos Creek. A feasibility study's conclusion of the existing creek was that "the habitat potential of the existing stream is so limited that there is little to be gained in any restoration effort" (HARZA Northwest 2000).

In an effort to more fully realize the stream's potential as fish and wildlife habitat and also as an aesthetic and passive recreational resource, the City of Kent is endeavoring to realign the creek along an almost entirely new pathway to join Big Soos Creek through intervening, mostly wooded land owned by King County. The proposed project will create a new stream channel for Cow Creek, which will continue on for a total of 3,350 feet to Big Soos Creek after passing through Lake Meridian Park and crossing under 152nd Way SE. A number of formidable constraints have been overcome in the process. The combined slopes and elevations of the existing land surface along the possible realignment pathway alternatives presented a fundamental challenge: the slope variability and maximum slope of the new stream channel need to be kept within limits to provide fish passage and productive habitat. However, the existing ground is fairly flat in some places and quite steep in others.

Phase 1 of the project was completed in 2007 and involved construction, on City of Kent park property, from the outlet of Lake Meridian to the east side of 152nd Way SE. Fish-passable box culverts and a labyrinth weir were installed to alleviate the flooding problems that occur for lake residents and increase the duration of flow from the lake to the proposed stream and wetlands.

Future Phase 2 will involve excavating a new channel that will meander through forested areas and existing wetlands before entering Big Soos Creek. A flow splitter will divert a portion of the higher flows back along the existing alignment to maintain the hydrology of existing wetlands, three acres of which will be enhanced to improve wildlife habitat. This new channel will incorporate large woody debris, riparian plantings, spawning gravel and scour pools to be used as resting areas for the resident and anadromous fish. The channel and backwater areas will also provide additional habitat to amphibians and other wildlife in the Big Soos Creek Watershed. New box culverts will cross the channel at three points within the new stream channel: two for utility access and one for the Soos Creek Park trail.

Other Fish and Wildlife Habitat Conservation Areas

<u>Priority Habitats</u>: WDFW mapping of Priority Habitat and Species classifies the two southern wetlands areas as Priority Habitat and maps it as palustrine (WDFW 2007) (Figure 14). To be considered a "Priority" wetland, it must have met the following criteria in WDFW's estimation: "Comparatively high fish and wildlife density, high fish and wildlife species diversity, important fish and wildlife breeding habitat, important fish and wildlife seasonal ranges, limited availability, high vulnerability to habitat alteration."

<u>Special Status Species</u>: The only priority species noted by WDFW (2007) in the area is resident cutthroat trout in the outlet stream from Lake Meridian. The lake itself contains 10 fish species, more than half of which are yellow perch, followed in number by largemouth and smallmouth bass (Verhey and Mueller 2001). In addition, kokanee salmon are present in the lake (Seiders et al. 2008), and Lake Meridian property owners have reported seeing kokanee spawn in the shallow beach areas. A bald eagle nest is mapped outside of shoreline jurisdiction, approximately 0.4 mile from the lake (WDFW 2007). The eagle likely forages in the lake and perches on trees within shoreline jurisdiction.

4.3.7 Lake Aquatic Invasive Species

Numerous studies have been conducted in Lake Meridian that include an aquatic vegetation component. King County identified 19 plant species in the lake, including seven emergent species, two floating species, and ten submergent species (KCSWM 1996). In 1994, surface coverage by floating aquatic vegetation totaled 5.3 acres, while the submergent aquatic vegetation comprised 25.4 acres. A more recent study commissioned by the City found eight submergent species, and calculated that milfoil alone affected 35 acres (Tetra Tech, Inc. 2002) (Exhibit 4). The typical lakeshore emergent vegetation community coverage was limited by shoreline alterations conducted by residential property owners: bulkheads, lawns, and other modifications. No more than 5 percent of the shoreline in most of the examined survey sections contained emergent vegetation (Verhey and Mueller 2001).



Exhibit 4. Lake Meridian Beneficial Uses and Aquatic Weed Map. Excerpted from Tetra Tech, Inc. 2002.

The dominant aquatic plant is Eurasian watermilfoil, a Class B noxious weed. At the time of WDFW's 2000 survey, milfoil formed a continuous band around the lake at depths between approximately 3 and 9 feet, covering the gravel substrate and occupying that portion of the lake which is most productive (Verhey and Mueller 2001). Tetra Tech's 2000 survey found milfoil between depths of 2 and 15 feet, with the highest densities between 6 and 14 feet (Tetra Tech 2002). The greatest concentrations were found near the WDFW boat launch and at the northwest end of the lake (Tetra Tech 2002). King County surveys conducted between 1976 and 1980 also found milfoil to be the dominant species (KCSWM 1996 cited in Verhey and Mueller 2001). According to the Department of Ecology, Lake Meridian became the first known Washington site to contain Eurasian watermilfoil in 1965 (http://www.ecy.wa.gov/Programs/wq/plants/ weeds/milfoil.html).

Lake residents and the City of Kent have also noticed an increase in white water lily (also known as fragrant water lily) (*Nymphaea odorata*), which is on King County's list as a "non-designated noxious weed." Control of species in this weed category is recommended, but not required, by King County. According to the City (Knox, pers. comm., 5 June 2008), this non-native water lily may be displacing the native yellow pond lily (*Nuphar luteum* ssp. *polysepalum*) and lake residents at the northeast corner of the lake have reported dramatic increases in coverage, which has prevented use of the swimming beach. Functionally, the two species are very similar.

4.3.8 Water Quality/Toxics

There are several sources of information regarding water quality in Lake Meridian, including various King County studies, the Department of Ecology, Washington State Department of Health, and more recently the City of Kent.

Water Quality

Lake Meridian is on Ecology's 303(d) list for two Category 5¹ parameters in the water medium: total phosphorus and fecal coliform. The "Listing Basis" notes for total phosphorus also indicate that the listing is based on 1978 data, and acknowledges that studies conducted in the 80s, 90s, and 2000s do not indicate that total phosphorus exceeds water quality standards (http://apps.ecy.wa.gov/wats/QBEListingReport Data.asp?resp=6356). However, King County's data might not be of sufficient rigorousness to meet Ecology's specific criteria for delisting (Koch, pers. comm., 7 May 2008). Further, meeting the water quality standard for phosphorus may not be sufficient to delist the lake as the listing is based additionally on impairment of "beneficial uses" tied to algal blooms.

The "Listing Basis" notes for fecal coliform state: "Recent verification monitoring since 1998 indicates that this water segment is meeting fecal coliform standards. Previous listing was based on data from 1978" (http://apps.ecy.wa.gov/wats/QBEListingReportData.asp?resp=6316). The listing is based on samples taken from the swimming beach area at Lake Meridian Park in 2003. Again, Ecology does not have verification that the King County data were collected in a manner

¹ "Placement in this category means that Ecology has data showing that the water quality standards have been violated for one or more pollutants, and there is no TMDL or pollution control plan. TMDLs are required for the water bodies in this category." http://www.ecy.wa.gov/programs/wq/303d/2002/2004_documents/2004_wq_assessment_cats.html

consistent with the criteria for delisting. Ecology is searching for the data to determine if delisting could be warranted (Koch, pers. comm., 7 May 2008).

Studies have not been conducted to determine the origin of the fecal coliform bacteria. As mentioned above, there are 72 parcels in the Lake Meridian drainage basin that are using septic systems to manage wastewater, in addition to a public park with a beach and swimming area. Properly functioning septic systems and drainfields may be a source of nitrates to groundwater, but bacteria, viruses and other chemicals such as phosphates are effectively neutralized or captured by soil filtration and the activity of soil microorganisms (http://www.metrokc.gov/health/wastewater/owners/questions.htm).

Lake Meridian has generally been classified as an oligotrophic (low productivity or low biological activity) lake in one of the headwater areas of the Big Soos Creek basin due to its low surface-water phosphorus levels and good clarity (Verhey and Mueller 2001; King County 2006). Tetra Tech, however, in its recent (2007) monitoring report for the City, reevaluated the historic data and determined that the lake bottom phosphorus and dissolved oxygen levels indicate that the lake is more mesotrophic (moderate productivity and biological activity).

Since early 2007, the City has been conducting bi-weekly water quality sampling of various stormwater outfalls on Lake Meridian. According to the City (Knox, pers. comm., 5 June 2008), the results generally indicate acceptable water quality. The exception would be a few occurrences of high phosphorus levels, possibly from residential fertilizer usage and/or carwashing soap in the Lake Meridian drainage area.

Toxics in Fish

The Washington State Toxics Monitoring Program (WSTMP), which characterizes toxic contaminants in freshwater fish, sampled fish tissue from 14 lakes in 2006, including Lake Meridian (Seiders et al. 2008). This was the first test of its kind in Lake Meridian, and indicates the presence of historical contaminants rather than the development of a new water quality problem. The assessed persistent bioaccumulative toxins (PBTs) include mercury, PCBs, dioxins and furans, chlorinated pesticides, and PBDE flame-retardants. Lake Meridian fish contained PBT concentrations that exceeded National Toxics Rule (NTR) criteria for total PCBs, 2,3,7,8-TCDD (the most toxic dioxin congener), 2,3,7,8-TCDD TEQ, and the chlorinated pesticides dieldrin, total chlordane, hexachlorobenzene, and toxaphene (Table 12). As indicated in Table 12, many of the sampled fish did not have detectable levels of the PBTs.

Analyte	Total PCB Aroclors (ug/Kg)		2,3,7,8- TCDD (ng/Kg)	Dieldrin (ug/Kg)		Total Chlordane (ug/Kg)		Hexachloro - benzene (ug/Kg)		Toxaphene (ug/Kg)		2,3,7,8- TCDD TEQ (ng/Kg)	
Species ¹	кок	LMB	КОК	кок	LMB	KOK LMB		кок	LMB	кок	LMB	КОК	
Water Quality Standard (NTR) ²	5.3		0.07	0.65		8.3		6.7		9.8		formerly 0.07	
Median value in statewide data set	19		0.082	0.52		1.1		1.4		17		0.202	
Result from Lake Meridian 2006 sample	32.5 ³	24.7 ³	0.017 ³	6.8 ³	2.3	13 ³	13 ³ 5.6 ³		15 ³ 9.5 ³		11 ³	0.659 ³	
Percentile rank in data set of detected values ⁴	70	59	69	100	93	93	86	98	96	44	23	88	
Historical data set reviewed⁵	A		В	C		A		С		С		А	
% fish sampled with detectable levels of analyte	65		37	41		40		44		8		100	

Table 12. Lake Meridian Fish Tissue Not Meeting Water Quality Standards (2006 WSTMP data in context of other Washington State data).

Source: Keith Seiders, Washington Department of Ecology.

¹ KOK – Kokanee, LMB - Largemouth bass

² NTR - National Toxics Rule

³ Result is qualified as an estimated value

⁴ Indicates the percent of samples in the data set that have lower concentrations than Lake Meridian

⁵ A - WSTMP 2001-2006, statewide freshwater fillet

B - Statewide freshwater fillet 1994+ from Ecology's Environmental Information Management (EIM) database

C - Statewide freshwater fillet 1992+ from EIM

The NTR criteria established by the federal government under the Clean Water Act were adopted by Ecology in lieu of setting state-specific standards based on local studies of natural background levels of these pollutants. The NTR criterion for PCBs is 5.3 parts per billion (ppb), a standard that is not met by 90 to 95 percent of fish in Washington's lakes (McBride, pers comm., 24 June 2008). The Department of Health has different criteria used in establishing its Fish Consumption Advisories. According to David McBride, human health issues are not a concern until PCB and mercury levels in fish exceed approximately 100 ppb (pers. comm., 24 June 2008). Based on available data from the early 1980s to 2003, the statewide average for PCBs in fish was around 65 ppb; the average PCB value of 19 included in Table 12 above is based only on data collected between 2001 and 2006 (Seiders, pers. comm., 25 June 2008). A median PCB value calculated from multiple studies spanning from 1990 to the present is expected to lay between 19 and 65 ppb (Seiders, pers. comm., 25 June 2008). Fish in Lake Meridian had total PCB concentrations under 35 ppb.

Exceedances of the federal NTR criteria require placement of Lake Meridian on Ecology's proposed 2008 303(d) list for the exceeded parameters. Ecology recommendations for 303(d) list inclusions were sent to the EPA on 23 June 2008. All of the exceeded parameters were placed in Category 5, except for 2,3,7,8-TCDD TEQ, which was placed in Category 2. Although tissue samples from Lake Meridian fish exceeded NTR criteria thresholds for PBTs, the PBT concentrations were not considered high in comparison to a list of 60 other Washington State lakes (including Lake Washington) that have been sampled since 2004 (Seiders et al. 2008). The lakes with the highest contaminant levels received scores between 50 and 250; Lake Meridian's score was 19.7 (Seiders et al. 2008).

The PBTs found in Lake Meridian's fish can come from the following sources:

- <u>Mercury</u>: Mercury occurs in the earth's crust and is released to the environment from natural events (e.g. volcanoes, weathering, and forest fires) and human activities (e.g. coal-fired power plant, disposal of fluorescent lamps, thermometers, thermostats, monometers and switches, medical-waste incinerators, and other industrial processes).
- <u>PCBs</u>: Polychlorinated biphenyls (PCBs), banned in the U.S. in 1979, are synthetic organic compounds historically used as cooling fluids in electrical equipment, and in inks, paints, and plastics. PCBs are stable, have low solubility in water, and have a high affinity for sediments and animal fats. PCBs can be released to the environments through the disposal of fluorescent lamp ballasts, older televisions, appliances, transformers, and capacitors.
- <u>Dioxins and furans (PCDD/Fs)</u>: Dioxins and furans, or polychlorinated dibenzo-p-dioxins and –furans (PCDD/Fs), are unintentional byproducts of combustion processes. Sources can include municipal- and medical waste incinerators, forest fires, cement kilns, coal combustion, residential and industrial wood combustion, residential waste combustion, diesel and gasoline fuel combustion, bleached-chemical wood pulp and paper mills, pentachlorophenol-treated wood, and chemical and pesticide manufacturing.
- <u>Chlorinated pesticides:</u> Pesticides historically received widespread use, and include insecticides, herbicides, fungicides, and related chemicals used to control pests. Many (including DDT, chlordane, and dieldrin) were banned from use in the U.S. during the 1970s and 80s. However, residual levels of these toxins persist in soils, sediments, water, fish tissue, and in wood products treated to resist termites.

Much of the PBTs in Lake Meridian's fish are a legacy of anthropogenic activities that occurred in the past. These toxins have largely been regulated or otherwise controlled at the source, however, and it is unlikely that additional PBTs are being delivered to Lake Meridian or other parts of the watershed (Gallagher, pers. comm., 21 March 2008). The PCBs and pesticides (dieldrin, total chlordane, hexachloro-benzene, and toxaphene) that typically entered the lake through surface-water runoff have been outlawed and are no longer in use. Airborne dioxins, mercury, and PCBs were largely produced and distributed at single sources like power plants and factories, and these have largely been controlled at the source (Gallagher, pers. comm., 21 March 2008). The PBTs generally enter Lake Meridian from either the atmosphere (as airborne particulate matter) or in surface water/stormwater runoff. These chemical toxins do not break down, and persist in lakebed substrates where the macroinvertebrate community ingests them. Once they enter the biological food chain, these toxins bioaccumulate in fish, and the older, larger fish end up carrying the highest relative concentrations. Rapid urbanization, such as that in the Lake Meridian watershed, can increase the volume of other chemical pollutants (not measured or reported in the Toxics Monitoring Study) delivered to the lake, but increasing upland development is unlikely to significantly affect the levels of PBTs currently found in Lake Meridian fish (Gallagher, pers. comm., 21 March 2008; Seiders, pers. comm., 24 June 2008). Existing City and State requirements for short- and long-term stormwater management, and erosion and sedimentation prevention during construction are likely preventing or minimizing introduction of new PBTs into the Lake Meridian system (Seiders and McBride, pers. comm., 24 June 2008).

According to the Environmental Protection Agency (EPA), PBTs "are associated with a range of adverse human health effects, including effects on the nervous system, reproductive and developmental problems, cancer, and genetic impacts" (EPA 2008). The Department of Health (2008) has not specifically placed Lake Meridian on its Washington State Fish Consumption Advisories list, although in all lakes and rivers of Washington State there is a mercury advisory recommending that the general public limit consumption of largemouth and smallmouth bass to two meals per month. Although mercury was found in Lake Meridian largemouth bass at a level of 512 ppb, this did not exceed the NTR standard of 825 ppb (Seiders et al. 2008). The mercury level in kokanee salmon (115 ppb) and the levels of other tested analytes in largemouth bass and kokanee salmon fell below the typical fish consumption advisory thresholds (McBride, pers comm., 26 June 2008).

Wisconsin Department of Natural Resources (2008) reports that "[b]ehavioral changes, mortality, reproductive failure, eggshell thinning, developmental abnormalities, impaired growth and development, altered blood chemistry, increased rate of disease outbreaks, organ and centralnervous-system damage, and impaired immune-system response are just some of the reported effects of PBTs in wildlife." Animals, such as bald eagles, osprey or great blue heron, that prey on fish in the lake would be vulnerable to accumulation of PBTs in their tissues. Amphibians that have close contact with contaminated sediments may also absorb PBTs through their skin (Wisconsin Department of Natural Resources 2008). The Washington Department of Health (McBride, pers. comm., 24 June 2008) stated that PBT levels in Lake Meridian fish pose "little to no risk" to humans swimming or otherwise recreating in the lake.

4.3.9 Opportunity Areas

<u>General</u>: Investigate potential for control of Eurasian watermilfoil through chemical, mechanical or biological control methods. The City's IAPMP (Tetra Tech 2002) recommended placement of bottom barriers (burlap sheets) in localized areas (see Exhibit 3 above). This work has not yet been conducted.

<u>Residential</u>: Many residential shoreline properties on Lake Meridian have the potential for improvement of ecological functions through: 1) reduction or modification of shoreline armoring, 2) reduction of overwater cover and in-water structures (grated pier decking, pier size reduction, pile size and quantity reduction, moorage cover removal), 3) improvements to

nearshore native vegetative cover, and/or 4) reductions in impervious surface coverage. Shoreline properties outside of shoreline jurisdiction but within the Lake Meridian basin that manage wastewater through on-site septic systems could also connect to the public sewer system.

<u>Lake Meridian Park</u>: Several opportunities exist to improve habitat conditions along the shoreline. These include: reduction of overwater cover by the existing pier through the installation of deck grating, removing or minimizing the impacts of shoreline armoring; and supplementation of nearshore native vegetation to improve habitat conditions.

4.4 LAKE FENWICK

4.4.1 Land Use Patterns

The north side of Lake Fenwick lies within the City of Kent and has two land use categories: Unit A - Open Space and Unit C – Residential (Figure 3f). Shoreline jurisdiction lies predominantly within Unit A - Open Space on the City Parks property, Lake Fenwick Park. A small Unit C segment (approximately 700' of shoreline) is in single-family ownership at the lake's northern tip. Residential buildings in this area appear to be located outside of shoreline jurisdiction.

The south end of the lake is in King County jurisdiction and is in Kent's PAA. Approximately 2,100 feet of shoreline is designated PW (King Co. Other Parks/Wilderness) and the remaining 900 feet are designated UR 4-12 (allowing residential development). The topography rises steeply from the lake in this area and the residential areas are located up from the lake.



South end of Lake Fenwick Park

Image of Lake Ferwirk

Image of Lake Fenwick

4.4.2 Transportation

The primary roadway passing through the Lake Fenwick shoreline is Lake Fenwick Road, located at the west end of the lake. Lake Fenwick road is classified as a residential collector arterial on the City's road classification map. No other roads are located within shoreline jurisdiction. The City's *Six Year Transportation Improvement Program 2008-2013* does not identify any transportation projects in the Lake Fenwick shoreline area.

4.4.3 Wastewater and Stormwater Utilities

Wastewater Utilities

The only mapped sewer line in Lake Fenwick shoreline jurisdiction is a 6-inch "siphon line" crossing of the associated wetland located west of Lake Fenwick Road (Figure 4f).

Stormwater Utilities

Only a few stormwater conveyances exist in shoreline jurisdiction, and those are primarily identified culverts passing runoff beneath Lake Fenwick Road (Figure 4g). A detention facility is shown at the upstream end of the associated wetland on the west side of Lake Fenwick Road, capturing stormwater runoff from the adjacent residential community.

4.4.4 Shoreline Modifications

Lake Fenwick has a low level of shoreline modification in the City portions. Approximately 350 linear feet of shoreline is armored, mostly in scattered short sections associated with a small fishing pier, the boardwalk trail crossing, and a boat launch. In the primary active use area near the parking lot, the shoreline is armored with vertical timbers with inset steps for lake access. Other access points with no vegetation are also armored with either timbers or boulders. The boat launch access is lined with small gravel up to the water's edge, with pre-cast concrete slabs in the water.

In the PAA portion of the lake, some single-family housing is closer to the water's edge where slopes allow, and several of the homes have a small floating dock and/or minor shoreline armoring.

4.4.5 Existing and Potential Public Access Sites

The primary public access for Lake Fenwick is Lake Fenwick Park, a 140-acre park that provides public access in the form of a boat launch, and swimming and fishing areas (Figure 8f). The park also includes water-enjoyment activities such as a trail, picnic areas, and a disc golf course.

4.4.6 Critical Areas

Geologically Hazardous Areas

The lake sits within a ravine between two steep hillsides. Therefore, the lake is encumbered by a number of geologic hazard areas. Landslide hazard areas are mapped around the entire lake (see Figure 13.1-13.3). Seismic hazard areas are identified along the western edge of the lake. Finally, steep slopes exist along the entire eastern edge of the lake, as well as the southwestern shoreline located just south of the city limits.

Flood Hazard Areas

Lake Fenwick does not have a mapped flood hazard area.

Wetlands

There is one known wetland system found within Lake Fenwick jurisdiction (Figure 11). The wetland is both mixed scrub-shrub and forested wetlands, transitioning to emergent and aquatic

bed at the lake edge. The lake-edge community includes a diverse mix of willow, alder, native yellow pond lily, floating-leaved pondweed, and cattail, among others.

Streams

Lake Fenwick is drained by a seasonal stream outlet at the southern tip of the lake in King County. An additional seasonal stream enters the lake through the associated wetlands at the northwest corner.

Other Fish and Wildlife Habitat Conservation Areas

<u>Priority Habitats</u>: WDFW mapping of Priority Habitat and Species classifies the wetland area as Priority Habitat and maps it as palustrine (WDFW 2007) (Figure 14). To be considered a "Priority" wetland, it must have met the following criteria in WDFW's estimation: "Comparatively high fish and wildlife density, high fish and wildlife species diversity, important fish and wildlife breeding habitat, important fish and wildlife seasonal ranges, limited availability, high vulnerability to habitat alteration." Lake Fenwick and the surrounding area are also classified as Urban Natural Open Space. Designation criteria for Urban Natural Open Space are the same as for priority wetlands.

<u>Special Status Species</u>: The only priority species noted by WDFW (2007) in the area is a bald eagle pair, which nests in the shoreline area to the northeast. Watershed Company staff observed a bald eagle pair perched in a Douglas-fir snag on the east shore during a site visit on December 10, 2007. Wood ducks were also observed earlier in the year, and a number of what appear to be wood duck nest boxes were mounted on trees at the lake edge. The lake itself is stocked with rainbow trout; yellow perch, largemouth bass and brown bullhead catfish are also found in the lake (http://wdfw.wa.gov/fish/prospects/county_k-l.htm).

4.4.7 Lake Aquatic Invasive Species

The City commissioned an integrated aquatic plant management plan, which was completed for Lake Fenwick in 2002 (Tetra Tech). This study found five submergent and one emergent aquatic vegetation species in Lake Fenwick, dominated by the invasive species Brazilian elodea (Exhibit 5). The survey noted presence of elodea at depths between 0 and 18 feet, with the highest densities in areas shallower than 8 feet. In all, approximately 77 percent of the surveyed shallow areas were affected. Brazilian elodea can be so dense that fish movement is limited; forage areas are reduced; and predators and prey have reduced visibility, hampering foraging and escape from predators. Dense stands of elodea can also uptake dissolved oxygen, reducing dissolved oxygen to lethal levels for fish (Tetra Tech 2002).

Although Brazilian elodea is listed by King County as a Class B noxious weed, control is not required in Lake Fenwick, presumably because the infestation is too far advanced. However, Tetra Tech recommended that triploid grass carp be introduced into the lake to control the Brazilian elodea. Stocking of the lake with grass carp is scheduled to occur in June 2009. The City's planned use of grass carp to eliminate Brazilian elodea will be monitored for effectiveness. A weed rake will be used to sample along predetermined aquatic transects with the results compared to 2001 diver surveys along these same transects.



Exhibit 5. Lake Fenwick Beneficial Uses and Aquatic Weed Map. Excerpted from Tetra Tech, Inc. 2002.

4.4.8 Water Quality

There are several sources of information regarding water quality in Lake Fenwick, including King County and the Department of Ecology. Lake Fenwick is on Ecology's 303(d) list for two Category 5 parameters: total phosphorus and invasive exotic species (Brazilian elodea, see discussion in Section 4.4.7 above). A Total Maximum Daily Load (TMDL) Plan for phosphorus was prepared in 1992, establishing a target total phosphorus concentration of 19 μ g per liter (Onwumere 2002). Implementation of the TMDL was assessed by the Department of Ecology in 2002 (Onwumere 2002). The assessment found that while "progress in water quality recovery" has been made, Lake Fenwick is still not meeting the quantitative standard necessary to meet Ecology's narrative water quality standard for aesthetics (unsightly algal blooms) (Onwumere 2002). Data was collected by King County in four years between 1993 and 2001, with an average total phosphorus of 36 μ g per liter. The sources of phosphorus and their relative contributions to the lake have been determined (Table 13).

Table 13.	Sources	of	Total	Phosphorus	Loads	to	Fenwick	and	Sawyer	lakes	(Data	from
	Entranco	, 19	991 an	d King County	, 2000)).						

Sources	Percent Contribution of Total Phosphorus
Net sediment release	23.6
Aquatic Plants	5.4
Birds	6.2
Atmosphere	2.6
Groundwater	8.5
Stormwater	46.5
Septic tanks	7.7

Partial table excerpted from Onwumere 2002.

Actions that the City has taken to implement the TMDL include: "phosphorus precipitation/inactivation, hypolimnetic aeration, watershed nutrient management (ordinances, sediment reductions, [and] passive nutrient attenuation" (http://apps.ecy.wa.gov/wats/QBEListingReportData.asp?resp=6336). The relatively high contribution level of "net sediment release" (24%) suggests that even though the lake may be experiencing reduced levels of external phosphorus inputs as a result of TMDL-related activities, it may still exceed the target limit for total phosphorus and continue to be subject to algal blooms. "Net sediment release" occurs when phosphorus that entered the lake is "absorbed or adsorbed to lake sediments and recycled among the sediment, water, and biotic compartments" (Onwumere 2002). The TMDL effectiveness report concludes with the following recommendations:

- 1) reducing cumulative loadings from internal phosphorus sources following turnover of the lakes,
- 2) reducing the increased fall and winter stormwater runoff activities,
- 3) continuing aeration at Lake Fenwick..., and
- 4) considering alum addition to take phosphorus out of the water column, which may improve adsorption to the sediments (Onwumere 2002).

Lake Fenwick is considered by King County to be a mesotropic to eutrophic (moderate to high productivity) (King County 2006). Based on data collected from the early 80s to 2004, King County characterizes lake water quality as "good to fair" (King County 2006).

4.4.9 Opportunity Areas

Lake Fenwick is an unusual urban lake because of its low level of modification, and its generally wide buffer of mixed forest. However, as noted above, there are some areas of shoreline armoring that could be modified to support public access while stabilizing the banks using bioengineering techniques.

Further, Brazilian elodea is currently a problem that the City will address through introduction of approximately 600 grass carp in 2008, consistent with a permit obtained from the Washington Department of Fish and Wildlife. The carp will be sterile and blocked from leaving the lake by a fish barrier at the outlet. Grass carp prefer to graze on Brazilian elodea and are expected to drastically reduce or eliminate the noxious weed.

4.5 GREEN RIVER NATURAL RESOURCES AREA POND

4.5.1 Site History

The Green River Natural Resources Area pond complex is a multi-celled facility with two inlets and one outlet funded and managed by the City's Public Works Department. The first cells (Cells 1-3 on Exhibit 2 included in Appendix B) at the northeast corner of the complex were constructed between 1964 and 1973 for sewage treatment. The northern-most cell (Cell 1) has overgrown with vegetation, and is now a forested wetland. Cells 2 and 3 are normally filled with water, but become partially dry in the late summer, creating mudflat habitat. Cell 5 was originally two separate primary treatment sewage lagoons divided down the center, each 16.5 acres in size. Each of the 16.5-acre lagoons contained up to 3 feet of water.



View of weir in the GRNRA



View of natural area in the GRNRA.

In the mid-1980s, the City began planning the conversion of the sewage treatment system into a larger stormwater storage and treament and flood control facility to improve water quality and reduce flood flows in Mill Creek Kent. Cells 1, 2 and 3 are not part of this stormwater and flood control system because of low-level contaminants (PCBs, heavy metals) that were found during site investigations prior to the GRNRA's construction. Storm and floodwater is therefore routed

away from those cells and the original clay linings of those cells were left intact to minimize groundwater infiltration. Cell 5 was reconfigured into its current arrangement and Cells 4, 6, 7 and 8 were constructed in 1996. The divider between the two 16.5-acre cells was removed and one new, larger cell (Cell 5) was graded to construct a central upland peninsula with a total finished pond area of 18.7 acres at the average water depth. The northeast corner of the eastern 16.5-acre cell was separated to form what is now a stormwater settling pond (Cell 4). A new 35.2-acre lagoon (Cell 6) was constructed west of Cell 5 for flood detention, and two additional cells (Cells 7 and 8) were constructed to the south as stormwater presettling ponds.

When flood conditions are not occurring, stormwater from an 832-acre sub-basin typically flows into the presettling ponds (Cells 4, 7 and 8), then into the treatment wetland (Cell 5), and then into the detention lagoon (Cell 6) before being routed back to Mill Creek Kent through the outflow channel. The detention lagoon (Cell 6) normally has a water level two feet lower than the constructed wetland (Cell 5), but water continuously drains from Cell 5 to Cell 6 over a sharp-crested weir set at an elevation of 23.0 feet above mean sea level (MSL).

A new diversion channel from Mill Creek Kent was also constructed in 1996 to route flood flows into the GRNRA storage ponds. This diversion channel directs floodwaters to the northeast corner of the GRNRA where water flows first into Cell 4 during minor events, or directly into Cell 6 via the flood overflow channel whenever the flood size exceeds the six-month event.

The ordinary high water marks of the individual cells have not been delineated. However, during a site investigation attended by Ecology, the City, The Watershed Company, and Makers on December 20, 2007, Richard Robohm (Ecology) placed the ordinary high water mark at approximately the 22.5-foot elevation in the detention lagoon (Cell 6). This estimation was based on Matt Knox (City) reporting the weir height between Cells 5 and 6 at 23.0 feet, and an examination of indicators in Cell 6 relative to the weir. After some field discussion, it was preliminarily determined that Cells 5 and 6 are effectively one body of water frequently enough during the year (Ecology suggested at least six times per year) to consider combining Cells 5 and 6 as a single shoreline lake.

From a review of GRNRA water level data (based on six years of continuous water level monitoring from 2000 to 2005), Cell 6 exceeds 23.0 feet MSL (and therefore overtops the weir from the downstream end leaving one continuous body of water) on average just over five times per year. Additional discussion ensued regarding the status of the perimeter cells (Cells 4, 7 and 8). Cell 7 is separated from Cell 6 by a weir with a top elevation of 26.0 feet (set at the calculated 25-year flood recurrence level), approximately 3.5 feet above the Cell 6 OHWM. Cells 7 and 8 are separated by a large concrete culvert; Cells 8 and 5 are separated by additional concrete culverts with a gate; and Cells 4 and 5 are also separated by a culvert with a gate. While these cells are hydraulically connected to Cells 5 and 6 via culverts and/or the 26.0-foot weir, that hydraulic connection is not a part of the ordinary high water mark definition or the criteria for establishing jurisdiction. Rather, hydraulic connectivity is a factor in determining associated wetlands.

By definition, the lake edge is determined by a "continuous ordinary high water mark" and the ordinary high water mark "is a biological vegetation mark...found by examining the bed and banks and ascertaining where the presence and action of waters are so common and usual, and so

long continued in all ordinary years, as to mark upon the soil a character distinct from that of the abutting upland..." Although the cells are connected, the culverts/weirs interrupt the ordinary high water marks between cells, do not have beds or banks, and do not contain vegetation. Further, the ordinary high water mark elevations of Cells 4, 7 and 8 appear to differ from that of Cells 5 and 6. The above factors constitute a break in the OHWM, and thus render Cells 5 and 6 the only shoreline waterbodies within the Green River Natural Resources Area. The other cells are considered associated wetlands, but the 200-foot shoreland area does not extend upland of the associated wetland edges.

Additional background information about the Green River Natural Resources Areas can be found at http://www.ci.kent.wa.us/publicworks/index.aspx?id=6120&terms=grnra.

4.5.2 Land Use Patterns

The Green River Natural Resources Area (GRNRA) is a City-owned and managed water quality management facility that includes extensive habitat enhancement and wildlife viewing activities. The facility includes two human-constructed ponds connected by a weir that constitute an approximately 55-acre lake. Additionally, there are four other human-constructed pond/wetland cells that are part of the water management system. The GRNRA site is surrounded on the north, east and south sides by industrial uses and the Green River Regional Trail lies to the west. Shoreline jurisdiction is located entirely within the GRNRA, so is therefore in the Unit A - Open Space category (Figure 3h). An associated wetland to the south of the GRNRA lies within an area designated as Industrial in the Comprehensive Plan.

4.5.3 Transportation

There are no roadways passing directly through the GRNRA. There are two roads which run adjacent to the GRNRA pond: South 212th Street and 64th Avenue South. South 212th Street is classified as a principal arterial and 64th Avenue South is classified as a minor arterial on the City's road classification map. The City's *Six Year Transportation Improvement Program 2008-2013* does not identify any transportation projects in the GRNRA shoreline area.

4.5.4 Wastewater and Stormwater Utilities

Wastewater Utilities

As previously mentioned, portions of the GRNRA pond complex were once wastewater treatment lagoons. A 12-inch sewer main originates at the southwest corner of the constructed wetland, joining with a 27-inch line that heads east and crosses the long inlet cell just west of 64th Avenue South (Figure 4h). According to City staff (Knox, pers. comm., 21 May 2008), this line is probably abandoned, although it does contain some flow that is assumed to be either groundwater leakage lagoon surface water seepage into the line. Most of the City's sewer mains in the area connect to the King County-Metro interceptor along 64th Avenue South.

Stormwater Utilities

As described above under Section 4.5.1, the GRNRA ponds are a stormwater and flood control facility. During Mill Creek Kent flood events, the ponds receive peak flows from Mill Creek Kent. The remainder of the year, the ponds receive stormwater runoff from an 832-acre sub-basin (Figure 5h).

4.5.5 Shoreline Modifications

Consistent with the GRNRA pond complex's nature as a constructed flood and stormwater facility, derived from a smaller sewage treatment facility (no longer active), the pond system is highly modified and controlled by weirs and culverts (see exhibit in Appendix B).

4.5.6 Existing and Potential Public Access Sites

The GRNRA is a 304-acre wildlife refuge that includes a combined stormwater detention and enhanced wetland facility, a public park, and a trail system (Figure 8h). This site provides public access to the ponds and wetlands that are part of the stormwater facility. With its nature walks, wildlife viewing towers, and bike path along the west and south sides of the site, the GRNRA pond and associated wetlands provides extensive water-enjoyment opportunities.

4.5.7 Critical Areas

Geologically Hazardous Areas

The GRNRA is located entirely within a seismic hazard area (see Figures 13.2). There are no other geologic hazard areas located around the GRNRA ponds.

Flood Hazard Areas

The wetland portions of GRNRA shoreline jurisdiction outside of the formal stormwater facility complex are within the current mapped 100-year floodplain (Figure 10.1). Other non-wetland areas north, south, and partially to the east are also in the floodplain. Flooding in the GRNRA shoreline jurisdiction likely does not threaten the perpetuation of trails, culverts, weirs and some access roads that are part of the park and stormwater facility.

Wetlands

Much of the GRNRA, including the individual cells that make up the GRNRA pond complex, consists of forested, scrub-shrub, emergent, and aquatic bed wetland (Figure 11). This large wetland area, with its diversity of vegetation types, provides habitat for a large number of birds, mammals, reptiles and amphibians. The complex also performs other wetland functions at a high level, including water storage and water quality treatment.

Streams

A system of constructed ditches and channels directs peak Mill Creek Kent flows into the GRNRA pond complex at the southeast and northeast corners. The system outlets at the northwest corner of the westernmost pond into a ditch system that leads back to Mill Creek Kent.

Other Fish and Wildlife Habitat Conservation Areas

<u>Priority Habitats</u>: WDFW mapping of Priority Habitat and Species classifies several areas of the GRNRA as Priority palustrine wetland habitat (WDFW 2007) (Figure 14). To be considered a "Priority" wetland, it must have met the following criteria in WDFW's estimation: "Comparatively high fish and wildlife density, high fish and wildlife species diversity, important fish and wildlife breeding habitat, important fish and wildlife seasonal ranges, limited availability, high vulnerability to habitat alteration."

<u>Special Status Species</u>: PHS data do not show any priority species in the GRNRA pond complex itself. However, the outlet stream reportedly contains resident cutthroat trout (WDFW 2007), and other fish species may enter the system during Mill Creek Kent flooding events. During bird surveys conducted at the GRNRA, bald eagles, peregrine falcons, pheasant, and a variety of other waterfowl species have been observed. During one trip in April 2005, bird counters identified 62 species (http://www.ci.kent.wa.us/publicworks/index.aspx?id=6120&terms=grnra).

4.5.8 Opportunity Areas

The Public Works Department and the Parks, Recreation and Community Services Department should continue to work together managing the GRNRA and implementing the Landscape Master Plan for the site.

4.6 SPRINGBROOK CREEK

The Springbrook Creek (09.0005) Subbasin is located east of the mainstem Green River, in and around the cities of Kent and Renton. The creek enters the mainstem Green River via the Black River downstream of Kent at RM 11.0. With an estimated mainstem stream length of 12.0 miles, and approximately 19.1 miles of tributary streams and 3.8 miles of drainage ditches (Williams 1975), it is the largest subbasin in the lower Green River Basin, draining an area of about 15,763 acres. In the eastern part of the subbasin, rolling hills rise to elevations of about 525 feet above the valley floor. One significant lake is present (Panther Lake) along with several smaller ponds and wetlands. Creeks originating in these upland areas drop abruptly through sharply defined, steep canyons to the valley floor where stream gradients flatten quickly. Typically, these canyons are short, with high gradients, and the streams they carry are generally not accessible to anadromous salmonids. The western half of the subbasin lies on the valley floor and stream gradients are virtually flat. A unique feature to this subbasin is the Black River Pump Station, where the entire flow of Springbrook Creek is *pumped* into the Green River (Kerwin and Nelson 2000). A Denil fish ladder allows salmon migration upstream past the pump station, and an airlift system enables downstream salmon migration. Springbrook Creek only meets shoreline jurisdictional criteria (minimum 20 cfs mean annual flow) for a short distance (approximately 450 feet) into the City limits.

4.6.1 Land Use Patterns

The entire Springbrook Creek shoreline jurisdiction is zoned and planned for Industrial Park and Industrial use, respectively (Figure 3c). The two industrial parcels to either side of the stream are developed, with buildings between 100 and 200 feet from the ordinary high water mark, and parking areas 50 or more feet from the ordinary high water mark. However, there are two undeveloped narrow parcels comprising the riparian corridor of Springbrook Creek that are noted as "dedicated open space" in the parcel data, even though they still remain in the Industrial/Industrial Park zones.

4.6.2 Transportation

South 180th Street (Southwest 43rd Street) is the only stream crossing of the Springbrook Creek shoreline within City limits. Parking areas associated with light industrial uses are the only other vehicular access areas located within Springbrook Creek shoreline jurisdiction. The City's *Six*

Year Transportation Improvement Program 2008-2013 does not identify any transportation projects in the Springbrook Creek shoreline area.

4.6.3 Wastewater and Stormwater Utilities

Wastewater Utilities

A sewer main crosses Springbrook Creek at SW 43rd Street (Figure 4c).

Stormwater Utilities

Just outside of shoreline jurisdiction to the west is a stormwater pond for the industrial building. That pond discharges into Mill Creek Kent just upstream of the upper limit of shoreline jurisdiction (Figure 5c). There do not appear to be any direct discharges to the system within Springbrook Creek shoreline jurisdiction.

4.6.4 Shoreline Modifications

The stream passes underneath SW 43rd Street in a large corrugated metal culvert. The banks for a short distance on either side of the culvert inlet are armored with angular boulders. The channel itself is a deep, excavated, canal-like feature.

4.6.5 Existing and Potential Public Access Sites

There is no developed public access to the Springbrook Creek shoreline area, other than a viewing opportunity from SW 43rd Street. However, just upstream of the 20 cfs cutoff point is the 5-acre Springbrook Greenbelt, which contains a user-made trail connecting to the Springbrook Creek shoreline area (Figure 8c). The shoreline-designated portion of Springbrook Creek could potentially accommodate a trail within the two narrow City-owned parcels located between the stream and industrial developments, if able to comply with Kent Critical Area regulations.

4.6.6 Critical Areas

Geologically Hazardous Areas

City maps show seismic hazard areas flanking the creek within the shoreline jurisdiction area (Figure 13.1-13.3). No other geologic hazards are mapped along this corridor.

Flood Hazard Areas

The Springbrook Creek 100-year floodplain is encompassed by shoreline jurisdiction (see Figure 10). The floodplain does not appear to extend beyond the top of bank, and does not appear to impact any of the developments on either side of the stream.

Wetlands

The Springbrook Greenbelt open space just upstream of shoreline jurisdiction is inventoried by the City as wetland (Figure 11). Based on aerial photo analysis, it appears to be primarily scrubshrub wetland with a narrow, intermittent forested fringe along the stream corridor and scattered trees.
Streams

The upstream limit of shoreline jurisdiction is the confluence with Mill Creek Kent.

Other Fish and Wildlife Habitat Conservation Areas

<u>Priority Habitats</u>: A small, forested portion of the Springbrook Creek Greenbelt open space is mapped as Priority palustrine wetland habitat (WDFW 2007) (Figure 14). To be considered a "Priority" wetland, it must have met the following criteria in WDFW's estimation: "Comparatively high fish and wildlife density, high fish and wildlife species diversity, important fish and wildlife breeding habitat, important fish and wildlife seasonal ranges, limited availability, high vulnerability to habitat alteration."

<u>Special Status Species</u>: According to WDFW (2007), Springbrook Creek contains coho salmon and cutthroat trout. Mill Creek Kent, at the upstream extent of Springbrook Creek shoreline jurisdiction, contains chinook and coho salmon, as well as resident cutthroat trout and steelhead. Kerwin and Nelson (2000) also report steelhead use of Springbrook Creek. No other priority species are mapped in the City of Kent's Springbrook Creek shoreline jurisdiction.

4.6.7 Floodplain and Channel Migration Zone

The Springbrook Creek shoreline area is within the draft 100-year floodplain for the Green River, but also has its own narrow floodway and floodplain (Figure 10.1). The current Springbrook Creek FEMA floodplain and floodway are encompassed by shoreline jurisdiction. Based on the maps, no upland structures are found within the 1995 Springbrook Creek-specific floodplain or floodway in shoreline jurisdiction. However, there are multiple structures located within the Springbrook Creek floodplain or floodway in City limits upstream of shoreline jurisdiction, almost all of which are classified as Limited Industrial uses such as warehouses and office complexes. At present, the channel within shoreline jurisdiction is confined between relatively high banks and is unlikely to migrate significantly.

4.6.8 Opportunity Areas

The City of Kent has provided some enhancement of the buffer on both banks of Springbrook Creek within the shoreline area, as well as upstream; several small conifer plantings were noted during December 2007 and February 2008 site visits. The enhancement included plantings and the installation of large woody debris structures adjacent to the stream channel. Additional plantings of native trees and shrubs would improve the wildlife corridor, and provide additional shade and organic debris to the stream. Landscape debris was noted in the buffer as well; adjacent businesses could be educated regarding appropriate disposal of lawn clippings and other landscape items. Finally, the culvert underneath SW 43rd Street could be replaced with a bridge.

4.7 JENKINS CREEK

4.7.1 Land Use Patterns

The Jenkins Creek shoreline affects only one parcel, which is the City of Kent's Armstrong Springs municipal watershed area (Figure 3d). There are no structures located on the property within shoreline jurisdiction. However, there is one well located on the property farther upstream.

4.7.2 Transportation

There are no roads that bisect shoreline jurisdiction of Jenkins Creek. The nearest roadway is Wax Road, located to the north within the City of Covington.

4.7.3 Wastewater and Stormwater Utilities

There are no stormwater or wastewater services or facilities in the Jenkins Creek shoreline jurisdiction.

4.7.4 Shoreline Modifications

There does not appear to be any shoreline modifications within the City of Kent's Jenkins Creek shoreline jurisdiction. However, there are extensive channel modifications less than one-half mile downstream adjacent to the Bonneville Power Administration property (City of Covington), and culverts and other modifications farther upstream.

4.7.5 Existing and Potential Public Access Sites

Public access to the Jenkins Creek shoreline area within the City is strictly prohibited to the public as part of the City's watershed protection policies. As previously mentioned, Armstrong Springs is a source of City drinking water.

4.7.6 Critical Areas

Geologically Hazardous Areas

City maps do not show any geologically hazardous areas in the Jenkins Creek shoreline jurisdiction. However, landslide-type soils and steep slopes are located to the southeast, outside of shoreline jurisdiction (Figures 13.1-13.3).

Flood Hazard Areas

The Jenkins Creek 100-year floodplain is encompassed by shoreline jurisdiction (see Figure 10.1). Based on aerial photos, there is one structure, a City well, located within the floodplain in City limits. The well is located farther upstream outside of shoreline jurisdiction.

Wetlands

City, King County, and WDFW PHS (2007) wetland mapping all show that much of the Cityowned watershed parcel in the Jenkins Creek shoreline jurisdiction is wetland (Figure 11). Based on aerial photos, the wetland is forested.

Streams

Cranmar Creek discharges into Jenkins Creek from the south at the 20 cfs point. There are also other small tributaries that feed into Jenkins Creek further upstream outside of shoreline jurisdiction.

Other Fish and Wildlife Habitat Conservation Areas

<u>Priority Habitats</u>: Priority habitats are not mapped by WDFW (2007) in Jenkins Creek shoreline jurisdiction (Figure 14).

<u>Special Status Species</u>: According to WDFW (2007), Jenkins Creek contains coho salmon and steelhead trout, as well as resident cutthroat trout. Cranmar Creek reportedly only contains coho and cutthroat trout (WDFW 2007). A bald eagle nest has also been mapped on the north side of Jenkins Creek, upstream of the confluence with Cranmar Creek. No other priority species are mapped in the City of Kent's Jenkins Creek shoreline jurisdiction.

4.7.7 Floodplain and Channel Migration Zone

As previously mentioned, the Jenkins Creek 100-year floodplain and floodway are encompassed by shoreline jurisdiction because of the presence of associated wetlands. Based on the maps, no upland structures are found within the floodplain or floodway in the City's shoreline jurisdiction. There are no engineered restraints on channel migration of the stream.

4.7.8 Opportunity Areas

The Jenkins Creek shoreline area will benefit most from continued preservation and protection.

4.8 PANTHER LAKE

Panther Lake is located in the 15,763-acre Springbrook Creek basin, which ultimately drains to the Black River and finally the Lower Green River. It is entirely within King County, but is also part of the City's Potential Annexation Area. King County has assessed and characterized Panther Lake as part of its SMP Update, including inventory, characterization, restoration plan, and cumulative impacts analysis. Panther Lake is approximately 34.3 acres. King County's Department of Natural Resources reports a maximum lake depth of 7 feet and a mean depth of 3 feet. Panther Lake has a public access boat launch, but much of the lake surface is covered by water lilies, which hampers some beneficial uses.

4.8.1 Land Use Patterns

The lake is entirely with the City's PAA. The north, northeast, and southern tip of the lake are within the Urban Separator land use classification, and are therefore categorized as Unit A - Open Space (Figure 3g). The rest of the lake is surrounded by residential land uses and is categorized as Unit C - Residential.

4.8.2 Transportation

The primary roadway passing through the Panther Lake shoreline is SE 208th Street, located south of the lake and classified by Kent as a minor arterial. SE 196th Street, classified as a residential collector arterial, also passes through shoreline jurisdiction at the north end of Panther Lake shoreline jurisdiction. The City's *Six Year Transportation Improvement Program 2008-2013* does not identify any transportation projects in the Panther Lake shoreline area, as the area is not yet located within the City limits. However, King County's *Six Year Capital Improvement Program 2007-2012* identifies one study project along SE 208th Street to optimize signal timings and match signal lengths by the City of Kent and WSDOT. No other projects were identified within shoreline jurisdiction.

4.8.3 Wastewater and Stormwater Utilities

The City's wastewater and stormwater utility maps do not include this area of the PAA.

4.8.4 Shoreline Modifications

Aside from the public boat launch, the lake edge does not appear to be modified and no overwater structures are present.

4.8.5 Existing and Potential Public Access Sites

There is one public access boat launch located along the southwestern shoreline (Figure 8g). However, as mentioned previously, the lake is almost completely covered by water lilies, which severely limit recreational potential.

4.8.6 Critical Areas

Geologically Hazardous Areas

According to King County's iMAP, potential erosion hazard areas are mapped adjacent to the southeastern portion of Panther Lake (Figures 13.1-13.3). There are no other hazard areas identified within the immediate vicinity of the lake.

Flood Hazard Areas

Panther Lake does not have a mapped flood hazard area.

Wetlands

Panther Lake itself, lake fringe areas, and substantial areas extending north and south of the lake comprise a single wetland (Figure 11). The wetland is primarily mixed scrub-shrub with some small forested areas, with aquatic bed in the body of the lake and emergent communities at the lake edge.

Streams

According to King County iMAP, Panther Lake is fed upstream by Panther Creek, the headwaters of which begin about 600 feet south of SE 208th Street. Panther Creek continues past Panther Lake and eventually feeds into Springbrook Creek in the City of Renton.

Other Fish and Wildlife Habitat Conservation Areas

<u>Priority Habitats</u>: Panther Lake and its associated wetland are considered a Priority wetland habitat as both palustrine and lacustrine types (WDFW 2007) (Figure 14). To be considered a "Priority" wetland, it must have met the following criteria in WDFW's estimation: "Comparatively high fish and wildlife density, high fish and wildlife species diversity, important fish and wildlife breeding habitat, important fish and wildlife seasonal ranges, limited availability, high vulnerability to habitat alteration."

<u>Special Status Species</u>: WDFW (2007) maps coho salmon in Panther Creek and into Panther Lake itself. These fish are planted. Two bald eagle nests have been mapped northeast of the lake, outside of shoreline jurisdiction.

4.4.9 Lake Aquatic Invasive Species

According to King County and local residents (Johnson 2007), the lake is overgrown with exotic water lilies. This species has crowded out native plants and has made it very difficult to navigate the lake, even with small watercraft.

4.4.8 Opportunity Areas

Panther Lake was assigned a Category H restoration designation based on King County's shoreline inventory and characterization model. Category H applies to those shorelines with a "Low" basin function and a "Medium" reach function. The appropriate restoration strategy according to this methodology is to focus on enhancement and creation.

The non-native lily infestation in Panther Lake is adversely affecting lake habitat by creating a monoculture and excluding native plants, and is limiting lake access even by canoes. One shoreline property owner also noticed a "rotten" smell (Johnson 2007), which is likely caused by decomposition of large volumes of organic material, reduced circulation in the lake resulting from the dense lily cover, and breakdown of muck soils. Some mechanical or chemical control of the lily problem may be necessary.

Residential shoreline properties on Panther Lake have the potential to provide improvement of ecological functions through improvements to nearshore native vegetative cover.

5.0 ANALYSIS of ECOLOGICAL FUNCTIONS and ECOSYSTEM WIDE PROCESSES

Ecological processes and functions of the City of Kent's shorelines are summarized in Tables 14 through 21, below, and illustrated on Figures 17a through 17h. For areas of the PAA characterized by King County as part of its Shoreline Master Program update, the level of ecological function was assigned per that effort. In the City, a number of variables were qualitatively factored together to assign a level of function to shoreline areas using the same labels as King County: Low, Low Medium, Medium, Medium High, and High.¹ Variables considered in the assignment of function included: condition of riparian vegetation, presence of impervious surfaces, bank condition (armored or levee), and general land use.

5.1 LOWER GREEN RIVER

Approximately 90 percent of the Lower Green River watershed is developed, with 65 percent of that being urban commercial land use. Urbanization increases the frequency, magnitude and

¹ To avoid confusion by the public and simplify mapping, the same naming scheme was used for assigning function labels per Kent's analysis of shorelines in City limits as King County used in their analysis of shorelines in unincorporated areas. The methodologies are quite different, however. King County developed a GIS-based "spatially explicit raster model." Each process that operates in lacustrine or riverine environments was modeled and scored, with scoring assigned as a particular process in the "pixel" (smallest evaluation unit, 25 ft²) rated relative to all other King County lake or river shoreline pixels. Potential scores ranged from 0 to 4, with 0 representing "highly altered conditions" and 4 representing little or no alteration. Pixel scores were then combined at the reach scale (delineated by King County using geomorphic data only). The process scores were averaged for each pixel and divided into five generalized categories of low, medium/low, medium, medium/high or high function.

duration of stormwater runoff, which adversely impacts salmonid rearing habitat. It also results in lower summer flows which adversely impact the amount of rearing habitat and increase summer water temperatures (Kerwin and Nelson 2000). As a result of the various flood protection plans, most of the commercial and rural developments rely on the built-up levee/revetment system. Two significant tributaries to the Lower Green River Watershed, Mill Creek Kent (Mullen Slough) and the Black River (Springbrook Creek), both experience backwater effects during high flow events, resulting in localized flooding within their respective Subwatersheds.

Process	Function Performance
Hydrologic	
Storage of water and sediment	LOW: Isolation of the river channel from its formerly wide floodplain and constriction of the channel by an extensive diking system has greatly reduced its ability to store flood waters across the floodplain and thereby attenuate flows. Similarly, fine sediments are prevented from reaching the floodplain for deposition and storage, and, within the leveed channel, fewer gravel bar areas are available for the deposition of coarser sediments. Though the river section south of Horsehead Bend in the City's PAA (Potential Annexation Area) ¹ has not been as extensively leveed, still, out-of-bank flows are uncommon, likely due to the combined effects of the White River diversion and flood control provided by the Howard A. Hanson Dam. Furthermore, the armored embankment of Green River Road SE along much of the right (east) bank of that section functions in a somewhat levee-like fashion and serves to truncate the channel migration zone in that area. Much of the former floodplain area now functions more like upland, and uplands have low water and sediment storage functions. Impervious surfaces and compact, managed lawns and other landscaped areas, which are only semi-permeable, interfere with the infiltration of precipitation and rapidly send water downstream rather than storing it. Wetlands and other natural water and sediment storage features are greatly reduced compared to their historic prevalence.
Transport of water and sediment	MODERATE: The constricted river channel is somewhat efficient at transporting water and fine to medium sediment based on its relatively narrow width, increased flood-flow depth, and decrease in channel roughness. Basically, the engineering of the channel over time has been done with an increase in flow conveyance efficiency in mind. The Howard A. Hanson Dam upstream represents a significant sediment sink, presumably reducing the quantity of sediments reaching the river channel in the vicinity of the City and needing to be passed through.
Attenuating flow energy	LOW: Particularly where both banks are leveed, the decrease in river channel roughness brought on by a decrease in the width/depth ratio, reduction in accumulated woody debris, and reduction in riverbank vegetation has greatly reduced the river channel's ability to absorb and dissipate stream flow energy.
Developing pools, riffles, and gravel bars	LOW: Along the leveed channel sections through most of the City, a lack of roughness elements such as primary log jams and a narrowing of the channel and floodplain to eliminate and prevent the re-formation of backwaters and side channels has resulted in a uniform, monotypic channel form which is not conducive to the formation and maintenance of

Table 14a.	Process and Function Summary for the Gree	n River in the City of Kent.
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Process	Function Performance
	the basic habitat elements, including pools, riffles, and gravel point bars. However, a few moderate backwater areas, pools and bars are present along the upstream section adjoining the City's PAA.
Removing excess nutrients and toxic compounds	LOW: Former floodplain areas provided a vast biofiltration function. Now that these areas are needed more than ever to provide this function, to remove an increased loading of toxics and nutrients, they have been virtually eliminated. The upland shoreline areas and the former floodplain areas now functioning essentially as upland are more often a source of nutrients and toxic compounds than a sink, due to lawn and landscaping runoff (pesticides, fertilizers, herbicides) and road runoff (hydrocarbons, metals). Segments of the Lower Green River mainstem within the Kent City limits are currently listed on the State's 303(d) list as Category 5 waters (failing to meet surface water quality standards) for fecal coliform, and as Category 2 waters (waters of concern) for PCBs, mercury, and Bis (2-ethylhexyl phthal) (see report text).
Recruitment and transport of large woody debris (LWD) and other organic material	LOW: Riverbank forest vegetation has been greatly reduced, reducing the recruitment of logs and other vegetative material as well. Furthermore, the channel migration zone has been eliminated and the river channel "frozen" in place. Laterally migrating river channels recruit the forest materials in their paths and also recruit and recycle riverbank gravels laid down along previous channel alignments. Levees and the land use modifications behind them restrict the ability of the river to recruit LWD and organic material.
Vegetation	
Temperature regulation	LOW: Low density of shoreline vegetation greatly reduces the level of shading afforded the river. Segments of the Lower Green River mainstem within the Kent City limits are currently listed on the State's 303(d) list as Category 5 waters (failing to meet surface water quality standards) for temperature.
Water quality improvement	LOW: Well-vegetated banks and buffers improve shading conditions, in turn benefiting both temperature and dissolved oxygen, and help to biofilter out toxic substances. However, the City's urban areas are dominated by roads and other impervious surfaces, lawns, and landscaping, and lack dense buffers of riverbank vegetation. These urban areas are sources, rather than sinks, of water quality contaminants such as fertilizers, herbicides, pesticides, hydrocarbons, metals, and eroded soils. Segments of the Lower Green River mainstem within the Kent City limits are currently listed on the State's 303(d) list as Category 5 waters (failing to meet surface water quality standards) for fecal coliform, and as Category 2 waters (waters of concern) for PCBs, temperature, mercury, and Bis (2-ethylhexyl phthal). Low dissolved oxygen levels have also been recorded (Kerwin and Nelson 2000) (see report text).
Slowing riverbank erosion; bank stabilization	LOW: The function of slowing the rate of riverbank erosion formerly provided by riverbank vegetation has now been taken over by artificial riverbank armoring, associated with the diking system, including areas of rip-rap and other artificial armoring materials. Prior to construction of the levees and artificially protected banks, the river was lined with mature, mixed-forest communities. Those communities are now almost entirely absent in these segments, so vegetation does not provide any significant riverbank stabilization function.

Process	Function Performance	
Attenuation of flow energy	LOW: (As stated above), the decrease in river channel roughness due to a reduction in accumulated woody debris, and reduction in riverbank vegetation has greatly reduced the river channel's ability to absorb and dissipate stream flow energy.	
Sediment removal	LOW: As stated above, isolation of the river channel from its formerly wide floodplain has greatly reduced its ability to biofilter flood waters across the floodplain and thereby has prevented fine sediments from reaching the floodplain for deposition and storage.	
Provision of LWD and organic matter	LOW: Riverbank forest vegetation has been greatly reduced, contributing to a reduction, along with the prevention of channel migration, in the recruitment of logs and other vegetative material. The reduction in shoreline vegetation has curtailed large woody debris and organic matter recruitment potential.	
Hyporheic		
Removing excess nutrients and toxic compounds	LOW-MODERATE: The water table in the hyporheic zone has likely been reduced due to a lowering of the river channel relative to its floodplain, thereby reducing the proportion of river flow which routinely flows in and out of the zone to be filtered in the process. However, the hyporheic zone likely does provide some nutrient and toxic compound removal when water from the developed floodplain and uplands infiltrates into the hyporheic zone instead of running off of the surface. Though overall river water quality parameters show mixed results and include specific problem areas (see previous discussions), water quality is still likely improved due to some of its flow entering the channel as groundwater via the hyporheic zone rather than as surface flow.	
Water storage and maintenance of base flows	LOW: Hyporheic zone functioning with respect to water storage is likely restricted, again, due to the relative depth of the river channel and its separation from its historic floodplain by the existing diking system. Such water stored in the hyporheic zone would be available to supplement dry season low river flows. Quantitative data are not available.	
Support of vegetation	LOW: Much of the vegetation within the range of the hyporheic zone and also within the shoreline zone is landscaping vegetation supported by irrigation water and precipitation rather than by hyporheic water storage. In addition, the river channel is typically deeper now relative to its floodplain than it was historically, thereby reducing the ability of the hyporheic zone to supply water to floodplain vegetation.	
Sediment storage	LOW: The hyporheic zone is restricted by a lowering of the river channel relative to its floodplain, as mentioned above, and extensive shoreline armoring, which limits movement of fines from the river into the hyporheic zone. Levees prevent silt-laden flood flows from spreading across the floodplain to infiltrate, recharge the hyporheic zone from above, and store sediments.	
Habitat		
Physical space and conditions for life history	LOW: Habitat in and along the river has been much reduced in quality, quantity, and complexity compared to its original condition. The vegetative community is now much sparser, with a much lower level of accumulated downed wood and snags, resulting in fewer places for various wildlife species to find cover or suitable nesting and rearing sites. The remaining vegetation also consists of a higher proportion of non- native, invasive species. The absence of dense shoreline vegetation is a limiting factor in terrestrial species (birds, mammals, amphibians) use of the shoreline, since cover, food, nesting sites, travel corridors, etc. are	

Process	Function Performance
	absent. Within the channel itself, fewer major log jams and less wood overall similarly results in less available protective cover, and diminishes the creation of pool/riffle sequences as well. The reduction in side channels and backwaters greatly reduces the amount of valuable edge habitat available, and further reduces overall complexity. These sheltered, low- energy environments would be more hospitable to emergent vegetation, providing a refuge for small fish and amphibians. Shallow aquatic areas provide critical rearing, foraging, and refuge habitat for fish, particularly salmonids. Riverbank armoring, however, generally eliminates the low- energy shallow-water environment, creating deeper, higher-velocity water that is inhospitable to small fish and amphibians, as well as to emergent vegetation.
Food production and delivery	LOW: Food production from developed floodplain and upland areas is limited by a reduction in native seed- and fruit-bearing vegetation. Not only does such vegetation provide food directly for terrestrial wildlife, but it is a source of insects and other organic matter that drop into the water and provide food for fish and other aquatic life. The historic, but now absent, emergent wetland areas that were associated with side channels, backwaters, and extensive floodplain wetlands also provided productive foraging areas for juvenile fish, small mammals, wading birds, and waterfowl.

¹ King County's function assessment of the Horsehead Bend PAA is provided in Table 12b.

Table 14b.Ecological Function Summary for the Green River (Horsehead Bend area) in
Kent's PAA.

River Reach Quality Element	Quality Rating
	Medium High on most of the right bank, some Medium
Light energy	Medium on the "head" portion of Horsehead Bend on the left bank, remainder is mostly Medium
Large woody debris	Medium on the "head" portion of the right bank, Low Medium on the remainder of the right bank
	Low Medium on the "head" portion of the left bank, Medium on the remainder of the left bank
	High on most of the right bank
Nitrogen	Medium on the "head" portion of the left bank, Medium High on the remainder of the left bank
	Medium High on the right bank
Pathogens	Low Medium on the "head" portion of Horsehead Bend on the left bank, remainder is Medium High
	Medium High on the right bank
Phosphorus	Low Medium on the "head" portion of Horsehead Bend on the left bank, remainder is Medium
Sediment	Medium on the right bank
	Low Medium on the "head" portion of Horsehead Bend on the left bank, remainder is Medium
Toxins	Medium on most of the right bank
I UXIIIS	Medium on the "head" portion of Horsehead Bend on the left bank, remainder is

River Reach Quality Element	Quality Rating
	mostly Medium High
Hydrologic cycle	Low Medium
Overall	Medium High on the "head" portion of the right bank, Medium on the remainder of the right bank
	Low Medium on the "head" portion of the left bank, Medium on the remainder of the left bank
	Note: See illustration in Exhibit 6 below

Source: King County iMAP, results of King County's shoreline functions modeling

Table 14c.Ecological Function Summary for the Green River (industrial area east of U.P.
railroad) in Kent's PAA.

River Reach Quality Element	Quality Rating
Light energy	Medium
Large woody debris	Low Medium
Nitrogen	Medium
Pathogens	Low Medium
Phosphorus	Low Medium
Sediment	Low Medium
Toxins	Medium
Hydrologic cycle	Low Medium
Overall	Low Medium Note: See illustration in Exhibit 6 below.

Source: King County iMAP, results of King County's shoreline functions modeling

5.1.1 Hydrologic

Both the White and Cedar/Black Rivers were diverted out of the Lower Green River subwatershed in the early 1900s, resulting in significant changes to hydrology and allowing salt water from the estuary to move farther upstream than before. The combined diversion of these two rivers reduced the drainage area of the Green River basin by almost 60 percent, with the diversion of the White having a much greater impact on the sections of the river in and near Kent.

The White River is a glacially fed stream supplying large quantities of sediment and summer flows. It previously joined the Green River near RM 31, several miles upstream of Kent. Historically, the White River functioned primarily as a Green River tributary, but was also connected to the Puyallup River via an overflow channel known as the Stuck River. However, the entire flow of the White River was diverted to the Puyallup River in 1906 by a log jam that formed during a flood. Subsequently, because of flood control concerns, a permanent diversion structure was constructed and completed in 1911, forcing the flow of the White River to continue discharging into the lower Puyallup River. Because it is glacially fed, the White River tends to have higher summertime flows than other, non-glacial systems in Puget Sound, and its diversion reduced summer flows in the Lower Green River sub-watershed by roughly 50 percent.



Exhibit 6. King County's overall shoreline function rating of the Green River PAA in Horseshead Bend area and in the industrial areas east of the railroad (from King County iMap).

Sediment transport from source areas to the downstream reaches of the river is an important process that produces and maintains salmonid habitat. In a properly functioning system, sediment provides a quality (medium-coarse) substrate for salmon egg incubation, food source (aquatic insect) production and cover from predators. However, the presence of Howard A. Hanson Dam effectively prevents delivery of these medium and coarse sediments from the upper basin to downstream reaches, though fine, suspended sediment continues to be carried past the dam (USACE and King County 2000). For salmonid fish and aquatic insect habitat, this is the worst of both worlds. In particular, the elimination of the supply of coarse sediment from the upper basin is believed to have had a profound effect on habitat conditions in the Middle Green River sub-watershed extending roughly upstream from Kent.

Diversion of the sediment-rich White River in 1906 also substantially reduced the supply of sediment to Green River reaches downstream of RM 31 (Kerwin and Nelson, 2000). According to Mullineaux (1970), the White River formerly supplied approximately 75 percent of the sediment reaching the lower Green. Of particular importance, the diversion of the White River substantially reduced the delivery of *coarse* sediment to the lower Green River, which may have reduced the availability of suitable anadromous salmonid spawning habitat there.

With the diversion of the White River and the construction of the Howard A. Hanson Dam, much of the total water volume and natural variability in streamflow has been lost, replaced by a smaller, highly regulated flow regime (see Exhibit 7). Now, flows that occur once every 100 to 200 years will be almost identical to those that flow every 5 or 10 years, except in duration, because outflow from the dam will not exceed 12,000 cfs. Fundamental to the form of a river is its hydrologic regime, which produces seasonal and decadal patterns of floods and drought. The historic patterns of channel migration, braiding, erosion, and deposition were for the most part controlled by moderate, relatively frequent floods. Typically, floods remove trees along the river's edge, deposit sediment in the floodplain, and do the work that forms the channel and its floodplain.

The Green River's ability to transport sediment, migrate across the valley floor, or inundate a significant portion of the floodplain has been significantly reduced since the placement of the dam as well as numerous levees. Given the dam operation, flows sufficient to cause large-scale channel avulsions are unlikely to occur more frequently than once in 100 or 200 years (Fuerstenberg et al. 1996). The historical floodplain, which developed in response to higher peak flows, has become largely isolated from flooding. In one unleveed location north of 277th Street, near the upstream extent of the PAA along the east bank, sediment deposition within the historical banks of the Green River indicates that a new, lower elevation floodplain is beginning to form (Andy Levesque, pers. comm., 19 October 2007). Construction of levees and revetments has further isolated the river from its historic floodplain, reducing the river's ability to inundate historic side channels or create new ones.

The conversion of shoreline areas from their pristine, pre-development condition to urban and agricultural development, flood control activities, and channelization all contribute to a loss of floodplain function. The presence of roads, pavement, and developed areas severely restricts the effectiveness of sediment filtration in riparian zones along the Lower Green River. Only 1.8 miles of habitat presently provide good sediment filtration with an additional 5.9 miles providing fair filtration. However, in general, the presence of non-vegetated, impervious areas near the river will likely prevent future improvements in sediment filtration by riparian zones. Properly functioning forested floodplains reduce the energy of flood flows, protect banks from excessive erosion and capture and store sediment, organic matter, and nutrients carried by floodwaters (Benner and Sedell 1997).

Levees and revetments have locked the channel into place and have effectively prevented bank erosion, even where gradual channel migration would have occurred naturally, effectively halting an important mechanism of large woody debris recruitment to the lower mainstem Green River. As described previously, these large-scale levees were built beginning in the early 1900's to help prevent the floodplains of the lower Green River from flooding. Levees are virtually continuous along both banks downstream of RM 25 (Fuerstenberg 1996), including most of the City of Kent. Levees and stream bank revetments also affect over 80 percent of the length of channel between RM 25 and RM 31 in and just upstream of the City (Perkins 1993).



The completion of Howard Hanson Dam on the Green River has decreased the magnitude of the "1-in-100 chance flood" as Auburn, Wash. since 1961.



Confinement of the channel between levees prevents high flows from accessing the floodplains, thereby reducing groundwater and hyporheic recharge, the filtering out and deposition of fine sediments, and biofiltration in general. The narrower, deeper channels resulting from construction of the levees also have higher water velocity and bed shear stress. Thus even small flood events may scour bed materials. At the same time, simplification of the channel, including elimination of access to off-channel areas, reduces the availability of high flow refugia used by salmonids to escape the high velocity flows. Such channel simplification can also reduce the accumulation and stability of spawning gravels.

Increased winter peak flows from tributary streams, including Soos and Newaukum Creeks upstream of Kent, may exacerbate flooding in the lower Green River. Conversely, decreased tributary inflows during the summer tend to exacerbate low summer flows and high water temperatures in the lower Green River (Kerwin and Nelson 2000).

5.1.2 Hyporheic Functions

As a result of the diversion of the White River and Cedar/Black River, the lower Green River bed and floodplain in and near Kent have been lowered. This lowering has disconnected off-

channel juvenile salmonid rearing habitat and has been further compounded and masked by the construction of levees. Since the diversions, the channel downstream of RM 32 has narrowed by forming a new floodplain within the old channel (Perkins 1993). The new floodplain surface is at least 7 feet lower than the former floodplain (Dunne and Dietrich 1978), presumably lowering the water table of the hyporheic zone as well. During the periodic episodes of inundation of the floodplain which occur naturally, water slowly seeps into the soil, recharging shallow alluvial aquifers (Bayley 1995; Junk et al. 1989). Water stored in alluvial aquifers, including the hyporheic zone, and wetlands slowly drains toward the river, sustaining baseflows in off-channel habitats and the mainstem river during periods with little precipitation (Naiman et al. 1992 in Kerwin and Nelson 2000). With this disconnection of the river from its floodplain and lowering of the floodplain (hyporheic) water table, storage of water in the hyporheic zone for low flow supplementation has been significantly reduced.

Construction of the Howard A. Hanson Dam has further reduced high-end flood flows, in turn urther reducing the amount of flow provided to side channels. During overbank flows, when adjacent floodplains are inundated, floodwaters seep into the floodplain, recharging the water table (USACE and King County 2000). This supply slowly drains toward the river throughout the year, supplying small floodplain streams, side channels, and even the river itself with cool flows late in the season. Without such inundation, the process cannot occur and floodplain streams and side channels dry up earlier in the season and river temperatures may be affected. Reduced flows also reduce water supply to the banks and areas within the active channel, thereby reducing bank storage and affecting riparian growth. The temperature of effluent groundwater is also a possible factor of temperature elevation in streams due to the effect of elevated soil temperatures outside the buffer (Fuerstenberg et al. 1996).

Groundwater levels in the current White River valley are higher than in the Green River Valley in the vicinity of Auburn and Kent, resulting in a flow of groundwater from the White River system to the Green River system. This flow was estimated to be approximately 34 million gallons per day (53 cfs) in September 1998 (Pacific Groundwater Group 1999). Thus, taking hyporheic flows into account, the diversion of the White River out of the Green appears to have been incomplete (Kerwin and Nelson 2000).

Water withdrawals and diversion of springs or other surface water sources also serve numerous cities and water districts in the Lower and Middle Green River Subwatersheds. These withdrawals, together with smaller wells exempt from water rights requirements, further reduce the water available to streams and the mainstem. An analysis of present flow conditions, conducted as part of the Reconnaissance Assessment (Kerwin and Nelson 2000), revealed that flows less than 302 cubic feet per second occurred 49 percent more often and summertime means and annual minimum extremes were consistently longer than under natural, pre-developed conditions. The annual minimum flow occurs two weeks earlier, in late August rather than mid-September, than it did in the natural condition (Green/Duwamish Steering Committee 2005).

5.1.3 Shoreline Vegetation

The wide, low-gradient valley bottom of the Lower Green River near Kent was historically a mosaic of floodplain forest with numerous large "swampy" wetlands scattered throughout. During flood events, the river overflowed its banks creating a network of ephemeral streams that fed the wetlands and tributaries within the valley (Green/Duwamish Steering Committee 2005).

Since a low, natural levee had formed along the riverbanks, water that left the main channel during such events would typically flow down-valley paralleling the river in tributary channels for miles before eventually rejoining the main channel once again. The riparian zone vegetation and structure of the river have since been radically altered, resulting in the decline of the functions connected to riparian zone vegetation for nearly the past 100 years (Fuerstenberg et al. 1996). The Howard A. Hanson Dam reduces flow rates and sediment passage, and the levees and revetments reduce river migration rates. This reduces the amount, frequency, and extent of sediment deposition, slowing the natural progression of plant succession that normally occurs in the riparian zone (USACE and King County 2000).

Soils data and anecdotal accounts suggest that the historic riparian vegetation community along the lower Green River was comprised of a mix of coniferous-dominated riparian stands, forested wetlands, and swampy meadows (Wharton 1990; Dunne and Dietrich 1978; Mullineaux 1970; Pence 1946). Young, early-successional deciduous trees such as willow, red alder, and black cottonwood probably occupied recently exposed bar surfaces, with older stands of coniferous or mixed coniferous and deciduous trees growing on terraces or stable floodplain surfaces. Western red cedar and Sitka spruce may have dominated forested wetlands. Other riparian tree species that were found in the lower Green River valley probably included black cottonwood, bigleaf maple, and western hemlock. Trees that were both abundant and routinely grew to a large diameter, and so would have most commonly contributed large wood to channels, included black cottonwood and bigleaf maple and, to a lesser extent, some large conifers including western red cedar and Douglas-fir. These trees would have contributed wood to the river channel large enough to function as persistent snags or the key pieces in jams (Collins and Sheikh 2005).

The Lower Green River valley bottom has since been dramatically altered. The most obvious and significant land cover change has been urban development. It is estimated that about 60 percent of the valley bottom is either high density (100% impervious) or low-density (50% impervious) development (Green/Duwamish Steering Committee 2005). Only 3 percent of the riparian stands along the lower mainstem Green River now consist of vegetation communities that are considered to provide good riparian shade. The majority of the channel between RM 11 and RM 32, including the sections in and along Kent, is exposed to direct solar radiation and has poor shade. The presence of roads and development within the floodplain will likely prevent the reestablishment of riparian vegetation that could provide adequate shade in the future.

White River diversion, levee construction, and flow controls due to Howard A. Hanson dam have all contributed to a decrease in the amount of riverbank and floodplain moisture available to vegetation (USACE and King County 2000). Growth rates and survival of typical riparian species decrease with reduced soil moisture conditions, leading to a reduction in riparian corridor width, and replacement of historic riparian species with species more tolerant of dryer conditions (Smith 1991). Cumulatively, there is less than one mile of intact riparian zone comprised of medium to large mixed deciduous and coniferous trees along the lower mainstem Green River. Approximately 18 percent (12.4 miles) of the riparian zone in the Lower Green River subwatershed supports native deciduous trees. However, in most cases, deciduous stands are narrow (<100 feet) or comprised of small, sparse trees mixed with patches of grass, pavement, or bare ground. Almost 50 percent of the riparian zone is comprised of forbs and grass, or shrubs, many of which are non-native. Pavement and bare ground account for approximately 33 percent of the total area within 300 feet of the river in this sub-watershed.

None of the mainstem riparian habitat in the Lower Green River sub-watershed is in good enough condition to be considered as functioning properly based on the NOAA Fisheries criteria. Over 80 percent of the riparian zone is currently considered to provide poor shade, organic matter recruitment, and sediment filtration because native vegetation communities have largely been converted to grass or shrubs and because development often extends to within 75 feet of the channel (Kerwin and Nelson 2000).

Studies by the Muckleshoot Indian Tribe and King County suggest that elevated temperatures may also be a significant problem in the lower Green River, with lack of large vegetation along the riverbanks cited as a primary cause (Fuerstenberg et al. 1996). The loss of streamside vegetation along tributaries and watershed forest cover has also resulted in an increase in the temperature of runoff entering the river and its tributaries. This could lead to water temperatures in the river that are harmful and, in extreme cases, fatal to fish and other aquatic species, particularly in the late summer when flows are low. The following graph shows stream temperatures during 2008 measured at Site 0311 (few hundred yards upstream from the former outfall at the Renton Junction Bridge on West Valley Road at Highway 1) relative to Ecology's threshold and the historic data. In 2008, temperatures were generally in line with historic values. King County's 25-year trend analysis, however, shows that "temperatures increased significantly at station 0311" (http://green.kingcounty.gov/WLR/Waterres/StreamsData/reports/trends.pdf).



Source: http://green.kingcounty.gov/WLR/Waterres/StreamsData/Conventional.aspx?Locator=0311

The height and density of the canopy is a factor in the production of shade, so trees up to 200 feet in height (approaching the site potential tree height) provide incremental shading of the river. The maximum tree height today is 60 to 80 feet and shrub vegetation is a maximum of 20 feet high. Approximately 37 percent of the Green/Duwamish Basin consists of pavement which provides no shade. Thicker canopies of conifers are more efficient traps of radiation than the thin canopies of hardwoods even though the densities may be the same (Fuerstenberg et al. 1996). Along the river's edge, the low percentage of conifers contributes less thermal protection of the river.

5.1.4 Habitat

The full extent of off-channel habitat originally available in the Lower Green River subwatershed (RM 11 to RM 25) pre-dating European settlement is unknown, since channelization and flow diversions had already begun to influence these channel segments at the time of the earliest maps (Kerwin and Nelson 2000). However, it is evident that the availability of these habitat types was once vastly higher. The Lower Green River historically migrated across a broad floodplain, but has since been channelized, and is now largely constrained by a system of levees and revetments that armor most of its banks and extend throughout the City of Kent and the lower Subwatershed (Perkins 1993; Kerwin and Nelson 2000). Virtually the entire length of the river in this area has been so affected. Channelization and an associated increase in sediment transport capacity have resulted in a loss of the active sand and gravel bars that historically typified the Lower Green River. The extensive network of valley-bottom wetlands previously maintained by frequent flooding along the Lower Green River was also lost as a result of flood control projects and urbanization. Although extensive wetlands, sloughs, and beaver ponds were once present throughout this area, the Lower Green River currently has little floodplain connectivity and supports little or no off-channel habitat (Kerwin and Nelson 2000).

The Lower Green River mainstem near where it enters the Kent City limits was historically characterized by a "Floodplain" channel type where sand and gravel bars were common, but the river quickly transitioned to a lower gradient "Palustrine" channel type through most of its length now adjoining the City that was gently sinuous, slowly migrating across the floodplain (Kerwin and Nelson 2000). Six miles of Floodplain channel type and fourteen miles of Palustrine channel type in the Lower Green River have since been channelized, each of which typically expressed complex planforms and dissipated flood energy via overbank flows. These changes appear to have resulted in the loss of nearly all the mainstem winter rearing habitats and a reduction in the quality of summer rearing and adult holding habitats in this portion of the watershed (Kerwin and Nelson 2000). The Floodplain areas that were channelized eliminated significant areas of gravel bars, which formerly provided important shallow marginal habitat, increased channel complexity, and sites suitable for colonization by riparian hardwood forests.

The construction of Howard A. Hanson Dam as well as diversion of the White River out of the basin have resulted in a reduction of the high flooding flows that are essential for reshaping the floodplain to form, maintain, and modify channel bars, braids, and side channels. In particular, the absence of large floods has had a profound influence on habitat conditions in the unconfined portion of the mainstem in the middle Green River, upstream of Kent. Coupled with this reduction in flood flows delivered to the lower reaches, the development of extensive levee systems along the lower Green River in and around Kent has greatly reduced channel diversity. The constructed levee system disconnects the mainstem Green River from its floodplain and reduces the river to a single, non-migratory channel. Where confined by levees, the cross section of the river may efficiently transport water but not sediment, and may result in the storage of sediment that has moved from eroded areas upstream (Fuerstenberg et al. 1996). River channelization and construction of levees reduce habitat complexity by creating and maintaining a single, deep, uniform channel which results in an overall decrease in channel length and less channel and estuary shoreline (ratio of 2.2 to 1, former to existing) (USACE and King County 2000).

Without periodic inundation, floodplain streams and off-channel habitats dry up earlier in the season and water temperatures may increase (Gore 1995). The diversion of the White and Cedar/Black Rivers and construction of revetments also reduced the channel width and caused the Green River to form a new, lower floodplain, cutting off access to former off-channel rearing habitats (Kerwin and Nelson 2000). Anchor Environmental (2004b) summarized conditions by noting that gradual channelization of the river in the last century has resulted in substantial losses in the quality and quantity of mainstem spawning, winter and summer rearing, and adult holding habitat (i.e. large, channel-wide pools) (Green/Duwamish Steering Committee 2005).

Because of the fluvial, glacial, and other geologic processes that formed the Lower Green River valley, tributaries historically provided the most abundant and dominant type of channel edge within it. Flooding was formerly common, creating a network of flood channels that fed the tributaries and wetlands. These tributaries provided important habitat and accounted for approximately one-third of total channel area and two thirds of channel edge (Collins and Sheikh 2004). Today, the tributaries are heavily altered due to development of the floodplain and are rarely fed by floodwater. Riparian habitats have been lost to roads, levees, and various encroaching land uses (Green/Duwamish Steering Committee 2005).

The resulting loss of these tributary, side channel, and riparian features has resulted in a significant decline in the diversity of habitat for salmon, which use off-channel habitats for spawning and rearing (USACE and King County 2000). Encroachment of land use, roads, trails, and levees to the river margins has greatly reduced the extent of existing or potential riparian habitat (Green/Duwamish Steering Committee 2005).

Many fish and wildlife species are dependent on the natural seasonal variations in streamflow that occur in free-flowing rivers to time their migrations, reproduction, and other behaviors. For example, the reduced flows and absence of spring freshets may prolong downstream migration of juvenile salmonids, thereby making juvenile salmonids more susceptible to predators and adverse water quality conditions (Fuerstenberg et al. 1996 in USACE and King County 2000). Juvenile salmonids including chinook, coho, steelhead, chum and cutthroat have been observed utilizing side channel habitats in the mainstem Green River during the spring (Jeanes and Hilgert 2000). Refill operations at Howard A. Hanson Dam during the spring have reduced the frequency of side-channel connectivity, which would increase the probability that juvenile salmonids may become stranded in side channels that become disconnected from the mainstem. Alterations in the natural flow regime during refill operations at the dam may also adversely impact spring spawning and incubation success by disconnecting off-channel habitats.

The floodplain in the Lower Green River Subwatershed is typically composed of gravelly and sandy alluvium, much of which was originally deposited during Pleistocene glaciation and has subsequently been reworked by the river (Perkins 1993). Southwest of Renton, valley floor deposits are composed of silt, clay and fine sand interbedded with peat (Mullineaux 1970). With the exception of coarse materials associated with a smaller alluvial fan that formed near the mouth of the Cedar/Black Rivers, these deposits of fine material form the substrate of the lower Green/Duwamish River (Mullineaux 1970). Therefore, it is unlikely that this sub-watershed ever provided important spawning habitat for anadromous salmonids downstream of RM 27, including the sections through and adjoining Kent. Just upstream of Kent, "spawning surveys

conducted between RM 27 and RM 30 indicated that use by spawning chinook is currently low compared to upstream reaches" (Cropp 1999 as cited in Kerwin and Nelson 2000).

With less than one mile of intact riparian zone vegetation (medium to large deciduous and coniferous trees located on the right bank near RM 32), the Lower Green River mainstem riparian habitat is not properly functioning and in poor condition. In most cases, deciduous stands are narrow and patchy, and much of the riparian vegetation consists of non-native forbs, grass, or shrubs. Pavement and bare ground account for approximately 33 percent of the total area within 300 feet of the river in the Lower Green River sub-watershed. Levees and revetments have confined the river channel, preventing erosion, channel migration, and recruitment of large woody debris. Overhead shading is largely non-existent throughout the Lower Green River, and the dense road network and development within the watershed will likely prevent establishment of riparian vegetation that could provide shade and large woody debris in the future.

This reduced recruitment and deposition of LWD has contributed to an overall decline in the channel complexity of the mainstem Lower Green River. Reduction in the supply of naturally recruited large wood through historical and ongoing timber harvest throughout the Green River Watershed contributes to the absence of in-stream wood (USACE and King County 2000). Ninety seven percent of the riparian zone along the lower Green River is considered to have poor LWD recruitment potential and microclimate conditions because native vegetation communities have largely been converted to grass or shrubs, and because development often extends to within 75 feet of the channel. None of the riparian zone along the lower Green River is considered to have good LWD recruitment potential. In unconfined streams where the channel migrates back and forth across the floodplain over time, wood may be recruited to the channel from throughout the channel migration zone (CMZ). The channel migration zone is defined as the lateral extent of likely movement along a stream reach with evidence of active channel migration or avulsions over the past 100 years (WFPB 2000).

5.1.5 Water Quality

Water quality in the Green River and its tributaries is affected by seasonal runoff patterns, and also varies widely depending on location in the watershed, intensity of land use (level of urbanization), and human activities. Most of Kent occupies the Lower Green River Subwatershed, which is a heavily developed area with extensive tracts of office/commercial and multi-family residential complexes. Land uses in this basin include residential, commercial, industrial, and agricultural, as well as some major highways, including Interstate 5. The City is also located in the Middle Green River Subwatershed, which has a lower level of development.

Section 303(d) of the Clean Water Act requires the State to identify waterbodies failing to meet water quality standards and develop Total Maximum Daily Loads (TMDLs) or Water Cleanup Plans for each waterbody on the 303(d) list. To comply with the Clean Water Act, waterbodies are assessed and subsequently characterized as either: Category 1-Meets clean water standards; Category 2-Water of concern; Category 3-No data available; Category 4-Polluted but the problem is currently being addressed; or Category 5-Polluted waters that require a TMDL (or the 303d list).

Segments of the Lower Green River mainstem within the Kent City limits are currently listed on the State's 303(d) list as Category 5 waters (failing to meet surface water quality standards) for temperature and fecal coliform, and as Category 2 waters (waters of concern) for PCBs, temperature, mercury, and Bis (2-ethylhexyl phthal). Maps showing specific locations in the mainstem with TMDL listings are available on Ecology's website. Mainstem summer water temperatures have peaked between 23 and 24 degrees C at several stations throughout the Lower Green River, posing a potential threat to anadromous salmonids migrating upstream during August and early September, and a probable threat to juvenile salmonids rearing throughout this reach of the river (Taylor Assoc. and King County 2004). Low dissolved oxygen levels have also been recorded in the Lower Green River and are likely detrimental to juvenile rearing habitat for salmonids. As a result of reductions in municipal and industrial discharges, however, water quality conditions in the Lower Green River have improved over those that existed in the 1960s (Kerwin and Nelson 2000).

Segments of shoreline tributary Big Soos Creek are also currently listed on the State's 303(d) list as Category 5 waters for fecal coliform and dissolved oxygen, affecting water quality in the lower Green River. In addition to shorelines of the State, other smaller Kent area streams flowing into the Green River mainstem have TMDL listings as well. Mullen Slough, where it discharges to the west side of the Green River, is listed as a Category 5 water for fecal coliform and dissolved oxygen. Hill (Mill) Creek, also entering the Green River from the west, is a Category 5 water for dissolved oxygen, temperature, copper, and fecal coliform; and a Category 2 water for pH and mercury.

5.2 BIG SOOS CREEK

Process	Function Performance
Hydrologic	
Storage of water and sediment	MODERATE: The creek still flows through fairly wide wetland floodplain along much of its length in and near the City, typically vegetated with willows and other scrub-shrub vegetation. During high flows, the creek is still able to spread out across its floodplain, and so the floodplain is still able to store and attenuate flood flows and trap and store fine sediments. These fine sediments are incorporated into the floodplain topsoil to nourish vegetative growth, in turn supporting wildlife habitat. Beaver dams at some locations aid in keeping the creek connected with its floodplain. In contrast to the Green River in and near Kent, the floodplain of Big Soos Creek has gone largely un- leveed and unconstrained. Wetland and floodplain regulations have helped to keep the floodplain relatively undeveloped, and thus able to better carry out its natural hydrologic and habitat functions.
Transport of water and sediment	MODERATE: Deforestation and urbanization throughout the basin has increased stream flows, flow volatility, erosion, and sedimentation. As for most streams in the region, the stream channel and floodplain have formed in response to a lower flow and sediment regime and are not entirely suited to carry the increased flows and sediment loadings experienced. For example, bank erosion is typically a response to higher flows as the channel enlarges and widens to accommodate higher flows.

Table 15. Process and Ecological Function Summary for Big Soos Creek in Kent.

Process	Function Performance
Attenuating flow energy	MODERATE: As mentioned above, some sections of broad floodplain remain which are characterized as scrub-shrub wetlands. These are effective at attenuating streamflow energy during flood events. However, the recruitment of woody debris, especially large woody debris, is impaired due to clearing and the small size of the streambank trees remaining. To its benefit, the basin includes a system of lakes, large wetland areas, and naturally infiltrative recessional outwash soils which all serve to dampen and moderate stream flow fluctuations. Still, the decrease in channel roughness brought on by a reduction in accumulated woody debris and bank vegetation has reduced the stream channel's ability to absorb and dissipate stream flow energy.
Developing pools, riffles, and gravel bars	MODERATE: Reduction in roughness elements, such as primary log jams and a narrowing of the floodplain in some areas, has resulted in a simpler channel form which is less conducive to the formation and maintenance of the basic habitat elements, including pools, riffles, and gravel point bars. Some pools have been formed in and near the City by beaver activity.
Removing excess nutrients and toxic compounds	MODERATE: Remaining broad floodplain areas provide a competent biofiltration function. However upland shoreline areas and developed, former floodplain areas now functioning essentially as upland are more often a source of nutrients and toxic compounds than a sink, due to lawn and landscaping runoff (pesticides, fertilizers, herbicides) and road runoff (hydrocarbons, metals). Segments of Big Soos Creek upstream of the City are also currently listed on the State's 303(d) list as Category 5 waters for fecal coliform.
Recruitment and transport of LWD and other organic material	LOW: Streambank forest vegetation, particularly large trees, has been reduced, reducing the recruitment of large logs and some other vegetative material as well. Remaining trees along the creek are typically small in size, such as the stands of willow lining the banks even where the floodplain is relatively intact, so opportunities for recruiting large wood are reduced. Furthermore, channel migration has been curtailed by development in places, primarily the major road crossings of SR 18 and SR 516. Laterally migrating channels recruit the forest materials in their paths and also recruit and recycle riverbank gravels laid down along previous channel alignments.
Vegetation	
Temperature regulation	MODERATE/LOW: Well-vegetated banks and buffers improve shading conditions, in turn benefiting both temperature and dissolved oxygen. Segments of Big Soos Creek upstream of the City are currently listed on the State's 303(d) list as Category 5 waters for dissolved oxygen. Low density and small size of shoreline vegetation greatly reduces the level of shading afforded the creek. However, smaller vegetation is needed to provide shade to a narrower creek as opposed to a wider river.
Water quality improvement	MODERATE: Where wide floodplain areas remain and are densely vegetated with willows, grasses, emergent vegetation, and other riparian vegetation types, an effective level of biofiltration can still occur. However, urbanizing areas in the basin are dominated by roads and other impervious surfaces, lawns, and landscaping, and lack densely vegetated buffers of sufficient width. These urban areas are sources, rather than sinks, of water quality contaminants such as fertilizers, herbicides, pesticides, hydrocarbons, metals, and eroded soils. Segments of Big Soos Creek upstream of the City are currently listed on the State's 303(d) list as Category 5 waters for fecal coliform.

Process	Function Performance
Slowing riverbank erosion; bank stabilization	MODERATE: The dense grasses and shrubby vegetation such as willows that line much of the Soos Creek banks are fairly effective at stabilizing soils and slowing the rate of erosion. However, the function of slowing the rate of bank erosion formerly provided by bank vegetation has now been taken over by artificial armoring in some areas, such as at the road crossings. Prior to settlement and clearing, the creek was lined with mature, mixed-forest communities.
Attenuation of flow energy	MODERATE/LOW: (As stated above), the decrease in channel roughness due to a reduction in accumulated woody debris, and reduction in bank vegetation has reduced the channel's ability to absorb and dissipate stream flow energy.
Sediment removal	MODERATE: As stated above, remaining densely vegetated floodplain areas are effective filters for the filtering and retention of fine sediments.
Provision of LWD and organic matter	LOW: Streambank vegetation now includes primarily only smaller tree sizes, so there is little opportunity for the recruitment of large woody debris. There is better opportunity for the recruitment of small woody debris, leaf litter, etc. that would contribute to a decomposition-based food chain.
Hyporheic	
Removing excess nutrients and toxic compounds	MODERATE/HIGH: The Soos Creek basin is dominated by highly infiltrative, glacial outwash soils which provide for a high degree of interaction between ground and surface waters. Stream flows supplement shallow groundwater or hyporheic flows and vice versa, thereby increasing the proportion of flow which routinely flows in and out of the zone to be filtered in the process. Furthermore, the hyporheic zone also provides some nutrient and toxic compound removal when water from the developed floodplain and uplands infiltrates into the permeable soils instead of running off of the surface. Though overall water quality parameters show mixed results and include specific problem areas (see previous discussions), water quality is likely improved due to its filtration as groundwater prior to entering stream flow.
Water storage and maintenance of base flows	MODERATE/HIGH: The combined presence of headwater lakes, large wetland areas, and highly infiltrative and interactive soils throughout the Soos Creek basin provides a high level of water storage which is available for the support of stream base flows. Hyporheic zone functioning with respect to water storage is enhanced due to the high degree of interactivity between the creek and its floodplain and supporting aquifers. Such water stored in the hyporheic zone is available to supplement dry season, low stream flows.
Support of vegetation	MODERATE: While the interaction between Soos Creek and its hyporheic zone is generally quite good, the gravelly outwash soils that tend to be present in the hyporheic zone and throughout the basin can be so well- draining and poor at wicking water upward that plants growing above these gravelly soils can be deprived of water even when an active water table is only a few feet below the surface. The few prairie areas present in Western Washington tend to form on such gravelly outwash soils, as occurs near Yelm, because these soils are too well-drained to support forest vegetation. However, landscaping vegetation within the shoreline zone is supported by irrigation water and precipitation rather than by hyporheic water storage.
Sediment storage	MODERATE/HIGH: Good interaction between the hyporheic zone and stream flows allows good potential for filtration of interflow and hyporheic flow, and thereby sediment storage. If sediment loading is too high, however, gravels of the hyporheic zone could become clogged, their sediment storage capacity used up, and the overall functioning of the hyporheic zone impaired.

Process	Function Performance
Habitat	
Physical space and conditions for life history	MODERATE/LOW: Habitat in and along Soos Creek has been reduced in quality, quantity, and complexity compared to its original condition. The vegetative community is now much sparser and with a much lower level of accumulated downed wood and snags, resulting in fewer places for various wildlife species to find cover or suitable nesting and rearing sites. The diminishment of dense shoreline vegetation is a limiting factor for terrestrial species' (birds, mammals, amphibians) use of the shoreline, since cover, food, nesting sites, travel corridors, etc. are absent.
	Within the channel itself, fewer log jams and less wood overall similarly results in less available protective cover, and diminishes the creation of pool/riffle sequences as well. Some beaver dams along the course of the creek have helped to maintain the abundance of in-channel wood, however. A reduction in side channels and backwaters has reduced the amount of valuable edge habitat available, and further reduced overall complexity. Shallow, low-energy aquatic areas provide critical rearing, foraging, and refuge habitat for amphibians and juvenile fish, particularly salmonids. Bank armoring has reduced the amount of low-energy shallow-water environment, creating deeper, higher-velocity water that is inhospitable to small fish and amphibians, as well as to emergent vegetation.
Food production and delivery	MODERATE: Food production from developed floodplain and upland areas is limited by a reduction in native seed- and fruit-bearing vegetation. Not only does such vegetation provide food directly for terrestrial wildlife, but it is a source of insects and other organic matter that drop into the water and provide food, either directly or indirectly, for fish and other aquatic life. The historic, but now reduced, emergent wetland areas that were associated with side channels, backwaters, and extensive floodplain wetlands also provided productive foraging areas for juvenile fish, small mammals, wading birds, and waterfowl.

5.2.1 Hydrologic

The Soos Creek subbasin is in the process of changing from being rural and forested to being heavily urbanized (particularly in the western areas). The subbasin has an extensive system of interacting lakes, wetlands and gravelly, infiltrating soils that collectively attenuate peak stream flows. In the 1980s, Soos Creek discharged about 8 to 10 cfs to the Green River during the summer (Metro 1988) and 400 cfs during one-year event high flows (King County 1990). The Soos Creek Basin Plan provides detailed subcatchment peak flow tables and maps for various future and existing conditions using HSPF modeling.

Existing flow-related problems occur in the upper reaches of the creek which are subject to low stream flows, both natural and anthropogenic (Exhibit 8). In 1990, it was predicted that stream flows would increase by an average factor of 1.8 under build-out conditions. However, some areas were expected to have stream flows increase to 3.5 times the 1985 levels (King County 1990). These higher flow increases would be in areas that have highly infiltratable soils that are converted to urban areas with impervious surfaces (Kerwin and Nelson 2000). Preliminary evidence from gaging stations seems to support the general conclusion of increased peak flows.

According to peak flow data collected since 1962 at the USGS gaging station on Soos Creek, the top five flow events on record all occurred after 1990 (Exhibit 9).

Soos Creek is one of the largest tributaries to the Green River and its hydrologic regime is dominated by winter rain events, with low flows occurring in the late summer. The topography is typified by rolling hills formed on glacial deposits. Lakes and wetlands in the headwaters of the basin help sustain stream flows by slowly releasing groundwater during the summer months. The primary impacts on the hydrology of Soos Creek include stormwater runoff, urban development and consumptive water use. The effects of urbanization and groundwater withdrawals have reduced summer low flows, which may delay the increase in streamflows in the fall to a level allowing the upstream migration of adult chinook salmon (Kerwin and Nelson 2000). The increased sediment delivery to alluvial fans and low gradient reaches of the Green River, in combination with the even lower low flows, impedes adult chinook attempting to migrate upstream into Soos Creek and other tributaries.



Exhibit 8. Average 7-day low flows in Soos Creek from 1953-1993 (after Kerwin and Nelson 2000).



Exhibit 9. USGS peak flow data for Big Soos Creek near Auburn, Washington, from 1964 through 2006.

Dense stands of young trees or shrubs are sufficient to provide good sediment filtration where the riparian zone is at least 150 feet wide. Approximately 45 percent of the existing riparian zone along Soos Creek provides good sediment filtration. Elsewhere, roads, development, or other contributing activities near the stream reduce the ability of riparian area to filter fine sediment (Kerwin and Nelson 2000).

5.2.2 Shoreline Vegetation

Streambank and riparian vegetation is important for maintaining temperature, removing excessive nutrients and toxic compounds, sediment removal, bank and channel stabilization, attenuation of flow energy, and provision of large woody debris and other organic matter. The following graph shows stream temperatures during 2008 measured at Site G320 (at confluence with Little Soos Creek) relative to Ecology's threshold and the historic data. In 2008, temperatures were generally in line with historic values. King County's 25-year trend analysis, however, shows a pattern of increasing temperatures at Site D320 (confluence with Jenkins Creek) (http://green.kingcounty.gov/WLR/Waterres/StreamsData/reports/trends.pdf).

Though shrubby willow and similar types of vegetation occur along the City's shoreline reaches of Soos Creek, little mature native vegetation remains in the riparian zone along the creek.

Basin-wide, there is still an intact riparian zone supporting native tree species between RM 1.5 and 2.8, and patches of native deciduous trees also occur elsewhere along the lower six miles of the creek. However, these trees are generally small. The remainder of the riparian zone is composed primarily of shrubs or grass. Development and roads limit the riparian zone width in many cases (Kerwin and Nelson 2000).



Source: http://green.kingcounty.gov/wlr/waterres/streamsdata/Conventional.aspx?Locator=G320

5.2.3 Hyporheic Functions

Surface water rights and claims in the Soos Creek basin amount to approximately 27 cfs, and are predominantly for irrigation and small multiple domestic systems (Culhane et al. 1996). Groundwater withdrawals represent the largest water source in the major Green River tributary basins, including Soos Creek. Apparent declines in summer stream flow have been identified for the Soos Creek basin, likely in response to increased urbanization, groundwater withdrawals, and changes in precipitation (WDOE 1995). The seven-day-average low flow rates in Soos Creek have decreased significantly between 1968 and 1993 (Kerwin and Nelson), with declining trends in the seven-day-average low flow rates detected for all years between 1968 to 1993 (Culhane 1995). The likely causes for these instream flow declines include a combination of decreased precipitation 1993 (Culhane 1995), increases in the percentage of impervious surfaces associated with urbanization, and increased groundwater withdrawal.

Potable water wells that produce less than 5,000 gallons per day do not require a water right. It is not known how many of these wells are present in the subbasin and what their cumulative impacts might be. Information in the *Ground Water Management Plan* (SKCGWAC 1989) and studies conducted by the USGS indicate that groundwater withdrawals from the Covington Upland have adversely impacted streamflow in Soos Creek. The mean annual streamflow in Soos Creek decreased about 14 percent and the mean monthly low flow rate decreased by about 33 percent during the time period from 1967 to 1992. However, precipitation as measured at

Palmer decreased only 5 percent during that same period, indicating that the declines cannot be attributed to decreases in precipitation alone. More likely, the decreases are also caused by a combination of groundwater removal and increases in the percentage of impervious surfaces (Culhane 1995 in Kerwin and Nelson 2000).

5.2.4 Habitat

Because existing stands of riparian trees (where present) are small, LWD recruitment is currently considered poor all along Soos Creek. Bank stability, shade, and organic matter recruitment are also considered poor along approximately 65 percent to 80 percent of Soos Creek (overall, not just in the City) because of development that extends to within 75 feet of the channel and the small size of trees in the riparian zone. Summer low-flow discharges are also decreasing (see *hydrology* above), which limits available rearing production for species of salmonids that require over-summer residency (Kerwin and Nelson 2000).

5.3 LAKE MERIDIAN

Table 16.	Ecological Function	Summary for Lake	Meridian.
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Function	Performance	
Hydrologic		
Storing water and sediment	LOW-MODERATE: The lake of course provides excellent water and sediment storage functions. However, the uplands surrounding the lake within Shoreline jurisdiction have low water and sediment storage functions. Impervious surfaces and compact managed lawns interfere with infiltration of precipitation and rapidly send water "downstream." Wetlands and other natural water and sediment storage features are generally lacking. The water storage capacity of the lake was decreased somewhat by the recent US Army Corps sponsored project, which sought to stabilize lake levels and reduce fluctuations to the benefit of lakefront homeowners.	
Attenuating wave energy	MODERATE: Bulkheading and other shoreline modifications have replaced native vegetation and natural woody debris as the features in place to attenuate wave energy. Shoreline erosion is not known to be a serious problem on the lake.	
Removing excess nutrients and toxic compounds	LOW: The lake is surrounded by intensively landscaped lakefront homes. The upland shoreline areas are more often a source of nutrients and toxic compounds, via lawn treatment runoff (pesticides, fertilizers, herbicides) and road runoff (hydrocarbons, metals). Although the lake is on Ecology's 303d list for fecal coliform and total phosphorus, the notes indicate that recent data shows Lake Meridian is meeting water quality standards for those criteria.	
Recruitment of LWD and other organic material	LOW: Dense residential development and other upland modifications restrict the ability of the lake to recruit LWD and organic material.	
Vegetation		
Temperature regulation	LOW: Lack of dense shoreline vegetation nearly eliminates potential for some shading of the shallow-water nearshore area. Vegetation is less effective at shading west-facing shoreline areas due to afternoon sun from the west.	
Water quality improvement	LOW: Residential areas surround the lake and are dominated by lawn and landscaping rather than dense buffers of native lakeside vegetation. These residential areas are sources of water quality contaminants such as fertilizers, herbicides and pesticides. In addition to the typical residential landscaping	

Function	Performance
	pollutants, runoff from surrounding urban areas carries hydrocarbons, metals, sediments, and other pollutants to the lake from roads, parking lots, and other developed areas.
Attenuating wave energy	LOW: In its pre-development condition, the lake was ringed with emergent wetlands and mature mixed-forest communities. Those communities are now almost entirely absent around the lakeshore, so vegetation does not provide any significant wave attenuation function. As mentioned above, bulkheading and other shoreline modifications have replaced native vegetation and natural woody debris as the features in place to attenuate wave energy.
Sediment removal and bank stabilization	LOW: Under natural conditions, there would be an ongoing, underlying rate of shoreline erosion, which would contribute to maintaining substrate conditions. This rate would be partially determined and moderated by the presence of shoreline vegetation whose root systems would tend to hold bank material in place. Instead, the lake shore now has little shoreline vegetation and a large proportion of it is armored. While this "stabilizes" the banks, it limits natural recruitment of lakebed materials.
LWD and organic matter recruitment	LOW: Again, the loss of natural, forested shoreline vegetation and its replacement primarily with lawn and other types of landscaping has nearly eliminated large woody debris and organic matter recruitment potential along the lake shore. Any trees or large woody debris that do enter the lake are likely to be quickly removed out of concern for safety or to reduce the risk of property damage.
Habitat	
Physical space and conditions for life history	LOW: Under natural conditions, the lake bottom would gradually rise in a shallow wedge such that incoming waves would roll up the bottom, and onto the shore, losing energy. This reduced energy environment would be more hospitable to emergent vegetation, which further attenuates wave energy and provides a refuge for small fish and amphibians. Shallow nearshore areas in lakes typically provide rearing, foraging and migration habitat for fish. Shoreline armoring, however, generally reduces this low-energy shallow-water environment, creating a deeper, more turbulent nearshore area that is less hospitable to small fish and amphibians, as well as to emergent vegetation. The deeper water may also allow larger fish predators to prey on small fish. The absence of dense shoreline vegetation is a limiting factor in terrestrial species' (birds, mammals, amphibians) use of the shoreline, since cover, food, nesting sites, travel corridors, etc. are limited or largely absent.
Food production and delivery	LOW: Food production from the uplands is limited by the lack of native seed- and fruit-bearing vegetation. This may be made up for, in part, by fruit trees and other non-native vegetation in yards which supplies some food for wildlife. Not only does native upland vegetation provide food directly for terrestrial wildlife, but it is a source of insects and other organic matter that drop into the water to provide food for fish and other aquatic life. The historical emergent wetland areas that are now reduced or absent also provided productive foraging areas for small mammals, wading birds and waterfowl.

5.4 LAKE FENWICK

Function

Hydrologic	
Storing water and sediment	MODERATE/HIGH: The lake of course provides excellent water and sediment storage functions. Furthermore, much of the upland surrounding the lake within Kent Shoreline jurisdiction is well-vegetated and undeveloped with relatively good water and sediment storage functions. Though some of the shoreline areas surrounding the lake are steep-sloped, there is little impervious surface or landscaped areas to interfere with infiltration of precipitation. Wetlands and other natural water and sediment storage features are present on City park property in the vicinity of a small inlet stream to the lake.
Attenuating wave energy	MODERATE/HIGH: The lake is not large enough to generate very large waves. Furthermore, the lake is surrounded by forested steep slopes and higher ground which protect the lake somewhat from wind energy. Boat wakes are not believed to be a major factor, especially since gas-powered engines are prohibited. Shoreline erosion is not a serious problem on the lake.
Removing excess nutrients and toxic compounds	MODERATE/HIGH: Relatively little impervious surface area such as roads feeds into the lake. Immediately surrounding areas are not urbanized, so runoff carries less in the way of hydrocarbons, metals, sediments, and other pollutants to the lake as would be the case from roads, parking lots, and other developed areas.
Recruitment of LWD and other organic material	LOW/MODERATE: A severely eroding lakeshore could recruit the large woody debris and other organic materials present in the eroded areas. However, lakeshore erosion around Lake Fenwick is quite slow and does not appear to be a factor in the recruitment of wood or other organic materials to the lake. Some wood, however, does fall into the lake as trees die or due to wind, but these are not hydrologic factors.
Vegetation	
Temperature regulation	HIGH: The combination of a forested lake shore and steep slopes provides good shading to the lake surface. The long and narrow shape of the lake also allows a higher percentage of its area to be shaded. As the forest trees mature further, shade may increase somewhat.
Water quality improvement	MODERATE/HIGH: The lake is generally surrounded by maturing mixed forest areas, as is the inlet small stream channel, which would tend to biofilter the water entering the lake. The lake is also shallow in areas with thick beds of macrophytic vegetation which would also tend to retain and/or break down toxics and nutrients. The few lakefront homes present do not appear to be intensively landscaped. Although the lake is on Ecology's 303d list for total phosphorus and invasive exotic species (Brazilian elodea), neither of these listings is related to the condition of the well-vegetated shorelands.
Attenuating wave energy	HIGH: Native vegetation around the lake is relatively intact, and so is available to provide a significant wave attenuation function. Little bulkheading or other shoreline modifications have occurred which would remove native vegetation and natural woody debris, the natural features which attenuate wave energy.
Sediment removal and bank stabilization	HIGH: Much of the lakeshore is lined with native vegetation, so the rate of shoreline erosion is presumably an underlying, natural, ongoing rate which contributes to maintaining natural lake substrate conditions. This rate is determined and moderated by the presence of the shoreline vegetation whose root systems tend to hold bank material in place.

Table 17. Ecological Function Summary of Lake Fenwick in the City of Kent.

Performance

Function	Performance
LWD and organic matter recruitment	MODERATE/HIGH: Much of the lake shore is forested with a mixed, maturing forest, providing opportunities for smaller wood, leaves, and some larger wood to enter the lake. However, the trees along the shore are not overly large and many are deciduous such as alder which decay much faster than conifer trees such as cedar. Divers conducting an aquatic vegetation survey noted that a "significant portion of the lake bottom was covered by woody debris of all sizes and species" (Tetra Tech 2002). Several large pieces of wood, unknown species, were also noted during site visits.
Habitat	
Physical space and conditions for life history	MODERATE/HIGH: The lake is largely surrounded by native upland vegetation. This dense shoreline vegetation is beneficial for terrestrial species' (birds, mammals, amphibians) and increases their use of the shoreline since cover, food, nesting sites, travel corridors, etc. are more available. Shallow nearshore areas include both emergent and submerged vegetation, which attenuates wave energy and provides a refuge for small fish and amphibians. These shallow nearshore areas provide rearing, foraging and migration habitat for fish. Maturing shoreline vegetation provides large organic debris recruitment to the lake to a moderate degree, which should increase over time as the forest matures.
Food production and delivery	MODERATE/HIGH: Food production from the uplands is available in various forms, including native seed- and fruit-bearing vegetation. Fruit trees and other non-native vegetation in yards may also supply some food for wildlife. Not only does native upland vegetation provide food directly for terrestrial wildlife, but it is a source of insects and other organic matter that drop into the water to provide food for fish and other aquatic life. The emergent wetland areas present along sections of the lakeshore, particularly in the park, provide productive foraging areas for small mammals, wading birds and waterfowl.

5.5 GREEN RIVER NATURAL RESOURCES AREA POND

Table 18. Ecological Function Summary of the Green River Natural Resources Area Ponds.

Function	Performance
Hydrologic	
Storing water and sediment	MODERATE/HIGH: The ponds and associated wetlands of course provide excellent water and sediment storage functions. Furthermore, much of the shoreline area surrounding the ponds within shoreline jurisdiction is well- vegetated and undeveloped with relatively good water and sediment storage functions. There is little impervious surface or landscaped areas to interfere with infiltration of precipitation.
Attenuating wave energy	MODERATE/HIGH: The ponds are not large enough to generate very large wind-driven waves, and are also shallow with abundant emergent and aquatic vegetation to attenuate any wave energy. Furthermore, the ponds are surrounded by shrubby slopes which protect the ponds somewhat from wind energy. Shoreline erosion is not a problem on the ponds.
Removing excess nutrients and toxic compounds	MODERATE/HIGH: Flows entering the ponds contain typical urban runoff pollutants, including hydrocarbons, metals, sediments, and other pollutants. However, many of these settle out in the ponds before re-entering Mill Creek Kent, providing an important water quality function.

Function	Performance	
Recruitment of LWD and other organic material	LOW/MODERATE: Only low quantities of small woody debris would be found in the ponds, and pond hydrology would not facilitate additional recruitment. The ponds' hydrologic regime does facilitate growth of emergent and aquatic vegetation that contributes ample organic material.	
Vegetation		
Temperature regulation	LOW: The shallow pond depths and the high ratio of area to perimeter limit the vegetation's ability to regulate water temperature of the ponds. Further, aquatic and emergent vegetation in the ponds may hinder water circulation in the ponds themselves.	
Water quality improvement	MODERATE/HIGH: Water moving through the upland shoreline area is provided a high level of treatment by vegetation prior to reaching the ponds (particularly any water traveling through the emergent wetland meadow to the west), and the emergent/aquatic vegetation in the ponds also provides valuable water quality improvement function to storm waters and diverted Mill Creek Kent waters.	
Attenuating wave energy	MODERATE/HIGH: Although the need for wave attenuation on the ponds is quite low, the abundant emergent and aquatic vegetation would perform that function well.	
Sediment removal and bank stabilization	MODERATE/HIGH: Much of the pond-shore is lined with at least a narrow band of native shrubs and emergent vegetation, there is no boat activity, and wind- driven wave energy is low. The need for bank stabilization is therefore quite low and the existing vegetation adequately performs that function. The shorelands surrounding the ponds would remove sediments from any sediment- laden water that passes through.	
LWD and organic matter recruitment	LOW: The existing riparian vegetation is a source of only small woody debris (small branches). Organic matter contribution could be moderately high, although the shrub/tree riparian area is narrow.	
Habitat		
Physical space and conditions for life history	MODERATE/HIGH: The ponds are set on the east side of the Green River Natural Resource area, which includes large areas of emergent, scrub-shrub and forested wetlands and some upland areas. Habitat diversity in the complex is high, and the area provides abundant space for a large variety of birds, mammals, reptiles and amphibians to carry out most or all life history stages. The abundance of shallow pond areas include both emergent and aquatic vegetation, which attenuates wave energy and provides a refuge and breeding/rearing areas for small fish and amphibians.	
Food production and delivery	MODERATE/HIGH: Food production for a variety of wildlife is high in the ponds and the associated wetlands. For example, swallows and other insect-eating birds, reptiles and raptors that prey on small mammals, and waterfowl and larval amphibians that feed on aquatic vegetation or aquatic invertebrates have ample food supplies.	

5.6 SPRINGBROOK CREEK

Table 19. Ecological Function Summary for Springbrook Creek near Kent.

Function	Performance
Hydrologic	
Storage of water and sediment	LOW: The Green River Valley diking network as a whole and the dam at the Black River Pump Station in particular prevent the storage of Green River

Function	Performance
	flood waters on the valley floor portion of Springbrook Creek. Isolation of the Springbrook Creek channel from the formerly wide Green River floodplain has greatly reduced its ability to help store Green River flood waters. Prior to diking throughout the valley, the Springbrook channel was commonly fed by overbank flows from Green River flooding. Since a low, natural berm had been formed by deposition along the river banks, overbank river flow typically did not readily re-enter the river, but, rather, paralleled the river in floodplain tributary channels including Mill Creek Kent and Springbrook Creek. The extensive diking system has also now prevented fine sediments of Green River origin from reaching the Springbrook Creek floodplain for deposition and storage. Uplands have low water and sediment storage functions, and, as elsewhere in the Green River Valley, much of the former floodplain area in the Springbrook Creek basin now functions more like upland. Impervious surfaces such as roofs and pavement associated with industrial and light industrial land uses and compacted, managed lawns and other landscaped areas, which are only semi-permeable, interfere with the infiltration of precipitation and rapidly send water downstream rather than storing it. Wetlands and other natural water and sediment storage features within the basin are greatly reduced compared to their historic prevalence.
Transport of water and sediment	MODERATE: The transport of water has been highly managed in the lower basin through an extensive system of pipes, channelized conveyances and, of course, the Black River Pump Station and dam. This system appears to be efficient with respect to flood prevention. Low streamflow gradients and energy in the lower basin limit sediment transport potential. Due to the diking system, sediments from the Green River are no longer supplied to the area. Sediments carried off of the Covington uplands to the east by various tributary streams tend to be deposited in alluvial fans upon reaching the valley floor, and the substrate in lower Springbrook Creek is dominated by silts.
Attenuating flow energy	LOW: In the lower basin, the decrease in channel roughness brought on by a decrease in the width/depth ratio (a narrowing and deepening of the channel), reduction in accumulated woody debris, and reduction in bank vegetation has greatly reduced the channel's ability to absorb and dissipate stream flow energy. However, gradients are very flat in the lower basin, and so there is little energy to dissipate and erosional forces are low. Tributary channels fed by the Covington uplands, however, experience increased peak flow rates and overall flow volumes due to urbanization at the same time their channels are losing vegetation, large wood, and other roughness features which function to attenuate energy and reduce erosion.
Developing pools, riffles, and gravel bars	LOW: Lack of roughness elements such as complexes of large woody debris, straightened, artificial channel sections, and a narrowing of the channel and floodplain to eliminate and prevent the re-formation of backwaters and side channels has resulted in a uniform, monotypic channel form which is not conducive to the formation and maintenance of the basic habitat elements, including pools, riffles, and gravel point bars. Inherent low energy and gradient in the lower watershed is also not conducive to gravel transport or bar formation, the scouring of deep pools, or the formation of pool/riffle complexes.
Removing excess nutrients and toxic compounds	LOW: Most of the former Green River floodplain in the basin is now occupied by urban uses - primarily industrial, light industrial, and retail. As such, it is not available to provide its former biofiltration function as part of either the Green River or Springbrook Creek floodplain. Though these areas are needed more than ever to provide this function, to remove an increased

Function	Performance
	loading of toxics and nutrients, their prevalence and functionality have been greatly reduced. The upland shoreline areas and the former floodplain areas now functioning essentially as upland are more often a source of nutrients and toxic compounds than a sink, due to landscaping runoff (pesticides, fertilizers, herbicides) and paved area runoff (hydrocarbons, metals).
Recruitment and transport of LWD and other organic material	LOW: Relatively few trees of any size occur along lower Springbrook Creek, so the recruitment potential for Large Woody Debris is quite low. Furthermore, much of the channel was constructed and is maintained as part of an artificial conveyance system. The creek has essentially no channel migration zone and so is "frozen" in place. Channels migrating laterally through forested areas recruit the trees in their paths and also recruit and recycle riverbank gravels laid down along previous channel alignments. The land use modifications in the areas they protect from flooding restrict the ability of the river to recruit LWD and organic material.
Vegetation	
Temperature regulation	LOW: The low density and reduced height of shoreline area vegetation along the creek greatly reduces the level of shading to the water surface.
Water quality improvement	LOW: The urban areas in the basin are dominated by roads, paved parking areas, industrial yards, roofs, and other impervious surfaces, and so lack dense buffers of streambank vegetation. What vegetated areas there are tend to be landscaped rather than natural vegetation. These urban areas tend to be predominantly sources, rather than sinks, of water quality contaminants such as fertilizers, herbicides, pesticides, hydrocarbons, metals, and eroded soils.
Slowing riverbank erosion; bank stabilization	LOW: The function of slowing the rate of bank erosion formerly provided by bank vegetation has now been taken over by artificial channelization and armoring associated with the extensive managed drainage system feeding into the Black River Pump Station. The system's channels include limited areas of rip-rap and other artificial armoring materials, though stream energy and erosive forces tend to be low due to low stream gradients. Prior to urbanization and construction of the drainage system, the creek flowed in a dispersed and braided fashion across the densely vegetated Green River floodplain and was lined with mature, mixed-forest communities. Those communities are now almost entirely absent in these segments, so vegetation does not provide any significant riverbank stabilization function, though the channels are not necessarily unstable.
Attenuation of flow energy	LOW: (As stated above), the decrease in channel roughness due to a reduction in accumulated woody debris, and reduction in bank vegetation has reduced the channel's ability to absorb and dissipate stream flow energy.
Sediment removal	LOW: As stated above, isolation of the Springbrook Creek channel from its own and the Green River's formerly wide floodplain has greatly reduced its ability to biofilter flood waters across the floodplain. Coarse sediments carried off of nearby hilly areas deposit upon reaching the valley floor, and finer sediments are either deposited in the channel, rather than on the floodplain, or are carried on through to and beyond the pump station. Furthermore, levees along the Green River have prevented fine river sediments from reaching the floodplain for deposition and storage.
Provision of LWD and organic matter	LOW: Streambank and floodplain forest vegetation has been greatly reduced, and the reduction in shoreline vegetation has curtailed large woody debris and organic matter recruitment potential. Furthermore, the channel has typically been narrowed to a single thread, whereas pre-development it spread out and braided across the floodplain in much more intimate contact

Function	Performance		
	with a much more intact and diverse vegetative community.		
Hyporheic	Hyporheic		
Removing excess nutrients and toxic compounds	LOW: The water table in the hyporheic zone on the valley floor portion of the basin has likely been lowered due to the development of a comprehensive drainage system in support of industrial and other urban development on the former floodplain. The Black River Pump Station is an integral part, which keeps water surface elevations in the drainage system pumped down, particularly preventing high water levels and associated floodplain recharge from occurring. Water tables in the hyporheic zone are therefore likely lowered as well. The lowering of the stream channel and the water surface elevation within it relative to the floodplain nearly eliminates hyporheic recharge due to flooding, and greatly reduces the proportion of streamflow which routinely passes in and out of the zone to be filtered in the process. The hyporheic zone may still provide some limited nutrient and toxic compound removal from the developed floodplain and uplands in those limited areas where water is still allowed to infiltrate into the hyporheic zone rather than running off of the surface.		
Water storage and maintenance of base flows	LOW: Hyporheic zone functioning with respect to water storage is restricted, again, due to the relative depth of the stream channel and its separation from the historic floodplain, the development of an extensive artificial drainage system, the operation of the Black River Pump Station, and industrial and other urban development that has resulted in the placement of large areas of contiguous impervious surfaces. All of these factors combine to prevent hyporheic floodplain recharge from occurring. If more water were stored in the hyporheic zone, it would be available to supplement dry season low stream flows.		
Support of vegetation	LOW: Little natural vegetation within the influence of a hyporheic zone in the lower basin remains. Much of the existing vegetation within the range of the hyporheic zone and also within the shoreline zone is landscaping vegetation, typically supported by irrigation water and precipitation rather than by hyporheic water storage. In addition, the channel is typically deeper now relative to the floodplain than it was historically, thereby reducing the ability of the hyporheic zone to supply water to floodplain vegetation.		
Sediment storage	LOW: Prior to European settlement of and development in the area, the Green River and Springbrook Creek floodplains overlapped considerably, and could be considered to be one and the same at many locations. The hyporheic zone is restricted by a lowering of the stream channel relative to the floodplain, as mentioned above, and the extensive placement of levees and impervious surfaces. These factors combine to limit the movement of fine sediments from either the Green River or Springbrook Creek into the hyporheic zone.		
Habitat			
Physical space and conditions for life history	LOW: Habitat in and along lower Springbrook Creek has been much reduced in quality, quantity, and complexity compared to its original condition. The vegetative community is now much sparser along a narrower band of buffer and with a much lower level of accumulated downed wood and snags, resulting in fewer places for various wildlife species to find cover or suitable nesting and rearing sites. The absence of dense shoreline vegetation is a limiting factor in terrestrial species (birds, mammals, amphibians) use of the shoreline, since cover, food, nesting sites, travel corridors, etc. are all diminished. Within the channelized stream itself, fewer large logs and less wood overall similarly result in less available protective cover and diminish the depth and		

Function	Performance
	complexity of pools. (Naturally lower gradients and stream energy make the lower basin generally less conducive to the formation of classic pool/riffle sequences). The reduction in side channels, backwaters, and braided channel areas due to development and creation of the drainage system has greatly reduced the amount of valuable edge habitat available and further reduced overall complexity. These sheltered, low-energy environments formerly provided more emergent vegetation and served as a refuge for small fish and amphibians. Shallow aquatic areas provide critical rearing, foraging, and refuge habitat for fish, particularly salmonids. Channelization and floodplain development, however, have eliminated many of these low-energy, shallow-water environments and the remaining channelized stream sections are less hospitable to small fish, amphibians, and emergent vegetation. The presence of the Black River Pump Station and dam near the mouth of Springbrook Creek has complicated and hindered the access of the basin by migratory salmonid fish, adversely affecting both upstream and downstream migrations.
Food production and delivery	LOW: Food production from developed floodplain and upland areas is limited by a reduction in native seed- and fruit-bearing vegetation. Not only does such vegetation provide food directly for terrestrial wildlife, but it is a source of insects and other organic matter that drop into the water and provide food for fish and other aquatic life. The historic, but now much-reduced, emergent wetland areas that were associated with side channels, backwaters, and extensive floodplain wetlands also provided productive foraging areas for juvenile fish, small mammals, wading birds, and waterfowl.

5.6.1 Hydrologic

Springbrook Creek flow has an annual yield of about 40 cfs. Bortz (1981) concluded that the most serious condition existing in this subbasin was the extreme volumes of water associated with storm events, and Harza (1995) reported that water quantity responded quickly after each storm event. This is typical of streams in urban areas that have relatively high impervious surface areas. In basins with greater permeable surface areas, flow decreases more slowly following rainfall events, allowing for a more efficient utilization by fish and other aquatic organisms of the increased instream flows (Lucchetti and Furstenberg 1992). There currently are two U.S. Geological Survey (USGS) stream gages in this subbasin. USGS gage number 12113346 is located in Garrison Creek and 12113349 is in Mill Creek Kent (Kerwin and Nelson 2000).

Mill Creek Kent, Garrison Creek and other Springbrook Creek tributaries arise along the east side of the basin from wetlands, lakes and rolling hills on the Covington drift plain, about 500 feet above the valley floor. Runoff in these till-covered areas is produced primarily as shallow subsurface interflow. Seepage zones along the valley wall bluffs contribute baseflow to streams and feed wetlands that line the upslope side of SR-167 along the base of the bluffs. The lower portion of the basin occupies a low-gradient alluvial floodplain on the Green River Valley floor (Gersib et al. 2005).

Bortz (1981) also observed that the extreme volumes of water associated with storm events resulted in scouring, streambank erosion, and subsequent siltation in the basin. The upper reaches of tributary Mill Creek Kent have been extensively modified. Harza (1995) found evidence of low to moderate downcutting along the hillslope sections of Springbrook Creek.

Past observed construction practices in the basin which removed vegetation to the water's edge are thought to have been a significant contributor to sediment entering Springbrook Creek. The instream substrate of the lower reaches of Springbrook Creek upstream as far as the SR 167 crossing reflects a depositional regime and consists exclusively of silts.

The Springbrook Creek subbasin appears on the EPA Clean Water Act 1996 and 1998 303(d) lists for water quality violations for the parameters of high temperature and low dissolved oxygen levels at multiple locations low in the subbasin. However, the 2008 303(d) list only includes Springbrook Creek for fecal coliform and dissolved oxygen violations. Temperature was downgraded to Category 2 (water of concern). The following graph shows stream temperatures during 2008 measured at Site 0317 (between East Valley Road and SR 167, north of SW 34th Street) relative to Ecology's threshold and the historic data. In 2008, temperatures were generally in line with historic values. King County's 25-year trend analysis did not evaluate water temperature.



Source: http://green.kingcounty.gov/WLR/Waterres/StreamsData/Conventional.aspx?Locator=0317

Low dissolved oxygen levels have been reported by numerous sources at sampling locations throughout the subbasin and appear to be a chronic seasonal occurrence. These water quality violations are believed to be the result of low water flows, lack of adequate riparian vegetation and shade, and point and non-point pollution sources (Harza 1995). During 1994, adult chinook salmon entered the Black River Pump Station between September 17 and October 22 when water temperatures were as high as 20.2 C at the station and 19.5 C at the Mill Creek Kent USGS gage, and dissolved oxygen levels averaged 4.5 mg/l at the Mill Creek gage. In 1994, coho salmon that entered the Springbrook Creek subbasin before October 26 would have faced similar water quality issues as chinook. Parametrix (1990) also suggested that concentrations of heavy metals in Mill Creek Kent increase during the first storm event after a dry period.
5.6.2 Shoreline Vegetation

From the confluence of Mill Creek Kent, near the Kent/Renton boundary, upstream to the State Route 167 highway crossing, Springbrook Creek resembles a drainage ditch. The creek continues mostly parallel and adjacent to State Route 167 with reed canarygrass and Himalayan blackberry bushes remaining the dominant vegetation. Red alder was also found sporadically throughout this reach with very little instream structure. Several sections of Springbrook Creek are so choked with invasive reed canarygrass and other vegetation such as nightshade that they serve as partial barriers (Kerwin and Nelson 2000). Riparian habitat along Springbrook Creek is not judged to be properly functioning based on NMFS criteria and is considered a limiting factor to natural salmonid production (Kerwin and Nelson 2000).

Reed canarygrass is abundant throughout the Springbrook Creek subbasin and was historically removed by dredging. Although it can provide some streambank erosion protection functions, it generally affords minimal fish habitat and prevents native shrubs and trees from becoming established in the riparian habitat zone. Japanese knotweed, an aggressive non-native weed that spreads rapidly in moist environments, was found in a wetland associated with Springbrook Creek between Highway 167 and Talbot Road.

Numerous streambank revegetation efforts have been conducted along the banks of Springbrook Creek and Mill Creek Kent over the past 10 years by both the City of Kent and King County Drainage District #1. Large projects have recently been completed just south of South 180th Street (near Kent's northern border) and just north of South 212th Street along Mill Creek Kent. Bank plantings of deciduous and evergreen trees will eventually provide additional shade and fish habitat structure.

5.6.3 Hyporheic Functions

Mill Creek Kent and other Springbrook Creek tributaries arise from the glacial deposits known as the Covington Uplands, and cut canyons through these deposits before emerging onto the valley floor. Recessional outwash deposits cover the floors of these side canyons. Advance outwash and pre-Fraser seepage zones are exposed at the base of the bluffs, and recharge the alluvial aquifer. Small alluvial fans develop where the creeks transition onto the valley floor. The lower reaches of Mill Creek Kent and most of Springbrook Creek flow through extensive alluvial deposits on the Green River valley floor (Gersib et al. 2005).

5.6.4 Habitat

Coho salmon, cutthroat trout, and winter steelhead adults have been observed spawning in Springbrook Creek and its tributaries, and juvenile hatchery origin coho salmon have also been released routinely in upper reaches of several tributary streams (Kerwin and Nelson 2000). The most significant fish passage barrier in this system is the Black River Pump Station, which poses some unique and difficult challenges. In 1958, an earthen Black River Dam was completed approximately 1,000 feet upstream of its confluence with the Green River, primarily to prevent Green River flood flows from backing up onto the Black River/Springbrook Creek floodplain. In 1972, the U.S. Natural Resources Conservation Service (NRCS, formerly U.S. Soil Conservation Service) replaced the dam with the current Black River Pumping Station. The station provided a means of discharging flood flows from the Black River/Springbrook Creek system to the Green River when the Green River was at a *higher* stage than the Black River

(otherwise flows could be discharged by gravity and pumping would not be needed). The pumping station is currently operated and maintained by King County Surface Water Management.

During flood periods on the Green River, the pumping station acts as a dam, preventing floods from backwatering into the Black River and the wide valley floor of the lower Springbrook Creek subbasin. The Black River Pump Station thereby isolates the Springbrook Creek subbasin from the Green River floodplain. Water levels downstream of the pumping station range from -4.0 to +21.5 feet MSL, depending on tidal conditions and the water level of the Green River. Water surface elevations upstream are normally held in the range of 0.0 to 2.0 feet, though they can reach as high as 13.0 feet. This range of water surface elevations upstream and downstream of the station often results in situation where the downstream water surface is *higher* than the upstream water surface. In order to pass upstream- and downstream-migrating salmonids around the structure, a unique fish passage system has been constructed and is in operation. A combination of a fish ladder followed by a fishway chute is used for upstream passage. At times, fish swim up a relatively short ladder to then slide down a somewhat longer chute to end up at a lower elevation than they started at. Juvenile fish migrating downstream are diverted around the pumps using an air-lift pump to raise the fish to the downstream water levels.

The upstream passage facility is normally operated from mid-September through 31 January of each year. This operational window precludes the upstream migration of some adult resident and anadromous cutthroat trout and anadromous steelhead. The species composition of fish migrating upstream was assessed in 1994, when a total of 229 coho salmon and 14 chinook were trapped between 17 September and 9 December (Harza 1995). The facility is not equipped to handle downstream migrating adult fish, including spawned-out steelhead (kelts) or chinook, so those that move upstream past the station cannot change their mind and exit the Springbrook Creek subbasin to spawn elsewhere. It is thought that some of the chinook entering the system do so to explore for spawning opportunities, but would leave again to look elsewhere if they could.

The downstream passage facility is operated weekdays from early April to mid-June each year, for approximately eight hours per day. Fish attempting to move downstream outside of that operational window are either prevented from exiting the subbasin, or must pass through the pumps (if operational). Juvenile chinook emerge and begin moving downstream in the middle Green River system and Soos Creek as early as February (J. Kerwin, pers. obs., cited in Kerwin and Nelson 2000; Jeanes and Hilgert 2000 cited in Kerwin and Nelson 2000; Hilgert and Jeanes 1999 cited in Kerwin and Nelson 2000). Thus any such early downstream chinook migrants may be prevented from exiting the Springbrook Creek subbasin.

The Springbrook Creek channel section parallel and adjacent to State Route 167 contains little LWD – primarily only pieces placed and anchored during restoration projects such as those mentioned above. Instream substrates consist almost exclusively of silts.

5.7 JENKINS CREEK

As previously mentioned, Jenkins Creek's biological and land use character are dominated by one use in the City (protected municipal watershed area), so no segments or discussion units are

established. Jenkins Creek within the City of Kent has moderate to high performance of ecological functions and lack of modification.

Function	Performance	
Hydrologic	·	
Storage of water and sediment	HIGH: Along Kent's shoreline section of Jenkins Creek, approaching the upstream shoreline boundary, the stream flows through a densely wooded area which is managed as a City watershed with very restricted access. Some of the City's Jenkins Creek shoreline area is wooded wetlands, and the soils beneath the floodplain and wetlands are sandy, gravelly, and permeable. During high flows, the creek is still able to spread out across its floodplain. As such, there is a high degree of flow interaction between the creek, its floodplain, associated riparian wetlands, and the floodplain/wetland soils. Water spilling over the banks and/or infiltrating through the permeable bank soils during flood events can be stored on the floodplain (including the riparian wetlands) and in the permeable soils below for later release. By this process, the floodplain is able to store and attenuate flood flows and trap and store fine sediments. These fine sediments are incorporated into the floodplain topsoil to nourish vegetative growth, in turn supporting wildlife habitat. The floodplain along the City's portion of Jenkins Creek is largely unconstrained.	
Transport of water and sediment	MODERATE: Flows through the area of Kent's shoreline section of Jenkins Creek are somewhat dispersed as they pass through a forested wetland area. While this does not make for the most efficient transport of water and sediment, it is beneficial in terms of fish and wildlife habitat, sediment retention and biofiltration for water quality improvement. However, deforestation and urbanization throughout the basin upstream of the City's Jenkins Creek shoreline area has likely increased streamflows, flow volatility, erosion, and sedimentation to a moderate extent. As for most streams in the region, the stream channel and floodplain have formed in response to a historically lower flow and sediment regime and are not entirely suited to carry the increased flows and sediment loadings experienced. Bank erosion may occur as the channel enlarges and widens to accommodate higher flows.	
Attenuating flow energy	HIGH: As mentioned above, sections of floodplain remain along Kent's shoreline section of Jenkins Creek which are characterized as forested wetlands. These are effective at attenuating streamflow energy during flood events as flow disperses and follows complex flow pathways. The recruitment of woody debris, including large woody debris, is good, increasing complexity and roughness in the channel as well as throughout the floodplain. To its benefit, the basin includes a system of lakes, large wetland areas, and naturally infiltrative recessional outwash soils which all serve to dampen and moderate stream flow fluctuations.	
Developing pools, riffles, and gravel bars	MODERATE/HIGH: The naturally forested condition of the channel banks and buffers provides for adequate large woody debris recruitment and bank protection, which is, in turn, conducive to bed scour and pool formation at locations where such debris accumulates. The debris also provides protective cover in the pools for fish, and riffles formed downstream provide spawning habitat. Gravel bars may form on the inside of channel bends where pools form on the outside. Gravel substrate supply and condition are good due to the underlying gravelly soils.	

Function	Performance
Removing excess nutrients and toxic compounds	MODERATE/HIGH: There is a high degree of interaction between the creek, its floodplain and included riparian wetlands, and an extensive hyporheic zone consisting of gravelly glacial outwash soils. These conditions are well- suited to provide for a high degree of biofiltration, removing pollutants entering the stream from portions of the watershed farther upstream. These pollutants may include lawn and landscaping runoff (pesticides, fertilizers, herbicides) and road runoff (hydrocarbons, metals).
Recruitment and transport of LWD and other organic material	MODERATE/HIGH: As a well-forested shoreline area that is protected, the potential for large woody debris recruitment is presently good and should increase even further as the forest matures over time. Due to the relatively small size of the stream (the City's Jenkins Creek shoreline area is at the upstream limit of shoreline jurisdiction), it would not transport <i>large</i> wood well, but would supply smaller wood and leaf litter to support biological functions downstream.
Vegetation	
Temperature regulation	HIGH: The combination of a well-established and maturing forest in the shoreline/buffer areas and a relatively narrow active channel during low-flow periods results in excellent shade being provided to the stream. This is not true for all areas farther upstream, however, so water may enter the City's shoreline reach at temperatures which have already been somewhat elevated. Vegetation need not be as tall to provide shade to a narrower creek as opposed to a wider river.
Water quality improvement	HIGH: Riparian and floodplain areas are intact and well-forested, resulting in good biofiltration function. However, for fine sediments and pollutants originating from farther upstream, shoreline vegetation can only be effective at removing pollutants when stream flow is made to come in direct contact with the vegetation, which happens most effectively during flood events. Under low-flow conditions, there is less direct contact between the streamflow and the riparian vegetation, so considerably less biofiltration can occur. The segment of Jenkins Creek in the City's shoreline jurisdiction is on Ecology's 303d list for fecal coliform.
Slowing riverbank erosion; bank stabilization	HIGH: The well-forested stream banks provide good bank stabilization with erosion occurring at rates consistent with well-functioning natural processes.
Attenuation of flow energy	HIGH: (As stated above), complex flow patterns through areas of riparian wetlands and accumulated woody debris during flood events provide a rough channel, enhancing the stream's ability to absorb and dissipate flow energy.
Sediment removal	HIGH: Densely vegetated floodplain and riparian area forest vegetation, along with its associated leaf litter and forest duff, effectively filters and retains fine sediments. Also highly infiltrative soils and an active and interactive hyporheic zone (see below) also provide capacity for biofiltration function.
Provision of LWD and organic matter	HIGH: In contrast with most areas in the region, opportunity for the recruitment of large woody debris is good due to the forested condition, and should improve further as the forest continues to mature. The City's Jenkins Creek shoreline areas are within a protected watershed area. There are also good opportunities for the recruitment of small-to-medium woody debris and leaf litter that contribute to a decomposition-based food chain.
Hyporheic	
Removing excess nutrients and toxic compounds	HIGH: The overall Soos Creek basin, including the tributary Jenkins Creek basin, is dominated by highly infiltrative, glacial outwash soils which provide for a high degree of interaction between ground and surface waters. Stream flows supplement shallow groundwater or hyporheic flows and vice versa,

Function	Performance		
	thereby increasing the proportion of flow which routinely flows in and out of the zone to be filtered in the process.		
Water storage and maintenance of base flows	MODERATE/HIGH: The combined presence of headwater lakes (Shadow, Wilderness, Pipe, and Lucerne), large wetland areas, and highly infiltrative and interactive soils throughout the Jenkins Creek basin provides a high level of water storage which is available for the support of stream base flows. Hyporheic zone functioning with respect to water storage is enhanced due to the high degree of interactivity between the creek and its surrounding gravelly soils and supporting aquifers. Such water stored in the hyporheic zone is available to supplement dry season, low stream flows.		
Support of vegetation	MODERATE: While the interaction between Jenkins Creek and its hyporheic zone is generally quite good, the gravelly outwash soils that tend to be present in the hyporheic zone and throughout the basin can be so well- draining and poor at wicking water upward that plants growing above these gravelly soils can be deprived of water even when an active water table is near the surface. Riparian wetlands would not be expected to extend far upslope under such conditions.		
Sediment storage	MODERATE/HIGH: Good interaction between the hyporheic zone and stream flows allows good potential for filtration of interflow and hyporheic flow, and thereby sediment storage. If sediment loading is too high, however, gravels of the hyporheic zone could become clogged, their sediment storage capacity used up, and the overall functioning of the hyporheic zone impaired.		
Habitat			
Physical space and conditions for life history	HIGH: Though second-growth, the forest in the City's Jenkins Creek shoreline area provides habitat of good quality and complexity and in good quantity for fish and wildlife. The forested vegetative community is complex and maturing, with accumulating downed wood and snags, resulting in more places for various wildlife species to find cover or suitable nesting and rearing sites. This increase in dense shoreline vegetation increases the quantity and quality of habitat available for use by terrestrial species (birds, mammals, amphibians) since cover, food, nesting sites, travel corridors, etc. are available and functioning.		
	Within the stream channel itself, an increase in logs and overall wood similarly results in more available protective cover, the creation of pool/riffle sequences, and an increase in habitat complexity as described above. Shallow, low-energy aquatic areas provide critical rearing, foraging, and refuge habitat for amphibians and juvenile fish, particularly salmonids.		
Food production and delivery	HIGH: The natural forest in the City's Jenkins Creek shoreline area should provide the food production that native wildlife are adapted to, including native seed- and fruit-bearing vegetation from wetland, floodplain, and upland areas. Not only does such vegetation provide food directly for terrestrial wildlife, but it is a source of insects and other organic matter that drop into the water and provide food, either directly or indirectly, for fish and other aquatic life. Emergent wetland areas associated with side channels, backwaters, and extensive floodplain wetlands also provide productive foraging areas for juvenile fish, small mammals, wading birds, and waterfowl.		

5.8 PANTHER LAKE

As previously mentioned, Panther Lake has been inventoried and analyzed by King County as part of its SMP update. The entire lake is in unincorporated King County, and within the City's PAA. The following table shows the results of King County's function analysis of Panther Lake.

Lake Reach Quality Element	Quality Rating	
Light energy	Medium High on west shore	
	High on remainder of lake	
Large woody debris	Low Medium on south shore	
	Medium on north shore	
	Medium High on west shore	
	High on east shore	
Nitrogen	High	
Pathogens	Medium High	
Phosphorus	Medium on north/south shores	
	Medium High on east/west shores	
	[lake is on Ecology's 303(d) list for total phosphorus]	
Wave energy	High	
Toxins	High on east shore	
	Medium High on north, south and west shores	
Sediment	Medium on north/south shores	
	Medium High on east/west shores	
Hydrologic cycle	Medium	
Overall	High on east shore	
	Medium High on remainder of lake Note: See illustration in Exhibit 10 below	

Table 21. Ecological Function Summary for Panther Lake in Kent's PAA.

Source: King County iMAP, results of King County's shoreline functions modeling



Exhibit 10. King County's overall shoreline function rating of the Panther Lake PAA (from King County iMap).

6.0 LAND USE ANALYSIS

As noted in Section 3.1, land use patterns are an important consideration in SMP analysis because such analysis can identify opportunities for "preferred uses", especially water dependent, water oriented and water enjoyment uses. Land uses adjacent to the water are also a determinant in assigning environment designations to specific sections of the shoreline. WAC 173-26-201(2)(d) requires future uses to be consistent with preferred uses. Additionally, an analysis of land use conditions is necessary to determine potential land use changes and their effect on shorelines with respect to SMA objectives. Finally, the existing land uses and proposed environment designation boundaries and provisions must be mutually consistent with Kent's comprehensive plan.

This section examines the data gathered in the inventory and describes likely land uses and comprehensive plan designations and implications for shoreline management for each segment. The analysis begins with the "Unit" classifications described in the inventory section, but describes specific segments in more detail. The unit classifications are:

- Unit A Open Space: contains land areas in shoreline jurisdiction generally dominated by Parks and Open Space (OS) and Urban Separator (US) zoned lands.
- Unit B High Intensity: contains land areas in shoreline jurisdiction generally dominated by Commercial (C) and Industrial (I) zoned lands.
- Unit C Residential: contains land areas in shoreline jurisdiction generally dominated by Single Family (SF), Medium Density Multifamily (MDMF), Mobile Home Park (MHP), and Low Density Multifamily (LDMF) zoned lands.
- Unit D Agricultural: contains land areas in shoreline jurisdiction generally dominated by Agricultural Resource (AG-R) and Agricultural Support (AG-S) zoned lands

6.1 GREEN RIVER

6.1.1 Unit A – Open Space

Table 22. Likely changes in land use and implications for shoreline management by sub-unit in
Green River Unit A – Open Space.

Sub-Unit see Figures 3a-3c)	Likely Changes in Land Use	Implications for Shoreline Management
A-1. Open space area on the east side of the river to the north and south of South 277 th Street bounded by the City limits	This area is designated as Urban Separator (US), so therefore may redevelop with low density residential or clustered residential with the possibility of some low intensity commercial.	Urban Conservancy – Low Intensity appears to be the most appropriate environment designation for this segment. Special attention should be paid to addressing new development in Urban Separator areas. It may be that special environmental protections should be placed on the new development.
A-2. Foster Park is on the north side of the river generally west of the railroad line and east of the Valley	There are no likely changes in land use, except for minor park improvements and potentially some environmental restoration. The City should consider changing the land	Urban Conservancy – Open Space appears to be the most appropriate environment designation for this segment, although the land use designation is Industrial.

Sub-Unit see Figures 3a-3c)	Likely Changes in Land Use	Implications for Shoreline Management
Freeway (SR 167)	use designation to Open Space because it currently has an Industrial designation.	
A-3. Riverview Park is on the north and east side of the river just west of the Valley Freeway (SR 167)	There are no likely changes in land use, except for minor park improvements and potentially some environmental restoration.	Urban Conservancy – Open Space appears to be the most appropriate environment designation for this segment.
A-4. Undeveloped area on south river bank with tributary west of Valley Fwy (SR 167)	Land use change in this area is unlikely because most of the shoreland area is also a stream corridor. This area is designated AG- S, however, so some low intensity commercial development may occur.	Urban Conservancy – Low Intensity appears to be the most appropriate environment designations for this segment. Special attention should be paid to addressing new development in Urban Separator areas. It may be that special environmental protections should be placed on the new development. A portion of this area is a designated wetland and is therefore protected under the Critical Area Ordinance.
A-5. The Riverbend Golf Complex	This area is unlikely to change as this is designated as OS (Open Space) in the Comprehensive Plan.	Urban Conservancy – Open Space appears to be the most appropriate environment designation. It will be important to ensure that there are provisions for golf courses in the SMP.
A-6. Golf course and open space on the south and west side of the river from the city limits south of W. Meeker St. to the industrial area north of the golf complex	The area that is designated OS (Open Space) is unlikely to change, but the area designated US (Urban Separator) has the potential to be redeveloped unless the land use designation is changed.	Urban Conservancy – Open Space appears to be the most appropriate environment designation for this segment. The City might consider changing the land use designation for Old Fishing Hole Park from Urban Separator to Open Space. It will be important to ensure that there are provisions for golf courses in the SMP.
A-7. Open space on the west side of the river from Cottonwood Grove Park to the residential area approximately 2,400' north of S 228 th Street	This area is designated as Urban Separator (US), so therefore may redevelop with low density residential or clustered residential with the possibility of some low intensity commercial.	Urban Conservancy – Low Intensity appears to be the most appropriate environment designations for this segment. Special attention should be paid to addressing new development in Urban Separator areas. It may be that special environmental protections should be placed on the new development.
A-8. Green River Natural Resource Area	This area is unlikely to change as it is in public ownership and used for water quality and natural resource purposes. The area is designated OS.	Urban Conservancy – Open Space appears to be the most appropriate environment designation for this segment. It will be important to ensure the SMP includes provisions for this facility.

Sub-Unit	Likely Changes in Land Use	Implications for Shoreline Management
A-9. Valley Floor Community Park	The park is likely to remain a park, but will likely develop with more active uses, although perhaps not within shoreline jurisdiction. There are opportunities to increase public access and increase opportunities for water-dependent recreational uses when this park is improved. Environmental restoration should also be considered.	Urban Conservancy – Open Space appears to be the most appropriate environment designation for this segment. It will be important to ensure that there are provisions for park maintenance in the SMP.
A-10. Green River Trail north of S 212 th St and south of Russel Road	The Green River Trail corridor is unlikely to develop as it is designated OS. The underdeveloped industrial land may develop, but it is outside shoreline jurisdiction.	Urban Conservancy – Open Space appears to be the most appropriate environment designation for this segment.
A-11. Future North Green River Park on the east shoreline just south of the City limits.	This area is unlikely to change land uses. The only changes might include some park improvements.	Urban Conservancy – Open Space appears to be the most appropriate environment designation for this segment. It will be important to ensure that there are provisions to accommodate new trail connections in the SMP.
PAA-A-1. Area within the PAA and City Limits north and east of the river at the easternmost segment of the Green River shorelands within the City and PAA	The area that is designated OS (Open Space) is unlikely to change, but the area designated US (Urban Separator) has the potential to be redeveloped to low density residential or clustered residential unless the land use designation is changed	Urban Conservancy – Open Space appears to be the most appropriate environment designation for the area that is designated OS. Urban Conservancy – Low Intensity appears to be the most appropriate environment designation for the area designated US. Special attention should be paid to addressing new development in Urban Separator areas. It may be that special environmental protections should be placed on new development.

6.1.2 Unit B – High Intensity

Table 23. Likely changes in land use and implications for shoreline management by sub-unit in
Green River Unit B – High Intensity.

Sub-Unit see Figures 3a-3c	Likely Changes in Land Use	Implications for Shoreline Management
B-1. Industrial area north of the river from commercial lot east of Central Ave, generally west and north to Foster Park	With the Industrial land use designation and predominance of industrial activities, it is likely that underdeveloped shoreline properties (approximately 1,000 feet of shoreline) will, over time, convert to large- to moderate-scale industrial uses.	High Intensity appears to be the most suitable environment designation, perhaps with an Urban Conservancy – Open Space parallel environment for the trail corridor. A new section of trail between S 266 th St and S 259 th St should also be Urban Conservancy – Open Space. The Cumulative Impact

Sub-Unit see Figures 3a-3c	Likely Changes in Land Use	Implications for Shoreline Management
		Analysis should identify the impacts of roughly 1,000 ft ² of underutilized lots being converted to industrial uses. Regulations should ensure that adverse impacts to the shoreline are avoided.
B-2. Industrial area south of the river just east of the Valley Freeway (SR 167)	With the Industrial land use designation and predominance of industrial activities, it is unlikely that property in this area will change use.	High Intensity appears to be the most suitable environment designation, perhaps with an Urban Conservancy – Open Space parallel environment for the trail corridor.
B-3. Industrial area north of the river just east of the Valley Freeway (SR 167) located between Foster Park and Riverview Park	With the Industrial land use designation and predominance of industrial activities, it is unlikely that property in this area will change use.	High Intensity appears to be the most suitable environment designation. Development regulations should address modifications to industrial uses to ensure that environmental conditions are improved as the site is redeveloped.
B-4. Small industrial area north of the river between the Valley Freeway (SR 167) and SR 181.	With the Mixed Use (MU) land use designation and predominance of industrial activities, it is unlikely that property in this area will change use.	High Intensity appears to be the most suitable environment designation for the industrial area and Urban Conservancy – Open Space appears to be the most suitable environment designation for the trail corridor. Development regulations should address modifications to industrial uses to ensure that environmental conditions are improved as the site is redeveloped.
B-5. Industrial area located along Russell R. north of S. 228 th St and south of the GRNRA	With the Industrial land use designation and predominance of industrial activities, it is unlikely that property in this area will change use. Russell Road is located in shoreline jurisdiction in this area. The comprehensive plan designation is OS (Open Space) in the Green River Trail corridor area.	High Intensity appears to be the most appropriate environment designation for the industrial areas and Urban Conservancy – Open Space appears to be the most appropriate designation for the Green River Trail corridor. Russell Road will also need to be considered.
B-6. Industrial area along east side of the river north of S 200 th St.	It is unlikely that these relatively new facilities will change in the foreseeable future.	High Intensity appears to be the most appropriate environment designation. Urban Conservancy – Open Space appears to be the most appropriate designation for the Green River Trail corridor.
B-7. Industrial and commercial area east of SR 181 and south of SW 43 rd St	The commercial parcel will likely develop in the near future. It is also likely that the single-family residence will redevelop into an industrial use at some point in the future. The hotel is unlikely to change because it appears to be a fairly new building.	High Intensity appears to be the most appropriate environment designation
PAA-B-1. Shorelands in the potential annexation area (PAA)	This area is designated Industrial in King County's Comprehensive Plan so it is likely to remain in industrial use.	High Intensity appears to be the most appropriate environment designation. It is important to add SMP provisions that ensure that shoreline conditions in this

Sub-Unit see Figures 3a-3c	Likely Changes in Land Use	Implications for Shoreline Management
generally south of the river and west of the Valley Freeway (SR 167)		area are upgraded if it redevelops.

6.1.3 Unit C – Residential

Table 24. Likely changes in land use and implications for shoreline management by sub-unit in Green River Unit C – Residential.

Sub-Unit see Figures 3a-3c	Likely Changes in Land Use	Implications for Shoreline Management
C-1. Residential area north and west side of the Green River east of Central Ave	The Comprehensive Plan designation is Medium Density Multifamily and Mobile Home Park. There are no likely land use changes because the current land uses fit the comprehensive plan.	Shoreline Residential for the residential area and Urban Conservancy – Open Space for the trail corridor appear to be the most appropriate environment designations, perhaps with parallel environments. There is little or no opportunity for conversion to water- oriented uses. It is not likely that redevelopment would cause impacts or contribute to cumulative impacts.
C-2. Residential area on north side of the river from one property west of SR 181 to the golf course at Russell Rd	There is little likelihood of a change in land use because the residences are relatively new and they are consistent with the MDMF (Medium Density Multifamily) land use designation.	There is little potential for negative impacts due to new development. Urban Conservancy – Open Space would be an appropriate designation for the trail portion of the segment and Shoreline Residential would be the most appropriate environment designation for the residential portion.
C-3. Residential area on east side of River from James Street north to S 228 th Street	There is little likelihood of a change in land use because the residences are relatively new and they are consistent with the LDMF (Low Density Multifamily) land use designation.	There is little potential for negative impacts due to new development. Urban Conservancy – Open Space for the trail portion and Shoreline Residential for the residential portion appear to be the most appropriate environment designations.
C-4. Residential area on west side of River south of S 216 Street	There will be approximately 1,000 feet of new residential development with perhaps about 20 new homes in this segment. These new homes will all be separated from the shoreline by the existing frontage road, Frager Road.	Shoreline Residential appears to be the most appropriate environment designation for this area. Regulations for shoreline development should address impacts due to new development, although in this case, the new development will be separated from the shoreline by Frager Road.
C-5. Recreational Vehicle (RV) Campground (KOA) on east side of the river south of S. 212 th St. and north of the GRNRA	This use is somewhat an anomaly in this area and so may change in spite of the current comprehensive plan designation. Because of the industrial uses around it, it may be developed as industrial although the GRNRA is a local amenity and so	This area might best be designated as Urban Conservancy – Low Intensity. The property only occupies about 300 feet of shoreline jurisdiction.

Sub-Unit see Figures 3a-3c	Likely Changes in Land Use	Implications for Shoreline Management
	multifamily housing might be a possibility.	

6.1.4 Unit D – Agricultural

Table 25. Likely changes in land use and implications for shoreline management by sub-unit in Green River Unit D – Agricultural.

Sub-Unit	Likely Changes in Land Use	Implications for Shoreline
see Figures 3a-3c		Management
D-1. South of the river just west of Valley Freeway (SR 167)	This area is designated as AG-S and AG-R, so some agricultural-related low intensity commercial development may occur.	Urban Conservancy - Low Intensity, or some other designation that recognizes agricultural activities, would be an appropriate environment designation.
D-2. Agricultural activities on the west side of the river from Riverbend Golf Course to Cottonwood Grove Park	This area is designated as Urban Separator (US), so therefore may redevelop with low density residential or clustered residential with the possibility of some low intensity commercial.	Urban Conservancy – Low Intensity, or some other designation that recognizes agricultural activities, would be an appropriate environment designation.
D-3. Agricultural area on west side of river south of S. 212 th Street	This area is being redeveloped into single-family houses. Since this area comprises approximately 2,000 linear feet of shoreline, it is conceivable that 20 to 40 new dwelling units might fall within shoreline jurisdiction. They would be separated from the shoreline by a frontage road.	Shoreline Residential seems to be an appropriate environment designation for this area. SMP regulations should address public access and environmental restoration opportunities when multi-lot development takes place.
D-4. Agricultural lands north of Valley Floor Community Park	This area is designated US (Urban Separator) and AG-R, so therefore may redevelop with low density residential or clustered residential with the possibility of some low intensity commercial	Urban Conservancy –Low Intensity appears to be the most appropriate environment designation for this area. Special attention should be paid to addressing new development in this area. It may be that special environmental protections should be placed on new development.

6.2 BIG SOOS CREEK

6.2.1 Likely Changes in Land Uses

This area is designated "Urban Separator" so therefore may redevelop with low density residential or clustered residential with the possibility of some low-intensity commercial.

6.2.2 Implications for Shoreline Management

The creek and adjacent shorelands lie within the Comprehensive Plan's Urban Separator designation (see Figure 3d) which "is reserved for low-density lands that define community or municipal identities and boundaries, protect adjacent resource lands, rural areas, and environmentally sensitive areas, and create open space corridors within and between urban areas which provide environmental, visual, recreational and wildlife benefits." Shoreline regulations should be prepared to ensure that the environment is not degraded with any potential new development, and consider restricting or prohibiting development in the channel migration zone or other flood hazard areas.

6.3 LAKE MERIDIAN

6.3.1 Likely Changes in Land Uses

Unit A - Open Space is unlikely to change because Lake Meridian Park is designated as OS (Open Space) in the Comprehensive Plan and the SF-planned wetland area is owned by the City of Kent and should likely be redesignated as Open Space. Unit C - Residential has a few lots that are either underdeveloped or could possibly be subdivided, although the effect on the overall land use would be minimal (See Figure 3e).

6.3.2 Implications for Shoreline Management

Urban Conservancy – Open Space appears to be the most appropriate environment designation for Unit A – Open Space (Lake Meridian Park) and Shoreline Residential appears to be the most appropriate environment designation for Unit C - Residential. Shoreline provisions should address shoreline modifications associated with single-family residences, such as decks, shoreline stabilization, and vegetation conservation. Provisions should call for public access and environmental restoration in the event that the mobile home park is redeveloped as multi-family dwellings.

6.4 LAKE FENWICK

6.4.1 Likely Changes in Land Uses

Changes in land use are unlikely within Kent jurisdiction and in the lands designated King Co. Other Parks/Wilderness. However, the residential-designated area within the PAA has the potential to redevelop and possibly increase in density (see Figure 3f).

6.4.2 Implications for Shoreline Management

The SMP provisions should address the residential properties and potential increase in residential development. Natural or Urban Conservancy – Open Space appear to be appropriate environment designations for the Unit A - Open Space areas within City limits. The residential areas within City limits and within King County jurisdiction should be designated as Shoreline Residential, but special environmental restrictions should be considered. For example, the first 100 feet closest to the shoreline might be designated Urban Conservancy – Open Space or Low Intensity.

6.5 GREEN RIVER NATURAL RESOURCES AREA POND

6.5.1 Likely Changes in Land Uses

Changes in land uses are unlikely. This site is in public ownership and used for water quality and natural resource purposes. There is a small utility property within shoreline jurisdiction (see Figure 3h).

6.5.2 Implications for Shoreline Management

This is a public facility developed and managed for priority uses, namely: water quality, flood control, wildlife enhancement, and public access. Urban Conservancy – Open Space may be an appropriate designation for areas within the GRNRA. Provisions should be made to consider maintenance and restoration activities of the GRNRA.

6.6 SPRINGBROOK CREEK

6.6.1 Likely Changes in Land Uses

No changes are likely, as this land is designated Industrial/Industrial Park. The two developable parcels are already built out. The two undeveloped, narrow parcels on either side of the stream are dedicated open space.

6.6.2 Implications for Shoreline Management

High Intensity appears to be an appropriate environment designation for the developed parcels, with an Urban Conservancy – Open Space assigned to the City-owned parcels.

6.7 JENKINS CREEK

6.7.1 Likely Changes in Land Uses

No changes are likely, as this land is protected for water supply purposes (see Figure 3d).

6.7.2 Implications for Shoreline Management

Urban Conservancy – Open Space or Natural would be an appropriate designation for this segment.

6.8 PANTHER LAKE

6.8.1 Likely Changes in Land Uses

The north, northeast, and southern tip of the lake are within the Urban Separator land use classification. This area may therefore redevelop with low density residential or clustered residential with the possibility of some low intensity commercial. On the west side of the lake, in the area with a residential land use designation, there is approximately 1,200 linear feet within shoreline jurisdiction that is currently underdeveloped and therefore has the potential to develop into residential uses. The development pattern will likely be similar to the residential development along the southwest corner of the lake (see Figure 3g).

6.8.2 Implications for Shoreline Management

Urban Conservancy – Low Intensity appears to be the most appropriate environment designation for the areas with the Urban Separator land use designation. Shoreline Residential would be the most appropriate environment designation for the areas with a residential land use classification. Regulations for shoreline development should address impacts due to new development in the residential areas. King County assigned the entire area around Panther Lake an environment designation of Residential Shoreline.

7.0 SHORELINE MANAGEMENT RECOMMENDATIONS

The following are recommended actions for translating inventory and characterization findings into proposed SMP policies, regulations, environment designation boundaries and restoration strategies.

7.1 SHORELINE MASTER PROGRAM

7.1.1 Environment Designation Provisions

- Recommendations for specific shoreline segments are discussed in Chapter 6.0 in Tables 22 through 25.
- Consider defining two different Urban Conservancy (UC) environments to address different concerns in the parks, agricultural areas and natural areas in the City. Urban Conservancy Open Space would apply to parks and open spaces. Urban Conservancy Low Intensity would apply to areas with land use designations of Urban Separator (US) and Agriculture (AG-S or AG-R). These areas tend to be underdeveloped but have the potential to experience low-density development. It may be that special environmental protections should be placed on new development in these areas. Also, the GRNRA area must accommodate a different variety of activities from the construction and maintenance of water quality facilities to natural habitat, so some special provisions for it may be useful. Identify a specific environment designation for wetlands not contiguous with other shorelands. There are several options for addressing this depending on the structure of SMP critical area provisions. It will be especially important to make the requirements for non-contiguous wetlands clear to permit applicants in this case.
- Incorporate parallel environments for sections along the Green River Trail.
- Pre-assign environment designations to potential annexation areas (PAAs) within the UGA. Coordinate with King County to identify the differences between County environment designations and the City's future designations.

7.1.2 General Policies and Regulations

Critical Areas Regulations

• Incorporate or reference the City's critical areas regulations in the Master Program. Address the fact that there are a number of wetlands potentially in SMA jurisdiction (depending on the FEMA floodplain determination) so these regulations could apply to wetlands located outside the primary jurisdictional areas and distant from the shoreline waterbodies.

Flood Hazard Management Regulations

- Ensure that the SMP reflects the flood hazard reduction elements in the City's current Comprehensive Emergency Management Plan and is current with the efforts to maintain a 100-year rating on the Green River levee. See also Section 7.3 Shoreline Modifications – Levees.
- Consider restricting or prohibiting development within channel migration zones and other flood hazard areas.

Parking Regulations

• Prepare provisions that accommodate parking for trail users. In many places, parking may be advantageously located outside jurisdiction, but some places, it may be necessary to develop parking in shoreline jurisdiction. The Green River Trail is a regional facility and part of a trail system of state-wide importance. It is expected that people from distant locations will want access to the trail.

Public Access

• Work with the Parks department to identify improvements to increase the quality of public access. Kent's shorelines are graced with excellent public access features. Besides the Green River Trail, there are numerous parks along the river that provide a variety of opportunities from passive enjoyment, nature study, fishing, boating and active sports. Lake Meridian Park has a boat launch that is a favored spot for water-skiers. Lake Fenwick's shorelines are currently dominated by a City park that offers fishing and other passive activities. Given this wealth of existing facilities, a public access plan was not prepared. Provisions for water-enjoyment uses and recreation uses should allow appropriate park and recreation improvements and encourage water-enjoyment uses along appropriate sections of the shoreline.

Shorelines of Statewide Significance

• Refer to or incorporate Shorelines of Statewide Significance priorities of RCW 90.58.020 in the SMP policies. The Green River is a Shoreline of Statewide Significance; provisions for shorelands of that water body must address the priorities in section 90.58.020 RCW. The Green River Trail is part of a regional trail system that is used by people from all over Puget Sound. Given this perspective, the trail is meeting the criteria of providing a resource of statewide significance. Additionally, Kent's portion of the Green River Valley is home to a wide variety of important industrial companies and activities and flood hazard reduction is a concern of relevance to the state. Finally, as a corridor for migrating listed salmon species, habitat restoration and water quality improvements are in the broader statewide interest. By giving priority to these shoreline functions, the Master Program can comply with shorelines of statewide interest policy.

Water Quality

- Include policies to address water quality issues that lie outside SMA jurisdiction.
- Identify measures that can be taken to improve water quality, especially in Lake Meridian and the Green River.

• Integrate City's NPDES stormwater activities with shoreline planning, either as part of the SMP or the Restoration Plan.

Vegetation Management

- Include provisions to retain and enhance shoreline vegetation around Lake Meridian, Lake Fenwick, and, upon annexation, Panther Lake.
- Identify measures to enhance vegetation on the Green River levees, acknowledging that levee maintenance places special constraints on the planting of vegetation.
- Include provisions for the control of noxious aquatic weeds, especially on Lake Meridian and Lake Fenwick. If necessary, include in the SMP policies calling for public actions to address noxious aquatic weeds.

7.2.7 Low Impact Development and "Green Building" Practices

• Coordinate with City staff to make sure that SMP provisions support the City's goal of encouraging environmentally responsible development.

7.1.3 Shoreline Modification Provisions

Shoreline Stabilization

• Explore a range of solutions to reduce the amount of bulkheads and shoreline armoring over time around Lake Meridian. Water depth and erosion concerns vary greatly around the lake.

Levees

• Include provisions for levee maintenance that, to the extent possible, encourages the restoration of ecological functions. See the Shoreline Restoration Plan.

Shoreline Restoration

• Include provisions encouraging applicable shoreline restoration activities.

Piers, Docks and Floats

- Include provisions related to dock expansion and replacement, especially on Lake Meridian. Explore issues related to the police boat ramp on Lake Meridian.
- Determine if further piers or docks are part of Parks Department plans.
- Pier regulations should be consistent with Washington Department of Fish and Wildlife design standards, and should recognize local issues related to fluctuating water levels and corresponding depth.
- Address piers and docks on Panther Lake through coordination with King County.

Shoreline Modifications in the GRNRA

- Ensure that SMP provisions continue to allow water quality and habitat conservation activities in the GRNRA. This area is highly managed to achieve multiple public functions and upgrade habitat in a controlled setting. Typical activities that should be accommodated include:
 - 1. Dewatering of lagoon and constructed wetlands
 - 2. Pumping water onto and from the mudflats.

- 3. Managing invasive vegetation through tilling and sparing use of herbicides.
- 4. Irrigating native plants with water from storm water pond.
- 5. Conserving native plant communities through a variety of activities including thinning.
- 6. Installing raised planting beds.
- 7. Trapping undesirable wildlife.
- 8. Conducting studies to monitor wildlife usage.

Transportation/Utilities/Levee Repair

• Include provisions for public transportation and utilities repair and maintenance in the shoreline jurisdiction. In particular, the SMP should take care to encourage and enable levee repair proposals to incorporate restoration while still accommodating the regionally valuable Green River Trail.

7.1.4 Shoreline Uses

Agriculture

• Include provisions for selected applicable agricultural activities. There are a few sections of shoreline that feature small agricultural activities such as nurseries. The Comprehensive Plan includes land use designations that allow for agricultural support activities. The SMP should address these uses within the limited context envisioned in Kent's Comprehensive Plan.

Boating Facilities

- Include provisions for boat ramps.
- Address the issue of boating impacts on Lake Meridian and see piers and docks discussion above.

Industry

• Address impacts of industrial development on the Green River. This may not be a substantial concern because most industrial uses do not front directly on the shoreline. However, development standards for industrial uses should be included for those few cases where they do front on the shoreline. Additionally, standards may be necessary to ensure that industrial uses adjacent to the Green River Trail do not impact that corridor.

Recreation

- Work with the Parks Department to identify issues related to park development. City parks provide many opportunities for shoreline restoration and can serve as demonstration projects to the greater public. Policies and regulations related to parks management should provide clear preferences for shoreline restoration consistent with public access needs and uses. Existing natural parks should be protected and enhanced.
- Include provisions for golf course to reduce impacts and encourage restoration near the shoreline.

Residential Development

• Address building setbacks, shoreline armoring, piers and docks and vegetation conservation for residential properties. Urban lakes, including Lake Meridian in Kent, have been impacted by nearshore vegetation removal, shoreline armoring, and piers. The SMP should consider

developing regulations that encourage or require shoreline restoration when specific new development or redevelopment activities are proposed. A standard buffer and/or setback should be developed, with an aggressive but practical list of buffer/setback reduction options that would result in a net improvement in shoreline functions. These might include removal of bulkheads, shoreline plantings, landscape chemical reduction or elimination, and removal of other near shore impervious surfaces, among others.

• Explore a range of options to address differing conditions, especially on Lake Meridian.

Water Enjoyment Commercial Uses

- Address opportunities for including more uses that increase opportunities for public enjoyment of the shoreline. For example, restaurants and cafes and other retail activities that orient toward the water should be addressed. Identify opportunity sites and include SMP provisions specifically allowing such uses. Discuss with Parks Department the possibility of concessions for small eating and drinking establishments as part of park development.
- Include provisions for public transportation and utilities development in the shoreline jurisdiction.

7.2 **RESTORATION PLAN**

The Restoration Plan should be prepared consistent with 173-26-201(2)(f)(i-vi) by addressing the following six subjects:

(i) Identify degraded areas, impaired ecological functions, and sites with potential for ecological restoration;

The discussions of degraded areas, impaired functions, and opportunity areas included in this report should be carried forward to the Restoration Plan.

(ii) Establish overall goals and priorities for restoration of degraded areas and impaired ecological functions;

A recommended starting point for development of restoration goals and priorities is the WRIA 9 products. Although the WRIA 9 work is largely salmon-focused, many of the salmon-related goals, policies, and other actions benefit other fish and wildlife as well. The WRIA 9 goals and policies should be examined and supplemented as needed to ensure that these goals are appropriate and comprehensive, not just for application to the Green River and Big Soos Creek, but also to the lakes and other streams that receive less attention in those documents.

(iii) Identify existing and ongoing projects and programs that are currently being implemented, or are reasonably assured of being implemented (based on an evaluation of funding likely in the foreseeable future), which are designed to contribute to local restoration goals;

There are numerous City programs and numerous outside organizations that are actively engaged in planning and implementing projects that could directly or indirectly contribute to achievement of restoration goals. Some of these are identified briefly in this report and should be expanded upon in the Restoration Plan (e.g., CIP projects planned by the City's Public Works Department). A special effort should be made to ensure that all City departments are contacted to identify additional projects or programs. Further, other organizations should be contacted to determine what projects or programs may be implemented in the future that would have a positive affect on shoreline ecological functions.

(iv) Identify additional projects and programs needed to achieve local restoration goals, and implementation strategies including identifying prospective funding sources for those projects and programs;

The degraded areas, impaired ecological functions, and sites with potential for ecological restoration identified under (i) above, and not addressed by any of the programs and projects identified in (iii) above, could be translated into additional projects and programs that the City should evaluate for implementation potential. Often, implementation of projects and programs is dependent on annual budgets, grant funding, partnerships with other entities, and unexpected "windfalls." The City should clearly identify and then pursue potential partners for implementation of certain projects or programs.

- (v) Identify timelines and benchmarks for implementing restoration projects and programs and achieving local restoration goals; and
- (vi) Provide for mechanisms or strategies to ensure that restoration projects and programs will be implemented according to plans and to appropriately review the effectiveness of the projects and programs in meeting the overall restoration goals.

The City should identify timelines and benchmarks for each project and program. For some planned actions, such as implementation of CIP projects, this may be easy. For other projects and programs that are the responsibility of outside organizations or that do not have a clear City authority, timelines and benchmarks may of necessity be vague and speculative. Despite the uncertainty inherent in timelines, identifying the timelines and benchmarks shows a commitment to long-term restoration goals.

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9.0 LIST OF ACRONYMS and ABBREVIATIONS

- Corps.....U.S. Army Corps of Engineers
- EcologyWashington Department of Ecology
- GMAGrowth Management Act
- HPA.....Hydraulic Project Approval
- KCCKent City Code
- LWDLarge Woody Debris
- NOAA Fisheries......National Marine Fisheries Service
- NRCSNatural Resources Conservation Service
- PAA.....Potential Annexation Area
- PAHspolycyclic aromatic hydrocarbons
- PCBspolychlorinated biphenyls
- PHSPriority Habitats and Species
- SMA.....Shoreline Management Act
- SMP.....Shoreline Master Program
- USFWSU.S. Fish and Wildlife Service
- WDFW Washington Department of Fish and Wildlife

APPENDIX A

INFORMATION REQUEST LETTER AND DISTRIBUTION LIST



COMMUNITY DEVELOPMENT Fred N. Satterstrom, AICP Director

PLANNING SERVICES Charlene Anderson, AICP Manager

> Mailing Address: 220 Fourth Ave. S. Kent, WA 98032-5895

> > Location Address: 400 West Gowe Kent, WA 98032

Phone: 253-856-5454 Fax: 253-856-6454 July 20, 2007

RE: City of Kent Shoreline Inventory and Assessment, request for existing information Green River, Lake Meridian and Big Soos Creek

Dear Stakeholders:

The City of Kent is in the early stages of examining its Green River, Lake Meridian and Big Soos Creek Shorelines for the purposes of updating its Shoreline Master Program per requirements of the Washington State Department of Ecology. We have recently hired MAKERS and The Watershed Company to assist with Shoreline characterization, analysis, and regulatory review. A Shoreline inventory, conducted by biologists from The Watershed Company, will be the first step. The products of the inventory include a map portfolio and a report characterizing ecological functions and ecosystem-wide processes, among other things.

The City is requesting your help in obtaining all existing physical and biological information regarding Green River, Lake Meridian and Big Soos Creek; their associated riparian and wetland areas; and other water relevant watershed or basin information. We are interested in any and all inventories, assessments, water quality analyses, and/or fish and wildlife distribution and habitat information. A map identifying the City's Shorelines is attached.

We are hoping to assemble our inventory by October 31, 2007 in order to complete the necessary characterization and analysis, and resultant recommendations, in a timely manner. Because we are hoping to reduce redundant data collection at the field level, a response would be appreciated by August 15, 2007. If possible, please provide hard copies or electronic files of any studies instead of a list of citations; contact the City if a copy fee is required. If you believe that another individual within your organization would be a more appropriate contact for this solicitation, please forward this letter to that individual, and notify us of the change in contact.

If you have any questions or need additional information, please feel free to contact me at (253) 856-5431 or canderson@ci.kent.wa.us.

Sincerely,

Charlene Anderson, AICP Planning Manager

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ADOPT A STREAM 600 128 ST SE EVERETT WA 98208

AMERICAN RIVERS NORTHWEST REGIONAL OFFICE 150 NICKERSON ST, SUITE 311 SEATTLE WA 98109

CASCADE BICYCLE CLUB PO BOX 15165 SEATTLE WA 98115

CASCADE LAND CONSERVANCY 615 SECOND AVE, #525 SEATTLE WA 98104

FRIENDS OF THE GREEN RIVER 10510 11 AVE NE SEATTLE WA 98125

GREEN/DUWAMISH & CENTRAL PUGET SOUND WATERSHED SALMON HABITAT CONSERVATION(WRIA) 9 201 S JACKSON ST, #601 SEATTLE, WA 98104-3855

KING CONSERVATION DISTRICT 935 POWELL AVE SW RENTON WA 98057

KING COUNTY DEPT OF NATURAL RES & PARKS PARKS AND RECREATION DIV 201 S JACKSON ST, #700 SEATTLE WA 98104

KING COUNTY DEPT OF NATURAL RES & PARKS WATER & LAND RESOURCES DIV GREEN RIVER FLOOD CONTROL ZONE 201 S JACKSON ST, #600 SEATTLE WA 98104

KING COUNTY DEPT OF NATURAL RES & PARKS WATER & LAND RESOURCES DIV DOUG OSTERMAN, WRIA 9 201 S JACKSON ST, #600 SEATTLE WA 98104 KING COUNTY DEPT OF NATURAL RES & PARKS WATER & LAND RESOURCES DIV JOSH KAHAN, GREEN RIVER BASIN 201 S JACKSON ST, #600 SEATTLE WA 98104

LAKE MERIDIAN COMMUNITY ASSOC 12946 KENT KANGLEY RD, #132 KENT WA 98031

WA DEPT OF FISH & WILDLIFE PRIORITY HABITATS AND SPECIES LORI GUGGENMOS 600 CAPITOL WAY N OLYMPIA WA 98501-1091

MID PUGET SOUND FISHERIES ENHANCEMENT GROUP TROY FIELDS, EXEC DIR 7400 SAND POINT WAY NE, #202N SEATTLE WA 98115

MUCKLESHOOT INDIAN TRIBE KAREN WALTERS 39015 172 AVE SE AUBURN WA 98092

NATIONAL MARINE FISHERIES TOM SIBLEY 7600 SAND POINT WAY NE SEATTLE WA 98115

NATIONAL PARKS SERVICE RIVERS, TRAILS & CONSERVATION 909 FIRST AVE, 5TH FLR SEATTLE WA 98104

RAINIER AUDUBON SOCIETY NANCY HERTZEL PO BOX 778 AUBURN WA 98071

SHARED STRATEGY FOR PUGET SOUND 1411 4TH AVE, #1015 SEATTLE WA 98101

TROUT UNLIMITED SOUTH KING COUNTY CHAPTER 115 PO BOX 3434 FEDERAL WAY WA 98003 US ARMY CORPS OF ENGRS SEATTLE DIST PO BOX 3755 SEATTLE WA 98124-3755

US EPA REGION 10 1200 6TH AVE SEATTLE WA 98101

US FISH AND WILDLIFE ROGER TABOR 510 DESMOND DR, #102 LACEY WA 98503-1263

UW CENTER FOR STREAMSIDE STUDIES BOX 352100 SEATTLE WA 98195

UW CENTER FOR URBAN WATER RESOURCES BOX 352700 SEATTLE WA 98195

UW SCHOOL OF AQUATIC & FISHERY SCIENCES SI SIMENSTAD BOX 357980 SEATTLE WA 98195

WASHINGTON DEPT OF FISH & WILDLIFE 16018 MILL CREEK BLVD MILL CREEK WA 98012-1296

WASHINGTON DEPT OF NATURAL RESOURCES REX THOMPSON PO BOX 47001 OLYMPIA WA 98504-7001

WASHINGTON DEPT OF NATURAL RESOURCES AQUATIC LANDS AND RESOURCES PROGRAM 1111 WASHINGTON ST SE, MS 47027 OLYMPIA WA 98504-7027

WASHINGTON STATE DEPT OF NATURAL RESOURCES BOYD POWERS, EXTERNAL SEPA PO BOX 47015 OLYMPIA WA 98504-7015 WASHINGTON TRAILS ASSOC 1305 FOURTH AVE, #512 SEATTLE WA 98101-2401

WASHINGTON TROUT PO BOX 402 15629 MAIN ST NE DUVALL WA 98019

.

WASHINGTON WATER TRAILS ASSOC 4649 SUNNYSIDE AVE N #305 SEATTLE WA 98103-6900

SIERRA CLUB NW OFFICE 180 NICKERSON ST, #202 SEATTLE WA 98109

MASTER BUILDERS ASSOC GARRETT HUFFMAN PO BOX 50108 BELLEVUE WA 98015

BLDG INDUSTRY ASSOC OF WA PO BOX 1909 OLYMPIA WA 98507-1909

LIVABLE COMMUNITIES COALITION JOHN MAURO 1617 BOYLSTON AVE, #201 SEATTLE WA 98122

SOOS CREEK WATER & SEWER PO BOX 58039 14616 SE 192 ST RENTON WA 98058-1039

WATER DISTRICT #111 27224 144 AVE SE KENT WA 98042

APPENDIX B

ASSESSMENT OF SHORELINE JURISDICTION


22 January 2008

Charlene Anderson City of Kent Planning Services 220 Fourth Avenue South, Suite 300 Kent, WA 98032-5895

Re: Proposed Kent Shoreline Jurisdiction

Dear Charlene:

The Watershed Company, in collaboration with City of Kent staff, has developed the attached proposed maps of shoreline jurisdiction. Under the City's current Shoreline Master Program, the Green River, Big Soos Creek, and Lake Meridian are regulated as shorelines. Existing shoreline jurisdiction includes the shorelands extending 200 feet from the ordinary high water mark and identified associated wetlands, and includes the floodway and 200 feet of adjacent floodplain where present.

The first step in updating the map of shoreline jurisdiction was to review the precise shoreline and associated wetlands definitions found in the WAC and in Washington Department of Ecology's (Ecology) rules and guidance documents. Portions of these definitions that apply to the City of Kent revolve around the size and flow thresholds for waterbodies meeting Shoreline criteria, the State Ordinary High Water Mark (OHWM) definition, and when to consider critical areas (wetlands) as "associated" with the shoreline.

Streams/River

Washington Department of Ecology's Digital Atlas was consulted to verify the upstream limits of stream and river shoreline jurisdiction based on USGS's recent study of the 20 cubic feet per second (cfs) cut-off. As in the original SMP work, the entire extent of the Green River within the City and a portion of Big Soos Creek are in shoreline jurisdiction. The Big Soos Creek shoreline jurisdiction area was modified slightly based on USGS point data, and the adjacent shorelands were projected 200 feet perpendicular to the direction of flow at that point.

USGS data placed an additional two City streams partially into shoreline jurisdiction: Springbrook Creek and Jenkins Creek. In the case of Springbrook Creek, Ecology's *proposed point* shapefile placed the upstream limit of 20 cfs approximately 100 feet downstream of the Mill Creek confluence. In the case of Jenkins Creek, Ecology's *proposed point* shapefile placed the upstream limit of 20 cfs a few hundred feet upstream of a major Jenkins Creek tributary (Cranmar Creek). Although Don Bales at Ecology indicated that the USGS points should not be shifted up- or downstream to tributaries without substantial flow data, a follow-up call was made directly to USGS (David Kresch) to discuss concerns. It was discovered that USGS' intent for C. Anderson 22 January 2008 Page 2 of 5

those points was that they fall at the Mill Creek tributary in the case of Springbrook Creek and at Cranmar Creek in the case of Jenkins Creek.

USGS seemed surprised that their points were not appearing on the shoreline waterbody in question, but, at least in our experience, up to 100 feet to the side (or even up- or downstream of USGS' intended point as discussed above). It is my understanding that USGS provided latitude-longitude data for the new points, and Ecology transcribed those into point shapefiles. That may be one source of error, or Mr. Kresch suggested that it might be a "projection error." Finally, Mr. Kresch postulated that the placement of Ecology's *proposed point* data may fall directly on the waterbody in the intended location when Ecology's 24k data layers are used, rather than the City's hydro layer. This latter possibly was investigated, and at least for Jenkins Creek and Big Soos Creek, the *proposed point* still fell in the same location regardless of whether the 24k hydro layer or the City's hydro layer was used.

Lakes

The minimum size limit for lakes to be designated as shoreline is 20 acres. Thus, as in the original SMP work, Lake Meridian is identified as a shoreline jurisdictional lake. Panther Lake, located in the City's Potential Annexation Area (PAA), also exceeds 20 acres. In addition, aerial photographs and GIS data were used to review other waterbodies within the City and its PAA to determine if they meet shoreline criteria. As a result, Lake Fenwick and the Green River Natural Resources Area were analyzed.

Lake Fenwick

According to the City's GIS layer, Lake Fenwick is just over 20 acres. However, other on-line sources and King County showed a lower area of 18 acres. The Watershed Company and two City staff adjusted the ordinary high water mark layer based on recent aerial photography, and then further adjusted the OHWM layer during a field visit by boat on 17 September 2007. The resultant acreage of Lake Fenwick is 23.6 acres.

Green River Natural Resources Area (GRNRA) Pond Complex

The Green River Natural Resources Area pond complex is a multi-celled facility with two inlets and one outlet funded and managed by the City's Public Works Department. The first cells (Cells 1-3 on the attached exhibit) at the northeast corner of the complex were constructed between 1964 and 1973 for sewage treatment. The northern-most cell (Cell 1) has overgrown with vegetation, and is now a forested wetland. Cells 2 and 3 are normally filled with water, but become partially dry in the late summer, creating mudflat habitat. Cell 5 was originally two separate primary treatment sewage lagoons divided down the center, each 16.5 acres in size. Each of the 16.5-acre lagoons contained up to 3 feet of water.

In the mid 1980s, the City began planning the conversion of the sewage treatment system into a larger stormwater storage and treament and flood control facility to improve water quality and reduce flood flows in Mill Creek. Cells 1, 2 and 3 are not part of the this stormwater and flood

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control system because of low-level contaminants (PCBs, heavy metals) that were found during site investigations prior to the GRNRA's construction. Storm and floodwater is therefore routed away from those cells and the original clay linings of those cells were left intact to minimize groundwater infiltration. Cell 5 was reconfigured into its current arrangement and Cells 4, 6, 7 and 8 were constructed in 1996. The divider between the two 16.5-acre cells was removed and one new, larger cell (Cell 5) was graded to construct a central upland peninsula with a total finished pond area of 18.7 acres at the average water depth. The northeast corner of the eastern 16.5-acre cell was separated to form what is now a stormwater settling pond (Cell 4). A new 35.2-acre lagoon (Cell 6) was constructed west of Cell 5 for flood detention, and two additional cells (Cells 7 and 8) were constructed to the south as stormwater presettling ponds.

When flood conditions are not occurring, stormwater from an 832-acre sub-basin typically flows into the presettling ponds (Cells 4, 7 & 8), then into the treatment wetland (Cell 5), and then into the detention lagoon (Cell 6) before being routed back to Mill Creek through the outflow channel. The detention lagoon (Cell 6) normally has a water level two feet lower than the constructed wetland (Cell 5), but water continuously drains from Cell 5 to Cell 6 over a sharp-crested weir set at an elevation of 23.0 feet above mean seal level (MSL).

A new diversion channel from Mill Creek was also constructed in 1996 to route flood flows into the GRNRA storage ponds. This diversion channel directs floodwaters to the northeast corner of the GRNRA where water flows first into Cell 4 during minor events, or directly into Cell 6 via the flood overflow channel whenever the flood size exceeds the 6-month event.

The ordinary high water marks of the individual cells have not been delineated. However, during a site investigation attended by Ecology, the City, The Watershed Company, and Makers on December 20, 2007, Richard Robohm (Ecology) placed the ordinary high water mark at approximately the 22.5-foot elevation in the detention lagoon (Cell 6). This estimation was based on Matt Knox (City) reporting the weir height between Cells 5 and 6 at 23.0 feet, and an examination of indicators in Cell 6 relative to the weir. After some field discussion, it was preliminarily determined that Cells 5 and 6 are effectively one body of water frequently enough during the year (Ecology suggested at least six times per year) to consider combining Cells 5 and 6 as a single shoreline lake.

From a review of GRNRA water level data (based on six years of continuous water level monitoring from 2000 to 2005), Cell 6 exceeds 23.0 feet MSL (and therefore overtops the weir from the downstream end leaving one continuous body of water) on average just over five times per year. Additional discussion ensued regarding the status of the perimeter cells (Cells 4, 7 and 8). Cell 7 is separated from Cell 6 by a weir with a top elevation of 26.0 feet (set at the calculated 25-year flood recurrence level), approximately 3.5 feet above the Cell 6 OHWM. Cells 7 and 8 are separated by a large concrete culvert; Cells 8 and 5 are separated by additional concrete culverts with a gate; and Cells 4 and 5 are also separated by a culvert with a gate. While these cells are hydraulically connected to Cells 5 and 6 via culverts and/or the 26.0-foot weir, that hydraulic connection is not a part of the ordinary high water mark definition or the criteria for establishing jurisdiction. Rather, hydraulic connectivity is a factor in determining associated wetlands. By definition, the lake edge is determined by a "continuous ordinary high

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water mark" and the ordinary high water mark "is a biological vegetation mark...found by examining the bed and banks and ascertaining where the presence and action of waters are so common and usual, and so long continued in all ordinary years, as to mark upon the soil a character distinct from that of the abutting upland..." Although the cells are connected, the culverts/weirs interrupt the ordinary high water marks between cells, do not have beds or banks, and do not contain vegetation. Further, the ordinary high water mark elevations of Cells 4, 7 and 8 appear to differ from that of Cells 5 and 6. It is our professional opinion that the above factors constitute a break in the OHWM, and thus render Cells 5 and 6 the only shoreline waterbodies within the Green River Natural Resources Area.

Additional background information about the Green River Natural Resources Areas can be found at <u>http://www.ci.kent.wa.us/publicworks/GRNRA/grnra.asp</u>.

Associated Wetlands

Existing wetland inventory information was reviewed to identify associated wetlands. Ecology guidance states that the entire wetland is associated if any part of it lies within the area 200 feet from the OHWM (or floodway in riverine environments) of a state Shoreline. Further guidance states that wetlands that are hydraulically connected to a Shoreline also would be considered associated, as well as wetlands within the 100-year floodplain. Wetlands that are separated by an obvious topographic break from the shoreline are not associated, provided they are outside the shoreland zone and provided that the break is not an artificial feature such as a berm or road. As needed, a few of the wetlands were visited in the field to verify the nature of their association with the shoreline waterbody. Generally, the City's latest Wetland Inventory Map was assumed to be sufficient for the shoreline jurisdiction assessment.

FEMA's draft map of the revised Green River floodplain (dated 28 September 2007) includes the entire Kent valley due to FEMA's assumption that the Green River levees would fail in a 100-year flood event. The City believes FEMA's draft map makes incorrect assumptions, and thus intends to appeal the draft. Adoption of a final Green River floodplain map would likely not occur until after SMP adoption, and the final map is expected to be revised from the 2007 draft. Accordingly, wetlands determined to be associated based on location in the Green River floodplain are not identified on the proposed jurisdiction maps as the map would be obsolete at finalization of FEMA's map. Associated wetland determinations based on presence in the Green River floodplain would be made on a project-by-project basis at the time of application using the latest approved version of FEMA's floodplain map.

Revised Jurisdiction Summary

The following are proposed areas of shoreline jurisdiction:

- Green River
- Big Soos Creek
- Springbrook Creek
- Jenkins Creek

C. Anderson 22 January 2008 Page 5 of 5

- Lake Meridian
- Lake Fenwick
- Green River Natural Resources Area Cells 5 and 6 (the detention lagoon and constructed wetland)
- Panther Lake (in City's PAA)
- Shorelands 200 feet from the OHWM, including floodways and contiguous floodplain areas landward 200 feet from the floodway
- Associated wetlands
- The City is <u>not</u> proposing to include the 100-year floodplain or critical area buffers as part of shoreline jurisdiction.

Please call if you have any questions.

Sincerely,

4my Summe

Amy Summe Environmental Planner

Enclosures







APPENDIX C

MAP FOLIO