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City of Issaquah
Best Available Science Report

2004

Prepared by:
City of Issaquah
Planning Department
1775 12th Ave NW
Issaquah, Washington 98027

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1. Introduction

1.1 GMA Requirements for Best Available Science

The Washington State Growth Management Act (GMA) requires every county and city to adopt policies and development regulations that designate and protect critical areas [RCW 36.70A.060(2)]. Critical areas are defined in RCW 36.70A.030(5) as:

a) wetlands
b) areas with a critical recharging effect on aquifers used for potable water
c) frequently flooded areas
d) geologically hazard areas
e) fish and wildlife habitat conservation areas

Issaquah adopted Critical Area Regulations (CAR) in 1994. The regulations were largely based on the King County CAR. Although, the City and County have amended the CAR subsequent to its adoption, the organization and standards of Issaquah's code remain very similar to the King County CAR. In particular, the City's code sections for wetland and stream classification/rating, buffer widths and mitigation ratios are all consistent with King County.

In 1995 the State Legislature added a new section to the GMA to clarify the State's goals and policies fro protecting critical areas' functions and values.

"While the GMA does not set specific state or regional development standards for critical areas protection, the statue is clear that local governments must include the "best available science" when designating and protecting them."
Citations of the Best Available for Designating and Protecting Critical Areas, Washington State Office of Community Development, July 2001

"While science is not the sole criterion to be used in developing critical area policies and regulations, the Legislature singled out science for special mention. Rather than imposing any particular statewide standard, the Legislature opted to defer to local decision making when determining how to "include" the best available science."
Critical Areas Assistance Handbook: Protecting Critical Areas Within the Framework of the Washington Growth Management Act, Washington State Department of Community Trade and Economic Development, November 2003

The Washington State Office of Community Development (OCD) adopted administrative rule guidance to assist cities and counties in how to include best available science in

land use policies and regulations (WAC 365-195-900 through 925). The procedural criteria include:

1) Assessment criteria to determine what information qualifies as best available science;

2) Recommendations for where local governments can obtain best available science;

3) Criteria to demonstrate that best available science has been included in the development of critical area policies and regulations;

4) Criteria to address inadequate scientific information; and,

5) Criteria to demonstrate "special consideration" for the conservation and protection of anadromous fish.

The City's review of compliance with the procedural criteria is found in Appendix B of this report.

1.2 Accomplishments and Compliance with Best Available Science

The City has made the following accomplishments to comply with BAS requirements:

Stream Inventory and Habitat Evaluation Report (Parametrix 2003) - The City contracted with Parametrix inc. to conduct a detailed study of streams and shorelines within the City. The *"Stream Inventory and Habitat Evaluation Report"* was completed in March 2003. One of the primary objectives of the study was to collect baseline information to aid in assessing stream functions and processes for the purpose of informing science-based regulatory protections consistent with state and federal laws, including the Growth Management Act (GMA), Shoreline Management Act (SMA), and Endangered Species Act (ESA). The report includes a detailed instream survey of Issaquah Creek and the East Fork of Issaquah Creek, assesses habitat functions, reviews City stream mapping and classifications, and identifies restoration and conservation areas.

The report is the City's best available science on stream resources and shows the City's commitment and "special consideration" for protection of anadromous fisheries.

Issaquah's Critical Area Regulations include a stream rating system which gives additional consideration and protection to salmonid streams. A 100-foot protected buffer is required for all streams with anadromous fish (and more inclusively with salmonids). This includes Class 1 streams, "shorelines of the state," Issaquah Creek and the East Fork, as well as Class 2 streams with salmonids. Wetlands that are associated with streams that provide habitat for Chinook salmon (ESA-listed specie) are also provided additional protection as a Class 1 rated wetland.

Best Available Science Reports (Parametrix 2003)

The City received a grant from OCD to assist in the BAS review and selected Parametrix, Inc. to provide technical/scientific assistance The primary tasks included: 1) to identify, collect and review available literature and data related to critical areas within the City limits and establish what sources of best available science are applicable to Issaquah, and 2) to prepare critical area policy/development standard recommendations based on comparing existing City critical area regulations to the identified BAS information.

Parametrix completed 4 papers as part of their BAS review: 1) Annotated Bibliography – lists citations of BAS sources for each critical area and the relevancy to City Code; 2) Specific Issues – response to specific questions prepared by staff and the River & Streams Board related to local issues and Issaquah's critical area regulations; 3) Code Recommendations – analysis of existing critical area regulations and identification of issues based on review of BAS; 4) Addendum to Code Recommendations – code analysis specific to steep slopes and geologic hazard areas.

The Annotated Bibliography is based on and includes a majority of the references cited in the state list of BAS citations published by OCD in 2002 (*Citations of the Best Available Science for Designating and Protecting Critical Areas*). Additional information sources meet one or more of the criteria included in the WAC 365-195-905. The Annotated Bibliography fulfills the State's BAS requirements for using scientific expertise and a valid scientific process to provide reliable information useful in understanding the consequences of developing policies and regulations effective in protecting Issaquah's critical areas. The Annotated Bibliography complies with procedural criteria WAC 365-195-905 through 910.

Critical Aquifer Recharge Areas (2003-2004)

One of the GMA critical area elements is "areas with a critical recharging effect on aquifers used for potable water." As part of the City's update of the critical area regulations, a draft ordinance has been prepared with the approval of the River & Streams Board and the Planning Policy Commission (PPC) to add aquifer protection measures into the critical area regulations. The proposed amendment includes groundwater protection standards to prevent contamination of groundwater in wellhead protection areas and to require infiltration of stormwater to ensure sufficient groundwater recharge.

Stream and Wetland Buffer Analysis (2004)

The Planning Department has been working with the River & Streams Board using GIS mapping to evaluate the implications or effects of increasing buffer widths. The River & Streams Board is a citizen committee appointed by the Mayor to serve as a scientific

and technical resource advisory board on protection and preservation of aquatic environments and critical areas. Most members of the River & Streams Board have specific training or expertise in wetland ecology, native plants, geology, etc.

The GIS mapping overlays wetland and stream buffers with existing land use and development to evaluate the level of development encroachment into existing buffers and if buffer widths were increased. Some preliminary conclusions indicate that increasing buffer widths in the most developed parts of the City would have the effect of creating non-conforming conditions versus the intended effect of adding vegetated buffer width to protect stream and wetland functions. See Wetland and Stream sections of this report for more information.

Comprehensive Plan Policies (2003-2004)

Issaquah amended the Land Use Element of the Comprehensive Plan in 2003 to include the following policy:

Policy L-1.7 Best Available Science: Critical area regulations and the Shoreline Master Program shall be based on Best Available Science as defined by the rule issued by Washington State Office of Community Development.

The following Comprehensive Plan policy amendments are proposed in 2004:

1) An amendment to clarify definitions of critical areas, consistent with GMA definitions:

Policy 1.1.7 Require protection of critical areas. “Critical Areas” include the following areas and ecosystems: (a) Wetlands; (b) areas with a critical recharging effect on aquifers used for potable water; (c) fish and wildlife habitat conservation areas; (d) frequently flooded areas: and (e) geologically hazardous areas, as defined in RCW 36.70A. 030 (5);

2) An amendment to begin addressing non-conforming development and re-development situations.

Policy 1.1.8.3 Critical Area protection shall include measures for a net improvement in Critical Area functions in the review of new development and for re-development.

Other existing Comprehensive Plan policies which serve to protect critical areas include:

Policy 1.1.10 Implements the critical areas regulations by focusing future growth in the following:

- 1.1.10.1 areas with no or minimal environmentally critical areas;
- 1.1.10.2 vacant platted lots in areas with existing public facilities;
- 1.1.10.3 areas where infill and redevelopment can occur with less environmental impacts due to the degree of existing development; and

1.1.10.4 areas where clustering development can protect environmentally critical lands;

Policy 1.2.3 Ensure that all development is consistent with the City's vision through the implementation of the Land Use Code, critical areas regulations and other development regulations.

Policy 4.2.4.8 Minimize impervious surface coverage, and maintain and/or enhance natural features or functions such as streams, wetlands and aquifer recharge areas;

I.3 Organization of BAS Report

Issaquah's BAS report is organized to address each critical area element. An introduction provides an explanation or definition of the critical area and the general extent or location within the City, followed by an assessment of how existing critical area regulations include and meet recommendations of BAS. Analysis from the Parametrix BAS reports is incorporated into this assessment. A conclusion at the end of each element summarizes findings in the assessment and includes recommendations to further strengthen the protection of critical area functions.

The BAS report has been prepared primarily by the Issaquah Planning Department because the focus is on review of the critical area regulations. However, the City of Issaquah takes a comprehensive view of critical area protection and there are other programs and efforts managed by other City departments that serve to protect and enhance critical areas. For example, the Parks Department manages acquisition and inter-agency coordination of natural open space areas, and the Public Works Engineering Department administers stormwater regulations and manages capital improvement projects and habitat stewardship. These other programs are described in more detail in Chapter 8 of this report.

An Annotated Bibliography (Parametrix, 2003) is included in the report as Appendix A. The Annotated Bibliography identifies scientific sources of BAS relevant to Issaquah and is organized under each critical area element.

The BAS report also includes an evaluation of the City's compliance with the procedural criteria (WAC 365-195-900 through 925) for best available science in Appendix B.

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2. FLOOD HAZARD AREAS

2.1 Introduction

Flood hazard areas are defined as those areas adjoining creeks and streams that are inundated by the 100-year flood. The Federal Emergency Management Agency's (FEMA) definition for the term "100-year flood" is the flood elevation that has a 1% chance of being equaled or exceeded each year. The 100-year flood, which is the standard used by most Federal and state agencies, is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and to determine the need for flood insurance.

Alterations to natural floodplains generally result in increasing the flooding risk to people and property and impact fish and wildlife habitat. Traditional flood control practices have been particularly damaging to fish and wildlife habitat, but contemporary methods are striving to provide an acceptable level of flood protection to people and property, while at the same time preserving and enhancing fish and wildlife habitat. Risk to people and property is best achieved by limiting floodplain development and assuring that allowed development does not increase flood elevations and flow velocities, change flood flow patterns, reduce flood storage, increase erosion or increase area of flood inundation.

The City of Issaquah regulates Flood Hazard areas to protect members of the public from injury, loss of life, property damage or financial loss due to flooding. Protection measures are specified in IMC 16.36 Areas of Special Flood Hazard and 18.10.530 Special Flood Hazard areas.

There are five streams in the City of Issaquah that have flood hazard designations: Tibbetts Creek, North Fork Issaquah Creek, East Fork Issaquah Creek, mainstem Issaquah Creek, and Tributary 0170 (a urban drainage tributary to Tibbetts Creek).

2.2 Assessment of Policies and Regulations

Comprehensive Plan Policies

Policy 1.3.1 Prevent increased flooding by:

1.3.1.1 restricting new development in flood prone areas;

1.3.1.2 establishing standards to minimize peak discharges and durations of storm water runoff;

1.3.1.3 purchasing development rights for floodplain properties that are vested but not built, when economically feasible;

1.3.1.4 allow no new building construction within the FEMA designated floodway.

Mapping/Classification

Flood Hazard areas are delineated by existing FEMA mapping. The mapping includes those areas inundated by 100-year and 500 year floods. To improve the accuracy of the FEMA mapping, which was originally developed in the 1970's, a consultant to the City (Montgomery Water Group) hydraulically modeled the floodplains/floodways along the main stem of Issaquah Creek and East Fork Issaquah Creek in 2002. Parametrix's BAS review of the new mapping states:

"The new mapping represents BAS because it includes a high density of cross-sections, extensive flood calibration information based on high water marks surveyed in 1996, an accurate hydraulic model with the graphic interface and error validation, and advanced aerial topographic mapping".

FEMA is presently reviewing this mapping for adoption in the Federal Mapping system (as Flood Insurance Rate Maps).

Issaquah classifies flood hazard areas consistent with the following FEMA definitions:

Floodways: For most waterways, the floodway is where the water is likely to be deepest and fastest. It is the area of the floodplain that should be reserved (kept free of obstructions) to allow floodwaters to move downstream. (FEMA)

100-year floodplain: defined as areas that are subject to a one percent (1%) or greater chance of flooding in any given year (FEMA), and

500-year floodplain: defined as areas that are subject to less than (1%) chance of flooding in any given year (FEMA).

Development Regulations – Issaquah Municipal Code 18.10. 530

Issaquah's development regulations prohibit residential and commercial development and all other encroachment in the FEMA floodway. Development in the 100-year floodplain is allowed provided the elevation of structures is at least one foot (1') above the established base flood elevation, compensatory storage is provided (i.e., no net fill), and no blockage of floodwaters occur that could impact neighboring properties (i.e., zero rise floodway). Many other specific requirements also apply. Development in the 500 year floodplain is not restricted.

A Flood Hazard Permit is required for all development activity within the 100-year floodplain to document compliance with City regulations. Before a certificate of

occupancy is issued, new building construction must provide an Elevation Certificate to verify that building elevations meet the 1-foot above base flood elevation requirement. The City keeps accurate records of all Flood Hazard Permits and Elevation Certificates to facilitate periodic audit by FEMA.

2.3 Conclusion

Issaquah's flood hazard area mapping, classification and regulations include best available science.

In recognition of the City's effective flood hazard codes and mitigation program, FEMA has given the City a Class 5 Rating under the Community Rating System. This provides a 25% reduction in flood insurance premiums to all city residents. The National Flood Insurance Program's (NFIP) Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS: (1) reduce flood losses; (2) facilitate accurate insurance rating; and (3) promote the awareness of flood insurance.

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3. GEOLOGIC HAZARD AREAS

3.1 Introduction

RCW 36.070A.030 (9) defines “Geologically hazardous as areas that because of their susceptibility to erosion, sliding, earthquake, or other geological events, are not suited to the siting of commercial, residential, or industrial development consistent with public health or safety concerns.”

Issaquah’s critical area regulations address geologic hazard areas as follows:

- Mine Hazards and Erosion Hazard Areas, IMC 18.10.520
- Landslide Hazards, IMC 18.10.560
- Seismic Hazards, IMC 18.10.570
- Steep Slope Hazards, IMC 18.10.580

Geologic hazards may pose a threat to the health and safety of citizens if development is inappropriately sited in areas of significant hazard. The primary objective of City regulations for geologic hazards is to protect the public and public resources from injury and property damage.

Steep slope standards also indirectly protect critical area functions. Much of Issaquah’s remaining blocks of forested area (not including the Tradition Plateau and surrounding State DNR managed lands) are located in steep slope areas. These forested areas provide important wildlife habitat, connect or link habitat areas in the City, and allow for groundwater infiltration providing a water source to wetlands and streams.

3.2 Assessment of Policies and Regulations

Comprehensive Plan Policies

The City of Issaquah’s Comprehensive Plan addresses the concerns of all critical areas as cited above in Section 1.2.

Mapping/Classification

The City has topographic mapping to identify the presence of steep slope areas. Site surveys and a slope analysis are required with project applications to more accurately determine the extent and location of regulated steep slope areas on a site. The City also has geologic and soil mapping to generally identify areas with erosion, landslide and seismic hazards.

For coal mine hazard areas, the City's primary source of mapping and information is the *"Abandoned Coal Mine Survey in the Area of Issaquah, King County, Washington"* (Office of Surface Mining, Goodson & Associates, 1984).

The critical area regulations state City mapping is intended as a guide to the general location and extent of critical areas. The criteria in the code that defines critical areas supersedes mapping. Because of the general scale of City mapping, site-specific topographic, survey and geologic information is required with development proposals to determine if critical areas are present on a site.

Development Regulations

In general, Issaquah requires site-specific studies with development proposals to: 1) identify the presence of geologic hazard areas and whether the areas meet regulatory thresholds according to the code definition or criteria; and, 2) prepare geotechnical reports to assess site conditions, evaluate risk and identify necessary mitigation.

The City has found that site-specific information is necessary due to the variety and complexity of geologic conditions. The site-specific information required to review development proposals qualifies as the best available science; both for providing relevant and accurate information about a site and identifying the mitigation measures to reduce the risk and impacts of a specific proposal.

Steep Slopes

Issaquah's critical area regulations define Steep Slope Hazard Areas as: "*Any ground that rises at an inclination of forty (40) percent or more within a vertical elevation change of a least ten (10) feet (a vertical rise of ten (10) feet or more for every twenty-five (25) feet of horizontal distance). A slope is delineated by establishing its toe and top and measured by averaging the inclination over at least ten (10) feet of vertical relief*." The code includes limited exemptions that exempt slopes with a vertical elevation change of up to 20-feet with a geotechnical report, and exempts slopes created by previous, legal grading activities (IMC 18.10.580.E).

The critical area regulations require a 50-foot buffer from the top, toe, and all sides of slopes greater than 40% (IMC 18.10.580.A). A Parametrix BAS study evaluated the 40% regulatory threshold to determine if there is a greater probability of slope failure or erosion hazard to justify the threshold. The report validated the 40% threshold, citing several studies to conclude there is a greater risk of surface erosion and landslides on slopes steeper than 40%.

The 50-foot steep slope buffer may be reduced to a minimum of 10-feet if a geotechnical study determines it would not reduce the level of protection. The code includes specific criteria that must be addressed to approve a reduction in the steep

slope buffer (IMC 18.10.580.A), including that engineering design standards verify a factor of safety would not be less than 1.5. In any case, the code requires a minimum 25-foot distance (10-foot buffer and 15-foot building setback) between an occupied building and the toe of a step slope.

The code also allows the City to require a third-party independent review of geotechnical analyses. This provides an additional, objective measure of protection.

Erosion Hazard Areas

The critical area regulations require an erosion control plan for all development proposals in Erosion Hazard Areas. This plan requires seasonal limitations for any clearing and grading in Erosion Hazard areas, temporary control measures and a vegetation management plan when determined to be necessary and states Clearing and Grading shall be "the minimum necessary to accomplish project specific engineering designs …". Limits to clearing and grading for roads, sewer, water and storm water utilities are approved through and reviewed in the field by the Public Works department. The Issaquah Municipal Code section 16.26 Clearing and Grading criteria provide, "development regulations and construction procedures which will preserve, replace or enhance, …. the natural qualities of lands and watercourses within the City; to minimize water quality degradation …….and protect ground water …quantities, locations and flow patterns; …… to decrease potential landslide, flood and erosion damage to public and private property….to require that development in environmentally sensitive areas be accomplished in a manner which protects those areas from damage or degradation".

Landslide Hazard Areas

The critical area regulations define landslide hazard areas as slopes greater than 40% and/or slopes greater than 15% impermeable soils or ground water seepage. Other criteria include evidence of past movement, areas unstable as a result of stream incision or streambank erosion, or areas subject to inundation by debris flows.

Landslide hazard areas with slopes 40% or greater are required to meet the development standards (50-foot buffer) for steep slope hazard areas. For landslide hazard areas with slopes less than 40%, which meet the other criteria, alteration or development activity is permitted only with findings that: 1) the development proposal would not decrease slope stability on adjacent properties; and, 2) the development proposal can be designed so the landslide hazard to the property and adjacent property development is eliminated or mitigated.

Coal Mining Hazards

The City has detailed mapping of historic coal mining activities to identify locations where there is a potential risk associated with abandoned mine workings. The critical

area regulations allow for the alteration of sites with coal mine hazard areas only after significant risks have been eliminated or mitigated, per the analysis and recommendations of a geotechnical evaluation.

Seismic Hazards
Seismic hazards are defined as: "those areas of the City subject to severe risk of earth-quake damage as a result of seismically induced settlement or soil liquefaction. These conditions may occur in areas underlain by cohesionless soils of low density usually in association with a shallow groundwater table."

Critical area regulations require "mitigation is implemented to the greatest extent feasible, and shall minimize any potential adverse impacts." In addition development proposals are subject to two (2) different levels of review based on the planned occupancy of the proposed structures (critical facilities and standard structures). Building codes to address the occupancies are defined in the International Building Code adopted by the city, effective July 1, 2004.

3.3 Conclusion

Issaquah's policies and regulations for geologic hazard areas meet GMA requirements for best available science. Scientific information has been included in the review and development of policies and standards. Regulations and standards for geologic hazard areas are consistent with best available science recommendations to protect public safety from significant risks of geologic hazards and to require mitigation of potential impacts.

The protection of steep slope areas also indirectly protects critical area functions by preserving forested areas for wildlife habitat, linking upland habitats to valley riparian areas, and allowing for groundwater infiltration providing a water source to wetlands and streams.

Issaquah requires site-specific studies to evaluate the risk and potential impacts of development proposal in geologic hazard areas. Site-specific geotechnical reports are required to assess site conditions, evaluate risks and identify necessary mitigation. Independent, third-party review of an applicant's geotechnical report is often required. The site-specific information required to review development proposals qualifies as the best available science; both for providing relevant and accurate information about a site and identifying the mitigation measures to reduce the risk and impacts of a specific proposal.

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4. CRITICAL AQUIFER RECHARGE AREAS

4.1 Introduction

The Washington State Growth Management Act (GMA) defines Critical Aquifer Recharge Areas in RCW 36.70A.030(5) as: “areas with a critical recharging effect on aquifers used for potable water.”

The Issaquah Creek Valley Aquifer is the primary source of potable drinking water for residents and businesses in the Cities of Issaquah and Sammamish. Issaquah has also connected to a regional water supply pipeline to supplemental the groundwater source.

The Lower Issaquah Valley Wellhead Protection Plan (Golder 1993) was prepared to provide a technical assessment of groundwater resources with an emphasis on groundwater quality protection. The Wellhead Protection Plan reviews the hydrogeology of the aquifer and used a groundwater flow model to determine likely paths and velocities of groundwater flows toward water supply wells in order to delineate time-based capture zones or wellhead protection areas. It also addresses groundwater quality and contaminant risks proximate to the well capture zones. This document fulfills regulatory requirements for wellhead protection planning and groundwater quality protection.

4.2 Assessment of Policies and Regulations

Comprehensive Plan Policies
The Comprehensive Plan includes policies in the Land Use Element supporting aquifer protection as follows:

Policy 1.1.8.3 - include aquifer recharge areas as an element of the critical area regulations and require stormwater infiltration, where feasible, in areas with high aquifer recharge potential in order to ensure recharge of the aquifer in the Lower Issaquah Basin.

Mapping/Classification

The Wellhead Protection Plan delineates the 1, 5 and 10 year capture zones around production wells operated by the City of Issaquah and the Sammamish Plateau Water and Sewer District. The capture zones provide for graduated levels of aquifer protection. The Parametrix BAS report evaluated the mapping and classifications of aquifer recharge areas in the Wellhead Protection Plan concluding:

“The Wellhead Protection Plan employed methods for aquifer recharge area mapping that meet and exceed the BAS guidelines. These include: consideration of surface and

subsurface geology, hydraulic properties of geologic strata (including pumping test results), groundwater-level elevation mapping and fluctuations, stream/aquifer interaction, and water-balance calculations as well as a computerized numerical groundwater model to simulate the groundwater flow system and delineate capture zones (WHPAs) for high-capacity municipal water wells."

Groundwater Quality Protection

Issaquah implements the Wellhead Protection Plan by reviewing the potential contaminant risk of proposed land uses within the capture zones of City production wells. The Table of Permitted Land Uses (IMC 18.06.130) includes a footnote that: "Any zoning district within the wellhead protection area may preclude or condition some permitted uses as established in this table." This provision allows the City to deny land uses or require mitigation to address the risk of groundwater contaminants in the proximity of City production wells.

Draft Critical Aquifer Recharge Area (CARA)

As part of the update of critical area regulations, the City began a Critical Aquifer Recharge Area amendment to expand on the Wellhead Protection Plan and add aquifer protection standards to the Critical Area Regulations in the Land Use Code. The proposed amendment includes groundwater protection standards to prevent contamination of groundwater in wellhead protection areas and also to require infiltration of stormwater to ensure sufficient groundwater recharge.

The draft ordinance is consistent with the *"Guidance Document for the Establishment of Critical Aquifer Recharge Area Ordinances"* (Washington Department of Ecology 1998) and with the *"Model Code Recommendations for Designating and Protecting Critical Areas"* (Washington State Office of Community Development 2002). Issaquah has also coordinated with King County in terms of mapping aquifer susceptibility and has actively participated in the Issaquah Creek Valley Groundwater Protection Committee.

A draft ordinance is presently under review by the City Council. The draft CARA has been approved by the City's River & Streams Board and the Planning Policy Commission (PPC) to add aquifer protection measures.

The draft CARA includes the following provisions:

<u>Groundwater Quantity Protection Standards which are intended to ensure sufficient recharge of the aquifer.</u>

- Infiltration of stormwater is required in all CARA areas to ensure sufficient groundwater recharge.
- Design and implementation of infiltration facilities is referenced to follow the 2004 draft King County Surface Water Design Manual (KCSWDM).

- Infiltration facilities would be required to infiltrate 95% of stormwater runoff volume.
- Small-scale, low impact development Best Management Practices (BMPs) would be required for smaller development that is exempted from requirements for constructed stormwater facilities.
- Infiltration of stormwater would not be required if it is not feasible due to site-specific soil or geologic conditions, if it is determined that increased saturation of soils would have the potential to impact adjacent properties or existing facilities, or if stormwater infiltration would present a considerable risk of contamination to the aquifer.

Groundwater quality protection standards to prevent contamination of groundwater.

- Regulation of commercial and industrial land uses that handle or store hazardous materials in wellhead protection areas.
- Specific land uses and materials that produce known contaminants of risk to groundwater quality are prohibited or restricted.
- Requirements or standards to mitigate the risk of contamination are listed for specific land uses and activities.
- Compliance with State and/or Federal Standards. Applicants would be required to provide documentation of compliance with State and/or Federal regulations.

4.3 Conclusion

The City of Issaquah's standards provide for protection of the aquifer, particularly in terms of minimizing the potential for contamination. The City's Wellhead Protection Plan (Golder 1993) includes mapping and rating of wellhead protection zones consistent with recommendations of best available science. The land use code includes a provision to prohibit land uses and activities that pose significant risk to groundwater quality. The City uses SEPA authority to require hydrogeologic studies where there is a concern about a proposal's potential impacts to the aquifer. The City's distribution of SEPA determinations ensures Federal, State, and County agencies are notified of proposed activities. The City's draft amendment to add aquifer protection standards to the critical area regulations will further strengthen protections of aquifer water quality and quantity.

5. WETLANDS

5.1 Introduction

In designating wetlands for regulatory purposes, jurisdictions are required to use the definition of wetlands in RCW 36.70A.030(20):

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

The City amended the definition of wetlands in the Comprehensive Plan as part of the 2004 Comprehensive Plan amendments to comply with this requirement.

5.2 Assessment of Policies and Regulations

Identification/mapping

Issaquah requires wetlands to be identified and delineated using the *Washington State Wetlands Identification and Delineation Manual* adopted by the State Department of Ecology (Ecology Publication #96-94).

The City's wetland mapping identifies general locations of wetland areas for planning purposes, but the large scale mapping is imprecise to record locations of wetlands on specific sites. The City requires site-specific wetland delineations by qualified professionals to confirm wetland boundaries and wetland classifications. Issaquah frequently requires an independent peer review of wetland delineations to confirm delineations and provide an objective process.

The critical area regulations specify that critical areas are to be identified by criteria versus mapping because of the approximate nature of City mapping. (IMC 18.10.380)

The City's most recent wetland mapping is provided in the *Stream Inventory and Habitat Evaluation Report* (Parametrix 2003). This mapping compiled National Wetland Inventory Maps, hydric soil maps from the U.S. Department of Agriculture, King County and Washington Department of Fish & Wildlife mapping, with additional wetland information from delineation reports, Environmental Impacts Statements, and other environmental documents. The mapping from the stream study shows wetlands within 250 feet of each side of Issaquah Creek and the East Fork of Issaquah Creek. The City has added wetlands in other areas of the City using similar sources of information. See Figure __.

Classification/rating

Issaquah's existing wetland rating or classification follows the wetland rating system developed by King County with adoption of their CAR in 1992. The major factors or criteria are the total wetland size, the number of different Cowardin vegetation classes present, whether the wetland is forested, and the presence of threatened or endangered species. There are three classes of wetlands under Issaquah's rating system.

The Washington Department of Ecology developed a four-tier rating system (Ecology, 1993) that expands on several factors such as vegetative class interspersion, presence of invasive species, etc. Ecology just recently revised their wetland rating system for Western Washington in August 2004.

Wetland rating is important because wetland buffer widths and mitigation ratios are linked to the wetland classification. Therefore, the rating system provides a scientifically defensible approach to protection standards. It's especially important in Issaquah where buffer widths are determined by the wetland rating versus a site-specific functions evaluation.

The most important considerations for rating wetlands are the wetland functions, the rarity and irreplaceability, and the sensitivity to adjacent human disturbance. These factors are adequately considered under Issaquah's rating system. Forested wetlands between 2,500 square feet and 1 acre in size are rated as Class 2 wetlands. Wetlands with threatened or endangered species are rated as Class 1 wetlands. In general, City practice is to apply a Class 1 rating for wetlands that are located within the floodway and many times the floodplain of streams with threatened or endangered species. This applies to wetlands along Issaquah Creek and the East Fork of Issaquah Creek, which have Puget Sound Chinook listed as a threatened specie under the Endangered Species Act (ESA). This administration of the code therefore gives the highest protective standards to wetlands that provide functions supporting anadromous fisheries. Criteria also assign a Class 1 wetland rating to wetlands with plant associations of infrequent occurrence. Issaquah utilizes SEPA authority to provide additional protective measures for unique or rare wetlands.

Issaquah is considering changing to the Ecology rating system. Advantages include using a system with wide acceptance by state agencies and other jurisdictions, and familiarity among biologists and consultants. However, the "King County rating system" is also widely used and understood. Some of the disadvantages to the Ecology rating is there is less predictability to property owners because wetland functions are considered in the rating. Also, the City has several examples where the Ecology wetland class would result in a lower wetland class affording less protection than under the City's present rating system. As an example, wetlands in the southeast corner of the City were delineated and classified for an Environmental Impact Statement (EIS) for the Southeast Issaquah Bypass road project. A couple of wetlands (including the largest, most significant wetland) were identified as a Class 2 wetland under Ecology's system, but a Class 1 wetland under the City's classification. (Table 4-14, page 4-83, Supplemental Draft EIS, August 2003).

In summary, Issaquah's wetland rating system recognizes greater functions and values and the irreplaceability of forested wetlands, as well as giving the greatest protection to wetlands located in the floodway/floodplain of Issaquah Creek and the East Fork due to the presence and habitat support for Chinook salmon.

Wetland impact avoidance

City code requires development to first avoid wetland impacts, then minimize impacts, and lastly mitigate or compensate for impacts to wetlands and wetland buffers (IMC 18.10.620). This mitigation sequence is consistent with federal and state agency guidelines including the Clean Water Act Section 404(b)(1) and the State DOE Model Code. The City's administration of this provision during development review reduces the number and scale of proposals with wetland impacts.

The City also requires a higher level of permit review for development proposals which impact higher classes of wetlands (IMC 18.10.700). Impacts must be shown to be unavoidable.

Wetland buffer width standards

Issaquah's critical area regulations presently require a 100-foot buffer width for Class 1 wetlands, a 50-foot buffer width for Class 2 wetlands, and a 25-foot buffer width for Class 3 wetlands.

The code also includes provisions to increase wetland buffer width requirements (IMC 18.10.660) on a case-by-case basis during review of development applications. Criteria to require an increase in wetland buffers include: to protect critical fish and wildlife habitat, maintain viable populations of existing species, protect critical drainage areas, protect groundwater recharge or discharge areas, and to protect adjacent land from landslide or severe erosion.

The scientific literature focuses on the buffer widths necessary to protect various functions including: sediments removal and erosion control, dissolved pollutant removal, large woody debris (LWD) recruitment, water temperature moderation, and wildlife habitat. The literature indicates a wide range of buffer widths are needed to effectively protect the various functions, thus the literature is not definitive in identifying an ideal buffer width to protect all functions.

An often-cited study is McMillan (2000), *"The Science of Wetland Buffers and Its Implications for the Management of Wetlands."* This study synthesizes locally relevant literature and GMA requirements. General summary statements from this report conclude:

- Buffer widths of 50 to 100 feet are considered to be the minimum needed to provide most water quality improvement functions.
- For most wildlife functions, the required buffer width is considered to be about 100 to 325 feet – assuming good cover of native trees and shrubs.

The Parametrix BAS report concludes:

> "Current wetland buffer widths are adequate to protect some functions especially for Class 1 and 2 wetlands. BAS indicates buffers less than 50 ft are generally not adequate to provide most functions. BAS states important wildlife functions should have 200 to 300 foot buffers based on land use, effectiveness in preventing water quality impacts to wetlands generally require 100 feet or greater buffer widths, and effectiveness in protecting wetlands from human disturbance require 50 to150 foot buffer widths. Many studies have found a positive correlation between the width of a buffer and its effectiveness in performing various functions. Increase buffer widths and/or limit application of buffer reduction and averaging to minimize loss of buffer functions and provide adequate wetland protection.
>
> BAS recommends using a buffer system that assigns buffer widths to wetlands based on the wetland category and a two- or three-tiered level of land use intensity. However, in urban environments, it may not be appropriate to distinguish high and low intensity land uses, since by definition urban areas are areas of high intensity land use."

It should be noted that buffer widths are only one tool to protect and maintain functions of wetlands. The City's strict standards for runoff and erosion control are likely to be more effective than buffers in controlling sedimentation. The City's stormwater regulations are also important to protecting and ensuring water quality. The majority of surface stormwater flows enter wetlands and streams through pipes or channels that bypass wetland and riparian buffer zones, thereby reducing the need for buffer widths to remove sediments and pollutants.

It's also been shown that the relationship between buffer widths and effectiveness is logarithmic; so that after a certain buffer width incremental increases in provide a

decreasing amount of extra protection. For example, Wong and McCuen (1982) indicates that 90% of sediment removal can be accomplished within the first 100 feet of a riparian buffer, but an additional 80 feet of buffer is needed to remove just 5% more sediment. A buffer of 33 feet will remove approximately 60% of sediment and pollutants, while it takes a buffer of approximately 150 feet to remove 75%, and a buffer of 660 feet to remove 90% or more of the sediment and pollutants. (DOE – Volume 2 Protecting and Managing Wetlands)

The City concludes that existing wetland buffer width requirements of 100-feet for Class 1 wetlands and 50-feet for Class 2 wetlands are within the range of recommendations of best available science to protect wetland functions and values.

The existing buffer standard of 25-feet for Class 3 wetlands may not be adequate to protect some functions. However, according to City mapping, Class 3 wetlands comprise only 13.5 acres of the total of 263 acres of wetlands, or approximately 5% of the total wetland area in Issaquah. Therefore, the risk to impacting critical area functions is low. The City is addressing this issue under the BAS procedural criteria (WAC 365-195-915(1), which allows consideration of nonscientific information where critical area regulations depart for recommendations of the best available science.

Issaquah will continue to evaluate wetland buffer standards using new information such as the State Department of Ecology's (DOE) publication *Wetlands in Washington State Volume 2: Guidance for Protecting and Managing Wetlands* (August 2004). The City is presently using GIS mapping to evaluate the implications or effects of increasing buffer widths. The mapping overlays wetland and stream buffers with existing land use to evaluate the level of encroachment into existing buffers and the impacts if buffer widths were increased. Preliminary conclusions indicate that increasing buffer widths in the most developed parts of the City would have the effect of creating non-conforming conditions versus the intended effect of adding vegetated buffer width to protect wetland functions.

Wetland buffer averaging

Issaquah's critical area regulations allow for buffer averaging of the standard wetland buffer width requirements. The code allows the standard buffer width to be reduced by a maximum of 75%. Proposals for buffer averaging are reviewed on a case-by-case basis. The code includes several provisions to minimize the degree of buffer averaging and to ensure that critical area functions are protected, including: 1) there is no net reduction in the total buffer area; 2) averaging would not impact wetland functional values; and 3) mitigation/revegetation may be required.

In administration of the code, development proposals which include buffer averaging are commonly required to provide a functional analysis to demonstrate the proposal would not decrease buffer functions. In addition, revegetation or enhancement of buffers is required, particularly if buffers have a predominance of invasive plant species.

Enhancement of buffers with native tree and shrub species adds a multi-story plant canopy providing increased shade, detrital input, and insect fall. The buffer enhancement required with buffer averaging proposals increases some buffer functions over standard buffer/setback standards without revegetation.

The City concludes that buffer averaging approval criteria adequately protect wetland functions for projects proposing buffer averaging and best available science is applied in case-by-case review. However, the City also recognizes that buffer averaging presently allows for reductions of up to 75% of the standard buffer width, and this could result in very narrow buffers that compromise some critical area functions. McMillan (2000) recommends that buffer not be reduced by more than 50% of the standard buffer width and that buffers should have a minimum width of 25 feet. To improve the protection of wetland functions, the City will be further evaluating buffer averaging provisions to: 1) require a minimum buffer width; 2) include impact avoidance and minimization criteria; and 3) limit buffer averaging to a percentage of the buffer perimeter.

Wetland mitigation ratios

Compensatory mitigation is typically required for impacts that are allowed to wetlands and/or their buffers. As discussed in the above section for Wetland Impact Avoidance, compensation of wetland impacts is required only after it can be demonstrated that wetland losses are necessary and unavoidable.

Per IMC 18.10.720: *"The overall goal of any compensatory mitigation project shall be no net loss of wetlands function and acreage and to strive for a net resource gain in wetlands functions and acreage over present conditions."* This goal is consistent with BAS.

According to King County's BAS Review, there are no scientific studies that identify empirically determined mitigation ratios. Functional replacement is difficult and requires extensive training, information gathering and monitoring. Therefore, replacement ratios are commonly based on the wetland category, assuming higher rated wetlands provide greater wetland functions and larger mitigation areas are then necessary to compensate for lost functions.

Issaquah's Critical Area Regulations Code presently requires wetland creation or restoration for wetland impacts. Replacement ratio is 2:1 for Class 1 and 2 wetlands and 1:1 for Class 3 wetlands.

Ecology's study of wetland mitigation projects (Washington State Wetland Mitigation Evaluation Study, February 2002) indicates that most mitigation has resulted in loss of wetland acreage, wetland types and wetland functions. The uncertainty of the results of mitigation supports requiring higher replacement ratios. Mitigation ratios are based on known failures of compensatory mitigation, to compensate for temporal loss of functions, and designed to compensate for historic loss of wetlands. Studies of the

success of mitigation projects suggest that replacement ratios based on mitigation success could be between 3:1 and 1.25:1.

To ensure adequate mitigation or compensation of wetland impacts, Issaquah's critical area regulations require in-kind replacement and on-site mitigation is required except where specific criteria can be met. To increase the success of mitigation replacing impacted wetlands and functions, the City requires submittal of detailed mitigation plans (including grading plan, planting plan and schedule, construction timing and notes, soil amendments, maintenance requirements and performance standards), and post-construction monitoring reports to identify and correct design problems.

The City concludes that existing mitigation ratios are in the range of recommendations of best available science and the code includes adequate provisions to ensure successful construction and monitoring of compensatory mitigation. The City will continue to review new sources of best available science, including the Department of Ecology's (DOE) recent publication *Wetlands in Washington State Volume 2: Guidance for Protecting and Managing Wetlands* (August 2004) to further improve the City's mitigation standards.

5.3 Conclusion

Issaquah's wetland regulations are supported by current best available science with the exception of Class 3 wetland buffer requirements. The existing buffer standard of 25-feet may not be adequate to protect some functions. However, it is estimated that Class 3 wetlands comprise less than 10% of the total wetland area in Issaquah. Therefore, the risk to impacting critical area functions is low. The City is planning to amend the code to increase the buffer width standard for Class 3 wetlands in 2005. Although, the standard is not consistent with recommendations of best available science, the City is addressing this issue to comply with the BAS procedural criteria (WAC 365-195-915(1), which allows consideration of nonscientific information where critical area regulations depart for recommendations of the best available science.

In addition, the City recognizes that buffer averaging could potentially allow for buffer reductions that compromise some critical area functions and will be further evaluating buffer averaging provisions in 2005 to: 1) require a minimum buffer width; 2) include impact avoidance and minimization criteria; and 3) limit buffer averaging to a percentage of the buffer perimeter.

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6. STREAMS

6.1 Introduction

Issaquah conducted a detailed study of streams and shorelines within the City: *Stream Inventory and Habitat Evaluation Report* (Parametrix 2003). One of the primary objectives of the study was to collect baseline information to aid in assessing stream functions and processes for the purpose of informing science-based regulatory protections consistent with state and federal laws, including the Growth Management Act (GMA), Shoreline Management Act (SMA), and Endangered Species Act (ESA). The report includes a detailed instream survey of Issaquah Creek and the East Fork of Issaquah Creek, assesses habitat functions, reviews City stream mapping and classifications, and identifies restoration and conservation areas.

For the mainstem of Issaquah Creek and the East Fork Issaquah Creek, the report includes a detailed instream habitat survey and evaluation of habitat conditions according to criteria outlined in the Urban Stream Baseline Evaluation Method (USBEM), as well as the Pathways and Indicators matrix developed by the National Marine Fisheries Service (NMFS) in 1996. This level of detail was concentrated on Issaquah Creek and the East Fork Issaquah Creek because these are the City's only Class 1 streams, "shorelines of statewide significance" regulated under the City's Shoreline Master Program. In addition, these 2 streams also have known populations of Puget Sound Chinook Salmon (a specie listed as threatened under the Endangered Species Act).

The *Stream Inventory and Habitat Evaluation Report* (Parametrix 2003) is the City's best available science on stream resources and demonstrates the City's commitment and "special consideration" for protection of anadromous fisheries.

Basin Overview

"The City of Issaquah is located within the Cedar-Sammamish watershed (Watershed Resource Inventory Area [WRIA] 8). This watershed drains 692 square miles in King and southern Snohomish counties and contains two major river systems (the Cedar and Sammamish) and three large lakes (Lake Washington, Lake Sammamish, and Lake Union). The Lake Sammamish subbasin includes Issaquah and Tibbetts creeks, and several other major tributaries. The Issaquah Creek subbasin encompasses 61 square miles, only a small portion of which is within the Issaquah City limits.

The mainstem of Issaquah Creek originates on the slopes of Tiger Mountain and flows northerly for approximately 17 miles to its mouth, north of the City limits. The Washington Department of Fish and Wildlife operates a hatchery at river mile (RM) 3, and salmon migration upstream of the hatchery weir is controlled. The East Fork Issaquah Creek is 7.3 miles long from its headwaters on West Tiger Mountain to Lake Sammamish. The lower reaches flow through Issaquah's central business district and

densely developed residential areas, but the upper reaches are within the Tradition Plateau Natural Resources Conservation Area. The headwaters of the North Fork flow from Yellow Lake north of the City limits. The North Fork channel joins the mainstem at RM 1.9 just north of Interstate 90. Tibbetts Creek originates south of the City limits and flows 4.3 miles to Lake Sammamish. The upper basin is within the protected areas of the Tiger, Cougar, and Squak mountains. The lower basin is within the City's urban growth area and is dominated by residential and commercial land uses.

One of the key findings in the Stream Study is: "The City of Issaquah makes up only a portion of the lower Issaquah and Tibbetts Creek basins. While urbanization within the City limits has affected shoreline and instream habitat conditions, watershed-scale processes (especially processes occurring in the upper basin) have also affected the health of Issaquah's streams and shoreline areas.

Many of the factors that affect habitat quality are the result of actions that extend beyond the City's jurisdiction. Additional measures that address basin hydrology, sediment transport, impervious surface area, and water quality on a watershed scale will need to be explored and pursued in conjunction with neighboring jurisdictions if long-term and sustainable habitat improvements are to be achieved.

The *"Stream Inventory and Habitat Evaluation Report"* (Parametrix, 2003) identified the most common problems of the main streams in Issaquah as follows:

Mainstem Issaquah Creek

High sediment loads – Streambed is composed primarily of small gravel and sand, and is highly unstable during moderate and high flows. Poor spawning habitat is due to fine sediment and increased sediment transport.

Increased hydrologic disturbance/Increased frequency of peak flows - Bank armoring and channel confinement have concentrated flood flows, preventing floodplain connectivity, and
creating higher velocity and water depths that wash out the bed creating a smoother profile dominated by glide and riffle habitat.

Lack of large woody debris - Large woody debris needed to form deep pools is generally lacking, consequently reducing holding habitat for kokanee and chinook salmon in the late summer and rearing habitat for several salmonid species year-round.

Lack of channel complexity - Large trees, dense riparian vegetation, and other immobile bed
elements are needed to create functional pools and develop a more complex riffle/run/glide channel pattern.

Lack of riparian vegetation – Low potential to recruit large woody debris (LWD) because the width and composition of the riparian corridor have been altered by urban development, and the ability of the stream to recruit woody material over time is severely limited.

East Fork Issaquah Creek

Frequency of peak flows leads to poor spawning habitat due to embeddedness and sediment transport .

Presence of high gradient riffles not conducive to spawning habitat –Riffles are highly embedded with fine sediment

Lower stream reach in the City has a high proportion of armored banks and channelization. This stream confinement results in lack of floodplain connection, loss of all off-channel habitat and lack of pool habitat needed for migration and rearing.

Lack of pool tailouts that provide important spawning habitat are lacking

Lack of large woody debris – Streambanks have little riparian overstory and limited potential to recruit large woody debris

North Fork of Issaquah Creek

Hydrologic disturbance due to widespread development of the subbasin.

Loss of summer base flows caused by increased runoff and diminishing aquifer recharge may be a limiting factor

Salmon production is limited because spawning areas are heavily impacted by sediment, summer low flows, and limited rearing habitat

Tibbetts Creek

Stream substrates are dominated by sand and silt as a result of reduced channel mobility and increased sediment loads.

Channelization has reduced habitat complexity, particularly rearing habitat, and lowered overall salmonid productivity

Lack of large woody debris

Fisheries

Issaquah Creek and its tributaries support native and non-native fish species. Native salmonids within the basin include fall chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), sockeye salmon and kokanee (*O. nerka*), winter steelhead (*O. mykiss*), and cutthroat trout (*O. clarki*). Although King County includes the Issaquah Creek basin as part of the range of bull trout (*Salvelinus confluentus*) its distribution would be limited to the headwater areas with infrequent strayings into downstream

areas. Other native fish found below the barrier weir at the Issaquah salmon hatchery include, but are not limited to, western brook lamprey (*Lampetra richardsoni*), river lamprey (*Lampetra ayresi*), peamouth chub (*Mylocheilus caurinus*), largescale sucker (*Catostomus macrocheilus*), mountain whitefish (*Prosopium williamsoni*), and one or more species of sculpin (*Cottus* spp.). Non-native fish such as brown bullhead (*Ameiurus nebulosus*), black crappie (*Pomoxis nigromaculatus*), pumpkinseed sunfish (*Lepomis gibbosus*), largemouth bass (*Micropterus salmoides*), and smallmouth bass (*Micropterus dolomieu*) primarily occur in the lower 1 or 2 miles of the mainstem.

Tibbetts Creek historically supported significant numbers of coho salmon, kokanee, steelhead, and cutthroat trout. Chinook salmon likely also used the stream. Urban development and resultant high erosion rates in the basin (King County SWM 1991) have degraded instream habitat, and natural production of these species is now very low (coho, cutthroat) or possibly non-existent in most years (chinook, steelhead)." *Stream Inventory and Habitat Evaluation Report* (Parametrix, 2003).

6.2 Assessment of Policies and Regulations

Identification/mapping
The *Stream Inventory and Habitat Evaluation Report* (Parametrix 2003) identified streams within the City using topographic maps, published reports/maps, information from the City's GIS database, and professional judgment. Working maps were reviewed by the City's River & Streams Board and then spot-checked in the field. The stream mapping in the report is the City's best available science.

Stream Classification
The stream mapping discussed above includes the rating or classification of all identified streams in the City. The *Stream Inventory and Habitat Evaluation Report* (Parametrix 2003) classified streams according to both the Washington State and City of Issaquah stream classification systems.

The critical area regulations categorize streams as follows:

A. Class 1 streams. "Class 1 streams" means those streams identified as "shorelines of the state" under the City Shoreline Master Program, pursuant to Chapter 90.58 RCW.

B. Class 2 streams with salmonids. "Class 2 streams with salmonids" means those streams smaller than Class 1 streams that flow year-round during periods of normal rainfall and those that are used by salmonids.

C. Class 2 streams. "Class 2 streams" means those streams smaller than Class 1 streams that flow year-round during years of normal rainfall with no salmonids.

D. Class 3 streams. “Class 3 streams” means those streams that are intermittent or ephemeral during years of normal rainfall and areas not used by salmonids, excluding roadside ditches and irrigation facilities.

Issaquah’s present stream classification system is primaily based on the presence/absence of salmonids. To determine fish use in City streams, consultants preparing the Stream Study reviewed published reports, agency data/maps, and field-inspected some streams in regard to habitat quality and accessibility. Summary tables in the Stream Study clearly identify the information sources used to determine the stream classification.

Issaquah’s stream classification system provides “special consideration” of anadromous fisheries (and all salmonid species), consistent with BAS procedural criteria WAC 365-195-925.

Stream Buffer Width Requirements

Issaquah’s critical area regulations presently require a 100-foot buffer width for Class 1 streams, a 100-foot buffer width for Class 2 streams with salmonids, a 50-foot buffer width for Class 2 wetlands (with no salmonids), and a 25-foot buffer width for Class 3 streams.

The code also includes a provision to increase stream buffer width requirements (IMC 18.10.780.B) during project review of development applications. Considerations for requiring an increase in stream buffers include: to protect critical drainage areas, critical fish and wildlife habitat, location of hazardous materials, landslide or erosion hazard areas, groundwater recharge or discharge areas, and the location of trail or utility corridors.

Scientific literature documents that riparian buffers/habitat, and in particular the vegetation in buffers, provide significant chemical, physical and/or biological functions that enhance ecological functions of adjacent aquatic bodies. Riparian buffers can provide “sink” functions including: improving water quality through sediment and pollutant retention, maintaining water temperature through shading, and attenuating flood water. “Source” functions include: stream baseflows from groundwater, large woody debris, gravel for spawning substrate, and insects and organic matter for food supply.

In general, stream buffers provide similar functions as wetland buffers. One difference is that stream buffers are important for recruitment of large woody debris (LWD), which is an important habitat component for fish-bearing streams but not as important a habitat feature for wetlands.

Most of the scientific literature addresses stream buffers necessary to protect riparian functional processes in more rural, forested environments. However, there are urban

conditions that limit the direct functional role of stream buffers in an urban context, including: narrow buffer widths that are constrained by structures and infrastructure resulting from historic development patterns, channelization and bank-hardening of streams, artificial barriers such as culverts isolate stream reaches and limit transport of woody debris, difficulty of restoring mature forests for large woody debris recruitment because of safety and land use factors, and stormwater systems that replace the pollutant removal and flood attenuation functions of buffers.

The scientific literature on stream buffers also indicates a wide range of buffer widths that are needed to effectively protect the various functions, and the literature is not definitive in identifying an ideal buffer width or even a minimum buffer width necessary to protect all functions. Several studies of best available science quantify the effectiveness of various buffer widths to perform specific functions. In general, studies indicate that buffers 100 to 150 feet wide provide approximately 80% of the potential functions, particularly for "sink" functions. Buffer requirements for wildlife habitat are typically larger, on the order of 100 to 600 feet. These studies also indicate there may be a point of diminished returns where little additional stream protection is gained even with substantial increase in buffer widths. For example, Wong and McCuen (1982) indicate that 90% of sediment removal can be accomplished within the first 100 feet of a riparian buffer, but an additional 80 feet of buffer is required to remove 5% more sediment.

There is also a shift toward studies evaluating landscape-level alterations to watersheds. The general effects of urbanization on lowland salmonid streams in the Puget Sound have been recently documented (Booth, 2000; May and Horner, 2000). While the effects of urbanization on a watershed are tied to the loss or disturbance of native riparian areas, the total impervious area in a watershed or drainage basin is also associated with stream degradation. Adverse impacts of high impervious levels include flushing of large woody debris and spawning gravels from streams. The simple application of prescriptive buffers may not be adequate to protect functions or restore urban streams because urban-induced changes to hydrology (high percentage of effective impervious area) may result in irreparable aquatic system loss. The Stream Study also concluded that watershed-scale processes have great impacts on Issaquah's streams, stating that "basin hydrology, sediment transport, impervious surface area, and water quality on a watershed scale will need to be explored and pursued in conjunction with neighboring jurisdictions if long-term and sustainable habitat improvements are to be achieved."

Issaquah concludes that existing stream buffer requirements of 100-feet for Class 1 streams and Class 2 streams with salmonids, and 50-feet for Class 2 streams are within the range of recommendations of best available science to protect stream functions and values.

All streams with salmonids require a 100-foot buffer. This applies to anadromous fish as well as resident salmonids such as Cutthroat Trout. The 100-foot buffer width

requirement provides the additional protection or "special consideration" for anadromous fisheries as required under WAC 365-195-925.

Issaquah presently requires a 25-foot buffer width for Class 3 streams, streams that are intermittent or ephemeral during years of normal rainfall and areas not used by salmonids. Small tributary streams are strongly influenced by riparian vegetation, which provides shading and contributes organic material. The existing buffer standard of 25-feet may not be adequate to protect some functions and the City is planning to further evaluate this standard and amend the code in 2005. However, given the factors discussed above, the risk of impacting critical area functions is low. Although, the standard is not consistent with recommendations of best available science, the City is addressing this issue to comply with the BAS procedural criteria (WAC 365-195-915(1), which allows consideration of nonscientific information where critical area regulations depart for recommendations of the best available science.

Stream Buffer Averaging

Issaquah's critical area regulations allow for buffer averaging of standard stream buffer width requirements. Stream buffers may be reduced by a maximum of 25% of the standard buffer width. Proposals for buffer averaging are reviewed on a case-by-case basis. The code includes several provisions to minimize the degree of buffer averaging and to ensure that critical area functions are protected, including: 1) low impact land uses would be located adjacent to areas where the buffer width is reduced; 2) buffer width averaging is not established for convenience purposes; 3) averaging would not impact stream functional values; 4) there is no net reduction in the total buffer area; and 5) mitigation/revegetation may be required.

In administration of the code, development proposals which include buffer averaging are commonly required to provide a functional analysis to demonstrate the proposal would not decrease buffer functions. In addition, revegetation or enhancement of buffers is required, particularly if buffers have a predominance of invasive plant species. Enhancement of buffers with native tree and shrub species adds a multi-story plant canopy providing increased shade, detrital input, and insect fall. The buffer enhancement required with buffer averaging proposals increases some buffer functions over standard buffer/setback standards without revegetation.

The City concludes that stream buffer averaging presently limits the extent of buffer reductions to a maximum of 25% of the standard buffer width and with consideration of the other approval criteria adequately protects stream functions. However, buffer averaging or reductions in the 25-foot buffer width for Class 3 streams could result in narrow buffers that compromise some critical area functions. Most of the scientific literature indicates a minimum 25-foot buffer width is necessary. As with wetland buffer averaging, the City will be further evaluating stream buffer averaging provisions to: 1) require a minimum buffer width; 2) include impact avoidance and minimization criteria; and 3) limit buffer averaging to a percentage of the buffer perimeter.

The critical area regulations also include a specific provision (IMC 18.10.780.2.h) that allows for the 100-foot buffer on Class 1 "shoreline" streams to be reduced to the buffer specified in the Shoreline Master Program. In several Shoreline Environment designations a 50-foot buffer is the minimum required for single-family development. An applicant must do a critical area study documenting that a smaller buffer would not significantly impact a stream. In the administration of this code provision, buffer re-vegetation or enhancement with native trees and shrubs is commonly required to mitigate for a reduction in the buffer width and to increase functions of riparian vegetation. The Parametrix BAS report addressed the issue of stream buffer reductions as follows:

"Stream buffer enhancement is effective in addressing certain functions such as stream shading, microclimate control, and habitat diversity, but does not adequately address or offset impacts such as channel confinement, floodplain disconnectedness, and loss of channel complexity, which are documented concerns for City of Issaquah streams (Parametrix 2003). For streams such as Issaquah Creek, where channel confinement and lack of floodplain connectivity creates limiting factors for salmonids (e.g., lack of rearing habitat), benefits derived by riparian enhancement will generally not be enough to offset the impact of further encroachment into the buffer."

This is consistent with one of the findings of the Stream Study:

"Channel confinement has a significant impact on the formative process for stream channel diversity, substrate size and stability, natural recruitment of LWD, and floodplain connection, all of which are critical to properly functioning aquatic habitat."

As discussed above, a critical area study is required to document that reducing the buffer would not result in significant impacts to a stream. This allows the City to consider the best available science on a case-by-case basis. However, the City will further evaluate this code provision with the evaluation of buffer averaging provisions.

Shoreline Master Program

Issaquah's Shoreline Master Program (SMP) applies to the mainstem of Issaquah Creek and the East Fork. The SMP include standards for specific use activities which provide additional protection of stream functions. The City completed the *"Stream Inventory and Habitat Evaluation Report"* (Parametrix 2003) to collect baseline information and assess stream functions and processes for the purpose of updating the SMP. The report assesses habitat functions by stream reach on Issaquah Creek and the East Fork of Issaquah Creek. This information will assist the City in updating the SMP and tailoring buffer requirements and other protections and conservation measures to different stream reaches.

6.3 Conclusion

Issaquah's regulations to protect stream functions are consistent with the range of recommendations included in current best available science. The existing buffer standard of 25-feet for Class 3 streams may not be adequate to protect some functions and the City is planning to further evaluate this standard and amend the code in 2005. However, given the factors discussed above, the risk of impacting critical area functions is low.

The City also recognizes that buffer averaging and reductions in the stream buffer widths could potentially compromise some critical area functions. The administration of the code during project review minimizes the risk to critical area functions because best available science is applied on a case-by-case basis and findings are required to ensure that buffer averaging or reductions would not adversely impact stream functions. The City is addressing this issue to comply with the BAS procedural criteria (WAC 365-195-915(1), which allows consideration of nonscientific information where critical area regulations depart for recommendations of the best available science. The City will continue to evaluate stream buffer averaging and reduction provisions in 2005 to further improve and strengthen protections for streams to: 1) require a minimum buffer width; and 2) limit buffer averaging to a percentage of the buffer perimeter.

The City of Issaquah has been very active in the process to develop the WRIA 8 Salmon Conservation Plan. The public review draft of the Chinook Salmon Conservation Plan is expected in November 2004. This plan will recommend land use actions, restoration and protection projects and opportunities for public involvement. The Chinook Salmon Conservation Plan is a collaborative effort among 25 cities and 2 counties. The watershed approach and scale of the Plan is especially relevant to Issaquah because stream functions in the City are strongly influenced by watershed processes that need to be addressed in cooperation with neighboring jurisdictions. Information included in the Plan will represent the new best available science for the watershed and the City looks forward to reviewing and implementing recommendations to further improve stream protections, particularly in regard to the protection of anadromous fisheries.

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7 WILDLIFE CONSERVATION AREAS

7.1 Introduction

Issaquah's policies and development standards for protection of wetland and stream habitat areas are addressed in separate sections of this report. Protection measures for anadromous fish are also considered in the "Stream" section of this report. Therefore, this section on wildlife conservation areas is focused on the City's protection of upland wildlife species and habitat.

State Classification Guidelines for Critical Areas (WAC 365-190-080) identify several types of wildlife habitats to be addressed in Critical Area Ordinances:

- Areas with which endangered, threatened and sensitive species have a primary association;
- Habitats and species of local importance;
- State natural area preserves and natural resource conservation areas;
- Fish and wildlife habitat connections between open spaces and larger habitat blocks.

Priority habitat areas identified in Issaquah include Issaquah Creek (all forks), wetlands (freshwater), riparian corridors, anadromous fish runs, resident fish reaches, and forested upland areas (Cougar, Squak and Tiger Mountains). The streams and Lake Sammamish support anadromous fish runs. Priority species include: Great Blue Heron, Bald Eagle, Pileated Woodpecker, Tailed Frog, anadromous fish species including Fall Chinook, Coho, Sockeye and Winter Steelhead, and resident fish species including Cutthroat Trout and Kokanee Salmon.

Issaquah is generally situated on the valley floor between two main creeks and their tributaries, Issaquah and Tibbetts Creeks which flow into Lake Sammamish. The Issaquah Creek Basin is one of the three most significant basins in King County, exhibiting high quality habitat and diversity of fish and wildlife populations, and one of the largest salmon populations in the WRIA 8 watershed.

The City has also grown onto the lower hillslopes of Cougar, Squak and Tiger Mountains (also known as the "Issaquah Alps") and Grand Ridge. The Issaquah Alps include approximately 25,500 acres of public natural open space preserved or managed as upland forest habitat, providing a significant area of wildlife habitat. The City of Issaquah, King County Department of Natural Resources and Parks, Washington State Parks and Recreation Commission and the Washington State Department of Natural Resources have formed an interagency partnership for management of the Issaquah Alps. This provides for coordination on land acquisition, recreational facilities development, and on-going operation and maintenance. The partner agencies also

work to acquire wildlife corridors to connect the Issaquah Alps to public lands located to the east and south.

The City of Issaquah has protected significant areas of natural open space within the City to provide linkages between the riparian corridors on the valley floor and the upland forested habitat of the Issaquah Alps. Examples include the acquisition of approximately 258 acres on the east flank of Cougar Mountain, dedicated as part of the "Talus" development project, and the 1,800 acre Grand Ridge Park directly to the east of the City, which was preserved as part of the Issaquah Highlands development.

7.2 Assessment of Policies and Regulations

Comprehensive Plan Policies

Land Use Element

Policy L-1.1 Maintain and enhance the natural environment: The Land Use Code shall maintain and enhance the natural environment and amenities to:

1.1.8 Require protection of critical areas, fish and wildlife areas and corridors and aquifer recharge areas;

1.1.8.1 identify and protect habitat networks that are aligned at jurisdictional boundaries through inter-jurisdictional cooperation;

1.1.8.2 maintain adequate forested and vegetative buffers along critical areas, riparian areas and fish and wildlife habitat areas.

As part of the 2004 Comprehensive plan amendments, Issaquah is adding a definition of Fish and Wildlife Conservation Areas, consistent with RCW 36.70A.030(5).

"Fish and Wildlife Conservation Areas: Areas necessary for maintaining species in suitable habitats within their natural geographic distribution so that isolated subpopulations are not created as designated by WAC 365-190-080(5). These areas include:

A. Areas with which state or federally designated endangered, threatened, and sensitive species have a primary association;

B. Habitats of local importance, including but not limited to areas designated as priority habitat by the Washington Department of Fish and Wildlife;

C. Commercial and recreational shellfish areas;

D. Kelp and eelgrass beds;

E. Herring and smelt spawning areas;

F. Naturally occurring ponds under twenty (20) acres and their submerged aquatic beds that provide fish or wildlife habitat, including those artificial ponds intentionally created from dry areas in order to mitigate impacts to ponds;

G. Waters of the state, including lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington;

H. Lakes, ponds, streams, and rivers planted with game fish by a governmental or tribal entity;

I. State natural area preserves and natural resource conservation areas; and

J. Land essential for preserving connections between habitat blocks and open spaces. "

Parks, Recreation, Trails and Open Space Plan

Issaquah updated its Parks, Recreation, Trails and Open Space Plan in January 2004. The Plan includes an inventory of natural open space within the City as well as surrounding regional parks, goals and objectives, and an implementation and capital improvement plan. Policies include to maintaining wildlife corridors (P-1.3), sustaining native biological diversity (P-2.3), and acquisition of wildlife habitat (P-7.6). The Plan also includes a chapter Open Space and Habitat Conservation Account (HCA), which includes strategies for protection, acquisition and stewardship of open space and wildlife habitat, and descriptions of freshwater (riparian zones and wetlands) and terrestrial habitat areas in the city.

Mapping/classification

A vital source of information about the approximate location and extent of wildlife, including species identified as endangered, threatened or sensitive, is available from the Washington State Department of Fish and Wildlife (WDFW) Priority Habitat and Species (PHS) Program. The City uses this program for information on fish and wildlife habitat location and for species and habitat management and conservation measures. The information is used both in landscape planning/ecosystem management efforts as well as during review of specific development proposals.

Development Review

Wildlife conservation areas are not presently included as an element of the critical area regulations and the City has not designated habitat conservation areas. Wetland and stream standards include protective measures and buffer requirements which preserve wildlife habitat functions and corridors. These critical area protections provide the greatest benefit toward protecting wildlife habitat areas. Riparian and wetland habitat zones are considered to be among the richest zones for aquatic organisms, mammals, and avian species (Clark 1977, Williams and Dodd 1979). Because wetland and

riparian habitats exhibit an “edge effect,” due to overlapping habitats, more niches are found in these areas than in any other habitat type.

Issaquah’s Shoreline Master Program (SMP) applies to the mainstem of Issaquah Creek and the East Fork. The SMP include standards for specific use activities which provide protection of stream habitat functions.

Protection of upland wildlife habitat areas within the City is primarily implemented during the development review process, including SEPA review. Development that is proposed in close proximity to locations identified on Priority Habitat and Species (PHS) maps is required to provide habitat assessment reports. Reports are also required if project SEPA checklists or local residents indicate the presence or proximity of species of concern. The City conditions development proposals based on potential project impacts, using management recommendations from the Washington State Department of Fish and Wildlife (WDFW) Priority Habitat and Species (PHS) Program. Conditions may include establishing buffer areas, limitations or seasonal restrictions on construction, protection of significant trees or vegetation and requirements to include native tree and shrub plantings and habitat features (i.e. retaining downed trees on-site, creating tree snags, habitat cribs, etc.) as mitigation for impacts.

Also as part of the development review process, Issaquah requires critical areas and associated buffers to be protected in perpetuity in critical area tracts or native growth protection easements (NGPE). This extends protection to riparian buffers, wetland areas and buffers, and upland forested steep slopes.

7.3 Conclusion

Issaquah’s policies and regulations for wildlife conservation areas meet GMA requirements for best available science. Scientific information has been included in the review and development of policies and standards.

Critical area standards for wetlands, streams and steep slopes include protective measures and buffer requirements which preserve the most valuable, richest wildlife habitat areas and corridors. In particular, measures to protect anadromous fisheries are discussed in the “Stream” section of this report.

Issaquah is adding a definition of wildlife habitat conservation areas to the Comprehensive Plan in 2004, as preparation for adding this as an element of the critical area regulations.

Issaquah uses information and mapping from the Priority Habitat and Species (PHS) program during review of development proposals and requires habitat assessments to address site-specific conditions and issues. The City coordinates with the Department of Fish and Wildlife (WDFW) Priority Habitat and Species (PHS) Program to condition

development based on WDFW management recommendations. Information and management recommendations from the PHS program represent best available science on wildlife habitat conservation areas.

The City of Issaquah has protected significant areas of natural open space within the City to provide linkages between the riparian corridors on the valley floor and the upland forested habitat of the Issaquah Alps. These links or connections ameliorate the major impacts of urban development which is the fragmentation of habitat and loss of habitat connectivity.

Issaquah's active participation in interagency coordination for management of the Issaquah Alps natural open space area also demonstrates the City's commitment to protecting wildlife habitat.

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8. Other Programs Protecting Critical Area Functions

The City of Issaquah takes a comprehensive approach to the protection of critical areas. The BAS Report focuses primarily on standards and regulations in the Critical Area Regulations. There are other City regulations relating to stormwater, water quality, flood hazards and clearing and grading that also provide protection for critical area functions. In addition, Issaquah actively protects critical areas through non-regulatory programs including: open space acquisition, capital improvement habitat enhancement projects, and habitat stewardship and public education.

Regulatory Programs

City regulations and standards that protect critical areas are found primarily in the Critical Area Regulations (IMC Chapter 18.10), Stormwater Management Policy (IMC Chapter 13.28), Stormwater Management Utility (IMC Chapter 13.30), Clearing and Grading Code (IMC Chapter 16.26), and Areas of Special Flood Hazard (IMC Chapter 16.36). State and Federal regulatory programs also direct City requirements and standards related to stormwater runoff, water quality, and habitat, including: the Puget Sound Water Quality Management Plan, National Pollution Discharge Elimination System (NDPES) Municipal Stormwater Permitting Phase II, and the Endangered Species Act (ESA) 4(d) Rule.

Transfer of Development Rights

Issaquah is presently considering a Transfer of Development Rights (TDR) program to help protect properties with significant critical areas by providing those property owners with the opportunity to sell their development rights as an alternative to developing their property. These parcels are designated “sending sites.”

Development rights from sending sites may be purchased by private property owners whose land is more suited for urban development. These parcels are designated as “receiving sites”.

Key Points of the proposed Transfer of Development Rights Proposal include:

- Shifts development away from environmentally critical areas;
- Provides an economic alternative for private property owners whose land includes environmentally critical areas;
- Preserves land in permanent conservation easement or as deeded permanent public open space as public benefit;
- Moves development to main commercial, retail and office areas with transit service; and
- Participation in the program is voluntary and the “market” would determine the value of the transferred development rights.

The City is holding a public hearing on the Transfer of Development Rights (TDR) program in November 2004. Work on the TDR Ordinance is expected to continue well into the first quarter of 2005.

Capital Improvement Projects, Stormwater Management Programs and Public Education

The City of Issaquah protects natural resources and critical areas with capital improvement projects that include habitat enhancement, stormwater programs and habitat stewardship and public education/outreach projects. The Stormwater Management Plan (2002) includes a table that summarizes City projects and programs that have an important role in the protection and enhancement of critical area functions.

Table ES-1. Summary of Stormwater Management Program Activities

Projects and Program Elements	Description	Status	Supporting Policy and Regulatory Requirements[1]	Report Section Reference
1. CAPITAL PROJECTS				
Tibbetts Creek Greenway Project	Construction of City-lead portion of the Tibbetts Creek Greenway Project at Tibbetts Valley Park, providing flooding and habitat improvements.	Constructed in 2003-2004.	Policy U4.2, U4.3, U4.5, U4.9 Council Goal #7 Basin Plan BW 7, 22	Sections 4.4, 5.2.3
Bianco Mine Tailings Stabilization	Stabilization of eroding mine tailings deposits along upper Tibbetts Creek, a component of Tibbetts Creek Greenway Project.	Constructed in 2002.	Policy U4.5, U4.9 Council Goal #7 Basin Plan BW 22	Sections 4.4, 5.2.3

Table ES-1. Summary of Stormwater Management Program Activities				
Projects and Program Elements	**Description**	**Status**	**Supporting Policy and Regulatory Requirements**[1]	**Report Section Reference**
Flooding Improvements	Flood improvements along major Issaquah – including Issaquah Creek, North Fork Issaquah Creek, East Fork Issaquah Creek, and Tibbetts Creek – such as: • Replacement of NW Juniper and NW Dogwood Street bridges, which are constrictions to floodwater. • Flood enhancements at City-owned acquisition properties. • Other flood improvements shown to provide benefits to multiple properties and/or public facilities.	Juniper and Dogwood bridge replacements scheduled for 2005 and 2006, respectively. Other activities are ongoing.	Policy 4.3.1, U4.5 Basin Plan BW 7	Section 4.3, Table 4-7
Streamside Property Acquisition	Purchase of developed and undeveloped properties along streams, including: • Properties with repetitive flood damage losses or would exhibit hazardous flooding conditions if developed; • Properties required to facilitate a capital project; • Properties having high value for future habitat preservation and improvements.	Five parcels have been purchased and houses removed since 1994. Another nine undeveloped lots were acquired to prevent future development.	Policy U4.3.1, U4.5 Basin Plan BW 7	Sections 4.3.4, 6.7

Table ES-1. Summary of Stormwater Management Program Activities				
Projects and Program Elements	**Description**	**Status**	**Supporting Policy and Regulatory Requirements**[1]	**Report Section Reference**
Stream Habitat Restoration	Construction of stream habitat improvements on City property, including: • Large restoration projects, such as the Corps of Engineers Squak Valley Park restoration project, which have regional or federal funding assistance. • Small restoration and enhancement projects (ongoing).	Squak Valley Park restoration scheduled for 2005. Other projects are ongoing.	Policy U4.5, U4.9 Basin Plan BW 22	Section 5.2.2
Water quality retrofits	Construction of water quality and stormwater recharge facilities along existing City stormwater systems, if found to be feasible and effective.	Demonstration project constructed in 2000.	Policy U4.4.2, U4.5 Basin Plan BW 17	Sections 5.2.4, 6.9
Storm Drainage Rehabilitation and Improvements	Fix existing drainage problems, repair deteriorating lines, and respond to new problems as they are identified and evaluated.	CIP program began in 2002 with annual funding.	Policy U4.4.2, U4.5 GMA	Section 5.2.5, Table 4-7
2. MANAGEMENT AND REGULATORY PROGRAMS – STORMWATER				
Stormwater Resource Action Plan	Support of education and outreach programs in coordination with Resource Conservation Office; participation in regional ESA planning efforts; special studies related to flooding, water quality and fish resources; support to Issaquah Creek Basin Steward; and aquatic resource monitoring program.	Ongoing programs.	Policy U4.4.1, U4.4.2, U4.5 Basin Plan BW 29, BW30	Sections 6.8, 6.9

Table ES-1. Summary of Stormwater Management Program Activities

Projects and Program Elements	Description	Status	Supporting Policy and Regulatory Requirements[1]	Report Section Reference
Regulatory Codes, Construction Inspection and Enforcement for New Construction	Day-to-day development project review to verify compliance with City stormwater and floodplain ordinances, construction inspections to verify permit conditions are met and best management practices for erosion and sediment control are implemented, and enforcement actions on code violations.	Ongoing programs.	Policy U4.1 IMC 13.28, 16.36, 18.10.340 Puget Sound Plan NPDES NFIP/CRS	Sections 6.2, 6.5.1
Emergency Water Quality Response	Response procedures, responsibilities and enforcement of water quality problems such as hazardous materials spills, illegal dumping, and water quality violations. Includes preparation and maintenance of spill response plan.	Enforcement is ongoing. Development of Spill Response Plan scheduled for 2004.	Policy U4.4.2 Basin Plan BW 18 Puget Sound Plan	Sections 6.4.2, 6.8, 6.9
Water Quality Problem Identification, Ranking, and Retrofitting Evaluation	Following up on data collected by the Aquatic Resource Monitoring Program, conduct targeted evaluations to identify specific sources of pollutants and response actions to eliminate them.	Ongoing program.	Policy U4.4.2, U4.5 Basin Plan BW 17 Puget Sound Plan NPDES	Sections 6.4.3, 6.8
Stormwater System Inventorying and Mapping	Develop accurate maps and facility inventory of public and private stormwater systems to support management, maintenance, and CIP programs.	Ongoing program.	Policy U4.4.2, U4.5 Puget Sound Plan NPDES GMA	Section 6.3.2
TV inspection of stormwater lines	Identify high priority maintenance and repair needs in aging underground conveyance systems.	Program began in 2002 with annual funding.	Policy U4.4.2, U4.5 GMA	Section 5.2.5

Table ES-1. Summary of Stormwater Management Program Activities				
Projects and Program Elements	**Description**	**Status**	**Supporting Policy and Regulatory Requirements**[1]	**Report Section Reference**
Aquatic Resource Monitoring Program	Monitoring of natural resources including water quality, instream and riparian habitat, streamflows and macroinvertibrates to monitor the health of our streams and track progress of programs that are designed to improve ecosystem health	Monitoring program began in 1998.	Policy U4.4.2, U4.5, U4.7 Puget Sound Plan Basin Plan BW 30	Sections 6.4.1, 6.8
Stormwater Utility	Support to Finance Department by providing accurate data for utility accounts for existing and new accounts. Includes impervious surface and parcel mapping.	Ongoing program. Major account updates occurred in 2002. Conversion to new accounting system in 2004 or 2005.	Policy U4.5 IMC 13.30	Section
Public Stormwater Facility Maintenance	Maintenance of public stormwater facilities by the Public Works Operations Department.	Ongoing program.	Policy U4.4.2, U4.5 GMA Puget Sound Plan NFIP/CRS NPDES	Section 6.3.1
Private Stormwater Facility Inspections	Inspection program of private facilities to verify required maintenance is performed and conveyance, detention and water quality facilities continue to operate as designed.	Program began in 2002.	Policy U4.4.2 Basin Plan BW 13 Puget Sound Plan NPDES	Section 6.3.3
Comprehensive Stormwater Planning	Develop and implement a comprehensive stormwater management program that addresses stormwater runoff and water quality.	Updates planned every five years.	Policy Objective U4 Policy U4, U4.8 Council Goal #2 Puget Sound Plan	This document Section 4.2.1.1

Table ES-1. Summary of Stormwater Management Program Activities				
Projects and Program Elements	**Description**	**Status**	**Supporting Policy and Regulatory Requirements[1]**	**Report Section Reference**
NPDES Phase 2 Stormwater Permitting Compliance	Submit application forms for NPDES Phase 2 municipal stormwater permit in March 2003 and follow-up on subsequent requirements as Ecology develops program.	Program began in 2003.	Policy U4.4.1 NPDES	Section 4.2.1.3
3. MANAGEMENT AND REGULATORY PROGRAMS – FLOODING AND HABITAT				
Floodplain and Floodway Mapping	Update inaccurate floodplain maps to make them more effective for flood hazard management programs, City Code, and flood insurance.	Ongoing program. Major FEMA floodplain map update to be adopted in 2004.	Policy U4.3.2 IMC 16.36, 18.10.340 Basin Plan BW 9 NFIP/CRS	Section 6.5.4
Flood Warning System and Flood Fighting	System of stream gauges, public information dissemination, and flood fighting efforts to warn residents of impending flood conditions and mobilize City crews to ensure safety of residents and property to the maximum extent feasible.	Ongoing program initiated after 1996 flood.	Policy U4.3.2, U4.5, U4.7 Basin Plan BW 10 NFIP/CRS	Section 6.5.2
FEMA Flood Insurance Program and Community Rating System	Enforcement of flood hazard management ordinance, public information program to inform residents of flood hazards and availability of flood insurance, and increased management efforts in return for reduced insurance premiums.	Ongoing program. CRS Rating improved to Class 5 in 2003.	Policy U4.3.2, U4.7 NFIP/CRS IMC 16.36, 18.10.340	Sections 4.2.3, 6.5.4, 6.5.5
Channel Improvements Maintenance and Monitoring	Post-construction permit compliance requirements for constructed City capital improvement projects	Ongoing program.	Policy U4.3.1, U4.5	Sections 4.2.1, 4.2.2

Table ES-1. Summary of Stormwater Management Program Activities				
Projects and Program Elements	**Description**	**Status**	**Supporting Policy and Regulatory Requirements[1]**	**Report Section Reference**
Regional Watershed Planning	Participation in Cedar – Lake Sammamish Watershed (WRIA 8) development of a long-term recovery plan for chinook salmon.	Ongoing program.	Policy U4.8	Sections 4.2.2, 6.8
4. PUBLIC EDUCATION AND OUTREACH				
Issaquah Stream Team	Implementation of Aquatic Resource Monitoring Program field efforts by volunteers at many Issaquah-areas streams	Ongoing program began in 1998.	Policy U4.4.2, U4.5, U4.7 Puget Sound Plan NPDES	Sections 6.6.2.1, 6.8
Business for Clean Water Program	Education and technical assistance to Issaquah businesses in stormwater pollution prevention responsibilities and best management practices	Ongoing program with assistance from King County staff.	Policy U4.4.2, U4.5, U4.7 Puget Sound Plan Basin Plan BW13	Sections 6.6.1.2, 6.8
Water Quality Education	Residential water quality education, smart and healthy landscape, green car wash, watershed signage, storm drain stenciling, and other education efforts.	Ongoing program.	Policy U4.5, U4.7 Puget Sound Plan NPDES	Sections 6.6.1, 6.8
Restoration Site Stewardship	Volunteer program for monitoring and maintenance of City CIP and volunteer-initiated restoration sites, with activities including vegetation plantings, weed control, and field surveys to monitoring restoration success.	Ongoing program.	Policy U4.5, U4.7 Puget Sound Plan Basin Plan BW20	Sections 6.6.2, 6.8

[1] Key for policies and regulatory requirements:

Policy:	2002 City Comprehensive Plan policy (Local)
Council Goal:	2002 Council Goal (Local)
IMC:	Issaquah Municipal Code (Local)
Basin Plan:	Issaquah Creek Basin and Nonpoint Action Plan (Local)

Puget Sound Plan:	Puget Sound Water Quality Management Plan (State)
GMA:	Growth Management Act (State)
NPDES:	NPDES Phase 2 Stormwater Permitting (State)
NFIP/CRS:	National Flood Insurance Program and Community Rating System (Federal)

Note: Potential ESA requirements are not included in this table because proposed Tri-County regional response proposal has not been finalized and accepted by Federal agencies.

Open Space Acquisition/Preservation

The City of Issaquah has an active program for the acquisition and preservation of natural open space both within and outside the city limits. One of the main objectives of the open space acquisition program is to protect the most valuable environmentally sensitive areas, to enhance habitat values for both aquatic and terrestrial wildlife species, and to link open spaces and riparian corridors in Issaquah with large forested upland areas (i.e. “Issaquah Alps”) that surround the City. Issaquah successfully partners with local and state agencies, including King County, Washington State Dept. of Natural Resources and Washington State Parks and Recreation Commission to increase public ownership of lands and protection of habitat areas within its sphere of influence.

The forested hills of the “Issaquah Alps” surrounding Issaquah consist of Cougar, Squak, Tiger Mountains and Grand Ridge, encompassing approximately 25,500 acres of publicly owned open space lands. In the past ten years, public land ownership has increased from 17,000 acres to its current size of approximately 25,500 acres through agency cooperation and partnership, and implementation of the Issaquah Area Wildlife and Recreational Trails Plan and other area planning documents. In addition, Taylor Mountain Forest and Rattlesnake Mountain Scenic Area have been included in the “Issaquah Alps” thus increasing public land acreage to more than 29,000 acres. Critical wildlife habitat corridors between the mountains and Grand Ridge have been protected. In-stream and riparian corridor habitat values have also been preserved from the headlands of Issaquah Creek at Taylor Mt. Forest to its mouth located in Lake Sammamish State Park.

The City has partnered with the state Dept. of Natural Resources (WDNR) in the protection of upland – forested habitat. Tiger Mt. State Forest includes approximately 15,500 acres of land with approximately 450 acres of Tradition Plateau in City ownership. Together, the City and WDNR have designated 4,400 acres as the West Tiger Mt./Tradition Plateau Natural Resources Conservation Area (NRCA). The NRCA is designed to protect outstanding examples of native ecosystems, habitat for endangered, threatened and sensitive species and scenic landscapes. The City and WDNR have also partnered and implemented stewardship projects to increase habitat values for Round and Tradition Lakes.

The City of Issaquah has acquired critical creek-side properties either through out-right acquisition or through development mitigation measures. The City has targeted properties that have been identified as having critical in-stream functions, such as anadromous fish spawning beds. The City now owns approximately __ acres of riparian properties in its effort to protect the stream functions and values.

The City of Issaquah has protected the most critical wetland areas adjacent to Issaquah Creek. It is estimated there are approximately 128 acres of Class 1 wetlands along Issaquah Creek, 51 acres or 40% is in City ownership.

Habitat Stewardship Program

The City of Issaquah has an active stewardship program that recruits volunteers from the community to engage them in various monitoring, restoration, and educational activities. The goals of the Issaquah Stewardship Program include:

- Determine baseline conditions and track changes over time of water quality, biological components and habitat of the aquatic resources in the City of Issaquah.
- Increase the success of restoration sites in meeting their identified goals.
- Involve citizens and community groups in monitoring and restoration activities to educate the citizenry about resource and water quality issues and increase the sense of ownership of our aquatic resources.
- Decrease the polluting practices of City of Issaquah residents and visitors.

The Issaquah Stewardship Program receives funding from the City of Issaquah, Washington Department of Ecology Centennial Clean Water Program, King County Water Works and the King County Conservation District.

The primary elements of the Issaquah Stewardship Program are described below.

Issaquah Stream Team

Approximately 30 volunteers from Issaquah and the surrounding communities are currently members of the Issaquah Stream Team. They participate in monthly chemical water quality sampling, annual habitat surveys, and macroinvertebrate sampling at 16 points in Issaquah-area streams. See Section 6.4.1 and City of Issaquah (2000) for detailed information on this program.

Monitoring methods are adapted from the City of Bellevue Stream Team Program, the Clallam County Water Watchers Program and King County Water and Land Resources Monitoring Division. Parameters include:

- Monthly water quality (dissolved oxygen, pH, turbidity, conductivity, temperature)
- Annual benthic macroinvertebrates (collected by volunteers, analyzed by lab)
- Bi-annual habitat and cross section surveys along specific reaches (stream profile, riparian vegetation, erosion, logs, pools, culverts and pipes)

In 2000, the habitat survey component was adapted to monitor capital improvement projects post in-stream habitat changes at the Gilman and Pickering Reach and pre-construction condition at the Johnson site. Characterization of second year stream reaches will continue as planned. Future cross section data will be tied into cross sections established by a consultant earlier this year.

Restoration Site / CIP Maintenance and Monitoring

Under this program volunteer teams are engaged in restoration monitoring and maintenance at three restoration sites along Issaquah Creek. This element was designed to have teams adopt a particular restoration site and do all monitoring and maintenance elements at each site. As of 2000, three sites have been adopted. Given the number of sites in the City and the varied interests of community members, the program is evolving to funnel all weed control efforts to one-day weed control parties with school groups, businesses, clubs and other interested community members.

Maintenance and monitoring elements include:

- Invasive weed control
- Watering
- Potential replanting as needed
- Bird surveys
- Wildlife surveys
- Seasonal photo points
- Annual plant survival and invasive weed surveys

Since 1994, the City of Issaquah has partnered with Save Lake Sammamish, King County Surface Water Management, the Mountains to Sound Greenway Trust and other local organizations to create a habitat stewardship program involving volunteers in the enhancement of City-owned riparian areas. Since 1994, approximately 57 acres of stream buffer along Issaquah Creek and Tibbetts Creek have been planted with about 35,000 native trees and shrubs and maintained from invasive plant species. Volunteers have contributed over 20,000 hours restoring, maintaining and monitoring sites. The City's habitat stewardship program has resulted in significant improvements to riparian habitat functions, as well as educating the public on the value of stream functions and the benefits of protecting Issaquah's stream resources.