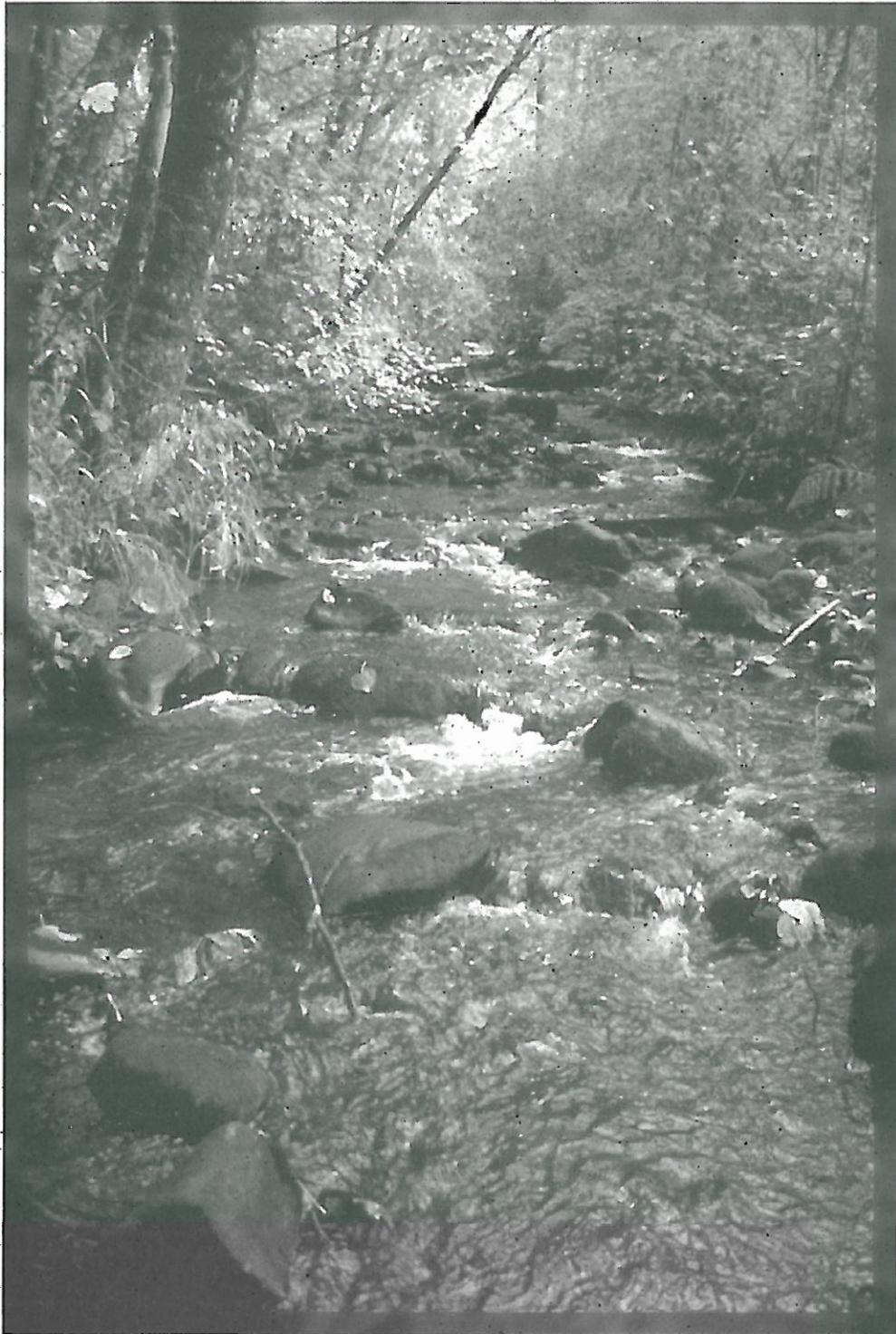


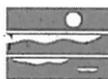
ISSAQUAH CREEK



Final Basin and Nonpoint Action Plan



King County
Surface Water
Management
Everyone lives downstream



WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

CITY OF
ISSAQUAH

Final

Issaquah Creek

Basin and Nonpoint Action Plan

December 1996

King County (Lead Agency)
Department of Natural Resources
Surface Water Management Division
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Suite 2200
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Issaquah/East Lake Sammamish
Watershed Management Committee
City of Issaquah
King Conservation District
King County
Muckleshoot Indian Tribe
Washington Dept of Natural Resources

Funded in part by the Washington State Department of Ecology Centennial Clean Water Fund

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Text will be made available in large print, Braille, or audiotape as requested.

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Chapter 1

Executive Summary

About the Plan

Issaquah Creek and the Basin

Summary of Major Findings and Recommendations

Implementation

Using the Plan

Chapter 1: Executive Summary

ABOUT THE PLAN

The purpose of the *Issaquah Creek Basin and Nonpoint Action Plan* is to develop a program of effective actions to prevent and reduce flooding, nonpoint source pollution, habitat degradation, and stream-channel erosion in the basin.

The plan was developed by a technical team staffed by the City of Issaquah and King County Surface Water Management (SWM) Division¹ under the direction of an interagency Watershed Management Committee (WMC) and the Basin Advisory Team (BAT), a citizens advisory committee. The project was funded by the City, the County, and the Washington State Department of Ecology. The documents already published include:

Current/Future Conditions and Source Identification Report for the Issaquah Creek Basin (1991)

Draft Issaquah Creek Basin and Nonpoint Action Plan (1992)

WMC - Proposed Issaquah Creek Basin and Nonpoint Action Plan (1994)

The plan that arose from this process is a hybrid, combining a basin plan and a nonpoint action plan. The basin plan focuses on stormwater management and protection of stream and wetland habitats. The nonpoint action plan is intended to identify actions to prevent and remedy pollution from nonpoint sources in the basin.

The plans were combined in the Issaquah Creek basin because of the interrelationships among water quantity, water quality, and habitat. The land and waters of the Issaquah Creek basin must be evaluated and managed as a whole, integrated system. Erosion cannot be managed without controlling the high flows that cause erosion, water pollution cannot be adequately reduced without controlling the runoff and sediment by which pollutants are transported, and aquatic habitat cannot be managed without considering all of the chemical, physical, and hydrologic elements that define each habitat.

The *Current/Future Conditions and Source Identification Report for the Issaquah Creek Basin*, available from King County SWM preceded the development of the plan. The conditions report documents current water quality, aquatic resources, watershed characterization, and surface-water conditions in the basin and examines potential impacts resulting from future land-use changes.

¹ Surface Water Management (SWM) Division's name has been changed to Water and Land Resources Division (WLRD) in 1997.

The principal outcome of the planning process was the development of the findings and recommendations that are described in detail in the *Draft Issaquah Basin and Nonpoint Action Plan*, and subsequently revised in the *WMC-Proposed Issaquah Basin and Nonpoint Action Plan*. These documents describe source control strategies, plan rationale, and implementation strategy.

The *Issaquah Creek Basin and Nonpoint Action Plan* was adopted by the Metropolitan King County Council as Ordinance No. 11886 on July 10, 1995. The Watershed Management Committee approved the plan on August 2, 1995. The City of Issaquah Council adopted the plan through its Water Resource Action Plan on October 10, 1995. The Washington State Department of Ecology approved the plan on October 16, 1996.

ISSAQUAH CREEK AND THE BASIN

The Issaquah Creek basin encompasses about 61 square miles of King County and contains both Issaquah Creek and Tibbetts Creek (Figures 1-1 and 1-2). Both creeks flow from steep headwaters in the southern basin into Lake Sammamish at the northern edge of the basin. The basin contains Issaquah Creek and its major tributaries (Holder, Carey, Fifteenmile, and McDonald creeks, and the North and East Forks of Issaquah Creek) as well as Tibbetts Creek. The basin plan has been divided into eight subbasins for this report: Upper Issaquah, Fifteenmile, Middle Issaquah, McDonald, East Fork, North Fork, Lower Issaquah, and Tibbetts creeks. Although Tibbetts Creek is not tributary to Issaquah Creek, it shares a common floodplain with the mainstem in large flood events and was therefore incorporated into this basin plan.

The basin is diverse in natural features. Elevations range from more than 3,000 feet at the peak of Tiger Mountain to near sea level at the mouth of Issaquah Creek. More than 80 percent of the basin is forested, with the remainder in wetlands, pastures, urban, and cleared areas. The streams, wetlands, and forests provide habitat for a great variety of fish and wildlife species, including eight species of salmonids, six of which are anadromous. The high quality habitat and abundant populations of fish and wildlife distinguish the Issaquah Creek basin as one of the three most significant basins in the King County Surface Water Management (SWM) Division service area together with Soos Creek and Bear Creek, in terms of natural resources.

The land uses in the basin are also diverse. Remnants of the historic forestry and agricultural activities in the basin exist in commercial forestry harvesting within the Tiger Mountain State Forest (Figure 1-3), which covers much of the eastern flanks of the basin, and in the few farms that remain along the mainstem of Issaquah Creek. In the upper basin, these uses have been supplanted by dispersed residential development and, in recent years, with several large subdivisions. In the lower valley, agriculture has been replaced by the growth of the City of Issaquah, a community of 9,000 people.

SUMMARY OF MAJOR FINDINGS AND RECOMMENDATIONS

The principal outcome of the planning process has been the development of the findings and recommendations that are described in detail in the rest of this report. The following discussion summarizes the plan's major findings and recommendations.

Major Findings

- 1. The lower portions of Issaquah Creek through the City of Issaquah are subject to widespread flooding that is expected to worsen with future basin development.** The lower segments of Issaquah Creek and Tibbetts Creek overflow their banks on a frequent basis, resulting in flooding of hundreds of homes and businesses. According to hydrologic and hydraulic modeling, more than 350 structures, including 212 homes, would be flooded in the 100-year flood event (the flood that occurs, on average, once every 100 years) under current basin conditions (Figure 1-5). More than 90 percent of these structures are within the City of Issaquah. Many of these structures were flooded in 1990, when there were two fairly large floods. While most flooding problems are not severe, causing nothing more than property damage, there are some locations in the basin where flooding results in hazardous conditions.

Flooding problems are largely the result of extensive development in floodplains in the lower basin, rather than increases in flood flows due to upstream development. This is predicted to change in the future, as additional development of the upper basin increases stormwater runoff into the stream system. If the basin develops to the limits of existing zoning with current land-use controls in place (Figure 1-4), the stormwater flows reaching the City of Issaquah will increase by about 20 percent in the mainstem; increases in tributaries could exceed 40 percent. Consequent increases in overbank flow and the expansion of the floodplain will result in a significant increase in the number of homes and businesses that will be subject to flooding. Stated another way, floods comparable to the 1990 events would be expected to recur every 12 to 15 years after basin development, rather than every 30-35 years as is currently the case.

- 2. Existing water quality in the Issaquah Creek basin, while generally good in current conditions, is predicted to deteriorate markedly with clearing and development in the upper basin.** Despite localized pollution from urban sources, roads, and agricultural and forestry activities, the water quality in Issaquah Creek and its tributaries is good, particularly during baseflow conditions. Analyses in the plan indicate that this is likely to change with clearing and development of forest lands in the upper basin, which would result in increases in the amount of nutrients, sediment, and toxic materials such as heavy metals entering the stream system. Without

mitigation in excess of current requirements, modeling indicates that lead loading to the stream system would increase by 75 percent, solids by 43 percent, and phosphorus by 92 percent as a result of future clearing and land development. Increases in solids and phosphorus are particularly important because the Issaquah Creek system provides 70 percent of the inflow to Lake Sammamish, which is already subject to eutrophic conditions and is expected to deteriorate markedly in the future unless these pollutants are controlled.

- 3. Deterioration in habitat within the Issaquah Creek basin has resulted in loss of fish and wildlife populations, and habitat and populations are predicted to decline further with continued basin development.** Although more than 80 percent of the basin remains forested, the 20 percent that has been cleared and developed in other land uses includes land along most of the mainstem and several of the larger tributaries of Issaquah Creek. These areas once featured important aquatic and riparian habitat, and the loss of habitat has resulted in a loss of native fish and wildlife populations in the Issaquah Creek system. The protection of existing habitat is critical to the survival of remaining populations, particularly to the eight species of salmonids, six of which are anadromous, that use the stream for spawning and rearing. Without stringent mitigation measures, the hydrologic and water quality impacts of future clearing and land development that have been discussed previously are expected to render areas of the basin unsuitable for salmon and other important fish and wildlife species. Maintaining fish and wildlife populations in the Issaquah system will also require the restoration of important habitats, such as mainstem spawning and rearing areas.

Major Recommendations

- 1. Reduce flood hazards by removing homes from the stream corridor, acquiring easements on undeveloped property, and restoring channel and floodplain capacity.** The natural functions of the stream channel and floodplain to transmit and store flood waters have been compromised by development of the stream corridors in the Issaquah basin. The plan proposes to restore these functions through the selective removal of homes and reconfiguration of the stream channel within the floodplain. Easements would also be purchased to allow reconfiguration of the channel on undeveloped streamfront land. In addition to benefits in flood protection, the purchase of land and easements and reconfiguration of the channel will allow the restoration of degraded fish and wildlife habitat along the mainstem and major tributaries.

The analysis in the plan indicates that the flood protection and habitat benefits of this program would be optimized at a cost of around \$15 million. It is assumed that overall costs, financing terms, and administration of the program would be negotiated between King County and the City of Issaquah after basin plan adoption. An analysis of flood protection alternatives

conducted in the planning process indicates that this combination of purchase and restoration, when combined with a floodproofing program also recommended in the plan, provides a moderate level of flood protection and excellent environmental benefits at a cost substantially lower than other options.

2. **Regulate the location and characteristics of new development to reduce impacts on stormwater runoff, water quality, and fish and wildlife habitat.** Flooding, water quality, and habitat problems will be much more severe in the future if all residentially-zoned areas of the basin are developed, even at the rural densities that predominate under current zoning. The plan proposes clearing and subdivision regulations that would dramatically reduce the amount of clearing associated with new construction. Modeling in the basin plan indicates that these measures alone will be highly effective at reducing runoff and the transport of sediment and nutrients into the stream system. In particularly sensitive areas, the plan proposes regulations that would increase the capacity and effectiveness of new stormwater control facilities. In two small areas of the basin, the plan recommends that current zoning be reevaluated through a community plan amendment to determine if the densities proposed are compatible with their environmental sensitivity. The other regulatory recommendations are proposed to be implemented through changes to King County codes.
3. **Solve discrete drainage problems through capital improvement projects.** Many discrete drainage problems were identified in the plan, most of which are associated with inadequate drainage facilities for roads and residential subdivisions in the basin. The plan proposes a capital improvement program that includes 43 projects at a total cost of \$7.4 million. More than half of the proposed projects are retrofits of road culverts, stormwater facilities, or other drainage facilities. It is assumed that funding for the capital improvement program will come from bonding and pay-as-you-go sources financed through surface water management fees.
4. **Restore disturbed fish and wildlife habitat through capital improvement projects and public programs.** The plan also identified many areas of the basin where land use or road construction has degraded the quality of aquatic and riparian habitat. Restoration of habitat is addressed through projects under the capital improvement program discussed previously and through several public programs recommended in the plan. Increased support for volunteer restoration projects has been through the efforts of a County-employed basin steward who provides technical assistance to citizens on bioengineering techniques for bank stabilization, and from a Conservation Corps to expedite small, simple restoration projects in the Issaquah Creek basin and elsewhere in the SWM service area. King County's participation in these public programs has been funded on a pay-as-you-go basis financed through surface water management fees or, in the case of the Conservation Corps, through reallocation of funding from the capital improvement program.

- 5. Reduce pollution from nonpoint sources through capital improvement projects, monitoring, enforcement, and education.** The plan proposes a variety of capital improvement, monitoring, and education efforts sponsored by several public agencies and private organizations to address nonpoint pollution from sources other than land development. Among the King County responsibilities are training sessions for land developers, production of educational materials for landowners on septic-system maintenance, and negotiation of an agreement with the Washington State Department of Natural Resources on forest practices within the basin. The plan assumes that these responsibilities will be divided among the basin steward and other SWM staff and staff of DDES and other County agencies. For more significant nonpoint sources, including the active and inactive mine sites in the basin, the plan recommends that these measures be supplemented by more aggressive implementation and enforcement of existing regulations by County and State agencies.

IMPLEMENTATION

Process and Schedule for Implementation

Most recommendations for new regulatory requirements were enacted with adoption of the plan by the Metropolitan King County Council in July 1995 and by the City of Issaquah in October 1995 (see Chapter 2 of this document for more information on specific regulations). A total of \$3 million has been funded by King County for capital improvement projects (CIPs). Most projects to be undertaken by King County are underway or in development (see Chapter 4 for more detail). A total of \$0.3 million was funded by Issaquah for CIPs in 1996 and up to \$2 million will be funded in 1997 and 1998. In addition, Issaquah also hired a water resources engineer to implement the basin plan recommendations.

Recommendations for actions by other agencies or organizations will depend on budgetary and staffing commitments from these jurisdictions, and will be implemented on varying schedules. Appendix C contains concurrence letters from implementing agencies that discuss budget and schedule issues.

Implementing Agencies

More than 20 agencies and organizations have a role in implementing the plan. Key tasks for which these agencies will be responsible include development of programs, projects, budgets, and regulations that are consistent with the plan. Implementing agencies include:

King County Agencies:

- Department of Development and Environmental Services (DDES)
 - Land Use Services
 - Building Services
- Department of Transportation
 - Road Services Division
- Department of Natural Resources
 - Surface Water Management (SWM) Division
 - Solid Waste Division (SWD)
 - Natural Resources Division
 - Water Pollution Control Division

Cities:

- City of Issaquah Public Works and Planning Departments

Regional Agencies and Special Purpose Districts:

- King Conservation District (KCD)
- Seattle/King County Department of Public Health (SKCDPH)

Indian Tribes:

- Muckleshoot Indian Tribe (MIT)

State Agencies:

- Washington State Department of Agriculture (WSDA)
- Washington State Department of Ecology (WDOE)
- Washington State Department of Fish and Wildlife (WDFW)
- Washington State Department of Health (DOH)
- Washington State Department of Natural Resources (WDNR)
- Washington State Department of Transportation (WDOT)
- Washington State Parks and Recreation Commission (WSPRC)

Federal Agencies:

- National Marine Fisheries Service
- United States Fish and Wildlife Service

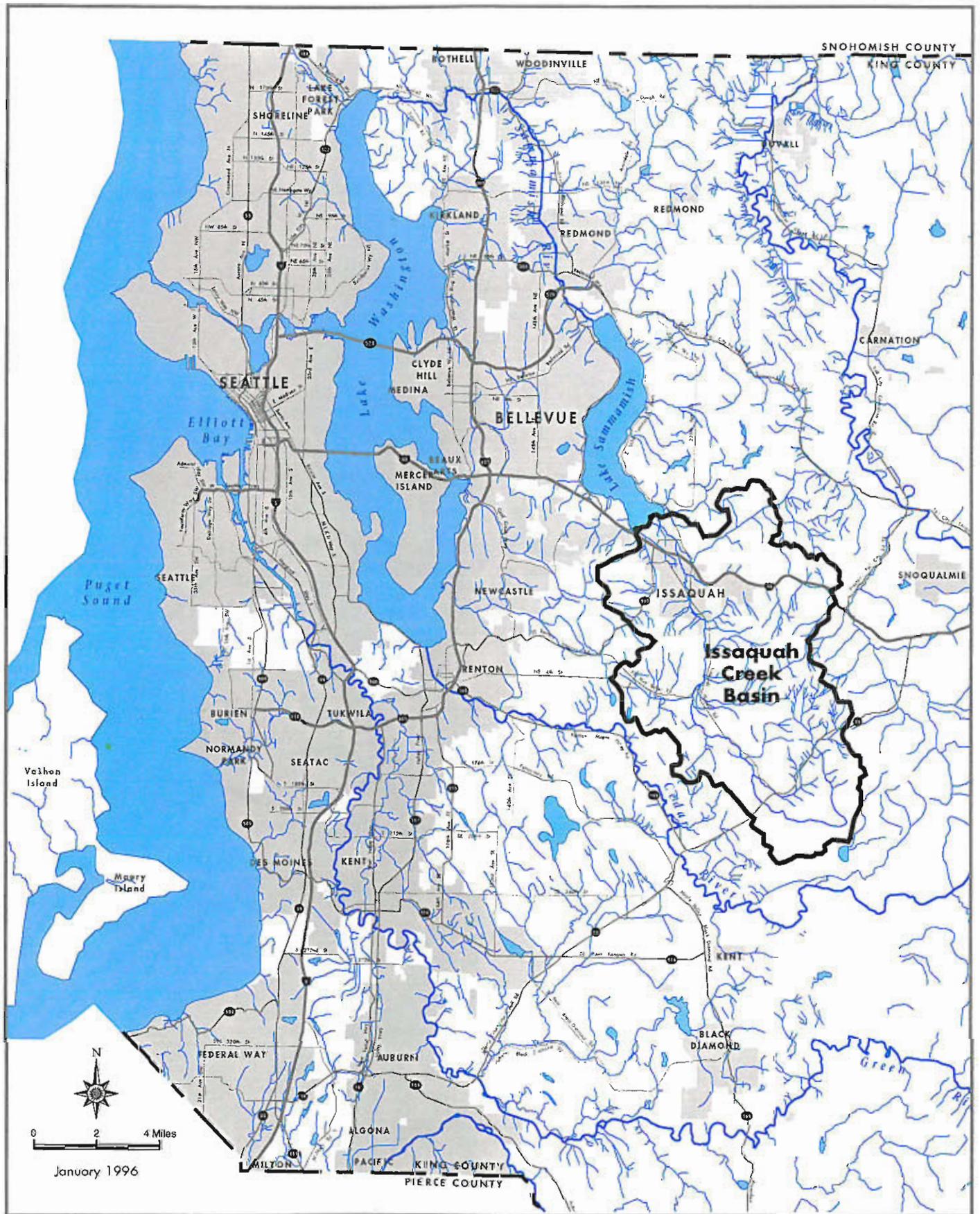
Others:

- Save Lake Sammamish
- Issaquah River and Streams Board

USING THE PLAN

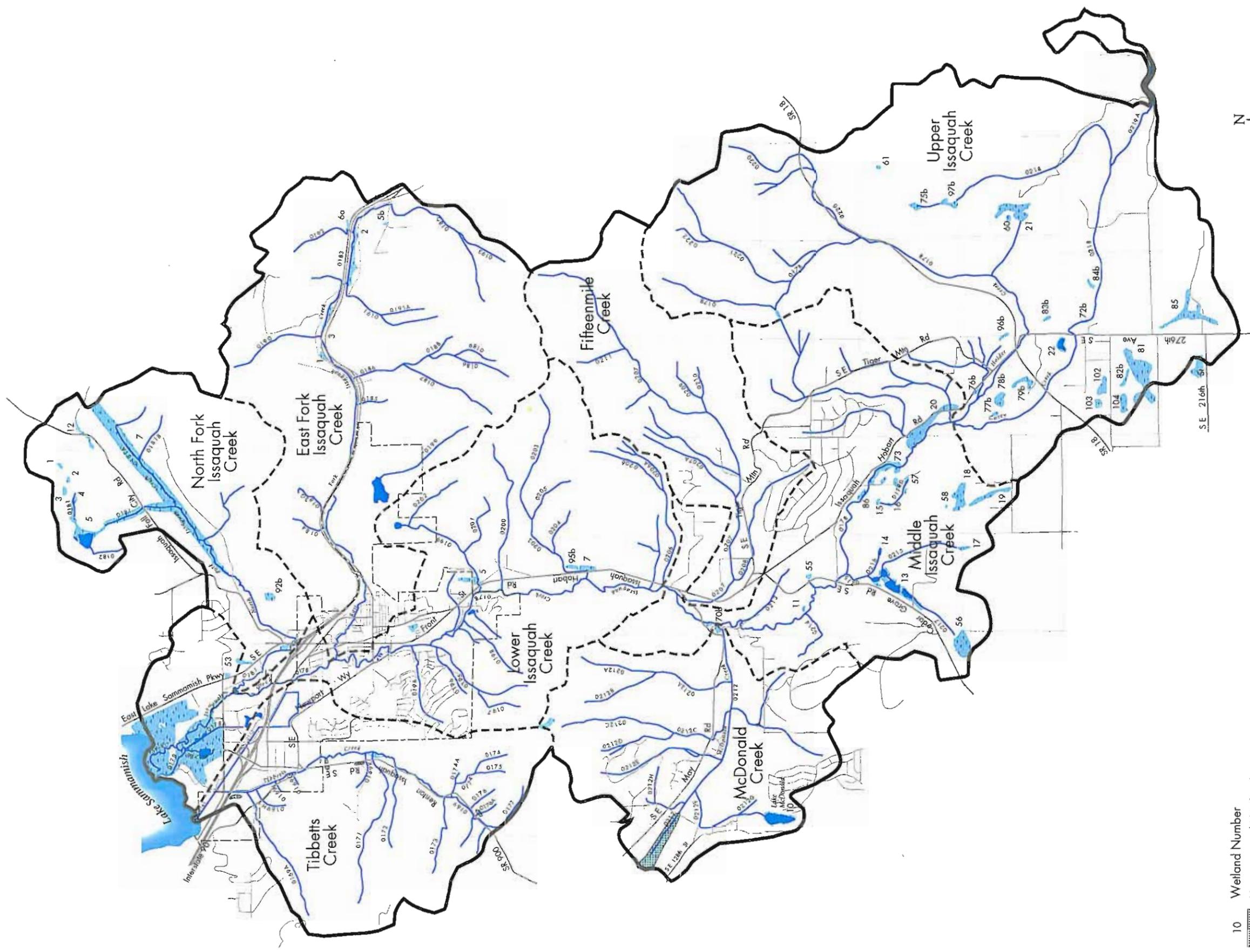
This Final Plan presents a summary of the *WMC-Proposed Issaquah Creek Basin and Nonpoint Action Plan* and adopted changes by King County and Issaquah Councils, and letters of approval and concurrence.

The substance of the plan is found in Chapters 2, 3, and 4. Chapter 2 provides all of the adopted regulations and identifies which King County Code is used to implement them. Chapter 3 identifies all of the recommended programs, by priority. It discusses what has been done or will be done, and who is responsible. Chapter 4 is a summary of the proposed Capital Improvement Projects to reduce flooding, improve water quality, improve stream and wetland habitats, and reduce stream channel erosion and deposition. A watershed characterization for each of the eight subbasins is found in Chapter 5. Chapter 6 describes plan development and implementation.



VICINITY MAP
Issaquah Creek Basin

Figure
1-1



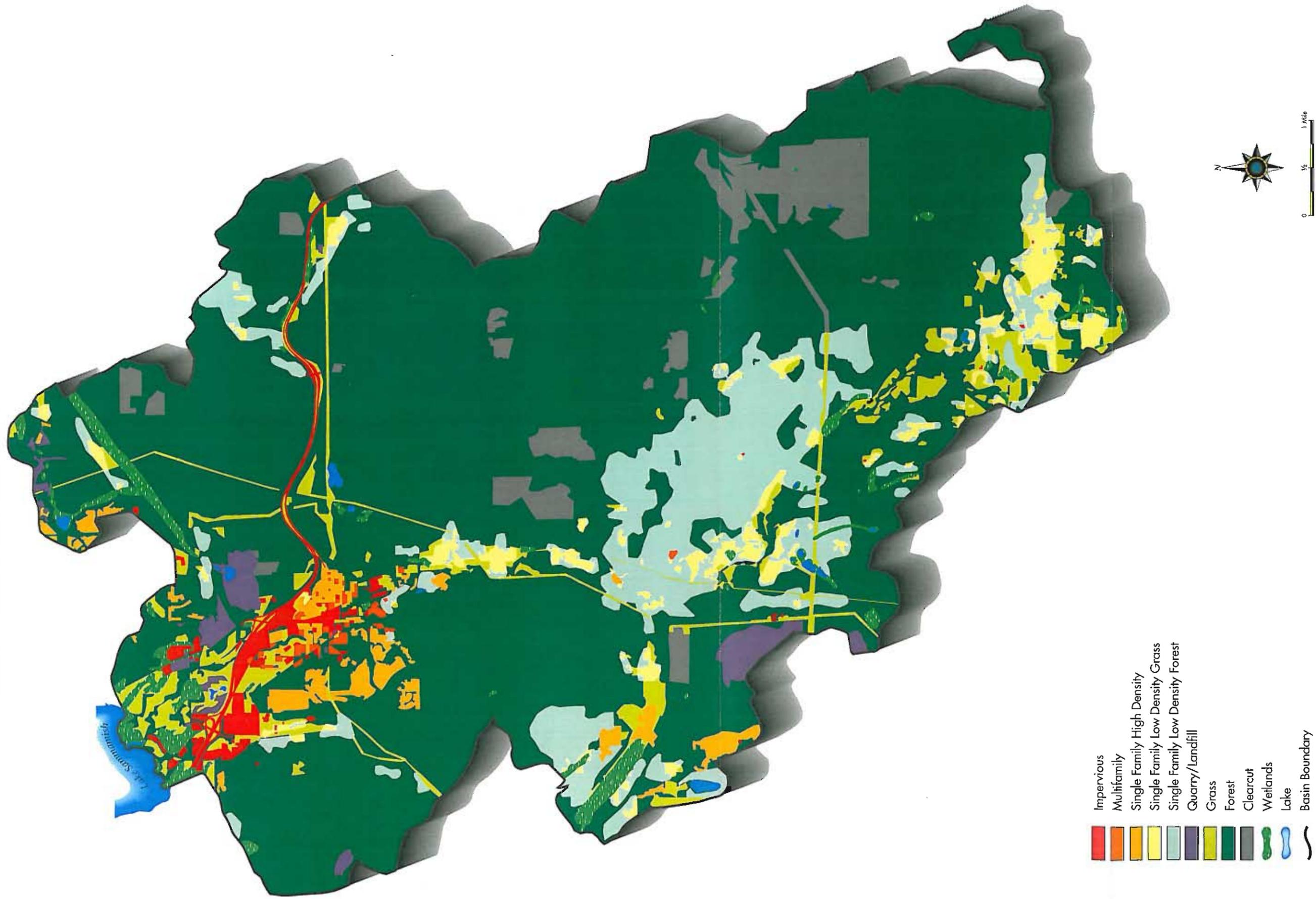
- 10 Wetland Number
- Uninventoried Wetland
- Basin Boundary
- Subbasin Boundary
- Stream/Lake
- Wetland



WATER FEATURES MAP

Issaquah Creek Basin

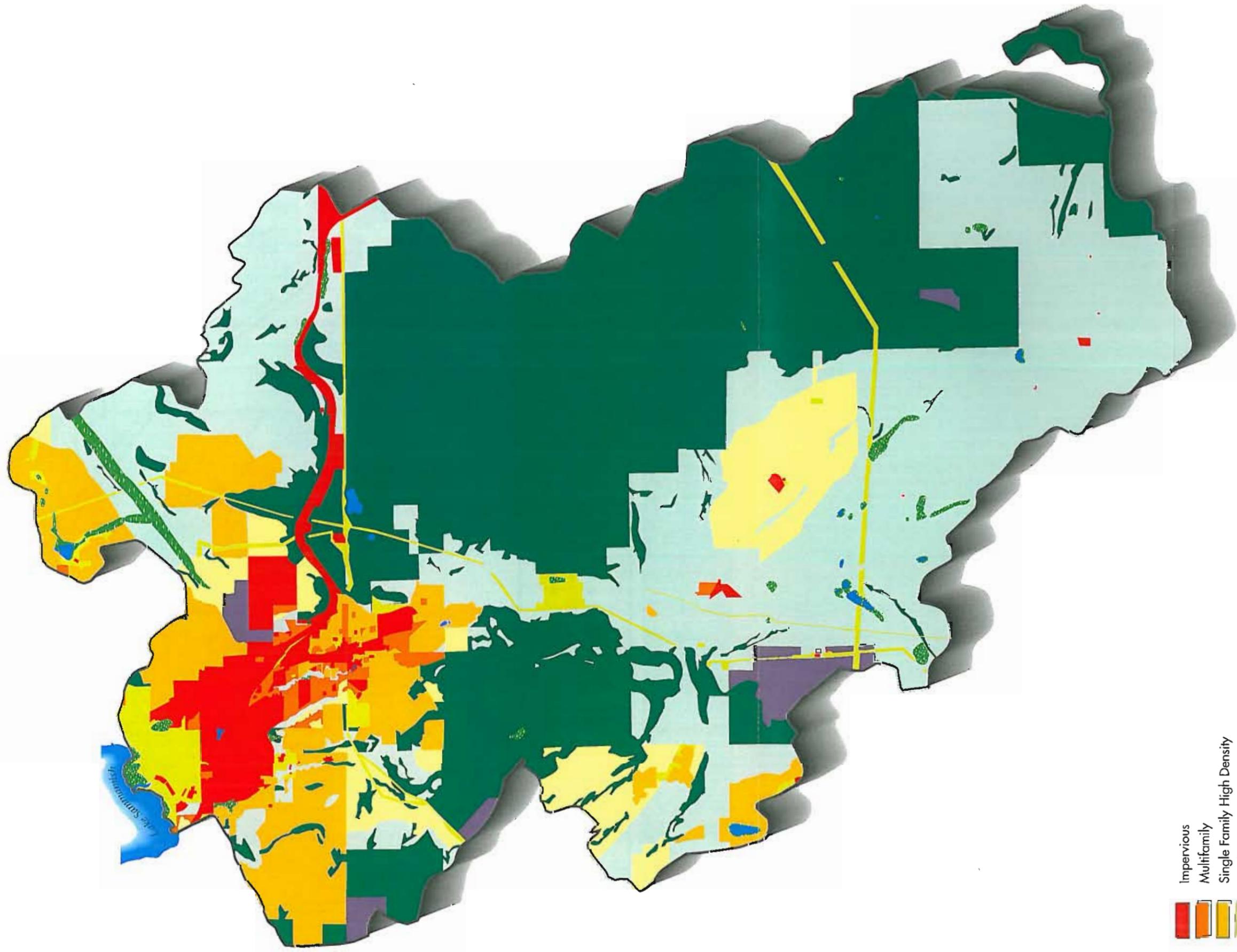
Figure 1-2



- Impervious
- Multifamily
- Single Family High Density
- Single Family Low Density Grass
- Single Family Low Density Forest
- Quarry/Landfill
- Grass
- Forest
- Clearcut
- Wetlands
- Lake
- Basin Boundary

CURRENT LAND USE/LAND COVER

Issaquah Creek Basin



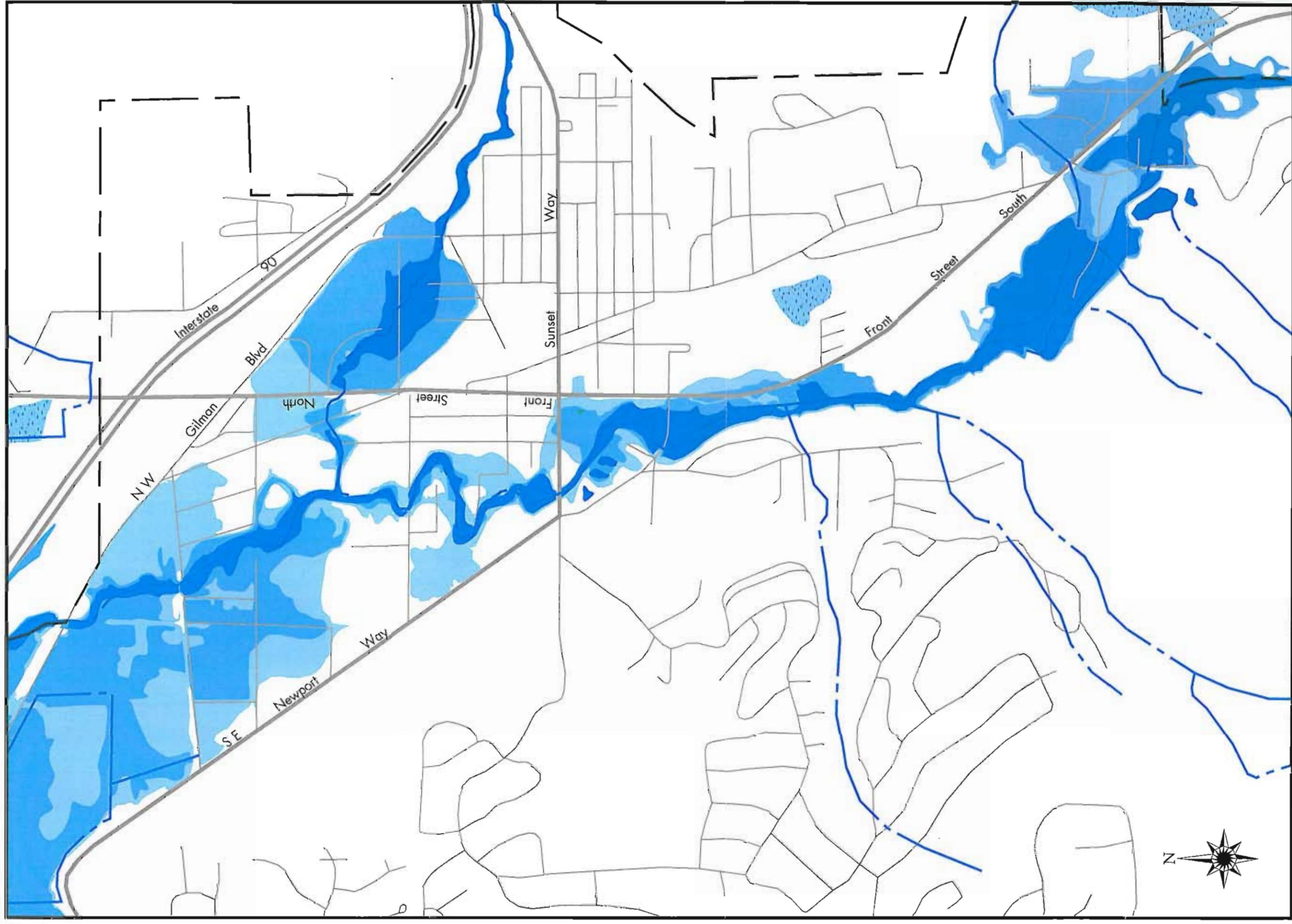
- Impervious
- Multifamily
- Single Family High Density
- Single Family Low Density Grass
- Single Family Low Density Forest
- Quarry/Landfill
- Grass
- Forest
- Clearcut
- Wetlands
- Lake
- Basin Boundary



0 1/2 1 Mile

FUTURE LAND USE

Issaquah Creek Basin



-  5 year Floodplain
-  25 Year Floodplain
-  100 Year Floodplain

-  Issaquah City Boundary
-  Stream/Lake
-  Wetland

FLOODPLAIN PROGRAM BOUNDARIES

Issaquah Creek Basin

Figure 1-5



Chapter 2

Regulations

Basinwide Regulations

- BW 1: *Establishment of Flow Reduction Standard for On-site Retention/Detention Facilities*
- BW 2: *Establishment of Erosion Protection Standard For On-Site Retention/Detention Facilities in Especially Sensitive Basins*
- BW 3: *Establishment of Open-Space Retention Requirements for Subdivisions and Clearing Restrictions on Existing Lots*
- BW 6: *Adoption of Zoning Changes in Critical Resource and Sensitive Areas*
- BW 19: *Water Quality Treatment Design Standards*

Subbasin Regulations

- EF2 & NF2: *Factors for Evaluation of Master Planned Developments*
- NF 3: *Wetland 7 Management Area*
- UI 2: *Standards and Performance Goals for New Subdivisions and Segregations*
- T 2: *Site Development Requirements*

Additional Permit Requirements

- T 5: *Sunset Quarry Water Quality Restoration*
- T 6: *Mutual Materials Company's Newcastle Pit Stormwater Management*
- T7: *Harris/Interpace Mine Stormwater Management*

Chapter 2: Regulations

INTRODUCTION

Chapter 2 presents the regulatory recommendations to surface water problems that apply in the Issaquah Basin. Under each recommendation is a description, responsible parties, estimated cost, estimated completion date, and priority. Figure 2-1 presents the areas in the basin where development conditions are required.

The special drainage requirements that apply in this basin resulted from adoption of Ordinance No. 11886 on July 10, 1995 by the Metropolitan King County Council. This added a new section to K.C.C. 20.12 and amended K.C.C. 16.82.050, K.C.C. 16.82.050, and K.C.C. 21A.12.030. The information provided in this chapter is for guidance and the reader is referred to the specific codes for regulatory language. Most of the requirements are administered through "Special Requirement #4" of the *King County Surface Water Design Manual (Design Manual)* (1990). All applicable drainage requirements of the *Design Manual* apply in full to any development project in this basin, including standard drainage thresholds and exemptions, unless specifically superseded by the requirements here. As the *Design Manual* is updated and approved by the Metropolitan King County Council, these regulations will be applied to development projects in the Issaquah Basin. The City of Issaquah Council adopted the plan through its Water Resources Action Plan on October 2, 1995.

BASINWIDE REGULATIONS

BW 1: Establishment of Flow Reduction Standard for On-Site Retention/Detention Facilities

Authority: Amendment to the Surface Water Design Manual approved through adoption of the Issaquah Creek Basin Plan

In the Issaquah basin (except for the subbasins listed in BW 2; see Figure 2-1, Development Conditions), on-site retention/detention (R/D) facilities, where mandated by the *Surface Water Design Manual (Design Manual)*, shall be designed to control the post-development peak hourly flows to corresponding pre-development levels for all annual peak hourly flows from the 2-year up to the 10-year. Whenever allowed by the *Design Manual*, infiltration shall be used to achieve this goal.

At this time, either of three analysis techniques may be used:

The first technique is to use a modification to the Santa Barbara Urban Hydrograph (SBUH) method. A seven-day rainfall distribution based on actual storms in the Puget Sound Lowlands replaces the Soil Conservation Service (SCS) Type 1a distribution in the *Design Manual*. Additionally, the

hydrographs for pervious and impervious surfaces are computed separately and added to obtain the total hydrograph for pervious and impervious segments. Travel time and time of concentration computations for pervious land segments are based on the sum of interflow, shallow concentrated flow, and open channel flow. Technical guidance for this modification is included in the reference section of the *Design Manual* as updated in August 1994. The calculated storage volume shall be increased by a safety factor of 30 percent.

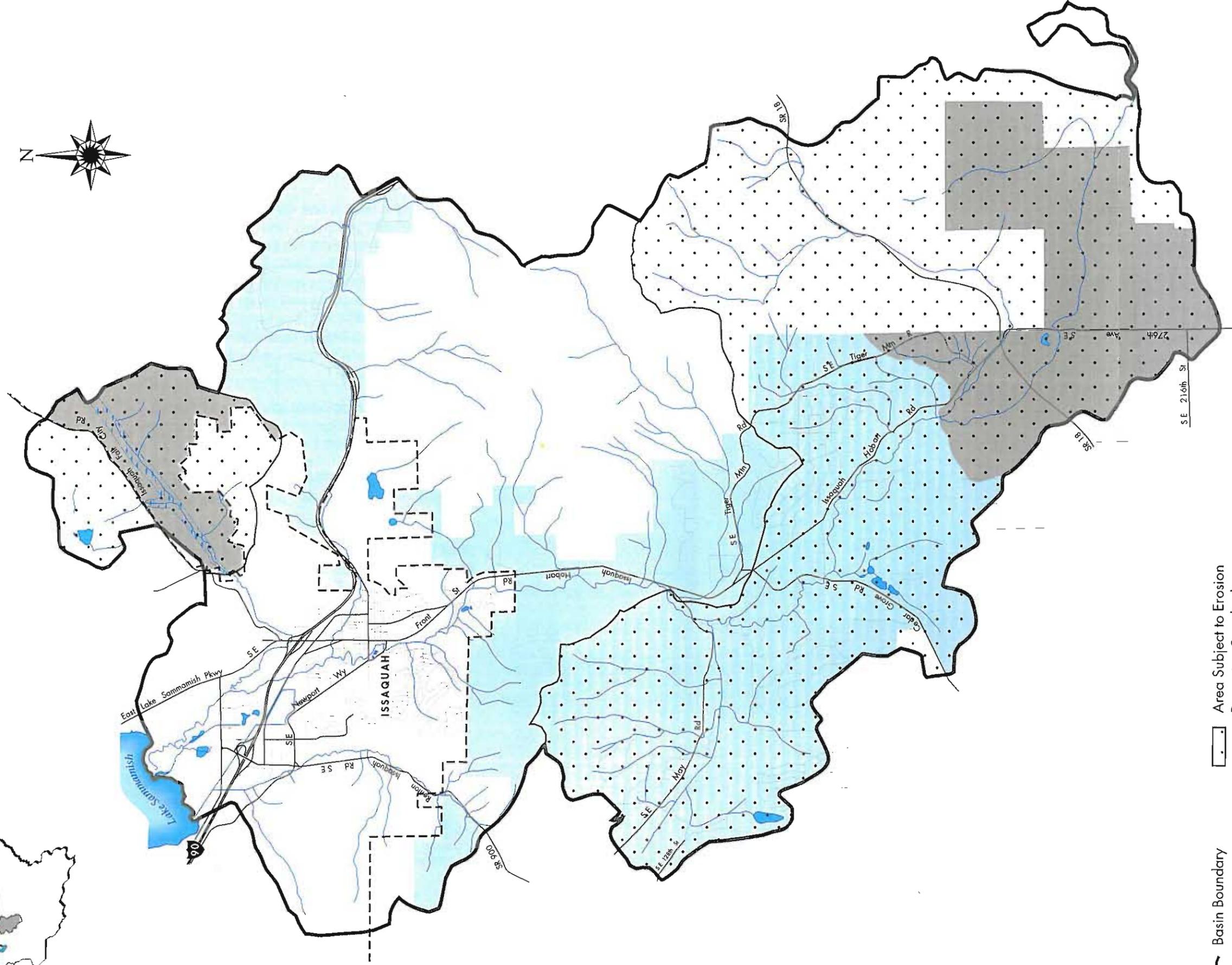
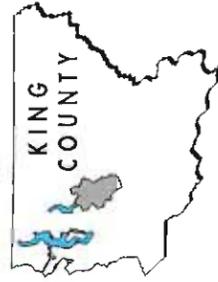
The second technique uses the method of the 1990 *Design Manual* with modified release requirements as follows:

<u>Post Development Storm Event</u>	<u>Pre-Development Flow Release Target</u>
2-year	one-half of the 2-year
10-year	2-year
100-year	10-year

No safety factor is required for facilities using these release rates.

The third technique involves iterative design using a calibrated continuous flow hydrologic simulation model. The Hydrologic Simulation Program - FORTRAN (HSPF) model used for the analysis in this basin plan is an example of this type of model. The calculated storage volume shall be increased by a safety factor of at least 10 percent.

Responsible Parties:	DDES, SWM
Estimated Cost:	\$25,000
Completion:	Ongoing
Priority:	M



- Basin Boundary
- Incorporated Area
- Stream/Lake
- Wetland 7
- Urban Growth Boundary
- Area Subject to Erosion Protection Standard
- Area Subject to Clearing Restrictions
- Area Subject to Impervious Area Limits and Clearing Restrictions



July 1996

BW 2: Establishment of Erosion Protection Standard for On-Site Retention/Detention Facilities in Especially Sensitive Basins

Authority: Amendment to the Design Manual approved through adoption of the Issaquah Creek Basin Plan

In subbasins where stream stability and habitat are highly sensitive to higher future flows, specifically the Upper Issaquah, Middle Issaquah and McDonald Creek subbasins, and the Wetland 7 drainages of the North Fork (see Figure 2-1), on-site R/D facilities, where mandated by the *Design Manual*, shall be designed to reduce post-development flow durations to their pre-developed levels for all flows greater than 50 percent of the 2-year event and less than the 50-year event. Additionally, the 100-year post-development hourly peak flow shall be reduced to the pre-development level. Whenever allowed by the *Design Manual*, infiltration shall be used to achieve this goal.

At this time, either of two analysis techniques may be used. It is recommended that a calibrated continuous flow simulation model, such as HSPF, be used for this analysis. The calculated storage volume shall be increased by a safety factor of at least 10 percent. If a continuous model cannot be used, the method of the 1990 *Design Manual* shall be used with the 24-hour design event with the following release requirements.

<u>Post-Development Storm Event</u>	<u>Pre-Development Flow Release Target</u>
2-year	one-half of the 2-year
10-year	2-year
100-year	10-year

The calculated storage volume shall be increased by a safety factor of 30 percent.

Responsible Parties:	DDES, SWM
Estimated Cost:	Covered by existing programs
Completion:	Ongoing
Priority:	H

BW 3: Establishment of Open-Space Retention Requirements for Subdivisions and Clearing Restrictions on Existing Lots

Authority: Amendment to K.C.C. 16.82.150 approved through adoption of the Issaquah Creek Basin Plan

For all new residential construction and residential subdivision in RA (Rural Area) (Figure 2-1) zoned areas in the Issaquah Creek basin open space tracts shall be reserved according to the following specifications:

1. Size Requirements for Open Space Tracts

- For subdivisions and short subdivisions, 65% of the plat shall be retained in one or more open space tracts, with all developable lots sited on the remaining 35% of the plat.
- If the permit applicant commits to constructing on-site retention/detention and water quality facilities to the standards of the *Design Manual* and this Plan (BWs 1 and 2), 40% of the plat shall be retained in one or more open space tracts, with all developable lots sited on the remaining 60% of the plat area.
- For individual lots, the clearing limits, either 65% or 40%, shall be applied at the time of building permit application unless the lot is within a subdivision that has been approved with other conditions to meet the clearing limits established above. In cases where conditions are applied to the subdivision, individual lots shall be exempt from the clearing restoration.
- On lots smaller than 20,000 square feet, up to 7,000 square feet may be cleared.
- If clearing occurred before the effective date of this ordinance, the size of the open space tract shall be either the size of the area cleared or 35% of the plat area, whichever is greater.
- Sensitive areas designated under K.C.C. Title 21 shall be recorded separately from tracts mandated by this regulation, but may be counted towards meeting these requirements.

2. General Requirements for Open Space Tracts

- All trees within open space tracts at the time of subdivision application shall be retained, aside from approved timber harvest activities and removal of dangerous and/or diseased trees.

- All open space tracts established pursuant to this regulation shall be clearly marked with at least one sign per buildable lot adjoining the tract indicating that the tract is permanent, dedicated open space.
- Open space tracts shall be shown on all property maps.
- The subdivision or permitting of building on parcels that are cleared in excess of the clearing limits stated in this regulation, after the effective date of this ordinance, shall be subject to conditions requiring the restoration of trees and understory vegetation on at least 65% of the plat or lot, or at least 40% if the applicant chooses to construct R/D facilities as stated above. A restoration plan shall be required of permit applicants, and shall be subject to the approval of DDES. DDES shall prepare administrative rules regarding the review and approval of restoration plans in consultation with the SWM Division before approving subdivision or building permits for such parcels. The administrative rules shall also specify when a restoration plan will be deemed sufficient to forego the six-year moratorium on permitting authorized in K.C.C. 16.82.140.
- In no case shall the amount of clearing and site disturbance exceed that allowable in the regulations and conditions specified in paragraphs A1 and A2 of Section 3 of K.C.C. 16.82.150.
- Open space tracts shall be protected by covenants, approved by the County, that restrict their uses to those stated under "Allowable Uses" below.

3. Allowable Uses

- Passive recreation uses and related facilities, including pedestrian and bicycle trails, nature viewing areas, fishing and camping areas, and other similar uses that do not require permanent structures, provided that cleared areas and/or areas of compacted soils associated with these uses and facilities do not exceed eight percent of the area of the open space tract.
- Utilities and utility easements, including surface water facilities, provided that, whenever possible, such uses are within or adjacent to existing road or utility easements.
- Timber harvest, provided that it is accomplished in accordance with a timber harvest management plan and clearing permit that have been approved by DDES. DDES shall prepare administrative rules regarding the review and approval of timber management plans in consultation with the SWM Division before approving any permits for timber harvest after the effective date of this ordinance.

- Tracts mandated by this regulation may be retained by the subdivider, conveyed to residents of the subdivision, or conveyed to a third party.
- For sensitive areas designated under K.C.C. Title 21 that are not within areas designated for clearing in the plat, uses shall be limited to those specified in K.C.C. 21A.24.

4. Exceptions

- Clearing required for the construction of infrastructure to serve any lots 1.25 acres or smaller in size shall not be counted towards the 35% maximum clearing standard.
- Public uses, including schools, churches, fire stations, parks, libraries, hospitals and roads, shall be exempt from the open space requirements.

In addition to the open space requirements adopted here, in the next update of the King County Comprehensive Plan, the Metropolitan King County Council should consider authorizing density bonuses in the rural area that could allow bonuses in the Issaquah Creek basin of up to a 50% increase in allowable density for subdivisions and short subdivisions that retain at least 80% of the property in one or more open space tracts. If necessary, more specific bonusing criteria should be formulated jointly by King County Community Planning, SWM, and DDES.

Responsible Parties:	DDES, SWM
Estimated Cost:	Annual (.25 FTE) = \$12,500
Completion:	Ongoing
Priority:	H

BW 6: Adoption of Zoning Changes in Critical Resource and Sensitive Areas

The review of zoning recommendations in the *WMC Proposed Issaquah Creek Basin Plan's* BW 6 were completed in the King County Comprehensive Plan, and 1995 zoning. No further studies or zoning revisions are recommended.

Responsible Parties:	Community Planning
Estimated Cost:	Covered by existing programs
Completion:	1995
Priority:	L

BW 19: Water Quality Treatment Design Standards

Authority: Amendment to the Design Manual approved through adoption of the Issaquah Creek Basin Plan

New developments in the Issaquah Creek basin that require drainage facilities under the current *Design Manual* shall achieve phosphorus removal using one of the following options:

1. A wetpond or combined detention/wetpond with a permanent pool volume equal to 4.5 times the volume of runoff from the mean annual storm ($VB/VR = 4.5$).

The VB/VR ratio is the volume of the wetpond basin divided by the volume of the runoff from the mean annual storm. The mean annual storm is equal to 0.46 inches at SeaTac and 0.56 inches at Landsburg. Mean annual storm precipitation can be adjusted for intermediate locations using the 2-year, 24-hour isopluvials as a guide. Runoff shall be estimated using a runoff coefficient of 0.9 for impervious areas and 0.25 for pervious areas. Forested areas need not be included in the calculation for pond sizing (zero runoff is assumed). The SBUH model shall not be used for estimating mean storm runoff values.

Pond volumes can be reduced for forest retention above 25 percent, according to the following schedule:

<u>% forest</u>	<u>VB/VR ratio</u>
25%	4.25
30%	4.00
40%	3.50
50%	3.25
60%	3.00

2. Forest retention of 60 percent or greater in addition to one of the following facilities: biofiltration swale, filter strip, wetpond, or combined detention/wetpond with a VB/VR of 3.0.
3. In addition to the above options, the use of two additional options involving sand filtration and infiltration are possible through a variance submitted to DDES:
 - a) A biofiltration swale, filter strip, or wetpond with a VB/VR of 3.0 followed by a sand filter; or a single large sand filter.
 - b) Soil infiltration, if soils are suitable. Soils that are suitable for water quality treatment have relatively slow infiltration rates (less than or equal to 2.4 inches/hour), as well as specific characteristics of organic content, cation exchange capacity, or grain size distribution.

Finally, if it can be demonstrated by the applicant that an alternative facility or combination of facilities is equally effective for phosphorus removal, then a variance request from this requirement can be submitted to DDES for approval. Guidance on facility design is available from the SWM Division and DDES.

Responsible Parties:	DDES, SWM
Estimated Cost:	Covered by existing programs
Completion:	Ongoing
Priority:	H

SUBBASIN REGULATIONS

East Fork and North Fork

EF 2 & NF 2 Factors for Evaluation of Master Planned Developments

Authority: Advisory to permitting agencies.

The following factors should be considered by applicants and county review staff in scoping, preparation, and review of all proposed developments within the East Fork and North Fork subbasins that meet requirements for preparation of a Master Drainage Plan (MDP) or Environmental Impact Statement (EIS) under King County codes.

1. The impacts of site development on the diversity, productivity, resilience, or habitat value of North Fork Wetland 7.
2. The impacts of site development on phosphorus loading from the tributaries draining to the North and East Forks of Issaquah Creek.
3. The impacts of site development on stream-channel erosion and transport of sediment to the North and East Forks of Issaquah Creek or Patterson Creek.
4. The impacts of site development on diversity and abundance of anadromous fish in the North and East Forks of Issaquah Creek or Patterson Creek; and
5. The impacts of site development on the frequency and duration of flood flows in the North and East Forks of Issaquah Creek.

Responsible Parties:	DDES, SWM
Estimated Cost:	\$30,000
Completion:	Ongoing
Priority:	H

North Fork
NF 3 Wetland 7 Management Area

Authority: Impervious surfaces--Amendment to KCC 21A.12.030 approved through adoption of the Issaquah Creek Basin Plan
Authority: R/D Standard--Amendment to the Design Manual approved through adoption of the Issaquah Creek Basin Plan

In order to prevent further degradation of North Fork Wetland 7, the largest riparian wetland in the Issaquah Creek basin, the following performance standards shall apply to all new subdivisions, short subdivisions, and Master Planned Developments in the area draining to the wetland:

1. All subdivisions and short subdivisions in rural residential zones within the North Fork subbasin shall have a maximum impervious surface area of 8% of the gross acreage of the plat. Distribution of the allowable impervious area among the platted lots will be recorded on the face of the plat. Impervious surface of roads need not be counted towards the allowable impervious area. In cases where both lot- and plat-specific impervious limits apply, the more restrictive shall be required.
2. For all lands draining to Wetland 7, on-site R/D facilities shall be designed to the standard specified in BW 2: Erosion Protection Standard. In addition, the stormwater conveyance, detention, and discharge facilities shall maximize infiltration potential to recharge the groundwater on which Wetland 7 depends. Whenever possible, the drainage system shall use perforated pipes in gravel trenches for stormwater conveyance and dispersal systems in undisturbed vegetation for stormwater discharge, and the detention ponds shall be designed to encourage infiltration.

Responsible Parties:	DDES, SWM
Estimated Cost:	\$15,000
Estimated Completion:	Ongoing
Priority:	H

Upper Issaquah

UI 2 Standards and Performance Goals for New Subdivisions and Segregations

Authority: Impervious surfaces--Amendment to KCC 21A.12.030 approved through adoption of the Issaquah Creek Basin Plan. Otherwise, language is advisory to permitting agencies.

All new subdivisions and segregations in this subarea should comply with the following conditions in addition to those specified in BW 1, BW 2, and BW 3. Compliance should be ensured by DDES through permitting processes.

1. **Impervious Surface:** All subdivisions and short subdivisions in rural residential zones within the Upper Issaquah subbasin shall have a maximum impervious surface area of 8% of the gross acreage of the plat. Distribution of the allowable impervious area among the platted lots will be recorded on the face of the plat. Impervious surface of roads need not be counted towards the allowable impervious area. In cases where both lot- and plat-specific impervious limits apply, the more restrictive limits shall be required.
2. **Lot Siting:** Subdivisions and segregations should be designed to avoid siting of residential lots in the steep inner gorge of Carey Creek.
3. **Road Crossings:** New road crossings associated with subdivision or segregation development should utilize bridges that fully span the stream channels of Holder and Carey creeks.
4. **MDP and EIS Requirements:** In addition to the above requirements, all developments that are partially or wholly within this subbasin that meet requirements for preparation of a Master Drainage Plan (MDP) or Environmental Impact Statement (EIS) under King County codes should include the following elements within the scope of the MDP and/or EIS:
 - a) The impact of development on natural hydrologic processes in the Holder and Carey Creek subbasins, as evaluated by predicted post-development changes in the magnitude and duration of high and low flows;
 - b) The impact of development on natural hillslope-sediment processes in these subbasins, evaluated by predicted post-development changes in the quantity of hillslope erosion and the rate of sediment delivery into stream channels; and

- c) The impact of development on water quality in Holder and Carey Creek and subbasin wetlands, evaluated by predicted post-development changes in water chemistry.

Responsible Parties:	DDES, SWM
Estimated Cost:	Covered by existing programs
Estimated Completion:	Ongoing
Priority:	H

Tibbetts

T 2 Site Development Requirements

Authority: Amendment to the Design Manual approved through adoption of the Issaquah Creek Basin Plan. Area annexed into the City of Issaquah in 1996.

All new residential or mixed-use developments in this subbasin that meet requirements for preparation of a Master Drainage Plan (MDP) under King County drainage code shall comply with the following standards. Compliance shall be evaluated by the City of Issaquah and the SWM Division in the scoping, review, and approval of the MDP.

1. Stormwater discharges from developed areas must bypass the steep channel reaches of Cougar and Squak Mountains by continuous pipeline to the valley floor. Detention to the standards of BW 1: Flow Reduction Standard must also be provided.
2. In order to control erosion and sediment transport to downstream areas, no more than 60 percent of the site shall be cleared of its natural vegetation. Uncleared land shall be located in one or more open space tracts. No subsequent clearing of these tracts shall be allowed. In addition, a stringent temporary erosion and sediment control plan shall be initiated to minimize construction-related erosion.
3. Approval for the Master Drainage Plan shall be contingent on the completion of those downstream flood control and drainage projects that are deemed essential by SWM and the City of Issaquah to control current surface water problems.

Responsible Party:	City of Issaquah
Estimated Cost:	\$15,000
Estimated Completion:	Ongoing
Priority:	H

ADDITIONAL PERMIT REQUIREMENTS

T 5 Sunset Quarry Water Quality Restoration

Authority: Advisory to permitting agencies administering K.C.C. 16 and the NPDES permit.

King County DDES should condition all new operating and grading permits for Sunset Quarry on the development of an explicit, enforceable plan for assuring that the surface-water discharge from this site complies with the effluent limitations contained in the "NPDES and state waste discharge general permit for process water, stormwater, and mine dewatering water discharges associated with sand and gravel operations, rock quarries, and similar mining facilities" effective August 6, 1994. SWM and DDES technical staff should cooperate on development of specific standards for operation of the quarry that are consistent with this objective. The plan should specify the proposed actions for disposing of spoils, reclamation of disturbed areas, installation and maintenance of adequate drainage and water quality facilities, and the relocation of Tibbetts Creek around the open mining area. The plan must also detail the monitoring procedures necessary to demonstrate compliance with the effluent limitations contained in the NPDES general permit. SWM should review and approve the plan prior to DDES permitting action.

Responsible Parties:	DDES, SWM
Estimated Cost:	Included in BW 29 and BW 31.
Estimated Completion:	Ongoing
Priority:	M

T 6 Mutual Materials Company's Newcastle Pit Stormwater Management

Authority: Advisory to permitting agencies administering K.C.C. 16 and the NPDES permit.

King County DDES should condition new operating or grading permits for the Mutual Materials Company's clay mine on the development and implementation of a pollution prevention plan for the site. The plan and schedule for plan development should correspond to the industrial NPDES general permit requirements for mining operations as outlined by the Washington State Department of Ecology. The plan should specify the proposed actions for disposing of spoils, reclamation of disturbed areas, and management of stormwater, including erosion and sediment controls, and construction and maintenance of water quantity and quality controls. The plan should also include monitoring to demonstrate compliance with the effluent limitations contained in the NPDES general permit dated August 6, 1994.

Responsible Parties: DDES, SWM
Estimated Cost: Included in BW 29 and BW 31
Estimated Completion: Ongoing
Priority: M

T 7 Harris/Interpace Mine Stormwater Management

Authority: Advisory to permitting agencies administering K.C.C. 16 and the NPDES permit.

King County DDES should condition all new operating and grading permits on the Harris/Interpace mine site on the development of an explicit, enforceable plan for assuring that the surface-water discharge from this site complies with the effluent limitations contained in the "NPDES and state waste discharge general permit for process water, stormwater, and mine dewatering water discharges associated with sand and gravel operations, rock quarries, and similar mining facilities" effective August 6, 1994. SWM and DDES technical staff should cooperate on development of specific standards for operation that are consistent with this objective. The plan should specify the proposed actions for disposing of spoils, reclamation of disturbed areas, and management of stormwater (including erosion and sediment controls), and construction and maintenance of water quantity and quality controls. The plan should also include monitoring to demonstrate compliance with the effluent limitations contained in the NPDES general permit.

DDES should condition any further work under the existing grading permit on submittal of a revised operating plan that provides reasonable assurance that further operations on this site will not result in sediment or pollutant discharge to Tibbetts Creek. Such a plan would require a sophisticated sediment control strategy combined with careful phasing of site development.

DDES should also require the permit holder on the Harris/Interpace site to develop and implement a plan to stabilize an existing earthflow, and to restore the channel and riparian zone of Tibbetts Creek Tributary 0174 adjacent to this site.

Responsible Parties: DDES, SWM
Estimated Cost: Included in BW 29 and BW 31
Estimated Completion: Ongoing
Priority: M



Chapter 3

Programs

High Priority

- BW 4: *Comprehensive TESC Program for Construction Sites*
- BW 5: *Adoption of City of Issaquah Critical Areas Ordinance*
- BW 7: *Establishment of Channel and Floodplain Restoration Program*
- BW 9: *Revision of Floodplain Mapping*
- BW 10: *Improvement of Flood Warning System*
- BW 16: *Establishment of Interagency Procedures for Administering Forest Practices*
- BW 21: *Designation and Protection of Significant Resource Areas*
- BW 22: *Development of Habitat Restoration and Enhancement Program*
- BW 29: *Establishment of Basin Steward Position*

Medium Priority

- BW 12: *Proposal of Revised Stream Crossing Design Criteria*
- BW 13: *Source Control Practices Within Urban Areas*
- BW 15: *Improvement of Farm Practices*
- BW 17: *Improvement of Water Quality from Road Drainage Systems*
- BW 18: *Development of a Spill Response Program*
- BW 23: *Establishment of Bank Stabilization Program*
- BW 24: *Establishment of Issaquah Fishery Management Task Force*
- BW 27: *Aquatic Resource Mitigation Banking*
- BW 30: *Basin Plan Monitoring*
- BW 31: *Basin Plan Enforcement*

Low Priority

- BW 8: *Establishment of Floodproofing and Elevation Programs*
- BW 14: *Control of Pollution from On-site Septic Systems*
- BW 20: *Additional Water Quality Recommendations*
- BW 26: *Completion of Wetland Inventory*
- BW 28: *Identification of Channel-Migration Hazard Areas*
- BW 33: *Development of Guidelines and Standards for Site Design*
- UI 3: *Purchase of Property and Transfer of Development Credits*
- UI 4: *Riparian Buffers on Forest Land*
- EF 5: *Retrofitting of Interstate 90 Stormwater Drainage System*
- LI 4: *Management of the Issaquah Hatchery*
- T 3: *Channel and Floodplain Restoration*

Studies

- MI 2: *Mirrormont Drainage Study*
- MD 3: *High Valley Drainage Study*

Chapter 3: Programs

Basinwide Programs

HIGH PRIORITY

BW 4: Comprehensive TESC Program for Construction Sites

King County and City of Issaquah are currently operating a comprehensive temporary erosion and sedimentation control (TESC) program in the Issaquah Creek basin to reduce erosion and sediment transport from construction sites. The existing program includes the following elements:

1. **Problem Assessment** - Assesses the importance of construction sites in terms of contribution to sediment loadings and impacts on fisheries. Identifying types and number of construction sites in the Issaquah basin in 1995-1996 was part of this effort.
2. **Regulations** - SWM updates the Surface Water Design Manual section on construction site controls to reflect current knowledge and conditions in King County development, new construction site BMPs, and information from the problem assessment.
3. **Education** - Provides educational opportunities for the construction industry and public works about construction site BMP requirements. As part of this program, DDES inspectors received training about BMPs and impacts of sediment on downstream water bodies.
4. **Program Coordination** - SWM, DDES, and City of Issaquah Public Works each provide staff to coordinate and administer this program.
5. **Monitoring and Evaluation** - An evaluation report is completed after each wet season. The report recommends changes and improvements as necessary, prior to the beginning of the subsequent wet season. The Muckleshoot Indian Tribe, the private sector, and other public agency personnel are involved in the evaluation of the program and preparation of the report. Report recommendations consider needs for more enforcement, construction phasing, educational efforts, and procedural changes in permitting and enforcement.
6. **Enforcement** - Enforces erosion and sediment control requirements through the use of notice of violations and stop work orders, as necessary, to attain compliance with regulations.

7. **Incentives** - The program is designed to introduce incentives and disincentives into the process as much as is practicable.

Responsible Parties:	DDES, City of Issaquah Public Works
Estimated Cost:	\$200,000 per year
Completion:	Ongoing

BW 5: Adoption of City of Issaquah Critical Areas Ordinance

In 1995, the Issaquah City Council adopted a Critical Areas Ordinance to replace the interim version. This ordinance regulates development in floodprone areas, segments with active channel migration, areas with important aquatic and riparian habitat landslide hazards, wetlands, steep slopes, and seismic areas; these regulations will also control sediment mobilization. The final ordinance includes standards that are consistent with, or more stringent than, the King County Sensitive Areas Ordinance (SAO). In particular, the following requirements are incorporated:

1. Buffer zones are required to restrict development and clearing adjacent to streams and wetlands. The SAO standards of 100-foot buffers for Class 1 streams, Class 2 streams with salmonid use, and Class 1 wetlands and 50-foot buffers for other Class 2 streams and Class 2 wetlands apply.
2. A zero-rise criteria for the 100-year floodplain is adopted to restrict development and filling within the floodplain. The ordinance clearly states that such development is prohibited unless no practicable alternative exists.
3. Restrictions on the location and allowable uses of development and the establishment of buffers around steep slopes and landslide hazard areas are incorporated in order to control erosion and sediment transport into streams and control landslides.
4. Penalties for code violations are maintained and include requirements to restore areas that are damaged by illegal land-use activities.
5. Funding is provided to ensure that adequate staffing is available to conduct permitting, monitoring, and enforcement actions under the ordinance.

Responsible Party:	City of Issaquah
Estimated Cost:	Covered by existing programs
Completion:	1995

BW 7: Establishment of Channel and Floodplain Restoration Program

The City of Issaquah and King County should restore stream channels and floodplains in areas where homes and businesses have been constructed within the corridors of Issaquah Creek and its major tributaries. The City and County should be responsible for funding the program within their respective jurisdictions. The County should also provide the City with technical assistance and advice. This program should (1) restore the ability of the channel and floodplain to convey and store floodwater, and (2) enhance the fish and wildlife habitat of the corridor, while ensuring that the benefit is greater than the cost as it relates to flood damage. The restoration program will be accomplished in the Lower Issaquah, East Fork, and North Fork subbasins through various combinations of the following tools.

- 1. Removal of homes from the floodplain** - In order to provide a corridor for flood conveyance and habitat restoration, the City and County should initiate a program to remove homes that have been constructed too close to the stream. The program should offer two options to streamfront homeowners: (1) purchase of the home followed by removal, or (2) relocation of the home to a location outside the corridor and above the 100-year floodplain. Participation by landowners in either option should be voluntary, with no condemnation of homes or property. All houses within 25 feet of the creek should be eligible for purchase or relocation. Other houses within 75 feet of the creek and in the 100-year floodplain should be eligible for consideration on a case-by-case basis. Using these criteria, approximately 89 houses would be eligible for consideration. While formal criteria for prioritizing houses to be purchased would need to be developed by the City and County, it is recommended that first priority be given to houses threatened by both flooding and channel migration, followed by houses threatened by flooding alone and houses that contribute to flooding problems elsewhere. Other determining factors might be the site's potential for providing flood storage, improving conveyance, or restoring habitat.

To estimate the costs of this program, the only houses included were those within a 125-foot-wide corridor that shifted laterally to include as few houses as possible. It is estimated that there are 47 single-family and 3 multi-family homes within this corridor in the basin. For costing purposes it was assumed that 26 (55%) of the owners of single-family and 1 (33%) of the owners of multi-family homes would sell their property to the City or County in the ten-year life of the purchase program. Preliminary mapping of the corridor and the location of eligible homes is available for review at the offices of the King County Surface Water Management Division and the City of Issaquah Public Works Engineering Department.

- 2. Purchase of easements** - Many privately owned properties along Issaquah Creek and its tributaries remain undeveloped or have homes that have been built some distance from the stream. To ensure that the stream corridor in these areas will remain undeveloped and available for increased flood conveyance and habitat restoration, the City and County should purchase easements from the owners of these parcels. The easements should allow channel reconfiguration, habitat restoration, and maintenance; public access should be

allowed only by consent of the property owners. Width of the easement could vary, with an average of 50 feet and a minimum of 25 feet for a total corridor width of 100 feet, not including the width of the stream. As with the purchase of homes, the sale of easements should be voluntary and no condemnation should be used. It is estimated that 157 properties would be eligible for this program, and for costing purposes it was assumed that 94 (60%) of the owners would choose to sell easements to the City or County in the ten-year life of this program.

3. **Purchase of property or development rights** - There are areas in the Issaquah Creek basin where development has been permitted under regulations that predate restrictions on floodplain land but the planned structures have not yet been built. In cases where the planned development would cause substantial flooding problems, the property or development rights should be acquired and the parcel left undeveloped. This will ensure that the stream corridor is available for flood conveyance, habitat restoration, and possibly public access.
4. **Removal of fill and bank stabilization structures** - In order to increase the capacity of the channel and floodplain to carry floodwater, fill and bank stabilization structures along streambanks should be removed, at public expense, from purchased properties and easements, except where structures are necessary to prevent channel migration onto houses or adjacent properties.
5. **Revegetation of the floodplain** - The City and County should initiate two programs to revegetate the channel and floodplain on Issaquah Creek and major tributaries. The first effort should be to use agency work crews, conservation corps, and other sources of labor to restore native vegetation on all purchased properties and easements. The second program should be to offer technical assistance, materials, and labor to streamfront landowners who are interested in revegetating their property but have opted not to participate in the purchase programs described in BW 22.
6. **Improvements in public access** - Additional public access and recreational use of the stream corridor should be considered in areas where the purchase of several adjacent properties would provide a contiguous open-space area. Provided that such uses could be accommodated without reducing the quality of fish and wildlife habitat or disturbing adjacent landowners, improvements such as short trails, tables and benches, and other facilities for walking, bird watching, and picnicking should be provided in these areas. It is estimated that three access sites would be acquired and improved in the ten-year life of this program. The King County SWM Division, the Muckleshoot Indian Tribe, relevant agencies, and neighboring land owners should be consulted in the planning and development of these sites.

The City of Issaquah and King County should negotiate an interlocal agreement to define responsibilities for program administration and establish financing mechanisms for the program. Ideally, the program should be funded through a combination of local, state, and federal sources. Potential sources of the local share of funding include existing surface-water capital improvement funds at the City and County or establishment of a new fund financed by a surcharge on surface water management fees. The City of Issaquah and King County should be responsible for funding the program within their respective jurisdictions.

Responsible Parties:	City of Issaquah Public Works, SWM
Estimated Cost:	Administration costs only-\$75,000 per year
Estimated Completion:	Starts 1996

BW 9: Revision of Floodplain Mapping

In association with the adoption of the Critical Areas Ordinance, the City of Issaquah adopted, for its floodplain map, the revised floodplain boundaries as defined in the basin plan. This reflects the more accurate floodplain mapping compiled by King County SWM in the production of this plan. SWM supplied the City of Issaquah with the floodplain map in final form identifying the modeled 25- and 100-year floodplains. In the event that the flood audit recommended by this plan generates changes to this map, those changes should be incorporated by the City.

In addition, the City and County should consider expanding the floodplain modeling as necessary to meet Federal Emergency Management Agency (FEMA) requirements. If such modeling, or analysis of existing modeling, is determined to be feasible, the information should be developed and forwarded to FEMA so that their Flood Insurance Rate Maps (FIRMs) can be adjusted to reflect the more accurate floodplain. The City is responsible for preparing a letter of map revision, with technical documentation, and submitting it to FEMA. The County is responsible for providing technical assistance and data from the hydrologic and hydraulic studies.

Responsible Party:	City of Issaquah
Estimated Cost:	\$5,000
Estimated Completion:	1995

BW 10: Improvement of Flood Warning System

The City of Issaquah Police and Public Works departments and King County SWM should improve the existing flood warning system to warn people of flooding conditions in the Issaquah Creek basin. The intent of the warning system is to inform basin residents of hazardous flooding conditions and reduce the potential for injuries. The improved warning system should include the following two elements:

1. The existing communication network should be improved to better distribute warning information from the King County Flood Warning System (KCFWS) to basin residents and businesses. The KCFWS currently monitors two stream gauges on Issaquah Creek and notifies officials of several City and County agencies when flooding is likely. The City of Issaquah should take the lead in establishing a telephone tree to distribute this information to residents of floodprone areas of the city. The results of the flood audit (BW 8) would help determine calling priorities for the telephone tree.
2. A permanent signing system along roads within the City and County should be established, notifying residents of likely locations for flooding, the potential for road closures, and alternate travel routes.

Responsible Parties:	City of Issaquah Public Works, SWM
Estimated Cost:	\$10,000; \$2,500 operating costs per year
Completion Date:	1997

BW 16: Establishment of Interagency Procedures for Administering Forest Practices

A memorandum of agreement (MOA) between King County and DNR concerning the administration of forest practices should be negotiated and approved. The agreement should include the following provisions:

1. The DNR should designate the entire basin west of the Timber Production Zone Boundary as an "area likely to convert" and require a Class IV DNR forest practice application (FPA) on any property in this area. This will require that most private forest harvest proposals be reviewed as if the land were going to be converted to other uses and thus require SEPA review, unless the landowner demonstrates his or her intent to remain in long-term forestry.
2. DNR should request King County participation in all watershed analysis projects established to guide timber management in the Issaquah Creek basin. In addition, DNR should invite King County and the Muckleshoot Indian Tribe to participate in formulating harvest plans for state-owned timber lands in the Issaquah Creek basin.
3. King County should assist in monitoring compliance with FPA requirements, and should refer possible violations to DNR for enforcement. DNR should notify King County Resource Planning of FPA violations in the Issaquah Creek basin.

Responsible Parties:	DDES, WDNR, DNR, SWM
Estimated Cost:	\$30,000 per year
Estimated Completion:	1997

BW 21: Designation and Protection of Significant Resource Areas

King County, the City of Issaquah, and other relevant agencies should recognize and protect Significant Resource Areas (SRAs) in the Issaquah basin. SRAs are defined as aquatic or terrestrial habitats that are important to the viability of plant and animal species and populations because of the species' or population's value as a biological and social resource. Areas may be "Regionally Significant Resource Areas" (RSRA) or "Locally Significant Resource Areas" (LSRA) based not only on their intrinsic condition and value, which is typically related to the size, complexity, and functional attributes of the habitats, but also on the size, functional condition, and structural complexity of the surrounding watershed. These external elements depend largely on the existing degree of disturbance caused by development activity in and around the habitat and its basin. Detailed recommendations on protection of specific SRAs are found in the subbasin recommendations chapter. Further descriptions of the criteria and effect of designation can be found in *Appendix D: Significant Resource Areas* published in the *Appendix to the WMC Proposed Issaquah Creek Basin and Nonpoint Action Plan*.

In the Issaquah basin, the following areas were identified as SRAs during the development of this plan (Figure 3-1).

Regionally Significant Resource Areas: Holder and Carey Creeks and their major tributaries; Issaquah Creek from the Holder-Carey confluence downstream to the confluence with Fifteenmile Creek; and North Fork Wetland 7 and Issaquah Creek Wetlands 1, 2, 18, and 19.

Locally Significant Resource Areas: Issaquah Creek from its confluence with Fifteenmile Creek to its mouth; Fifteenmile Creek; the East Fork of Issaquah Creek; and Wetlands North Fork 5 and Issaquah 10, 22, and 60.

The general approach to protection of SRAs in the Issaquah basin is to preserve both the structure and the functions of the area. Although SRAs themselves are specific wetlands, shorelines, streams, or other habitats, their function and structure depend on conditions often far-removed from their immediate boundaries. Two levels of these physical conditions are thus defined: **catchment** conditions, which affect the rate and volume of runoff, groundwater movement, water chemistry ("quality"), and sediment delivery; and **local** or adjacent conditions, which determine the degree of bank and buffer vegetation, the magnitude and frequency of human intrusions, and the presence of structural elements (such as large woody debris in streams and snags in wetlands).

Regionally Significant Resource Areas are highly dependent on both catchment and local conditions for their quality and integrity. Therefore, the RSRAs in the Issaquah basin must be protected through both catchment-level and local-level protection actions. Catchment-level actions apply to the entire tributary area and the drainage areas that drain to the tributaries, and they may include land-use restrictions or special detention standards among other controls. Local-level actions focus on areas adjacent to the feature and include such tools as fixed-width buffers (such as those prescribed by the SAO) and additional restrictions targeted to specific landscape features such as adjacent steep slopes, wooded areas, or swales.

Responsible Parties: SWM, City of Issaquah
Estimated Cost: Included in BW recommendations
Completion: Ongoing

BW 22: Development of Habitat Restoration and Enhancement Program

King County Surface Water Management has initiated and financed a program for completing small, simple habitat restoration projects throughout the Issaquah Creek basin. The program has focused on the installation of projects that require simple materials and manual labor, to complement the use of existing County and City of Issaquah capital improvement programs for more complex projects. Activities under this program include small-scale bank stabilization, removal of non-native plants, revegetation of streams and wetlands, fencing, and other similar projects. The program has the following characteristics:

Labor force - The program uses conservation corps or trained volunteer groups, whenever possible. City and County work crews supplement these workers only as needed to perform elements of the projects that require more highly skilled operations.

Eligibility and identification of projects - Assistance under the program is available to public agencies and to private landowners with appropriate projects to restore or enhance aquatic and riparian habitat. SWM staff have developed and applied a convention in the Issaquah plan and other basin plans to identify simple, small-scale habitat projects using the XX99 numbering system (see Chapter 4). Most of these are suitable for this program.

Program management - The program is managed by a team composed of the basin steward, SWM scientists and engineers, and local project co-sponsors.

Budgeting and funding - The program is funded through a combination of SWM bond and fee revenues, grants, and contributions from project co-sponsors. Projects on private land require a match of materials, funding, or in-kind assistance from the property owner.

Parties Responsible: SWM
Estimated Cost: \$75,000 per year
Estimated Completion: 1995-1998

BW 29: Establishment of Basin Steward Position

King County SWM has hired a basin steward for the Issaquah basin. The duties of the basin steward include:

1. Providing technical assistance to basin residents to prevent nonpoint pollution, revegetating disturbed areas, and pursuing other topics related to basin plan implementation.
2. Serving as liaison between basin residents and City, County, State, federal, and tribal agencies, and among the agencies themselves, on topics related to the Issaquah basin.
3. Assisting in monitoring of water quality and habitat conditions in the basin and in the identification of code violations.
4. Assisting with revegetation projects using a conservation corp or volunteer groups.
5. Convening and chairing an interagency committee to coordinate agency activities in implementing this plan.
6. Informing basin residents of available incentive programs for water quality enhancement.
7. Developing reports on the health of the basin. The report includes the status of, and schedule for, plan implementation (including the status of capital projects, educational and enforcement efforts, and overall program accomplishments); interpret monitoring results and identify significant changes in the condition of the basin; and based on these changes, identify appropriate responses for basin management program changes, such as basin plan amendments, capital projects list changes, added costs, and staffing changes.
8. Developing a process for resolving disputes about plan implementation.

Responsible Parties:	SWM and City of Issaquah
Estimated Cost:	\$75,000 per year
Completion:	Ongoing

MEDIUM PRIORITY

BW 12: Proposal of Revised Stream Crossing Design Criteria

The King County Roads and Surface Water Management divisions should convene a committee to develop county-wide design standards for the construction of new and replacement structures at stream crossings. The committee should, at a minimum, include representatives of the Washington State Department of Fish and Wildlife; the Muckleshoot Indian Tribe; and King County Environmental, Roads, and Surface Water Management divisions. Committee recommendations should be adopted as revisions to the King County Roads Standards and the King County Surface Water Design Manual. The recommendations should specify criteria and standards to meet the following goals:

1. Crossings should allow unimpeded upstream and downstream passage of salmonids at all life stages at flows up to the 50-year flow for all Class 1 and 2 (with salmonid) streams. "Unimpeded" conveyance refers to the location of the crossing outside of the 50-year flow event without any headwater influences, accounting for predicted future sediment loads and debris considerations. The development of the design standards will be the objective and goal of the committee process.
2. Crossings should allow unimpeded conveyance of runoff and transport of current and predicted future sediment loads and debris at flows up to the 50-year flow.

Responsible Parties:	SWM, Roads
Estimated Cost:	\$20,000
Estimated Completion:	1997

BW 13: Source Control Practices within Urban Areas

The City of Issaquah and King County SWM should take several actions to reduce nonpoint pollution from sources within the urban areas of the basin. Examples of these sources include pollutants associated with business operations and household activities (e.g., cleaning chemicals, hazardous wastes, pesticides, pet wastes, used motor oil and antifreeze). This recommendation includes the following components:

1. The City of Issaquah, in coordination with the basin steward, other SWM staff, and the Muckleshoot Indian Tribe, should sponsor education and public involvement activities focused on urban nonpoint pollution, including public workshops, storm drain stenciling projects, wetland naming projects, and mailings on nonpoint pollution control to area businesses.

2. SWM should assemble existing educational materials from the King County Solid Waste Division (KCSWD), Seattle-King County Department of Public Health (SKCDPH), Metro, the Muckleshoot Indian Tribe, and WDOE for distribution to local residents and businesses. In addition, SWM should encourage the distribution of materials on nonpoint pollution using the KCSWD's Waste-Mobile, regular utility or hauler mailings, and newsletter mailings.
3. SWM should take the lead role in organizing and conducting training sessions for developers, permit reviewers, contractors, and businesses on new water quality and environmental requirements (e.g., industrial NPDES permits, K.C.C. Chapter 8.12 Water Pollution Control Requirements). Training should be offered on an annual basis.
4. The Issaquah Department of Public Works should increase the frequency of catch basin maintenance and ensure that oil/water separators are installed and maintained for all automotive businesses and high traffic parking areas associated with new construction (e.g., shopping centers, retail, and food businesses) before discharge to surface waters. During retrofitting of existing drainage systems, oil/water separators should be installed for all existing high traffic parking areas.

Responsible Parties:	City of Issaquah, SWM
Estimated Cost:	\$25,000 per year
Estimated Completion:	Ongoing

BW 15: Improvement of Farm Practices

1. The recently adopted King County Livestock Ordinance (#11168; KC Chapter 21A.30) could substantially reduce nonpoint pollution in the Issaquah Creek basin by improving animal keeping practices. King County should cooperate with the King Conservation District to encourage early compliance with the ordinance.

To accomplish this, the KCD has hired a conservation plan specialist to work with owners of farms and pasture land in the area to develop and implement conservation plans. The conservation plan specialist should provide technical assistance on best management practices and seek funding to provide grants and loans to farmers and pasture owners to develop and implement the plans. The specialist should also recognize farms that follow approved conservation plans as model farms and should develop voluntary provisions for farm operators without plans to participate in programs to improve water quality on their farms. As part of the process of developing conservation plans, KCD should also develop an inventory of farms in the basin that includes information on farm size, number of animals, subbasin location, and mailing address.

2. In cooperation with the King County Solid Waste Division (KCSWD), SKCDPH, and KCD, SWM should continue to pursue the feasibility of incorporating farm animal manure into the existing KCSWD yard waste composting program, or develop a separate composting program specifically for animal manure. Concurrent with the pursuit of an animal waste disposal program, KCD should provide information to farm and pasture owners about existing manure processing opportunities available in King County.

Responsible Parties: KCD, DNR, Basin Steward
Estimated Costs: \$20,000
Estimated Completion: Ongoing

BW 17: Improvement of Water Quality from Road Drainage Systems

The Washington State Department of Transportation (WSDOT), King County SWM and Roads Divisions, and the City of Issaquah should take several actions to reduce nonpoint pollution from road runoff and road-maintenance activities. These actions should include the following:

1. Memorandum of Understanding (MOU) - An MOU should be developed among the County, State, and City of Issaquah to establish a program to evaluate road-runoff impacts, implement source-control BMPs, and retrofit stormwater drainage systems as needed for water quality and quantity control. Each agency should perform a survey of its road-related drainage systems and outfalls to evaluate the need for implementing or improving source-control BMPs and to determine the potential for retrofitting drainage systems to improve water quality. The surveys should include a review of existing water quality and quantity data, site visits, and hydraulic reviews of the drainage systems. Retrofitting of existing road drainage systems for water quality treatment should be evaluated in conjunction with all road widening and improvement projects. Each agency should pursue funding to perform surveys, improve source control, and retrofit the systems where feasible.
2. Maintenance - Each agency should review and update its maintenance procedures for road-related drainage systems to minimize the impacts of maintenance activities on water quality. Programs should be reviewed to ensure there is adequate funding of maintenance programs. Where fish-bearing streams flow in roadside ditches, specific maintenance plans should be developed by King County Roads and SWM divisions. WSDOT should implement maintenance procedures being developed for the Highway Runoff Manual as part of WAC 173-270. Maintenance procedures for all agencies should be flexible enough so that specific basins can be targeted for special maintenance.

3. **Vegetation Management** - Each agency should work with sewer, water, and electric power utilities to evaluate and implement mechanical cutting and other non-toxic vegetation control methods, such as integrated pest management and adopt-a-ditch programs, instead of herbicides. When necessary to control noxious weeds or problem areas, herbicides should be used in accordance with RCW 17.10 and WAC 16-750 (roads and utility rights-of-ways). Specific herbicide use by utilities and private operators should be recorded with SKCDPH as a matter of public record.
4. **Construction** - Each agency should comply with all applicable erosion, sediment, and pollutant control requirements (equivalent to the Stormwater Management Manual for the Puget Sound Basin) for all road or facility-related construction projects (e.g., road widening, new road construction, construction of conveyance pipes or water quality facilities).

Responsible Parties: WSDOT, Roads, SWM, City of Issaquah, SKCDPH
Estimated Costs: \$75,000, \$20,000 operating
Estimated Completion: 1997-1998

BW 18: Development of a Spill Response Program

The City of Issaquah, in coordination with King County Roads and SWM divisions, and local (City and Fire District 10) fire departments should develop a coordinated spill response plan and team to prepare for and respond to spills in the Issaquah Creek basin. The spill response program should focus on two main areas:

1. **Highway Spill Response Program** - The City of Issaquah (fire and public works departments) should participate in the spill response program for Interstate 90 currently coordinated between WSDOT and WDOE. The City's proximity to Interstate 90 and the East Fork of Issaquah Creek would enable the City to respond quickly to spills in order to provide preliminary containment, thus protecting the East Fork and the groundwater resources of the area.
2. **City/Basin Spill Response Program** - The City of Issaquah, in coordination with King County and Fire District 10, should develop a spill response program for the City and the Issaquah Creek basin to improve response times for large spills, and provide cleanup for small spills (0-5 gallons). This program should be coordinated with WDOE's ongoing spill response program.
The initial program should include the following elements: training of fire department personnel in spill response (the minimum level of training for off-site emergency responders is defined in WAC 296.62.300-3112); purchasing spill containment materials (absorbent, lights, polyethylene, booms, etc.); and establishment of a contract with a clean-up contractor for large spills within the City and the basin.

Responsible Parties: SWM, WSDOT, Issaquah, Roads
Estimated Costs: \$30,000; operational costs - \$10,000 per year
Estimated Completion: 1997-1998

BW 23: Establishment of Bank Stabilization Program

King County and the City of Issaquah should cooperate to establish a new program to encourage the use of soil bioengineering techniques for stabilizing eroding streambanks in the Issaquah Creek basin. This fulfills plan goals to promote environmentally sound techniques for bank stabilization and to restore aquatic habitats. The bank stabilization program should consist of three elements:

1. Development and distribution of technical assistance materials for streamside landowners and a design manual for engineers. These materials should be produced by King County SWM using information compiled for the bioengineering manual for large rivers.
2. Adoption of standards for bank stabilization work that would require the use of bioengineering techniques wherever possible. The standards should also limit the emergency use of riprap and concrete by requiring that all such materials, if installed at all, be temporary and replaced within two years using soil bioengineering techniques. Changes in standards should be undertaken by the City of Issaquah, King County, and the Washington Department of Fish and Wildlife after review of the new standards by these agencies and the Muckleshoot Indian Tribe.
3. Adoption of requirements that all City and County public works or similar projects in stream corridors employ bioengineering methods for bank stabilization wherever possible.

Responsible Parties: SWM
Estimated Costs: \$5,000
Estimated Completion: 1998

BW 24: Establishment of Issaquah Fishery Management Task Force

King County Surface Water Management is convening a task force composed of all parties with stock or habitat management responsibility for Issaquah Creek to develop a management plan for salmon in the Issaquah Creek watershed. The plan should address issues including:

1. Future management of the Issaquah Salmon Hatchery.

2. Potential for additional escapement of spawning salmon to the upper basin.
3. Habitat protection and restoration in the basin.
4. Research and data collection needs: habitat, limiting factors.
5. Consistency with fishery management goals and programs in the entire Lake Washington basin.

The task force includes representatives of the National Marine Fisheries Service; the U.S. Fish and Wildlife Service; Washington Department of Fish and Wildlife (WDFW) and Ecology (WDOE); the Muckleshoot Indian Tribe; King County Surface Water Management Division and the Department of Development and Environmental Services; the City of Issaquah; and Friends of Issaquah Salmon Hatchery (FISH). Implementation of task force recommendations pertaining to fishery management will be contingent on approval by the WDFW and the Muckleshoot Indian Tribe, the agencies responsible for co-management of salmon and trout in this area.

If possible, agency representatives should be the same as those on the Lake Washington Ecosystem Research group to ensure that the Issaquah system is examined in the proper context of the larger Lake Washington system, of which it is a critical part.

Responsible Parties:	SWM, WDFW, City of Issaquah, Muckleshoots
Estimated Costs:	Costs covered by existing programs
Estimated Completion:	Ongoing

BW 27: Aquatic Resource Mitigation Banking

In order to incorporate the Issaquah Creek basin into the emerging countywide program for mitigation banking, SWM should complete the following tasks:

1. **Inventory and evaluate potential banking sites.** A basinwide inventory should be compiled using existing data. Sites already identified, including the lower reaches of tributary 0203 and North Fork Issaquah Creek Wetland 7, should have functional assessments completed and be analyzed further to determine mitigation actions and costs.
2. **Identify upcoming development projects.** Public agencies with potential construction projects within the basin should be queried to determine the likelihood for projects suitable for mitigation banking.
3. **Acquire and restore sites that are suitable for mitigation banking.** Based on the anticipated needs for mitigation banking, appropriate sites should be purchased and restored. Reimbursement of capital costs will occur as a condition for permitting of the relevant project or projects.

Responsible Parties: SWM, DDES, City of Issaquah, Roads, Parks
Estimated Costs: \$30,000
Estimated Completion: 1998

BW 30: Basin Plan Monitoring

King County SWM and the City of Issaquah are establishing a monitoring program to assist in the evaluation of the basin and nonpoint action plan. The focus of the monitoring program is to identify changes in basin conditions, including hydrology, water quality, aquatic resources, and land use. This information should be used to update or modify specific elements of the plan. The monitoring program should include the following components:

1. **Hydrologic Monitoring** - Three sets of continuous flow and precipitation recording gages should be established at selected sites in the basin (preliminary sites are at the mouth of Issaquah Creek, on the East Fork, and Middle Issaquah Creek). These gages should be monitored for at least five years to determine whether flows increase in a manner predicted by hydrologic modeling. An assessment of the change in flows in relation to land-cover changes should be conducted using the HSPF model at the end of the five years.
2. **Wetlands Monitoring** - The hydrology, vegetation, and wildlife of selected Class 1 wetlands in the basin should be monitored according to the following schedule. Staff and crest stage gages should be installed and read quarterly. Vegetation community composition and species cover and wildlife censuses should be measured annually. Additional wetlands should be monitored using existing inventory data and color and infrared aerial photos to determine vegetation and wetland class (*e.g.*, scrub-shrub, emergent) changes over time.
3. **Stream Habitat and Fish Monitoring** - Core habitat sites should be monitored biannually for canopy cover, condition of riparian vegetation, pool:riffle ratios, residual pool depth, and large woody debris. Fish counts, including spawner and out-migrant counts and spot electrofishing for juveniles should also be carried out annually. Chosen sites will focus on stream-related RSRAs and LSRAs.
4. **Channel Monitoring** - At selected channel morphometry sites, monitoring should be carried out biannually to measure channel cross sections and sediment size distribution and to determine rates of channel migration.
5. **Water Quality and Sediment Monitoring** - At selected core sites in the basin, water quality monitoring should be performed to determine turbidity, dissolved oxygen, temperature, conductivity, and pH. Stream samples should also be collected during several baseflow and storm events each year to determine phosphorus concentrations at the core sites, because of their impact on Lake Sammamish. Sediment samples should be collected biannually.

6. **Development Monitoring** - Development data should be reviewed annually to determine the number of new lots (formal and short plats), new impervious areas, sewers, and roads conditions imposed relative to basin plan recommendations (e.g., clearing limits, open-space retention), and the status of zoning and adopted regulations.
7. **CIP Monitoring** - Selected monitoring of capital improvement projects should be coordinated with all ongoing basin monitoring. Specific CIP monitoring may include several components of the recommendations outlined in 1-5 above.
8. **Citizen Monitoring** - Whenever possible, citizens should be encouraged to participate in the monitoring recommendations noted above (e.g., reading of staff gages in wetlands), or provide additional monitoring to supplement ongoing efforts.
9. **Database Development** - A basin-specific database, including existing data and data collected as part of this recommendation, should be developed and updated at least annually. The database should be computerized, geographically-based, and readily available to interested agencies.
10. **Monitoring Report** - A report on all monitoring will be included in the reports prepared by the basin steward (see BW 29).

Responsible Parties:	SWM, City of Issaquah
Estimated Costs:	\$75,000 per year for monitoring
Estimated Completion:	Every two to five years, first year was 1995

BW 31: Basin Plan Enforcement

1. **Enforcement Protocol** - The King County SWM Division should initiate efforts to establish an enforcement protocol that is consistent with the goals and objectives of section 319 of the 1987 Clean Water Act. This protocol should identify a lead enforcement agency and the specific roles and responsibilities of the Department of Ecology; King County SWM, Environmental Division of DDES; DNR; SKCDPH; and KCD in responding to spill reports, animal-keeping-related pollution, forest-practice violations, septic-system failures, or other explicit water quality violations. This process should replace the current Interagency Water Quality Trouble Call/Emergency Response Program that is coordinated by Water Pollution Control.
2. **SWM Division Enforcement** - The SWM Division Drainage Investigation and Regulation (DIR) Unit should expand their responsibilities to include inspection and enforcement of water quality BMP requirements related to the NPDES permit program. The DIR Unit should coordinate with DDES enforcement staff to report and enforce violations of SAO requirements, clearing and grading requirements, and animal-density limits.

3. **DDES Inspection and Enforcement** - King County DDES inspection staff have responsibility for ensuring compliance with clearing, grading, and SAO requirements in the basin. DDES should allocate sufficient inspection staff to enforce these requirements. Whether additional staff are necessary to provide adequate inspection should be determined through analysis of workloads and examination of required inspection frequency.
4. **Violation Reporting** - The SWM Division should simplify the reporting of surface-water-related code violations by publishing a central telephone number for reporting such violations in the blue pages of the telephone book.

Responsible Parties:	DDES, SWM, WDOE, SKCDPH, KCD, DNR
Estimated Costs:	\$38,000 per year
Completion:	Ongoing

LOW PRIORITY

BW 8: Establishment of Floodproofing and Elevation Programs

King County and the City of Issaquah should offer technical and financial assistance to residents and business owners within floodplain areas to floodproof and elevate their homes and businesses. The City and County should be responsible for funding the program within their respective jurisdictions. The County should also provide technical assistance in the City. The programs should include:

1. **Flood audits** - King County Surface Water Management and the City of Issaquah should form a team to conduct structure-by-structure flood audits of homes and businesses within the 25-year floodplains of Issaquah Creek and its major tributaries. The audits, which should be available on request of the property owner, should include a property inspection and survey and would result in a report with recommendations for flood damage reduction. The recommendations for damage reduction should be implemented by the property owner or through the programs described below. Funding for this program should be sought from the Federal Emergency Management Agency, which funded a comparable audit process on the Chehalis and Skookumchuck rivers.
2. **Loans for major floodproofing and elevation** - King County and the City of Issaquah should establish, for their respective jurisdictions, programs to subsidize no-interest loans to floodplain property owners to floodproof or elevate their homes and businesses. Loan subsidies should be available to owners of all structures within the 25-year floodplain. Loans should be secured through a lien on the property and should be paid off on a payment schedule or prior to the sale of the property. For homes identified as eligible for public purchase under BW 7, homeowners should be required to include within the lien an agreement to sell the property to the City or County for the appraised fair market

value when the property is offered for sale. This is commonly known as a "right of first refusal." A mediation process would be established to resolve disagreements on property value. It is estimated that 286 properties would be eligible for this program, and, for costing purposes, it was estimated that 100 (35%) of eligible property owners would choose to participate in the ten-year life of the loan program.

3. **Public floodproofing projects** - King County and the City of Issaquah should continue to study potential locations for publicly funded and constructed floodproofing projects, including the construction of setback berms along streams. In certain locations (along the mainstem in particular), the 100-year floodplain is hundreds of feet wide and extends far beyond the 25- and 50-year floodplains (Figure 4-3). There has been extensive development in many of these areas. Berms located at the edge of the 25-year floodplain could reduce flooding in these homes and businesses, and may be possible without significant impacts on channel conveyance and flood elevations. Berms should be sited only in areas where there are no structures between the stream and berm location.

Responsible Parties: City of Issaquah, SWM
Estimated Costs: Administration costs in BW7

BW 14: Control of Pollution from On-Site Septic Systems

The Seattle-King County Department of Public Health (SKCDPH) should enhance current educational efforts, pursue changes to existing regulations, and identify funding sources for system maintenance and repair to reduce pollution from failing on-site septic systems in the Issaquah Creek basin.

1. **Education** - Educational efforts should include distribution of brochures and other informational materials to residents, contractors, and design firms on system siting, design, installation, operation, and maintenance. Local utilities could be contacted about obtaining their permission to distribute this information with utility bills. Trade groups should also be kept informed and utilized as distributors of information to the community. These efforts should be targeted towards residents of relatively high-density neighborhoods, areas subject to septic system failure (see Figure 9-3 of the *Issaquah Creek Current and Future Conditions Report*, KCSWM 1991), new home buyers, and areas where abandoned septic systems (after conversion to sanitary sewers) are an ongoing problem.

2. **Title 13 Amendments** - SKCDPH should evaluate the feasibility of amending Title 13 of the King County Code to require that as-built on-site septic system plans and locations be recorded documents that accompany the title transfer of property. SKCDPH should evaluate the feasibility of amending Title 13 to require that proof of on-site septic system maintenance be sent to SKCDPH every three years. If it is determined that this is feasible, residential units due for maintenance could be notified by SKCDPH three months prior to the end of each three-year period.
3. **Incentives for System Repair** - SKCDPH should continue to identify and inform septic system owners about sources of public funding for system maintenance and repair. In addition to exploring the use of the State Revolving Fund for these purposes, the agency should inform individuals with failing septic systems of the housing rehabilitation loan program offered through the King County Planning and Community Development Division and the King County Low Income Rehabilitation Program. Specific information on these programs is available through the Housing Hotline.

Responsible Parties: SKCDPH
Estimated Costs: \$15,000

BW 20: Additional Water Quality Recommendations

The following additional water quality recommendations are proposed to address specific nonpoint source pollution problems (*see Appendix A: Nonpoint Water Pollution*) not covered in BWs 13 through 19.

1. **Seminar for Boaters and Lakeside Residents** - The Washington State Parks and Recreation Commission and the Seattle-King County Department of Public Health, in cooperation with the King County SWM Division and Save Lake Sammamish should conduct an annual seminar to educate users of the Lake Sammamish State Park boat launch and lakeside (resident) users about their impact on lake water quality. The seminars should include information about proper sewage and garbage disposal, and the effects of oil, grease, gas, paint, and solvent residues on the lake.
2. **Sensitive Areas Brochure.** The King County Environmental Division has prepared a brochure that describes and simplifies Sensitive Areas Ordinance requirements and tax relief programs. The brochure should be sent out by the King County Assessor with property tax statements. The brochure would help educate property owners about the types of activities that are allowed or prohibited on their land, particularly as related to buffer requirements and protection of aquatic resources.

3. **Workshops on the Basin Plan** - Upon adoption of the basin plan, the SWM Division has been conducting workshops with contractors, developers, basin residents, and County staff (DDES, SWM and Roads divisions, SKCDPH, Community Planning) to provide education about the newly adopted basin plan requirements.
4. **Use of Low Phosphorus Products** - In accord with the phosphorus reduction goals for the Lake Sammamish Water Quality Management Plan, the City of Issaquah should encourage local business participation in a voluntary program to promote the sale and use of soaps, detergents, and organic lawn fertilizers that contain little or no phosphorus in areas that drain to Lake Sammamish.
5. **Business Compliance with NPDES Requirements** - Businesses currently operating in unincorporated King County should ensure that they are in compliance with the water pollution control requirements specified in K.C.C. Chapter 8.12. The King County Best Management Practices (BMP) manual or the Stormwater Management Manual for the Puget Sound Basin provide information on the implementation of BMPs. Businesses that are required to get a permit from the Washington State Department of Ecology under the National Pollutant Discharge Elimination System (NPDES) industrial permit program should be in compliance. This includes the development of a pollution prevention plan by July 1994, and implementation of source- and treatment-control BMPs by July 1995 and 1996, respectively.
6. **Stormwater Discharges from the Constructed Drainage Network** - In response to requirements of the NPDES permit program, SWM and the City of Issaquah should inventory and map the constructed drainage network to trace sources of pollutants from developed areas to receiving waters. The major discharge points should be screened periodically during dry weather conditions for illicit, or non-stormwater, discharges. Pollutants discharging to receiving waters from the constructed storm drainage system should be reduced to the maximum extent practicable using source- and treatment-control BMPs.
7. **Information on Commercial Pesticide Applicators** - The Washington State Department of Agriculture (WSDA) should collect, monitor, and make available to SKCDPH (and other interested agencies) data regarding licenses issued to commercial pesticide applicators. Within legal constraints, and upon request by SKCDPH, information should be made available on the type of chemical applied, quantities, location of application, potential for public health effects, and emergency measures in case of poisoning or spills.

8. **Secondary School Outreach** - The SWM Division, in association with the City of Issaquah, should annually conduct half-day secondary school education efforts to inform students about water quality issues. The program should be targeted at the appropriate grade level and carried out at all public schools in the Issaquah Creek basin. Other interested parties, such as the Muckleshoot Indian Tribe, the King Conservation District, and DNR should participate in this effort.

Responsible Parties: SWM, DDES, City of Issaquah, Road, SKCDPH
Estimated Costs: \$70,000
Completion: Ongoing

BW 26: Completion of Wetland Inventory

To improve the protection of wetlands and associated aquatic resources such as streams and water quality, the King County DDES, with the assistance of the King County Surface Water Management Division and the City of Issaquah, should complete field data collection and classification of wetlands throughout the basin planning area in order to prepare a unified and comprehensive inventory of wetlands in the Issaquah Creek basin.

The recommended inventory work will be used to update the two existing wetland inventories: the King County Wetlands Inventory and the City of Issaquah Wetlands Inventory.

Responsible Parties: SWM, DDES, City of Issaquah
Estimated Costs: \$30,000

BW 28: Identification of Channel-Migration Hazard Areas

King County SWM and the City of Issaquah should prepare assessor-scale maps that designate the areas of the Issaquah Creek system that are subject to channel migration. If necessary both jurisdictions should adopt regulations to ensure that such areas remain undeveloped. Such restrictions should require that applicants for development within these areas conduct site-specific studies to determine the setback necessary to achieve adequate safety, without bank armoring, before construction can proceed.

Responsible Parties: SWM, City of Issaquah
Estimated Costs: \$14,000

BW 33: Development of Guidelines and Standards for Site Design

King County SWM should develop a report on guidelines and standards for site development to minimize impacts on surface-water quantity and quality. The report should identify and evaluate ways to minimize development-related increases in runoff and pollutants through the location and design of new construction. An advisory group composed of representatives of the development community, private community and environmental organizations, and permitting agencies should be convened to assist in the evaluation. The process should result in a publication of site-design guidelines and standards that is oriented to the development community and site design professionals.

Responsible Party:	SWM
Estimated Costs:	\$40,000

Subbasin Programs

UI 3: Purchase of Property and Transfer of Development Credits

King County should acquire part or all of the Hobart Properties site to provide added protection to sensitive streams and wetlands and allow for public use and enjoyment of the area.

In addition, within the context of the Transfer of Residential Development Credits (TDC) chapter (21.36) in the King County zoning code adopted in June 1993, the Hobart Properties site should be designated as a sending area. The receiving area should be the urban portion of the basin within the City of Issaquah or other urban areas outside of the basin. The intent of this designation should be to divert development away from environmentally significant and sensitive areas to less important resource areas and less environmentally constrained areas. This should help ensure that the more important resource areas and more heavily constrained areas receive fewer impacts from development.

UI 4: Riparian Buffers on Forest Land

When DNR initiates Watershed Analyses within the Upper Issaquah subbasin, King County should participate, with certified specialists, in the development of appropriate prescriptive riparian buffers. Prior to the completion of DNR's Watershed Analysis in this subbasin, the DNR should invite King County to participate in Interdisciplinary Team reviews of buffers for timber harvest and other forest management activities.

EF 5: Retrofitting of Interstate 90 Stormwater Drainage System

The Washington State Department of Transportation, in coordination with SWM, should establish retrofit priorities for the Interstate 90 drainage systems that discharge to East Fork Issaquah Creek. This effort should focus on the feasibility of retrofitting for water quality control and preliminary cost estimates. Subsequently, WSDOT should pursue funding to retrofit the identified priority systems. When and if funding from the State legislature is authorized for implementation of the Puget Sound Highway Runoff Program (WAC 173-270) and NPDES requirements, the East Fork Issaquah Creek portion of Interstate 90 should receive priority, on a region-wide basis, for retrofit of the stormwater drainage system. Detailed design of the retrofits would follow.

LI 4: Management of the Issaquah Hatchery

Implemented through BW 24, a task force should develop recommendations for harvest management, hatchery operation (including outplanting), habitat protection, and wild stock identification and protection within the Issaquah watershed. This task force functions as a subset of members of the Lake Washington Ecosystem study steering committee that is established as a coordinating body for comprehensive studies of the Lake Washington watershed. Among other issues, the task force should investigate the potential of modifying the management of the hatchery to emphasize research, education, and natural salmon production in the Issaquah basin. This task force would present these recommendations to the co-managers of the Issaquah salmonid stocks for consideration.

T 3: Channel and Floodplain Restoration

King County SWM should continue to work with the City of Issaquah and Rowley Enterprises, a major landowner along lower Tibbetts Creek, on a solution to widespread flooding problems in the floodplain. Unlike the lower mainstem of Issaquah Creek and the East Fork, lower Tibbetts Creek has little development along its banks, eliminating the need for purchase and removal of structures. The restoration program in this subbasin should focus on restoring the natural configuration of the stream channel and recreating a floodplain that will convey flood flows safely from upstream of Newport Way to the confluence with Lake Sammamish. In addition, the program should improve channel and floodplain habitat and provide for public access and recreational use.

The channel and floodplain restoration program should be accomplished through a cooperative program to improve conveyance at stream crossings, realign the channel, construct setback berms along the edge of the floodplain, revegetate the floodplain, and reduce sediment loading. The mechanism for cooperation should be established in an agreement among the participating agencies and property owners. Details of the program are described further in capital improvement projects 6711 and 6713.

Studies

MI 2: Mirrormont Drainage Study

King County SWM should conduct a study of the Mirrormont subdivision to determine how to upgrade the drainage system and reduce downstream impacts. The study should be conducted by the Drainage Investigations and Regulations unit.

MD 3: High Valley Drainage Study

King County SWM should conduct a study of the High Valley development on the southwest flanks of Squak Mountain to determine how to upgrade the drainage system and reduce downstream impacts. The study should be conducted as part of the Neighborhood Drainage Assistance Program (NDAP) by the Drainage Investigation and Regulation unit.



Chapter 4

Capital Improvement Projects

Introduction

Recommendations

Chapter 4: Capital Improvement Projects

INTRODUCTION

Capital improvement projects (CIPs) are a significant component of the *Issaquah Creek Basin and Nonpoint Action Plan*. Forty-three projects are proposed to reduce flooding, water pollution, erosion, and to repair damage to aquatic habitat at a cost of \$7.4 million. This places the construction of all recognized potential projects beyond the means of the foreseeable funding sources. As a result, priority rankings were determined and a set of "core" projects were identified. Table 1 lists the priority, responsible agency, status, estimated costs, and estimated completion date. There currently is \$3 million allocated to complete 18 projects by 1998.

A description, in project-number order, of each of the recommended projects follows. These projects include culvert replacement to pass flood flows or enhance fish passage, stormwater treatment to remove sediment, wetland and streambank revegetation, and channel stabilization. Figure 4-1 shows the location of each of these projects. For more detailed information about these capital improvement projects and the conditions they are intended to address, see the *Watershed Management Committee-Proposed Issaquah Creek Basin and Nonpoint Action Plan* (King County 1994) and the *Issaquah Creek Current/Future Conditions & Source Identification Report* (King County 1991).

RECOMMENDATIONS

1411 NE Dogwood Street Bridge Hydraulic Constriction Elimination

The City of Issaquah should reconstruct the NE Dogwood Street bridge to improve conveyance.

1412 Bar Scalping at RM 0.75 and 1.00

The City of Issaquah should perform bar scalping to remove past sediment accumulation at RM 0.75 and 1.00. The bars should be scalped above the summer water surface elevation to remove approximately 200 cubic yards of sediment.

Table 1
CAPITAL IMPROVEMENT PROJECTS
CIP "Core" Recommendations (sorted by priority)

Subbasin	Responsible Agency ¹	Plan #	Project Name	Status (1998) ¹	1994 Costs ²	Estimated Completion Date
Upper	DNR	2546	Holder/Pheasant Creek Diversion	PC	\$10,000	1995
Upper	WSDOT	2543	Upper Holder Fish Passage	NF	\$3,500	
Upper	WSDOT	2544	Tributary 0220 Fish Passage I	NF	\$30,000	
Upper	WSDOT	2545	Tributary 0220 Fish Passage II	NF	\$30,000	
Lower	SWM	2599	Tributary 0199 Coop Stream and Riparian Enhancement	S	\$10,000	1997
North Fk	SWM	4613	Habitat Improv for North Fk Wetland 5 (Yellow LK)	PC	\$36,000	1995
Tibbetts	SWM	6718	Large Woody Debris Placement	S	\$100,000	1997
North Fk	SWM	4612	Water Quality Imprv for North Fk Wetland 5 (Yellow LK)	PC	\$60,000	1995
Middle	SWM	2599B	Stream-Corridor Riparian Wetland Revegetation	D/C	\$120,300	3 Projects Installed 1995
Tibbetts	ISS	6711C	NW Poplar Way Culvert Replacement	S	\$167,000	
Middle	SWM/Road	2532	Mirrormont Erosion Control	C	\$305,000	1996
Upper	SWM	2599E	Holder Ck Sd. Management and Hab. Enhancement	D	\$135,000	1997
Upper	SWM	2547	Carey Creek Fish Passage at SE 204th St.	C	\$380,400	1996
Tibbetts	ISS	6711D	SE Newport Way Culvert Replacement	NF	\$308,800	
Tibbetts	ISS	6712A	Newport Wy Cross, Replace, at Anti-Aircraft (0169A) Ck	NF	\$163,500	
Upper	SWM	2599F	Stream-Corridor Riparian Wetland Revegetation	D/C	\$183,700	1 Project Installed 1995
Lower	SWM/Road	2524	Tributary 0203 Stream-Channel Relocation/Restoration	C	\$491,700	1996
Lower	SWM/Road	2522	Tributary 0199 Fish Passage Enhancement	NF	\$297,400	
North Fk	SWM	4615	Klahanie Stormwater Facility Improvements	C	\$200,000	1996
Tibbetts	ISS	6711A	NW Sammamish/SE 56th St. Culvert Replacement	D	\$415,800	
Upper	SWM	2599G	Holder Creek Stream-Channel Enhancement	D	\$214,200	1997
North Fk	SWM	4614	North Fork Wetland 7 Habitat Improvements	D	\$287,900	1997
Tibbetts	SWM	6717	Bianca Mine Spills Remediation	D	\$700,000	1997
East Fk	ISS	1411	NE Dogwood St. Br. Hydraulic Constriction Elimination	C	\$250,000	1996
Tibbetts	WSPRC	6713A	Lake Sammamish State Park Channel Enhancement	D	to be determined	³
Tibbetts	WSDOT	6711B	Interstate-90 Culvert Replacement	P	to be determined	³
Tibbetts	ISS	6713B	Tibbetts Ck Relocation and Floodplain Restoration	D	to be determined	³
Tibbetts	ISS	6713C	Tibbetts Manor Flood Setback Berm/Dredging	D	to be determined	³

Total = \$4,900,200

Table 1 (continued)

CIP "Non-core" Recommendations (sorted by priority)

Subbasin	Responsible Agency ¹	Plan #	Project Name	Status (1996) ¹	1994 Costs ²	Estimated Completion Date
Lower	SWM	2599A	Nudist Park Ck LWD Placement	PC	\$4,000	1994
Upper	SWD	2542	Hotel Creek Diversion	NF	\$10,000	1995
Tibbetts	WSDOT	6711E	State Route 900 Fish Passage	NF	\$14,000	
McDonald	KCSWD	2557	Improve Turb. Control from Cedar Hills	NF	\$25,000	
Middle	SWM	2533	Embankment Stabilization of 231st Place SE	NF	\$158,000	
East Fork	ISS	1412	Bar Scalping at RM 0.75 and 1.00	NF	\$44,200	
East Fork	SWM/ISS	1499	Large Woody Debris Placement	S	\$71,100	1998
Middle	SWM	2599D	Four Creeks Ranch Cooperative Bank Stabilization	PD	\$240,800	
Lower	SWM/Road	2525	Nudist Park Creek Fish Passage	PC	\$450,800	
East Fork	ISS	1413	Dogwood St. Bank Stabilization	PD	\$95,800	Not Needed
Middle	SWM	2599C	Pheasant Ck Cooperative Bank Stabilization	NF	\$330,200	
Tibbetts	SWM	6716	Kelly's Ranch Riparian Restoration	P	\$100,000	?
Middle	Road	2534	Embankment Stabiliz. of SE May Valley Rd	NF	\$106,000	
Tibbetts	WSDOT	6712B	SR 900 Stream Modification at Trib 0171	NF	\$393,000	
Tibbetts	SWM	6715	Ficker Tributary Revegetation	NF	\$88,400	
Lower	SWM/Road	2523	Tributary 0200 Sediment Management	NF	\$335,000	
					Total =	\$ 2,466,900

¹ Key to Abbreviations:

- DNR = Department of Natural Resources
- ISS = City of Issaquah
- Road = King County Roads Division
- P = Pending
- S = Study
- D = Design
- C = Under Construction

- SWM = King County Surface Water Management Division
- WSDOT = Washington State Department of Transportation
- WSPRC = Washington State Parks and Recreation Commission
- PC = Project constructed
- NF = Not funded
- PD = Project dropped

² Includes surveying, design, project management, and right-of-way costs.

³ Component of the Tibbetts Greenway Projects; project is not funded; estimated to be completed in 1997/98

1413 Dogwood Street Bank Stabilization

The City of Issaquah, using the guidelines developed in BW 23, should insure the stability of streambanks adjacent to public roads, targeting first the area of most severe risk for bank failure (approximately 50 lineal feet along Dogwood Street just below the Crescent Street footbridge).

1499 Large Woody Debris Placement

The City of Issaquah and King County SWM should restore aquatic habitat by placing large woody debris in the channel.

2522 Tributary 0199 Fish Passage Enhancement

King County Roads and SWM should replace the undersized culverts that carry tributary 0199 underneath 238th Way SE and Issaquah-Hobart Road with utility vault structures (three-sided concrete box culverts) designed to allow the channel to function as a natural stream system.

In addition, a 30' by 200' area overgrown by blackberry bushes on both sides of tributary 0199 from the Issaquah-Hobart Road to the confluence with the mainstem of Issaquah Creek should be cleared. This area should be revegetated with native riparian plants and coniferous trees.

2523 Tributary 0200 Sediment Management

King County Roads and SWM should replace the tributary 0200 culverts underneath 238th Way SE and Issaquah-Hobart Road with utility vault structures (three-sided concrete box culverts) sized to accommodate sediment transport through the reach.

In addition, between 238th Way SE and Issaquah-Hobart Road, an area approximately 4' deep by 30' wide and 100' long should be excavated to function as a sediment trap with sloped sidewalls to provide access. Maintain the trap by periodically removing the accumulated sediment. Also remove sediment from the deposition zone upstream of 238th Way SE.

2524 Tributary 0203 Stream Channel Relocation/Restoration

In 1996 King County SWM and the Roads Division relocated the stream away from a roadside ditch by constructing a new fish-passable crossing underneath the Issaquah-Hobart Road and a 700-foot section of channel with a riparian corridor in an adjacent field. The new channel would be designed to integrate in-stream diversity features, along with pool:riffle habitat, into the riparian zone.

2525 Nudist Park Creek Fish Passage

In the summer of 1993, the King County Roads Division replaced the two culverts underneath the Issaquah-Hobart Road with one bottomless box culvert. Upstream of the road crossing, they removed the 4- to 5-foot vertical rock wall and constructed a series of boulder-cobble stream terraces to provide fish passage. This project should be monitored for at least two years after construction to evaluate the effectiveness of the fish passage project and the upstream sediment control (project 2599A) during the five-year or greater storm event. King County Surface Water Management provided technical assistance and will do the monitoring and any additional fish passage work needed.

2532 Mirrormont Erosion Control

Within the Mirrormont subdivision, King County Roads and/or SWM should improve the ditch and driveway culverts as needed along SE 159th and SE 158th streets. Pipe the flow underneath SE 158th Street and into an enlarged, riprap armored ditch along 252nd Avenue SE. At the end of the cul-de-sac, collect and tightline flows down an eroding unused county road right-of-way. Install a new culvert underneath the Issaquah-Hobart Road to convey runoff to the existing ditch system. To help slow the rate of sidewall failure, fell trees, currently cantilevered over the edge of the slide, into the ravine. Use the trunks and branches to protect the slope base and bed from erosive action. King County Roads and SWM will negotiate the scope as well as the cost sharing for this project.

2533 Embankment Stabilization of 231st Place SE

The King County SWM Division should reconstruct the road embankment adjacent to mainstem Issaquah Creek in the upper Four Creeks Ranch development, in accord with the bank stabilization recommendation (BW 23).

2534 Embankment Stabilization of SE May Valley Road

The King County Roads Division should reconstruct the left-bank, upstream road embankment at the bridge over Issaquah Creek, in accord with BW 23.

2542 Hotel Creek Diversion

A historic diversion of Hotel Creek in the Cedar River watershed into Carey Creek should be re-diverted by the Seattle Water Department into Webster Creek - its original channel - to prevent further sediment delivery into Carey Creek and the consequent burial of salmonid rearing habitat. In addition, the Webster Creek culverts need to be replaced to allow them to carry the 100-year flow.

2543 Upper Holder Fish Passage

WSDOT should immediately install four weirs on the apron of the SR 18 concrete box culvert at RM 16.4 to produce a backwater sufficient to pass salmonids across the apron into the culvert fishway.

2544 Tributary 0220 Fish Passage I

WSDOT should fit the lowermost of the two 56-inch-diameter culverts with baffles to permit movement of salmonids upstream.

2545 Tributary 0220 Fish Passage II

WSDOT should fit the single 56-inch-diameter culvert with baffles to permit movement of salmonids upstream.

2546 Holder/Pheasant Creek Diversion

In 1995 DNR replaced an existing culvert that serves as an equalizing conduit for flows between Otter Lake wetland and Holder Creek and constructed a non-erosive channel from the culvert outlet to Holder Creek.

2547 Carey Creek Fish Passage at SE 240th Street

In 1996 King County SWM replaced the two 48-inch-diameter culverts with a bottomless vault that fully spans the stream channel.

2557 Improve Turbidity Control for Stormwater from Cedar Hills Landfill

The King County Solid Waste Division should evaluate the effectiveness of existing controls and the need for additional stormwater controls to reduce turbidity in discharges from the Cedar Hills Landfill. This effort should be carried out as part of the NPDES permit process and the development of a pollution prevention plan for the site.

2599A Nudist Park Creek Large Woody Debris Placement

In coordination with the culvert replacement under Issaquah-Hobart Road and the Nudist Park Creek restoration project carried out by the Roads Division of King County, SWM should continue the placement and monitoring of large woody debris in Nudist Park Creek that was begun in the fall of 1990.

2599B Stream-Corridor Riparian Wetland Revegetation

King County SWM should revegetate the corridor of Issaquah Creek from RM 11.1 to 11.7 through a phased, multi-year program.

2599C Pheasant Creek Cooperative Bank Stabilization

In a cooperative project between the landowner and King County SWM, replace the existing rocked streambanks with stabilization by bioengineering methods.

2599D Four Creeks Ranch Cooperative Bank Stabilization

King County SWM should replace the most recent rockwork on Issaquah and lower McDonald Creeks with bioengineering methods.

2599E Holder Creek Sediment Management and Habitat Enhancement

Throughout the Holder Creek ravine, from the mainstem crossing of SR 18 at RM 16.4 downstream to the Issaquah-Hobart Road at RM 14.0, SWM should reestablish large woody debris jams to trap sediment that now passes rapidly through the ravine.

2599F Stream-Corridor Riparian Wetland Revegetation

SWM should revegetate the corridor of Issaquah Creek from RM 0.0 to 0.2 on Holder tributary 0178A and from 0.0 to 2.3 on Carey Creek through a phased, multi-year program, using methods described in BW 22 and BW 23.

2599G Holder Creek Stream Channel Enhancement

Throughout the reach between RM 13.8 and 13.9, SWM and the property owner should replace the rock-work at inside bends and constrictions with bioengineered streambanks. The reconstructed banks should be shaped to provide streamside terraces and allow the formation of point bars at inside bends that provide increased floodway capacity during flood flows. Moreover, provisions should be made to improve in-stream and riparian habitats related to fisheries concerns.

2599H Tributary 0199 Cooperative Stream and Riparian Enhancement

With the cooperation of the landowners along the banks of tributary 0199, King County SWM should plant the upper reach stream sides with shade-tolerant trees and shrubs under the existing canopy; add large woody debris to selected sites; assist in the development of a pasture management plan; revegetate the mid-reach of the stream through the pasture with shrubs and trees. To improve fish passage, King County Roads and SWM should replace the culvert at 238th Way SE (see project 2522).

4612 Water Quality Improvements for North Fork Wetland 5 (Yellow Lake)

King County SWM should undertake the following actions to improve water quality in Wetland 5.

1. Reinforce the eroded portion of an earthen berm separating the forebay and Yellow Lake with large riprap or appropriate bioengineering techniques to prevent erosion during peak flows.
2. Acquire and revegetate a 25-foot buffer with native vegetation along the tributary 0182 biofiltration swale in the Klahanie development.

4613 Habitat Improvements for North Fork Wetland 5 (Yellow Lake)

1. King County SWM should undertake the following actions to improve habitat in Wetland 5. Where possible, improvements should be required as mitigation for continuing development in Klahanie.

2. Restore and, where possible, widen existing buffers by replanting degraded or excessively narrow buffer areas with native vegetation. Buffer areas near trails could be restored by cessation of mowing.
3. Collect and dispose of trash during annual "Spring Clean" and other volunteer events.
4. Eradicate purple loosestrife by hand pulling, and, if necessary, spot treatment with an approved herbicide.
5. Post interpretive signs explaining wetland and buffer functions and requesting that people approach the wetland only at formal viewing areas. At least one of the signs should identify purple loosestrife and what to do if it is seen.

4614 North Fork Wetland 7 Habitat Improvements

King County SWM should undertake the following actions to improve habitat in Wetland 7:

1. Where easements or rights-of-entry can be acquired, remove fill, restore hydrology by plugging old wetland drainage structures, and replant disturbed portions of Wetland 7 and its buffer. Emphasis should be placed on use of cedar and spruce seedlings to accelerate restoration of forested swamp conditions.
2. Collect and dispose of trash during annual "Spring Clean" and other volunteer events. Prevent continued dumping by gating off powerline rights-of-way and other unpaved roads in Wetland 7 and its buffer.
3. Post interpretive signs explaining wetland/stream and buffer functions. At least one of the signs should identify purple loosestrife and what to do if it is seen.

4615 Klahanie Stormwater Facility Improvements

Four or five stormwater facilities in the Klahanie development should be retrofitted to provide enhanced water quality treatment of stormwater. To determine where the greatest water quality improvements could be attained cost-effectively, King County SWM should conduct a limited study to evaluate existing detention ponds, wet ponds, ditches, and swales.

6711 Conveyance Improvements on the Mainstem

The following stream crossings along Tibbetts Creek should be upgraded to the standards specified in BW 12 by the designated agencies to increase their capacity to pass flood flows, sediment, and debris and to improve fish passage.

- A. NW Sammamish Road/SE 56th Street Culvert Replacement**
The City of Issaquah should replace Tibbetts Creek culverts beneath NW Sammamish Road (SE 56th Street) with a larger capacity bottomless culvert or a spanning structure.
- B. Interstate-90 Culvert Replacement**
WSDOT should replace the culverts at the crossing of Interstate 90 and Tibbetts Creek with a bridge or other spanning structure. The culverts underneath Interstate 90 restrict high flows and cause backwater flooding of upstream businesses. Coupled with channel improvements in Lake Sammamish State Park (project 6713A), this project is necessary to reduce the current flooding and prevent even worse flooding in the future.
- C. NW Poplar Way Culvert Replacement**
The City of Issaquah should replace the culvert at the NW Poplar Way crossing of Tibbetts Creek with larger capacity culverts.
- D. SE Newport Way Culvert Replacement**
The City of Issaquah should replace the undersized twin box culverts at the SW Newport Way crossing of Tibbetts Creek with a larger capacity culvert or a spanning structure. The culverts underneath SW Newport Way currently cause flooding and hamper fish passage.
- E. State Route 900 Fish Passage**
WSDOT should replace the long concrete box culvert at the SR 900 crossing of Tibbetts Creek with a spanning structure. The stream channel should be restored to a more natural state at the conclusion of the project. This should be accomplished as part of the ongoing project to improve the segment of SR 900 between Issaquah and Renton. In the interim, baffles should be placed in the culvert and a weir on the concrete apron should be installed to ensure fish passage.

6712 Conveyance Improvements on Tributaries

- A. Newport Way Crossing Replacement at Anti-aircraft (0169A) Creek**
The City of Issaquah should realign the Newport Way crossing of Anti-aircraft Creek (Tributary 0169A) with an upgraded box culvert. This project would remove the sharp bend in the stream created when the Summerhill subdivision was developed, eliminating flooding and deposition of sediment on Newport Way.

B. SR 900 Fish Passage and Stream Modification at Tributary 0171

The existing box culvert on tributary 0171 is a barrier to upstream migration of adult and juvenile salmonids. WSDOT should rebuild the crossing and the adjacent stream reaches to allow free access to the upper tributary system. This should be accomplished during the SR 900 improvements.

6713 Channel and Floodplain Reconstruction

The following projects should be undertaken by the agencies identified to reconstruct the natural functions of the stream channel and floodplains of lower Tibbetts Creek.

A. Lake Sammamish State Park Channel Capacity

The Washington State Parks and Recreation Commission should provide increased capacity for flood conveyance in the reach of Tibbetts Creek that passes through park land. This project should incorporate habitat enhancement, such as placement of in-stream log structures, as feasible. When the channel and floodplain restoration recommendations in T 3 are complete, high flows will no longer be partially diverted from Tibbetts Creek (0169) into tributary 0170, but will be conveyed directly into the main channel. While this will reduce flooding within the park along 0170, the increased capacity in the park will be needed to convey these increased flows in the mainstem of Tibbetts Creek and prevent flooding of park roads and buildings.

B. Tibbetts Creek Relocation and Floodplain Restoration

With the cooperation of the City of Issaquah and King County, the Rowley Agency should relocate Tibbetts Creek away from its present location in a roadside ditch along 19th Avenue NW into a reconstructed channel. A prescribed floodplain should be created with setback berms to convey flood flows. The reconstructed floodplain should be revegetated with native species.

C. Tibbetts Manor Flood Setback Berm/Dredging

The City of Issaquah should construct setback berms along this segment to create a prescribed floodplain along the stream and reduce the diversion of flood flows into the large commercial areas within the Tibbetts Creek floodplain. The reconstructed floodplain should be revegetated with native species. If necessary, the channel should be dredged to increase conveyance.

6715 Ficker Tributary Revegetation

King County SWM should revegetate the banks of upper Ficker Creek (a tributary to 0169A) by hydroseeding and conifer planting.

6716 Kelly's Ranch Riparian Zone and Floodplain Restoration

The Kelly's Ranch riparian zone along Tibbetts Creek should be restored by King County SWM in cooperation with the land owner to improve fish habitat, water quality, and floodplain functions. Animal access to the creek should be limited to specific stream crossing and watering points by fencing the riparian zone.

6717 Bianca Mine Spoils Remediation

The King County SWM Division should stabilize the stream banks and stream channel through the stream reach adjacent to the Bianca Mine spoils piles. The spoils should be regraded to move the toe of the actively eroding spoils away from the toe of the slope and reduce the inclination of the spoils pile. The regraded slopes should be vegetated and the channel stabilized by placing boulders and large woody debris throughout the reach.

6718 Large Woody Debris Placement

The King County SWM Division should install roughness elements (large woody debris and boulders) in the channel for 1500 feet downstream from the Bianca Mine spoils site.



Chapter 5

Watershed Characterization

Introduction

Upper Issaquah Creek Subbasin

Fifteenmile Creek Subbasin

Middle Issaquah Creek Subbasin

McDonald Creek Subbasin

East Fork Issaquah Creek Subbasin

Lower Issaquah Creek Subbasin

Tibbetts Creek Subbasin

Chapter 5: Watershed Characterization

INTRODUCTION

This chapter provides a summary of the watershed characteristics of the Issaquah basin by individual subbasin. The issues covered in this chapter include land use, geology, hydrology, water quality, fish use, flooding, erosion, deposition of stream channel sediment, and aquatic habitat. A complete discussion of these issues can be found in Chapter 5 of the *WMC-Proposed Issaquah Creek Basin and Nonpoint Action Plan* (1994), and *Current/Future Conditions and Source Identification Report* (1991). A summary of the fish use of Issaquah Creek and Tributaries is presented in Table 2.

UPPER ISSAQUAH CREEK SUBBASIN (Holder and Carey Creeks)

The Upper Issaquah Creek subbasin is formed by the drainages of Holder and Carey creeks (tributaries 0178 and 0218) and covers an area of some 11,540 acres, approximately 18 square miles, in the southeastern quarter of the Issaquah Creek basin (Figures 5-1 and 5-2). The steep bedrock topography of Tiger and Taylor Mountains, which forms the upper subbasin, gives way at lower altitudes to narrow, alluvium-filled valleys that merge to form the main Issaquah valley, northwest of Hobart.

Holder Creek originates on the steep southeastern slopes of Tiger Mountain and on the southwestern slopes of South Taylor Mountain and flows some 7 miles to its confluence with Carey Creek. It is steep for most of its length, dominated by boulders and cobble. Patch gravels are common, but extensive spawning beds are rare except upstream of debris jams and in the flatter, lowermost reaches. The system provides spawning and rearing habitat for steelhead, sea run and resident cutthroat trout, and coho salmon. Anadromous fish cannot ascend above the SR 18 crossing at RM 16.4, but resident cutthroat were observed throughout the upper reaches to just above the East Tiger Mountain Road.

Carey Creek originates in a broad saddle on the southeastern slopes of South Taylor Mountain and flows 7 miles to the confluence with Holder, forming the mainstem of Issaquah Creek. Carey Creek is the quintessential salmon stream for most of its length. It is a low-gradient stream with extensive pool and riffle complexes and abundant large woody debris providing structure and stability. A series of cascades occur at RM 5.2, blocking anadromous fish from the upstream reaches. Nevertheless, the lower reaches provide spawning and rearing habitat for coho salmon, steelhead, and both sea run and resident cutthroat trout and, occasionally, sea run Dolly Varden char. Upstream of the cascades, resident cutthroat occupy the system to its headwaters.

This subbasin is heavily forested, mainly by second-growth timber; forestry uses dominate the current land use surrounding both tributaries. The Washington State Department of Natural Resources (DNR) operates the Tiger Mountain State Forest at the headwaters of Holder Creek, while the headwaters of Carey Creek are in private ownership. The lower subbasin is occupied by livestock farms and scattered dwellings. Future land use provides for rural-density single family (1 du/5 acres) in the lower subbasin and throughout a significant portion of the middle and upper reaches of Carey Creek. This zoning and land-ownership pattern suggests that there will be a major reduction in forested lands in the upper Carey Creek system. Overall, forest land cover is expected to be reduced from the current level of 80 percent of the subbasin to 50 percent. Of particular significance is a proposed development of some 1,700 acres in upper Carey Creek.

The Upper Issaquah subbasin is largely undeveloped and represents the most abundant and relatively undamaged salmonid habitat in the Issaquah Creek basin. Landscapes within this watershed, having mostly recovered from logging effects earlier in the century, exhibit conditions of hydrology, water quality, and habitat that benefit salmonid production. Particularly in the Carey Creek system, aquatic and terrestrial habitats are occupied by diverse species and life histories of salmonids and a number of animals: elk, deer, bear, and various avian species and amphibians. Such conditions are increasingly rare in the urbanizing areas of King County.

Future problems stem mainly from development activity in the Upper Issaquah Creek subbasin. Hydrologic modeling suggests that as the upper subbasin builds out, the 25-year peak flow will increase by about 26 percent, an absolute increase of some 413 cubic feet per second, driven mainly by changes in land use in the Carey Creek basin. Thus, changes to stream habitat structure, sedimentation and erosion rates, and water quality parameters - particularly turbidity, phosphorus, and alkalinity - should be expected for this system. Without considerable mitigation, adverse impacts to salmonid resources will likely be significant and enduring.

Table 2

**Anadromous Fish Use of Issaquah Creek and Tributaries
(Table 8-1 of the *Current/Future Conditions Report - October 1991*)**

NAME	STREAM #	LENGTH (in miles)	ACCESSIBLE LENGTH	SPECIES	SPAWNING (S) REARING (R)
Issaquah Creek	0178	17.3	- All species to RM 3.1. No CK above hatchery -		
North Fork - Issaquah Creek	0181	4.25	1.6/RES	SE/CO/CT	S/RS/RS
	0181A	0.75	RES	CT	RS
East Fork - Issaquah Creek	0183	7.20	5.5/RES	SE/CO/CK/CT/ RB	R/RS/RS/RS/R S
	0186	1.75	0.35/RES	CO/SE/CT	RS/S/RS
	0191	1.10	0.20/RES	CO/CT	RS/RS
	0192	0.75	0.15/N	CO/CT	RS/RS
	0194	0.80	O/N		—
	0195	1.20	0.15/N	CO/CT	S/RS
	0198	1.00	0.20/RES	CO/CT	R/RS
	0199	2.75	0.75/RES	CO/CT	RS/RS
	0200	1.50	0.50/N	CO/CT	RS/RS
	0201	0.60	0.1/N	CO/CT	S/S
	0203	2.30	0.4/RES	CO/CT	S/SR
	0203A	1.10	0.45/N	CO/KO/CT	SR/S/SR
0206	1.00	0.0/RES	CT	SR	
Fifteen Mile Creek	0207	5.40	1.5/RES	SH/CO/CK/CT	SR/SR/SR/SR
	0208	1.30	1.0/N	CO/CT	SR/SR

KEY TO ABBREVIATIONS

- | | |
|-------------------|----------------------|
| CK = Chinook | CO = Coho |
| SE = Sockeye | CT = Cutthroat |
| SH = Steelhead | SRCT = Sea run |
| DV = Dolly Varden | RB = Rainbow |
| RB* = Right bank | KO = Kokanee |
| S = Spawning | R = Rearing |
| U = Unknown | N = No fish observed |
- /RES = resident fish above this mile RES = Resident fish only this stream
- 0 = inaccessible to anadromous fish
- Accessible Length: X.XX = accessible to anadromous fish to this point

Table 2 (continued)

NAME	STREAM #	LENGTH (in miles)	ACCESSIBLE LENGTH	SPECIES	SPAWNING (S) REARING (R)
McDonald Creek	0212	3.10	1.8/N	CO/CT/RB	SR/SR/SR
	0212C	1.80	0.25/N	CO/CT	R/SR
	0212E	1.10	0.25/N	CO	S
	UNNMBRD	1.60	0.4/RES	CO/CT	SR/SR
	(Enters mainstem on RB* at RM 7.6)				
	0213	1.00	0.35/N	CO/CT	S/SR
	0214	0.70	0.50/N	---	---
	0215	1.50	0.30/N	CO/CT	SR/SR
	0216	0.40	0.1/U	U	---
	0217	0.80	0.0/N	---	---
	UNNMBRD	1.20	0.40	CO/CT/SE	S/S/S
(Enters mainstem on RB* at RM 10.8)					
Carey Creek	0218	5.60	2.6/RES	CO/SE/CK/RB SRCT/SH/DV	RS/S/RS/RS/ RS/RS/RS
Holder Creek	0178	Continued as Holder Ck.		CO/SH/DV/CT	RS/RS/RS/RS
	0219	1.20	0.7/N	CO/CT	S/RS
	0219A	1.10	0.0/N	---	---
	0221	1.60	0.0/N	---	---
Tibbetts Creek	0169	4.30	3.0/RES	CO/SE/CT	RS/S/RS

TOTAL ACCESSIBLE LENGTH = 37.2 MILES
 TOTAL STREAM LENGTH = 122 MILES

KEY TO ABBREVIATIONS

- | | |
|--------------------------------------|--------------------------------------|
| CK = Chinook | CO = Coho |
| SE = Sockeye | CT = Cutthroat |
| SH = Steelhead | SRCT = Sea run |
| DV = Dolly Varden | RB = Rainbow |
| RB* = Right bank | KO = Kokanee |
| S = Spawning | R = Rearing |
| U = Unknown | N = No fish observed |
| /RES = resident fish above this mile | RES = Resident fish only this stream |
| 0 = inaccessible to anadromous fish | |

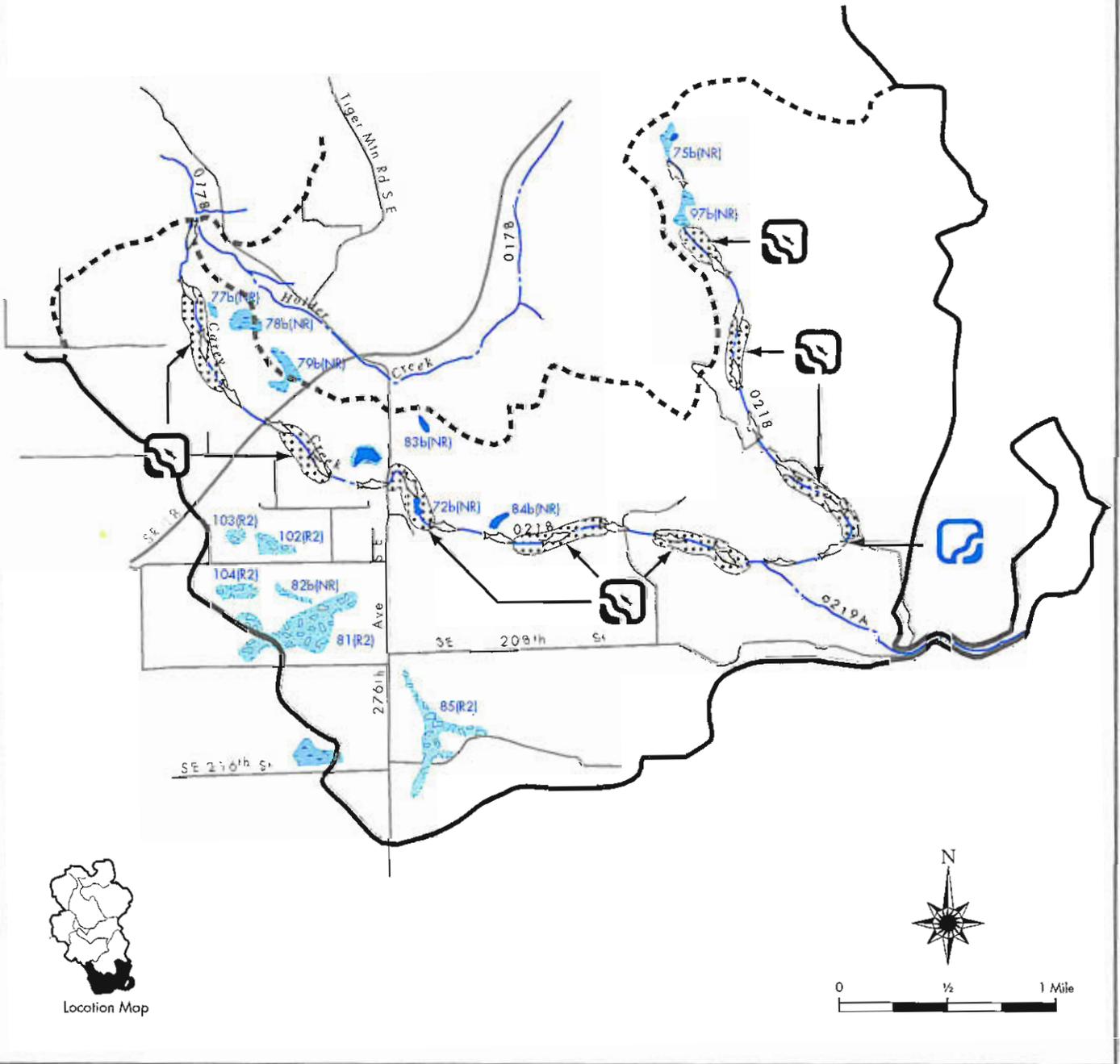
Accessible Length: X.XX = accessible to anadromous fish to this point

-  Basin Boundary
-  Subbasin Boundary
-  Lake
-  Resource Area
-  Impassable Falls/Cascade
-  Concentrated Salmonid Spawning Areas

- Stream Classification**
-  Class I
 -  Class II w/ salmonids
 -  Class II w/o salmonids
 -  Class III
 -  Unclassified

- Wetland Classification**
-  Rated I
 -  Rated II
 -  Rated III
 -  Unrated (NR)
 -  10(R2) Wetland Number & Rating

Note: Spawning and rearing of Salmonids occurs throughout all accessible streams in this system.



UPPER ISSAQUAH CAREY CREEK SUBBASIN RESOURCES
Issaquah Creek Basin

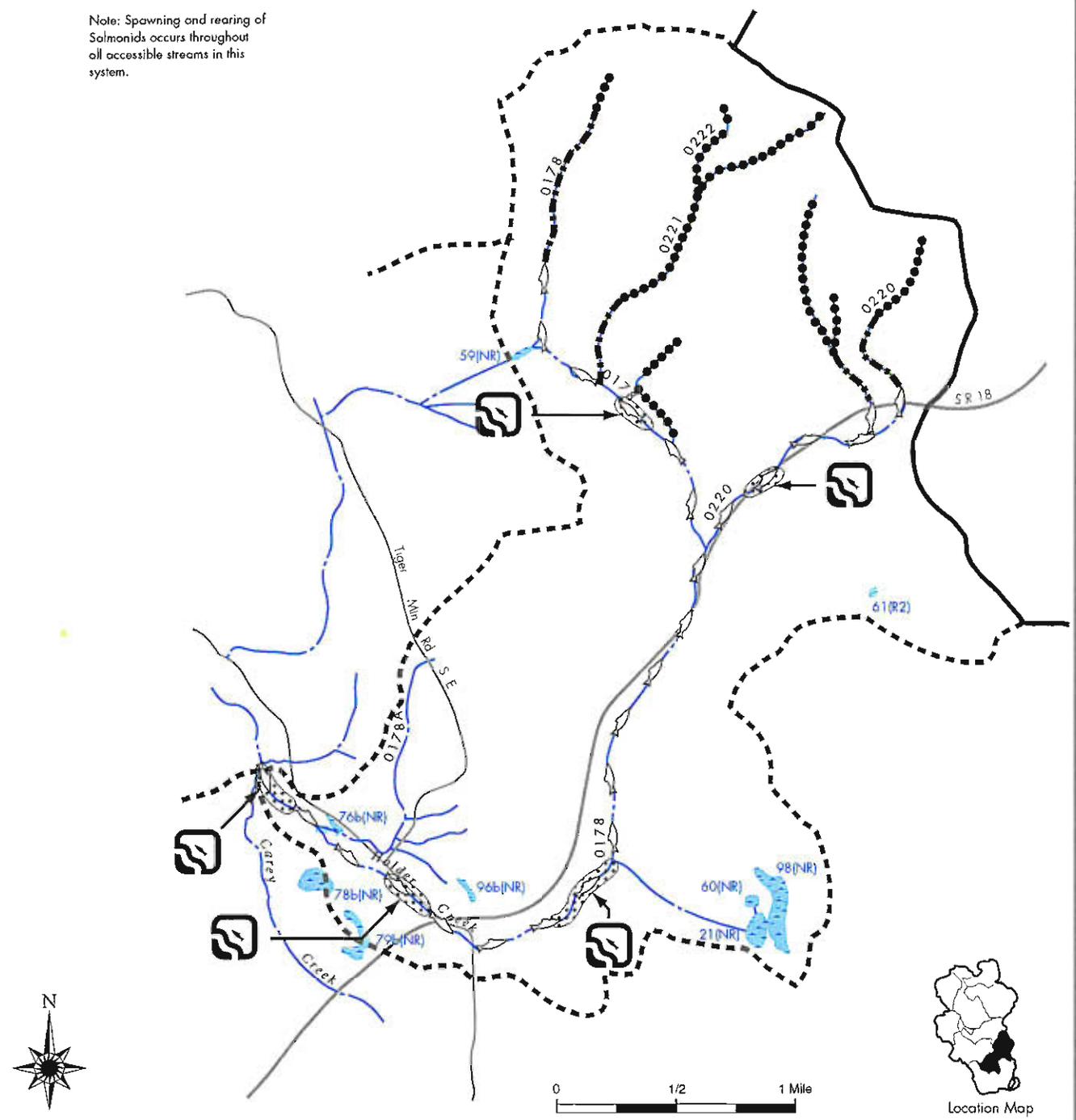
Figure
5-1

-  Basin Boundary
-  Subbasin Boundary
-  Lake
-  Resource Area
-  Concentrated Salmonid Spawning Areas

- Stream Classification**
-  Class I
 -  Class II w/ salmonids
 -  Class II w/o salmonids
 -  Class III
 -  Unclassified

- Wetland Classification**
-  Rated I
 -  Rated II
 -  Rated III
 -  Unrated (NR)
 - 10(R2)** Wetland Number & Rating

Note: Spawning and rearing of Salmonids occurs throughout all accessible streams in this system.



UPPER ISSAQUAH HOLDER CREEK SUBBASIN RESOURCES
Issaquah Creek Basin

Figure
5-2

Current problems in this subbasin include local bank erosion in Holder Creek, particularly where SR 18 impinges on the creek; high sediment delivery to the lower reaches of Holder Creek; fish passage barriers on Holder Creek due to SR 18 culvert crossings on the mainstem and a tributary; a diversion out of upper Holder Creek into Pheasant Creek; sedimentation into Carey Creek from a diversion out of the Cedar River watershed; and under-utilization of extensive stream habitat by anadromous salmonids.

Particularly in the Holder catchment, the steep topography of the Upper Issaquah subbasin limits the formation of extensive wetlands. However, Carey Creek begins in a large, beaver pond-dominated wetland complex on South Taylor Mountain and passes through other wetlands as it flows downstream. Upstream of the cascades at RM 5.2, narrow riparian wetlands and at least one other beaver pond can be found. The downstream reaches flow through extensive riparian wetlands, mostly unmapped, that occupy the broad floodplain.

FIFTEENMILE CREEK SUBBASIN

The Fifteenmile Creek subbasin covers 2,928 acres (approximately 4.6 square miles) in the eastern central Issaquah Creek basin (Figure 5-3). The creek has its headwaters on the southeastern slope of West Tiger Mountain. The mainstem, its three main tributaries, and several smaller channels compose ten miles of stream channel, most of it high gradient and dominated by boulder and cobble cascades. Ninety-five percent of the basin is presently covered by forest. This is expected to be reduced to about 72 percent over the next 10 to 25 years, primarily by logging in the Tiger Mountain State Forest. The 25-year peak flow is presently about 388 cubic feet per second (cfs); that is expected to increase to 443 cfs – a 14 percent increase, relatively modest in comparison to the other subbasins in the planning area.

With an average slope approaching ten percent, this is one of the steepest subbasins in the Issaquah Creek basin. Specific problems here are predominantly the result of this topography and the resulting high energy of Fifteenmile Creek. The January 1990 storm washed out a private culvert and associated fill on 252nd Place SE that provided sole access for 15 houses. Localized areas of channel erosion, common throughout the system, are problematic in the vicinity of 240th Avenue SE, where development is encroaching on the stream corridor. The most immediate threat to a residence exists at the mouth of Fifteenmile Creek, where a house was built with insufficient setback from the active channel and has subsequently required extensive bank armoring to maintain channel stability.

In spite of both natural and human-generated erosion and sedimentation, there have been few reports of flooding in this subbasin. This condition probably is explained by the relatively low rate of development that prevails here, a condition that is likely to continue.

A barrier to anadromous fish exists at RM 1.5 in the form of a bedrock cascade, which is topped by an abandoned water-supply dam. The reaches of the stream below the barrier are characterized by gradients of 1 to 1.5 percent in a near-continuous, high-gradient riffle. Despite the continuous presence of a well-vegetated riparian corridor, large woody debris is rare and unevenly distributed as a result of both natural and human factors. These conditions make habitat in this creek best for steelhead and sea run cutthroat trout, rather than salmon, and warrant the designation of the channels of this subbasin as a locally significant resource area (LSRA).

MIDDLE ISSAQUAH CREEK SUBBASIN

The Middle Issaquah Creek subbasin covers an area of 3,238 acres (approximately 5 square miles) (Figure 5-4), 80 percent of which is presently forested. The subbasin is mainly in agricultural and low-density single-family residential land uses at present. Future land uses will allow for a major increase in low-density single-family residential development, reducing forest land by up to 50 percent. As a consequence of these local changes, the 25-year peak flow in this subbasin is modeled to increase to almost 2,855 cubic feet per second, a 29-percent increase. This increase in surface-water flows will accelerate flooding and channel migration in existing problem areas as well as in presently problem-free areas.

This subbasin has a history of both lowland and localized flooding, particularly at the Mirromont development and near the confluence of Issaquah and Pheasant creeks (tributaries 0178 and 0178E). King County projects in 1986 and 1988 have addressed several local problems here; however, at least two private residences continue to be flooded and several roads, both public and private, have been blocked or washed out by sediment and high flows.

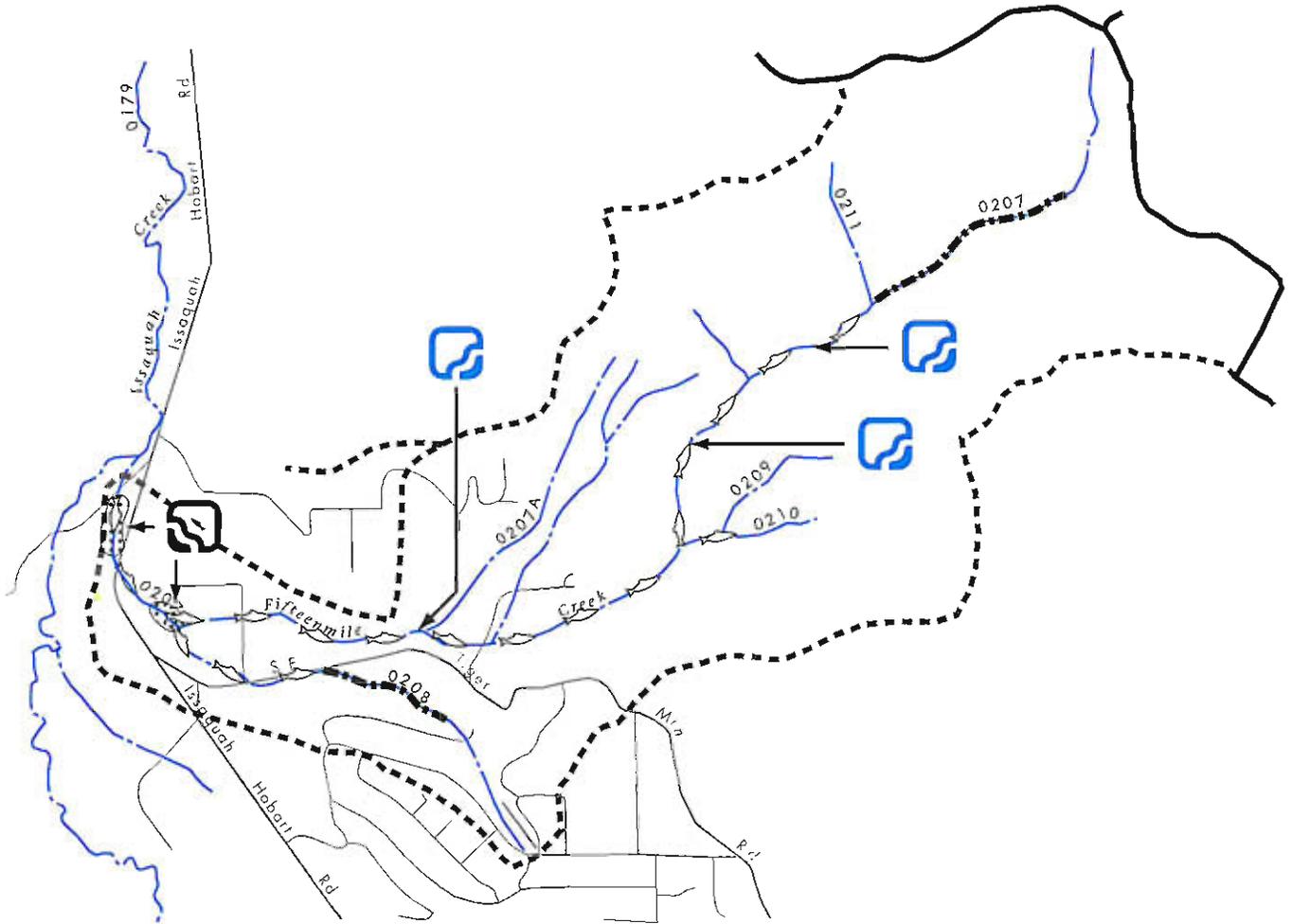
The main channel of Issaquah Creek actively migrates throughout much of this subbasin. Numerous locations show lateral channel shifts from the two 1990 storms from a few feet up to several tens of feet, with even larger changes accumulating over the last several decades. Although examples of such movement are scattered throughout this subbasin, the most damaging changes occurred in the Four Creeks Ranch area (RM 8.2-8.8), where development has encroached upon a zone of active channel migration. The most severe erosion problem here shifted the active channel to within a few feet of a house foundation during the November 1990 flood, following a pattern of channel migration evident over the preceding decades. Just upstream, longer-term channel migration has left steep embankments along the right bank, a portion of which failed catastrophically in March 1991, temporarily damming the mainstem of Issaquah Creek.

- Basin Boundary
- Subbasin Boundary
- Lake
- Resource Area
- Impassable Falls/Cascade
- Concentrated Salmonid Spawning Areas

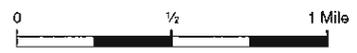
- Stream Classification**
- Class I
 - Class II w/ salmonids
 - Class II w/o salmonids
 - Class III
 - Unclassified

- Wetland Classification**
- Rated I
 - Rated II
 - Rated III
 - Unrated (NR)
 - 10(R2)** Wetland Number & Rating

Note: Spawning and rearing of Salmonids occurs throughout all accessible streams in this system.



Location Map



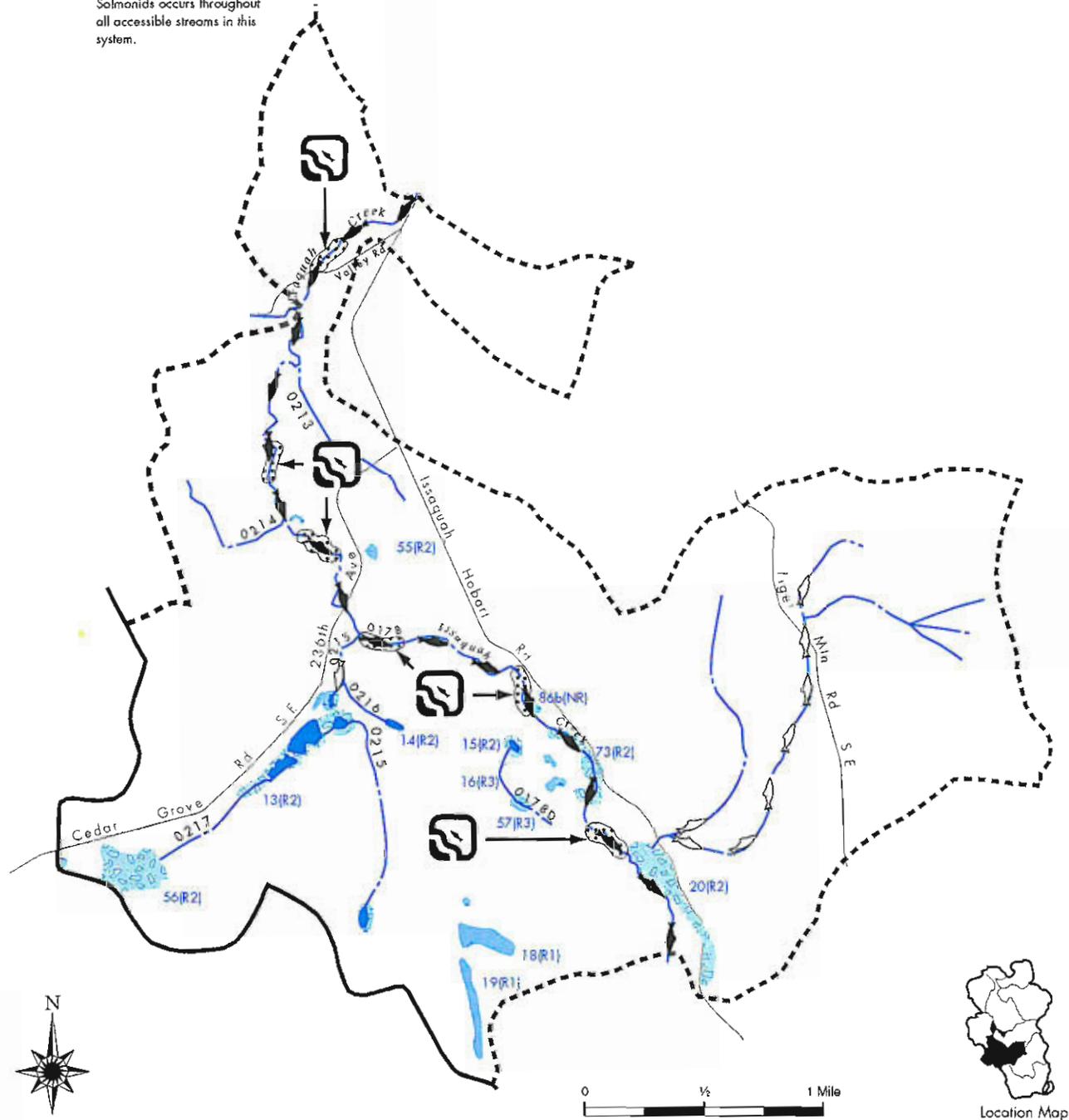
FIFTEENMILE CREEK SUBBASIN RESOURCES
 Issaquah Creek Basin Figure 5-3

-  Basin Boundary
-  Subbasin Boundary
-  Lake
-  Resource Area
-  Concentrated Salmonid Spawning Areas

- Stream Classification**
-  Class I
 -  Class II w/ salmonids
 -  Class II w/o salmonids
 -  Class III
 -  Unclassified

- Wetland Classification**
-  Rated I
 -  Rated II
 -  Rated III
 -  Unrated (NR)
 -  Wetland Number & Rating

Note: Spawning and rearing of Salmonids occurs throughout all accessible streams in this system.



MIDDLE ISSAQUAH CREEK SUBBASIN RESOURCES
Issaquah Creek Basin

Figure 5-4

This reach of mainstem Issaquah Creek forms a moderate-gradient system that supports a regionally significant salmonid fishery, in spite of low-level land-use impacts from livestock farming, road building, and floodplain encroachment. The gradient throughout this reach of the Issaquah mainstem (RM 7.7 to RM 12.8) is slightly less than 1 percent. Gravels are free of fines and are unconsolidated, providing excellent spawning conditions. An uneven pool:riffle character predominates, and riffles appear to be slightly more common than pools due to the paucity of large woody debris in this reach. Braiding is apparent in many sections, particularly near RM 9.6 and RM 10.5, providing excellent summer rearing habitat and refuge from high winter flows for juveniles. The riparian corridor also contains large forested wetlands, unmapped during the King County inventory. These wetlands serve as floodwater and sediment storage areas during the winter and may act as stream recharge areas during other seasons.

MCDONALD CREEK SUBBASIN

The McDonald Creek subbasin covers 3,200 acres (5 square miles) in the southeast portion of the Issaquah Creek planning area (Figure 5-5). The headwaters of the creek (also called Mason Creek) drain from Lake McDonald in the south, and from the Cedar Hills upland. Most of the main channel is low gradient. Drainage is characterized by extensive wetland areas that have been filled and drained for agricultural and residential development.

Flooding in this subbasin is significant and has occurred in two main locations, the High Valley subdivision and the Sunset Valley Farms subdivision. Sunset Valley Farms is situated in a broad floodplain along McDonald Creek, portions of which are expected to extend up to 450 feet in width as the subbasin builds out. Surface-water flow is expected to increase significantly as development occurs and natural features are replaced with impervious surfaces and lawns. When the subbasin is built out, the current average 25-year peak flow of 226 cubic feet per second (cfs) could increase to as much as 358 cfs, a 58 percent increase.

The McDonald Creek valley has been the historical recipient of large amounts of sediment from the steep mountain slopes that drain into it from the north. Sediment from the tributaries on Squak Mountain has accumulated in a fan shaped deposit almost one mile wide and over 2,000 feet long between the foot of Squak Mountain and McDonald Creek. This is a zone of pervasive, chronic sediment deposition, because here, where the stream gradient levels out, there is a decrease in sediment transporting ability. In recent decades this natural sedimentation process has been escalated by upstream development and forestry practices.

The area near Lake McDonald is one of three major regions in the Issaquah Creek basin designated for urban development by the 1985 King County Comprehensive Plan. The 1992 Growth Management Act update of that plan proposes that this area be redesignated to rural. However, much of the area

around Lake McDonald has already been subdivided into suburban-sized lots as has much of the area north of SE May Valley Road and in the valley itself. As a result, forest lands will be reduced from their present 75 percent to an estimated 15 percent of the subbasin in the process of development, and peak flows can be expected to increase dramatically.

McDonald Creek is used by anadromous and resident fish. Coho salmon have been observed using tributaries 0212C, 0212E, and 0212I. In addition, coho also use the reach of McDonald Creek at about RM 0.75. Here, the creek assumes a low-gradient riffle character with pools at outbends and at obstructions, and the corridor becomes densely wooded. McDonald Creek (along with Tibbetts Creek) has the poorest water quality of all the creeks in the Issaquah Creek system, according to 1989-90 Metro storm monitoring data. In particular, the Cedar Hills landfill seems to be an occasional source of high levels of turbidity.

EAST FORK ISSAQUAH CREEK SUBBASIN

East Fork Issaquah Creek originates on the north slopes of Tiger Mountain and flows down steep mountainsides in a relatively narrow channel to its confluence with the mainstem in the much broader valley below (Figure 5-6). Throughout most of its 7.2-mile length, East Fork Issaquah Creek is a relatively energetic stream, which is expressed by numerous examples of recent bank erosion in its middle and upper reaches. As the creek emerges from this confining valley onto the floor of the main Issaquah Creek valley, much of the sediment eroded from upstream in the last several thousand years has formed a lobe-shaped alluvial fan underlying about 100 acres of the City of Issaquah, just west of the Sunset Way interchange.

Under projected unmitigated land-use changes in the East Fork Issaquah Creek subbasin, the current 25-year peak flow of 742 cubic feet per second is expected to increase by 22 percent. Floodplain modeling on the East Fork predicts that as many as 84 single-family residences, one multifamily residence, one public building, and nineteen commercial buildings could be at least partially flooded by 100-year future flood conditions, even with mitigation applied to new development. Depth of flooding could increase by as much as 0.7 feet, and the floodplain width is predicted to increase by as much as 180 feet in the lower portion of the stream.

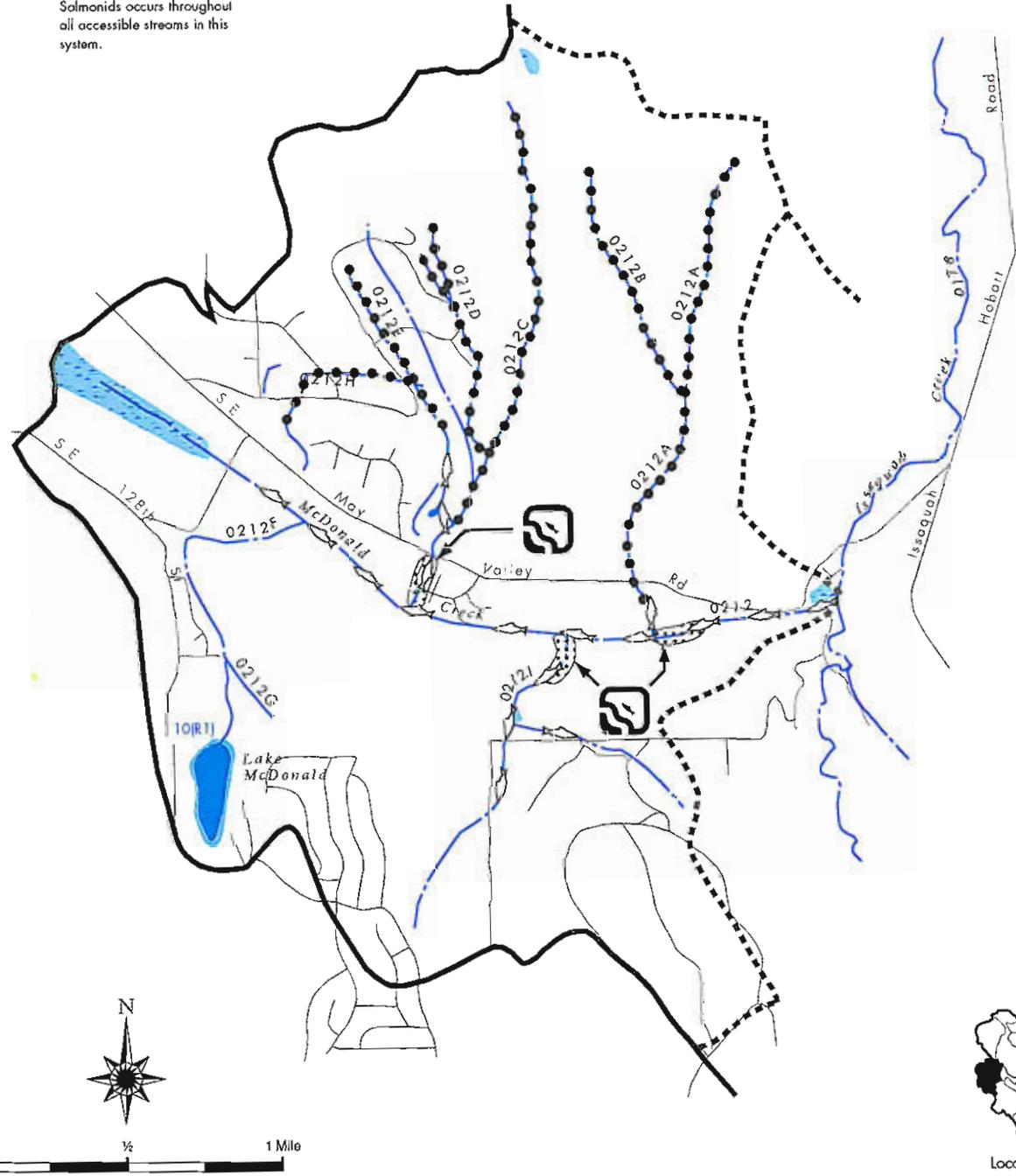
The East Fork probably has seen greater physical alteration than any stream in the Issaquah Creek system, beginning with its early use as a flume for the transportation of logs during the 19th Century. Early logging practices were generally destructive to the forests and streams in the subbasin, and although present-day forest practices have improved somewhat, they still typically result in some stream-system degradation. A notable exception is occurring in the Tiger Mountain State Forest, where innovative forest management techniques are being tested.

-  Basin Boundary
-  Subbasin Boundary
-  Lake
-  Resource Area
-  Concentrated Salmonid Spawning Areas

- Stream Classification**
-  Class I
 -  Class II w/ salmonids
 -  Class II w/o salmonids
 -  Class III
 -  Unclassified

- Wetland Classification**
-  Rated I
 -  Rated II
 -  Rated III
 -  Unrated (NR)
 -  Wetland Number & Rating

Note: Spawning and rearing of Salmonids occurs throughout all accessible streams in this system.



McDONALD CREEK SUBBASIN RESOURCES
Issaquah Creek Basin

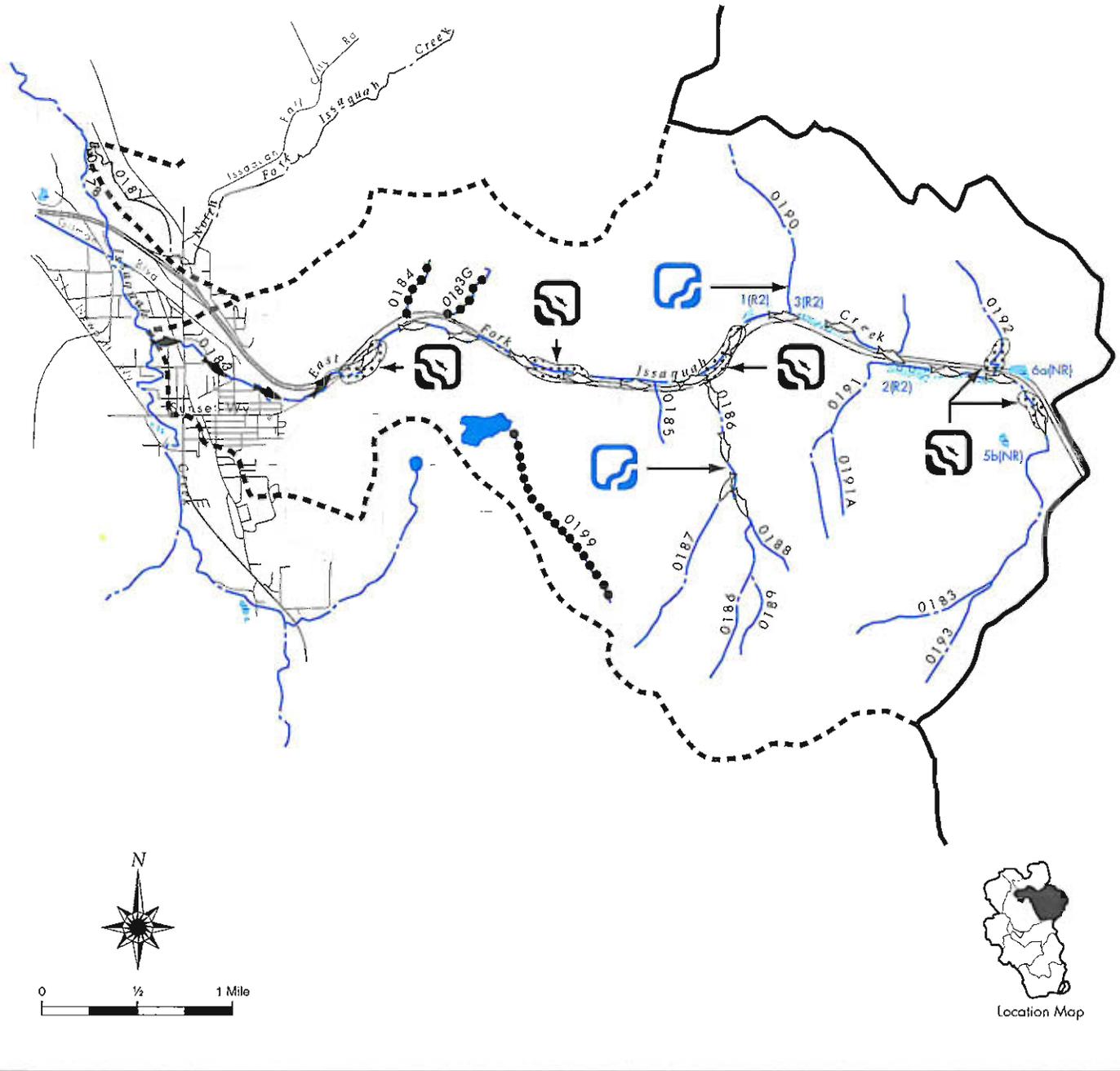
Figure
5-5

- Basin Boundary
- Subbasin Boundary
- Lake
- Resource Area
- Impassable Falls/Cascade
- Concentrated Salmonid Spawning Areas

- Stream Classification**
- Class I
 - Class II w/ salmonids
 - Class II w/o salmonids
 - Class III
 - Unclassified

- Wetland Classification**
- Rated I
 - Rated II
 - Rated III
 - Unrated (NR)
 - 10(R2)** Wetland Number & Rating

Note: Spawning and rearing of Salmonids occurs throughout all accessible streams in this system.



EAST FORK ISSAQUAH CREEK SUBBASIN RESOURCES
 Issaquah Creek Basin Figure 5-6

Construction of Interstate 90 in the 1970s generated another set of problems for this stream system. During construction, the creek was diverted and confined in many locations. Runoff from Interstate 90, which is not detained for water quantity control or otherwise treated for water quality control, adds to the impacts on the system. The lack of quantity and quality control along Interstate 90 increases the likelihood of a significant impact to the East Fork if a chemical spill occurs.

The land surrounding the East Fork Issaquah Creek is at great risk of flooding. Two distinct flooding areas are identified and include the upper portion of the creek above High Point Road (overbank flooding in pasture and Interstate 90 areas during the January and November 1990 storms) and the area below the Sunset Way entrance to Interstate 90. Throughout this lower mile, the stream has been armored and further constricted to facilitate home, road, and commercial construction. Many of the residential, commercial, and industrial structures located in the subbasin lie in the floodplain and experience frequent flooding.

Local bank erosion in the upper reaches of the East Fork is common, particularly where the reconstructed channel has been excessively confined by adjacent roadway fills. Erosion is also evident on many of the northern tributaries that flow steeply off Grand Ridge, especially those draining areas of past disturbance near the western subbasin boundary. Deposition of eroded sediment is not presently causing significant conveyance problems, except near the mouth of the creek at the Rainier Boulevard N bridge. However, zones of substantial sand deposition above the High Point interchange on Interstate 90 and local infilling of pools throughout the lower channel have probably reduced the habitat value of this stream.

Habitat in the East Fork system is in generally good condition and supports steelhead and resident anadromous strains of cutthroat trout throughout the system, as well as significant runs of sockeye, coho, and some chinook salmon in the lower reaches. Salmonids are prevented from moving farther upstream than RM 5.5, where a water intake dam has been constructed. This dam probably has only limited effect on fish production as stream gradients above the dam are quite steep, ranging up to 10 percent, and habitat is more suited to trout. Below this barrier, fish habitat is generally quite good, except for some severely channelized reaches in the lower portion of the stream within the City of Issaquah. The East Fork Issaquah Creek subbasin is designated a locally significant resource area (LSRA) in this plan.

NORTH FORK ISSAQUAH CREEK SUBBASIN

This subbasin covers 2,855 acres (4.5 square miles) of mainly low elevations (Figure 5-7). The North Fork Issaquah Creek, also known locally as Jordan Creek, begins at Yellow Lake on the forested slopes of Grand Ridge and flows 3.7 miles to its confluence with mainstem Issaquah Creek at river mile 1.8. The upper reaches of the North Fork occupy a prehistoric glacial meltwater channel,

forming a low-gradient stream fed by four much steeper lateral tributaries. The lower North Fork channel, in contrast, cuts down at the edge of the valley, abruptly dropping 200 feet at a 10-percent gradient to the valley floor.

At present, flooding is confined largely to the lower portion of the channel below East Lake Sammamish Parkway SE. The gradient in this portion of the stream is relatively flat, and residences are constructed close to the banks of the channel. At least nine houses and several commercial structures (storage buildings) are within the future 100-year floodplain on the North Fork.

Approximately 72 percent of the subbasin is presently covered by forests, the remainder consisting of high-density single-family residential subdivisions and a gravel mining operation. If the subbasin is fully developed according to existing zoning, the amount of forested land could drop to less than half its present level, and impervious surfaces could increase from three to near eighteen percent. Under these future conditions, the presently low peak flows, which are a result of current land cover, are expected to increase substantially. For example, the current 2-year peak flows of 73 cubic feet per second (cfs) would nearly double to 130 cfs. This is a worst-case analysis of the present zoning, without detention facilities to reduce flows.

The forests of the North Fork include substantial, Class 1 wetlands, particularly North Fork Wetlands 5 and 7. Aside from hydrologic benefits, these wetlands provide habitat for an unusually large number of wildlife species, including pileated woodpecker, deer, coyote, cutthroat trout, and black bear. The rapid development that characterizes the North Fork Issaquah Creek subbasin, poses a threat to these remarkable wetland resources.

Increasing development of this subbasin is likely to change its hydrology, changing the patterns that presently support valuable wetland habitats, provide flood storage capacity, and maintain water quality. Although development will unavoidably increase the impervious surfaces and decrease vegetation, these detrimental effects can be alleviated by a combination of corrective actions for off-site problems and an on-site strategy that minimizes detrimental impacts. Because development is expected to have a significant impact on the hydrologic systems in general, as well as on the wetlands, zoning decisions are of great concern in this subbasin.

LOWER ISSAQUAH CREEK SUBBASIN

The Lower Issaquah Creek subbasin covers 5,708 acres within and just upstream of the City of Issaquah in the narrow valley between Squak and Tiger Mountains (Figure 5-8). The City of Issaquah and its associated development dominate much of this subbasin, which has been severely altered by both natural processes and human activities over the last several decades. In Issaquah Creek's lower reaches, the most important of the natural processes are stream-channel migration and high levels of sedimentation and flooding. Historic and present development has exacerbated these conditions, and the subbasin is confronted by a future in which existing problems will worsen as streamflows increase.

The Lower Issaquah Creek subbasin experiences the most serious flood damage of any subbasin. Property losses from flooding are the most extensive in the Issaquah Creek basin. The worst damage occurs in the reach between NW Clark Street and NW Holly Street. Flooding of roads regularly occurs at NW Clark Street, Front Street S, and Gilman Boulevard. Culverts conveying streams underneath the Issaquah-Hobart Road often clog with sediment resulting in road closures and periodic maintenance. The stream channel adjacent to Front Street frequently overflows its right bank, flooding several homes. Residential, commercial, and public buildings from SE Sycamore Place to Gilman Boulevard are sandbagged during major storms to minimize flood damage. Pasture and yard flooding, as well as bank erosion, occur during major storms along Issaquah Creek from the confluence of McDonald Creek to SE Sycamore Place. If the entire basin were to build out to current zoning, but without mitigation, the 25-year peak flow at the mouth of Issaquah Creek is predicted to increase 21 percent from the current 3,478 cfs to 4,210 cfs. Such peak flows would cause corresponding increases in floodplain elevations, especially if current land uses continue to intensify adjacent to the creek.

The lowermost seven-mile-reach of Issaquah Creek, together with its local tributaries, include some of the most active channel conditions in the basin. Channel infilling, bank erosion, and channel migration are all active in portions of this subbasin. Infilling of the channel by sediment through the City of Issaquah is reducing flood capacity, a growing problem primarily because of the severe encroachment into the floodplain of Issaquah Creek by roads, houses, and commercial buildings.

Lateral tributaries flowing off Squak Mountain carry significant amounts of sediment into Issaquah Creek. In part, this is the result of headwater development with minimal or no detention. No Name and Nudist Park Creeks are major contributors to the sediment load to the valley of lower Issaquah Creek. Sediment originates in their headwaters where extensive, recent logging has induced erosion in steep channels. Problems of erosion and deposition in the steep tributaries, and migration and infilling of the mainstem, are largely driven by the magnitude of flows in the channel. Development-induced flow increases are likely to accelerate the rate of these processes without effective mitigation.

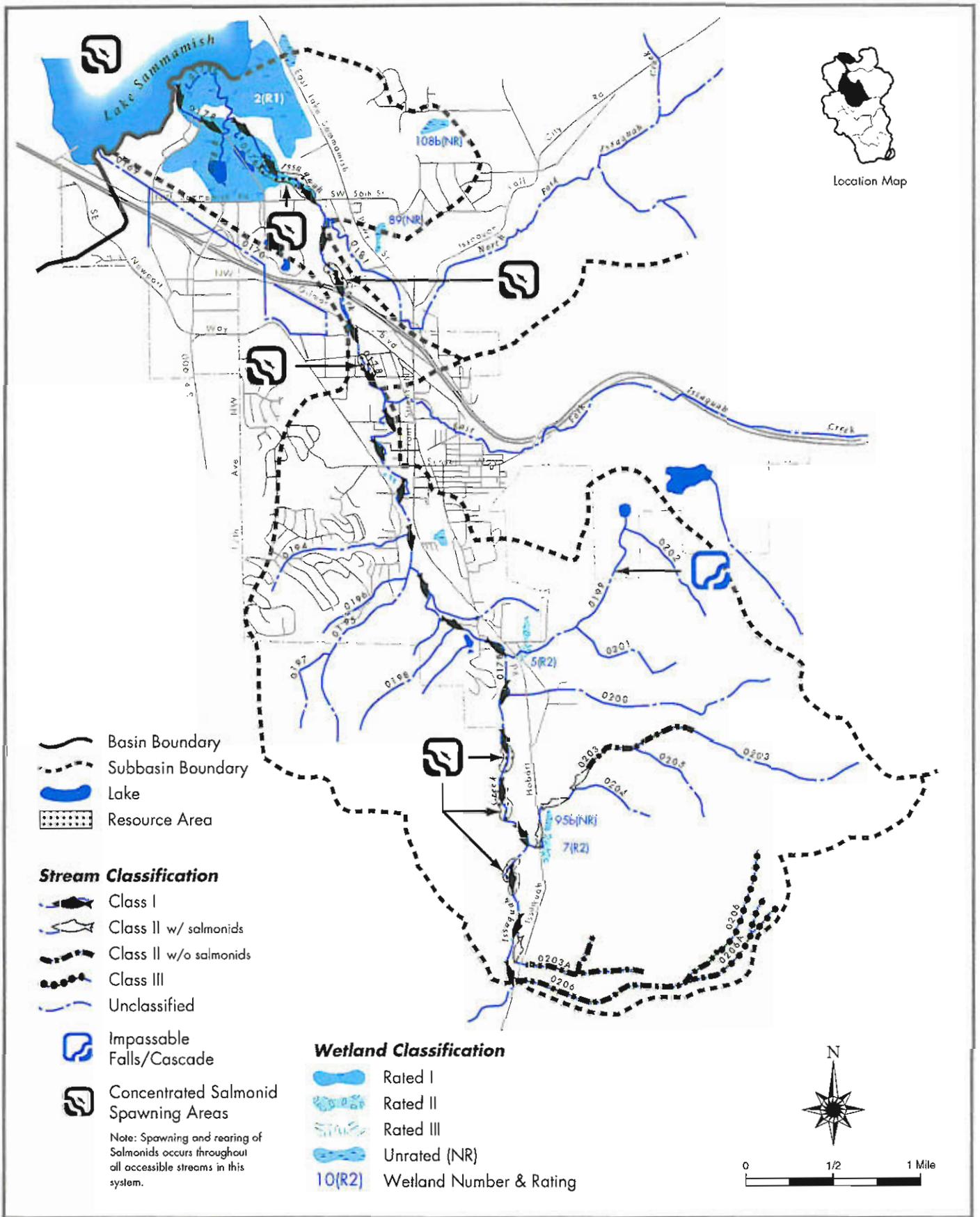
The section of the mainstem from its confluence with Lake Sammamish to SE 56th Street (RM 1.7) serves primarily as transport and rearing habitat for salmonids and provides spawning areas for bass, perch, and suckers from the lake. Throughout this reach, mean stream width is over 30 feet, and pools often exceed six feet in depth and 2,000 square feet in surface area. The streambed is mostly fine sand and silt. The stream flows over floodplain sediments of its own deposition. Operation of the State fish hatchery has also been affected by sediment loads. Coarse sediment descending Cabin Creek has contributed to partial clogging of the main hatchery water intake.

Upstream, toward SE 56th Street, the channel assumes a pool:riffle character excellent for spawning salmonids, as evidenced by the number and size of the redds (salmonid egg nests) and by the presence of juvenile chinook, coho, steelhead salmon, and adult resident cutthroat and rainbow trout. Residences line the banks above SE 56th Street and reduce the riparian habitat to less than 100 feet in most places. Habitat is sufficient for chinook, coho, and sockeye to be observed spawning throughout this reach. Upstream of Interstate 90 (RM 2.3), to about SE 96th Street, the creek flows through the main portion of the City of Issaquah. Lack of cover in this reach provides little habitat for fish or riparian-zone wildlife species.

TIBBETTS CREEK SUBBASIN

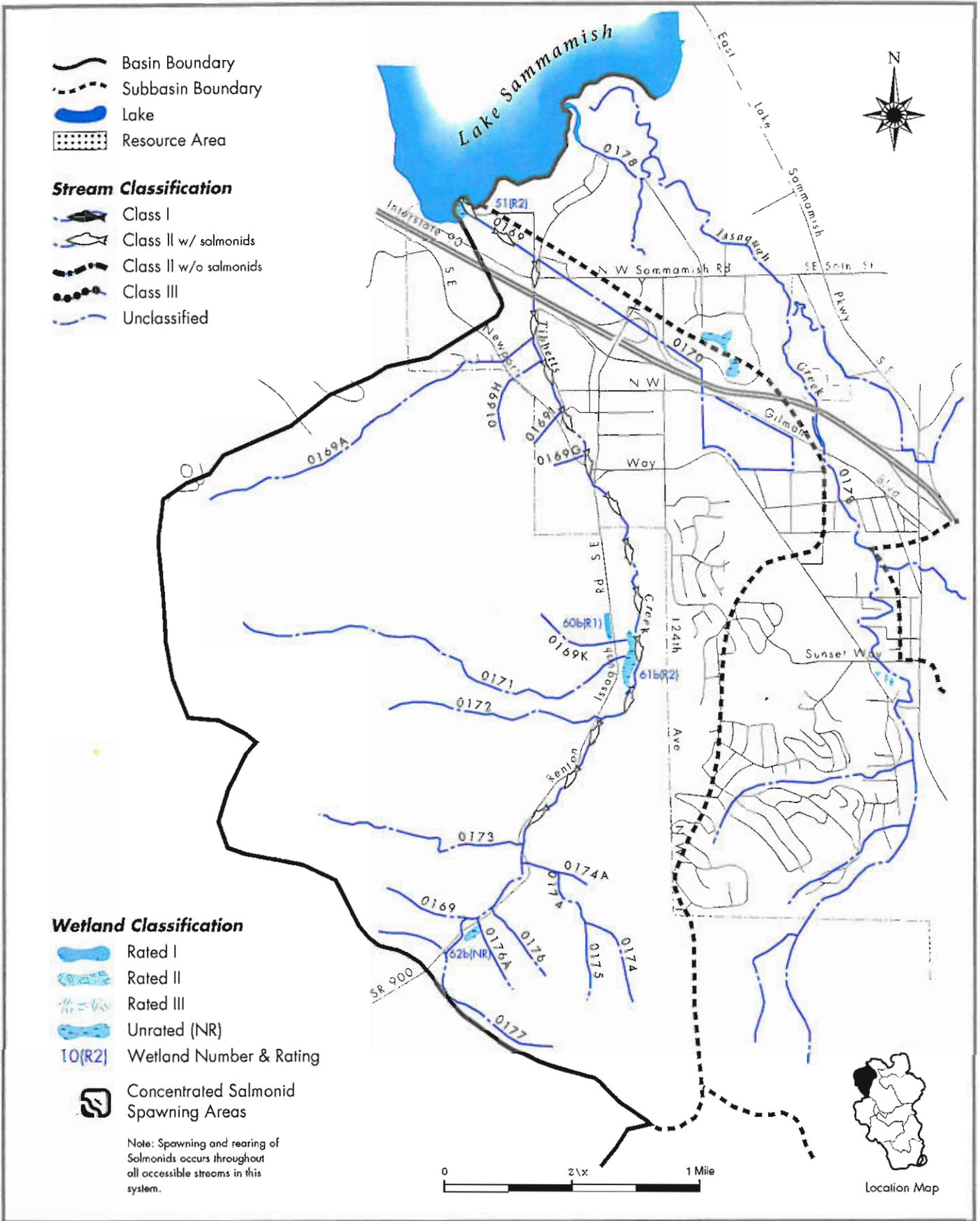
The Tibbetts Creek basin covers 3,640 acres (about 6 square miles) and is located west of downtown Issaquah (Figure 5-9). Tibbetts Creek begins in the steep uplands of Squak and Cougar Mountains, drops rapidly into the valley, and loses velocity where an alluvial fan has been deposited. The creek flows through the floodplain that it shares with Issaquah Creek and eventually discharges to Lake Sammamish. The gradient of the upper reaches results in a very energetic system with generally faster erosion and sediment transport rates than Issaquah Creek, resulting in relatively rapid sediment deposition in the lower valley.

Land use in the subbasin varies dramatically, from light industrial areas along the lower creek to mining at Sunset Quarry and agricultural and forestry uses: the forests comprising 80 percent of the subbasin. At maximum buildout under current zoning, rural land would be reduced to approximately 30 percent due to residential, commercial, and roadway construction. Without proper detention, this could result in a 43-percent increase in the 25-year peak flow, aggravating existing flooding problems and introducing flooding into previously flood-free areas. In addition to rising floodwater levels, the duration of flooding will also increase, as will severity of erosion and sedimentation.



LOWER ISSAQUAH CREEK SUBBASIN RESOURCES
 Issaquah Creek Basin

Figure 5-8



TIBBETTS CREEK SUBBASIN RESOURCES
 Issaquah Creek Basin

Figure
 5-9

In this subbasin, the sedimentation and flooding problems are interrelated. The lower reach is a zone of chronic, long-term, natural deposition. Were the channel unconfined, infilling of the channel would eventually result in shifting of the channel to a new location. However, development on this alluvial fan has now fixed the channel into its current location by a combination of culverts and channel armoring. As a result, the inevitable deposition is localized within the immediate zone of the channel.

Because major channel shifts are no longer possible, sedimentation controls must be implemented. Dredging or sedimentation ponds address some degree of the problems directly but are expensive, environmentally damaging, and require perpetual maintenance. Reduction of the sediment input into the main channel provides a partial solution to the problem.

Current habitat throughout the drainage ranges from fair to very poor. Reduced stream-channel stability and increased substrate mobilization caused by mining activities and logging operations have dramatically affected habitat. In the upper watershed, forestry, mining, hobby farming, eroding banks, lack of streamside vegetation, and loss of instream habitat complexity have had severe impacts on habitat. At RM 1.4, where the creek flows onto the historic alluvial plain formed by Tibbetts and Issaquah Creeks, local floodplain development and stream channelization have greatly reduced habitat complexity and severely lowered salmonid productivity.

Although Tibbetts Creek is classified as Class AA (extraordinary) or Class A (excellent) by the Department of Ecology, the waters rarely meet these standards, particularly during storms. Beneficial uses are affected by sediment, animal feces, and phosphorus. Total phosphorus loads to Lake Sammamish are predicted to increase by 155 percent, the second highest rate in the basin. Two significant sources of pollutants are Kelly's Stable, where pastures are overstocked and contribute runoff laden with nutrients, bacteria, and sediment; and Sunset Quarry, where stormwater and sediment control ponds have failed repeatedly. In addition, an earthslide on the Interpace mining property contributes sediment to the stream.



Chapter 6

Plan Development and Implementation

Development of the Plan

Status of Implementation

Project Financing

Chapter 6: Plan Development and Implementation

DEVELOPMENT OF THE PLAN

The Issaquah Creek Basin and Nonpoint Action Plan was the work of a planning team, two committees, and the general public. The planning team was staffed by King County Surface Water Management (SWM) and City of Issaquah employees. The team worked under the overall direction of the King County SWM Division and City of Issaquah management and the elected councils of both jurisdictions. The role of the planning team was to conduct all technical analyses and evaluations required in the planning process, develop recommendations, convene and oversee the work of the advisory committees, and produce the draft and final plans. The team also ensured that the process for plan development followed the requirements of the Nonpoint Rule (Chapter 400-12 WAC) and that the plan was consistent with other pertinent regulations, such as Section 319 of the Federal Clean Water Act.

Two committees were formed to participate in the development of the basin and nonpoint action plan. The Watershed Management Committee (WMC) was composed of representatives of King County SWM, the City of Issaquah, the Washington Department of Natural Resources, the Muckleshoot Indian Tribe, and the King Conservation District. The WMC was established as a steering committee under State of Washington regulations governing the nonpoint action planning process (Chapter 400-12 WAC) and functioned as the principal decision-making body for policy issues in the basin and nonpoint action plan. The Basin Advisory Team (BAT) was composed of residents of the Issaquah basin. The BAT functioned as the principal advisor to the planning team and WMC on major issues in the planning process and as liaison to other community groups and the general public.

The public participated in the planning process in several ways. First, the public was involved in committee meetings and presentations to the City and County Council. Second, volunteer activities were conducted in the Issaquah basin since the beginning of the planning process, including storm drain stenciling, stream cleanups, and corridor revegetation projects. A third opportunity to participate was through review of drafts of this plan, and through public meetings and hearings associated with this process.

SEPA REVIEW

The *Issaquah Creek Basin and Nonpoint Action Plan* was subjected to environmental review and the threshold determination process as required under RCW 43.21C of the SEPA process. After review of a completed environmental checklist, and other relevant information, the lead agency (King County Department of Public Works, Surface Water Management) issued a Determination of Nonsignificance under WAC 197-11-340(2). Individual capital improvement projects (CIPs) are initiating SEPA determinations when the CIPs go to the design phase of plan implementation. Chapter 4 of *Appendix to the Watershed Management Committee - Proposed Issaquah Creek Basin and Nonpoint Action Plan* (1994) contains the environmental checklist and threshold determination.

STATUS OF IMPLEMENTATION

The actions recommended in this plan vary in when and how they will be implemented. Certain actions, such as changes in Issaquah or King County codes and regulations, were initiated as soon as the plan was adopted by the City (October 1995) and County (July 1995) Councils. Table 3 identifies the current status of each of the recommendations. At the end of 1996, of the 33 BW recommendations, 16 recommendations are in service, and six are in the process of being developed.

Most capital improvement projects recommended as high priorities in the plan are being constructed between 1995 and 1998, as design and permitting tasks are completed. Five projects have been completed, and in 1996, 18 are being designed or are under construction (see Table 1, Chapter 4). Approximately \$3 million was allocated to fund these projects. The City of Issaquah is working on a program to reduce flood damage and restore the lower floodplain of Issaquah Creek. Up to \$2.3 million will be funded in 1997/98 by the City of Issaquah. It is hoped the program will be operational within three years. The implementation of other programmatic recommendations, such as proposals for educational programs, are occurring as staff and budgets allow, concentrating on the highest priority programs. The City of Issaquah hired a water resources engineer to implement the basin plan recommendations.

Citizens and landowners throughout the basin and more than 20 agencies and organizations (See Chapter 1 Executive Summary) have a role in implementing the plan. The agencies responsible for basin recommendations and the status of each are listed in Table 3. The implementation status of Capital Improvement Projects are listed in Chapter 4 - Table 1. Reports will provide an assessment process to document the status and needed changes to the recommendations in the *Issaquah Creek Basin and Nonpoint Action Plan*.

Table 3

IMPLEMENTATION STATUS OF PLAN RECOMMENDATIONS

Plan Adopted By: King County - July 10, 1995
 City Of Issaquah - October 4, 1995

Number	Recommendation	Priority ¹	Status (1996) ²	Implementation Comments
BW 1	Flow Reduction R/D Standards	M	IS	DDES, DM
BW 2	Erosion Protection R/D Standards	H	IS	DDES, DM
BW 3	Open Space	H	IS	DDES, DM
BW 4	Temporary Erosion Sediment Control Program	H	IS	DDES Inspector
BW 5	Issaquah Critical Area Ordinance	H	IS	Adopted 1995 - City of Issaquah
BW 6	Zoning Changes	L	IS	RA-5 went to RA-10, SC went to RA-5
BW 7	Floodplain Restoration	H	IP	City of Issaquah applied for \$1.5 million FEMA funding
BW 8	Floodproofing and Elevation	L	I	City of Issaquah pursuing flood audit
BW 9	Floodplain mapping	H	IS	
BW 10	Flood Warning System	H	IP	City of Issaquah
BW 12	Culvert Design Criteria	M	I	
BW 13	Urban Water Quality (WQ)	M	IS	Basin Steward, Lake Sammamish Initiative
BW 14	Septic Systems	L	I	
BW 15	Farm Water Quality	M	IS	Countywide livestock ordinance, KCD
BW 16	Forest Practices	H	IP	
BW 17	WQ from Road Drainage	M	I	
BW 18	Hazardous Spill Resource	M	I	
BW 19	WQ Treatment Design Strds.	H	IS	DDES, DM
BW 20	Other WQ	L	IS	SWM, DDES
BW 21	Significant Resource Areas	H	IS	DDES, DM
BW 22	Habitat Restoration	H	IS	SWM
BW 23	Bank Stabilization	M	IP	Demonstration Projects constructed in 1995
BW 24	Fish Management Task Force	M	IS	SWM taking the lead
BW 26	Wetland Inventory	L	I	
BW 27	Mitigation Banking	M	IP	Countywide program
BW 28	Channel Migration	L	I	
BW 29	Basin Steward	H	IS	SWM
BW 30	Monitoring	M	IP	First year in 1995
BW 31	Enforcement	M	IS	DDES, TESC Program, SWM
BW 33	Guidelines for Site Design	L	I	

¹ Priorities set by points as described in the *Appendix to the Issaquah Creek Basin and Nonpoint Action Plan*, H = A, M = B, L = C

² Key to Abbreviations:

- IP = Development of program in progress
- DM = Drainage manual
- KCD = King Conservation District
- DDES = Department of Development and Environmental Services
- IS = In service program/regulation
- I = Inactive

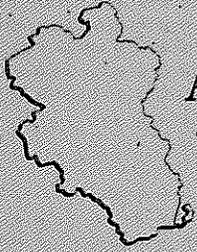
Table 3 (continued)

Subbasin Regulations

Number	Recommendation	Status (1996)	Implementation Comments
UI 1	Basinwide Regulations to Upper Issaquah Subbasin	IS	BW6, BW3, BW2
UI 2	Standards and Performance Goals for New Subdivisions and Segregations	IS	DDES
UI 3	Purchase of Property and Transfer of Development Credits	IP	King County Council has approved funding in 1997 Budget
UI 4	Riparian Buffers on Forest Land	I	
FM 1	Basinwide Regulations to Fifteen Mile Creek Subbasin	IS	BW3
MI 1	Basinwide Regulations to Middle Issaquah Subbasin	IS	BW2, BW3
MI 2	Mirrormont Drainage Study	I	
MD 1	Basinwide Regulations to McDonald Creek Subbasin	IS	BW6, BW3, BW2
MD 2	Floodproofing and Elevation	I	
MD 3	High Valley Drainage Study	I	
EF 1	Basinwide regulations to East Fork Issaquah Subbasin	IS	BW3
EF 2	Factors for Evaluation of MPD	IS	DDES, City of Issaquah
EF 3	Channel and Floodplain Restoration	I	
EF 4	Floodproofing and Elevation	I	
EF 5	Retrofitting of I-90 Stormwater Drainage System	I	
NF 1	Basinwide Regulations to North Fork Issaquah Subbasin	IS	BW3
NF 2	Factors for Evaluation of MPD	IS	DDES, City of Issaquah
NF 3	Wetland Management Area	IS	DDES, SWM
NF 4	Channel and Floodplain Restoration	I	
NF 5	Floodproofing and Elevation	I	
LI 1	Basinwide Regulations to Lower Issaquah Subbasin	IS	BW3
LI 2	Channel and Floodplain Restoration	IP	BW7
LI 3	Floodproofing and Elevation	IP	BW8
LI 4	Management of Issaquah Hatchery	IS	BW24
T 1	Basinwide Regulations to Tibbetts Creek Subbasin	IS	BW 3
T 2	Site Development Requirements	I	City of Issaquah Annexation Area
T 3	Channel and Floodplain Restoration	IP	
T 4	Floodproofing and Elevation	I	
T 5	Sunset Quarry Water Quality Restoration	I	Mine Currently Closed
T 6	Newcastle Pit Stormwater Management	IP	DDES, SWM
T 7	Harris/Interpace Mine Stormwater Management	IP	DDES, SWM

PROJECT FINANCING

The regulatory, programmatic, and capital improvement programs necessary in order to control current and future impacts will have substantial public and private costs. Public costs are estimated at \$857,000 for the first year and \$450,000 to keep ongoing programs. A total of \$4.9 million has been requested for the "core" capital projects. Three million dollars has been funded by the SWM Division service charge and \$2.3 million from the City of Issaquah and FEMA funding. Other implementing agencies should propose funding increases in their future budgets, but approval of these increased budgets, and thus the implementation schedule for these recommendations, remains to be determined. Some recommendations, for which funding is not available or anticipated, will become part of an "unfinished agenda" for the future.



Appendix A

Nonpoint Water Pollution

Introduction

Beneficial Uses

Nonpoint-source Pollution Problems

Water Quality Assessment

Future Water Quality Conditions

Goals and Objectives

Appendix A: Nonpoint Water Pollution

INTRODUCTION

This appendix summarizes nonpoint pollution problems in the Issaquah Creek basin and overviews specific goals and objectives for controlling these sources. The problem definition, and goals and objectives were developed by the Issaquah/East Lake Sammamish WMC with staff support from the lead agency, King County SWM Division, the City of Issaquah, the King County Resource Planning Section, and the Seattle-King County Department of Public Health in accordance with the watershed planning process defined by the state of Washington (400-12 WAC). A citizen-based Basin Advisory Team and a technical advisory committee also participated in this process. A complete discussion of this topic can be found in Chapter 6 of the WMC-Proposed *Issaquah Creek Basin and Nonpoint Action Plan* dated September 1994.

Nonpoint source pollution is defined as pollution not originating from a specific point such as a pipe, ditch, or other discrete conveyance. Instead, nonpoint source pollution originates from diffuse sources that enter surface waters and, in combination with point sources, degrade water quality. The difficulty in identifying, isolating, and if necessary, treating or eliminating nonpoint pollution sources adds to the complexity of managing these sources. Solutions focused on source control hold the most promise for addressing nonpoint source pollution problems.

Point Source pollution originates from a defined source such as a pipe, and can be traced to a particular site, business, or activity. Point source pollution can therefore be treated or controlled directly at the source. There are several point sources in the Issaquah basin, including Lakeside Sand and Gravel, Consolidated Dairy Products, the Issaquah fish hatchery, and Sunset Quarry, all of which have NPDES permits for surface water discharges.

BENEFICIAL USES

One of the main objectives of the basin and nonpoint action plan is to protect the resources and beneficial uses of the Issaquah basin. The two criteria primarily used to identify resource degradation are beneficial use impairment and exceedence of water quality standards. For the Issaquah and Tibbetts Creek basins, beneficial uses fall into five main categories: water supply, fisheries and wildlife, recreation, wetlands, and aesthetics. Fisheries and wildlife beneficial uses in the basin are described in detail in Chapter 8 of the *Current/Future Conditions & Source Identification Report* for the Issaquah basin. A discussion of the beneficial uses of wetlands and their role in water quality can be found in Chapter 10 of the same report. The remaining beneficial uses found in the basin are discussed below.

Two water districts (Sammamish Plateau Sewer and Water District, King County Water District 90) and the City of Issaquah serve parts of the Issaquah basin. Other small water supply groups such as Mirrormont Service serve consolidated residential areas on the southern end of the basin. The remaining water supply for basin residents is obtained through private residential wells. The source of all water for all of these users originates exclusively from groundwater aquifers in the basin.

The streams and lakes in or along the Issaquah and Tippetts Creek basins provide for many recreational uses. These uses include swimming, wading, water skiing, and skin or scuba diving (primarily contact) and hiking, fishing, and boating (secondary contact). The mouths of both Tippetts and Issaquah creek are located in an extensive State park system at the south end of Lake Sammamish. The lake, which is the receiving water body for both basins, is used almost exclusively for recreation.

NONPOINT-SOURCE POLLUTION PROBLEMS

This source assessment is summarized from the *Issaquah Creek Basin Current/Future Conditions and Source Identification Report* (King County, 1991). Potential sources of nonpoint pollution in the Issaquah and Tippetts Creek basins include urbanization (e.g., construction and stormwater runoff), on-site septic systems, agriculture (commercial and small farms), pesticide/fertilizer applications, forestry operations, landfills, sand and gravel mining, hazardous wastes, underground storage tanks, and boating.

Development, Urbanization, and Stormwater Runoff. The conversion of forest land to residential developments and the conversion of non-forested lowland into commercial land use are the most common land use changes presently occurring in the basin. Stormwater runoff represents both a quantity and quality problem in urban areas where land use has been converted from primarily forested and open space land use to impervious surfaces in residential, commercial and industrial areas. High streamflows associated with urbanization and large impervious surfaces result in streambed scouring, erosion, and degradation of spawning and rearing habitat for fish.

Typical pollutants found in surface water runoff in urbanized watersheds include solids, nutrients, bacteria, oxygen demanding materials, heavy metals, petroleum hydrocarbons, and synthetic organics. During the development phase of a watershed, construction activity typically results in increased sedimentation and nutrient release from bare soil. In heavily urbanized areas, pets usually replace farm animals as a source of fecal pathogens.

One interstate (I-90), two State roads (SR 900 and SR 18), and one major County road (Issaquah-Hobart Road) are located in the basin. In many places where streams and roads cross, untreated road runoff is discharged directly to the streams. Petroleum products and by-products, heavy metals, and sediments are the common pollutants contained in this runoff.

Urban watersheds are also characterized by many types of impervious surfaces, including rooftops, driveways, buildings, sidewalks, parking lots, and highways. Sediment and a variety of accumulated chemicals tend to build up on these surfaces. These pollutants are washed off into storm drains and/or directly tend to build up on these surfaces. Surface runoff, then, becomes the principal method by which pollutants are transported to streams and lakes. Atmospheric deposition of dust, volatilized hydrocarbons, and a variety of other airborne pollutants also contribute to degraded water quality.

Onsite Septic Systems. A typical on-site sewage disposal system consists of a septic tank and drainfield. The system provides initial treatment of liquid borne wastes and settling of solids before purification occurs in native soils. If adequately maintained, on site septic systems are designed to serve the wastewater treatment needs of a building/facility for the life of the structure. The identification of on-site sewage disposal systems as a nonpoint source of pollution to groundwater and surface waters can generally be attributed to failing systems.

The Issaquah and Tibbetts Creek basins are currently served by two sewer and water districts. The North Fork subbasin is served by Sammamish Plateau Sewer and Water District. The East Fork, Issaquah Creek, and Tibbetts Creek subbasins are served by the Issaquah Sewer District. The remainder of the basin has approximately 2000 households using on-site sewage disposal systems.

The status of on-site sewage disposal systems was reviewed and analyzed by the Health Department. The review included examination of past surveys, a record review, and a 1990 field survey of 192 septic systems. Based on file reviews of 1432 systems, the Health Department estimated a failure rate for the basin to be 5.5 percent (Anderberg, 1991). This failure rate is slightly higher than the 3-5 percent failure rate for the entire Puget Sound area (PSWQA, 1989a). The field survey revealed an overall 9 percent failure rate and a 5 percent prefailure rate. The combined failure rate for file and field failures is 5.7 percent.

Agricultural Nonpoint Sources. Agricultural activities potentially resulting in nonpoint pollution can be divided into two main groups: animal keeping and crop production. These range from large, commercial ventures to small-acreage farms. Sediment, nutrients, bacteria, organic material, and pesticides are the typical pollutants associated with farming activities. Improper pasture management (too many animals and overgrazing), lack of sacrifice (confinement) areas, unlimited animal access to streams, and excessive numbers of waterfowl on ponds are common problems. Other agricultural practices or sources are improperly managed row cropping, inadequate waste storage facilities, improper soil tillage, and improper timing and application of animal manure, fertilizers, and pesticides.

In a recent King Conservation District (KCD) survey of the agricultural activity in the Lake Sammamish basin (which included East Lake Sammamish, East Fork Issaquah Creek, Issaquah Creek, and Tibbetts Creek) nearly 100 percent of the farming practices were characterized as consisting of small commercial operators and the "hobby farmer" (Minton and Fitch, 1988). In the KCD survey, only 10 to 20 percent of the pasture land being used by animals was considered adequately protected to

reduce off-site impacts. Overstocking was the most commonly noted problem. Animal estimates for Issaquah and Tibbetts Creek drainage basins were combined with field surveys conducted by SWM division staff and are approximated as follows: 750 horses, 500 cattle, 300-400 goats, and 25-50 llamas. These livestock generate approximately 80,000 lbs/day of manure (15,000 tons/year).

During field reconnaissance, many small farms throughout the basin were noted as having denuded pastures, overgrazed pastures, lack of adequate pasture size or overstocked pastures, and improper facilities for animal waste storage. Although the size of non-commercial farm operations were typically small compared to those of larger commercial farms, the observed frequency of degraded pasture conditions on small farms points to the significant pollutant contribution non-commercial farms cumulatively have to surface waters in the basin.

The agricultural trend in this basin has been towards smaller land ownership, which in turn has resulted in higher animal densities on smaller acreage. The basin's streams provide a convenient and inexpensive source of water for livestock and other farm animals. In some areas, unrestricted animal access to streams is provided by the farmer who is probably unaware of the impact that this has on downstream water quality.

Pesticides. The use of pesticides on agricultural lands, for roadside maintenance, and by individual homeowners presents a potential nonpoint pollution source in the Issaquah and Tibbetts Creek basins. The usage of pesticides in the basin, however, is not well documented. Nevertheless, the potential for groundwater contamination from chemical residuals and surface water contamination from over sprays and over application is a concern relative to the long-term protection of these resources.

King County Roads Division operates a roadside herbicide spraying program within the basin boundary. Herbicides applied in 1989 included Simazine, Atrazine, and Diuron. In 1990, herbicide applied in the area included approximately 50 pounds of Diuron and Atrazine, and less than five gallons each of Glyphosate and Dicamba (Anderberg, 1991). These herbicides were sprayed over approximately 240 miles of roadside within the study area. The amount of applied herbicide residual has steadily decreased in the last several years as a result of better application methods, including dilution and decreased application volumes (SKCDPH, 1989). Washington State Department of Transportation (WSDOT) is responsible for chemicals applied to those sections of 1-90, SR 900, and SR 18 that are within the basin. In 1990, WSDOT applied a variety of chemicals including Fosamine Ammonium, Glysphosate, Dicambia, Triclopyr, Diuron, and Diquat over 12 miles of highway within the Issaquah and Tibbetts Creek basin areas.

The Washington State Department of Agriculture reports that although accurate use figures are not available, the majority of pesticide and herbicide use within the Issaquah basin is through household applications. When properly applied, this type of application should not pose a threat to water quality (Wick, 1990). The apparent limited application through agricultural and road-side spraying does not appear to pose a significant threat to water quality at this time (Anderberg, 1991).

Forestry. Forest practices associated with the growing and harvesting of timber can contribute to nonpoint pollution. Logging road construction, maintenance, and accompanying vehicular traffic are commonly the dominant activities influencing accelerated erosion and sediment (Swanson, 1988). These activities alter the timing and volume of runoff, and expose large areas of soil type, and topography (Geppert, 1984). Timber harvesting also has a tremendous effect on water movement, which directly affects water quality. Elevated quantities of sediment and runoff are produced during storm events leading to alteration of stream channel morphology. These trends will be magnified when forested land is developed into other land uses, resulting in complete clearcutting, with removal of understory and stumps.

The 61 square miles of the Issaquah and Tibbetts Creek basins are forested primarily with native tree species including Douglas fir, western hemlock, red alder, western red cedar, and big leaf maple. At the present time, 22.5 square miles (35 percent of the basin) are used for commercial industry. Washington State Department of Natural Resources (DNR) manages Tiger Mountain State Forest, a 15-square mile tract within the watershed, and Weyerhaeuser operates a tree farm on 2 square miles within the watershed.

In 1984, the State of Washington adopted a sustainable harvest base that uses a 60-year rotation limiting clearcuts (0 to 10 year age class) to 16 percent or less in each of the four forest drainages (DNR, 1986). At present, 125 acres are scheduled to be harvested annually, amounting to 1250 acres per decade for all mainstem creeks.

The Issaquah subbasin had four times as many Forest Practice Applications (FPA) as the other subbasins combined. For the Tibbetts and Issaquah Creek subbasins, conversions were only a quarter of all the FPAs. Most logging did not occur on slopes considered sensitive (over 40 percent steepness). Complete clearcuts were uncommon; most sites were cut between 60 and 80 percent.

A large percentage of the watershed (27 percent) is committed to long-term forest rotations, which allow sites to recover from forest practices. Forestry activities, including harvesting, generally have less impact than other active land uses, such as mineral extraction, agriculture, and residential development. However, nonpoint water quality problems have been documented for Class II and III forest practices, as well as for Class IV conversions. The data analysis and field review show that logging into sensitive areas is no more likely to occur for land conversions than for forest practices on land committed to forestry.

Landfills. Landfills are potential sources of nonpoint pollution. Major earth moving activities are a part of the day-to-day operations of a landfill. Inadequate erosion and sedimentation control can result in excessive quantities of sediments being entrained in storm water. Improper management of landfill leachate can also be lead to nonpoint pollution. Additionally, leachate that is not collected, treated, and disposed of properly can result in surface water contamination.

The Cedar Hills Landfill, the regional municipal solid waste landfill for King County, operates on a 920 acre site approximately 4 miles south of the City of Issaquah. At Cedar Hills, there is an extensive leachate collection and pretreatment system. The leachate is conveyed to two aerated lagoons where it is treated for organic waste strength and solids reduction prior to being discharged into the Metro sewage collection system. Cedar Hills is divided into two separate surface water drainage basins. The northern half of the site is located in the Issaquah Creek basin and the southern half is included in the Cedar River basin. There are five waste disposal areas at Cedar Hills that are located in the Issaquah Creek basin.

Resource Extraction. Gravel mining is the leading form of mineral extraction in Washington State and occurs primarily west of the Cascades (WDOE, 1988). Sediment is the most common pollutant associated with gravel mining. During the extraction process, large areas of rock and soil are mined and sorted according to size. Fine silts and sands that result from this separation process are then washed into streams or into the drainage system during storm events, producing significant amounts of surface water runoff. Downstream, these silts and sands are deposited into the large pores found in gravel beds, often resulting in the "cementing" of salmon spawning beds and other aquatic habitat.

In the Tibbetts and Issaquah Creek basins, there are four active mining operations: Sunset Quarry, Lakeside Sand and Gravel, Mutual Materials mine pit, and the Interpace Mine. Sunset Quarry, located on Squak Mountain along tributary 0169, is a major source of silt, sand, and sediment to Tibbetts Creek. The ongoing problems with runoff discharges from Sunset Quarry to Tibbetts Creek (and May Creek) have resulted in substantial water quality and habitat degradation.

Small Quantity Hazardous Waste Generators. Small quantity hazardous waste generators (SQHWG) were investigated by the Health Department as a potential source of nonpoint pollution in the basin. The increased use of chemicals in the home and in small businesses has resulted in growing amounts of leftover wastes. Auto service and repair shops, print shops, dry cleaners, beauty salons, medical facilities, and school shops are some of the businesses that are potential SQHWG in the basin. Because this emerging problem may have a serious impact on ground water and surface water supplies, it must be considered as a potential threat within the basin (Anderberg, 1991).

Currently, there is no accurate estimate of the amount of hazardous waste disposal in the Issaquah and Tibbetts Creek basins. The disposal of household hazardous wastes poses a current threat to water quality and will increase with population growth in the basin (Anderberg, 1991).

Underground Storage Tanks. Underground storage tanks (USTs) were investigated by the Health Department as a potential source of nonpoint pollution in the basin. USTs are used for the storage of petroleum and other regulated substances and pose a threat to public health through potential pollution of groundwater aquifers. Because the majority of the population in the Issaquah basin is dependent on groundwater as a drinking water source, serious consideration should be given to the condition of USTs in the basin. Tank leakage may be caused

by deterioration of the tank, improper installation, pipe failures, and/or spill and overfills.

The Department of Ecology has identified and registered 123 USTs in the basin. This list is not all-inclusive, but does include the majority of underground tanks in the area. Exempt from WDOE registration are the thousands of underground heating oil storage tanks not covered by WDOE's UST regulations. Many of the USTs are in the 6-20 year age bracket, with 43 percent of those 11 to 20 years old. Eleven percent of the tanks are more than 30 years old. Based on size classification, 25 percent of the tanks fall within the range of 10,000 to 20,000 gallons. Additionally, leaded, unleaded, and diesel fuel account for 77 percent of the compounds stored in the USTs in the Issaquah basin.

Single walled, bare steel tanks without corrosion protection, particularly those that have been in the ground over 15 years, are the most vulnerable to leakage. A recent WDOE survey of USTs in the Issaquah area indicates that of the 75 USTs older than 15 years and of known tank material, 57 (76 percent) are steel tanks. Twenty two (39 percent) of those steel tanks are further documented as single wall tanks. USTs without special leak containment or leak detection systems represent a potential for surface water and groundwater contamination. The WDOE has found that 37 percent of the listed USTs in the Issaquah basin do not have leak detection systems. Deterioration of the tank, improper installation, pipe failures, spills and overfills may all contribute to tank leakage.

Although it is clear that USTs may represent a severe threat to groundwater in the region, it is less clear that they represent a significant threat to surface water quality. The extent of the problem depends on the types of contaminants that are leaked, the migration patterns of the groundwater, and the sensitivity of the resources. USTs found in close proximity to surface water features could pose a significant threat to water quality. Within the Issaquah basin, the USTs are concentrated in the business center of Issaquah. Tibbetts Creek, and the North and East Forks of Issaquah Creek flow through the City of Issaquah are therefore the surface waters most susceptible to contamination.

Boating and Marinas. Recreational boating and associated facilities, (e.g. marinas, launching/access sites) can contribute pollutants to lake systems. The most common concern associated with boating activities is the discharge of untreated or partially treated human waste (PSWQA, 1989b). Other nonpoint contaminants from marinas and recreational boating activities include: oils and greases, petroleum hydrocarbons; detergents; solvents; paints; antifouling agents (e.g., tributyltin [TBT], which is highly toxic to aquatic life); and litter (particularly plastics and styrofoam).

There are presently no marinas in the Issaquah basin. Lake Sammamish State Park, near the south end of the basin, is the only boating facility in the vicinity listed in the publication "Public Boating Facilities in Washington State" (1988). Currently, nonpoint pollution originating from boating activities is probably minimal as compared to other land use practices and activities in the basin. However, marina and boating related nonpoint pollution may pose a future problem in the basins as usage of the area lakes for recreation increases.

WATER QUALITY ASSESSMENT

In addition to identifying the potential range of nonpoint problems in the basins, significant water quality problems were also identified in the Issaquah and Tibbetts basins using historical data, baseflow data (non storm), storm water quality sampling results (1989-1990), and field surveys. Additional information is available from the Issaquah hatchery, which has been collecting influent water samples from Issaquah Creek as part of the NPDES wastewater discharge permit process. Comparison of water quality results were made using Washington State water quality standards for Class AA (Extraordinary) and A (Excellent) waterbodies (Chapter 173 201 WAC), EPA water quality criteria, and State Board of Health Drinking Water Regulations. A brief discussion of these standards is presented here.

Water Quality Standards. The water quality standards for the state of Washington are defined in Chapter 173-201 WAC. All waters in the Issaquah Creek and Tibbetts Creek basins are classified as Class AA (Extraordinary) or Class A (Excellent). State water quality criteria (WDOE, 1988a) are defined for fecal coliforms, dissolved oxygen, temperature, pH, and turbidity. Other water quality variables, such as phosphorus and nitrogen, do not have State water quality criteria established.

Water Quality Monitoring. As part of their 1989-1990 Freshwater Assessment Program, water quality conditions during baseflow were monitored at two sites on the mainstem of Issaquah Creek: one site on the North Fork Issaquah Creek, and one site on Tibbetts Creek (Metro, 1990). Since 1987, Metro has also conducted a limited wet weather sampling program that includes ten river and stream sites throughout the county, one of which is Issaquah Creek.

Water quality variables routinely monitored in Metro's program (streams) include temperature, pH, conductivity, turbidity, total suspended solids, alkalinity, ammonia, dissolved oxygen, nitrate+nitrite nitrogen, ortho phosphate, total phosphorus, cadmium, chromium, copper, iron, mercury, nickel, lead, zinc, fecal coliform, and enterococcus bacteria.

Fecal coliform and enterococcus geometric means were calculated for five stream locations. Generally, it was found that fecal coliform standards are exceeded in the basin during baseflow conditions. For enterococcus, all geometric means - except the wet season means for Tibbetts Creek and Issaquah Creek above the fish hatchery - exceeded the steady state geometric mean indicator density of 33 organisms per 100mL. The frequency of enterococcus standard exceedence is typical of slightly urbanized basins but does not necessarily indicate nonpoint pollutants due to sources such as failing septic systems.

The conditions study included the evaluation of baseflow total metal concentrations. Copper, chromium, iron, nickel and zinc concentrations were all below their respective toxic criteria (using an estimated hardness value of 100 mg CaCO₃/L). Cadmium, mercury, and lead concentrations were all less than their respective detection limits of 0.002, 0.0002, and 0.03 mg/L. Baseflow metal concentrations do not appear to represent a current threat to water quality.

Nutrients such as nitrogen and phosphorus do not have specific State or federal standards but are used as indicators of water quality problems. To reduce algae growth and maintain water clarity, total phosphates (TP) as phosphorous (P) should not exceed 50 ug/L in any stream at the point where it enters any lake reservoir (EPA, 1986). Baseflow yearly mean TP concentration exceeded this guideline at Tibbetts Creek only.

Four indicator parameters (fecal coliform, temperature, dissolved oxygen, and turbidity) were chosen by Metro to evaluate water quality for contact recreation, salmonid rearing, and general instream disturbances or impacts (Metro, 1990). During the 1988-1989 monitoring season, fecal coliform counts exceeded water quality standards four and six times out of 12 samples for sites 0631, (mainstem at SE 56th Street) and A632 (North Fork), respectively.

Exceedence of water quality standards for dissolved oxygen, temperature and fecal coliforms has occurred on Tibbetts Creek. General baseflow water quality is characterized by variable turbidity with high levels in the late winter and summer periods, high fecal coliform counts, wide temperature range, and a lower dissolved oxygen content than characterized by Class AA waters. Specifically, during the 1988-1989 monitoring season, fecal coliform counts were exceptionally high during November, May, and June and exceeded water quality criteria seven of 12 times. Dissolved oxygen similarly failed to meet State water quality criteria five of 12 times.

Tibbetts Creek water quality continually fails to meet Class AA standards and has failed to meet such standards throughout the Metro freshwater monitoring program. Metro, in their 1988-1989 Status Report (Metro, 1990) characterized Tibbetts Creek water quality as "fair." Under WAC 173-201 070, Tibbetts Creek is classified as Class AA because all feeder streams to lakes are classified as Class AA unless specifically identified in WAC 173-201 080. Issaquah Creek is one such stream that is specifically classified as Class A (considered "very good" in the 1990 Metro report). It usually has better overall water quality and rating than Tibbetts Creek.

Previous storm data collected by Metro beginning in 1987 for Issaquah Creek (one site) were of limited value for basinwide water quality assessment. Subsequently, storm water quality samples were collected by Metro from five locations in the Issaquah basin during five storm events during 1989-1990. Average suspended solids, fecal coliform, nitrate+nitrite nitrogen, and total phosphorus values were measured at the five sampling sites. Total suspended solids concentration was 12 and 17 times higher during storm events at stations 0631 and 0633, respectively. Generally, where data were available for comparing storm and baseflows, storm pollutant concentrations were higher than baseflow concentrations.

Fecal coliform concentrations during storm events exceeded water quality standards at all five sites. At McDonald Creek, average storm fecal coliform concentration (as a geometric mean) was 1535 organism/100 mL, which exceeds water quality criteria by a factor of 15. Average nitrate+nitrite nitrogen concentrations at Tibbetts Creek (E630) and at Issaquah Creek (0631) were 1425 and 1224 ug/L, respectively. Total phosphorus concentrations exceeded recommended criteria (50 mg/L) at all five sites during storm events.

Cadmium, chromium, copper, mercury, nickel, lead, zinc, and iron concentrations were measured during five storm events. Using a representative hardness value of 20 mg CaCO₃/L during storms, metal toxicity was evaluated. Most sites did not show any acute or chronic standard violations except during the December 4, 1989 samples. Site 0635, however, showed chronic standards violation during most sampling events for cadmium, chromium, copper, nickel, and zinc. The high concentrations of metals are particularly interesting given the land use of this site. The site is located on McDonald Creek, which drains primarily residential land use.

Fisheries Impacts. The WDOE and City of Issaquah Public Works Department conducted an investigation into the fish kills on the North Fork Issaquah Creek, which occurred during storm events in late March and early April of 1990. Water tissue samples of fish were collected after the second event. Pollutants, including metals, ammonia sulfides, 1,2 Benzenedicarboxylic Acid, and Diisonyl Ester, are believed to have acted in combination with low hardness to result in the death of juvenile salmonids (Devitt, 1990). Source identification focused on the storm drainage system that enters the North Fork Issaquah Creek at RM 0.2. Sediment samples that were collected in storm drains several weeks after the event failed to identify the source of the above mentioned pollutants.

Issaquah Salmon Hatchery management believe that toxic conditions exist year round downstream of RM 0.2. These conditions, however, are only noticed after fish release (and death) from the hatchery occurs. An *in situ* fish bioassay using juvenile coho was used to evaluate the year round potential toxicity. In the autumn of 1990, two bioassays were conducted. In both cases, fish in cages located downstream of the outfall (RM 0.2) died shortly after placement in the stream, while fish in upstream cages remained healthy (S. Lynne, 1991).

FUTURE WATER QUALITY CONDITIONS

In the Issaquah basin, land use is changing from largely agricultural and forested land to residential, non-commercial farming and light-commercial development. New developments in the downtown area and along the I-90 corridor, such as the I-90 Corporate Center and Sammamish Park Place, are currently impacting surface water quality and will continue to do so as the sites are graded, paved, and landscaped. This change in land use has resulted in, and will continue to result in, increased stormwater flows and concentration and transport of nonpoint pollutants, to the basin's streams, lakes, and groundwater. Increases in water quantity and decreases in water quality are of concern now, and will continue to be of concern in the future. As development continues in the basin, impacts to beneficial uses will continue, particularly from increases in fine sediment into fish spawning habitat and increased algal blooms from nutrient enrichment.

Although large scale commercial agricultural land use has significantly decreased in the basin, numerous small farms operate in low density zoned areas. These small farms frequently present the potential for nonpoint pollutant problems due to overstocking of pastures that lead to overgrazing and denuding. Denuded pastures then become a source of sediment and nutrients because there is nothing to hold

the soil in place. Based on historical trends, hobby farms will likely increase in areas zoned for low density development and therefore have the potential to increase water quality impacts in the future.

The quality and quantity of water received by downstream systems will be altered as development occurs. Proper implementation of BMPs and other controls can significantly reduce the impacts from nonpoint pollutants. Beneficial use impairment will occur at a substantially reduced level than would occur without any mitigation.

GOALS AND OBJECTIVES

The goals and objectives for addressing the significant nonpoint pollution problems in this basin were identified in the source by source water quality assessment completed for this plan (King County, 1991). The Watershed Management Committee considered State water quality and pollution reduction standards (173 201 WAC and 90 48 RCW) during development of these goals and objectives. The goals and objectives were adopted by consensus by the WMC and Basin Advisory Team in accordance with 400 12 WAC.

Basinwide Goals

1. Protect and enhance water quality by minimizing sources of water pollution to surface and ground water;
2. Protect and enhance beneficial uses, including swimming, fishing, boating, aquatic habitat (fisheries and wildlife), water supply and aesthetics in Lake Sammamish, Lake McDonald, Lake Tradition, Issaquah Creek, Tibbetts Creek, critical aquifer recharge areas, wetlands, and all tributary waters in the basin; and
3. Protect and enhance water quality through corrective and preventive methods, including best management practices (BMPs), education, planning, regulation, enforcement, incentives, capital projects, natural and constructed system maintenance, and restoration of degraded natural and constructed systems.

Source - Specific Goals

I. Urbanization

- A. Stormwater and Phosphorus
 1. Ensure stormwater enters the natural drainage in such a condition that beneficial uses and water quality are protected;
 2. Secure appropriate land use density controls for groundwater quality protection in areas of critical aquifer recharge;
 3. Adopt and implement the nonpoint and point source control strategies from the Lake Sammamish Water Quality Management Project for protection of Lake Sammamish water quality; and
 4. Eliminate illicit hookups in the Issaquah and Tibbetts Creek watersheds.

B. Land Clearing and Grading

1. Develop and implement a clearing and grading education program for developers, construction workers, enforcement officers, and citizens seeking building permits;
2. Implement land clearing BMPs to minimize erosion and sediment impacts to water quality from land clearing;
3. Improve code enforcement by DDES for clearing and grading standards and BMPs;
4. Establish appropriate land use density controls for water quality protection.

C. Small Quantity Hazardous Waste Generators

1. Develop and implement an education program for watershed residents and businesses regarding the impacts of small quantity hazardous waste generation on water quality;
2. Assist in the collection and proper disposal of household hazardous waste;
3. Promote the use of alternative cleaning products and hazardous waste substitutes;
4. Encourage the use of the Waste Information Network and the Industrial Material Exchange (IMEX); and
5. Accelerate and improve compliance with existing State and local regulations.

D. Underground Storage Tanks (USTs)

1. Ensure the completeness of UST registration and inspection with WDOE;
2. Implement educational and maintenance programs for UST users; and
3. Improve compliance with existing State regulations.

II. Animal Keeping

1. Implement small farm education and BMP programs to inform livestock owners about their impacts on water quality and to correct existing problems; and
2. Ensure compliance with existing regulations and programs.

III. On site Septic Systems

1. Evaluate the feasibility of establishing a regular homeowner proof of septic system maintenance program that identifies failing or pre-failing systems;
2. Implement existing educational programs for homeowners and other on-site septic operators regarding location of drainfields and proper maintenance and functioning of septic systems;
3. Expedite repair and replacement of pre-failing and failing on-site septic systems and promote the use of alternative systems where needed; and
4. Ensure compliance with existing regulations for on-site septic systems.

IV. Boating and Marinas

1. Implement an education program for boat owners and users, covering the use, handling, storage, and transfer of above ground fuel;
2. Minimize/eliminate trash, sewage, and other pollutant discharge to Lake Sammamish from boating related activities; and

3. Ensure compliance with existing boating and water quality regulations.

V. Forest Practices

1. Maintain a viable forestry land use in the basin by converting all FR zoning to F zoning;
2. Designate all zoning except those areas zoned for forest production (F zone) as areas likely to convert;
3. Attain full conformance with the County's Sensitive Areas Ordinance through participation in SEPA review for all areas designated as likely to convert;
4. Ensure County participation in the Watershed Analysis Teams as established by the Department of Natural Resources for the evaluation of forest practices in designated county watersheds; and
5. Establish County monitoring support to assist DNR in identification of violations of the Washington State Forest Practices Rules and Regulations.

VI. Other Nonpoint Sources

A. Pesticides

1. Reduce road maintenance, commercial, and residential use of pesticides and fertilizers through development and implementation of education programs, technical assistance, and use of alternative methods;
2. Encourage the proper application and timing of pesticides and fertilizers; and
3. Achieve commercial, public, and private compliance with existing regulations through education programs.

B. Landfills

1. Achieve compliance with existing surface water and NPDES stormwater regulations through improvement in or additions to existing surface/stormwater treatment systems that minimize nutrient, sediment, and turbidity impacts to McDonald Creek and headwater wetlands; and
2. Increase the scope of landfill water quality monitoring to include sampling for off-site impacts during storm events.

C. Sand, Rock, and Gravel Quarries

1. Achieve compliance with existing surface water and NPDES stormwater regulations through improvement of existing stormwater treatment systems and/or construction of additional treatment systems that minimize nutrient, sediment, and turbidity impacts to the North Fork Issaquah Creek and Tibbetts Creek.



Appendix B

Water Management Committee Response

Appendix B: WMC Response to King County Council Changes of the WMC-Proposed Plan and Adoption by the City of Issaquah

The Watershed Management Committee (WMC)-proposed Issaquah Creek Basin and Nonpoint Action Plan was submitted to the King County Council for review and adoption in November 1994. During the council review process, changes were made to several recommendations that are reflected in the text of this final document (the WMC-approved and King County Council adopted plan). Some of the changes were supported by the WMC, but others were not supported in their entirety. This appendix provides the WMC perspective on these recommendations. Possible future amendments to the plan to address these changes are briefly discussed.

BW-3: Establishment of Open Space Retention Requirements for Subdivisions

The WMC-Proposed plan contained a bonusing system as part of recommendation BW-3 that would apply to rural residential zones. Under this system, bonus densities up to a 50 percent increase would be allowed for subdivisions, short subdivisions, or segregations that retain at least 80 percent of the property in one or more open-space tracts. [The base requirement is for 40 percent and 65 percent open-space retention for developments with and without stormwater detention systems, respectively.] During the Council adoption process, the bonus density provision was eliminated from BW-3 for consistency with adopted 1994 Comprehensive Plan policy R-203, that states "residential density incentives should not be offered in the Rural Area except in Rural Farm or Forest Districts." Because of the potential for reducing future increases in basin flood flows, **the WMC recommends that density bonuses in rural areas be reconsidered in any future plan amendment or in updates to the Comprehensive Plan.**

The WMC-proposed plan contained a provision allowing the open-space retention requirements to be waived at the discretion of the DDES director for development of property for public uses such as schools, fire stations, parks and roads, or for the subdivisions or segregation of land that was previously cleared and used for agricultural purposes. During the Council adoption process, this discretionary waiver was changed to an outright exemption for development of property for schools, churches and public parks and for parcels that were "largely or wholly cleared of overstory and understory vegetation" as of the effective date of plan adoption. **The WMC recommends that this outright exemption be reconsidered in any future plan amendment.**

BW-4: Comprehensive TESC Program for Construction Sites

The Comprehensive TESC Program, a program jointly developed by the SWM Division and DDES, was substituted for seasonal clearing and grading limits that were originally proposed in the *Draft Issaquah Creek Plan* (December 1992). The Comprehensive TESC Program consists of the following elements: (1) studies to determine the extent and nature of TESC problems, (2) revised regulations, involving updates to the Surface Water Design Manual And Grading Code, (3) contractor education and certification, (4) inspector education and new programs, (5) an adaptive management program, (6) program monitoring and devaluation, and (7) program coordination.

The WMC was skeptical about the long-term success of this program because of funding, the number of inspectors, and the record of similar programs in the past. The WMC expressed qualified support for the TESC program if the following conditions were met:

(1) There was immediate funding of the proposed TESC program. [*The first-year program was funded in 1993-1994 and partially funded through 1996*]. **The WMC recommends on-going funding as part of a long-term program.**

(2) Clear deadlines were established for evaluating the success of the TESC program. [*A progress report was completed in February, 1994, and the first-year report was transmitted to Council in March 1995. The second-year report was transmitted to Council in Fall 1995*]. **The WMC recommends ongoing annual reports on the program. If the program is found to be inadequate in controlling construction-site erosion, the WMC recommends amending the Issaquah Creek Plan to include additional requirements such as targeted seasonal clearing and grading limits, more enforcement, or construction phasing.**

UI-2: Standards and Performance Goals for New Subdivisions and Segregations

The WMC-proposed plan contained impervious surface limits of eight percent applied to all structures, driveways and roads within the development for subdivisions and segregations in the Upper Issaquah Creek subbasin. During the Council adoption process, roads were exempted from this allowable impervious surface limit. The WMC is concerned that the road exemption may compromise the effectiveness of the original recommendation in protecting the aquatic resources of this subbasin. **The WMC recommends that monitoring be carried out by the basin steward to determine the effect of these increases in allowable impervious surfaces.**

City of Issaquah Adoption of the Issaquah Plan

The City of Issaquah submitted a concurrence letter, dated June 16, 1995, to the WMC regarding Issaquah's role in implementing the Issaquah Creek Plan. The letter noted that the City has already adopted policies in its Comprehensive Plan which were partially based on the Issaquah Creek Plan. The letter also stated that protection of water resources is a City Council goal, that the plan will be used to help guide the City in protecting surface waters, and that subject to funding, the City will strive to accomplish its part to implement the Issaquah Creek Plan. **The WMC recommends that the City of Issaquah Council adopt the full plan.** [The City subsequently adopted *The City Of Issaquah Water Resource Action Plan* in October 1995, containing most of the recommendations from the *Issaquah Creek Basin and Nonpoint Action Plan*.]



Appendix C

Letters of Concurrence

Appendix C: Letters of Concurrence

This appendix contains letters from agencies and organizations who will be responsible for implementing the Issaquah Creek Basin and Nonpoint Action Plan. Each letter indicates the agency and organization's support for the plan and responsibility for implementing different recommendations. As the lead agency for developing this plan, the King County Surface Water Management (SWM) Division will coordinate plan implementation among the participating agencies and organizations.

The Washington State Department of Ecology approval letter is also contained in this appendix. Review and approval by Ecology is carried out to ensure that the plan complies with all applicable requirements of Chapter 400-12, Washington Administrative Code ("Local Planning and Management of Nonpoint Source Pollution"). Upon plan approval, implementing agencies are eligible to apply for state funding for plan implementation.

In lieu of obtaining concurrence letters from individual departments or divisions within King County, the King County Council adopted the plan as Ordinance No. 11886, which implements the surface water management and environmental policies of the plan. The City of Issaquah's Council adopted the plan through its Water Resources Action Plan. Specific decisions on funding of plan recommendations and allocation of County staff to implement the plan is made while approving annual work programs and budgets for individual departments.

Development of this plan has been funded in part with a grant from the Washington Department of Ecology. The grant requires that the content of the plan be prepared in accordance with Washington Administrative Code (WAC) chapter 400-12. WAC 400-12-545 requires that each agency and organization responsible for implementing a portion or portions of the plan submit a statement of concurrence indicating its intent to follow through with the recommendations contained in the plan. Agencies and organizations also have the option of submitting a statement of nonconcurrence with the plan.



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Northwest Regional Office, 3190 - 160th Ave S.E. • Bellevue, Washington 98008-5452 • (206) 649-7000

October 16, 1996

Issaquah/East Lk. Sammamish Watershed Mgt. Committee
Attn.: Dave Clark, Chair
King County Department of Natural Resources
Surface Water Management Division
700 Fifth Avenue, Suite 2200
Seattle, Washington 98104

Dear Mr. Clark:

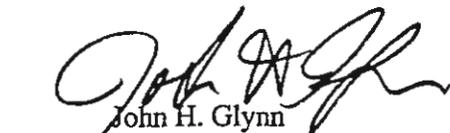
Please accept my compliments on the completion of the Issaquah Creek Basin and Non-point Action Plan. The amount of work that has gone into the development of this plan is apparent. All agencies and citizens that participated are to be commended.

The Issaquah Creek Basin and Non-point Action Plan has been reviewed by staff of Ecology's Northwest Regional Office, Water Quality Program. A copy of their report is enclosed. I have reviewed your Plan and the staff report, and hereby conditionally approve the Plan for the purposes of compliance with Chapter 400-12 WAC. Because the staff report identified areas that may require further clarification or development, you may need to make changes prior to final printing of your Plan.

We recognize that implementation of the Plan will require considerable efforts at the local level. We will help in any way we can to assist in implementing the Plan.

We look forward to the successful implementation of your Plan and its water quality benefits to the Issaquah Creek and the Lake Sammamish Watershed.

Sincerely,


John H. Glynn
Water Quality Supervisor
Northwest Regional Office

JG:rs
Enclosure

c: Loren Reinelt, City of Issaquah

A REPORT OF THE ECOLOGY STAFF REVIEWING THE FINAL SEPTEMBER 1996 VERSION OF THE ISSAQUAH CREEK BASIN PLAN AND NONPOINT ACTION PLAN SUBMITTED SEPTEMBER 6, 1996 AS THE FINAL VERSION FOR ECOLOGY APPROVAL.

Ecology staff, Rod Sakrison and Ron Devitt, reviewed the September 1996 version of the Issaquah Creek Basin Plan and Nonpoint Action Plan submitted on September 6, 1996, as the final version of the Plan for Ecology approval. The reviewers evaluated the Plan during September 1996. Overall, the reviewers were very impressed with the excellent quality and detail in the plan. Many of the action items are outstanding examples of non-point pollution control strategies.

The Plan was read by Ecology reviewers, statements of concurrence were evaluated, and the plan was compared with the requirements of the 1991 version of Chapter 400-12 WAC, Local Planning and Management of Nonpoint Source Pollution (the Nonpoint Rule).

Ecology's reviewers report consists of two sections: "Determinations Pursuant to the Process for Final Approval of Watershed Action Plans, November 1989," and "Detailed Comments." (The process for Approval provides procedural guidance to Ecology staff regarding the review of watershed management committee approved plans.)

Because the Ecology reviewers feel the Plan is in most part consistent with the Nonpoint Rule, and almost entirely meets the criteria in the Ecology Process for Final of Watershed Action Plans, we recommend that the Plan be conditionally approved. There are a few significant items, detailed below under "Detailed Comments," that should be considered prior to final printing of the plan.



Rod Sakrison, Ecology Reviewer

SEPTEMBER 1996 VERSION OF THE ISSAQUAH CREEK BASIN PLAN AND
NON-POINT ACTION PLAN, SUBMITTED AS THE FINAL VERSION FOR
ECOLOGY APPROVAL

ECOLOGY PLAN REVIEW DETERMINATIONS PURSUANT TO ECOLOGY
PROCESS FOR FINAL APPROVAL OF WATERSHED ACTION PLANS (10/89)

1. The Plan has been reviewed against the provisions of Chapter 400-12 WAC. The Plan is consistent with Chapter 400-12 WAC.
2. The Plan is consistent with the goals and requirements of the Puget Sound Water Quality Management Plan (PSWQMP), and specifically the Nonpoint Source Pollution chapter of the PSWQMP.
3. The implementation strategy is feasible and adequate to control non-point sources of pollution and protect beneficial uses.
4. Implementing entities, through their statements of concurrence, have the authority and commitment to implement the Plan.
5. The public has been extensively involved and has participated in the development of the Plan. Public participation is documented in the Plan.
6. Compliance with applicable state and federal laws is conditional, dependent on submittals pursuant to the lead agency's NPDES municipal stormwater permit (No. WASM23001 - Cedar/Green). An explanation of the concerns regarding compliance is contained in the detailed comments that follow.

SEPTEMBER 1996 VERSION OF THE ISSAQUAH CREEK BASIN PLAN AND
NONPOINT ACTION PLAN, SUBMITTED AS THE FINAL VERSION FOR
ECOLOGY APPROVAL

DETAILED DEPARTMENT OF ECOLOGY COMMENTS ON THE PLAN

Overall the Ecology reviewers are impressed with the dedication and commitment of the Watershed Management Committee. A comprehensive, implementable non-point action plan has been developed for the Issaquah Creek Basin and will be an important management plan for that portion of the Lake Sammamish Watershed.

The vast majority of the Plan fully complies with the intent of Chapter 400-12 WAC. In particular, the watershed characterization, plan development and implementation strategies are excellent. Approval is withheld pending further evaluation of a limited aspect of the Plan.

At this time, it is inappropriate to review for approval the regulatory requirements contained in Chapter 2. This area of the Plan, which sets development standards for the Issaquah Creek basin, closely mirrors the *King County Surface Water Design Manual*. It is well known and recognized that the *Surface Water Design Manual* is a very significant program element required by the Department of Ecology for implementation of NPDES permit No. WASM23001 - Cedar/Green, issued to King County under the Federal Clean Water Act on September 26, 1995 (special condition S8.b.8.a).

In the program requirements of the special condition, the NPDES permit calls for the control of runoff from new development. The permittee must adopt ordinances, minimum requirements and best management practices (BMP's) equivalent to those found in Volumes I - IV of Ecology's *Stormwater Management Manual for the Puget Sound Basin*, (1992 edition, as amended). To date, Ecology has reviewed and approved King County's *Stormwater Pollution Control Manual* as equivalent to Ecology's Volume IV.

Ecology has received copies of numerous King County ordinances, including Basin Plans pursuant to K.C.C. 20.14. It has been Ecology's position that comment on the adequacy of these regulations will be made in conjunction with our comments on the King County *Surface Water Design Manual*. (see page 6, attached *Comments On King County's Proposed Stormwater Management Program*, September 8, 1995 letter from Mike Llewelyn to Jim Kramer).

JANE HAGUE
BRUCE LANG
MAGGI FIMIA
GREG NICKELS
LARRY PHILLIPS
BRIAN DERDOWSKI
LOUISE MILLER

July 3, 1995
icbsubs.tk

Introduced By: Vance

Proposed No.: 94-730

ORDINANCE NO. **11886**

AN ORDINANCE adopting the Issaquah Creek Basin and Nonpoint Action Plan as a functional plan consistent with the King County Comprehensive Plan, adopting surface water management and environmental policies in the plan area, adding a new section to K.C.C. 20.12 and amending K.C.C. 16.82.050, K.C.C. 16.82.150, and K.C.C. 21A.12.030.

PREAMBLE:

For the purpose of effective surface water management in the Issaquah Creek basin, the Metropolitan King County Council makes the following findings of fact:

1. The Issaquah Creek basin covers approximately 61 square miles and includes Issaquah Creek, the North and East Forks of Issaquah Creek, and Tibbetts Creek.
2. The King County Council adopted Motion 7602 in July, 1989 authorizing an interlocal agreement between King County and the City of Issaquah to prepare the Issaquah Creek Basin and Nonpoint Action Plan.
3. The Issaquah Creek basin features many excellent natural resources, including high-quality habitat for eight species of anadromous salmon and trout.
4. Portions of the Issaquah Creek basin experience problems with flooding, erosion, sediment deposition, water pollution, and loss of fish habitat due to land development and insufficient standards for stormwater management.
5. Implementation of the policies set out in the plan will address many existing stormwater, water quality, and habitat problems, and will substantially reduce the impacts of future development on basin resources.

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SECTION 6. Severability. If any provision of this ordinance or its application to any person or circumstance is held invalid, the remainder of the ordinance or the application of the provision to other persons or circumstances is not affected.

INTRODUCED AND READ for the first time this 21st day of November, 1997.

PASSED by a vote of 11 to 1 this 10th day of July, 1995.

KING COUNTY COUNCIL
KING COUNTY, WASHINGTON

Kent Pullen
Chair

ATTEST:

Gerald A. Peters
Clerk of the Council

APPROVED this 21st day of July, 1995.

Ray Lohr
King County Executive

Attachments:

- A. WMC-Proposed Issaquah Creek Basin and Non-Point Action Plan
- B. Amendments to be included in the Issaquah Creek Basin Plan and Non-Point Action Plan
 - 1. Amendments to Issaquah Creek Basin Plan and Non-Point Action Plan
 - 2. Glossary of Terms
 - 3. Map and Table showing property owners where to find all of the Basin Plan regulations which apply to their site.

RESOLUTION 95-12

A RESOLUTION OF THE CITY OF ISSAQUAH
ADOPTING THE WATER RESOURCE ACTION
PLAN

WHEREAS, the Administration presented the City Council with a Draft Resource Action Plan in June 1995; and

WHEREAS, one of the City Council's Goals is to "Coordinate strategies to protect and enhance Issaquah's water supply"; and

WHEREAS, the Council Utilities Committee has considered the Plan during joint meetings with Commissioners of the Sammamish Plateau Water and Sewer District; and

WHEREAS, the City participated in the development of the Issaquah Creek Basin and Nonpoint Action Plan, Draft Issaquah Creek Valley Ground Water Management Plan, Well Head Protection Plan; and

WHEREAS, the City is interested in providing protection to the natural resources;

NOW THEREFORE, the City Council of the City of Issaquah hereby resolves as follows:

1. The City of Issaquah Water Resource Action Plan, dated August 8, 1995, is hereby adopted.
2. The Water Resource Action Plan shall be used as a guide for developing City budgets and for coordinating strategies to protect and enhance Issaquah's water supply.

PASSED by the City Council this 2nd day of October, 1995.

HARRIS E. ATKINS
HARRIS E. ATKINS, CITY COUNCIL PRESIDENT

APPROVED by the Mayor this 3rd day of October, 1995.

HARRIS E. ATKINS
OR ROWAN HINDS, MAYOR

FILED this 4th day of October, 1995.

Attest:

Linda Ruehle
LINDA RUEHLE, CITY CLERK

APPROVED AS TO FORM:

OFFICE OF THE CITY ATTORNEY:

Wesley Owen

RESOLUTION NO.: 95-12



City of Issaquah

Post Office Box 1307
Issaquah, WA 98027-1307

(206) 391-1000
Fax: (206) 391-1036

June 16, 1995

RECEIVED
JUN 20 1995

KING COUNTY
SURFACE WATER MANAGEMENT DIVISION
JIM KRAMER

Mr. Jim Kramer
King County
Surface Water Management Division
700 - 5th Avenue, Suite #2299
Seattle, WA 98104

RE: Concurrence; WMC - Proposed
Basin and Nonpoint Action Plan
Issaquah Creek

Dear Mr. Kramer:

The City has been working with King County SWM and other agencies through the Watershed Management Committee to develop this plan. It has been, and I'm certain will continue to be, a good working relationship. The Proposed Plan is very comprehensive and carries the support of the City.

The City concurs with the recommendations presented in the Issaquah Creek Basin and Nonpoint Action Plan which the City of Issaquah expects to participate in implementation. The City has already adopted policies in it's Comprehensive Plan which were partially based on this Plan. Protection of the water resources is a City Council Goal. This Plan will be used to help guide the City in protecting the Surface waters. Subject to funding, the City will strive to accomplish it's part to implement the Issaquah Creek Basin and Nonpoint Action Plan.

Please contact Sheldon Lynne at 557-2505 if you have any questions.

Sincerely,


Rowan Hinds
Mayor

RCH/amf

cc: City Council
Leon Kos, City Administrator
Cheryl Fambles, Assistant City Administrator
Sheldon Lynne, Senior Engineer



MUCKLESHOOT INDIAN TRIBE

39015 172nd Avenue S.E. • Auburn, Washington 98092-9763

Phone: (206) 939-3311 • (206) 939-5311

February 15, 1995

Issaquah/East Lake Sammamish Watershed Management Committee
c/o Dennis Canty, Project Manager
King County Surface Water Management Division
700 Fifth Av., Suite 2200
Seattle, WA 98104

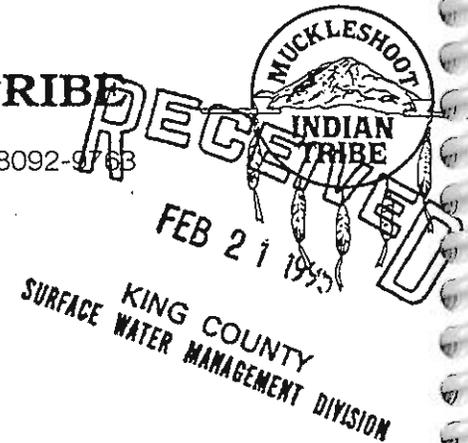
Dear Watershed Management Committee Members:

The Muckleshoot Tribe finds the Issaquah Basin and Nonpoint Action Plan to be generally consistent with its natural resources protection goals and objectives, and, therefore, supports the Plan with a few reservations as expressed in this letter.

The Tribe is particularly pleased with recommendations that establish open-space retention requirements (BW-3) that may help maintain existing hydrologic and habitat conditions and prevent further degradation; the adoption of zoning changes to regulate the location and characteristics of new development to reduce impacts to fish, wildlife, and water resources (BW-6); the establishment of the channel and floodplain restoration program (BW 7); and the establishment of basin-wide recommendations to improve stream crossings, habitat, and water resources.

The Tribe is concerned about the following recommendations:

- ◆ Erosion protection standards (BW2). We believe that the assumption that such standards will protect fish by protecting in-stream habitat may be invalid and should be re-worded. The standards may cause a reduction of channel instability, thus potential habitat loss, but they do not necessarily reduce direct stormwater impacts to salmonids, such as displacement from increased water velocities. In addition, some development actions are exempt from these standards but will still generate stormwater. Finally, the overall increase in stormwater due to increased impervious surfaces basin-wide may result in the increased duration of peak flows that are detrimental to juvenile salmonids;
- ◆ Aquatic Resource Mitigation Banking (BW 27). In Table 2-4, the Tribe and several agencies have been identified as implementing this recommendation. However, in the text of BW 27 on page 4-49, only SWM has been identified as completing the main tasks associated with this recommendation. We recommend that the text on page 4-49 be updated to include the Tribe in tasks 1 and 2 of this recommendation.
- ◆ The Tribe would like to review the Development of Habitat Restoration and Enhancement Program (BW 22), and Capital Improvement Project 2524 - Tributary 0203 Stream Channel Relocation/Restoration. In addition, the Tribe should be involved in the preparation and review



of clearing restriction code amendments that will be prepared by SWM, Community Planning, and DDES (page 4-9).

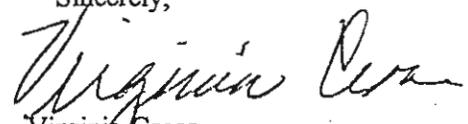
- ◆ Finally, there is an error on page 3-12 in the second paragraph. The SAO should be applied in addition to the Forest Practices Act (RCW 76.09), not the Forest Practice Application Regulations. Forest Practice Applications are the permits that are issued to enforce the Forest Practices Act.

Under the Plan and contingent upon staff time availability, the Tribe will participate as follows in the implementation of these recommendations:

1. Open Space Retention Requirements (BW-3)	Development of criteria for timber harvest management
2. Comprehensive Temporary Erosion and Sediment Control Program for construction sites (BW-4)	Evaluation of the program and preparation of evaluation report
3. Channel and Floodplain Restoration (BW-7)	Consultation on public access improvements
4. Improvement of Practices in Urban Areas (BW-13)	Participation in education effort
5. Interagency procedure for administering Forest Practice (BW-16)	Participation in the formulation of timber harvest plans and on analysis teams
6. Aquatic Resource Mitigation Banking Task Force (BW-27)	Participation in taskforce
7. Establishment of Issaquah Fishery Management Task (BW-24/LI-4)	Recommendations participation in taskforce - approval of recommendations
8. Force Basin Stewardship (BW-29)	Interagency committee to review basin plan implementation

In conclusion, the Muckleshoot Indian Tribe supports the recommendations and actions in the Issaquah Creek Basin Plan to control nonpoint pollution, restore fisheries habitat, and enhance aquatic resources with the revisions suggested above. The Tribe appreciates the work of the Watershed Management Committee and Basin Advisory Team to restore natural resources in this watershed.

Sincerely,


Virginia Cross
Chairwoman

RECEIVED
DEC 19 1994



KING COUNTY
SURFACE WATER MANAGEMENT DIVISION

King Conservation District
935 Powell Ave. SW - Renton, WA 98055 - (206) 226-4867

December 15, 1994

Issaquah Creek Watershed Mgt. Committee
c/o King County Surface Water Mgt. Div.
700 Fifth Ave., Suite 2200
Seattle, WA. 98104

Dear Committee Member:

King Conservation District supports the Issaquah Creek Basin and Nonpoint Action Plan recommendation involving the Conservation District. We believe implementation of the plan by all agencies will benefit Issaquah Creek, the City of Issaquah, Lake Sammamish and Lake Washington. The Conservation District concurs and agrees to implement the actions described in recommendation BW15, 29, 31 for King Conservation District subject to availability of funding. The District will seek funding from all sources available including Metropolitan King County Council, Washington Conservation Commission, Department of Ecology and other possible sources.

In addition to the work specified specifically for King Conservation District to perform, we will also seek to assist other implementing agencies by providing technical assistance, and where possible, funding for implementation projects.

Following is a detailed summary of specific recommendations and proposed action to be taken by King Conservation District.

Recommendation BW15: Improvement of Farm Practices (See attached wording of BW15).

Action - King Conservation District is performing farm planning at this time in the entire County. However, funding and staffing are very low so any one area of the County does not receive adequate attention. Voluntary compliance and requests for assistance already far exceeds District staffing capability. We have the experience to do the specified work and have implemented pilot projects in small farm planning and education. We will work with the livestock oversight committee to develop and implement funding proposals and also to make recommendations for possible revision of the existing ordinance.

Recommendation BW29: Establishment of Basin Steward Position - King Conservation District will be interested in serving on the proposed interagency Committee to periodically review basin plan implementation progress.

Recommendation BW31: Basin Plan Enforcement - King Conservation District will assist agencies in developing an enforcement protocol.

We look forward to implementing this basin and nonpoint plan.

Sincerely

A handwritten signature in cursive script that reads "Jack Davis".

Jack Davis
District Manager



WASHINGTON STATE DEPARTMENT OF
Natural Resources

RECEIVED

JAN 20 1995

JENNIFER M. BELCHER
Commissioner of Public Lands

KING COUNTY
SURFACE WATER MANAGEMENT DIVISION
KALEEN COTTINGHAM
Supervisor

December 9, 1994

Dennis Canty, Project Manager
Issaquah Watershed Management Committee c/o
King County Surface Water Management
700 Fifth Avenue Suite 2200
Seattle, WA 98104

Dear Mr. Canty:

Thank you for the opportunity to comment on the Issaquah Creek Basin and Nonpoint Action Plan. This response is to your request for a statement of concurrence or nonconcurrence from the Department of Natural Resources. This response is also in behalf of the Department acting as staff to the Forest Practices Board (FPB).

The Department recognizes and supports the efforts of King County to address water quality issues in the Puget Sound Region and will work closely with the County through our existing programs. This plan brings together tribal, other governmental and agency interests in a common direction for watershed protection. The Department appreciates the hard work, coordination and public involvement it takes to put together such a plan.

The Department is committed to working with local government and the community and looks forward to working with King County and the Issaquah Watershed Committee. The Forest Practices Regulations, the Timber/Fish/Wildlife process, the Forest Stewardship Program and other Department land management programs can work to address water quality issues as they relate to forest practices.

Please do not hesitate to contact Dave Dietzman, PSWQA Watershed Plan Coordinator at (206) 902-1633 if you have concerns or questions regarding these comments.

Sincerely,

Kaleen Cottingham
Supervisor

Attachment

KC:dd

ATTACHMENT

CONCURRENCE/NONCONCURRENCE STATEMENTS:

BW 16: Establishment of Interagency Procedures for Administering Forest Practices

Recommendation: A memorandum of Agreement (MOA) between King County and DNR concerning the administration of forest practices should be negotiated and approved.

DNR concurs with this recommendation. Please continue to work with Art Tasker at the South Puget Sound Region (206) 825-1631 to complete the MOA. When Watershed Analysis, in accordance with WAC 222-22, occurs in the Issaquah Creek basin, we will welcome participation by King County and the Muckleshoot Indian Tribe. If you have staff interested in the training required to become certified for watershed teams please contact Art.

BW 29: Establishment of Basin Steward Position

Recommendation: King County SWM should hire a basin steward for the Issaquah basin.

DNR concurs with this recommendation. A basin steward will be able to bring all the various parties together to more effectively protect the Issaquah basin. Three immediate contacts for your basin steward should be Doug McClelland -- King District Manager, Cyril Moya -- Forest Practice Forester, and Don Theo -- Stewardship Coordinator. They all may be reached at our South Puget Sound Region Office at (206) 825-1631.

BW 31: Basin Plan Enforcement

Recommendation: The King County SWM Division should initiate efforts to establish an enforcement protocol that is consistent with the goals and objectives of Section 319 of the 1987 Clean Water Act.

DNR concurs with this recommendation. The protocol will identify lead agencies and the specific roles and responsibilities in enforcement actions. Coordination of enforcement and responsibilities will further protect resources and eliminate duplication.

UI 4 Riparian Buffers on Forest Land

Recommendation: For timber harvest and other forest management activities in this subbasin that are not subject or associated with watershed analysis, DNR should establish buffers consistent with King County stream classifications and regulate activities within these buffers in accordance with the King County Sensitive Areas Ordinance. For management activities subject to a watershed analysis, DNR should request King County participation in the analysis team, and the team should evaluate the appropriate buffer sizes for affected streams.

DNR cannot concur with this recommendation. We agree with the intent to protect the riparian habitat associated with Holder and Carey Creeks. However, the appropriate method to determine adequate buffer widths is through detailed Watershed Analysis. The DNR is precluded, by the State Forest Practices Act, from imposing King County's Sensitive Areas Ordinance standards on private and state land forest practices where the landowner intends to continue to practice forest management. The DNR offers the following as potential new language that addresses the issue but is not in conflict with the Forest Practices Act.

New UI 4: Riparian Buffers on Forest Land

Recommendation: When DNR initiates Watershed Analysis within the subbasin, King County should participate, with certified specialists, in the development of appropriate prescriptive riparian buffers.

Prior to the completion of DNR's Watershed Analysis in this subbasin, the DNR should invite King County to participate in Interdisciplinary Team reviews of buffers for timber harvest and other forest management activities.

CIP #2546 -- Holder/Pheasant Creek Diversion

Recommendation: The DNR should replace an existing culvert that serves as an equalizing conduit for flows between the Otter Lake wetland and Holder Creek and construct a non-erosive channel from the culvert outlet to Holder Creek.

DNR concurs with this recommendation. We have started the permit process for completing the project. The anticipated completion date is October 31, 1995. The DNR will coordinate with King County Surface Water Management during the project. The contact person will be Jerry L. Johnson, Duvall Forester 1, (206) 825-1631.

SAVE LAKE SAMMAMISH

1420 N.W. Gilman Blvd., Suite 2565
Issaquah, Washington 98027

February 25, 1995.

Dennis Canty, Project Manager &
Watershed Management Committee
Issaquah Creek Basin & Nonpoint Action Plan
King County Surface Water Management Division
700 Fifth Avenue, Suite #2200
Seattle, WA 98104.

Dear Mr Canty:

**RE: ISSAQUAH CREEK BASIN & NONPOINT ACTION PLAN
SLS LETTER OF CONCURRENCE**

Save Lake Sammamish (SLS) has reviewed the Issaquah Creek Basin and Nonpoint Action Plan and supports the twin goals of flood hazard reduction, as well as protection and enhancement of natural resources, specifically water quality and fish habitat within this Basin.

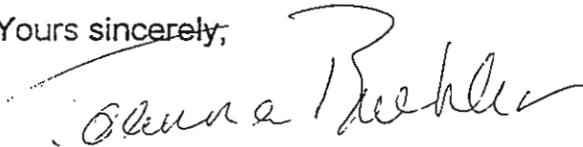
While SLS generally concurs with the proposed Plan, we are disappointed by the deletion of Density Bonuses in rural-designated areas in return for the designation of at least 80% of the plat area in open space tracts. Although this has been judged incompatible with the King County Comprehensive Plan, SLS believes it should be re-evaluated along with proposed legislation to increase the maximum building coverage and impervious surface standards for lots in rural-designated areas (amendments to Ordinance 10870, Section 165 and K.C.C.21A.06.625 and Ordinance 10870, Section 340, as amended, and K.C.C. 21A.12.030).

As previously stated, SLS disagrees with exempting schools, churches, and other public facilities from open-space tract requirements and clearing restrictions (BW-3).

Members of the Watershed Management Committee, and staff members of the involved agencies are to be complimented on their hard work and the high quality of analysis, as well as the thoughtful approach in developing recommended solutions. It has been a pleasure to have participated as a member of the Basin Advisory Team in the development of this Plan.

Save Lake Sammamish looks forward to participating in the implementation of the plan, specifically BW20; the continuing dissemination of information concerning these important natural resources, and education of basin residents and users as to how best protect and enhance water quality and habitat for the benefit of this and future generations.

Yours sincerely,



Joanna A. Buehler
President

A Non-Profit Organization

(206) 641-3008

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Western Washington Fishery Resource Office
2625 Parkmont Lane, Bldg. A
Olympia, Washington 98502
(360)753-9460
FAX (360)753-9407

RECEIVED

APR 0 3 1995

April 4, 1995

KING COUNTY
SURFACE WATER MANAGEMENT DIVISION

Mr. Lorin Reinelt
Senior Water Quality Engineer
King County Surface Water Management Division
700 Fifth Avenue, Suite 2200
Seattle, Washington 98104

Dear Mr. Reinelt:

We reviewed the Issaquah Creek Watershed Management Committee Proposed Basin and Nonpoint Action Plan, dated September 1994, and our response follows:

The plan and cover letter request a statement that the U.S. Fish and Wildlife Service participate on the Issaquah Creek Fishery Management Task Force (BW 24) and on development of a management plan for the Issaquah Hatchery (LI 4).

Roger Tabor of this office is involved in Lake Washington fisheries studies and is familiar with fisheries issues of the Lake Washington drainage. Roger can represent the Service subject to time and funding availability, and may be contacted at the letterhead phone and address.

Sincerely,

Ralph S. Boomer
Project Leader

cc: Alisa Ralph (ES)
Roger Tabor (WWFRO)



STATE OF WASHINGTON
DEPARTMENT OF AGRICULTURE

P.O. Box 42560 • Olympia, Washington 98504-2560 • (206) 902-1800

January 12, 1995

RECEIVED

JAN 17 1995

Mr. Dennis Canty
Issaquah Watershed Management Committee
King County Surface Water Management Division
700 Fifth Avenue, Suite 2200
Seattle, Washington 98104

KING COUNTY
SURFACE WATER MANAGEMENT DIVISION

Dear Mr. Canty:

This letter shall act as a letter of concurrence for the Issaquah Creek Basin and Nonpoint Action Plan. The Washington State Department of Agriculture supports the efforts of the Issaquah Watershed Management Committee to protect the water quality of the Issaquah Creek Basin.

The action plan identifies the Department of Agriculture as the implementing agency for one recommendation. This is found in BW 20: Additional Water Quality Recommendations. Item 7 on page 4-40 states:

"Information on Commercial Pesticide Applicators - The Washington State Department of Agriculture (WSDA) should collect, monitor, and make available to SKCDPH (and other interested agencies) data regarding licenses issued to commercial pesticide applicators. Within legal constraints, and upon request by SKCDPH, information should be made available on the type of chemical applied, quantities, location of application, potential for public health effects, and emergency measures in case of poisoning or spills."

WSDA will make available, upon request, information regarding licenses issued to commercial pesticide applicators. The contact person for this information is Ms. Margaret Tucker of our Licensing and Education Section. Her phone number is (360) 902-2015.

The recommendation has several elements that the department has limited or no ability to repond to. The first such element is the request to provide information on the types and amounts of pesticides applied by commercial applicators in certain geographical areas. WSDA rules require that commercial pesticide applicators, and others, keep application records. The

department does not require applicators to submit these records on a routine basis as we do not have the resources to process the information. We also do not have the resources to conduct specific record call-ins, thus we are unable to concur with this part of the recommendation.

Recommendation BW 20(7) also requests WSDA to provide information on the potential for public health effects from pesticide applications and emergency measures in case of poisoning or spills. We will provide what information we can in these areas but it is very limited. Information on the public health effects of pesticides can be obtained through the pesticide section of the Washington State Department of Health. Information can also be obtained from WSU Food and Environmental Quality Laboratory in Richland, Washington. Their phone number is (509) 375-9462. WSDA hopes to hire an environmental toxicologist in the near future. If this occurs we could then provide this type of information. Information on poisoning can best be obtained from the poison control centers or the State Department of Health. Spill response information should be obtained from the Washington State Department of Ecology as this area falls under their statutory responsibility. Local HazMat units would also be a good source of information.

As stated above, The Department of Agriculture supports the Issaquah Watershed Management Committee's efforts. We will support the management plan within the limits of our statutory authority and resources. I have delegated Lee Faulconer of our Program Development Branch to be the contact person for the Watershed Management Committee and King County. He can be reached at (360) 902-2047. He will help expedite your requests or answer any questions you may have.

Sincerely,

PESTICIDE MANAGEMENT DIVISION



William E. Brookreson
Assistant Director

WEB:lfb

cc: Stu Trefy, Policy Assistant
Ann Wick, Program Manager



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Northwest Regional Office, 3190 - 160th Ave S.E. • Bellevue, Washington 98008-5452 • (206) 649-7000

December 14, 1994

RECEIVED
DEC 15 1994

Mr. Dennis Canty, Project Manager
Mr. Lorin Reinelt, Senior Water Quality Engineer
King County Surface Water Management
Department of Public Works
700 Fifth Avenue, Suite 2200
Seattle, WA 98104

KING COUNTY
SURFACE WATER MANAGEMENT DIVISION

Dear Mr. Canty and Mr. Reinelt:

Re: Concurrence with the Issaquah Creek Basin and Nonpoint Action Plan

Congratulations on your high quality production of the Issaquah Creek Basin and Nonpoint Action Plan. Because the actions in the plan which require Ecology's concurrence primarily involve our Northwest Regional personnel, this letter of concurrence is being issued from Ecology's Northwest Regional Office.

Ecology agrees with the overall goals and objectives identified in the plan. Enclosed with this letter are Ecology's specific comments and statement of concurrence for the two actions which involve Ecology.

Again, congratulations! Successful implementation of this plan and protection of water quality in the Issaquah Creek Basin will require the active participation of many agencies, groups, and citizens. Ecology looks forward to participating in this exciting team effort to further protect water quality in King County.

Sincerely,

Michael Rundlett
Regional Director

BH:bh:gm

Enclosure: Statement of Concurrence

cc: John Glynn, Water Quality, Ecology NWRO
Stew Messman, Water Quality, Ecology NWRO
Ron Devitt, Water Quality, Ecology NWRO
Paul O'Brien, Spill Response, Ecology NWRO
Gail Dorf, Nooksack Team, Ecology
Bob Duffy, Watershed Unit, Ecology HQ

STATEMENT OF CONCURRENCE: **ISSAQUAH CREEK BASIN AND NONPOINT ACTION PLAN**

Action BW-29: Establishment of Basin Steward Position

*Recommendation: King County SWM should hire a basin steward for the Issaquah Creek Basin. The duties of the basin steward should include:

1. Providing technical assistance to basin residents to prevent nonpoint pollution, revegetating disturbed areas, and pursuing other topics related to basin plan implementation.
2. Serving as liaison between basin residents and City, County, State, Federal, and Tribal agencies, and among the agencies themselves, on topics related to the Issaquah basin.
3. Assisting in monitoring of water quality and habitat conditions in the basin and in the identification of code violations.
4. Assisting with revegetation projects using a conservation corp or volunteer groups.
5. Convening and chairing an interagency committee to coordinate agency activities in implementing this plan.
6. Informing basin residents of available incentive programs for water quality enhancement.
7. Developing an annual report at the end of each water year. The report should describe the status of, and schedule for, plan implementation (including the status of capital projects, educational and enforcement efforts, and overall program accomplishments); interpret monitoring results and identify significant changes in the condition of the basin; and based on these changes, identify appropriate responses for basin management program changes, such as basin plan amendments, capital projects list changes, added costs, and staffing changes.
8. Developing a process for resolving disputes about plan implementation."

Ecology concurs with this recommendation with the understanding that there will be no direct cost to Ecology for the basin steward position. Ecology will participate in implementation committee meetings, plan audits and provide technical assistance when requested.

Please contact Stew Messman of the Water Quality Section at Ecology's Northwest Regional Office (206) 649-7070 and/or Bob Duffy of the Watershed Unit at Ecology's Headquarters Office (206) 407-6412, for coordination of Ecology's participation in implementing this recommendation.

STATEMENT OF CONCURRENCE: ISSAQUAH CREEK BASIN AND NONPOINT ACTION PLAN

Action BW-31: Basin Plan Enforcement

"Recommendation:

1. **Enforcement Protocol** - The King County SWM Division should initiate efforts to establish an enforcement protocol that is consistent with the goals and objectives of section 319 of the 1987 Clean Water Act. This protocol should identify a lead enforcement agency and the specific roles and responsibilities of Metro; the Department of Ecology; King County SWM, Environmental Division of DDES; DNR; SKCDPH; and KCD in responding to spill reports, animal-keeping-related pollution, forest-practice violations, septic-system failures, or other explicit water quality violations. This process should replace the current Interagency Water Quality Trouble Call/Emergency Response Program that is coordinated by Metro.
2. **SWM Division Enforcement** - The SWM Division Drainage investigation and Regulation (DIR) Unit should expand their responsibilities to include inspection and enforcement of water quality BMP requirements related to the NPDES permit program. The DIR Unit should coordinate with DDES enforcement staff to report and enforce violations of SAO requirement, clearing and grading requirement, and animal-density limits.
3. **DDES Inspection and Enforcement** - King County DDES inspection staff have responsibility for ensuring compliance with clearing, grading, and SAO requirements in the basin. DDES should allocate sufficient inspection staff to enforce these requirements. Whether additional staff are necessary to provide adequate inspection should be determined through analysis of workloads and examination of required inspection frequency.
4. **Violation Reporting** - The SWM Division should simplify the reporting of surface-water-related code violations by publishing a central telephone number for reporting such violations in the blue pages of the telephone book."

Ecology concurs with this recommendation with the understanding that the "NPDES permit program" referred to in the above section means the "NPDES *STORMWATER* permit program".

Please contact John Glynn of the Water Quality Section at Ecology's Northwest Regional Office (206) 649-7033 and Paul O'Brien of the Spill Response Section at Ecology's Northwest Regional Office (206) 649-7130 for coordination of Ecology's participation in implementing this water quality emergency response recommendation.



RECEIVED
JAN 23 1995

State of Washington
DEPARTMENT OF FISH AND WILDLIFE KING COUNTY
SURFACE WATER MANAGEMENT DIVISION

16018 Mill Creek Blvd., Mill Creek, WA 98012-1296 Tel. (206) 775-1311 / Fax # 338-1066
January 19, 1995

Dennis Canty, Program Manager
King County Department of Public Works
Surface Water Management Division
700 Fifth Avenue, Suite 2200
Seattle, Washington 98104

**RE: WMC - PROPOSED BASIN AND NONPOINT ACTION PLAN -
ISSAQUAH CREEK, WRIA 08.178**

Dear Mr. Canty:

Washington Department of Fish and Wildlife (WDFW) staff have reviewed the referenced document and this letter contains our statement of concurrence with the goals and objectives of the plan.

WDFW commends your division for the high quality and comprehensiveness of this plan. Plan objectives, if implemented to the extent proposed, will go a long way towards mitigating many of the water quality and fish habitat problems which plague the Lakes Washington/Sammamish salmonid stocks. As you are undoubtedly aware, coho, chinook and sockeye salmon, and steelhead stocks native to this basin have declined in numbers in recent years, due at least in part to habitat degradation. WDFW is committed to reversing this trend, and we believe implementing many of the aspects of this plan will help to achieve that goal - at least in this part of the basin.

For our part, WDFW is already implementing recommendation BW23 through enforcement of the Hydraulic Code and will increase this effort as staffing and funding permits.

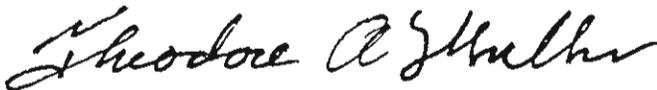
Dennis Canty
January 19, 1995
Page 2

We are not all that sure that the Issaquah salmon hatchery will be a vehicle for recovering native fish stocks, unless a supplementation program becomes necessary. However, we will commit to membership on the Issaquah Fishery Management Task Force to help develop the education and research aspects of the plan (Recommendations BW24 and LI4).

WDFW is pleased to see your division doing such a good job of integrating solutions to the contemporary fish management problems into your planning efforts.

Thank you for wanting to take part in the stewardship of this valuable state resource.

Sincerely,



Theodore A. Muller
Regional Habitat Program Manager

TAM:ks

CLEVE PINNIX
Director



STATE OF WASHINGTON

WASHINGTON STATE PARKS AND RECREATION COMMISSION
7150 Cleanwater Lane • P.O. Box 42650 • Olympia, Washington 98504-2650 • (206) 755-1500
February 10, 1995

RECEIVED
FEB 15 1995
SURFACE WATER MANAGEMENT DIVISION
KING COUNTY

RE: Issaquah Creek Basin Plan Concurrence
Response - Lake Sammamish State
Park

Lorin Reinelt, Senior Water Quality Engineer
King County Surface Water Management Division
700 Fifth Ave, Suite 2200
Seattle WA 98104

Dear Mr. Reinelt:

Thank you for your patience waiting for our concurrence statement for the Issaquah Creek Basin Plan. The plan offers some very realistic goals that will improve the quality of the Issaquah Creek Basin. You and your staff's hard work shows in the plan.

Prior to presenting our concurrence statement I would like to offer some observations on Tibbetts Creek channel and floodplain reconstruction that may affect State Parks participation in the process:

1. Currently in the plan Tibbetts Creek Channel and Floodplain Reconstruction projects are prioritized to be implemented on upstream projects first. It seems to make more sense to improve the creek from the mouth up. If upstream improvements are completed first, the improved conveyance may increase flood impacts to down stream areas, i.e., Lake Sammamish State Park.
2. Additional funding support may be required from other agencies and organizations to assist the Lake Sammamish State Park channel capacity project proposed in the basin plan. Impacts from flooding on Tibbetts Creek within the park have been minor in the past with exception of tributary 0170, which has flooded the Ranger's residence on occasion. The increased channel capacity within the park is being proposed to accommodate increased flows from upstream channel improvements. State Parks is not responsible for those increased flows.
3. Prior to State Parks participation in channel widening and restoration work we would like to have WDFW concurrence on the project as well.
4. State Parks recommends that SEPA and environmental permit work for the floodplain reconstruction be completed for the entire Tibbetts Creek Basin, that way the entire system can be properly evaluated as an ecological unit.
5. The earliest State Parks could provide funding for this project would be during the 97/98 biennium. We begin budget preparation two years prior to the start of the biennium. Therefore, the sooner we know the project cost estimate and timing the better.

Concurrence Statement:

The staff of the Washington State Parks and Recreation Commission concurs with the responsibilities identified in the plan for State Parks with the exception of the Lake Sammamish State Park Channel Capacity project (pg. 5-102) on Tibbetts Creek. In regards to Tibbetts Creek, State Parks agrees in concept with the proposed project, however, the level of commitment may be dependent upon available funding and support from other community agencies. State Parks is supportive of protecting and improving the quality of the entire Issaquah Creek Basin. As the basin improves, so will the quality of Lake Sammamish State Park.

Thank you for giving us the opportunity to participate in the Issaquah Creek Basin Plan.

Please call me at (360) 902-8633 if you have any questions or concerns.

Sincerely,



Mike Ramsey, Assistant Manager, Environmental Programs

- cc: David W. Heiser, E.P., Manager, Environmental Programs
Tom Boyer, P.E., Chief, Engineering and Construction
Don Simmons, Manager, Puget Sound Region
Randy Person, Assistant. Chief, Site Planning
Doug Whisman, Manager, Lake Sammamish State Park
Doug Strong, Parks & Recreation Coordinator, Boating Program



**Washington State
Department of Transportation**

Sid Morrison
Secretary of Transportation

District 1
15700 Dayton Avenue North
P.O. Box 330310
Seattle, WA 98133-0310
(206) 440-4000

March 9, 1995

RECEIVED
MAR 13 1995

KING COUNTY
SURFACE WATER MANAGEMENT DIVISION
JIM KRAMER

Mr. Jim Kramer
King County Surface Water Management Division
King County Department of Public Works
700 Fifth Avenue, Suite 2200
Seattle, WA 98104

Statement of Concurrence for the
Issaquah Creek Basin and Non-
Point Action Plan

Dear Mr. Kramer:

I am pleased to transmit a Statement of Concurrence by the Washington State Department of Transportation (WSDOT) for implementation of the Issaquah Creek Basin And Nonpoint Action Plan. Our Statement of Concurrence addresses recommendations that require action by WSDOT. I would like to thank you, the members of the Watershed Management Committee, and county staff for their hard work and long hours over the past years to produce this action plan. Your efforts to protect the water quality and associated aquatic resources of the Issaquah and Tibbits Creek Watersheds are very much appreciated.

The primary contact for WSDOT participation in implementation of the plan is Dale Morimoto, Northwest Region Environmental Manager, (206) 440-4548. Other contacts are :

Don Komac, Area 4 Maintenance Superintendent, Kent, 872-6470, or
Phil George, Area 5 Maintenance Superintendent, Bellevue, 822-4161

Thank you again for your efforts. If you have any questions or require further information, please contact us.

Sincerely,

RONALD Q. ANDERSON, P.E.
Regional Administrator

EH:tm

Enclosure: Statement of Concurrence February 1995

cc: Don Komac, MS-44
Phil George, MS-45



**Washington State
Department of Transportation**
Sid Morrison
Secretary of Transportation

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Issaquah Creek Watershed Nonpoint Action Plan

STATEMENT OF CONCURRENCE

by the
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

March 1995

Recommendation

BW-17: Improvement of Water Quality from Road Drainage Systems:
Page 4-34

WSDOT supports the objectives of recommendation BW-17. A Stormwater Outfall Inventory Program is underway to examine, prioritize, and rank stormwater retrofit opportunities for all state highways in accordance with the Puget Sound Runoff Program (Chapter 173-270 WAC May 1991). The Assistant Environmental Program Manager for Hydraulics (206-440-4642) is the contact for specific information about facilities inventoried in the Issaquah Creek Basin. In addition, a portion of the basin in unincorporated King County is included in the National Pollutant Discharge Elimination System (NPDES) permit to be issued in the spring of 1995. As part of the permit, a stormwater management program, approved by the Department of Ecology, will be developed.

Requirements for erosion, sediment, and pollutant control measures for all highway construction projects are identified in WSDOT's Highway Runoff Manual (HRM). The HRM is consistent with the Department of Ecology's Stormwater Management Manual for the Puget Sound Basin, pursuant to WAC 173-270.

WSDOT maintenance procedures for road-related drainage systems are defined in the HRM and the WSDOT Maintenance Manual. The intent is to guide the preservation of facilities in a condition, function, and capacity that matches, as nearly as possible, the original design and construction. Further, WSDOT maintenance activities are intended to minimize impacts on water quality, and the HRM defines specific procedures to minimize water quality impacts. As new information on maintenance BMPs continues to become available, it will be evaluated for incorporation into WSDOT stormwater protection policies. The Maintenance Supervisors listed on the cover letter to this attachment serve as contacts for WSDOT maintenance activities in the Issaquah Creek basin. AREA 4 is responsible for SR 900. The portions of I-90 and SR 18 in the Issaquah Creek basin are maintained by AREA 5.

WSDOT published a programmatic Final Environmental Impact Statement (FEIS) on Roadside Vegetation Management in December 1993. The FEIS selected Alternative G - Locally Based, Long-Term Planning and Integrated Vegetation Management as the preferred alternative. Alternative G incorporates principles of Integrated Pest Management within the development of Roadside Management Plans (RMPs). WSDOT has developed two RMPs for other areas in the state as test projects, and has secured grant funding to continue working on program objectives. Implementation of Alternative G in the Issaquah Creek basin is dependent on the development of an RMP for the area. In the interim, WSDOT will be transitioning into utilizing principles of Integrated Pest Management in making vegetation management decisions, and efforts will be made to minimize the use of chemical management techniques in the basin. Larry Russ, (206-705-7853) Chief Landscape Architect for WSDOT Operations and Maintenance, should be contacted for further information about development of Roadside Management Plans.

Recommendation

BW-18: Development of a Spill Response Program

Page 4-36

WSDOT will work cooperatively with the implementing agencies and other participants in a coordinated spill response plan for the Issaquah Creek watershed. WSDOT's primary function will be to provide the expertise and services of the Incident Response Team for emergency situations. In the event of a spill/accident, the WSDOT Incident Response Team generally handles traffic control operations on state highways. The NW Region Incident Response Team Supervisor, Gerald Althausen (206-464-5838), serves as a contact for WSDOT's HAZMAT/Emergency Response programs in the Issaquah Creek basin vicinity.

2543 Upper Holder Fish Passage Page 5-11

Four weirs are required on the apron of the Holder Creek Culvert, River Mile 16.4 and SR 18 MP 22.1, for salmonoid passage across the concrete slab to the fishway in the culvert:

WSDOT concurs with the intent of the fish passage proposal 2543. Implementation of this recommendation is dependent on the availability of funds. WSDOT will investigate the following funding sources for implementation of barrier correction projects.

1. Culvert correction for sites that pose fish passage problems are systematically addressed by WSDOT and the Washington State Department of Fisheries and Wildlife (WDFW) via the Interagency Agreement of 1991. In conformance with that agreement, which includes funding provisions, WDFW has completed a review of WSDOT rights of way for features that block upstream migration of salmonoids, and is now working on habitat evaluations and fish use verification for those culverts. Data from the habitat evaluations and fish use verification will be used to help prioritize work requests for removing fish barriers. WDFW anticipates

completing this phase of the evaluation by 1997. While significant progress has been made, resolution of all culvert blockages will take an extensive program of planning, surveying, evaluation, and construction.

2. Fish passage projects can also be funded by a road project if the fish barrier is located within the project's boundaries and it has been determined to be cost effective to address the barrier problem during road construction.

The Holder Creek culvert at River Mile 16.4 is currently not on the inventory of fish blockages. Funding for repair will be attempted and the proposal will be forwarded to WDFW for review and possible addition to the inventory of blockages.

2544 Tributary 0220 Fish Passage 1
Page 5-12

WSDOT should retrofit the lowermost of the two 56-inch culverts under SR 18 at MP 22.76 with baffles to permit movement of salmonoids upstream:

WSDOT concurs with the intent of fish passage proposal 2544 and will investigate funding sources for implementation of barrier correction projects.

Fish passage proposal 2544 is currently not on the inventory of fish blockages described under item 2543. It will be forwarded to WDFW for review and possible addition to the inventory of fish blockages.

2545 Tributary 0220 Fish Passage II
Page 5-12

WSDOT should retrofit the single 56-inch culvert under SR 18 at MP 22.94 with baffles to permit movement of salmonoids upstream:

WSDOT concurs with the intent of fish passage proposal 2545 and will investigate funding sources for implementation of barrier correction projects.

Fish passage proposal 2545 is currently not on the inventory of fish blockages described under item 2543. It will be forwarded to WDFW for review and possible addition to the inventory of fish blockages.

EF-5 Retrofitting of Interstate 90 Drainage System

Page 5-60

WSDOT, in coordination with King County Surface Water Management (SWM), should establish retrofit priorities of the I-90 drainage systems that discharge to the East Fork of Issaquah Creek:

WSDOT supports the objectives of recommendation EF-5. A Stormwater Outfall Inventory Program is underway to examine, prioritize, and rank stormwater retrofit opportunities for all state highways in accordance with the Puget Sound Runoff Program (Chapter 173-270 WAC May 1991). The Assistant Environmental Program Manager for Hydraulics (206-440-4642) is the contact for specific information about facilities inventoried in the Issaquah Creek Basin. In addition, a portion of the basin in unincorporated King County is included in the National Pollutant Discharge Elimination System (NPDES) permit to be issued in the spring of 1995. As part of the permit, a stormwater management program, approved by the Department of Ecology, will be developed.

6711 Conveyance Improvements on the Mainstem;

B, Interstate-90 Culvert Replacement

Page 5-101

WSDOT should replace the culverts at the crossing of Interstate 90, MP 13.65, and Tibbetts Creek with a bridge or other spanning structure:

WSDOT recognizes the benefits of 6711B. These benefits would include a more efficient bedload conduit under I-90 and reduced WSDOT maintenance costs for removing sediment. In that regard, maintenance of the downstream channels through Lake Sammamish State Park as well as the I-90 roadway profile necessitates that upstream sources of sediment be controlled. Currently, adjacent culverts restrict the energy available for operation of the I-90 culvert system and are primary contributors to local area flooding.

The I-90 culvert system represents a public investment that far exceeds the value of adjacent stream crossing structures. Adjacent culverts should thus, when necessary, be replaced with bridges to facilitate bedload migration and conservation of the limited energy for use by the I-90 culvert system. The WSDOT Tibbitts Creek system will be reevaluated following those replacements. WSDOT will consider a bridge or single barrel culvert installation when the Tibbitts Creek culvert system requires replacement. Such replacement could be facilitated by a structural failure, flooding of I-90, the existence of a hazard to public safety, or the undertaking of a major highway project in the area with available funding.

**6711 Conveyance Improvements on the Mainstem;
E, State Route 900 Fish Passage**
Page 5-101

WSDOT should replace the long box culvert at SR 900, MP 19.47, with a spanning structure. The stream channel should be restored to a more natural state at the conclusion of the project. Temporary baffles should be placed in the culvert and a weir on the concrete apron should be installed to ensure fish passage:

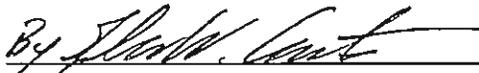
WSDOT concurs with the intent of fish passage proposal 6711E and will investigate funding sources for implementation.

Fish passage proposal 6711E is currently not on the inventory of fish blockages described under item 4543. It will be forwarded to WDFW for review and possible addition to the inventory of fish blockages.

**6712 Conveyance Improvements on Tributaries;
B, State Route 900 Fish Passage and Stream Modification on Tributary 0171
Page 5-102**

WSDOT should rebuild the crossing of tributary 0171 under SR 900, MP 20.4, and adjacent stream reaches to allow free access to the upper tributary system:

Fish passage proposal 6712B is on the State Highway Fish Passage Inventory described under item 4543. The gradient from the culvert to Tibbitts Creek is severe and cannot be modified in a temporary manner. The passage issue will either be addressed with the SR 900 widening or it will be prioritized and addressed by way of the State Highway Fish Passage Inventory which is developed in conjunction with WDFW.



RONALD Q. ANDERSON, P.E.
Regional Administrator
Washington State Department of Transportation

Dated this 9 day of March, 1995

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Acronyms and Abbreviations

BAT	Basin Advisory Team
BMP	Best Management Practice
BW	Basinwide Recommendation
CIP	Capital Improvement Project
COE	U.S. Army Corps of Engineers
DDES	Department of Development and Environmental Services (King County)
DIR	Drainage Investigation and Regulation (SWM)
DNR	Department of Natural Resources (King County)
DOH	Washington State Department of Health
EIS	Environmental Impact Statement
EF	East Fork Issaquah Creek Subbasin
EPA	Environmental Protection Agency (United States)
FEMA	Federal Emergency Management Administration
FM	Fifteenmile Creek Subbasin
GMA	Growth Management Act (State of Washington)
HEC-2	Hydrologic Engineering Center model version 2
HPA	Hydraulic Project Approval
HSPF	Hydrologic Simulation Program - Fortran
K.C.C.	King County Code
KCD	King Conservation District
KCDNR	King County Department of Natural Resources
KCSWD	King County Solid Waste Division
KCFWS	King County Flood Warning System
LI	Lower Issaquah Creek Subbasin
LSRA	Locally Significant Resource Area
LWD	Large Woody Debris
MD	McDonald Creek Subbasin
MDP	Master Drainage Plan
Metro	Department of Metropolitan Services (King County)
MI	Middle Issaquah Creek Subbasin
MIT	Muckleshoot Indian Tribe
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPD	Master Planned Development
NEPA	National Environmental Protection Act
NF	North Fork Issaquah Creek Subbasin
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
PSWQA	Puget Sound Water Quality Authority
RCW	Revised Code of Washington
R/D	Retention/Detention
RM	River Mile
RSRA	Regionally Significant Resource Area
SAO	Sensitive Areas Ordinance (King County)
SBUH	Santa Barbara Urban Hydrograph
SCS	Soil Conservation Service
SEPA	State Environmental Protection Act

SKCDPH	Seattle-King County Department of Public Health
SQHWG	Small Quantity Hazardous Waste Generators
SLS	Save Lake Sammamish
SWD	Seattle Water Department
SWM	Surface Water Management Division (King County)
TDC	Transfer of Development Credits
TESC	Temporary Erosion and Sedimentation Control
T	Tibbetts Creek Subbasin
UI	Upper Issaquah Creek Subbasin
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UST	Underground Storage Tank
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife (formerly WDW and WDF)
WDNR	Department of Natural Resources (State of Washington)
WDOE	Department of Ecology (State of Washington)
WMC	Watershed Management Committee
WSDA	Washington State Department of Agriculture
WSDOT	Washington State Department of Transportation
WSPRC	Washington State Parks and Recreation Commission

