King County

Public Rules

Title	Document Code No.
Beaver Lake Management Plan	PUT 8-7 (PR) KCC 9.08
Department/Issuing Agency Department of Public Works/Surface Water Management Division	Effective Date June 8, 1995

King County
Public Rules and Regulations

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Beaver Lake Management Plan	PUT 8-7 (PR) KCC 9.08
Department/Issuing Agency Department of Public Works/Surface Water Management Division	Effective Date June 8, 1995
Approved Tony Fischer 5/5/95	

1.0 SUBJECT TITLE: Beaver Lake Management Plan

1.1 EFFECTIVE DATE: The effective date of this Public Rule is thirty days after the filing date with the Clerk of the Council.

1.2 TYPE OF ACTION: NEW.

1.3 KEY WORDS: (1) Drainage; (2) Total Phosphorus Removal; (3) Permit Review; (4) Lake Management Plan; (5) Design Manual; (6) Surface Water Management Division; (7) Department of Development and Environmental Services.

2.0 PURPOSE: To designate the Beaver Lake watershed a special management area for total phosphorus loading control and to establish a standard procedure for evaluating drainage plans and related materials for applications of development within the Beaver Lake Watershed (within the East Lake Sammamish Drainage basin) for their conformance with an 80% total phosphorus loading reduction goal or AKART (all known, available, and reasonable methods of prevention, control and treatment) as applied to all new stormwater inputs.

3.0 ORGANIZATIONS AFFECTED:

3.1 Landowners and residents of unincorporated King County, Beaver Lake watershed.

3.2 Applicants.

3.3 Department of Development and Environmental Services (DDES) or its successor agency.

3.4 Department of Public Works, Surface Water Management Division, or their successor agencies.

4.0 REFERENCES: King County Code 9.08.010 and 9.08.120; King County Code 2.98; Ordinance 11522; Surface Water Design Manual.

5.0 DEFINITIONS: In addition to the definitions listed in Section 5 of this Public Rule, all definitions included in the King County Surface Water Design Manual are hereby adopted by reference.

5.1 "AKART" means all known, available, and reasonable methods of prevention, control, and treatment.

5.2 "Eutrophic" means a trophic status characterized by moderately high algal productivity, more serious oxygen depletion in the bottom waters, some recreational use impairment, summer chlorophyll a concentration greater than 10 μg/l, a summer Secchi depth of <2 meters, and a winter total phosphorus concentration greater than 20 μg/l.

5.3 "Hypereutrophic" means a trophic status characterized by high algal productivity, intense algal blooms, fish kills due to oxygen depletion in the bottom waters, frequent recreational use impairment, summer chlorophyll a concentration greater than 10 μg /l, a summer Secchi depth generally less than 2 meters, and a winter total phosphorus concentrations greater than 30 μg/l.

5.4 "Lake Management Plan" means the plan (and supporting documents as appropriate) describing the lake management recommendations and requirements which are formally adopted by rule under procedures specified in K.C.C. 2.98.

5.5 "Mesotrophic" means a trophic status characterized by moderate algal productivity, oxygen depletion in the bottom waters, usually no recreational use impairment, summer chlorophyll a concentration averaging 4-10 μg/l, a summer Secchi depth of 2-5 meters, and a winter total phosphorus concentrations ranging from 10-20 μg/l.

5.6 "Oligotrophic" means a trophic status characterized by low algal productivity, algal blooms are rare, water clarity is high, all recreational uses unimpaired, summer chlorophyll a concentration average less than 4 μg/l, a summer Secchi depth greater than 5 meters, and a winter total phosphorus concentrations ranging from 0-10 μg/l.

5.7 "Phosphorus" means elemental phosphorus and for the purposes of this reule shall be measured as total phosphorus.

5.8 "Phosphorus Concentration" means the mass of phosphorus per liquid volume.

5.9 "Phosphorus Loading" means the total mass of phosphorus per time basis.

5.10 "Total Phosphorus" means the phosphorus concentration as determined by a state certified analytical laboratory using EPA 365.3 or SM 4500-P-B,E or an equivalent method.

5.11 "Trophic State Index" means a classification system which uses algal biomass as the basis for classification which can be independently measured by chlorophyll a, Secchi depth, and total phosphorus concentration.

5.12 "Trophic Status" means a classification which defines lake quality by the degree of biological productivity.

6.0 POLICIES

6.1 The Beaver Lake watershed as generally identified in the Beaver Lake Management Plan, which is available in summary to all Surface Water Design Manual subscribers or for purchase at the Surface Water Management Division or the Department of Development and Environmental Services, is a sensitive lake and is hereby designated a critical drainage area. This designation is:

6.1.1 Existing whole-lake total phosphorus concentration for the combined Beaver Lake system is 23 μg/l. Beaver Lake 1 and Beaver Lake 2, individually, have whole-lake total phosphorus concentrations of 36 ($\pm$2) μg/l and 20 ($\pm$1) μg/l, respectively;

6.1.2 Whole-lake total phosphorus concentration, chlorophyll a, and secchi depth indicate that the Beaver Lake system is bordering on eutrophic conditions;

6.1.3 Modeling of the Beaver Lake system's future trophic status indicates that the lake will become hypereutrophic with a whole-lake total phosphorus concentrations predicted to be 36 μg/l without additional phosphorus removal via stormwater treatment;

6.1.4 Maintaining existing trophic status is a management plan goal. To maintain existing trophic status, an 80 percent total phosphorus annual loading removal goal was established for new impervious surface development prior to stormwater discharges to Beaver Lake.

6.2 The standards specified in Policy 6.4 of this Public Rule shall apply to all development proposals located within the Beaver Lake watershed which require drainage review as specified in the King County Surface Water Design Manual.

6.3 Development proposals within the Beaver Lake watershed may be exempt from management plan requirements if they demonstrate to the satisfaction of the Department of Development and Environmental Services that on-site surface and stormwater runoff drainage does not in fact drain into the basin mapped in Appendix 9.1 of this Public Rule.

6.4 For projects which create greater than 5,000 sq. ft. of new impervious surface subject to vehicular use in the Beaver Lake watershed, the following conditions shall apply, unless the conditions identified in Policy 6.3 are documented to the satisfaction of the Department of Development and Environmental Services.

6.4.1 The proposed stormwater facilities shall be designed to remove 80 percent of all new total phosphorus loading on an annual basis due to new development (and associated stormwater discharges) in the Beaver Lake watershed where feasible or utilize AKART if unfeasible.

Currently the AKART standard or interim best management practices for phosphorus sensitive lakes can be fulfilled by the following stormwater treatment design criteria:

6.4.1.1 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).

6.4.1.1.1 Mandatory roof downspout infiltration unless shown to be unfeasible, and maximization of forest or native vegetation retention.

6.4.1.1.2 Pond volume can be reduced by maximizing forest retention according to the following schedule:

Forest (%)	VB/VR ratio
25	4.25
30	4.00
40	3.50
50	3.25
60	3.00

6.4.1.1.3 Forest retention areas shall be in tracts dedicated to the County. Buffers without trails can be counted in the percent forest figure.

6.4.1.1.4 The VB/VR ratio is the volume of the wet pond 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. Runoff can be estimated using a runoff coefficient of 0.9 for impervious area and 0.25 for all other pervious area. Forested areas in tracts dedicated to the County need not be included in the calculation of pond sizing (i.e. zero new runoff volume assumed). If this method is used in other areas, and Seatac precipitation statistics under-estimate the rainfall as judged by the isopluvial distribution of the 2-year 24-hour precipitation, the mean annual rainfall should be adjusted upward.

6.4.1.2 Although current King County SWM designs are not complete for sand filtration, incorporation of sand filters into stormwater treatment facility designs (i.e. treatment trains) can be pursued through the variance process to achieve additional total phosphorus removal. The proponent must demonstrate that equivalent or improved total phosphorus treatment can be expected with an alternative treatment system which incorporates sand filtration than by methods described in 6.4.1.1.

6.4.1.3 Where soil are suitable, on-site infiltration of storm water runoff can be pursued through the variance process as an AKART alternative. Soils are considered suitable for infiltration if at least two feet of soil exist where one of the following soil conditions are met: 1) the cation exchange capacity of the soil equals or is greater than five milliequivalents; 2) the organic content of the soil is equal to or greater than five percent; 3) the grain size distribution of site soils is equivalent to not more than 25 percent gravel by weight (75 percent passing the #4 sieve) and of that passing the #4 sieve, either a) 50 percent minimum passes the #40 sieve and two percent minimum passes the #100 sieve, or b) 25 percent minimum passes the #40 sieve and five percent minimum passes the #200 sieve; and 4) the infiltration rate is 2.4 inches/hour or less. Additionally, the proponent must demonstrate that equivalent or better phosphorus treatment can be expected with on-site infiltration than by methods described in 6.4.1.

6.4.1.4 As the King County Surface Water Design Manual is updated and additional treatment options and designs for total phosphorus removal become available, alternative treatment systems may be utilized if the AKART standard for phosphorus removal can be demonstrated.

6.4.2 Hydrologic analysis shall be determined using a continuous hydrologic model such as the Hydrologic Simulation Program-Fortran (HSPF), the King County Runoff Time Series program (KCRTS), the Santa Barbara Urban Hydrograph, or the VB/VR methodology . These methodologies may be revised or superseded by other methodologies

for achieving the same performance goal as stipulated by future revision to the Surface Water Design Manual.

6.5 This Public Rule will only be in effect until December 31, 1996 unless a Lake Management District has been formed for the Beaver Lake watershed in 1996.

6.6 If any portion of this Public Rule or its application to any person or property is held invalid, the remainder of this Public Rule or the application of the provision to other persons or property shall not be affected.

6.7 This Public Rule is exempt from the rule of strict construction and shall be liberally construed to give full effect to the objectives and purposes for which it was adopted.

7.0 PROCEDURES

Responsibility	Action	
DDES	7.1	Identifies that the project is in the Beaver Lake watershed.
DDES	7.2	Informs applicant that the project is located in the Beaver Lake Management Plan area.
Applicant	7.3	Submits additional information which either:
		7.3.1 Demonstrates that the project qualifies for the exemption in Policy 6.3; or
		7.3.2 Complies with Policy 6.4.
DDES	7.4	Reviews the materials submitted in step 7.3 and determines if it complies with the Beaver Lake Management Plan.
		7.4.1 Returns inadequate material to the applicant with specific instructions to comply with step 7.3.
		7.4.2 Forwards adequate engineering plans to be processed according to the established review process.

8.0 RESPONSIBILITIES

8.1 The Surface Water Management Division is responsible for:

8.1.1 Amending this Beaver Lake Management Plan Public Rule if requirements of the Beaver Lake Management Plan Public Rule warrant alteration.

8.1.2 Updating the Beaver Lake Management Plan Public Rule as new information becomes available.

8.2 The DDES is responsible for:

8.2.1 Identifying each project which is within the Beaver Lake Management Plan area.

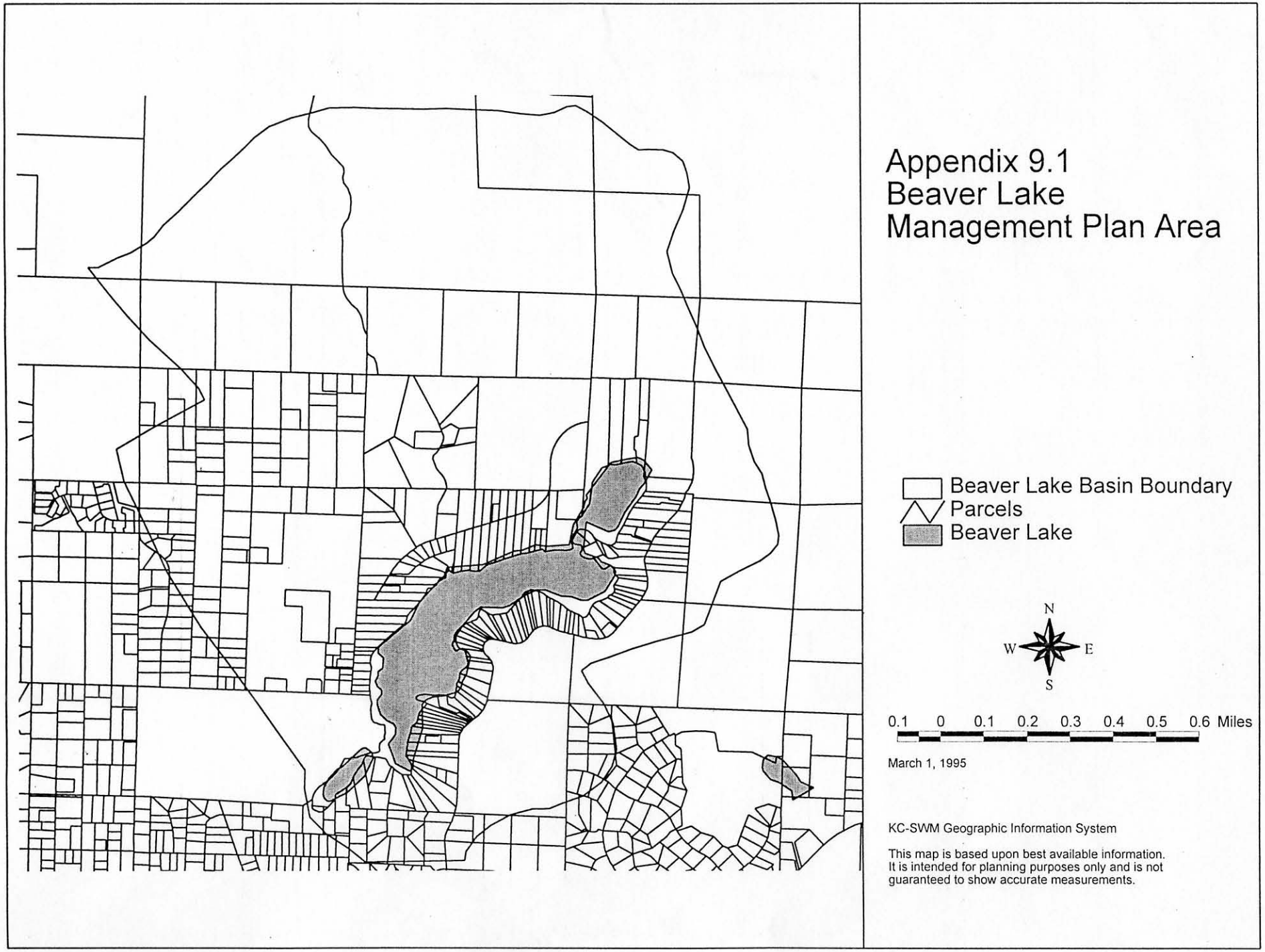
8.2.2 Determining if the material submitted by the applicant complies with either Policy 6.3 or Policy 6.4 of this Public Rule.

8.3 The applicant is responsible, at a minimum for:

8.3.1 Demonstrating that the project complies with Policy 6.3 or with the requirements in Policy 6.4 of this Public Rule.

9.0 APPENDICES

9.1 Map of the Beaver Lake Management Plan Area. Precise borders of this management area are indicated on the Beaver Lake Watershed Map at the DDES permit center.


Appendix 9.1
Beaver Lake
Management Plan Area
Beaver Lake Basin Boundary
Parcels
Beaver Lake
N
W
E
S
0.1 0 0.1 0.2 0.3 0.4 0.5 0.6 Miles
March 1, 1995
KC-SWM Geographic Information System
This map is based upon best available information.
It is intended for planning purposes only and is not
guaranteed to show accurate measurements.

Appendix 9.1

Beaver Lake Management Plan Area

King County Surface Water Management

- Watershed Boundary
- Parcel Boundary
- Road
- Lake
- Lake Outlet

Sources: King County GIS Parcel Coverage, 1995; Aerial Photos, 7-22-89, 1:12,800; Aerial Photos, 9-14-89, 1:13,500; Aerial Photos, 4-11-89, 1:7,200; King County Wetland Notebooks, 1980; Field Survey, 11-95. Produced 12-95 FB

King County Surface Water Management

Everyone lives downstream