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Lake Desire Management Plan

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King County Public Rules

Title

Lake Desire Management Plan

Document Code No.

PUT 8-9 (PR)
KCC 9.08

Department/Issuing Agency

Department of Natural Resources/Surface Water Management Division

Effective Date

July 18, 1996



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KING COUNTY COUNCIL

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Approved *[Signature]* 6/14/96

1.0 SUBJECT TITLE: Lake Desire Management Plan

- 1.1 **EFFECTIVE DATE:** The effective date of this Public Rule will be the date after the Soos Creek Community Plan P-suffix condition (Soos Creek Community Plan Update 1991, page 164, A-12) is repealed by the Metropolitan King County Council or at least thirty days after this public rule is filed with the Clerk of the Council.
- 1.2 **TYPE OF ACTION:** NEW.
- 1.3 **KEY WORDS:** (1) Drainage; (2) Phosphorus Removal; (3) Permit Review; (4) Lake Management Plan; (5) Surface Water Design Manual; (6) Surface Water Management Division; (7) Department of Development and Environmental Services; and (8) Lake Desire.

2.0 **PURPOSE:** To designate the Lake Desire watershed (Appendix 9.1) a special management area for total phosphorus loading control and to establish a standard procedure for evaluating drainage plans and related materials for applications to development within the Lake Desire watershed (within the Cedar River Drainage basin) for their conformance in meeting a 50 percent phosphorus removal goal. Currently, to achieve conformance with the 50 percent total phosphorus loading reduction goal, the Sensitive Lake Protection Menu of the 1996 Draft Surface Water Design Manual update (Appendix 9.2) shall be applied to all new or redevelopment related stormwater inputs which drain to Lake Desire.

3.0 ORGANIZATIONS AFFECTED:

- 3.1 Landowners and residents of unincorporated King County, Lake Desire watershed area.
- 3.2 Applicants for development in the Lake Desire watershed area.
- 3.3 Department of Development and Environmental Services.
- 3.4 Department of Natural Resources, Surface Water Management Division.

4.0 **REFERENCES:** King County Code 9.08.010 and 9.08.120; King County Code 2.98; Ordinance 12101; and King County Surface Water Design Manual (1990 and February 1996 draft update) hereinafter referred to as the Design Manual.

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

5.1 "Eutrophic" means a lake 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 $\mu\text{g/l}$, a summer Secchi depth of <2 meters, and winter total phosphorus concentrations greater than 20 $\mu\text{g/l}$.
- 5.2 "Hypereutrophic" means a lake 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 $\mu\text{g/l}$, a summer Secchi depth generally less than 2 meters, and winter total phosphorus concentrations greater than 30 $\mu\text{g/l}$.
- 5.3 "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.
- 5.4 "Mesotrophic" means a lake 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 $\mu\text{g/l}$, a summer Secchi depth of 2-5 meters, and winter total phosphorus concentrations ranging from 10-20 $\mu\text{g/l}$.
- 5.5 "Mean Annual Storm" means a storm derived rainfall event defined by the U.S. Environmental Protection Agency in the Results of the Nationwide Urban Runoff Program (NURP), 1986. The mean annual storm is defined as the annual rainfall divided by the number of storm events in the year. The NURP studies refer to pond sizing using the V_b/V_r ratio: the ratio of the pond volume (V_b) to the volume of runoff from the mean annual storm (V_r).
- 5.6 "Oligotrophic" means a lake 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 $\mu\text{g/l}$, a summer Secchi depth greater than 5 meters, and a winter total phosphorus concentrations ranging from 0-10 $\mu\text{g/l}$.
- 5.7 "Phosphorus" means elemental phosphorus and for the purposes of this rule 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 in an inflowing stream, surface water runoff, direct discharge through pipes, groundwater, and other sources over a specified time period (often annually).
- 5.10 "Phosphorus Sensitive Lake" means a lake of high resource value which has a combination of water quality characteristics and watershed development potential that makes them particularly prone to eutrophication induced by development.
- 5.11 "Pollution-generating Impervious Surface" means those impervious surfaces which are subject to vehicular use or storage of leachable material, wastes or chemicals, and which receive direct rainfall or the run-on or blow-in of rainfall.

- 5.12 "Redevelopment Project" means a project that proposes to add, replace, and/or alter impervious surface (for purposes other than routine maintenance, resurfacing, regrading, or repair) on a site that is already substantially developed (i.e., has 35 percent or more of existing impervious surface coverage).
- 5.13 "Subject to vehicular use" means a surface whether paved or not, which is regularly used by motor vehicles. This includes roads, unvegetated road shoulders, bike lanes within the roadway, driveways, parking lots, unfenced firelanes, diesel equipment storage yards, and airport runways.
- 5.14 "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.
- 5.15 "Trophic State Index" means a lake 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.
- 5.16 "Trophic Status" means a classification which defines lake quality by the degree of biological productivity.
- 5.17 " V_r " means the site runoff volume generated from the mean annual storm in the developed condition.

6.0 POLICIES

- 6.1 The Lake Desire watershed, as generally identified in the Lake Desire Management Plan, (which is available in summary to all Design Manual subscribers, for purchase at the Surface Water Management Division, for review at the Department of Development and Environmental Services, or on file and available for review at the King County Fairwood Library), contains a phosphorus sensitive lake and is hereby designated a critical lake watershed. This designation is defined as follows:
 - 6.1.1 Existing (1993-1994) annual whole-lake total phosphorus concentration for Lake Desire system is 49 $\mu\text{g/l}$, summer whole-lake total phosphorus is also 49 $\mu\text{g/l}$;
 - 6.1.2 Whole-lake total phosphorus concentration, chlorophyll a, and Secchi depth indicate that the Lake Desire system is a eutrophic lake;
 - 6.1.3 Modeling of Lake Desire future trophic status indicates that the lake will become hypereutrophic with a summer whole-lake total phosphorus concentration predicted to be 114 $\mu\text{g/l}$ without additional total phosphorus removal via stormwater treatment, in-lake aeration, and watershed best management practices;
 - 6.1.4 Improving existing trophic status is a goal of the management plan;
 - 6.1.5 Improving existing trophic status requires that 50 percent of total phosphorus loading be removed from all new development prior to discharge to any drainage that enters Lake Desire and construction of an in-lake aeration system; and

- 6.1.6 Implementation of an in-lake aeration system is the first priority for improving lake water quality as determined in the lake management plan.
- 6.2 The standards specified in Policy 6.4 of this Public Rule shall apply to all new development or redevelopment proposals located within the Lake Desire watershed which require drainage review as specified in the Design Manual.
- 6.3 Development proposals within the Lake Desire 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 Lake Desire watershed as illustrated in Appendix 9.1 of this Public Rule.
- 6.4 For new or redevelopment projects subject to drainage review which create greater than 5,000 square feet of new and/or replaced pollution generating impervious in the Lake Desire 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 All proposed projects meeting the threshold given in 6.4 shall provide a stormwater treatment facility option as specified below. These facilities or facility combination are sized to remove 50 percent of the total phosphorus loading due to development in the Lake Desire Watershed. When the Design Manual update is adopted, these facilities choices shall be replaced by the sensitive lake protection menu, providing the menu goal for total phosphorus removal remains 50 percent or greater. In the interim, the treatment standard for phosphorus sensitive lakes can be fulfilled immediately by implementing one of the following options:
- 6.4.1.1 A wetpond or combined detention/wetpond with a permanent pool volume equal to 4.5 times the volume of runoff (V_r) from the mean annual storm (pond volume = $4.5 V_r$). The wetpond sizing criteria is described in Appendix 9.3.
- 6.4.1.2 A two-facility treatment train which involves the use of a biofiltration swale, filter strip, wetpond, basic combined detention and wetpond, or wetvault followed by a linear sand filter, sand filter vault, or basic sand filter (Appendix 9.2). All facilities should be designed using the criteria detailed in Chapter 6 of the February 1996 draft Design Manual. A storage volume of $3V_r$ applies to the wetpond, combined detention/wetpond, and wetvault options;
- 6.4.1.2.1 A phosphorus credit may be accrued to substitute for the second water quality facility, provided enough credits are earned. Credit earning actions include: (1) leaving 20 - 65 percent of the site in undisturbed native vegetation; (2) directing runoff to grassy areas with level spreading; (3) covered parking or covered waste disposal and recycling

areas isolated from stormwater conveyance system; and (4) covered vehicle washing areas connected to the sanitary sewer system. Each credit action has a range of possible points associated with it. These credits are detailed in Appendix 9.2.

6.4.1.2.2 A phosphorus credit may also be accrued by making a voluntary payment towards the design and construction of an in-lake aeration system for Lake Desire. This payment can substitute for the second water quality facility but must produce a compensating or comparable water quality benefit to Lake Desire as determined by the Surface Water Management Division. Facility sizing may also be considered in determining compensating or comparable benefits associated with this credit. The amount of such payment will be project specific and determined through the Surface Water Design Manual variance process. All payments collected under the provisions of this section will be held in a reserve account until expended on design and construction of an in-lake aeration system for Lake Desire. The expenditure of individual payments must occur within five years of collection or be refunded with interest to the affected property owners. This credit option will remain in effect for the Lake Desire watershed until construction funding of an in-lake aeration system is completed.

6.4.1.3 For properties located at least a quarter of a mile from Lake Desire and where soils are suitable, on-site infiltration of storm water runoff may be used. General requirements for infiltration facilities are included in Appendix 9.4. Design criteria are detailed in Chapter 6 of the February 1996 Draft Design Manual;

6.4.1.4 As additional treatment options and designs for phosphorus removal become available, alternative treatment systems may be proposed using the experimental variance process. The 50 percent total phosphorus removal goal must be demonstrated as part of the variance application.

6.4.2 Upon adoption of the 1996 Design Manual update, runoff from all new development proposals which is not infiltrated shall be detained by retention/ detention facilities that meet the Level 3 water level protection standard (Appendix 9.5) unless modified in accordance with Policy 6.4.1.2.2. In the interim, until the revised Design Manual with KCRTS is adopted, ponds can be designed using either KCRTS to meet the Level 3 standard or the Soil Conservation Service-Santa Barbara Urban Hydrograph (SBUH), 24-hour Storm Method described in the 1990 Design Manual. In using SBUH, post-development 2-year, 10-year, and 100-year storm flows should not exceed pre-development storm flows equaling 50 percent of the 2-year, 10-

year, and 100-year flows respectively. Additionally, a 40 percent volumetric safety factor shall be added to facilities designed using the SBUH method.

- 6.5 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.
- 6.6 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 GENERAL PROCEDURES

<u>Responsibility</u>	<u>Action</u>
DDES	7.1 Identifies that the project is in the Lake Desire watershed.
DDES	7.2 Informs applicant that the project is located in the Lake Desire Management Plan Public Rule 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 Lake Desire Management Plan Public Rule. 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 Lake Desire Management Plan Public Rule if requirements of the Lake Desire Management Plan Public Rule warrant alteration.
- 8.1.2 Updating the Lake Desire 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 Lake Desire Management Plan Public Rule 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 Lake Desire Management Plan Area. Approximate borders of this management area are also indicated on the Lake Desire Watershed Map at the DDES permit center.
- 9.2 Sensitive Lake Protection Menu and Credit Earning Actions.
- 9.3 Wetpond Sizing.
- 9.4 Infiltration Facilities General Requirements
- 9.5 Flow Control Standards

Please call 206-296-6519 if you would like to receive the appendices (24 pages).

Appendix 9.1: Map of the Lake Desire Management Plan Area.



Lake Desire Management Plan Area
King County Surface Water Management

-  Watershed Boundary
-  Subcatchment Boundary
-  Stream
-  Parcel Boundary
-  Road
-  Wetland
-  Lake
-  Lake Outlet

Sources:
 King County Wetland Notebooks, 1980;
 King County GIS coverage. (Lakes & roads
 boundaries matched to parcels coverage).



Map prepared by GIS/Cartography 1/31/96

