

April 5, 1995

Introduced By: Miller

elsmot/jl

Proposed No.: 95-46

MOTION NO.

9530

A MOTION accepting the executive's
East Lake Sammamish Pipeline study
recommendations and requesting their
inclusion in implementing legislation.

WHEREAS, on November 8, 1993, the King County council
adopted Ordinance No. 11111, adopting the East Lake Sammamish
Basin Plan, and

WHEREAS the East Lake Sammamish Basin Plan requires
piping of storm water runoff from development proposals
identified in Ordinance 11111, Attachment C, and

WHEREAS the King County council has requested the
surface water management division to complete a full study of
the feasibility of cooperative construction of the pipelines
in four sub-basins, and

WHEREAS the surface water management division has
completed the study and found that pipelines are from 38
percent to 589 percent more expensive than on-site storm
water management, and

WHEREAS the surface water management division has
identified the environmental consequences of not constructing
pipelines, and

WHEREAS the surface water management division recommends
infiltration ponds on outwash soil and enhanced detention
ponds on till soil as an alternative to the pipelines in the
four sub-basins;

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NOW THEREFORE, BE IT MOVED by the council of King

County:

The King County council, having reviewed the East Lake Sammamish Pipeline study (shown as Attachment A) and approved its recommendations to exempt the four study sub-basins from the existing pipeline requirement, requests that the executive include these recommendations in proposed revisions to area zoning and development regulations as part of the Comprehensive Plan update or in the next proposed ordinance modifying the East Sammamish Community Plan.

NOW, THEREFORE BE IT MOVED by the Council of King

County:

PASSED by a vote of 13 to 0 this 17th day of April, 1995.

KING COUNTY COUNCIL
KING COUNTY, WASHINGTON

Kent Pullen
Chair

ATTEST:

Gerald A. Peterson
Clerk of the Council

Attachments:

- A. Eastlake Sammamish Pipeline Study
- B. Ordinance No. 11111, Attachment C

King County Surface Water Management
East Lake Sammamish Pipeline Study

Summary and Requested Council Action

The SWM Division has completed a study to assess the feasibility of constructing pipelines in the East Lake Sammamish (ELS) basin to help control flooding and erosion. The study was requested by the Council as part of Ordinance 11111.

This study specifically reviews the technical and financial feasibility of constructing pipelines in four sub-basins located on the ELS plateau. At the request of the County Council, the SWM Division has explored the possibility of joint funding for the pipelines involving both the public and private sectors.

The conclusion of the study is that the costs of the pipelines are too high relative to their benefits to warrant cooperative construction by private or public financing. The recommended alternative is on-site management of stormwater through infiltration or enhanced detention.

This report summarizes an analysis of environmental consequences of this alternative. Based on this analysis and the high cost of pipelines to property owners, we recommend that the Council exclude these four study basins from the pipeline requirement.

Background

The East Lake Sammamish basin plan was adopted by the County Council on November 8, 1993 by Ordinance 11111. The plan evaluates the water quality, aquatic resources, and surface water problems of the basin under past, current, and future land-use conditions. It also defines a comprehensive surface water management program and a nonpoint source pollution action plan for the basin. A number of recommendations in the plan are basin specific surface water management standards that address the problems of increased runoff caused by new development.

The basin plan's ravine protection standard specifically requires that runoff from all development proposals in designated parcels in the Monohon and Panhandle sub-basins be conveyed down the western slope of the basin via continuous pipelines. The standard also defines a no-disturbance area on the western slope of the sub-basin, to prevent damage from erosion in this extremely sensitive area. Four potential pipelines were identified from nine sites in these areas that would require the cooperation of a large number of property owners (see attached map for location). The Council requested a pipeline study when adopting the ELS basin plan. The objective of the study is to determine the feasibility of cooperative construction and/or joint funding of these four pipelines. Development of these parcels cannot proceed without the pipelines, except for single-family building permits on existing lots and projects that achieve 100 percent on-site retention.

The ravine protection standard of the ELS Basin Plan establishes a ranked order of preferred stormwater management strategies for new development in selected sub-basins:

1. 100% on-site retention, particularly through infiltration of flows generated by new development;
2. Tightline to convey developed flows past the erosion sensitive slopes directly into Lake Sammamish;
3. Enhanced on-site detention with highly controlled release.

The order of these management strategies reflects an intent to eliminate or minimize increased stormwater volumes and peak flows to at-risk ravines through infiltration if feasible, and tightlines where infiltration is not feasible. Infiltration is the preferred form of stormwater control because it reduces stormwater volumes generated by new development, recharges groundwater, contributes to stream baseflow, and benefits fisheries by contributing to upwelling in Lake Sammamish. Enhanced on-site detention is considered a fall-back option when neither infiltration nor construction of a tightline is feasible. It is more stringent than regular detention and requires a larger pond with a smaller outflow to release water more slowly.

Engineering Feasibility

The study examines two options for stormwater management in the four study basins. Option 1 consists of controlling stormwater flows with on-site facilities and Option 2 utilizes a tightline to convey flows down to Lake Sammamish after providing water quality treatment. The methodology used to evaluate the feasibility of these two options was complex, due to the unique relationship between several important parameters, such as soil type, zoning, existing development, size and location of developable parcels, and the no-disturbance zone. Because of this complexity and the unique relationship between the above-mentioned parameters for each basin, each basin was modeled and evaluated separately.

Soil type determined the on-site facility appropriate for each parcel within the basins. Each study basin contains significant areas of both permeable outwash soils and impermeable till soils. For sites located in outwash soils, 100% on-site retention using infiltration is assumed to be possible, feasible, and required. For sites located in till soils, appreciable infiltration is not possible and flows must either be tightlined past the erosion-sensitive slopes, or detained with enhanced detention so that developed discharges are minimized.

The study relies on the crucial assumption that infiltration is possible on outwash soil. This assumption is necessary because the actual infiltrative capacity of local soils can only be determined by site-specific testing. Conservative infiltration rates were used to size facilities on outwash, but the feasibility of infiltration will only be confirmed as development occurs.

For Option 1, infiltration ponds were assumed for parcels on outwash soils and enhanced detention ponds with wetponds for water quality treatment were assumed for parcels on

till soils. For Option 2, in addition to construction of tightlines for flow control, on-site water quality treatment using infiltration on outwash soils and wetponds on till soils was assumed. On-site and tightline costs were determined for each option and basin based on pond and tightline design, construction, and opportunity costs. (see table 1) Opportunity costs approximate the value lost from using land for surface water management facilities. This was estimated at \$70,000 per single family lot and \$10,000 per multi-family unit.

Financial Feasibility

Based on the engineering study, tightlines were shown to be 54% to 589% more expensive than on-site controls depending on the sub-basin area. A detailed financing plan for the tightlines was not completed given this initial projection of costs. However, possible options including private financing using the shared facilities program, County participation in the tightlines, and a sub-basin charge were analyzed for Basin 1. Analysis focused on this basin because it has the most developable lots and the lowest cost per lot of the four basins. See table 2 for a summary of per lot costs for different financing options for Basin 1.

Studies of possible shared facilities have shown that developers can realize substantial savings by contributing to build one large facility rather than several smaller ones. The major factor which makes these facilities economical is that one shared facility takes up less space than multiple small facilities, reducing the number of lots dedicated to surface water facilities. For the tightlines, there was only a small savings in the number of lots required for surface water because on-site water quality treatment is required. Additionally, because of the high level of existing development in the basins, there was a limited number of developable lots to share the costs.

Additional problems with constructing tightlines in these basins as shared facilities are coordination and timing. Under the shared facilities model, it is assumed that the first developer will build the facility and get reimbursement from the County and/or other developers. Currently, voluntary agreements are the only legal mechanism for reimbursement. Local Improvement Districts (LID) and Utility Local Improvement Districts (ULID) are currently not available for use by King County. Establishing a Surface Water Improvement District (SWID) is being explored as part of the shared facilities program.

Regardless of the exact financing mechanism, these basins present difficulties because most of the landowners would only be able to develop a small number of lots. For example, 8 of the 16 parcels in Basin 1 have an existing house and only two parcels have a buildable area of more than three acres. It is hard to predict when or if these parcels will be subdivided for development. Additionally, there are numerous other parcels in Basin 1 which could be subdivided but were not included in the study because they had an existing house and would not yield at least four additional lots. Because of these problems and the high costs of the pipelines, cooperative construction by multiple private landowners is not feasible.

Instead of relying solely on private landowners to build the tightlines, the County could play a larger role. Tightlines could be sized for flows from existing as well as new development in the basin. However, the existing problems in the basin do not rank high on the priority list in relation to other planned CIPs. Currently there is a need for CIP projects in ELS of approximately \$14.2 million of which \$1.8 million is funded in 1995-1997. It would cost the County \$356,186 for Basin 1 and \$48,429 for Basin 2 to fund the difference between a tightline for future flows and a tightline for all flows. Additionally, property owners would still need to pay substantially more for a tightline than for on-site controls.

In order to eliminate that disincentive, the County could fund the tightline up to the difference between tightline and on-site costs. This would cost the County an additional \$742,000 for Basin 1 and \$646,000 for Basin 2. Even if the County could locate funding for these specific projects, it would set a very expensive precedent. Additionally, there has been opposition from environmental groups to proposed tightlines in the ELS basin.

Another option for funding the tightlines would be a sub-basin charge on all property in the sub-basin. For Basin 1, assuming the projected build-out in the study, this would cost approximately \$3,815 per single family equivalent. This would shift over a million dollars of the tightline cost to existing development, but would still be a more expensive option for new development as a whole than on-site controls. Since SWM fees are based on contribution to the problem, undeveloped land would not be charged until it became developed. At that time, a connection charge would need to be assessed. Since the SWM program rate structure does not currently have connection charges or sub-basin fees, ordinance changes would be required. Additionally, depending on the timing of new development, the County might need to build the tightline and wait many years for reimbursement.

Environmental Consequences

The Council asked that SWM identify the environmental consequences if the cooperative construction of pipelines was not feasible. In general, substituting an enhanced-detention pond for a pipeline means that 1) runoff is discharged over the surface at a point onto what may be previously unchanneled slope; 2) the duration of low storm flows is greatly increased; and 3) correction of existing problems does not occur.

Conversely, pipelines would prevent the creation of new channels and additional erosion of sensitive slopes. They could also correct existing problems if designed and integrated into existing systems. However, this study does not address the full environmental impacts of pipeline construction. There are outstanding environmental issues because the pipelines would discharge into Lake Sammamish. The State Department of Ecology will be considering limits on phosphorus concentrations in Lake Sammamish because of a Shoreline and Pollution Control Hearings Boards order from November 1994. Future stormwater outfalls could exceed these limits.

The specific consequences of not building the pipelines vary by basin and are highly dependent on development expectations:

Basin 1

Many Springs Creek has a history of significant channel erosion, and it is the site of several County and private efforts at stabilization. Because of these past problems a defined channel already exists and increased low-flow durations would probably not be noticeable. The environmental consequences of not building a pipeline, therefore, are limited to the likely future course of the erosion that is already occurring in this channel from existing runoff sources.

Basin 2

No surface-water channel is present through much of the no-disturbance zone here. Given recent development this condition may soon change; and without a pipeline such channel erosion would surely occur at buildout. About 100 cubic yards of sediment would likely be eroded in the course of creating this new channel, which in turn would be transported with only some interruption into Lake Sammamish.

Basin 3

Potential impacts are greatest in this basin but depend on development expectations. If redevelopment of existing one acre lots does not occur, consequences are unlikely. But if future redevelopment achieves the underlying zoning, the current impervious area could double. Environmental consequences would be delayed and probably deferred well into the future; they would first be manifest in the initiation of channel erosion east of SW 24th Way, which subsequently clogs the road drainage system and impedes access up this arterial. Thus significant environmental damage would be limited. If the basin is redeveloped, future SWM or Roads capital improvement projects could be required to correct erosion problems.

Basin 6

Based on drainage area and regional curves of channel size, the volume of sediment of transported would probably be only a few tens of yards, trapped mainly in two ponds and Class-2 Wetland 64. Because of the small size of the contributing basin, the duration of flows exiting the pond would be limited and catastrophic stream erosion would be very unlikely, regardless of the ultimate density of upland development.

Recommendations

Because of the high cost of tightlines, lack of suitable financing mechanisms, and limited environmental consequences, on-site controls are recommended for these areas. Infiltration should be used wherever feasible, and enhanced detention should be used in other areas.

Although funding the tightlines that serve the basins as a whole is not cost effective, smaller cooperative ventures could be viable. If some of the smaller parcels are developed simultaneously, a shared pond could make economic sense. This could be especially advantageous if some of the parcels on till soils could share an infiltration pond with parcels on outwash soils. Also, smaller tightlines serving possible multi-family development in Basin 1 or single family development in Basin 2 could be considered when those parcels are developed.

East Lake Sammamish Tightlines

Costs for Surface Water Management: On-site vs. Tightline

	Basin 1	Basin 2	Basin 3
Number of lots/units*	64 SF; 164 MF	83	
On-site	\$1,368,000	\$939,000	\$13
Tightline	\$1,042,000	\$864,000	\$51
Tightline WQ	\$1,068,000	\$721,000	\$12
Total Tightline	\$2,110,000	\$1,585,000	\$64
Difference	\$742,000	\$646,000	\$50
% Difference	54%	69%	

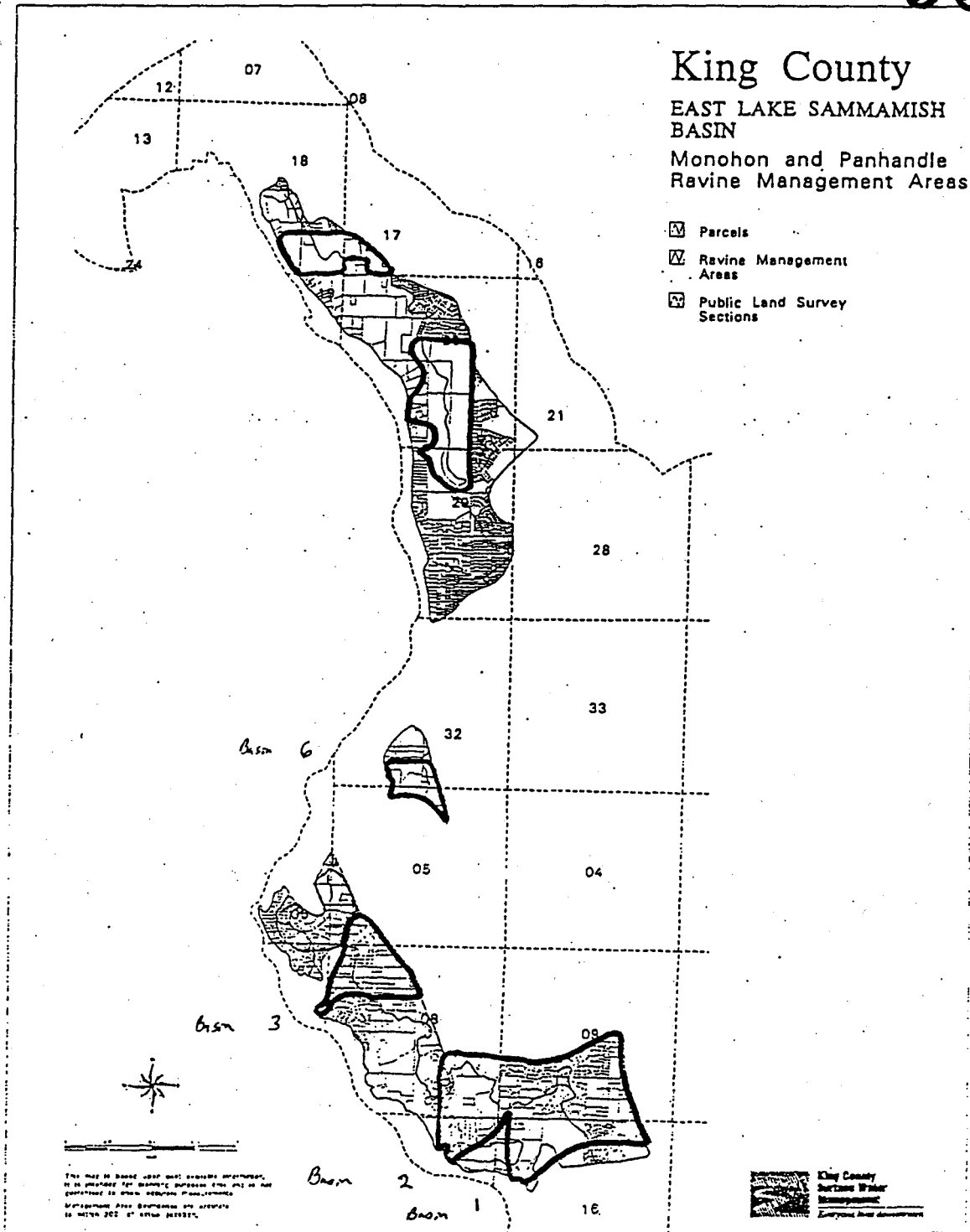
* Total projected developable lots before reductions for surface water facilities

Financing Options

Cost per Single Family Lot Equivalent
Basin 1

Who pays for tightline:	New Development	Basin 1 Landowners	New
County Contribution:	None	None	\$50
Tightline	\$11,085	\$3,815	\$
Tightline WQ	\$11,362	\$11,362	\$1
Tightline Total	\$22,447	\$15,177	\$2
On-site detention	\$14,553	\$14,553	\$1

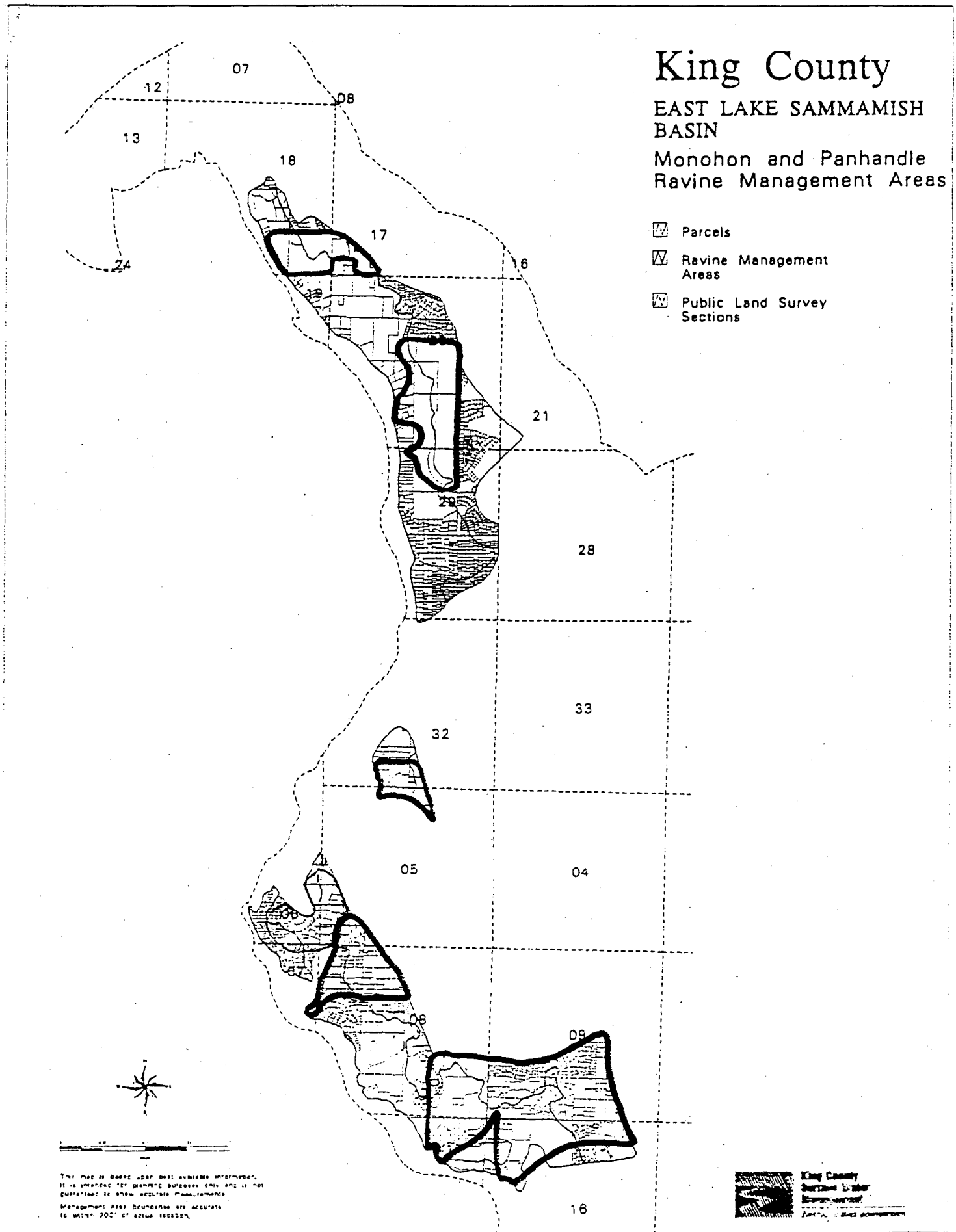
Note: If any participation in addition to new development, assume building of
instead of tightline for new development only (\$1,042,000)
Costs allocated by projected single family equivalent lot (Approximately
ELS basin costs based on Basin 1 tightline only; for all four tightlines th



ATTACHMENT C

OUTLINED AREAS IN THE EAST LAKE SAMMAMISH BASIN MUST PIPE
 STORMWATER DISCHARGE FOLLOWING WATER-QUALITY TREATMENT

(excepting single-family building permits and 100% stormwater infiltration)



ATTACHMENT C ---- OF ORDINANCE 11111

OUTLINED AREAS IN THE EAST LAKE SAMMAMISH BASIN MUST PIPE STORMWATER DISCHARGE FOLLOWING WATER-QUALITY TREATMENT

(excepting single-family building permits and 100% stormwater infiltration)