

# Proposed Plan and Final Supplemental EIS



EXPIRES 9/11/00



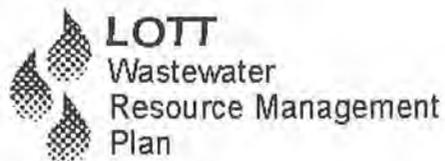
November 1998

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## **LOTT** Wastewater Resource Management Plan

BROWN AND CALDWELL  
and Associated Firms



## CHAPTER ONE: SUMMARY

### 1.3 INTRODUCTION

The LOTT Wastewater Management Partnership helps protect public health and the environment by providing wastewater management services for the urbanized area of north Thurston County. Its four government partners (Lacey, Olympia, Tumwater and Thurston County) jointly manage wastewater resources for today's 14,000 acre area, serving a population of about 69,500 people. Their joint efforts currently include a central treatment plant, major sewer lines, flow management, and long-range planning.

Since 1989, LOTT's ultimate sewer service area has been the long-term Urban Growth Management Area for Lacey-Olympia-Tumwater. Using adopted population estimates for the three cities and county portions of the urban growth area, a 1994 study showed that wastewater flows could exceed the capacity of LOTT's current wastewater treatment plant during wet weather months as early as 2001.

By 1995, the existing LOTT Budd Inlet Treatment Plant had reached 85 percent of its permitted wet weather capacity which is the NPDES permit threshold for a new round of facilities planning. Failure to plan would result in violation of the permits issued to each of the LOTT Partners. Such a violation carries a suite of penalties including no additional connections to the sewers tributary to LOTT joint facilities, no issuance of septic tank permits in the ultimate sewer service area (the Urban Growth Management Area), and fines of up to \$10,000 per day. As a consequence, the ability to manage growth by concentrating it with urban-level services inside the Urban Growth Management Area could be lost. Growth pressures during such a moratorium would likely focus on the rural areas where it is more difficult to provide

urban-level services. Without municipal sewer systems, new structures would use on-site wastewater systems. As pressures grow to increase rural area population density, the drinking water supply could be threatened.

To define and address needs, the LOTT Partners began preparing a 22 year plan for managing the region's wastewater. The planning process started in fall 1995 and has extended for three full years. This chapter summarizes LOTT's proposed Wastewater Resource Management Plan and its integrated Supplemental Environmental Impact Statement (EIS). To meet state environmental evaluation requirements, the plan considers three possible alternatives for future wastewater management in the LOTT service area – *The Highly Managed Alternative* (LOTT's preferred program), a *Traditional Facilities Alternative*, and a *No Action Alternative*. Descriptions of those alternatives are preceded by information about the planning process and factors that influence planning. They are followed by environmental impact, cost, and governance summaries.

The purpose of the LOTT Wastewater Resource Management Plan is to explain how services will be provided, identify the environmental consequences, indicate how these services will be paid for, and describe how LOTT will be managed. This plan is also intended to meet the planning requirements of its National Pollutant Discharge Elimination System (NPDES) Permit, requirements of the federal Clean Water Act, Washington State's water pollution control legislation, the State Environmental Policy Act, state requirements of the Growth Management Act, local environmental protection and land use management covenants and agreements, and the generally held values of the public LOTT serves.

## 1.4 THE PLANNING APPROACH

Before starting the planning process, LOTT's Advisory Committee expressed two goals:

- The planning process must achieve, to the highest degree possible, a community consensus on future wastewater management.
- The end product must be a combined and fully integrated plan and environmental evaluation rather than two separate documents. Environmental evaluation would guide engineering.

To help establish context for the LOTT Wastewater Resource Management Plan, a cross-section of about 50 citizens and stakeholders was asked to identify key questions, values, and attitudes about wastewater. Responses were correlated with results of a simultaneous random sample telephone survey of 615 UGMA residents. The Advisory Committee used the results to define a group of public values. These values were confirmed during public meetings and speakers bureau presentations. They have guided the entire planning process:

- As a first priority, **maximize utilization of LOTT's existing treatment capacity.** Manage demand to avoid or delay the need for new treatment capacity.
- Prepare a plan that **meets current and future wastewater needs** throughout the LOTT service area. Accommodate planned growth, consistent with LOTT's legal requirements.
- Select wastewater facilities for the region's future that yields **maximum benefits to the environment.** Mitigate any potentially adverse impacts of new facilities.
- Take all possible steps to **control facilities costs.** Carefully consider the lowest cost and most cost-effective alternatives, and evaluate the impact on LOTT ratepayers.
- **Treasure LOTT's treated wastewater as a valuable, long-term resource** to be

cleaned and restored, reused, then ultimately returned to the environment.

- Clearly define, demonstrate and document the value to the community of new facilities needed for the future. Design any new LOTT facilities to **produce multiple benefits for the community.**
- **Conduct a pro-active and open facilities planning process** that informs and involves citizens in planning and decision making.
- **Assure an equitable distribution of costs** for any new facilities between current ratepayers and new development.
- Establish an organizational structure to build and operate the region's future facilities effectively and efficiently, one that **assures equitable and accountable representation of the public.**
- Integrate LOTT's facilities plan with other related local issues, plans, and infrastructure programs to maximize regional cooperation and avoid duplication of effort and cost.

Citizens consistently reported throughout the planning process that the two most important public values for guiding wastewater planning are protecting the environment and controlling costs.

Building on the public values and initial planning, the spectrum of wastewater management approaches was divided into nine Program Directions to aid public discussion:

1. **Demand Management:** Delay the need for new wastewater treatment capacity by reducing wastewater flows through water conservation, graywater separation, on-site disposal, and other measures.
2. **Reclamation:** Use treated wastewater for irrigation and commercial/industrial water supply.
3. **Groundwater Recharge:** Use highly treated wastewater to replenish groundwater.
4. **Discharge More in Budd Inlet:** Increase the capacity/quality of the current facilities.

5. **New Puget Sound Discharge in Thurston County:** Find a new marine discharge location in Thurston County.
6. **Puget Sound Discharge in Pierce County:** Use an existing Pierce County marine discharge (Tatsolo Point or Chambers Creek).
7. **Freshwater Discharge:** Find a suitable river discharge location (Deschutes, Black/Chehalis or Nisqually).
8. **Combination:** Use more than one program direction.
9. **No Action.**

The Program Directions and a Programmatic Environmental Impact Statement that evaluated each of them. They were the focus of extensive public information and involvement activities through 1996. In January 1997, study of two directions (No.6 and No.7) stopped due to strong public opposition and adverse features identified in the Programmatic EIS. For the next few months, efforts focused on combining the remaining action directions into a coordinated program to meet defined wastewater needs. On May 30, 1997, the LOTT Advisory Committee defined a "Preferred Program Direction," a non-traditional approach to a combination of the first four Program Directions. The

Preferred Program – presented in this Plan as *The Highly Managed Alternative* – is a direct result of public comment received throughout the planning process.

## 1.3 PLANNING DATA

### 1.3.3 LOTT Planning Area

During public processes conducted from 1990 through 1994, the City of Lacey, City of Olympia, City of Tumwater, and Thurston County developed their respective comprehensive plans for the north Thurston Urban Growth Management Area (UGMA). The UGMA boundary is determined by local jurisdictions and approved by the state. One of the requirements includes provision of urban services within the UGMA, including wastewater management.

The LOTT study area is coincident with the North Thurston County UGMA and represents the ultimate limits of the LOTT service area. The ultimate UGMA boundary and the current incorporated jurisdictional boundaries (which are contained within the UGMA boundary) are shown in Figure 1-1. As of 1996, the combined UGMA includes approximately 51,000 acres equally split between incorporated and unincorporated areas.

**1.3.4 Population and Employment Projections**

Currently, wastewater services have been extended to most areas within the incorporated limits of the three cities. Future regional wastewater services will be provided in response to population and employment increases. This LOTT planning effort is responsive to adopted local plans and neither establishes nor challenges their assumptions or criteria.

Using land use zoning contained in the individual adopted comprehensive plans, the Thurston Regional Planning Council (TRPC) regularly

develops local population and employment forecasts. The forecasts are developed through a process that is based on state, county and city involvement. These are the forecasts used in this plan.

The TRPC last completed an update of the population forecasts in 1995. The forecasts include residential population and employment projections in 5-year intervals through the year 2020. TRPC employment projections used for this plan are listed in Table 1-1. Table 1-1 and Figure 1-2 use the published "medium growth scenario."

**Table 1-1. LOTT Planning Area Employment Projections by Jurisdiction<sup>a</sup>**

Jurisdiction		1995	2000		2010		2020	
		Total	Growth <sup>b</sup>	Subtotal <sup>c</sup>	Growth <sup>b</sup>	Subtotal <sup>c</sup>	Growth <sup>b</sup>	Subtotal <sup>c</sup>
Lacey	Incorporated <sup>d</sup>	13,392	2,598	15,990	5,197	21,187	5,134	26,321
	UGMA <sup>e</sup>	3,465	194	3,659	388	4,048	532	4,579
	<b>Sub-Total</b>	<b>16,857</b>	<b>2,793</b>	<b>19,649</b>	<b>5,585</b>	<b>25,234</b>	<b>5,666</b>	<b>30,900</b>
Olympia	Incorporated <sup>d</sup>	37,965	3,769	41,734	6,642	48,376	8,004	56,381
	UGMA <sup>e</sup>	1,538	381	1,918	206	2,124	1,328	3,453
	<b>Sub-Total</b>	<b>39,503</b>	<b>4,150</b>	<b>43,652</b>	<b>6,848</b>	<b>50,501</b>	<b>9,333</b>	<b>59,834</b>
Tumwater	Incorporated <sup>d</sup>	11,780	1,467	13,247	2,923	16,170	3,102	19,271
	UGMA <sup>e</sup>	2,344	97	2,442	182	2,624	293	2,917
	<b>Sub-Total</b>	<b>14,124</b>	<b>1,565</b>	<b>15,689</b>	<b>3,105</b>	<b>18,794</b>	<b>3,395</b>	<b>22,188</b>
Totals	Incorporated <sup>d</sup>	63,136	7,835	70,971	14,762	85,733	16,240	101,973
	UGMA <sup>e</sup>	7,347	672	8,019	776	8,796	2,153	10,949
	<b>LOTT Planning Area</b>	<b>70,483</b>	<b>8,507</b>	<b>78,990</b>	<b>15,538</b>	<b>94,529</b>	<b>18,394</b>	<b>112,922</b>

<sup>a</sup> Employment projections from Thurston Regional Planning Council, April 15, 1996.

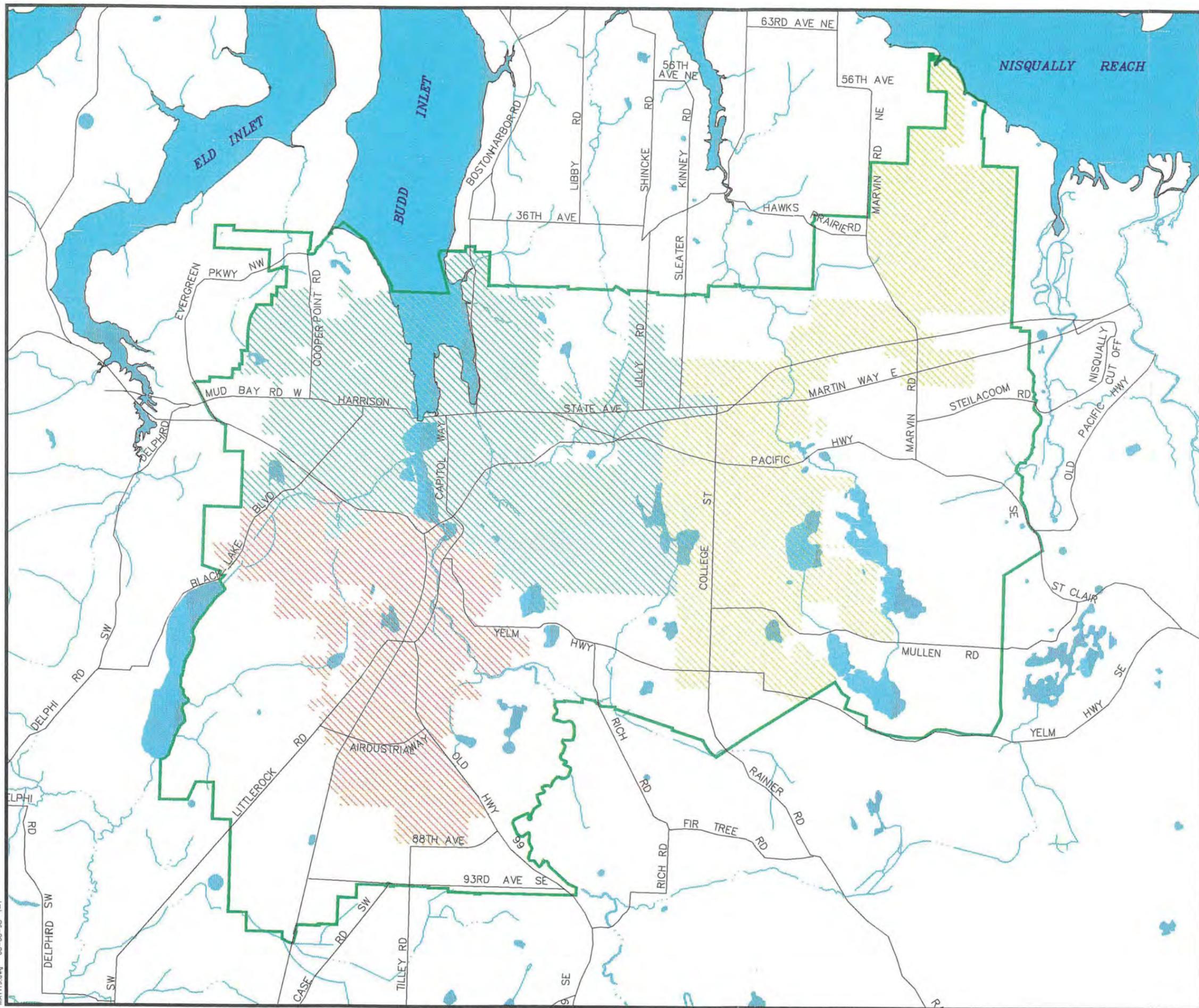
<sup>b</sup> Incremental growth between planning years.

<sup>c</sup> Includes the 1995 subtotal population and sum of growth columns through the planning year.

<sup>d</sup> Incorporated as of 1995.

<sup>e</sup> UGMA outside of 1995 incorporated areas.

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 **LOTT**  
Wastewater  
Resource Management  
Plan

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SCALE IN FEET

LEGEND:

-  INCORPORATED LACEY
-  INCORPORATED OLYMPIA
-  INCORPORATED TUMWATER

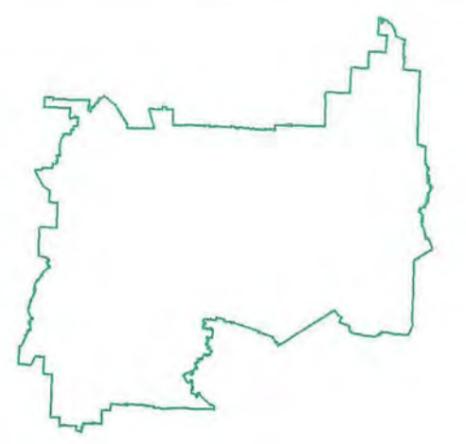
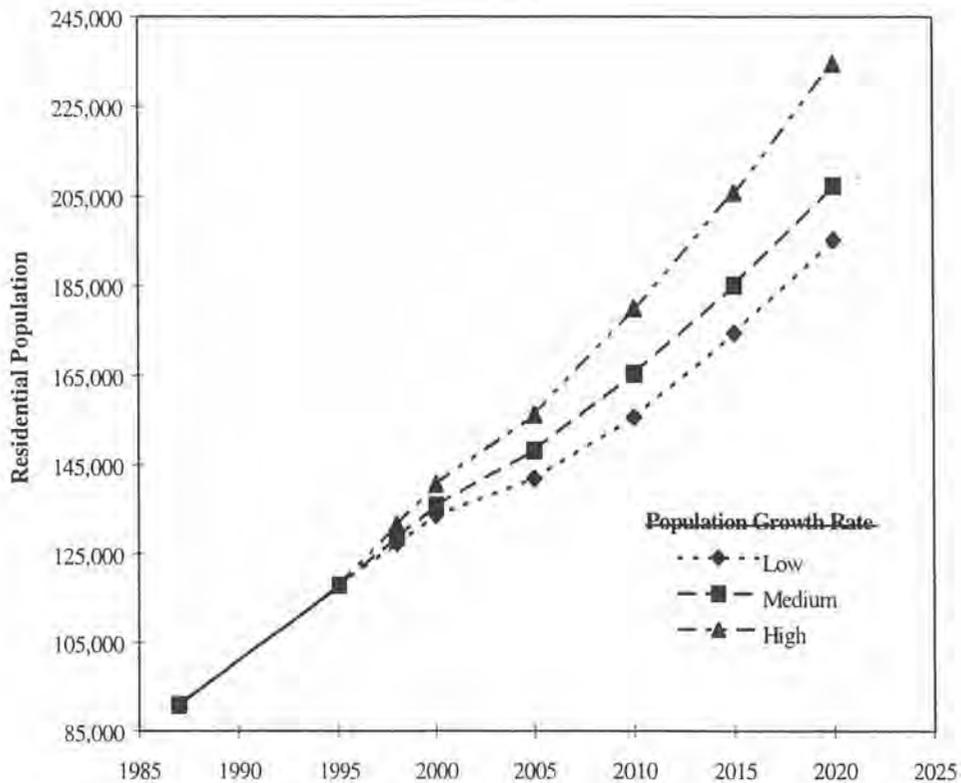


Figure 1-1  
LOTT Planning Area

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a. Population forecasts based on TRPC data dated April 15, 1996.  
1987 UGMA total population equals 90,900.

**Figure 1-2. LOTT Service Area Residential Population Forecasts<sup>a</sup>**

### 1.3.5 Flow Reduction Programs

Future wastewater treatment capacity needs can be decreased by reducing per capita wastewater and improving the sewer system. Consistent with the public value to maximize use of existing facilities, flow reduction programs are a fundamental part of the Wastewater Resource Management Plan. To address flow reduction opportunities, the LOTT Partners have implemented three programs:

- **Wastewater Flow Reduction (Water Conservation) Program** – projects to reduce residential, commercial and industrial wastewater entering the sewer systems tributary to LOTT joint facilities. Projects focus on fixture replacements (such as toi-

lets, front-loading washing machines, showerheads, etc.) to help reduce base wastewater flows.

- **Inflow and Infiltration Reduction Program** – projects reducing stormwater inflow and/or groundwater infiltration (I&I) entering the system. Reducing the amount of I&I will reduce peak flows handled by the treatment plant during heavy rains, thereby expanding the plant’s capacity to handle wastewater.
- **On-Site Systems Program** – continuing sustainable use of on-site systems where development densities and soils allow reducing reliance on sewers. Examples of on-site systems include septic tanks and drain

fields, graywater separation, and composting toilets.

LOTT relies on cost-effectiveness as a criteria for approving, funding, and evaluating flow reduction projects. From LOTT's perspective, a project is cost-effective if it results in lower overall long-term costs than constructing new wastewater treatment capacity. LOTT's flow reduction programs are more fully described in Chapter Three.

### 1.3.6 Wastewater Flow and Loading Projections

Population and employment together with per capita wastewater contributions are the basis for projecting the total amount of wastewater (flows) and waste concentrations (loadings). Flows and loadings over time establish the schedule and need for wastewater management actions.

Wastewater flows include not only per capita residential contributions, but also flows arising from commercial, industrial, and institutional activities, utilization of entitlements (commit-

ments to the brewery and The Evergreen State College), and inflow and infiltration. To estimate the wastewater flows, the following preliminary information must be determined:

- Year of interest
- TRPC growth scenario
- Future sewerage assumption (aggressive/unaggressive)
- Seasonal or storm event (dry, wet, peak hour, etc.)

Wastewater flow projections are calibrated to actual measured values from LOTT's Inflow and Infiltration Study. Time-averaged wet weather flows are calculated from 30 years of precipitation data. Assumptions used to project wastewater flow rates are contained in Table 1-2.

To properly establish the extent of new facilities required to meet future flows and loadings, the remaining available capacity in existing facilities must be determined.

**Table 1-2. Assumptions Used to Project Wastewater Flows**

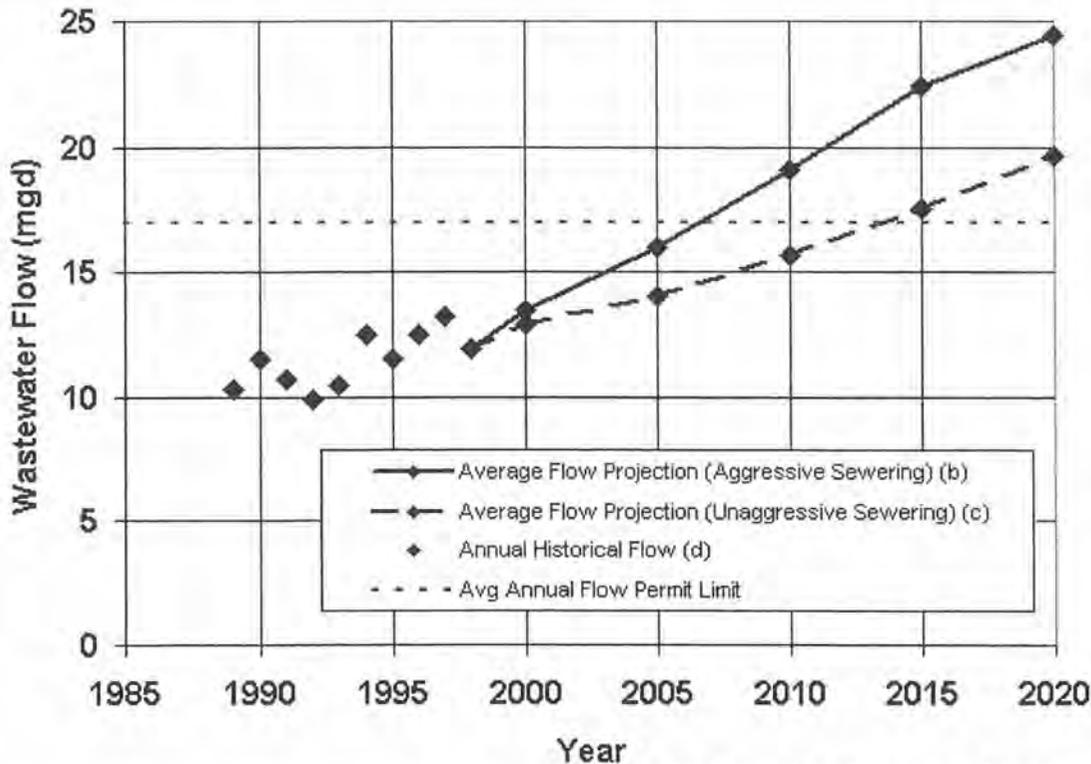
Classification	Assumption
Water Conservation	Water conservation efforts will reduce the system-wide residential wastewater generation rate 9.1 percent by 2005, resulting in a decrease from the present system-wide value of 76.2 gpcd (gallons per capita per day) to 69.3 gpcd. People living in newly constructed homes, which already have low-flow fixtures, are expected to generate wastewater flows of 66 gpcd, the current Lacey residential average. Areas with a larger proportion of older homes have higher per capita generation rates. It is assumed the per capita generation rate for people living in existing homes in Olympia and Tumwater to decline from their present levels to 76 and 66 gpcd, respectively. One-third of this reduction is assumed to occur by 2000.
I&I Rehabilitation	I&I rehabilitation projects under way should reduce the 10-year, peak day system-wide I&I by 2.7 percent by 1999 and 8.3 percent by 2000. It is assumed that the I&I generated by other seasonal and storm events will be reduced in a similar proportion.
Entitlement Flows	Wastewater flows for average conditions reflect the current measured flows from the brewery and TESC, i.e., 0.66 and 0.11 mgd, respectively. For peak conditions, assume full entitlements of 2.0 mgd (brewery) and 1.656 mgd (TESC).

Figure 1-3 illustrates the expected range of wastewater flows in the LOTT service area

through the planning period and Table 1-3 indi-

ates the projected peaking factors to be applied to estimate peak flow conditions.

Notes in the following information refer to "saturation." As used here, saturation means 80 percent of zoned population density is reached. The date when saturation will occur is substan-



tially beyond the horizon of this plan.

Assumptions include: 1) water conservation program will reduce 1995 domestic wastewater generation rate 4.1 and 9.1 percent by 2000 and 2005, respectively. 2) I&I rehabilitation will result in a 2.7 and 8.3 percent reduction in current (1995) system I&I flows by 1998 and 1999, respectively. 3) full utilization of entitlements beyond 1995. If in fact entitlements should remain at current levels, reduce flows by 2.89 mgd.

<sup>b</sup> Flows resulting from sewerage of 100 percent of the population and employment.

<sup>c</sup> 100 percent of new users connect and current on-site users will be connected by straight line projection from 1998 to 2015.

<sup>d</sup> All new users connect, but current on-site users will not connect during the planning period.

<sup>e</sup> LOTT treatment plant average annual discharge limited to 17 mgd.

<sup>f</sup> Saturation flow (80 percent of zoned density) is estimated at 55.4 mgd.

<sup>g</sup> Saturation flow (80 percent of zoned density) is estimated at 50.2 mgd.

<sup>h</sup> 1995 values are estimated. Measured flows are higher than the estimates because 1995 was a wetter than average year

**Figure 1-3. Projected Annual Average Wastewater Flow**

**Table 1-3. Projected Flow Peaking Factors <sup>a</sup>**  
 These numbers multiply average annual flows

Seasonal of Storm Event	Planning Year				
	1995	2000	2010	2020	Saturation <sup>b</sup>
Average annual	1.0	1.0	1.0	1.0	1.0
ADWF <sup>c</sup>	0.9	0.9	0.9	0.9	0.9
AWWF <sup>d</sup>	1.1	1.1	1.1	1.1	1.1
10 yr., peak month	1.7	1.5	1.4	1.4	1.3
10-yr., peak day <sup>f</sup>	3.1	2.4	2.3	2.2	1.9
10-yr., peak hour <sup>g</sup>	5.5	4.0	3.7	3.5	3.0
Max. recorded month <sup>h</sup>	1.5	1.4	1.3	1.3	1.2

<sup>a</sup> Peaking factors multiply the average annual flow. The peaking factors are based upon an average of the aggressive and unaggressive sewerage scenarios.

<sup>b</sup> Saturation horizon is defined as development reaching 80 percent of zoned density

<sup>c</sup> Average dry weather flow from May 1 to October 31.

<sup>d</sup> Average wet weather flow from November 1 to April 30.

<sup>e</sup> 10 percent chance monthly flows will exceed this storm in any given year.

<sup>f</sup> 10 percent chance monthly flows will exceed this storm in any given day.

<sup>g</sup> 10 percent chance monthly flows will exceed this storm in any given hour.

<sup>h</sup> Maximum recorded month occurred December 1994

## 1.4 EXISTING WASTEWATER FACILITIES

A key element in developing the LOTT Wastewater Resource Management Plan is an understanding of the existing facilities limitations and their relationship to projected flows and loadings. The evaluation of the existing LOTT facilities done for this plan was broken into several different categories to focus discussion:

- National Pollutant Discharge Elimination System (NPDES) permit.
- Water recycling.
- Treatment facilities.

- Wastewater conveyance system.
- Wastewater collection system.

### 1.4.1 NPDES Permit

The Washington Department of Ecology issued LOTT's most recent NPDES permit on December 17, 1993. This permit was effective through June 30, 1997, and has been effectively to allow completion of this plan. The permit contains both special and general conditions. The conditions most affecting the performance of the plant are summarized below. The letters "mgd" mean millions of gallons per day. This abbreviation is used throughout this plan.

**Table 1-4. LOTT Wastewater Treatment Plant Permit Limits**

Criteria	Limit <sup>a</sup>
<b>Flows</b>	
Annual average flow	17 mgd
Dry weather average	15 mgd
Maximum monthly average	22 mgd
Maximum day	36.5 mgd
Peak hourly to treatment plant	55 mgd
<b>Biochemical Oxygen Demand</b>	
Maximum monthly average (November 1- March 31)	5,504 lbs/day
(April 1 – October 31)	3,670 lbs/day
Maximum weekly average (November 1- March 31)	8,256 lbs/day
(April 1 – October 31)	7,898 lbs/day
<b>Total Suspended Solids</b>	
Maximum monthly average	5,265 lbs/day
Maximum weekly average	7,898 lbs/day
<b>Fecal Coliform</b>	
Maximum monthly average	200/100 ml
Maximum weekly average	400/100 ml
<b>Ammonia Nitrogen Loading (November 1-March 31)</b>	
Maximum monthly average	26 mg/l
Maximum daily	36 mg/l
<b>Total Inorganic Nitrogen Loading (April 1-October 31)</b>	
Maximum monthly average	3.0 mg/l

As contained in Sections S1 through S19 of the 1994 LOTT NPDES permit.

The maximum recorded monthly average flow occurred in January 1998, when the LOTT treatment plant averaged 18.5 mgd (84 percent of the maximum allowed). On the following occasions the plant exceeded the allowable influent conditions as listed below:

- Exceeded 15 mgd maximum monthly average dry weather flow – June 1996.
- Exceeded 36.5 mgd maximum day flow - February 8, 1996.
- Exceeded 36.5 mgd maximum day flow - April 23, 1996.

### 1.4.2 Water Recycling

Although the Budd Inlet Plant’s treated discharge is returned to the marine environment, water recycling as discussed in this plan is limited to the plant’s internal use of strained re-

claimed water for process and utility purposes. Reclaimed water currently produced at the plant satisfies requirements under the State Department of Health / Department of Ecology guidelines for Class C use (not Class A, the higher quality of reclaimed water generally mentioned in this plan). Treated effluent is strained, pressurized and used at the plant.

### 1.4.3 Treatment Facilities

The existing LOTT Wastewater Treatment Plant is described as an advanced secondary treatment plant with biological nutrient (nitrogen) removal and ultraviolet disinfection. The plant treats both liquid and solids streams. The plant process flow schematic is shown in . The plant operates in the biological nutrient removal mode during the dry weather period only when the total inorganic nitrogen (TIN) limit is in effect.

A detailed plant re-rating study was conducted for this plan. The evaluation included analysis of plant hydraulics, primary and secondary clarifier performance, electrical system, solids mass balance, and testing and modeling of the biological treatment process. A complete description of this analysis is contained in Chapter Four.

**Re-rating Assessment**

Results from the re-rating analysis suggest that plant operations are constrained at a maximum hydraulic limitation of 64 mgd at the peak two-hour flow condition and 55 mgd at the peak 24-hour flow condition. Plant capacity capability was identified to be 30 mgd for winter loading conditions and 24 mgd for summer loading conditions, provided that the supply of readily available carbon can be sustained, future organic loadings stay consistent and return activated sludge pumping capacity is improved. In addition, reconfiguration of the first anoxic and aeration basins is recommended to more reliably manage the biological process.

**Wastewater Conveyance System**

The conveyance system is a large part of the LOTT facilities. The planning effort included evaluation of the capacity of the existing LOTT conveyance system, and an estimate of the remaining conveyance capacity. This information was used to evaluate system capacity under future flow conditions to identify necessary improvements. The following technical information was evaluated:

- Existing and future sewer flows.
- Hydraulic capacity.
- Remaining capacity in the system.
- Locations of conveyance features expected to have insufficient capacity.
- Alternatives for meeting future capacity requirements.

The 1994 LOTT I&I Study established sewer drainage basins in the LOTT service area. These same basins were used in this evaluation to represent the boundaries of sewer collection service areas, sometimes referred to as "sewer-sheds." I&I entering the LOTT system comes

from two different types of sewer systems. The first comes from combined sewer systems designed to drain both wastewater and stormwater. The second comes from groundwater leaking into sanitary-only separated sewers. On a per acre basis, combined sewers contribute substantially more I&I than the separated sewer system.

The I&I Study estimated that approximately 53 percent of the system-wide I&I was generated in the combined sewer drainage area. However, this area currently represents only 740 acres of the approximate 14,000-acre collection system service area. The I&I Study also established I&I rates for each of the LOTT sewer basins based on field measurements. The I&I rates were normalized to the amount of pipe in the basin and are expressed as gallons per day per inch-diameter-mile (gpd/idm). This was coupled to an I&I estimation model developed for each basin driven by measured rainfall.

The hydraulic capacity analysis for the LOTT conveyance system was performed in several steps; evaluate flow monitoring records and physical configuration data, develop a computer model, calibrate the mode to existing flow data, and evaluate capacity.

During modeling, capacity was considered exceeded if either of the following conditions were met:

- Average dry weather flow and I&I conditions cause depth in the sewer to be greater than 70 percent of the diameter.
- 10-year peak hour I&I conditions cause pipeline surcharging greater than 2 feet above the crown on the upstream end of the pipe.

As a result of the LOTT conveyance system analyses, several capacity restrictions were identified. The areas with limited hydraulic capacity include: upper sections of the Grass Lake interceptor, multiple sections of the Percival Creek interceptor, Capitol Lake pumping station, and sewers associated with the Southern connection. All these sections are currently experiencing or will experience capacity related problems. LOTT already has several of these upgrades under development.

### **Wastewater Collection System**

Collection systems are the sewer lines tributary to the LOTT conveyance system. These pipes are the retail service lines owned and operated by individual LOTT Partners that connect to homes and businesses. Collection facilities include gravity sewers, manholes, pump stations, force mains, inverted siphons, and septic tank effluent pumping (STEP) pressure mains. The collection systems are fully discussed in the comprehensive sewer plans of each jurisdiction.

## **1.5 OTHER WASTEWATER MANAGEMENT CONSIDERATIONS**

Other planning and policy considerations influence LOTT's wastewater management choices, including issues related to level of sewerage and the role of individual on-site treatment systems (such as septic tanks and graywater systems). Factors include current LOTT Partner policies regarding on-site systems, the degree to which the jurisdictions can depend upon use of on-site systems in the future, and protection of public health.

### **Growth Management Act Consistency**

The Growth Management Act (GMA) mandates "concurrency." This means that adequate public facilities must be available when the impacts of development occur or a financial commitment must be in place to complete the improvements within six years of development approval. "Adequate public facilities" are facilities that have the capacity to serve development without decreasing levels of service below locally established minimums. If suitable sewage disposal facilities are not available, building permits cannot be approved.

The GMA also requires that cities and counties coordinate their land use plans and capital facility plans, and ensure that those plans are financially feasible and realistic. Of the three alternatives being evaluated for the LOTT Wastewater Resource Management Plan, the *Traditional Facilities Alternative* offers the typical and well-known response to this type of planning requirement, relying on the construction of

a large treatment facility. *The Highly Managed Alternative*, however, offers an unusual, incremental approach.

### **On-Site Systems, Public Health and Growth**

Decisions regarding future use of on-site systems influence the extent of sewerage within the LOTT service area, the number and size of treatment facilities required, and the cost of the long-range wastewater management program.

Less than one percent of Thurston County soils are ideal for on-site sewage system use, and about 12 percent of the soils offer only moderate on-site system limitations.

An analysis of current land use plans and on-site lot requirements suggests that up to 28 percent of the residential population can be served by on-site systems in the year 2020 with ideal soil and groundwater conditions. Thus, a minimum sewerage level of 72 percent would be required to support the adopted plans. This means LOTT should be prepared to serve at least 88,000 additional people, generating roughly 8.0-mgd of base wastewater flow, excluding allowances for inflow and infiltration.

Additional analyses conducted based on virus mortality and migration suggests that separation distances between on-site systems of up to 400 feet are necessary to reduce virus concentrations below safe drinking water standards in the groundwater. This requires a lot size somewhat larger than the minimum 12,500 square feet discussed under Sewering Scenarios later in this section. (See Chapter Five for a detailed description of these analyses.)

### **Personal Responsibility**

LOTT's public opinion research suggests that, while not large, there is a segment of the population willing to take on higher levels of responsibility for personal wastewater management. These individuals face several impediments, including the requirement to pay a full monthly sewer bill despite their efforts to send less wastewater down the drain. Also, permitting procedures for systems requiring high levels of personal responsibility are cumbersome since they are infrequently utilized.

The structure-based wastewater management system is well-established and not easily changed. At the same time, the LOTT Partners wish to recognize and enable those wanting to take on a larger personal responsibility for wastewater management. To the extent these individuals manage their wastewater without harm to public health or the environment, LOTT can provide less service. However, when other individuals acquire and occupy a structure previously occupied by persons exercising high levels of personal responsibility, the possibility exists that LOTT will need to provide full wastewater service to the new occupants. In recognition of the need to enable motivated individuals to assume higher levels of responsibility for managing their own wastewater, the LOTT Partners, with approval of this Wastewater Resource Management Plan, agree to the following activities that reduce dependence on the LOTT system:

- Work cooperatively with responsible agencies to clarify and simplify permitting of permissible on-site systems.
- Consider future rate modifications for sewer connections serving individuals who maintain and utilize permitted systems.
- Consider cost-effective incentives to assist LOTT ratepayers with purchase or installation of equipment for permitted systems.
- Work cooperatively in finding, devising and funding training and information programs

which assist individuals seeking to maintain and utilize permitted systems.

In making these commitments, the LOTT Partners recognize that municipal systems are not the only means of managing wastewater and assuring protection of public health and the environment.

**Sewering Scenarios**

To meet the planning requirements of WAC 173-240, LOTT must estimate the total number of customers that will be connected to the wastewater collection system. These estimates need to consider the ultimate service requirements but focus on the 22-year planning period. Estimating the number of new connections LOTT may need to serve in the UGMA is a function of commercial and industrial development, the number of new residences, and the number of permanent on-site treatment systems used. Also a key factor is when and where these customers connect to the LOTT system. As a result, many different scenarios can be developed to describe possible sewerage levels in the UGMA. Three different sewerage scenarios, A, B, and C, shown in Table 1-5, were developed to describe the range of potential new customers connecting to LOTT during the planning period. The scenarios consider the level of sewerage necessary to support the adopted land use densities from each jurisdiction and to sustain the Thurston County Department of Health's minimum standard for on-site systems density (12,500 sf minimum lot size.)

**Table 1-5. Estimated Sewered Population in 2020 by Scenario**

Scenario	Sewered Population in the Urban Growth Area <sup>a</sup>	
	People	% of UGMA Population
A	196,956	95
B	180,371	87
C	150,812	73

<sup>a</sup>Thurston Regional Planning Council forecast population data (April 1996).

**Scenario A** represents sewerage at least 95 percent of the 207,323 persons in the UGMA. Un-

der this aggressive sewerage scenario, nearly all areas receive sewers by the end of the planning

period. Based on current regional on-site system management policies, it is unlikely that this sewerage level will be reached within the planning period.

**Scenario B** represents sewerage 87 to 90 percent of the UGMA by the end of the planning period. This scenario recognizes that several areas in the UGMA are experiencing difficulties with on-site system management and will likely be required to connect to sewer. Scenario B assumes that the Tanglewilde area will be 100 percent sewerage by the year 2010 and the numerical equivalent of 50 percent of the existing on-site systems will be converted to sewer.

**Scenario C** represents the minimum sewerage level, 72 percent, that can meet the land use densities contained in the comprehensive plans.

**Increased Winter Discharges Into Budd Inlet**

Both *The Highly Managed Alternative* and the *Traditional Facilities Alternative* can be implemented without obtaining additional wet weather discharge capacity in Budd Inlet. However, this would continue to allow wet weather conditions to dictate the location and timing of new facilities. This is not desirable since LOTT has limited ability to anticipate the wet weather conditions from year to year. Consequently, LOTT will need to increase the reserve capacity retained in the system and it would require that satellite reclamation and regional treatment plants be designed for wet weather capacity instead of average annual capacity. This increases the amount of new treatment capacity required through the planning period by 4.5 mgd (70 percent). Furthermore, LOTT will need to have this new capacity in place as early as 2001 since wet weather flows may exceed permit limits by that time.

Dry weather flows are more predictable than wet weather flows. Consequently, facility needs based on dry weather capacity needs can be planned for and constructed more economically. Relief from winter flow pressures would enable refocusing of attention on dry weather conditions.

## 1.6 THE HIGHLY MANAGED ALTERNATIVE

*The Highly Managed Alternative* is an environmentally based system for building small units of capacity responding just in time to actual measured conditions. This approach offers multiple benefits -- it integrates public values identified early in LOTT's planning, responds to flow reduction results, permits LOTT to take advantage of technological developments, enables flexible response to future regulations, and allows LOTT to match new capacity closely with occurring growth at a cost substantially below traditional approach costs.

This new approach is far different from traditional wastewater facilities plans which typically result in a single, new, large treatment plant. Without the availability of federal and state grants, capital formation is largely the responsibility of local governments. This reality, coupled with the commitment to incorporate public values and follow the orderly development process established in the Growth Management Act, allowed LOTT to consider this unconventional approach to wastewater facilities planning.

### 1.6.1 Highlights of *The Highly Managed Alternative*

**Uses Wastewater as a Resource**

*The Highly Managed Alternative* begins a shift toward using wastewater to sustain water resources through reclamation and groundwater recharge. Although these methods have been used in dry climates for many years, they are very new to the Pacific Northwest. Use opportunities could increase with concerns about maintaining stream flows for fish.

**Optimizes Existing Facilities**

The transition to use of wastewater as a resource will be aided by optimizing use of LOTT's existing facilities. This helps "buy time" to develop, test, and gain local experience with initial reclamation and groundwater recharge facilities. Optimum use includes aggressive pursuit of reduced per capita wastewater flows, continuing cost-effective removal of stormwater inflow and

groundwater infiltration, and making full use of the LOTT Budd Inlet discharge, provided this can be accomplished in an environmentally acceptable manner.

#### **Focuses on the Environment**

Unlike traditional facilities plans, *The Highly Managed Alternative* adds capacity based on environmental factors instead of pre-selecting a solution then identifying the environmental impacts. Areas are defined for reclamation and recharge based on their environmental suitability for those measures. Only then are specific sites and projects defined.

#### **Adds Capacity in Increments**

*The Highly Managed Alternative* relies on small increments of new capacity being added 0.5 to 3.0 mgd at a time. These increments will be added in a tightly managed manner to match as closely as practical actual needs for added treatment and conveyance. Adding capacity in small increments also provides the opportunity to take advantage of improving technologies and reduces the risk of over-commitment to any single technical approach.

#### **Takes a “Just-in-Time” Approach**

By shortening the time between identification of a capacity need and implementation, *The Highly Managed Alternative* allows for rapid adjustment to changing rates of growth and tailoring of capacity increments to actual needs. It also postpones capital investment until actually needed. This concept can be described as “just-in-time” capacity.

#### **Requires a “Highly Managed” Approach**

Adding increments as small as 500,000 gallons will require continuous attention. Conditions must be constantly measured, compared and evaluated to ensure capacity needs are met when needed. Environmental analysis and public information/involvement are continuous activities. Decisions to add capacity are triggered by measured conditions.

#### **Enables Alternative Financing**

Adding capacity in small increments opens greater possibilities for equitably balancing the cost impacts of new facilities among existing rate payers and future development. This ap-

proach favors cash over debt financing, and short-term borrowing over long-term financing. It seeks to maintain required reserve treatment capacity at the lowest possible cost. It also allows, to the extent practical, the capital cost of new capacity increments to be recovered on a “growth pays for growth” basis.

#### **Results in a “Living” Plan**

As a plan, *The Highly Managed Alternative* is a continuing work in progress. Sections will continually be added as conditions change, flow reduction projects proceed, new increments are considered, continuing environmental analysis is conducted, and increments are added.

#### **Addresses Public Values**

As a result of this unconventional approach, *The Highly Managed Alternative* addresses multiple public values including:

- Maximizes the use of existing facilities
- Meets current and future demands
- Relies on environmental suitability
- Controls facilities costs
- Uses LOTT’s treated wastewater as a resource

### **1.6.2 A Combination of Program Directions**

Four of the original nine Program Directions form the core of *The Highly Managed Alternative*. A fifth remains under consideration in case implementation of *The Highly Managed Alternative* is slowed or stopped.

**Flow Reduction** (formerly Demand Management) – Flow reduction efforts include three continuing programs: 1) wastewater flow reduction – reducing base wastewater flows; 2) inflow and infiltration reduction – cost-effective reduction of stormwater or groundwater entering the system and 3) on-site systems – diverting flows and loadings from LOTT to on-site and other systems.

#### **Reclamation**

Reclamation involves treating wastewater to meet state Class A standards for irrigation and

commercial/industrial purposes within Thurston County. Class A reclaimed water is safe for human contact and most uses except drinking. Since most reclamation opportunities in Thurston County currently consist of seasonal irrigation (up to an approximate total of 10 mgd), reclamation will not fully satisfy all of LOTT's resource use capacity needs.

### **Groundwater Recharge**

Groundwater recharge offers a year-round strategy to supplement the demand for reclaimed water. It uses even more highly treated wastewater to replenish groundwater supplies. While the costs of pursuing recharge may be higher than other alternatives, LOTT will seek opportunities to strategically add incremental recharge facilities that position LOTT to rely upon recharge as a primary, long-term program component. Groundwater Recharge will begin by circulating Class A Reclaimed water through a series of constructed wetlands for additional polishing. Then the water will enter an infiltration pond which allows it to soak through the ground to the aquifer, gaining final treatment from the soil.

### **Additional Wintertime Discharge in Budd Inlet**

Additional wintertime discharge in Budd Inlet offers comparatively low cost reserve capacity that LOTT needs to gradually shift to reclamation and groundwater recharge. Increased discharge to Budd Inlet in the winter enables LOTT to more efficiently manage high flows caused by heavy rains. Centrally located, this reserve capacity is also necessary to bridge between the times when new increments of reclamation and groundwater recharge capacity are added.

### **New Puget Sound Marine Discharge**

Additional marine discharge, beyond that in Budd Inlet, is not the focus of *The Highly Managed Alternative*. However, if unforeseen conditions slow or stop LOTT's ability to shift to reclamation and/or groundwater recharge, it is important to have the possibility of a marine discharge under consideration. *The Highly Managed Alternative*, therefore, includes continuing study of new marine discharges.

### **Service Area Management**

*The Highly Managed Alternative* is a resource-based approach. It relies upon matching areas acceptable for groundwater recharge and potential demand for reclaimed water with the wastewater supply.

Implementing *The Highly Managed Alternative* is made easier by dividing the LOTT service area into smaller units that correspond to drainage basins, opportunities to use reclaimed water, and opportunities to recharge groundwater. *The Highly Managed Alternative* divides the LOTT service area into five geographical areas called Resource Management Basins (RMBs). These are shown on Figure 1-4.

The intent is to manage supply and demand largely within a basin and rely upon the existing Budd Inlet treatment plant to handle all solids. In this manner, projected wastewater flows are balanced with opportunities to recycle treated effluent within a geographic area. This process reduces dependence upon elaborate distribution systems. It also maximizes the use of existing facilities, minimizes up front capital costs, and enables support facilities to be more easily integrated into community areas, all while providing greater environmental protection. To be sustainable, facilities in the RMBs must support year-round water recycling; seasonal recycling alone will not resolve capacity limitations at the existing plant.

To meet identified new treatment capacity needs, small satellite reclamation plants will be built with capacities ranging from 0.5 to 3.0 mgd, depending upon demand. These plants (not including associated ponds) will occupy 0.5 to 2.0 acres of land and provide liquid treatment only. To assure full use and minimal cost, they need to be located in areas that offer three key features: 1) existing sources of wastewater to be treated, 2) users for the reclaimed water produced, and 3) sites where soil conditions are suitable for groundwater recharge. New pipelines will largely follow roadways and established rights-of-way.

Reclaimed water produced will be used for irrigation of large green belts, parks, golf courses and agriculture, and for consumptive industrial

purposes near the satellite plants. When not actually being used, reclaimed water will be circulated through a series of impervious constructed wetlands, totaling about 30 acres, where plants will provide additional polishing. The water can then proceed to a smaller groundwater infiltration basin. Groundwater recharge will initially be accomplished with five to ten-foot deep infiltration basins of about 5 acres each. Likely sites for near term application are located in southwest Lacey/southeast Olympia, northeast Lacey and/or south Tumwater.

**LOTT Facilities Under The Highly Managed Alternative**

*The Highly Managed Alternative* requires a new definition of LOTT joint facilities. Decentralized treatment plants, all connected to the Budd Inlet Treatment Plant for solids handling and

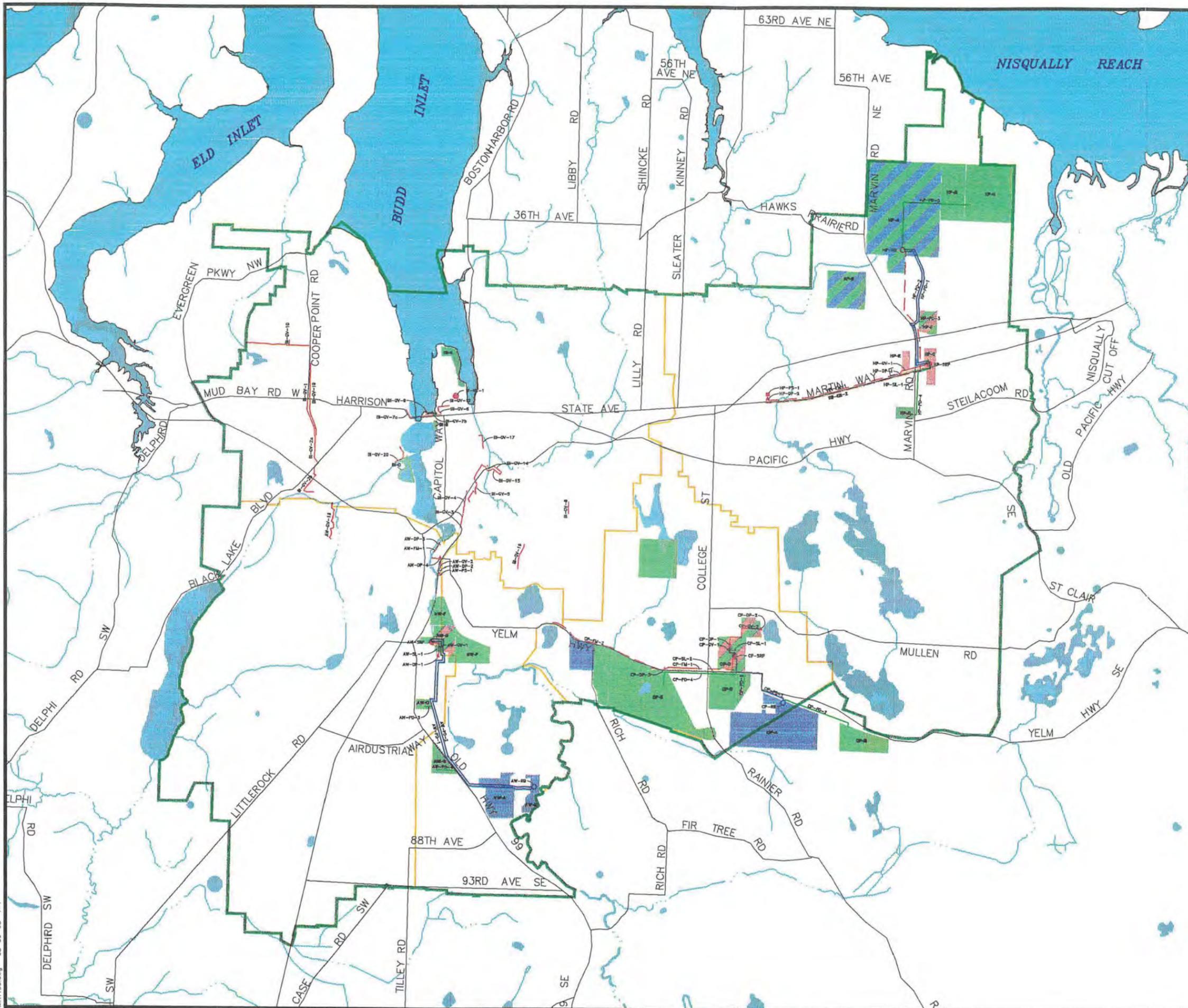
emergency back up, will result in facilities being built which serve one Partner because of available opportunities to recycle water, but which resolve another Partner's need for additional capacity. Also, new treatment plants will rely on existing, interconnecting pipelines (that could cross Partnership jurisdiction boundaries) to carry solids to the Budd Inlet Treatment Plant for processing. This arrangement was never imagined under the old "joint facilities" definition. A revised "joint facilities" definition, shown below, for *The Highly Managed Alternative* recognizes the existing definition and adds additional language which deals with new facilities built by or transferred to LOTT following approval of the Wastewater Resource Management Plan.

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"New Joint Facilities" shall mean the trunk sewer lines, sewage pumping stations, sewage force mains, sewage treatment facilities, outfall lines, treated wastewater storage ponds, polishing ponds, infiltration ponds, reclaimed water pipelines, appurtenances thereto and other wastewater facilities built by or on behalf of LOTT or transferred to LOTT after (approval date of the Wastewater Resource Management Plan) which are integral to LOTT's provision of wastewater management services in the collective interest of LOTT Participants. New Joint Facilities shall include all facilities downstream from new LOTT treatment facilities, including those previously owned and operated by individual LOTT Participants which are transferred to LOTT as a result of this Agreement.

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**LOTT**  
 Wastewater  
 Resource Management  
 Plan




 SCALE IN FEET

- LEGEND:
- TREATMENT PLANT
  - RECHARGE FACILITY
  - PUMPING STATION
  - ▲ DIVERSION POINT
  - GRAVITY
  - - - FORCE MAIN
  - RECHARGE
  - RECLAIM
  - SOLIDS
  - OUTFALL
  - TREATMENT SITE
  - RECHARGE SITE
  - RECLAMATION SITE

- LEGEND: RESOURCE MANAGEMENT BASINS - FACILITY ABBREVIATIONS
- AW AIRPORT/WEST
  - BI BUDD INLET
  - CP CHAMBERS PRAIRIE
  - HP HAWKS PRAIRIE

Figure 1-4  
*The Highly Managed Alternative*  
 Proposed Facilities

BROWN AND CALDWELL  
 AND ASSOCIATED FIRMS

**A Program of Projects**

Just-in-time capacity involves a series of wastewater management facilities made available the moment each is needed. Each identified facility need is translated into an individual project, with its own series of planning, design and construction steps. Each project progresses through a series of

development stages that cover a project’s entire life from earliest concept to operational wastewater treatment facility. Each stage moves the project closer to implementation. Table 1-6 lists *The Highly Managed Alternative* project stages in chronological order.

**Table 1-6. LOTT Project Stages**

Stage	Description
<b><u>F</u>loating</b>	The very early concept which leads to creation of an identified project. An idea or ideas which need evaluation. No sites are identified.
<b><u>E</u>merging</b>	Facility concepts are developed and potential sites are identified. Programmatic evaluation is initiated and early cost estimates are made.
<b><u>D</u>efining</b>	Preliminary financing plan identified, environmental reconnaissance work done, preliminary design and permit needs established and property rights secured.
<b><u>C</u>larifying</b>	Environmental process completed and key permits secured. Property is acquired and financing secured. Moving from this stage assures completion of the project unless there are dramatic shifts in treatment plant requirements
<b><u>B</u>lueprint</b>	Final engineering design. Plans, specifications and estimates completed, bids requested and all permits secured to allow construction.
<b><u>A</u>chieved</b>	Construction contract awarded, construction completed, facility(s) commissioned.

Although *The Highly Managed Alternative* envisions only two years to prepare final design and construct a single project, several years of preliminary planning and permitting are needed before the two year final design and construction period can begin. The time between project conception and operating reality can be managed to provide completion certainty and cost control. However, this requires an organized approach and timely decision making. To successfully respond to changing capacity needs, this means *The Highly Managed Alternative* will require a suite of projects under various stages of development simultaneously. Management of projects will involve regular reviews of the monitored data and projected needs, and devel-

opment of an annual Capital Improvement Program (CIP). Review of this data may cause projects to migrate to different stages of development. A quarterly review of measured data and predictions is proposed to assure adequate time to adjust to any rapidly emerging trends. A regular revision of the Capital Improvement Program also serves as an opportunity for public review.

Four types of “capacity” projects, in order of importance, are involved in implementation of *The Highly Managed Alternative*:

- **Resource Use Capacity** – These are facilities for distribution and end use of the treated effluent. There are two distinct cate-

gories of resource use capacity in the LOTT system: the permitted capacity discharged to Budd Inlet and the cumulative consumptive use of water recycling, including reclamation and groundwater recharge. The capacity of each is limited based on seasonal factors and, in the case of water recycling, the characteristics of the end use.

- **Treatment Capacity** – These are facilities in a treatment plant. Treatment capacity will be provided at the existing Budd Inlet treatment plant or provided at satellite facilities. Satellite reclamation plants will be fully utilized as they are commissioned. Reserve capacity will be maintained at the Budd Inlet Plant.
- **Conveyance Capacity** – These facilities provide regional transport or “conveyance” of collected wastewater to treatment centers. Conveyance capacity varies through the system. LOTT will balance the need for additional conveyance capacity with recycling opportunities and available treatment capacity

- **Collection Capacity** – This is the network of sewers that are used to provide retail wastewater service to individual customers. It will continue to be the responsibility of each jurisdiction to provide and maintain collection capacity. Once jurisdictions establish that an area will receive wastewater collection service, *it is imperative* that service extension be coordinated with LOTT to assure that resource uses can be satisfied most efficiently. These collection facilities are **jurisdictional** facilities.

LOTT will assure that adequate capacity is provided in each of those components labeled as LOTT facilities. Decisions to add capacity are triggered by measured conditions and largely driven by Partners’ adopted land use plans.

**Capital Requirements**

Under *The Highly Managed Alternative*, the projected capital requirements (see Table 1-7) are less significant than they are for the *Traditional Facilities Alternative*.

**Table 1-7. Estimated Capital Cost Summary - *The Highly Managed Alternative* <sup>a</sup>**

Facility Type	Description	Estimated Capital Cost (in 000's)
<b>New Treatment</b>	Satellite reclamation plants, and solids transfer lines to meet new demands	\$78,305
<b>Water Recycling</b>	Reclaimed water distribution, polishing ponds and groundwater recharge basins (includes land)	\$33,863
<b>New Conveyance</b>	Regional sewers and pump stations to serve new customers	\$8,040
<b>System Upgrades</b>	Improvements to existing treatment and conveyance facilities to correct existing deficiencies.	\$65,611
<b>TOTAL</b>		<b>\$185,720</b>

Notes: a). Costs shown in 1998 dollars.

The *Highly Managed Alternative's* 22-year anticipated capital program is based on a sewerage scenario (Scenario B), which assumes 87 percent of the structures in the LOTT service area will be connected to the LOTT system by 2020. Revenue from connections and associated monthly rates is based on 75 percent sewerage (Scenario C). This conservative approach to financing leads to a higher certainty that actual costs will not exceed estimates.

## 1.7 THE TRADITIONAL FACILITIES ALTERNATIVE

The second of the LOTT Wastewater Resource Management Plan alternatives is the *Traditional Facilities Alternative*. A traditional facilities plan includes construction of large-scale wastewater management facilities to serve estimated needs for a fifteen to twenty year period. This approach historically has offered the best opportunity to achieve maximum benefit from economies of scale and assure coordinated development of a wastewater system. Since facilities are constructed in anticipation of demands over the next 15 to 20 years, this approach provides substantial reserve capacity once new facilities are constructed. This has repeatedly proven to be a highly cost-effective wastewater management approach when grants and low interest loans are available to mitigate high up front capital costs.

Water recycling will play only a small role in the *Traditional Facilities Alternative* since the system required to distribute all or most of the plant's highly treated water would be too costly (about \$3 million per mile). LOTT currently operates a marine discharge into Budd Inlet. Based on the results of the 1998 Budd Inlet Scientific Study, it is unreasonable to expect that any additional Budd Inlet discharges will be permitted in the summertime. Consequently, to gain new treatment capacity, LOTT will need to consider a new regional treatment facility with discharge to a new marine location. Preliminary studies indicate that within the LOTT service area, the Devil's Head zone south of Anderson Island is the best location. This suggests locating a treatment plant between Marvin and Me-

ridian Roads north of Interstate 5 so it can be close to the discharge point and able to intercept flows in the growing areas of eastern Olympia and north Lacey. Extensive evaluation would be required prior to establishing a new outfall location in Puget Sound. The new discharge location would need to meet stringent water quality standards near the outfall and at far field locations. These standards will affect actual treatment levels and the precise outfall location.

For development of the *Traditional Facilities Alternative*, an advanced secondary treatment facility with nutrient removal similar to the LOTT Budd Inlet plant has been assumed. While initial development would include conveyance, plant, and outfall sized to their maximum planned use, treatment plant construction is projected to be in two stages about ten years apart. Since the *Traditional Facilities Alternative* relies upon a new, large treatment plant and new marine discharge, permitting issues surrounding the construction of the new marine outfall and siting the new wastewater treatment facility will control the implementation schedule.

The *Traditional Facilities Alternative* addresses the following public values:

- Maximizes the use of existing facilities by continuing to pursue flow reduction and increased winter discharge in Budd Inlet.
- Meets current and future demands.
- Enables efforts to protect groundwater through sewerage.
- Controls long-range capital costs, due to economies of scale.
- Can be designed and constructed to offer multiple community benefits.

Under the *Traditional Facilities Alternative*, LOTT would continue to manage wastewater services as it does at present. With a second regional treatment plant, LOTT will need to balance the efforts of the partner jurisdictions during extension of wastewater collection services to balance available conveyance and treatment capacity reserves between the existing Budd Inlet and new facilities. New facilities are re-

quired to be planned and constructed once the existing facilities reach 85 percent of the rated design condition. Since treatment facilities will be largely independent of one another under the *Traditional Facilities Alternative*, each facility will be required to independently maintain reserve capacity.

Based on the *Traditional Facilities Alternative* planning assumptions and the modeling results, several sections of the existing LOTT conveyance network will need to be expanded. Additional capacity will be provided by constructing new pipes parallel to adjacent sections. The average dry weather daily flow reaching the Budd Inlet treatment plant in 2010 is estimated to be

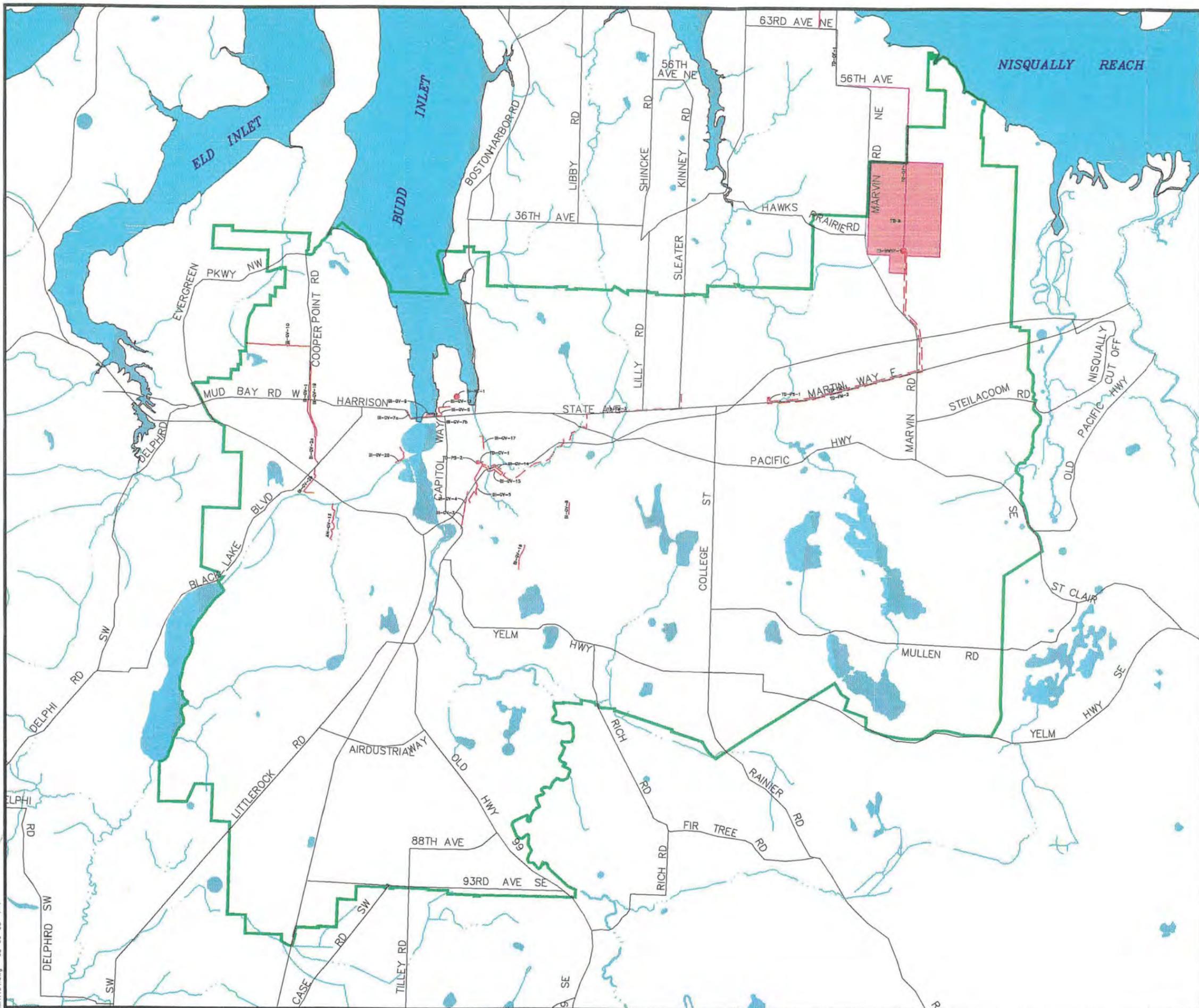
24.3 mgd, and 75.6 mgd during 10-year peak day wet weather conditions. These conditions require flow to be redirected to another treatment facility as early as the year 2005 but no later than 2010.

Using pump stations, flow can be diverted to a new regional treatment plant from two different locations as shown in Figure 1-5.

- Martin Way pump station
- Intersection near Indian Creek and the Union Pacific Railroad (UPRR)

Table 1-8 contains a summary of the capital facilities requirements for the planning period.

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LOTT  
Wastewater  
Resource Management  
Plan

0 7,000 14,000  
SCALE IN FEET

LEGEND:

- TREATMENT PLANT
- PUMPING STATION
- GRAVITY
- - - FORCE MAIN
- GUTFALL
- TREATMENT PLANT SITE

Figure 1-5  
Traditional Facilities Alternative  
Proposed Facilities

BROWN AND CALDWELL  
AND ASSOCIATED FIRMS

**Table 1-8. Estimated Capital Cost Summary –Traditional Facilities Alternative <sup>a</sup>**

Facilities Type	Description	Estimated Capital Cost (in 000's)
<b>New Treatment</b>	Regional treatment plants to meet new demands	\$131,163
<b>Water Recycling</b>	Reclaimed water distribution, polishing ponds and ground-water recharge basins (includes land)	\$1,905
<b>New Conveyance</b>	Regional sewers and pump stations to serve new customers	\$55,039 <sup>b</sup>
<b>System Upgrades</b>	Improvements to existing treatment and conveyance facilities to correct existing deficiencies.	\$52,950
<b>TOTAL</b>		<b>\$241,057</b>

<sup>a</sup>) Costs shown in 1998 dollars.

<sup>b</sup>) Includes \$2,000,000/yr for shellfish mitigation and the new marine outfall into the Devil's Head region of South Puget Sound.

## 1.8 NO ACTION ALTERNATIVE

The *No Action Alternative* assumes no major capital facilities would be constructed to increase LOTT wastewater collection, conveyance, or treatment capacity. Collection systems would continue to be operated and maintained by each individual jurisdiction. All wastewater treatment within the LOTT service area would be treated at the existing LOTT treatment facility located in downtown Olympia, similar to current practice, up to the maximum allowable average monthly discharge of 22 mgd. As the 22-mgd capacity limit is reached, greater use of on-site septic systems would be expected to occur inside and outside the UGMA.

The *No Action Alternative* addresses the following public values expressed by LOTT stakeholders:

- Uses existing facilities up to maximum permit limits.
- Results in the lowest capital costs.

- Assures an equitable distribution of costs among existing and future ratepayers for existing facilities.

Flow reduction measures already implemented by individual jurisdictions and LOTT would continue. Measures to recycle wastewater would be limited to discharges from on-site systems. Reserve capacity within the system would be optimized to extend the system limits as far as regulatory agencies will allow. The permitted capacity will be exceeded between the years of 2003 and 2012, depending upon the number of connections. Under this alternative, growth would be accommodated on a first-come, first-served basis until the permitted capacity limit is reached. Decisions about allocating remaining capacity will be determined in accordance with existing inter-jurisdictional agreements.

The *No Action Alternative* represents the lowest capital cost option. However, additional operational costs are associated with this alternative. Fines and penalties totaling over \$3,500,000 per

year may be levied against LOTT by the Department of Ecology under the existing National Pollutant Discharge Elimination System (NPDES) permit. A moratorium on sewer connections and septic tanks would also be imposed within the UGMA.

There are two wastewater management options available to LOTT under the *No Action Alternative*: marine discharge to Budd Inlet and on-site systems. Each option has finite capacity within the UGMA. The Budd Inlet discharge is more easily defined since it is largely dependent on the NPDES permit issued by Ecology. Unfortunately, the capacity of the soils in the UGMA to sustain on-site system discharges is less absolute since it is dependent on many variables. The *No Action Alternative* will rely upon

on-site systems to meet a majority of the wastewater management services in the UGMA through the planning period.

One of the performance indicators for on-site systems is the nitrate nitrogen (NO<sub>3</sub>-N) concentration in the groundwater. A simplified model based on the work conducted by Hanzsche and Finnemore, in 1992, Predicting Groundwater Nitrate-Nitrogen Impacts, was developed for the North Thurston County UGMA. The model generates order of magnitude estimates of the groundwater NO<sub>3</sub>-N concentration. Results will vary with assumptions and local conditions. The results of the analysis are contained in Table 1-9.

**Table 1-9. Nitrate-Nitrogen Concentration of Groundwater Recharge in LOTT UGMA**  
(mg/l = milligrams per liter)

Mass Balance Inputs Loading Equation Variables		Groundwater NO <sub>3</sub> -N Concentration (mg/d)			
Recharge Rate, R (in/yr) <sup>a</sup>	NO <sub>3</sub> -N in on-site system effluent <sup>b</sup> (mg/l)	1 Dwelling unit/acre <sup>c</sup>	2 Dwelling units/acre <sup>c</sup>	3 Dwelling units/ acre <sup>c</sup>	4 Dwelling units/acre <sup>c</sup>
12	60	6.4	10.6	14.0	16.8
29.5	60	3.4	5.5	7.4	9.2
12	40	4.5	7.3	9.6	11.4
29.5	40	2.6	4.0	5.2	6.3

<sup>a</sup> average recharge rate of precipitation in inches per year (assumed 1 mg/l of nitrate-nitrogen in precipitation from fertilizers, plants, atmosphere, pets)

<sup>b</sup> concentration of nitrate-nitrogen in wastewater entering soil (assumed 25% denitrification occurs in soil)

<sup>c</sup> Dwelling unit (du) = one residential unit with 2.5 occupants served by an on-site sewage system.

Nitrate nitrogen concentrations above 5.0 mg/l are considered a warning threshold and concentrations above 10 mg/l exceed maximum regulatory standards. Approximately 90 percent of the residential population inside the UGMA is forecast to reside in areas with densities greater than 4.0 dwelling units per acre. These results

suggest that, for this alternative, land use objectives will need to be modified to reflect the lower achievable development densities.

Since land use proposed in the adopted comprehensive plans cannot be supported, this alternative does not comply with GMA and, consequently, LOTT does not consider the *No Action*

*Alternative* a sustainable option for the Wastewater Resource Management Plan.

## 1.9 POTENTIAL ENVIRONMENTAL IMPACTS

**NOTE:** A more complete summary of environmental impacts can be found in Chapter Nine, Section 9.3, page 11.

In 1996 LOTT issued a Final Programmatic EIS (*Final PEIS*) in which the nine broad wastewater treatment alternatives, or "Program Directions" were analyzed. The preferred program direction, *The Highly Managed Alternative*, was developed as a result of findings and input received during the previous Programmatic EIS process. The Supplemental Environmental Impact Statement (SEIS) prepared for this plan provides additional analyses that build on the information provided in the Final PEIS. It also identifies more site-specific environmental impacts associated with the siting of wastewater facilities in generalized locations throughout north Thurston County.

The SEIS comparatively evaluates the impacts on various elements of the environment, to enable reviewers to accurately evaluate the relative feasibility of the alternatives under consideration. The SEIS focuses upon implementation of *The Highly Managed Alternative*, the *Tradi-*

*tional Facilities Alternative*, and the *No Action Alternative*. **Potential locations of facilities shown in the SEIS are preliminary, and generally include areas much larger than needed for the proposed facility's footprint and buffer zone.** Under *The Highly Managed Alternative* LOTT would need to use up to approximately 120 acres, distributed over several sites, during the 22-year planning period.

The SEIS is supplemented by several other technical studies, including a scientific study of water quality and circulation issues in Budd Inlet, investigations of soils and groundwater resources suitable for groundwater recharge, and other studies.

The objective of the proposal is to manage wastewater service in a manner consistent with adopted plans and regulations and projected growth. LOTT has incorporated public values in its development of this plan, which aims to be environmentally sensitive and cost effective over the long term.

The following table provides a summary of the potential environmental impacts by element associated with each alternative evaluated in the SEIS. Information used to identify and evaluate potential impacts has been collected through extensive studies and previous environmental analyses, as well as comments from agencies and the public.

<b>ENVIRONMENTAL ELEMENTS</b>	<b>SUMMARY</b>
<i>The Highly Managed Alternative</i>	
Earth	Because of the decentralized approach to the wastewater management, construction-related impacts to earth associated with satellite reclamation plants, recharge facilities and conveyance components will be distributed over a wide area. Impacts will be incremental and localized, but ongoing.
Air/odor	This alternative will result in distributing the risk of potential odor impacts throughout the LOTT service area, as opposed to concentrating odor potential in a centralized location. This will increase the number of adjacent property owners and, as a result, the potential for odor complaints. Public education, along with facility design and maintenance, will be critical to minimize complaints.
Surface water resources	Increased flows to Budd Inlet during the winter months are not anticipated to promote algal growth at any point during the year. LOTT effluent contributes a minor percentage of bacterial loading to Budd Inlet and is therefore not anticipated to affect Budd Inlet's consistency with applicable water quality standards. During the summer, nutrient inputs from the Budd Inlet Treatment Plant may contribute to algae blooms in Budd Inlet with resulting decreases in dissolved oxygen; increased flows at current nutrient concentrations may exacerbate this water quality phenomenon. Implementation of this alternative may provide a water quality benefit by augmenting base stream flows in the Deschutes River, Chambers Creek, and/or Woodland Creek.
Groundwater resources	Reclaimed wastewater would be used to recharge local groundwater supplies and to replace the use of groundwater for irrigation at reclamation sites. Potential for recharged effluent to benefit base stream flows in Deschutes River and/or Woodland Creek. Potential for increased spring discharge and associated wet ground problems along the shore of Pattison Lake. Potential for land slumping in steep slope areas of the Hawks Prairie RMB.
Fish/shellfish	Groundwater recharge may enhance baseflows in Deschutes River and/or Woodland Creek, providing potential benefit to fish resources. Treated effluent from Budd Inlet Treatment Plant not expected to have noticeable impact on bacteria levels in Budd Inlet; no impact to shellfish certification is anticipated.
Land use	Properties will need to be acquired in four RMBs to ensure that reclamation and/or recharge facilities can be built when needed to provide capacity. Land will be required in parcels ranging from 0.5 to 3 acres for satellite reclamation plants to approximately 5 acres for each recharge basin. Use of 30 acres will be needed for accompanying polishing ponds, preferably in conjunction with other development or park areas. Conditional use permits will be required, with public notification provisions. Acquiring suitable facility sites in a timely manner will be critical to implementation.
Public services and utilities	Maintaining multiple facilities in multiple basins will require greater commitment of resources than existing conditions or <i>The Traditional Facilities Alternative</i> . Implementing the reclamation program will necessitate cooperative planning with water user groups.

<i>The Traditional Facilities Alternative</i>	
Earth	Construction-related impacts to earth will be associated largely with the regional treatment plant and new outfall. Overall, the area affected will be lesser than that associated with <i>The Highly Managed Alternative</i> ; however, depending on the alignment, slope stability may be of concern associated with the new outfall.
Air/odor	Potential for odor generation, and accompanying complaints, will be focused at the regional treatment plant site.
Surface water resources	This alternative would require constructing a new outfall in Puget Sound. Water quality impacts, including increased nutrient and bacteria loading, would be of concern. Extensive studies would be required prior to selecting an outfall site to determine the optimal location for dilution/dispersion of effluent, and to minimize biological impacts. Studies include feasibility level or siting analyses, and site-specific evaluations once an outfall location is selected. These studies are estimated to require a period of five to eight years to complete, and would result in an outfall location that minimizes water quality impacts in Puget Sound. There is minimal potential to enhance freshwater resources through this alternative.
Groundwater resources	Under this alternative, most wastewater resources will be discharged to marine waters; thus, this alternative provides minimal opportunity to augment groundwater aquifers in the region through recharge of reclaimed wastewater, or through use of reclaimed wastewater for irrigation or commercial/industrial uses.
Fish/shellfish	Prior to implementing a new outfall in Puget Sound, it will be necessary to demonstrate that impacts to fish will be negligible. As described above, this will require several years of site-specific studies. Implementation of a new outfall will result in immediate decertification of commercial shellfish beds in the vicinity of the new outfall up to a 1-mile radius. Mitigation could include financial reimbursement as well as habitat enhancement efforts.
Land Use	Up to an approximately 20-acre site will need to be acquired for the treatment plant, as well as construction easement or right-of-way for the new outfall. It will be necessary to acquire the property in the near future to ensure its availability when the additional capacity is needed. A conditional use permit would be required, as well as consistency with the Thurston County <i>Shoreline Master Program</i> , which does not allow degradation of water quality or decertification of aquaculture areas.
Public services and utilities	Planning for and permitting a new outfall will require an extensive commitment of legal and scientific resources, and may not be achievable within the time frame needed for new capacity. Implementation difficulties are greater than with <i>The Highly Managed Plan</i> , but once constructed, operational commitment would likely be lower.
<i>No Action Alternative</i>	
Surface water resources	There would be no direct impacts outside of Budd Inlet, where effluent from the Budd Inlet Treatment Plant would continue to be discharged in accordance with permit limitations. There is limited potential to enhance freshwater resources through this alternative.
Groundwater resources	Groundwater recharge would occur through discharge from on-site sewage systems. Potential for groundwater contamination, particularly from nitrates, bacteria, and viruses, could increase with increased use of on-site sewage systems.

Land use	Urban development densities stipulated in adopted comprehensive land use plans could not be met. Resulting densities may be inconsistent with the Growth Management Act.
Public services and utilities	Commitments to provide wastewater service would likely not be met, resulting in potential service moratoria and accompanying land use constraints.

**Table 1-10. Capital Cost Summary for Sewering Scenario B<sup>a</sup>**

Facility Description	Connections		Rates		Total
	Capital Cost	Allocation <sup>b</sup>	Capital Cost	Allocation <sup>c</sup>	Capital Cost
New Treatment Plants and Solids Lines	\$70,474,500	90%	\$7,830,500	10%	\$78,305,000
Reclaim/ Recharge	\$27,090,400	80%	\$6,772,600	20%	\$33,863,000
New Connection Pipes	\$8,040,000	100%	\$0	0%	\$8,040,000
System Upgrades	\$4,823,730	9%	\$48,773,270	91%	\$53,597,000
Total	\$110,428,630	64%	\$63,376,370	36%	\$173,805,000
Total without Upgrades	\$105,604,900	88%	\$14,603,100	12%	\$120,208,000

- a. Sewering scenario C was used to calculate required connection fees and rates. This generates a conservative estimate. Under this assumption 137,185 connect to the LOTT sewer by 2020.
- b. Portion of total costs for each type of facility paid by connections.
- c. Portion of total costs for each type of facility paid by rates.

**Table 1-11. Financing Analysis for Sewering Scenario B<sup>a</sup>**

Required Financing	\$49,133,990
Sewer Rate Increase <sup>b</sup>	\$4.32
Hook-up Fee Increase <sup>b</sup>	\$3,641

- a. Sewering scenario C was used to calculate required connection fees and rates. This generates a conservative estimate. Under this assumption 137,185 connect to the LOTT sewer by 2020. Financing costs are based on Table 1-10.
- b. Average cost over the planning period.

**Table 1-12. Jurisdictional Monthly Sewer Rates for Sewering Scenario B<sup>a</sup>**

Jurisdiction	LOTT Sewer Fee	City Sewer Fee	Current Total	One-time LOTT Increase	New Total	Increase
Lacey	\$21.00	\$11.00	\$32.70	\$4.32	\$37.02	13.2%
Olympia		\$9.71	\$30.71		\$35.03	14.1%
Tumwater		\$10.95	\$31.95		\$36.27	13.5%

- a. Sewering scenario C was used to calculate required connection fees and rates. This generates a conservative estimate. Under this assumption 137,185 connect to the LOTT sewer by 2020. Financing costs are based on Table 1-10.

**Table 1-13. Jurisdictional Connection Charges for Sewering Scenario B<sup>a</sup>**

Jurisdiction	LOTT Connection Charge	City Connection Charge	Current Total	One-time LOTT Increase	New Total	Increase
Lacey	\$830	\$1,348	\$2,178	\$3,641	\$5,819	167.2%
Olympia		\$1,505	\$2,335		\$5,976	155.9%
Tumwater		\$1,836	\$2,666		\$6,307	136.6%

- a. Sewering scenario C was used to calculate required connection fees and rates. This generates a conservative estimate. Under this assumption 137,185 connect to the LOTT sewer by 2020. Financing costs are based on Table 1-10.

Mitigation measures will be implemented for both action alternatives. All design, construction and implementation will be conducted in accordance with adopted regulations. Long term monitoring of facility performance will be done to ensure design standards are met and there is no residual impact to the environment. No significant adverse impacts are expected to result from *The Highly Managed Alternative*; there may be long term impacts associated with the new discharge to Puget Sound in the *Traditional Facilities Alternative*.

Future environmental review will be conducted on a project-specific basis as needed for permitting or as a result of changes or availability of new, more detailed information for proposed projects described in the Wastewater Resource Management Plan. All subsequent environmental review will be accomplished in accordance with SEPA and may take the form of a mitigated declaration of non-significance, addenda to the Supplemental EIS, or an additional supplemental EIS.

### 1.10 FINANCE

In order to determine the financial feasibility of the Wastewater Resource Management Plan, LOTT developed a comprehensive financial plan. The financial plan is based on a review and analysis of:

- LOTT's current financial status
- Trends in public utility finance
- Financial options
- Financing mechanisms

Against this context, the LOTT financial plan assessed the capital costs of the alternatives and determined both the nominal and present values costs associated with each alternative. The nominal dollar costs of the alternatives ranged from \$208 million to \$330 million, with *The Highly Managed Alternative with Budd Inlet Capacity* as the lowest cost alternative (Scenario A sewerage).

The "net present value" cost comparison, which takes into account the "time value of money," determined that there was an almost \$100 million dollar difference between the lowest cost and the highest cost alternatives. *The Highly Managed Alternative with Budd Inlet Capacity* has the lowest net present value cost at approximately \$103 million – \$24 million less than the next lowest cost alternative.

*The Highly Managed Alternative with Budd Inlet Capacity* is the "financial preferred alternative" due not only to the lowest nominal and present value cost, but also to its superior financial flexibility and risk mitigation features. This alternative relies on small, flexible increments of capacity which are delivered "just in time" and in response to proven increases in demand for capacity. *The Highly Managed Alternative* has more flexibility to respond to changes in demand and a much lower fixed cost on customers.

In order to develop a plan for financing *The Highly Managed Alternative*, a dynamic financial model was created. This model summarizes all of the major financial elements of the capital program, the customer base, and the related costs and revenues and then determines the financing requirements and rate impacts. For

purposes of the financing analysis in this report, the model was programmed to analyze the sewerage Scenario B capital program using the Scenario C numbers for "population served." This scenario, which results in a \$185 million capital program and a 75 percent overall sewerage rate, provides a conservative basis for the financial analysis.

In order to determine rate impacts, costs of the plan projects were allocated between "rates" and "connections" based on the TAC's assessment of the benefits of the project categories. The overall split of costs resulting from these allocations was 64 percent to connections and 36 percent to rates.

Using these capital, sewerage and cost allocation scenarios, the model determined that, without inflation, the plan would result in a one-time LOTT monthly sewer fee increase of \$4.32 and a one-time LOTT connection fee increase of \$3,641. With these increases in place, a relatively low \$49 million of cash flow debt financing would be needed to round out funding for the program.

## 1.11 GOVERNANCE

The LOTT Wastewater Management Partnership was formed in 1976 to access federal and state clean water grant funds. The arrangement is a contract among the cities of Lacey, Olympia, Tumwater and Thurston County to coordinate provision of wastewater conveyance and treatment services for the urban area of northeast Thurston County. Although the Partnership appears to function as an entity, the Partnership arrangement relies on the City of Olympia to provide legal status for LOTT. The Advisory Committee, a group composed of one elected official from each Partner, recommends planning, construction, and financing actions to the Olympia City Council. The City of Olympia operates LOTT facilities as well as acting as legal owner. All existing LOTT facilities are located within the City of Olympia and financing is done by the City of Olympia.

*The Highly Managed Alternative* involves "just in time" availability of treatment capacity

through construction of small Satellite Reclamation Plants located near potential reclaimed water uses and near suitable infiltration soils. This means LOTT plants will be located in many jurisdictions. The plant locations will have no direct relationship to the location of new connections. The management and political considerations associated with this approach have caused the LOTT Partners to consider a new governmental relationship.

*The proposal described below is included in the Wastewater Resource Management Plan so there is a full understanding of all factors which may have indirect environmental impact. As the Draft Plan/SEIS is issued, the proposal is still under development. The information presented here is the current thinking on LOTT governance.*

In the near term, a new LOTT entity is proposed which will be responsible for new LOTT facilities developed under the Wastewater Resource Management Plan. Formed under Washington State's Interlocal Cooperation Act, the new entity – called LOTT Cooperative – would own and manage new facilities using powers specifically delegated to it by each of the LOTT jurisdictions.

Lacey, Olympia, Tumwater and Thurston County have authority to plan, own and operate wastewater systems. Certain parts of this authority will be delegated to LOTT Cooperative to implement *The Highly Managed Alternative* of the Wastewater Resource Management Plan of 1998.

All authorities delegated to LOTT Cooperative are tied to and limited by the regional wastewater plan (Wastewater Resource Management Plan) approved by the legislative authority of each participant. While the Cooperative is responsible for updating and proposing modifications to the regional wastewater plan, authority to substantively modify or replace the plan is specifically retained by each participating jurisdiction. Land use authority remains clearly in the hands of Lacey, Olympia, Tumwater and Thurston County.

The Advisory Committee, as established under the original LOTT Partnership, would continue to function in its usual role for all LOTT Partnership functions. The same committee would serve as the board of directors of LOTT Cooperative.

Initially, operation of LOTT Cooperative facilities would be handled by the City of Olympia under contract. The Cooperative would use the same staffing as the Partnership, and functionally there would be little distinction between the Partnership and the Cooperative. Ownership and financing, however, would be clearly different. The Partnership/Cooperative arrangement could remain in place indefinitely, however the

design is intended to allow migration of all LOTT facilities and responsibilities to the Cooperative in the long term. Timing of this shift will be determined by need and opportunity as existing LOTT Partnership debt is retired.

Formation of the LOTT Cooperative requires approval of an intergovernmental contract by each of the participating governments. It is anticipated approval of this contract will be coincident with approval of the Wastewater Resource Management Plan.

**NOTE – This document includes only Chapter One: Summary of the Wastewater Resource Management Plan. The full document is several hundred pages in length and includes the Final Supplemental Environmental Impact Statement. It is available for review in hard copy form at the LOTT offices, 500 Adams Street NE in Olympia. Call 360-664-2333 for more information.**