

Wastewater Resource Management

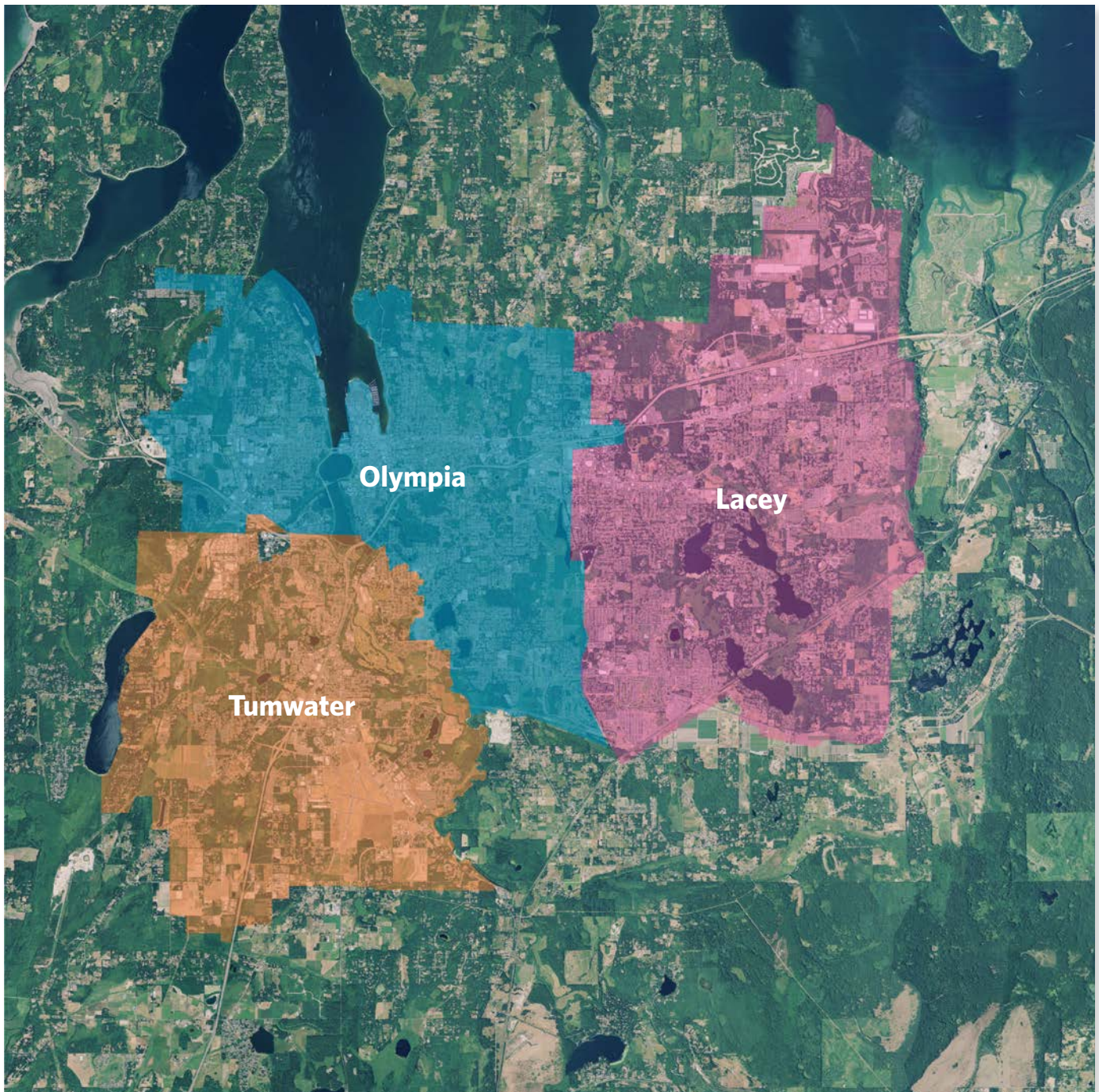
2050 LOTT System Plan

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Section 1: Introduction

The LOTT Clean Water Alliance (LOTT) is a regional wastewater utility providing services for the urban areas of Lacey, Olympia, and Tumwater in north Thurston County, Washington. LOTT's mission is to protect public health and the environment by cleaning and restoring water resources for our communities. While wastewater treatment is the primary function of the utility, LOTT is also responsible for planning to ensure it can meet growing demand for wastewater management over the long-term.



LOTT provides services for the urban areas of Lacey, Olympia, and Tumwater in north Thurston County.



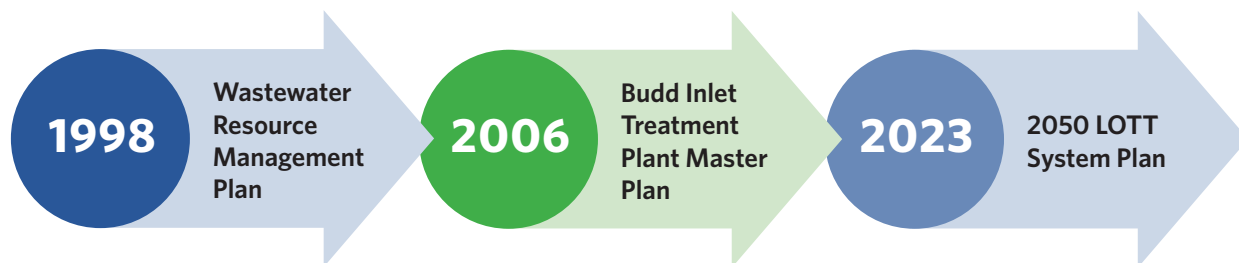
The Budd Inlet Treatment Plant serves as the core of LOTT's overall system, treating the majority of wastewater from the service area.

In the late 1990s, LOTT conducted a long-range planning process that resulted in the Wastewater Resource Management Plan (WRMP), also referred to as the "Highly Managed Plan." The WRMP established key wastewater management strategies, which included production of Class A reclaimed water as a community resource. Two reclaimed water treatment plants and one groundwater recharge facility were built as a direct result of this long-range planning effort.

Planning work was further refined with completion of the Budd Inlet Treatment Plant (BITP) Plan in 2006. That plan assessed process and facility needs, identifying a series of major capital projects to sustain the BITP. With the completion of the Biological Process Improvements project in 2023, the projects identified in the 2006 BITP Plan have now been implemented.

In 2018, LOTT began a new system-wide planning effort, acknowledging that much had changed since the WRMP and the 2006 BITP Plan were developed. This document summarizes this most recent planning work, providing an overview of what has been accomplished under the WRMP, new information and changes in conditions since that plan was established, and options and opportunities to refine LOTT's long-range plan to meet the needs of the future. This document is intended as a high-level overview. Additional information regarding technical assessments completed as part of this planning effort is available in the Phase 1 and Phase 2 reports completed by Brown and Caldwell.

LOTT is responsible for planning to ensure system capacity can meet growing demand for wastewater management over the long-term.



Section 2: LOTT's Wastewater Resource Management Plan

In the 1990s, LOTT undertook a long-range planning process to determine how to meet its growing communities' future wastewater management needs, within the constraints of limited discharge capacity to Budd Inlet. LOTT's main treatment facility is the BITP, located in Olympia.

This plant treats about 13 million gallons per day to advanced secondary standards, and most of its treated effluent is discharged to Budd Inlet.

Budd Inlet is a narrow embayment at the southernmost point of Puget Sound and the Salish Sea. Because of low dissolved oxygen and other water quality concerns in Budd Inlet, the state-issued discharge permit for the BITP includes strict discharge limits. To meet those limits and help protect water quality, in 1994 LOTT became the first treatment plant along Puget Sound to include nutrient removal as part of its treatment process. Since then, LOTT has consistently met the most stringent discharge permit limits of any wastewater treatment facility discharging to Puget Sound.



LOTT meets stringent water quality permit requirements to discharge treated water to Budd Inlet at the southernmost point of Puget Sound.

The 1990s planning process spanned four years, and included extensive technical analyses and public involvement. The resulting Wastewater Resource Management Plan (WRMP) was based on ten public values identified through the planning process, focused on meeting community needs, maximizing use of existing resources, providing community and environmental benefits, and managing costs.

Public Values

1. Maximize utilization of existing treatment capacity
2. Meet current and future wastewater needs
3. Maximize benefits to the environment
4. Control facilities costs
5. Treasure treated wastewater as a valuable resource
6. Produce multiple benefits for the community
7. Conduct proactive, open facilities planning processes
8. Ensure equitable distribution of costs
9. Operate in an equitable and accountable manner
10. Integrate planning with local issues, plans, and programs

Traditionally, wastewater utilities tend to build large, oversized treatment facilities and grow into them over time as wastewater system flows increase. LOTT's WRMP employed a different approach based on a combination of management strategies and a continuous planning model. This has been referred to as a "highly managed" approach; it requires annual assessment of system-wide capacity to determine when new capacity will be needed and to build that capacity in small increments "just in time" as needs arise.

WRMP strategies were four-fold:

1. Reduce flows into the wastewater system to delay the need to build capacity
2. Continue to discharge to Budd Inlet, with expanded discharge in winter months
3. Produce reclaimed water at decentralized satellite plants
4. Utilize reclaimed water for reuse and groundwater recharge to offset the need to increase discharges into Budd Inlet

Following adoption of the WRMP in 1998, LOTT has accomplished much through successful implementation of these strategies. The subsections that follow provide a brief overview of how LOTT has advanced each of the key strategies over the last several decades.

Flow Reduction

This management strategy is based on the premise that reducing flows into the wastewater system would delay the need to build new treatment capacity. Implementation focused on two main areas: inflow & infiltration and water conservation.

Inflow & Infiltration

Inflow and Infiltration (I&I) refers to unwanted surface and subsurface water entering the sewer system.

Inflow generally refers to rain or snowmelt runoff that enters the sewer system via manholes, storm drains connected to the combined storm/sewer system, and basement drains. Infiltration refers to groundwater that enters the system through leaky sewer pipe joints, manholes, and service connections.

At the time that the WRMP was being developed, wet weather operations at BITP were being affected by the ongoing issue of I&I from combined sewers in downtown Olympia that collected both stormwater and wastewater. This led to an extensive I&I study in the 1990s and an interjurisdictional agreement under which the City of Olympia removed more than 8 million gallons per day (mgd) of I&I from the wastewater collection system, marking a major flow reduction accomplishment. In 2008, the LOTT Board determined that the City had met its obligation for addressing I&I in the combined system.

I&I flows into the wastewater system have been reduced by more than 8 million gallons per day since 1997.

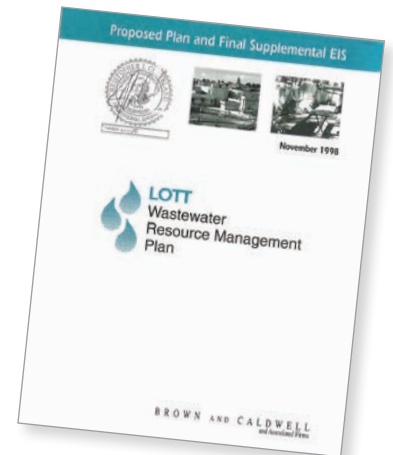
comprehensive condition assessments of the collection system and includes ongoing system inspection and monitoring. Since then, LOTT has invested over \$4 million to rehabilitate manholes and repair or replace deteriorating pipelines.

In 2003, LOTT established a flow monitoring program to track I&I for all sub-basins within the LOTT system. Under the program, the entire system is evaluated once every seven years. Monitoring identifies areas of concern for I&I, and aids in the prioritization of rehabilitation projects to reduce I&I. Each of the partner cities are responsible to address any significant increases in I&I that develop within their respective collection systems, and LOTT is responsible for addressing I&I in the LOTT-owned collection system.

Under the Collection System Management Program established in 2008, LOTT has taken a proactive, systematic approach to inspect, maintain, rehabilitate, repair, and replace LOTT-owned infrastructure to reduce I&I. The program began with



LOTT's proactive, systematic approach to inspecting and repairing collection system assets helps to control I&I and reduce incoming flows.



LOTT has been implementing the strategies identified in the Wastewater Resource Management Plan since its adoption in 1998.

Since 1997, LOTT's regional Water Conservation Program has reduced flows by more than 1.3 million gallons per day.

1.3 mgd have been conserved. The program has been so successful that many of the older commercial and residential fixtures in the service area have now been replaced with water-efficient models. In addition, plumbing codes now require fixtures with



Public education and outreach is a key component of water conservation and flow reduction efforts.

Water Conservation

Since 1997, LOTT has led a regional Water Conservation Program in collaboration with the water utilities of the three partner cities – Lacey, Olympia, and Tumwater. The program offers incentives to customers served by the LOTT system for indoor water conservation measures that reduce wastewater flows to LOTT treatment facilities. Program offerings have included free water-efficient toilets, showerheads, and faucet aerators, and monetary rebates for the purchase and installation of water-efficient toilets, urinals, clothes washers, and commercial/industrial equipment. Through the program, over 1.3 mgd have been conserved. The program has been so successful that many of the older commercial and residential fixtures in the service area have now been replaced with water-efficient models. In addition, plumbing codes now require fixtures with greater water-efficiency. For those reasons, significant additional gains through this program are not anticipated.



The Water Conservation Program offers rebates to install water-efficient toilets, washing machines, and other appliances.

Part of LOTT's success with the water conservation program is due to its commitment to public education. Replacing water-use fixtures is one approach to achieving conservation. Encouraging behavior change is another. The WET Science Center, opened in 2010, is a free educational center for community members to learn what they can do to reduce water use and prevent contaminants from going down the drain and into the wastewater system. Interactive exhibits and educational programs focus on these messages. In addition to general community use, the WET Center and water conservation messaging is integrated into field trip programs for the three school districts within LOTT's service area.

Discharge to Budd Inlet

As part of the 1990s planning effort, LOTT undertook a scientific study to determine the potential water quality impacts of increasing BITP discharge to Budd Inlet. The Budd Inlet Scientific Study showed that BITP wintertime discharge could be increased without negatively impacting nutrient levels or dissolved oxygen in Budd Inlet. The Washington State Department of Ecology (Ecology) considered this finding in setting seasonal discharge limits for the BITP. The permit allows for higher discharge in winter months, while applying nutrient discharge limits in the shoulder months of April, May, and October, and more stringent limits June-September.



With completion of a major upgrade to its nutrient removal system, the Budd Inlet Treatment Plant is performing better than ever.

In 1994, LOTT completed the original plant upgrades to nutrient removal and ultraviolet disinfection. Since then, LOTT has been able to meet stringent discharge limits with great success, often performing better than required. In 2020, LOTT began construction on a second generation nutrient removal system to reconfigure the original process and improve the level of process control. Initial performance of the new system shows promising results, with nutrient (nitrogen) removal even more effective than expected. The new system places the BITP among the best performing plants in the nation for this treatment technology.

Nutrient removal has been in use at the BITP for decades, providing the highest level of wastewater treatment in the Puget Sound region.

The Martin Way Reclaimed Water Plant (MWRWP) employs membrane bioreactor technology to produce about 1.5 mgd. As part of the satellite, LOTT also built the Hawks Prairie Reclaimed Water Ponds and Recharge Basins. This site in northeast Lacey includes a series of constructed wetland ponds and 8 acres of recharge basins. Reclaimed water from the MWRWP that is not used elsewhere is sent to this site and used to recharge and replenish groundwater.

In the spirit of incremental expansion established under the WRMP, both of these facilities were designed to be expanded in small increments (1 mgd) as additional capacity needs arise. LOTT also purchased several properties as potential sites for future satellite

reclaimed water plants. The Mullen Road site (5 acres) was purchased in 2006 and the Deschutes Valley property (45 acres) was purchased in 2011.

Since 2006, LOTT's Class A reclaimed water has helped our partner communities stretch their water supplies through reuse and groundwater recharge.

Reclaimed Water Production

LOTT built two reclaimed water treatment plants in the early 2000s. These facilities treat wastewater to a high state-defined standard called Class A reclaimed water. This treated water can be reused for beneficial purposes or recharged to groundwater. The Budd Inlet Reclaimed Water Plant (BIRWP), located at the BITP, began operation in 2004. This plant takes final effluent from the BITP and passes it through a sand filter and additional disinfection to generate about 1.5 mgd of Class A reclaimed water.

In keeping with the WRMP focus on decentralized satellite treatment facilities, the first satellite reclaimed water plant was constructed in 2006.



The Budd Inlet Reclaimed Water Plant uses sand filter technology to produce about 1.5 mgd of Class A reclaimed water.



The Martin Way Reclaimed Water Plant uses membrane bioreactor technology to produce about 1.5 mgd of Class A reclaimed water.

Reclaimed Water Reuse and Recharge

LOTT reuses a portion of the reclaimed water produced at each of its facilities for process water and irrigation at its treatment plants, surrounding grounds, and nearby pump stations. LOTT also uses Class A reclaimed water from the BIRWP for public outreach and community amenities. A fountain and pond outside LOTT's Regional Services Center showcases the high quality water, and a demonstration wetland provides an example of how this resource can support a vibrant ecosystem. The wetland is home to aquatic insects, frogs, red-winged blackbirds, and nesting ducks. Across the street in the East Bay Public Plaza, reclaimed water flows through an interactive splashing stream that is a treasured playground for families in summer months. This unique water feature provides community members with the opportunity to see and touch Class A reclaimed water, raising awareness that it is a safe and valued resource.



The interactive wading stream at the East Bay Public Plaza is fed by Class A reclaimed water.

Since 2006, LOTT's Class A reclaimed water has helped our partner communities stretch their water supplies through reuse and groundwater recharge.

Class A reclaimed water from the BIRWP is also used

to irrigate streetscapes and parks in downtown Olympia, including Percival Landing and Heritage and Marathon Parks. LOTT offices, WET Science Center, and Hands On Children's Museum toilets are flushed with reclaimed water. It is also used for irrigation at the Tumwater Valley Golf Course. LOTT constructed a one million gallon storage tank south of the golf course, co-located with a City of Tumwater park, to help manage peak demand for the resource.

As established under the WRMP, LOTT also uses reclaimed water to recharge groundwater. This management strategy provides a year-round means for upland disposition of the treated water, since irrigation reuse is only seasonal. Class A reclaimed water from the MWRWP is used

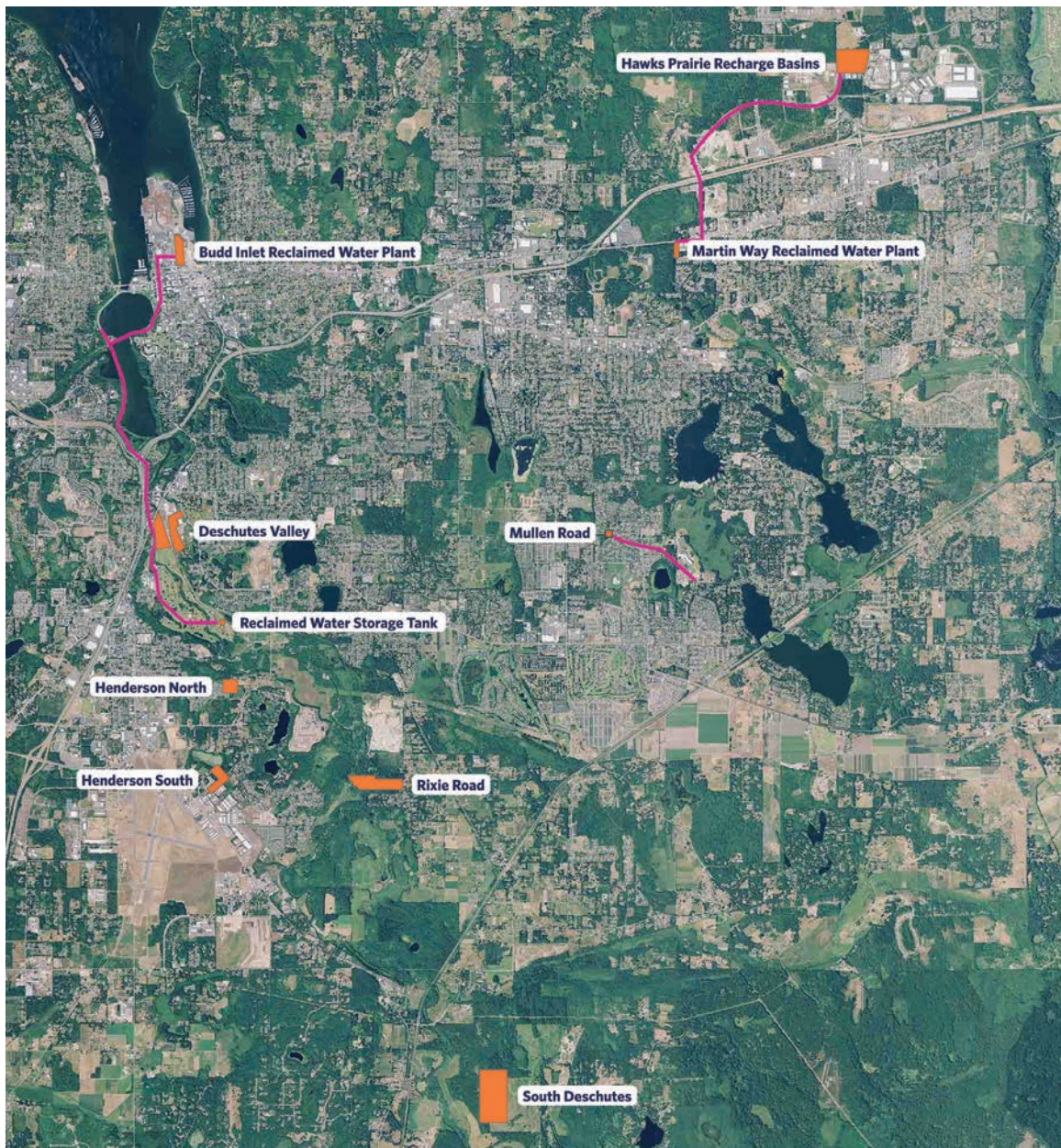
for recharging groundwater at two locations. The Cities of Lacey and Olympia own and operate the Woodland Creek Groundwater Recharge Facility. There, they use reclaimed water for recharge to mitigate a portion of their municipal water rights. Any water not used by the cities is sent to LOTT's Hawks Prairie site, where it flows through wetland ponds prior to entering groundwater recharge basins.



Class A reclaimed water is used to replenish groundwater at LOTT's Hawks Prairie Recharge Basins site.

LOTT's overall reclaimed water system consists of two production facilities, one recharge site, a storage tank, and approximately 11 miles of conveyance pipelines. As part of the long-range vision for expanded groundwater recharge at multiple sites, LOTT purchased several properties for potential future use as infiltration sites.

- The Henderson South property (13 acres) was purchased in 2006.
- The Rixie Road property (32 acres) was purchased in 2008.
- The South Deschutes property (50 acres) was purchased in 2009.
- The 58th Avenue property (5 acres) was purchased in 2009, and was sold in 2017 following completion of the 2016 report by Brown and Caldwell indicating a facility at this site would likely never be necessary.
- The Henderson North property (10 acres) was purchased in 2015. A small portion of this property, featuring a single-family residence, was sold in 2021.



This map depicts LOTT's overall reclaimed water system, including existing facilities, pipelines, and properties acquired for potential future system expansion.

Section 3: System-Wide Planning to 2050

The WRMP established in the late 1990s has served LOTT well as its original long-range plan. In addition to establishing four key wastewater management strategies, it set LOTT on a path of continual planning. This planning approach is based on ongoing review of existing capacity, projections of future capacity needs, and development of additional system capacity “just in time”, in an incremental manner as need arises. This has allowed LOTT to dynamically manage its plans and capital projects, avoid stranded investments, take advantage of advances in technology, and readily adapt to changes in wastewater system flows and regulatory requirements.

The Wastewater Resource Management Plan has served LOTT well for nearly 25 years. The 2050 LOTT System Plan builds on this foundation, refining long-term management strategies for the future.

Building on the framework established in the WRMP, LOTT completed the first iteration of system-wide planning in 2006 with the Budd Inlet Treatment Plant Master Plan. That effort assessed process and facility needs, identifying a series of major capital projects to sustain the BITP. With the completion of the Biological Process Improvements project in 2023, projects identified in the 2006 BITP Plan have now been implemented.

LOTT began the current planning effort in 2018, acknowledging that the WRMP was developed in 1998 with a planning horizon of 22 years, through the year 2020. The current effort allows for a comprehensive look at facility needs and long-range management strategies to account for all that has changed since the WRMP and the 2006 BITP Plan were

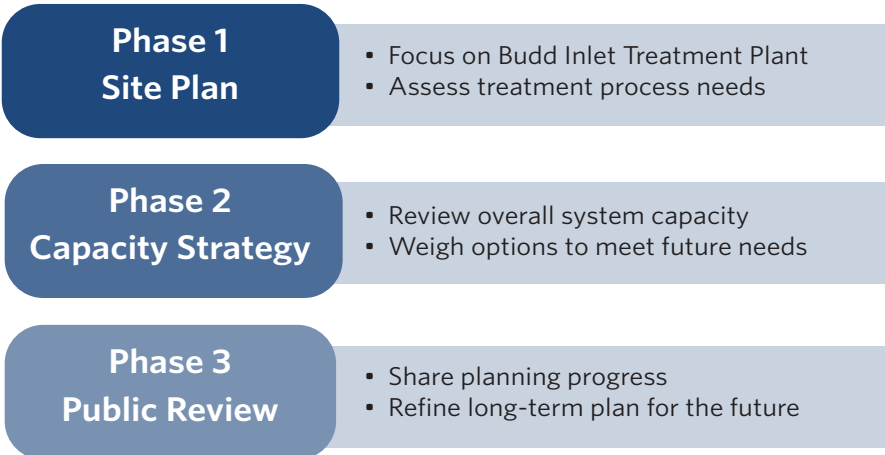
developed, and all that will be needed to manage wastewater capacity for the next 25 year window, through 2050. By that time, it is anticipated that the LOTT wastewater system will reach “build out”, meaning that all undeveloped parcels within the service area will be developed and connected to the system by 2050.

Planning Process

This planning effort was structured in three phases. Phase 1 focuses its attention on the BITP, picking up where the 2006 BITP Plan left off to provide a long-term road map for wastewater treatment at this location. Phase 1 work presents a vision of how the BITP can be adapted over time to ensure continued high-quality treatment even as influent flows and loads increase through 2050.

Phase 2 planning takes a broader look at overall wastewater system capacity, including reclaimed water, satellite facilities, discharge, and end uses. Alternatives to meet future capacity needs were evaluated to refine long-term management strategies for the future.

Phase 3 of the planning effort focuses on sharing progress with stakeholders and the public through community presentations and completion of State Environmental Policy Act (SEPA) environmental review and public input process. The intent of this three-phased process is an update of LOTT’s long-term plan for managing both the BITP and the overall wastewater system over the next 25 years.



New Information and Changing Conditions

Each phase of planning takes into account a wealth of information that has been developed since the WRMP was put into place. In that time, the quality of data available for use in projecting future flows and loadings and other analyses has improved significantly. LOTT has also developed a better understanding of the advantages and challenges of operating satellite facilities, conducted site assessments to better understand suitability of LOTT-owned properties for future facilities, and completed a multi-year study on the safety of using reclaimed water for groundwater recharge.

Conditions have also changed considerably since development of the WRMP, and they will continue to change. State-level planning efforts have resulted in more stringent limits on BITP nutrient discharge to Budd Inlet. Changing weather patterns have resulted in longer duration, more intense storm events. The following subsections present a brief overview of the new information and changing conditions that were considered in the development of the 2050 LOTT System Plan.

Wastewater Flow Projections

The quality and availability of data used for projecting population changes and future wastewater flows and loadings has improved greatly in recent years. This new data indicates that population growth and associated wastewater flows are increasing at a slower rate than originally predicted. Similarly, the rate at which on-site septic systems have been converted to the municipal wastewater systems is much slower than assumed when the WRMP was developed.

The result is that overall wastewater system flows have increased more slowly than previously estimated. This has delayed the need to build new system capacity, and opened the door to alternative strategies for meeting system capacity through 2050.

Revised flow projections have another implication. Wastewater flow availability is limited at the MWRWP and other points in the system where satellite facilities were originally envisioned. This makes them less cost-effective in providing overall system-wide capacity benefits due to the high up-front capital costs and on-going operational costs of satellite facilities.

Key Planning Considerations

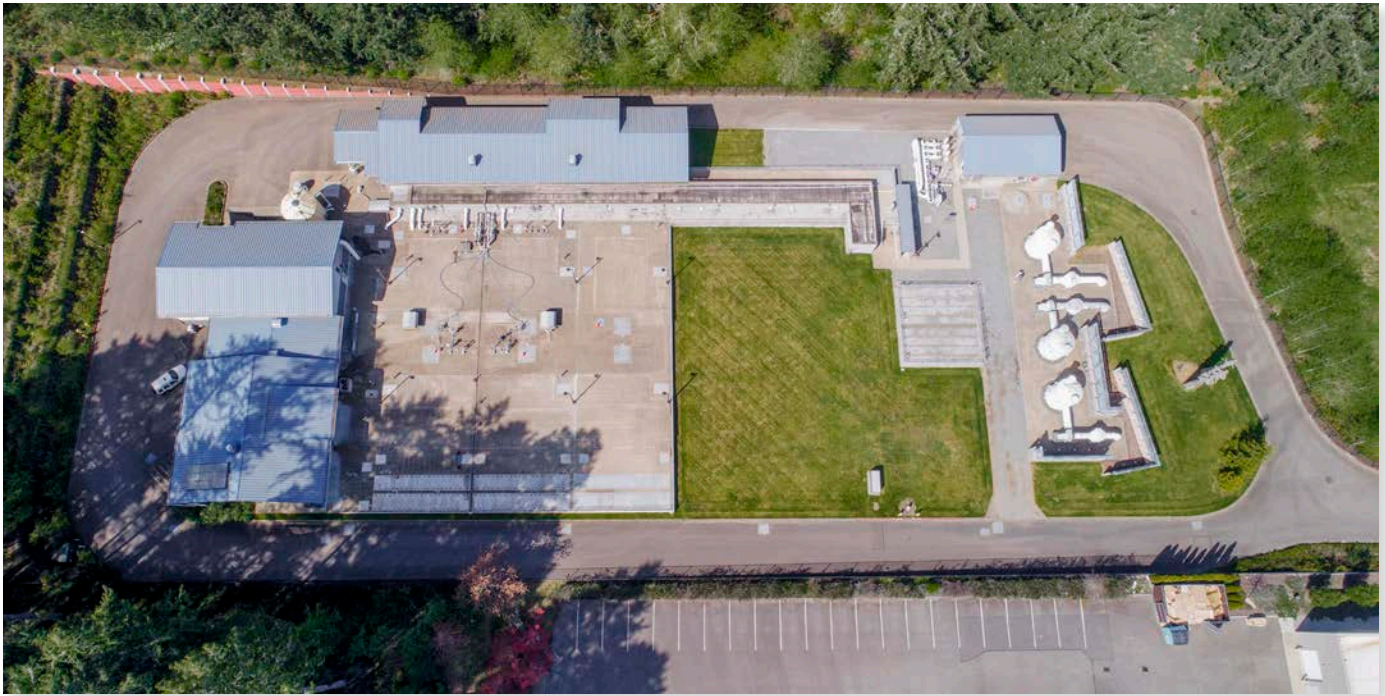
1. Wastewater system flows have increased at a slower rate than originally anticipated.
2. Satellite facilities are staff and resource-intensive to build and operate.
3. Existing treatment facilities can accommodate expanded production of reclaimed water to meet future needs of our partner jurisdictions.
4. Site assessments of undeveloped properties show the sites have less capacity to recharge groundwater than anticipated. The existing Hawks Prairie recharge site can accommodate a significant increase in infiltration over time.
5. The Reclaimed Water Infiltration Study determined the risk from residual chemicals in reclaimed water used for groundwater recharge is low, and the current use is safe and appropriate.
6. New permit requirements mean LOTT must plan to operate its nutrient removal treatment process year-round, and seasonal discharge limits will also become more stringent.
7. Sea level rise and more intense storm events are expected to increase peak flows.

Operational Considerations

The 2050 LOTT System Plan incorporates operational lessons learned from implementation of the WRMP. These are related to operation of a satellite facility and the completion of key projects to improve treatment performance.

While originally envisioned as a remote-operated facility, the MWRWP has required daily staffing by an onsite Operator. It also requires a large amount of operational and maintenance attention, with crews of staff frequently onsite to perform that work. Moving staff and equipment between the BITP and MWRWP is inefficient and costly. Limited source flow due to diurnal flow fluctuations at the MWRWP has slowed realization of a significant system-wide capacity benefit. It has also slowed the rate at which production of reclaimed water, a resource valued by jurisdictional partners, has increased.

The MWRWP can currently treat up to 2 million gallons of wastewater a day (mgd) and was designed with future expansion in mind. There is adequate space on its existing footprint to accommodate up to 5 mgd of treatment. LOTT holds a perpetual easement on City of Lacey property adjacent to the MWRWP that could be used to expand treatment capacity as high as 8 mgd in the future. With supporting infrastructure already in place, incremental expansion of this facility would be cost-effective as flows become available.



With supporting infrastructure already in place, incremental expansion of the Martin Way Reclaimed Water Plant is a cost-effective option.

Conversely, operational lessons learned at the BITP show that significant gains in treatment performance are possible through new treatment technologies and refined process control. LOTT staff excel at achieving nutrient removal well beyond levels originally anticipated. With completion of the second generation nutrient removal upgrade in 2023, these gains are expected to continue, with direct benefit to overall system capacity. Further, completion of a key capital improvements project – Biological Process Improvements – has freed up valuable space at the BITP, and flow availability is not a limiting factor. This provides the opportunity to expand reclaimed water production at the BIRWP.

Expanding reclaimed water production at existing facilities – the BIRWP and the MWRWP – can help to meet partner jurisdiction interest in the resource and provide system-wide capacity benefits. This option is more cost-effective than building and operating additional satellite treatment facilities.

Recharge Site Assessments

To implement the satellite facility vision developed as part of the WRMP, LOTT purchased a number of properties as potential sites for future reclaimed water recharge facilities. Purchase decisions were based on the opportunity to acquire properties from willing sellers, the location of properties in relation to related system infrastructure, and initial, high-level site evaluations that indicated hydrogeologic conditions favorable for recharge. More in-depth site assessments conducted over time revealed that the hydrogeologic conditions at most of the sites support considerably less infiltration capacity than originally anticipated. A search for alternative sites has also not yielded prospects with significant recharge capacity.

LOTT’s Hawks Prairie Recharge Basins (HPRB) site currently infiltrates on average 0.8 mgd of Class A reclaimed water from the MWRWP. The site has unique hydrogeologic conditions that allow it to function as a high-capacity groundwater recharge facility, projected to accommodate up to 8 mgd of flow. Finding a similar site that could be used for recharge of reclaimed water produced at the BIRWP is unlikely.

An ideal site would be located in the vicinity of existing infrastructure south and slightly east of the BIRWP. LOTT purchased the two Henderson sites, along with the Rixie Road and South Deschutes sites in that corridor with that intent. All of these sites have undergone field studies and groundwater modeling to refine understanding of their infiltration potential. In each case, the estimated infiltration capacity has decreased as additional site-specific investigations have been completed. While the South Deschutes site has the greatest capacity (estimated between 1.5 and 5 mgd), it is likely that adjacent parcels would be negatively impacted by infiltration at the higher end of the range. The Henderson and Rixie Road sites appear limited to 1.0-1.5 mgd capacity each.

Recharge Site Capacity Estimates			
	Distance from BIRWP (miles)	Initial Estimate (mgd)	Refined Estimate (mgd)
Henderson North	3.8	–	1.3
Henderson South	4.8	3-5	1.5
Rixie Road	5.0	3-5	1
South Deschutes	8.5	3-6	1.5-5

Residual Chemicals in Reclaimed Water

LOTT recently completed a 10-year scientific study to assess potential risk to human and ecological health due to residual chemicals that may remain in reclaimed water used to recharge groundwater. Residual chemicals is the term used to refer to chemicals that come from pharmaceuticals, personal care products, household products, and commercial/industrial uses. Findings of this extensive scientific effort, referred to as the Reclaimed Water Infiltration Study, indicate the risk to human and ecological health from residual chemicals in reclaimed water used for infiltration is low. The independent Peer Review Panel for the study indicated:

- The risk assessments were well designed and protective of human and ecological health.
- Under current conditions, the potential risks associated with groundwater recharge are low and the water is safe.

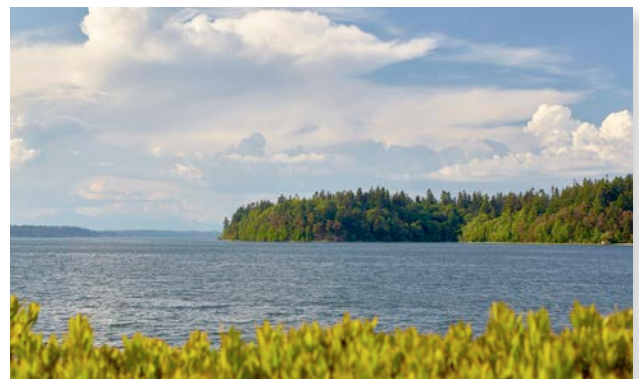
While the study indicates LOTT’s long-range strategy of using reclaimed water for recharge is responsible and safe, this research effort was a point-in-time study that reflects current conditions. Many factors can, and likely will, change in the future. New regulations, particularly for PFAS chemicals, are expected at the state and federal levels, which could impact treatment requirements for groundwater infiltration. If advanced treatment systems to remove residual chemicals are eventually required, they would be costly to install and operate, increasing the life-cycle cost associated with groundwater infiltration.

Discharge Permit Limits

The initial impetus for LOTT's reclaimed water program was compliance with its National Pollutant Discharge Elimination System (NPDES) permit. The permit specifies seasonal mass-based limits for biochemical oxygen demand (BOD), total suspended solids (TSS), and total inorganic nitrogen (TIN), along with more conventional concentration-based limits and removal requirements. The mass-based limits impact the quantity of flow that may be discharged at the BITP's effluent outfall into Budd Inlet.

Ecology recently completed the Budd Inlet Total Maximum Daily Load (TMDL) Water Quality Improvement Plan. As part of that process, Ecology has indicated additional reductions to the allowable BOD and TIN discharge limits in the BITP NPDES permit will be forthcoming for the August and September period. The new TIN limit effectively reduces the volume of effluent discharge by 1-2 mgd, depending on the concentration. The BOD revision is even larger, and therefore the volume reduction is also larger, and averages 3-4 mgd.

The TMDL also indicates that Capitol Lake is the biggest contributor of oxygen depletion to Budd Inlet (60%), while the BITP contributes less than 3%. To address the Capitol Lake contribution, the Capitol Lake-Deschutes Estuary Environmental Impact Statement (EIS) identified estuary restoration as the preferred alternative. Until estuary restoration is complete, Budd Inlet will remain in violation of state and federal water quality standards. This continued water quality impairment increases the risk that LOTT will be subject to even more stringent discharge regulations in the future. LOTT ratepayers have already invested over \$60 million to upgrade the main treatment facility for nutrient removal, and LOTT has been meeting the most stringent discharge permit limits on Puget Sound for over three decades. Further regulation on LOTT's discharge, which would likely result if estuary restoration does not proceed, would entail significant and disproportionate costs to LOTT ratepayers.



BITP discharge permit requirements are expected to become more stringent as a result of Ecology's Budd Inlet Water Quality Improvement Plan.

In addition, a new Nutrient General Permit was issued by Ecology for treatment plants discharging to Puget Sound. The general permit includes mass-based nitrogen limits. These limits are being applied as annual load limits, so they differ from the seasonal limits in the NPDES permit for BITP. The annual load limit primarily affects LOTT's winter discharge. Currently, 78% of nitrogen discharge from the BITP occurs during the winter. With the general permit effective as of January 2022, LOTT must plan to operate its nutrient removal treatment process year-round, rather than seasonally.

Climate Change and Weather Patterns

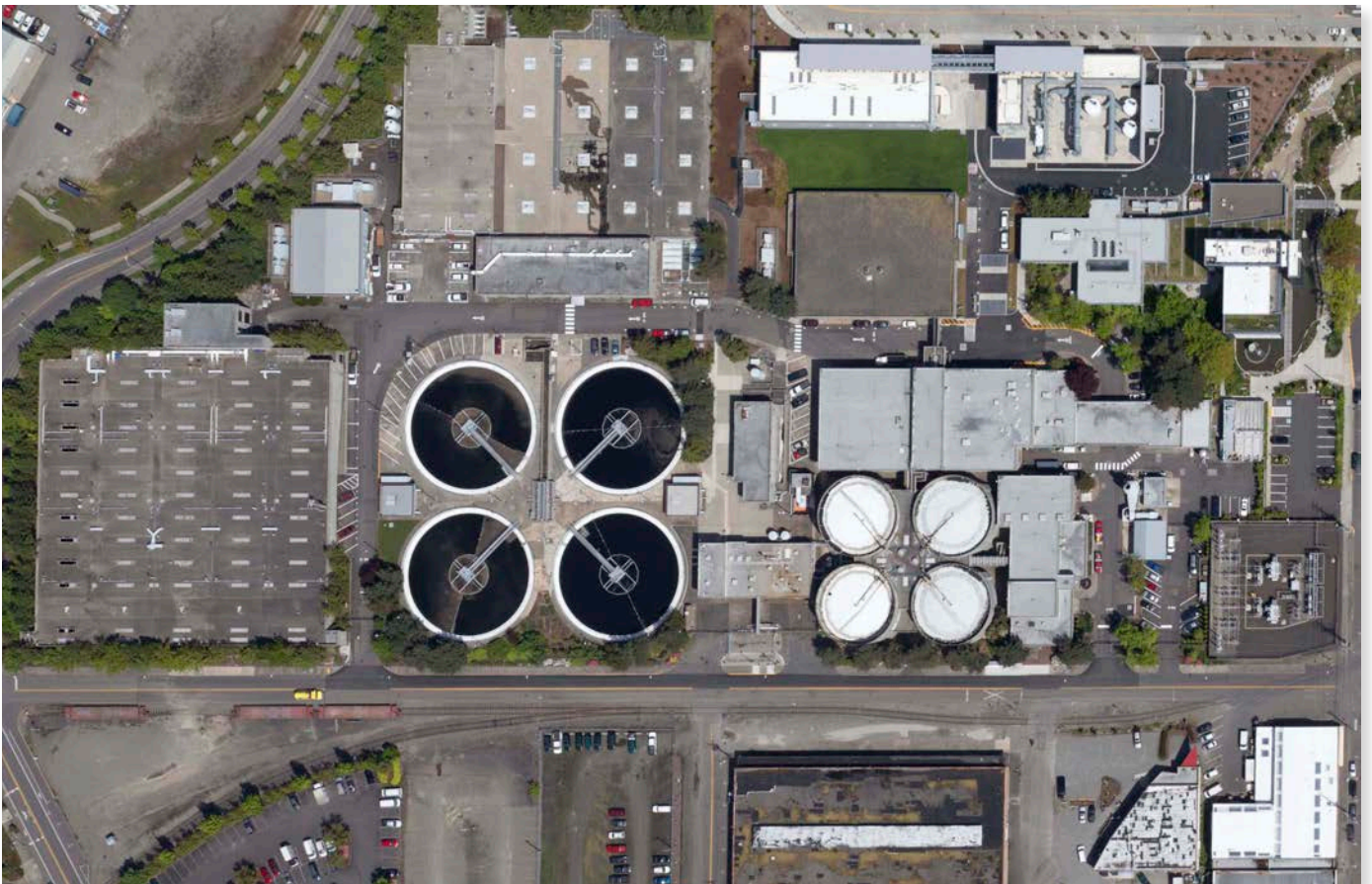
Climate change has the potential to affect the BITP in several ways. Most notably climate change may disrupt historical weather patterns, resulting in more severe storm events with greater intensity and longer duration. These weather events challenge the hydraulic and treatment capacity of the BITP, increasing the likelihood of combined sewer overflows. They also increase flows related to I&I. Sea level rise associated with climate change may increase the likelihood and frequency of overland flooding in the downtown Olympia combined sewer system, causing increased wet weather peak flows to the BITP. Sea level rise also increases the likelihood and frequency of flooding at the BITP itself, threatening vulnerable equipment, resources, and operational capabilities. LOTT partnered with the City of Olympia and Port of Olympia to complete the Olympia Sea Level Rise Response Plan in 2019, and the three entities continue to collaborate on implementation of response measures to minimize impacts to Olympia's downtown, the Port, and the BITP. While the response plan addresses risks due to sea level rise, LOTT must also take risks associated with changing weather patterns into account when assessing BITP and system needs into the future.



Sea level rise and storm events of increasing intensity are expected to result in higher peak flows in the wastewater system and potential flooding at the Budd Inlet Treatment Plant.

Phase 1: Budd Inlet Treatment Plant

Phase 1 planning focused on a full assessment of BITP facility needs. Generally, facility needs are tracked and updated each year as part of LOTT's annual capacity assessment and capital planning work. They are defined based on capacity modeling, performance improvements, asset management repair and replacement work, and feedback solicited from staff. On a biannual basis, LOTT publishes a budget and capital improvements plan (CIP) that summarizes upcoming projects. LOTT maintains a very detailed 6-year CIP, as well as a long-range CIP to guide capital management and financial decisions. Phase 1 planning work went beyond these ongoing planning activities to conduct an in-depth facility needs assessment for the BITP. The focus was on process-related needs to provide effective wastewater treatment of projected flows and loads for two planning scenarios – 2050 build out and full connection. Under the 2050 build out scenario, all the undeveloped parcels within the cities of Olympia, Tumwater, Lacey, and their respective urban growth areas are expected to be developed and connected to the LOTT system by 2050. Parcels with existing septic tanks are expected to gradually connect to the LOTT system, with 35% connecting by 2050. The full connection scenario refers to the point where 100% of existing septs are connected to the LOTT system, at some point beyond 2050.



Phase 1 planning focused on a comprehensive assessment of facility needs to sustain and upgrade the Budd Inlet Treatment Plant through 2050.

Phase 1 planning work included an in-depth assessment of process related needs for the Budd Inlet Treatment Plant.

The consultant Brown and Caldwell conducted the BITP needs assessment with extensive involvement of LOTT staff, particularly from the Operations & Facilities and Engineering departments. The intent of this Phase 1 work was to:

- Assess upgrade or expansion needs for each treatment process
- Review options for siting facilities and expansions on or near the existing BITP footprint
- Develop an updated site map with locations for facilities and expansions
- Identify property acquisition needs
- Estimate timing and costs of future capital improvements for use in LOTT's long-range CIP

The Phase 1 facility needs assessment identified a variety of project needs and types. In some cases, projects involve capacity expansion; in others, they focus on refurbishment, equipment replacement, and repairs to existing facilities. Finally, in some cases, projects involve improvements to treatment efficiency, reliability, or performance. For refurbishment, repair, and replacement, near-term projects were defined based on staff prioritization and information from LOTT's asset management program. Longer-term projects were projected based on industry-standard guidelines for renovation cycles and facility rebuilds (depending on the type of facility).



The Phase 1 site map shows potential locations for future process facilities and expansions at the Budd Inlet Treatment Plant.

The BITP site supports multiple uses and facilities in addition to providing wastewater treatment processes. The facilities are divided into process, administrative, storage, public spaces, and parking. Though the site plan that resulted from Phase 1 work shows all these facility types, the assessment focused on process-related needs and whether the existing footprint of the BITP is sufficient to house future needs.

A key objective of the effort was to maintain flexibility, recognizing that LOTT must remain nimble to adapt to continuously changing conditions.

Since 1994, the NPDES permit for BITP has included more stringent discharge limits for nitrogen and BOD than any other wastewater plant discharging to Puget Sound. With completion of Ecology's Budd Inlet TMDL Water Quality Improvement Plan, those limits have become even more stringent. While limits have previously been seasonal in nature, the new Nutrient General Permit, which applies to all publicly-owned treatment plants discharging to Puget Sound, includes a year-round limit on nutrient discharge. These recent regulatory changes are a clear example of why it is critical that LOTT retain flexible options for the future.

This Phase 1 facilities needs assessment identified promising options. It also verified that the BITP can continue to meet stringent regulatory requirements and can be adapted over time to meet our communities' future treatment capacity needs.

Phase 1 work verified the BITP can be adapted over time to continue to meet stringent permit requirements and our communities' growing wastewater capacity needs.

Detail regarding process-by-process assessments can be found in the Phase 1 report: Budd Inlet Treatment Plant Master Planning Update, May 6, 2020, prepared by Brown and Caldwell. In addition to review of the existing process facilities, the report includes alternative assessments for key process areas, with options for how to meet future challenges related to centrate treatment, secondary clarifiers, wet weather, and digesters.

Highlights from Phase 1 Analyses

- The BITP is well positioned to accommodate the facilities and processes necessary to meet our communities' wastewater treatment requirements
- There is adequate physical space at the BITP to accommodate nearly all future facility needs. Space newly available due to completion of the Biological Process Improvements project can provide equalization storage in the near-term to better manage storm events. The space may eventually be used to expand reclaimed water treatment.
- There are multiple options for siting reclaimed water expansion at the BITP, eliminating the need to build additional satellite reclaimed water plants at off-site locations.
- Acquiring additional property north of LOTT's Washington Street parcel and vacating B Avenue are high priorities to ensure that future expansion of secondary clarifiers can be accommodated.
- Acquiring contiguous property to the east, north of Jefferson Avenue, would provide additional flexibility to accommodate future facilities, but it is not equal in priority to property north of LOTT's Washington Street parcel.
- A new wet weather treatment system may be needed to manage increased peak flows from changing weather patterns. The system will require acquisition of property for a wet weather pump station in the downtown Olympia area.
- A thorough list of future capital improvements at the BITP has been developed as part of this effort, including estimated timing and costs. This data has been incorporated into LOTT's 6-year CIP and high-level, long-range CIP, to ensure that LOTT has adequate resources to implement necessary projects over time.

Phase 2: Capacity Management

The WRMP, developed in the late 1990s, provided a roadmap for LOTT to manage future wastewater management needs of its growing communities. It relied on a combination of strategies to meet future needs, including flow reduction, continued discharge to Budd Inlet from the BITP, and alternative discharge through reclaimed

Phase 2 planning work focused on evaluation of two key long-term strategies – reclaimed water expansion per the WRMP, and a new option to provide enhanced treatment at BITP.

water production, reuse, and groundwater recharge. The WRMP originally envisioned reclaimed water production at the BITP and three satellite water reclamation plants. These plants would treat between 3-5 mgd and would effectively divert flows away from the BITP to ensure discharge from the BITP would not exceed NPDES permit limits, even as wastewater flows increased due to growth.

Much has changed since development of the WRMP, including new information and new technologies to be considered. The intent of Phase 2 work was a comprehensive review of long-term management strategies to ensure LOTT is on a viable path to meet overall wastewater capacity needs well into the future. This assessment was completed by Brown and Caldwell, with extensive input from LOTT staff through a series of focused workshops.

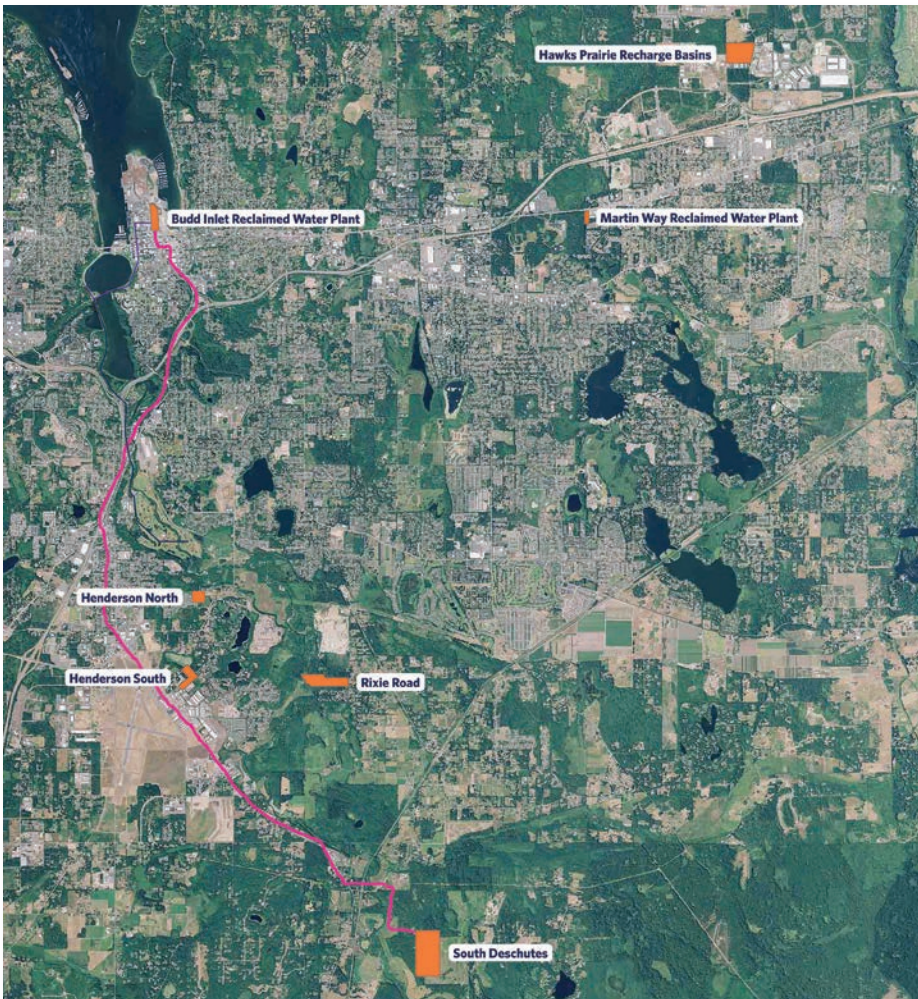
In broad terms, Phase 2 work focused on evaluation of two key long-term strategies – reclaimed water expansion per the WRMP, and a new option to provide enhanced treatment at BITP. Treatment technologies have advanced to a point where it may be possible to generate a BITP effluent with such low nutrient concentrations that NPDES limits could be met by means other than alternative discharge. The following subsections provide a

brief overview of those evaluations. More detail can be found in the Phase 2 report: Master Planning Capacity Assessment, January 2022, prepared by Brown and Caldwell.

Reclaimed Water Expansion

The WRMP envisioned meeting new capacity needs primarily through expansion of reclaimed water production, reuse, and groundwater recharge as a means of alternate discharge. LOTT built the BIRWP, MWRWP, and HPRB as initial steps in realizing that vision, successfully producing high quality water that is valued as a resource. As part of the plan analyses, LOTT used updated flow and loading projections to estimate how capacity needs could be met under the historical approach of satellite reclaimed water production and groundwater recharge. LOTT would need to develop up to 10 mgd of production facilities, and 8 mgd of groundwater recharge facilities to meet the anticipated regulatory limits for the 2050 build out scenario. That could increase to 16 mgd of production and 13 mgd of recharge under the scenario of full connection of septic tanks within the service area.

Phase 2 work included a comparison of three different alternatives for expanding reclaimed water production and recharge. Because of the challenges and cost-inefficiencies associated with development of additional satellite treatment plants, all of the alternatives focus future reclaimed water production at existing facilities. Each alternative provided a different approach for where the reclaimed water produced at the BIRWP would be recharged. The most cost-effective alternative for the long-term involved installation of a reclaimed water conveyance pipeline approximately eight miles in length from the BIRWP southeast to a recharge facility that would be developed on LOTT's South Deschutes property. This alternative also offers some ecological advantage, given recharge takes place upstream in the Deschutes River watershed where flow augmentation would be of benefit.



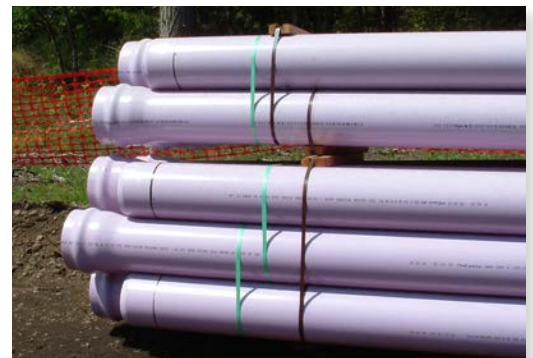
If reclaimed water from the Budd Inlet Reclaimed Water Plant is to be used for recharge, the best option presently available is an eight mile pipeline and a new recharge facility at LOTT's South Deschutes property.

reuse has been limited to areas adjacent to reclaimed water conveyance lines installed by LOTT to convey the water from the BIRWP to a LOTT-owned storage tank and from the MWRWP to the HPRB. Although the WRMP assumed reuse would play a major role in alternative discharge, use of the resource for water rights mitigation has become the priority for LOTT partners, transforming the product into a commodity with tangible benefits.

The cost to meet future capacity needs primarily through reclaimed water expansion is estimated to be at least \$116 million.

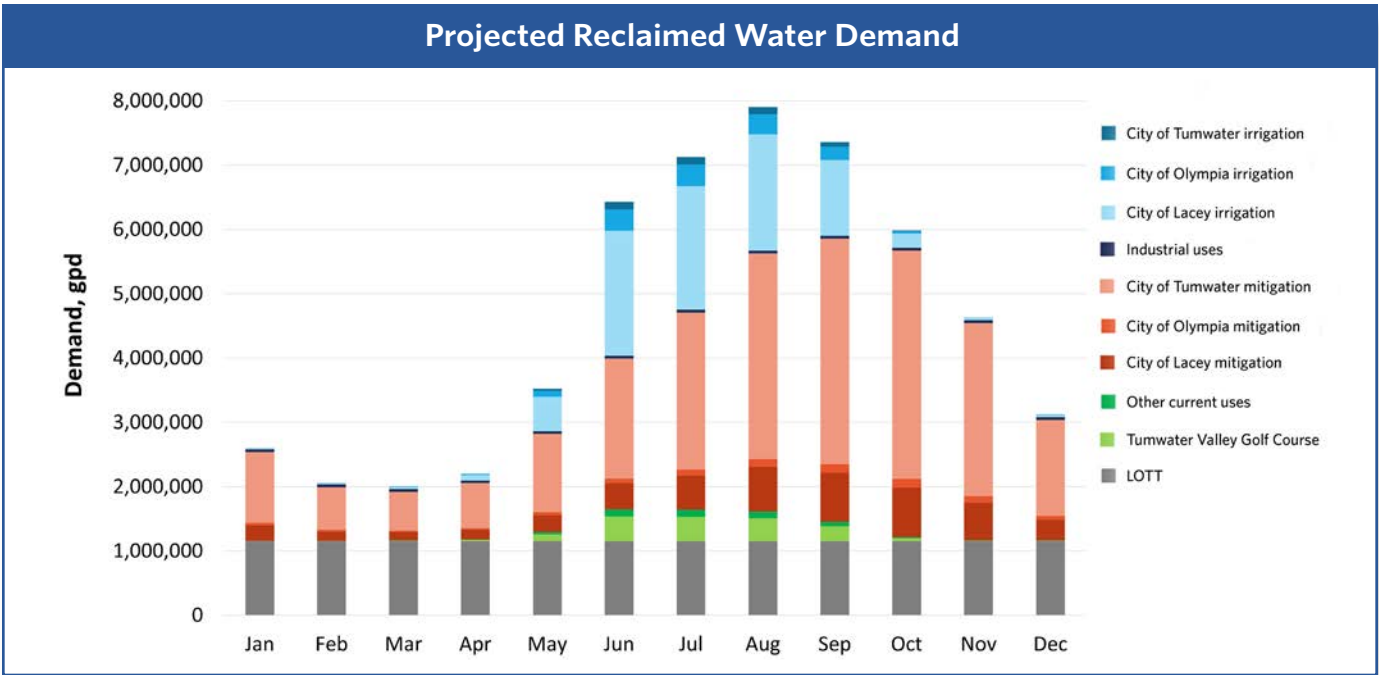
The results of this evaluation reflect the challenges previously mentioned. High-capacity groundwater infiltration sites are rare and located long distances from production facilities. Site evaluations of LOTT's undeveloped infiltration sites show that the sites have limited capacity. To achieve significant capacity benefit, multiple low-capacity sites would need to be developed, which would be costly and increase the likelihood of negative impacts to adjacent properties. Alternatively, conveyance would be needed to the farthest South Deschutes site, as this site has the greatest capacity and the least likelihood of offsite impact. The near-term cost of this alternative has been estimated at approximately \$116 million.

LOTT has developed a highly successful reclaimed water program, and demand for the product now exceeds supply. Originally, extensive networks of purple pipes were envisioned to convey reclaimed water to areas where it could be reused for irrigation and other purposes, replacing potable water for those uses and helping partner cities conserve their potable water supplies. Installation of extensive pipe networks has proven cost-prohibitive. Instead, reclaimed water



Due to the high cost of installing purple pipe networks, most reuse of reclaimed water occurs in areas near LOTT-owned infrastructure, such as the reclaimed water storage tank located south of the Tumwater Valley Golf Course.

Phase 2 work included an assessment of current and future anticipated reclaimed water demands from each of LOTT’s partner cities and other stakeholders. This required each city to provide feedback on projected reclaimed water demands in terms of quantity, quality, seasonality, end use, and location of end use through 2050 and beyond.



Projected reclaimed water uses of LOTT partner jurisdictions and others by 2070.

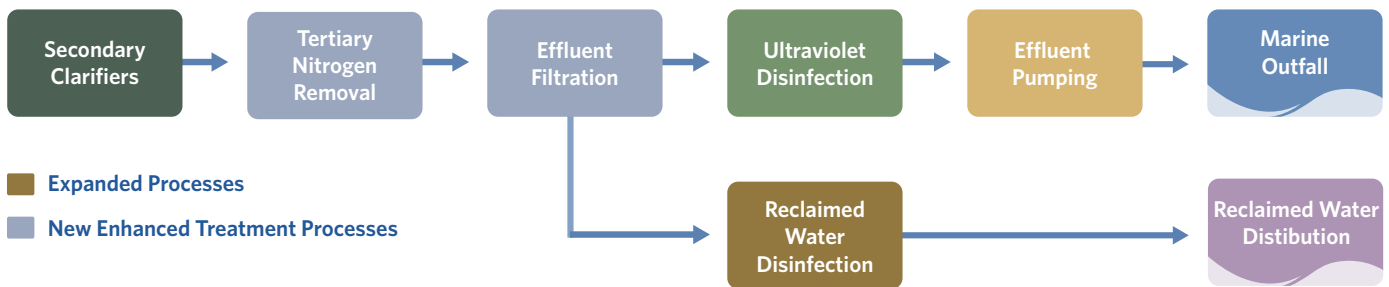
Beneficial end uses provide some capacity benefit, though they are primarily seasonal in nature. There are other drivers for LOTT’s reclaimed water program. As a result of the public value to treat wastewater as a valuable resource, LOTT has a commitment to beneficial reuse, providing the resource for use by its partner cities as feasible. Reclaimed water production can be expanded at the existing facilities of BIRWP and MWRWP to meet the projected future reclaimed water needs of the partners.

Enhanced Treatment at the Budd Inlet Treatment Plant

While there is demand for a reclaimed water product, the principal driver of LOTT’s reclaimed water program is compliance with the BITP NPDES permit. At current levels of treatment performance, LOTT could need to develop up to 16 mgd of additional capacity to ensure compliance under the full connection scenario. However, there are available technologies that could improve the BITP effluent quality to such a level that significantly more flow could be discharged while remaining in compliance with the new mass-based permit.

Tertiary treatment involves adding a layer of treatment downstream of existing secondary processes. To comply with the mass-based permit limits, treatment would be applied for both BOD and TIN removal. It would be possible to phase implementation, installing only half of such a system to provide capacity through the mid-2030s and subsequently expanding the facility as needed, based on performance.

Budd Inlet Treatment Plant Enhanced Treatment (general concept)



Several technologies are currently being used for tertiary nitrogen removal, such as denitrification filters, moving bed bioreactors, biologically active filtration, and ion exchange. Each of these systems could meet the TIN target of 1 mg/L. Some of the systems may be able to achieve the BOD target of 3 mg/L on their own, while others would require the combination of a tertiary filter. Tertiary filtration can be achieved through similar technologies used to generate reclaimed water. In fact, with appropriate disinfection, the tertiary product would be classified as Class A reclaimed water. Filtration technologies could include sand filters, compressible media, cloth discs, or membranes.

Phase 2 reviewed two options for siting these processes at the BITP. The alternatives assessment focused on how each option would fit into the existing BITP site plan. Due to space limitations within the existing footprint of the BITP, both alternatives would benefit from acquisition of additional property north of LOTT's Washington Street parcel, as identified in Phase 1 of the planning effort. Both alternatives would result in a high quality effluent that would meet Class A reclaimed water standards, thus expanding production capacity of the BIRWP to 3 mgd or more. In fact, tertiary treatment offers the opportunity to eventually enhance reclaimed water treatment to produce water nearing potable quality.

New treatment technologies can effectively reduce key pollutants – nitrogen and biochemical oxygen demand – to lower levels than ever before.

The cost of enhanced treatment to meet future capacity needs is estimated to be approximately \$42 million.

The enhanced treatment strategy would be developed in phases as capacity needs arise. Ultimately, it is envisioned to provide up to 15 mgd of capacity, enough to meet the full connection scenario and virtually eliminate the need to develop additional reclaimed water recharge sites. Of the two enhanced treatment alternatives considered, the most cost-effective option is estimated at \$42 million, a cost considerably lower than meeting future capacity by reclaimed water expansion alone.



Key components of an enhanced treatment system would be located on LOTT's Washington Street properties just west of the Budd Inlet Treatment Plant.

Phase 3: Public and Stakeholder Engagement

Stakeholder engagement has been ongoing throughout the planning process, with a focus on sharing information and gathering input from local, state, and tribal staff members. Initial engagement was part of routine, well-established coordination, such as monthly check-ins with partner staff regarding the reclaimed water program. Regular discussions took place with the Technical Sub-Committee, made up of partner Public Works Directors, LOTT's Executive Director, Operations & Facilities Director, and Engineering Director, along with support staff. Discussion and updates were routinely provided to the LOTT Board of Directors. Engagement also involved topic-specific discussions with community partners and regulators. This included meetings with partner cities to discuss their anticipated future reclaimed water needs. Periodic check-in meetings were also held with Squaxin Island Tribe staff and Ecology staff.

Public feedback and stakeholder input help shape the 2050 LOTT System Plan.

Public engagement also focused on information sharing and gathering feedback. Information about planning had been incorporated into public presentations since the effort began in 2018, often in tandem with outreach related to LOTT's Reclaimed Water Infiltration Study. From the outset, presentations were included in public Board meetings to keep the Board and the public up to date on system-wide planning activities and progress. Public engagement efforts increased in fall 2022 with a presentation at the October 2022 Board meeting and a series of presentations to community groups. Presentations to elected officials of the Lacey, Olympia, and Tumwater City Councils, Thurston County Commission, and Squaxin Island Tribal Council were provided in January 2023. A Community Forum to provide more details about the 2050 LOTT System Plan and the State Environmental Protection Act (SEPA) environmental review/public comment process is planned for March 2023. Comments and feedback gathered at the forum and through the SEPA process will be used to refine the 2050 LOTT System Plan prior to LOTT Board of Directors consideration of master plan approval.



Public engagement focused on information sharing through a series of community presentations.

Section 4: Update to Management Strategies

The purpose of this planning work was to complete a comprehensive facility needs assessment for BITP and to revisit and evaluate LOTT's system-wide long-range planning direction. This work was necessary given new information and conditions that have changed since the late 1990s when the WRMP was developed. The WRMP identified four main management strategies: flow reduction, continued discharge to Budd Inlet from the BITP, and alternative discharge through water recycling, reuse, and groundwater recharge. After 25 years, the framework established under the WRMP is still relevant in many ways. This system-wide planning work indicated that the original framework can be readily adjusted to take advantage of advancements in technology and opportunities for cost-efficiency.

Budd Inlet Treatment Plant

Phase 1 work indicated that the BITP is well positioned to continue to meet our communities' wastewater treatment requirements to 2050. There is adequate physical space at the BITP to accommodate nearly all future facility needs. Acquiring additional property north of LOTT's Washington Street parcel and vacating B Avenue are high priorities to ensure flexibility in accommodating future process expansions. This approach was further supported by Phase 2 analyses. Future capital improvements projects were identified, including necessary expansions, rehabilitations, upgrades, and repairs. Estimated project timing and costs provided data helpful in building out a comprehensive view of resources necessary to implement LOTT's long-range CIP, a high-level outline of which is included in the 2023-2024 Budget and Capital Improvements Plan.

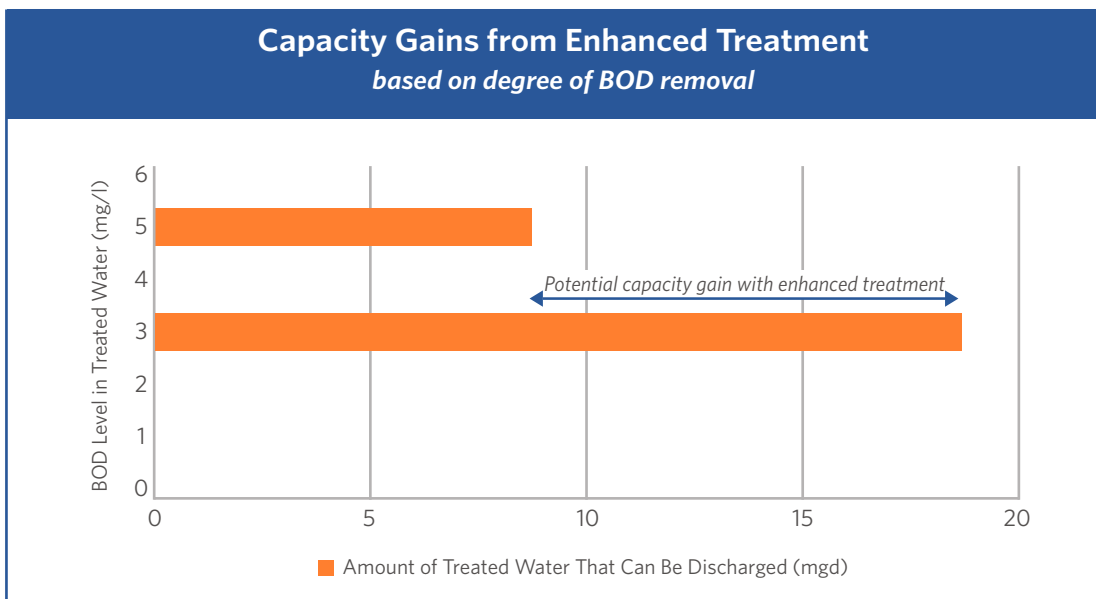
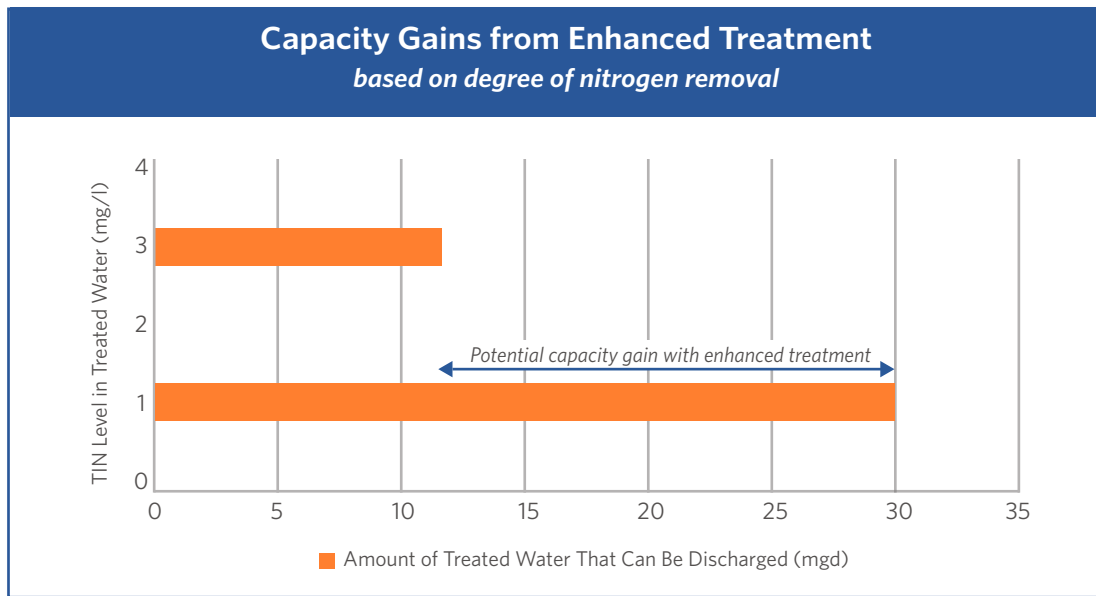
Flow Reduction

This management strategy was based on the premise that reducing flows into the wastewater system would delay the need to build new treatment capacity. Through inflow & infiltration reduction efforts and implementation of a regional water conservation program, LOTT achieved significant flow reduction. The flow reduction strategy, however, is less impactful with regard to overall system capacity now that LOTT's discharge permit is loadings-based, rather than flow-based. In addition, conservation gains have been trending lower each year due to previous program success in reducing our communities' discretionary water use. For these reasons, the LOTT-led water conservation program will likely be curtailed after 2024. Further conservation and I&I gains, where deemed cost-effective, would be pursued opportunistically.

Discharge to Budd Inlet from the BITP: Enhanced Treatment

This management strategy was originally established in relation to increased wintertime discharge from the BITP, based on a 1990s scientific study indicating water quality would not be negatively impacted by wintertime discharge. Conditions and opportunities have changed greatly since this strategy was developed. The BITP discharge permit requirements are even more stringent now, focused on seasonal nutrient limits from April through September. However, recently completed upgrades to the existing nutrient removal process and new treatment technologies provide the opportunity to further enhance treatment at the BITP. By continuing to reduce nutrient levels, this will allow for discharge of more flow while remaining in compliance with permit limits. This enhanced treatment strategy has the potential to fulfill nearly all additional system capacity needs in the future, greatly decreasing the need to rely on alternative discharge through groundwater recharge of reclaimed water.

Enhanced treatment has the potential to fulfill nearly all the additional system capacity needs in the future.



Phase 2 planning analysis indicated that implementation of the enhanced treatment system could be accomplished under the WRMP “just in time” approach. This would allow construction in phases, with size and scale of each phase designed to match actual needs. Performance resulting from the Biological Process Improvements project is promising but it will be necessary to monitor treatment performance over several years to establish average performance values for the new nutrient removal system. If performance remains as high as initial indications, the need for enhanced treatment may be delayed or reduced in scale. Opportunity to realize efficiencies by developing the system in tandem with a wet weather treatment system is dependent on LOTT’s ability to acquire additional property north of the Washington Street parcel and vacation of B Avenue, making both of those actions a high priority.

Reclaimed Water Production

The 2050 LOTT System Plan analysis supports focusing future reclaimed water production expansion at the two existing facilities: MWRWP and BIRWP. LOTT has adequate space to expand the MWRWP to up to 5 mgd. Timing for expansion will be dependent on when source flow becomes available at that site. At the BITP, there is adequate space to greatly expand reclaimed water production. The technology and siting of additional reclaimed water production is likely to be influenced by design and timing for enhanced treatment at BITP. There are opportunities to develop these facilities in tandem and realize efficiencies. Stakeholder demand for reclaimed water may also influence timing of expansion. Projected LOTT partner reclaimed water needs can be met, however, interest from a new large-scale user, such as irrigation at the State Capitol Campus, could accelerate the need for additional production. The advantage of expanding production at the BITP is that wastewater flow as a source for reclaimed water production is not a limitation. Because of the shift away from developing additional satellite production facilities, several undeveloped properties held by LOTT are likely surplus to the needs of the utility, including:

- Mullen Road site
- Deschutes Valley property



There is space within the existing footprint of the Budd Inlet Treatment Plant, or on the adjacent Washington Street properties, to expand reclaimed water treatment capacity to more than 3 mgd.



There is adequate space within the existing footprint of the Martin Way Reclaimed Water Plant to expand treatment capacity up to 5 mgd.

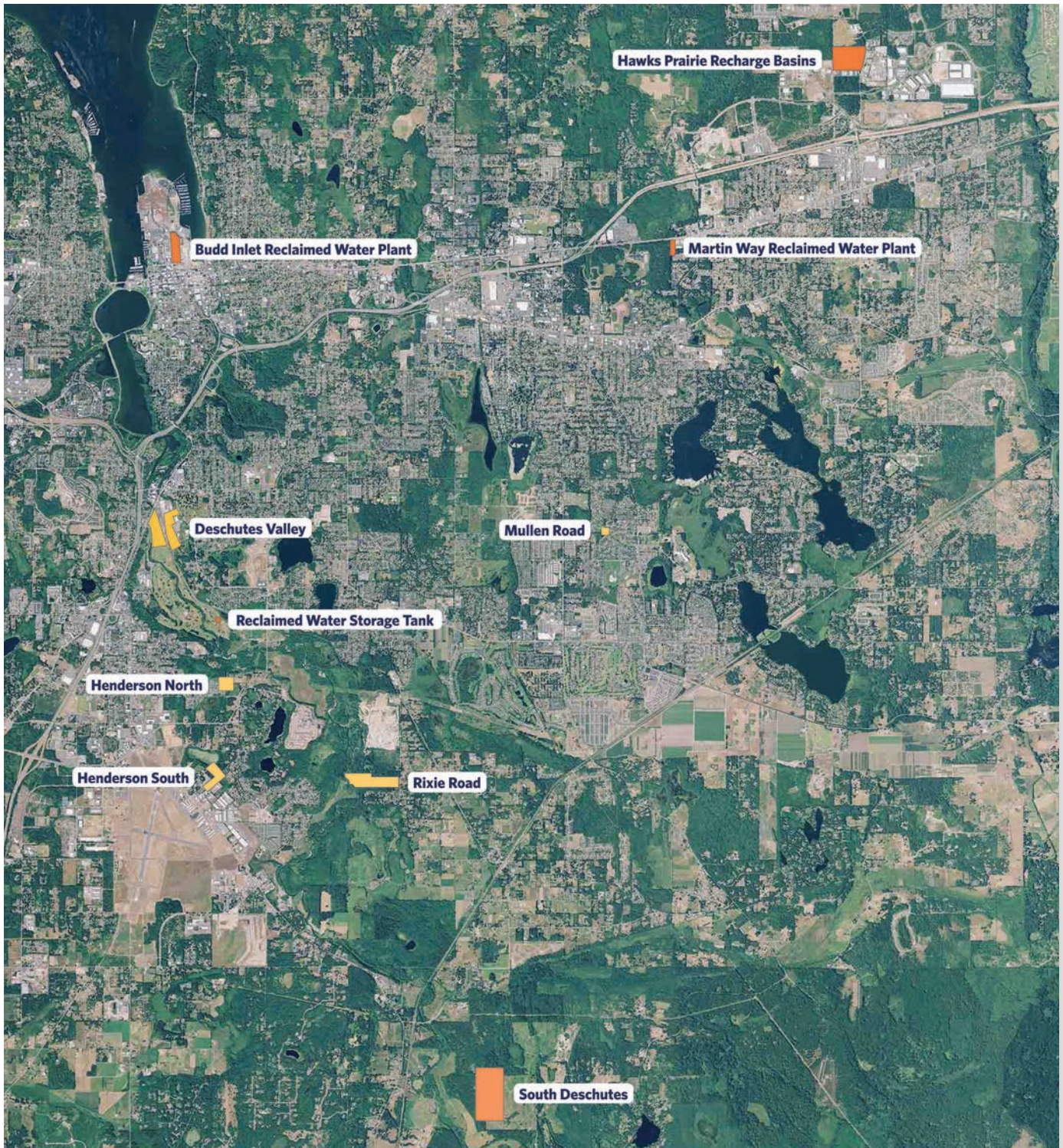
Reclaimed Water Recharge

This analysis supports shifting future expansion of recharge to the existing HPRB site. The HPRB site is estimated to have capacity for 5-8 mgd of recharge. Completion of the Reclaimed Water Infiltration Study supports use of the site for this purpose. The site was designed as default discharge for reclaimed water that is not otherwise used or needed by LOTT or the LOTT partners. The cities of Lacey and Olympia use the resource at their Woodland Creek Groundwater Recharge Facility and receive water rights mitigation credit for that use. They will be expanding recharge at that site, and possibly developing new recharge facilities in the future. It is also possible that the partners will apply for mitigation credit for an increase in infiltration at LOTT's HPRB.

Because of the significant capacity gains possible from enhanced treatment at the BITP, development of a new recharge facility to take reclaimed water produced at the BIRWP is not likely to be necessary. However, to retain maximum flexibility for the future, there is benefit to LOTT retaining the undeveloped South Deschutes property for that purpose. The Phase 2 analysis showed that this site holds the greatest infiltration capacity should recharge of reclaimed water from BIRWP be necessary.

Because of the shift away from developing additional recharge facilities, several undeveloped properties held by LOTT are likely surplus to the needs of the utility, including:

- Henderson South property
- Henderson North property
- Rixie Road property



LOTT owns several undeveloped properties that are likely surplus to the utility's needs (shown in yellow) given the shift away from developing new satellite facilities.

Optimizing Alternatives

Planning analyses ultimately point to a combination of strategies to maximize flexibility and meet future community needs, not only for wastewater system capacity but also for access to reclaimed water as a resource. Plan recommendations include these key considerations:

- Further enhance treatment performance at BITP with tertiary treatment
- Expand reclaimed water production and recharge at existing facilities aligned with demand
- Complete related upgrades in phases, in keeping with WRMP “just in time” approach
- Surplus properties identified as unnecessary given focus on existing facilities

This optimization of alternatives provides a cost-effective and adaptable long-term strategy. Projected future capacity would be met primarily through enhanced treatment at the BITP. Expansion of reclaimed water would round out the needed capacity gains, and provide partner jurisdictions with enough Class A reclaimed water to meet their reuse and recharge needs for the foreseeable future.

A phased approach to development of these alternatives maximizes opportunity to continually adjust and to benefit from developing new technologies. If treatment performance from the newly upgraded nutrient removal system at the BITP exceeds expectations, the need for enhanced treatment may be reduced or delayed. If partner jurisdictions identify new opportunities for reclaimed water reuse or recharge, expanded production could be accelerated.

Planning analyses ultimately point to a combination of strategies to maximize flexibility and meet future community needs.

High-Level Summary of Long-Term Expansion Concepts Estimated Capacity Benefit and Cost of Optimized Alternatives						
	Phase 1: 2050 Build Out		Phase 2: Full Connection		Totals	
	Capacity	Cost	Capacity	Cost	Capacity	Cost
Capacity Needed	10 mgd	-	6 mgd	-	16 mgd	-
Budd Inlet Treatment Plant Enhanced Treatment	7.5 mgd	\$26.8M	7.5 mgd	\$16.4M	15 mgd	\$43.2M
Martin Way Reclaimed Water Plant Expansion	1.5 mgd	\$8.5M	1 mgd	\$8.5M	2.5 mgd	\$17.0M
Budd Inlet Reclaimed Water Plant Expansion	1.5 mgd	\$8.1M	Optional	Optional	1.5 mgd	\$8.1M
Totals	10.5 mgd	\$43.4M	8.5 mgd	\$24.9M	19 mgd	\$68.3M
Estimated System Need Met					120%	

Section 5: Conclusion

The highly managed Wastewater Resource Management Plan developed in the late 1990s has served LOTT well. The WRMP was originally developed to take the utility through 2020, but the general framework for managing wastewater is applicable well beyond that original planning horizon. This 2050 LOTT System Plan is intended to build upon the foundation established in the WRMP, refining long-range management strategies based on new information and analyses.

The Budd Inlet Treatment Plant continues to serve as the core of system capacity. Continual investment to sustain and upgrade existing systems at the BITP has made this possible. New promising treatment technologies will allow for further treatment performance improvements. By focusing on enhanced treatment at BITP, LOTT will gain the additional system capacity necessary to meet its communities' growing demands through full system build out.

At the same time, LOTT's successful reclaimed water program will continue to serve community needs. By expanding reclaimed water production and recharge at existing facilities, LOTT can cost-effectively augment system capacity and ensure enough Class A reclaimed water to serve the projected future uses of the partner cities. While reclaimed water is no longer the default means for meeting new capacity, it remains a valuable community resource.

This 2050 LOTT System Plan builds upon the WRMP to provide an effective, adaptable plan to meet long-range wastewater management needs. The strategies outlined here maximize cost-efficiency and adaptability, offering flexible options to meet capacity needs through 2050. These strategies also remain aligned with the public values identified as part of the 1990s planning process to maximize the use of existing infrastructure, treat wastewater as a valuable resource, and meet future capacity needs in a cost-effective, responsible manner.

An Effective, Adaptable Plan to Meet Future Needs

- The 2050 LOTT System Plan builds upon the successes of the original Wastewater Resource Management Plan.
- The Budd Inlet Treatment Plant is still the core of the overall system thanks to our communities' ongoing commitment to sustaining this critical infrastructure.
- With new technologies and enhanced treatment at BITP, LOTT will gain the additional system capacity necessary to meet community needs through full system build out.
- By expanding reclaimed water production and recharge at existing facilities, LOTT can provide Class A reclaimed water aligned with future uses of our partner jurisdictions.
- The strategies outlined in the 2050 LOTT System Plan maximize cost-efficiency and adaptability, offering flexible options to meet system capacity needs through 2050.



This 2050 LOTT System Plan provides an effective, adaptable plan to meet long-range wastewater management needs through 2050.

Section 6: References

- 2022 Phase 2 Master Planning: Capacity Management Report** | Prepared for LOTT Clean Water Alliance by Brown and Caldwell
- 2022 Reclaimed Water Infiltration Study Project Summary** | Prepared for LOTT Clean Water Alliance by HDR
- 2022 Budget and Capital Improvements Plan 2023-2024** | Prepared by LOTT Clean Water Alliance
- 2022 Budd Inlet Dissolved Oxygen Total Maximum Daily Load Water Quality Improvement Report and Implementation Plan** | Publication 22-10-012 Prepared by Washington Department of Ecology
- 2022 Puget Sound Nutrient General Permit: National Pollutant Discharge Elimination System Permit for Discharges From Municipal Wastewater Treatment Plants in the Washington Waters of the Salish Sea** | Prepared by Washington Department of Ecology
- 2020 Budd Inlet Treatment Plant Phase 1 Master Planning Update** | Prepared for LOTT Clean Water Alliance by Brown and Caldwell
- 2019 Olympia Sea Level Response Plan** | Prepared for City of Olympia, Port of Olympia, and LOTT Clean Water Alliance by AECOM
- 2019 Phase II Site Infiltration Capacity Evaluation for Henderson North Property** | Prepared for LOTT Clean Water Alliance by Pacific Groundwater Group
- 2019 Phase III Site Infiltration Capacity Evaluation for Henderson North Property** | Prepared for LOTT Clean Water Alliance by Pacific Groundwater Group
- 2019 Phase III Site Infiltration Capacity Evaluation for Tumwater & South Deschutes Area** | Prepared for LOTT Clean Water Alliance by Pacific Groundwater Group
- 2018 National Pollutant Discharge Elimination System Waste Discharge Permit No. WA0037061 for the Budd Inlet Treatment Plant and Budd Inlet Reclamation Facility** | Prepared by Washington Department of Ecology
- 2016 Reclaimed Water Production, Conveyance, and Recharge Alternatives: 2016 Update** | Prepared for LOTT Clean Water Alliance by Brown and Caldwell
- 2015 Henderson (South) Site Feasibility Evaluation** | Prepared for LOTT Clean Water Alliance by HDR
- 2009 Hawks Prairie Groundwater Modeling Update** | Prepared for LOTT Alliance by Brown and Caldwell
- 2006 Budd Inlet Treatment Plant Master Plan** | Prepared for LOTT Alliance by Brown and Caldwell
- 1998 LOTT Wastewater Resource Management Plan** | Prepared for LOTT Alliance by Brown and Caldwell
- 1998 LOTT Budd Inlet Scientific Study** | Prepared for LOTT Alliance by Brown and Caldwell
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