CASE STUDIES IN RECLAIMED WATER USE

Creating new water supplies across Washington State

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and Emily Morris

WASHINGTON STATE DEPARTMENT OF ECOLOGY

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If you need this information in an alternate format, please contact us at (360) 407-6502.
If you are a person with a speech or hearing impairment call 711 or 1-800-833-6388 for TTY.

Cover:
Reclaimed water discharged from Walla Walla treatment plant. Ecology photo

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Introduction

The case studies in this booklet share the experiences and perspectives of 15 operating or planned reclaimed water facilities across the state of Washington.

Washington's 1992 Reclaimed Water Act provided a new program for treatment and management of wastewater as a new water supply to replace drinking water for non-drinking (nonpotable) purposes. Reclaimed water use is a fundamental element of our state's strategy to provide sustainable water supplies that will meet our future needs.

Reclaimed water is derived from domestic wastewater and small amounts of industrial process water or stormwater. The process of reclaiming water, sometimes called water recycling or water reuse, involves a highly engineered, multi-step treatment process that speeds up nature's restoration of water quality. The process provides a high level of disinfection and reliabilty to assure that only water meeting stringent requirements leaves the treatment facility.

The city of Yelm's reclaimed water enters the Cochrane Memorial Park though this waterfall. Later, it receives further treatment through wetland polishing before recharging to the ground water. Ecology photo.

By the end of 2004, 17 facilities had been constructed or upgraded to operate under the state's reclaimed water standards. More facilities are engaged in various stages of planning, design, or construction. Several tribal governments within the state of Washington are also planning and constructing reclaimed water facilities.

On the following pages, you will learn why each facility chose reclaimed water use and the creative ways in which they have used the water, planned and constructed their facilities, and financed the projects. Each study provides a picture of the decisions made, lessons learned, and problems solved.

Uses of reclaimed water from these facilities include crop and landscape irrigation, toilet flushing, dust control, construction water, industrial cooling, created wetlands, ground water recharge, and stream-flow augmentation.

For more information, contacts for each project are listed at the end of each case study. The inside back cover contains contact information for technical assistance from the Washington State Department of Ecology (Ecology) and the Washington State Department of Health and a link to Ecology's Web site. The Web site provides a comprehensive introduction to reclaimed water use, answers to frequently asked questions, minimum state standards and design criteria, several guidance documents and forms, and a number of helpful links.

CITY OF SEQUIM
Clallam County

Rapid growth and the desire to reopen shellfish harvesting areas prompted Sequim to plan and build a Class A water reclamation plant. Selected as one of four small community demonstration projects to model reclaimed water use, Sequim used legislative funding to plan, design, and construct a reclaimed water distribution system and educational park.

Reclaimed Water Uses

Sequim's Class A reclaimed water is used to irrigate public landscape areas along ten downtown streets. The city supplies reclaimed water for a variety of municipal nonpotable uses, such as dust control and street cleaning.

In 1999, Sequim purchased land to create a reclaimed water demonstration site at Carrie Blake Park. Class A reclaimed water irrigates the park grounds and creates park gardens, ponds, and wetlands. Park restrooms use reclaimed water to flush the toilets.

Reclaimed water leaving Carrie Blake Park supports salmon habitat in Bell Creek. A long underground pipe cools the reclaimed water and a cascade aeration structure elevates dissolved oxygen levels before water enters the creek.

Sequim produces reclaimed water year-round; however, the city has not developed enough year-round uses. One potential use is toilet flushing for a planned Washington State Department of Transportation rest area. Until uses are developed, the unused reclaimed water is discharged through Sequim's marine outfall. The outfall was extended to 1,320 feet to avoid impacting shellfish resources.

Planning and Outreach

Projected growth indicated that the community of 4,000 would triple in size by the year 2010. Sequim also was under pressure to find a way to reopen 2,800 acres of commercial, recreational, and tribal shellfish beds in Sequim Bay. In 1995, Sequim formed a citizen task force to plan for wastewater needs. Sequim envisioned reclaimed water as an asset to the community and built a Class A water reclamation plant at the treatment plant site in 1998.

With the treatment plant located near Sequim Bay, Sequim needed additional funding to construct a distribution system to get water to use areas. The city also needed to promote reclaimed water use by showing citizens the benefits of its use. Sequim requested help and was selected as one of four small community reclaimed water demonstration projects throughout the state. Sequim used this special funding to plan, design, and construct a reclaimed water distribution system and educational park.

Sequim gained support through public meetings and community education efforts. City employees continue to

Sequim uses reclaimed water to offset potable water use for nonpotable purposes. Despite a 27% growth rate, Sequim uses the same amount of drinking water as in 1998.

Carrie Blake Park, Sequim's reclaimed water education park.
Ecology photo

Sequim's Water Reclamation Treatment Facility. Ecology photo

give presentations and tours to state agencies, interested groups, and local citizens. City directors also seek creative ways to educate and promote the benefits of water reuse. For example, Sequim annually stocks a pond at Carrie Blake Park with rainbow trout for a day of public fishing.

Sequim also uses Carrie Blake Park, part of the Olympic trail system, for educational outreach. Reclaimed water signs are readily visible throughout the park. A central kiosk uses posters and narratives to explain the benefits of water reuse. Sequim is expanding and covering part of the park's outdoor amphitheater to accommodate more local events – another opportunity for educational outreach.

"It's become a way of life for us"
- Jim Bay, Sequim Public Works Director

Reclaimed water use enhances downtown Sequim. Ecology photo

In the future, Sequim envisions expanding its reclaimed water production capacity by serving the Jamestown S'kallam Tribe, Carlsborg, and Sequim Bay State Park.

Treatment and Water Quality

The Class A water reclamation facility has a design capacity of 0.8 million gallons per day (mgd) and averages 0.5 mgd. The facility uses an existing oxidation ditch for biological secondary treatment. Advanced treatment components for Class A reclaimed water include chemical addition to combine fine particles. The particles are then removed by a settling unit and anthracite filter. Ultraviolet light disinfects the highly treated water to Class A standards. Operators use continuous monitoring to ensure that reclaimed water always meets Class A standards before distribution.

Financing

Sequim financed their upgrades to a Class A reclamation water facility with a $5.3 million Washington State Department of Ecology State Revolving Fund loan.

The $3.4 million demonstration project appropriation funded the planning, design, construction, land purchase, distribution, and the water features at Carrie Blake Park.

Sequim spent $2.5 million in administrative, debt repayment, supplies, and equipment costs in 2004.

Table 1: Residential Sewer Rates

Rate	**Amount**
Monthly Rate	$37
Connection Fee	$3,000

Contact Sequim:

◆ *James Bay*, Public Works Director, (360) 683-4908

SUNLAND SEWER DISTRICT
Clallam County

Located in the water limited rain shadow of the Olympic Mountains, the SunLand development is seeking ways to use their wastewater as an irrigation water supply. SunLand also needs to improve the quality of water currently used for pasture irrigation to avoid ground water contamination. The district plans to meet both needs by upgrading their treatment facility to produce Class A reclaimed water and irrigate their golf course.

Reclaimed Water Uses

SunLand produces and uses Class D reclaimed water for sprayfield irrigation on pastureland adjacent to the treatment plant. The site produces about 22 acres of hay each growing season.

In the future, SunLand intends to produce Class A reclaimed water for golf course irrigation. A pipe will deliver the reclaimed water from the treatment plant to a storage pond at the golf course. Winter flows will be stored for summer irrigation use.

Planning and Outreach

The SunLand development consists of 950 residential lots surrounding an 18-hole golf course. The wastewater collection system was installed in the 1970's, and the wastewater treatment plant (a lagoon) began operating in 1979. In 1999, the SunLand Water District Board of Commissioners decided to upgrade the facility to achieve Class A quality reclaimed water for golf course use.

With the 1999 upgrades, the facility was not able to achieve Class A standards on a regular basis. Ecology reclassified the facility to Class D reclaimed water quality for pasture irrigation as an interim solution. Additional treatment is needed to prevent ground water contamination. The potential for contamination is high for the following reasons:

- The spray field overlies a shallow water table aquifer.
- The effluent application rate exceeds recommended fertilization rates.
- Sixty percent of the effluent is applied when crops are not growing.
- Sufficient nitrogen removal is not occurring in the field.

Ecology approved the necessary improvements to achieve Class A reclaimed water in 2004. SunLand plans to complete the upgrades necessary to achieve Class A reclaimed water by 2007.

SunLand sign. Ecology photo

Reclaimed water irrigates the adjacent spray field. Ecology photo

Reclaimed water potential use as golf course irrigation. Ecology photo

Treatment and Water Quality

SunLand's Class D facility is an advanced wastewater treatment facility with a design flow capacity of 0.162 million gallons per day (mgd). Current average flow varies between 0.12 mgd during wet season and 0.09 mgd during the dry season. The treatment includes biological secondary treatment with sequencing batch reactors (SBR) followed by advanced treatment to produce reclaimed water. This consists of chemical addition, a cloth-disk filter, and disinfection with chlorine. After the chlorine contact chamber, the water flows into polishing ponds for two to three days before spraying on a restricted access pasture.

During the start-up of the SBRs in 1999, SunLand experienced some problems and could not successfully treat all the wastewater. Operators diverted the inadequately treated water to the old lagoon for storage. The lagoon is still used to store residual solids and all liquid from the lagoon is returned to the new facility's headworks for treatment.

The facility has not been able to achieve Class A reclaimed water quality and SunLand does not have enough storage to be able to store the Class D water over the winter. However, the facility should eventually be able to meet the storage requirements when they obtain Class A quality and use the golf course pond for storage. Due to its higher level of treatment, Class A reclaimed water with nitrogen removal could also be applied to the pasture and allowed to infiltrate to ground water at any time of year.

Polishing ponds. Ecology photo

Financing

SunLand received the following financial assistance for the 1999 tertiary upgrades and 2005 reclaimed water improvements:

Table 2: Financial Assistance

Project Funding	Purpose	Amount
Clean Water State Revolving Fund Loan	1997 Design	$76,000
Public Works Trust Fund Loan	1999 Construction	$910,000
Public Works Trust Fund Loan	1999 Engineering	$25,000

SunLand charges their residents $31 a month for sewer service and a one time connection fee of $50. However, new homeowners in the development incur a late-comer fee of $1,074.

Because SunLand operates their sewer and water utility jointly, their operation and maintenance budget includes costs for both. Their 2004 budget was $440,000, which includes administrative costs, plant operating and lab supplies, chemicals, tools, minor equipment, lease of spray field, water testing, repair and maintenance, engineering fees, machinery, and equipment.

Contact SunLand:

Dick Stuhr, Water District Manager, (360) 683-3309

NORTH BAY / CASE INLET
Mason County

Mason County needed to replace failing on-site septic tanks contaminating western Puget Sound shellfish beds. Their solution was a regional Class A reclaimed water facility serving 2,700 residents. The facility, which began operating in 2000, provides reclaimed water to nearby state forests. Water not used for forest irrigation recharges the aquifer.

Reclaimed Water Uses

Class A reclaimed water spray irrigates a forestland tract with three zones leased from the state Department of Natural Resources (DNR). This facilitates tree growth and provides drought-resistance and fire protection. Operators apply the water at a maximum rate of six inches of water per week. The irrigation lines (colored purple to signify reclaimed water) lie on the surface for easy movement during logging operations. Shallow monitoring wells under the irrigation fields electronically measure water levels to prevent over watering of the trees.

In winter months and during major rainfall events, operators divert the Class A water from the forest use to an on-site percolation pond.

Planning and Outreach

Mason County began planning after following regulatory action from the Washington State Department of Health prohibiting shellfish harvesting in the North Bay area of Case Inlet in western Puget Sound. Failing on-site septic systems were the major source of contamination. The county needed to replace failing on-site septic tanks serving the towns of Allyn, Victor, and Lakeland Village, a combined population of approximately 2,700 residents.

Beakers compare the superior quality of reclaimed water (right) to wastewater effluent. Ecology photo

Mason County formed a citizen advisory committee, sent out mailings, made personal property owner contacts, and held numerous public meetings. Mason County selected a central sewer system that conveys area wastewater to a Class A reclamation facility as the best long-term solution. The County overcame the following challenges in planning and implementing the project:

- Securing enough grant and loan dollars to keep monthly residential rates affordable.
- Locating and informing a number of non-resident and transient property owners.

Reclaimed water irrigation sprinkler. Ecology photo

Reclaimed water irrigation on the DNR forest land. Ecology photo

- Obtaining accurate information about on-site system locations.
- Meeting legal challenges to the new sewer ordinance.

The Class A facility began operating in 2000. Future plans include reclaiming more wastewater flows by adding the Belfair community to the system. Mason County is still deciding if flows from Belfair will go to North Bay/Case Inlet or to a new Class A plant located in Belfair.

Treatment and Water Quality

The Class A reclamation plant has a maximum treatment capacity of 0.37 million gallons per day (mgd), and currently averages around 0.15 mgd. The reclamation facility produces Class A reclaimed water and removes nitrogen. The treatment train includes biological secondary treatment with sequencing batch reactors (SBR), advanced treatment with chemical addition for coagulation and mixing, followed by a cloth-disk filter, and disinfection with ultraviolet light. Operators use continuous monitoring to ensure that reclaimed water always meets Class A standards before distribution.

Table 3:
Residential Sewer Rates

Fee	Type	Amount
Monthly Rate	Lot	$48.50
	Vacant Lot	$15.00
Hook Up Fee		$5,000

Financing

Planning, design, and construction of the entire project cost approximately $22 million dollars. This includes fees paid for access, easements, and compensation for lost revenue to an area golf course during the construction period; and construction of the collection system, pump stations, treatment plant, infiltration ponds, irrigation system, controls and programming. Operating and maintenance costs are about $230,000 per year. Mason County funded the project with Ecology and United States Department of Agriculture (USDA) Rural Development grants and loans as shown in Table 4. Mason County plans to repay the debt through residential sewer rates, development charges, and connection fees as shown in Table 3.

Table 4. Financial Assistance

Source	Grant	Loan
Ecology	$5,000,000	$9,000,000
USDA	$3,740,000	$5,200,000

Contact Mason County:

- *Doug Micheau*,
Utilities and Waste Management Director,
(360) 427-9670 ext. 270
- *Tom Moore*,
Utilities and Waste Management Program Manager,
(360) 427-9670 ext. 732
- *Steve Cole*,
Utilities and Waste Management Operator III,
(360) 275-7067

THE LOTT ALLIANCE
Thurston County

The LOTT Alliance is the regional wastewater treatment system serving the cities of Lacey, Olympia, Tumwater, and northern Thurston County. In 1998, the four government partners chose Class A reclaimed water as the core of their long-range wastewater resource management plan. This choice responds to urban needs and strong public desires to begin treating wastewater as a water resource.

Regional Planning

The regional 20-year plan includes the production of Class A reclaimed water at the existing regional Budd Inlet wastewater treatment facility and the construction of three new satellite facilities at decentralized locations throughout the urban area. Each facility will initially treat at least 1.0 million gallons per day (mgd). All four facilities plan expansion up to 5.0 mgd each.

As a wastewater utility, LOTT is not a water supplier. Instead, its four government partners will play that critical role. An interagency Reclaimed Water Policies Task Force spent three years identifying and addressing over 40 policy issues related to the distribution and use of the LOTT generated reclaimed water. Many of these policy issues have been resolved through a series of interlocal, distribution, supply, and end-user agreements. The agreements offer a regional resource approach while preserving each jurisdiction's operating autonomy. This distribution methodology assures fairness to all.

LOTT'S BUDD INLET FACILITY

For their first project, LOTT chose to produce Class A reclaimed water by upgrading a portion of their existing Budd Inlet wastewater treatment facility. The treatment facility is located in the downtown area of the city of Olympia (the state capital) and discharges effluent to the southern-most end of Puget Sound. LOTT completed construction of the Class A reclaimed water upgrade in 2004. The first full distribution and use of the water will occur during the 2005 irrigation season.

Reclaimed Water Uses

The city of Olympia will distribute reclaimed water for uses including:

- Irrigation at the state's Heritage Park, Marathon Park and, eventually, the State Capitol Campus.
- Irrigation at city parks near downtown Olympia.
- Irrigation, equipment, boat wash down, dust suppression, and a pond at the Port of Olympia.
- Irrigation, pump seals, cleaning, and toilet flushing at LOTT's Budd Inlet Treatment Plant
- Toilet flushing and cleaning at LOTT's Capitol Lake Pump Station.

LOTT chose reclaimed water as the core of their long-range water management plan.

Night view of the Budd Inlet Class A reclaimed water facility.
LOTT photo

A purple hydrant provides reclaimed water for use at the LOTT facility. Ecology photo

LOTT's progressive long-range plan took environmental stewardship and public concerns to heart and created a community supported, state of the art treatment facility.

Planning and Outreach

LOTT's Budd Inlet Facility treats and discharges an average of 10 to 12 million gallons per day (mgd). The Budd Inlet Reclaimed Water Facility meets three key purposes:

- Discharge of fewer pollutants into Puget Sound estuary.
- Make reclaimed water available for use in downtown Olympia.
- Provide high profile public education and acceptance of reclaimed water use.

Initially, 1.0 mgd will receive additional treatment to become Class A reclaimed water. Because the site is located in downtown Olympia, land constraints required the facility to be compact. LOTT purchased some additional land assuring that the facility can expand to 5.0 mgd to meet future demands.

Treatment and Water Quality

The Budd Inlet wastewater treatment plant treats all wastewater received with advanced secondary treatment, including nitrogen removal and disinfection with ultraviolet light before the effluent is discharged to Puget Sound. The water reclamation process diverts this highly treated wastewater effluent as the source water to produce Class A reclaimed water.

After diversion, LOTT adds a chlorine solution for additional disinfection. Additional chemicals remove the remaining impurities by forming particles that combine and settle out of the water. A continuously self-cleaning sand filter removes any particles that do not settle out.

LOTT disinfects the water again before distribution. This provides additional safety by maintaining a chlorine residual throughout the distribution pipes. Approximately 140,000 gallons of reclaimed water can be held for on-site storage. Monitoring equipment provides continuous monitoring of flow, turbidity and chlorine residual, ensuring that LOTT sends only reclaimed water meeting the Class A standard to customers.

Table 5: Residential Sewer Rates

Fees	Cost	Repay Project Capital Cost
Monthly Rate	$25.50	$23.21
Connection Fee	$3,641 (20-year average)	$327.69

Financing

Construction of the Budd Inlet Plant's Reclaimed Water Facility cost $2.8 million. LOTT estimates annual operating costs at $127,000, including labor and benefits, chemicals, power, and miscellaneous supplies. The tables show how LOTT repays their debt for their reclaimed water treatment upgrades (Table 5) and describes the allocation of their residential rate revenue (Table 6).

Table 6: Sewer Revenue Allocations

Category	Amount
(per rate payer ERU per month)	
LOTT Operation and Maintenance	$9.92
New Capital and Debt Service	$7.89
Debt Service of 1994 Nitrogen Removal Upgrade	$4.89
LOTT Alliance Administration	$1.55
LOTT Equipment Replacement	$1.25

LOTT constructed a 12-inch reclaimed water distribution line through downtown Olympia at an approximate cost of almost one million dollars. Retrofitting new pipes through a highly developed area increased the costs. To reduce costs, LOTT laid the reclaimed water lines at the same time as a needed sewer upgrade. The cost of additional pipelines, pumping facilities, and other infrastructure necessary to serve prospective customers could total millions of additional dollars.

The LOTT partners believe the costs are worthwhile since the reclaimed water will be a valuable, long-term resource for their communities.

LOTT'S HAWKS PRAIRIE SATELLITE

LOTT chose satellite facilities (compact, decentralized water reclamation plants) as the center of their 20-year plan for reclaimed water use. Hawks Prairie, LOTT's first satellite facility, began construction in July 2004.

Reclaimed Water Uses

Water produced by the satellite facility will supply a series of constructed wetland ponds and a ground water recharge basin. LOTT plans to use up to 250,000 gallons per day of the water for maintaining the wetlands and irrigating the properties at the ground water recharge site.

Water not used for the wetlands will be available to the cities of Lacey and Olympia for landscape irrigation, commercial and industrial processes, environmental enhancements, and other uses. Water that is not currently used will circulate through the ponds before going to eight acres of infiltration basins to recharge ground water.

Quote from LOTT plan: *"Treasure LOTT's treated wastewater as a valuable, long-term resource to be cleaned and restored, reused, then ultimately returned to the environment."*

LOTT's Hawks Prairie Reclaimed Water Satellite will feature attractive constructed wetlands storage ponds and interpretive exhibit kiosks in a 30-acre park-like setting. LOTT photo

LOTT pioneers the way for satellite Class A reclamation facilities with the construction of Hawks Prairie. Facility design should produce a superior product and will be aesthetically pleasing to onlookers.

Planning and Outreach

LOTT chose the Hawks Prairie site because it has many potential reclaimed water users, suitable ground water recharge sites, and existing wastewater flows. The Hawks Prairie Satellite plan (see picture) includes a reclaimed water treatment plant, series of constructed wetland ponds, ground water recharge basins, and about three miles of purple pipe connecting the plant to the pond/recharge site.

LOTT involved the public in both the overall planning process and the Hawks Prairie Satellite planning phases. Workshops with neighbors of the plant and pond/recharge sites were crucial in addressing the wide range of citizen concerns, including potential odors, aesthetics, property values, noise, and traffic impacts. Public education about reclaimed water will continue through an active outreach program throughout construction and will include interpretive panels at four kiosks at the Hawks Prairie Pond and Recharge site.

Treatment and Water Quality

The Hawks Prairie reclaimed water facility begins operation in 2006. Initially the facility will produce 2.0 mgd of Class A water. The satellite plant will divert wastewater collected from LOTT's Martin Way Pump Station in Lacey. The satellite plant treats only the liquid water portion of the wastewater, returning the solids to the sewer for treatment at the main Budd Inlet Treatment Plant.

LOTT chose membrane biological reactors (MBRs) to reclaim the water. With a small footprint, reduced site requirements, greater operational flexibility, and lower costs, this technology reliably produces very high quality water that exceeds Class A standards. Ultraviolet light will disinfect the treated water before distribution. Monitoring and alarms assure that LOTT only distributes water meeting the Class A standard.

Financing

LOTT plans to finance the Hawks Prairie project through customer hook up fees and existing monthly sewer rates as shown for the Budd Inlet facility. LOTT will save reclaimed water distribution costs by constructing the Hawks Prairie facility near existing sewer lines and potential reclaimed water customers. LOTT estimates construction costs of approximately $30 million.

Table 7: Capital Costs For Hawks Prairie Satellite Project

Project Funded	Amount
Satellite Class A Reclaimed Water Plant	$18,597,163
Constructed Wetlands Ponds and Ground Water Recharge Basins	$6,222,250
Conveyance Lines (Wastewater and Reclaimed Water)	$5,611,378

Contact LOTT:

- *Karla Fowler*, Program Manager, (360) 664-2333 ext. 1112
- *Laurie Pierce*, Facilities Manager, (360) 664-2333 ext. 2127

CITY OF YELM
Thurston County

One of Western Washington's fastest growing small cities, Yelm, embraced reclaimed water as their water and wastewater solution for a myriad of local issues. Selected as one of four state demonstration projects, Yelm received needed funding support from the state Legislature to make the project a reality. In 2002, Yelm received Ecology's Environmental Excellence Award for successfully implementing Class A reclaimed water.

Reclaimed Water Uses

Yelm uses Class A reclaimed water for:

- Seasonal urban landscape irrigation.
- Cochrane Memorial Park water features.
- Recharging ground water.
- Treatment plant equipment process water.
- Fire fighting.
- Street cleaning.
- Dust control.
- Power generation.

Cochrane Memorial Park, an aesthetically pleasing eight-acre city park, contains several water features including constructed surface and submerged wetlands that polish the reclaimed water before it recharges the ground water. In the center of the park, a fishpond uses the water to raise stocked rainbow trout for local catch and release fishing.

In winter, excess reclaimed water generates power in the Centralia Power Canal, a diversion from the Nisqually River. The city is constructing a reclaimed water storage reservoir to manage periods of peak demand. Yelm's plans to use reclaimed water for bus washing, concrete manufacturing, and additional irrigation. Yelm is also investigating the feasibility of additional ground water recharge.

Planning and Outreach

Yelm began its wastewater facility planning efforts to safeguard public health from septic system contamination of the area's shallow drinking water wells. In 1990, the city chose an affordable option that included a centralized collection system and a secondary wastewater treatment lagoon discharging to the Nisqually River.

This quickly became a short-term solution. The Nisqually River supports five species of Pacific salmon and sea-run cutthroat trout and ends in a national wildlife refuge. Yelm was under considerable legal pressure from a variety of parties to find a better option. The community wanted to embrace reclaimed water as the best solution to safeguard public health, protect the Nisqually River, and to provide an alternate water supply for city use.

Local residents voted Cochrane Memorial Park as one of the most romantic spots in Yelm.

Cochrane Memorial Park's fish pond. Ecology photo

Facility mascot, Mike the Pipe, sits on the sand filters at Yelm's water reclamation facility. Ecology photo

However, Yelm faced a number of new challenges:

- Finding additional funding to upgrade the treatment plant – again.
- Building local support to make the project work.
- Locating customers who could use the water immediately.

Yelm requested and received legislative support as one of four small community demonstration projects. City officials initiated an extensive community public education and involvement effort. The city sponsored several town meetings and developed educational skits for the local schools. Finally, Yelm chose to construct a wetlands park to have a highly visible and attractive focal point promoting reclaimed water use.

Yelm adopted a local reclaimed water ordinance establishing the conditions of reclaimed water use. The ordinance includes a "mandatory use" clause allowing Yelm to require construction of reclaimed water distribution facilities as a condition of development approval. Yelm continues to plan expansion of storage, distribution, and use facilities.

The new facility began operating in 1999. The Class A reclaimed water facility currently produces and uses approximately 0.25 million gallons of water per day (mgd) and has capacity to produce up to 1.0 mgd to accommodate growth.

A reclaimed water sign at Cochran Memorial Park. Ecology photo

Treatment and Water Quality

The Yelm reclamation plant had to modify the wastewater treatment plant significantly for reclaimed water production. The city chose to use sequencing batch reactor (SBR) technology for secondary treatment (biological oxidation) and nitrogen removal. Advanced treatment follows with chemical coagulation, upflow sand filters, and chlorine disinfection. On-line monitoring equipment assures that reclaimed water distributed to customers always meets the quality standards.

School children tour Yelm's Class A facility. Ecology photo

In 1999, Yelm secured an Ecology grant to conduct a ground water monitoring study. The data indicates no significant changes to aquifer water quality from reclaimed water use.

Financing

Yelm received a state planning grant of $250,000. The project's construction cost was $8.2 million and the total project including administration was $9.6 million. Table 8 shows project funding sources.

Yelm's annual operation and maintenance costs are close to $1.0 million. This includes operator salaries and benefits, sewage collection, treatment and water reclamation, monitoring, solids removal, power, distribution, and public uses.

Residential monthly sewer rates are $39.46 per month. The charge for a new residential connection is $5,417. Contractual agreements allow Yelm to recover some of the costs through charges for reclaimed water supplies. Yelm reclaimed water rates are approximately 80 percent of their drinking water rate.

Constructed wetlands in Cochrane Memorial Park.
Ecology photo

Contact Yelm:

- *Shelly Badger*, City Administrator, (360) 458-8405
- *Jon Yanasak*, Reclamation Facility Operations Manager, (360) 458-8411

TABLE 8: Financial Assistance

Source	Amount
Centennial Clean Water Fund Grant (Legislative Appropriation)	$3,398,500
US Department of Agriculture Rural Development Loan	$3,857,000
US Department of Agriculture Rural Development Grant	$344,449
Utility Local Improvement District	$2,000,000
City Funds	$30,901

Persistent planning, funding support and public relations efforts solved Yelm's wastewater disposal problems and created a state-of-the-art Class A reclaimed water facility and a beautiful city park.

KING COUNTY

King County envisions reclaimed water use as an important water management tool for alleviating drought induced water shortages and finding new ways to meet their growing water demands. The county actively supports legislation and applied research for reclaimed water production within the state. King County currently maintains a pilot technology program and produces reclaimed water at two regional treatment facilities. Future plans include increased reclaimed water production as new facilities come on line.

Reclaimed Water Uses

King County's current reclaimed water program produces 284 million gallons per year of Class A reclaimed water at two regional wastewater plants. Since 1997, King County has used the reclaimed water for in-house treatment plant purposes and for irrigation of parks and athletic fields. Using reclaimed water leaves an equivalent amount of water in local streams and rivers or the municipal water supply, depending on the application.

King County uses beakers to demonstrate the exceptional quality of Class A reclaimed water. King County photo

SOUTH TREATMENT PLANT

King County's South Plant can produce up to 1.3 million gallons per day (mgd) of Class A reclaimed water. The facility currently produces 0.25 mgd. The reclaimed water is used for on-site plant processes and irrigation. King County operates Fort Dent Park as one of the major sport facilities for the county with softball, soccer, cricket, rugby, and play fields. For five years, one softball and one soccer field were irrigated with reclaimed water, saving over 25 million gallons of drinking water. An all-weather soccer field was installed in 2003, so the annual water usage has gone down slightly as a result. Projects are being implemented to provide reclaimed water to other facilities near the South Treatment Plant, such as the Foster Golf Course in Tukwila. Foster Golf Course will irrigate its 4,788-yard, 18-hole golf course fairways, greens, and landscaping using 0.3 mgd of reclaimed water.

A reclaimed water hydrant provides water for county and other jurisdiction staff to use for street sweeping, clean drains, catch basins utilizing vector trucks, and to control dust. King County's Water and Land Resources Division is using the water to irrigate newly planted vegetation for stream restoration and flood control projects. The use of reclaimed water trucks for drought response has allowed King County to get water uses on-line quickly and gain public support for reclaimed water use.

WEST POINT TREATMENT PLANT

King County's West Point Plant can produce up to 0.70 mgd of Class A reclaimed water. Currently all of the water, 0.5 mgd, is used internally at the facility, saving $161,000 and over 300,000 gallons of drinking water annually.

The West Point treatment plant also serves as an applied research center for King County to evaluate alternative technologies for producing reclaimed water. After thoroughly reviewing technologies available for reclaiming wastewater, King County chose to investigate alternatives to both standard and advanced treatment processes including membrane technologies. These studies provide a great deal of data that has been helpful both to King County and to other utilities investigating options for reclaimed water treatment.

Planning and Outreach

King County is located on Puget Sound, and covers more than 2,200 square miles. King County's metropolitan area includes the city of Seattle and reaches across county lines. With more than 1.5 million people, King County is the 12th most populous county in the nation.

The county's active support and promotion of reclaimed water began in 1991 with proposals that resulted in the 1992 Reclaimed Water Use Act. In 1995, the county completed a water reclamation and reuse feasibility study and began producing Class A reclaimed water. By 1999, King County's 30-year Regional Wastewater Services Plan (RWSP) called for expanding the production and use of reclaimed water as a valuable resource. The county evaluates the potential for both satellite and centralized facilities.

King County involves the community and areas affected by any potential upgrade or change to the wastewater treatment system through the following avenues:

- Written and on-line information.
- Public outreach with public notification.
- Speaker bureaus.
- Community open houses.
- Treatment facility tours.

The county evaluated locating a small, reclaimed water satellite facility in the Sammamish Valley. This proposed facility would provide water for a local golf course, athletic fields, nurseries, and crops. Two of the elements of the project involved technology assessment and public outreach. An early action phase of the project combined these elements by building a small pilot scale facility at one of their pump stations and using the reclaimed water produced to irrigate test garden plots that represent the range of water users in the valley.

Instead of a satellite facility, King County is currently exploring a more cost-effective option of producing reclaimed water at a new 36.0 mgd centralized facility, called Brightwater. The proposed Brightwater facility would initially produce about 5.0 mgd of Class A reclaimed water when it comes online in 2010. The reclaimed water could be used at the treatment plant site for irrigation, tank wash down, and other processes requiring non-potable water.

King County received the 2002 Association of Metropolitan Sewerage Agencies (AMSA) "National Environmental Achievement Award for Research and Technology" in water reuse.

Inside view of King County applied research center to test reclaimed water technologies.
Ecology photo

Demonstration garden in Sammamish Valley.
King County photos

King County plans to make the reclaimed water available to customers along the effluent line and via pipeline to the Sammamish Valley area. The county has the ability to expand reclaimed water production capacity at Brightwater as customer demand grows.

King County's regional reclaimed water program continues to identify potential reclaimed water users near the regional wastewater plants and conveyance systems.

Treatment and Water Quality

Most of King County's wastewater flows to one of two regional treatment plants – West Point and the South Plant. West Point's maximum design capacity is 133 mgd, their average flow is 108.8 mgd. The South Plant's maximum design capacity is 115 mgd, their average flow is 74.2 mgd. King County's regional treatment plants use an activated sludge treatment process to treat all of the wastewater to the federal secondary treatment standards before discharge into Puget Sound. Only a portion of the water treated at the regional treatment plants is reclaimed for use. The reclaimed water receives additional treatment (beyond secondary treatment) to meet Class A standards. This advanced treatment involves using chemical coagulation and filtering the water through upflow sand filters to remove any remaining particles. A high-level chlorine disinfection process follows the filtration step. Monitoring equipment provides continuous monitoring of flow, turbidity, and chlorine residual to assure that only reclaimed water meeting the required Class A standard is sent to customers.

Membrane Bioreactor Technology

For new facilities such as the Brightwater Treatment Plant, King County plans to use membrane bioreactor technology. This unit combines an activated sludge secondary treatment bioreactor and a microfiltration membrane. Membranes are submerged in the aeration tank and water is drawn through the membrane with a low-pressure vacuum, leaving the solids in the aeration tank. The membrane bioreactor can convert screened sewage to clean effluent in a single process — eliminating the need for separate primary, secondary, and advanced treatment. It produces a very high quality effluent meeting Class A criteria (after disinfection). This technology has the potential to significantly reduce plant footprint while producing improved effluent quality.

Financing

The South Treatment Plant upgrade to a reclamation facility cost $2.24 million, which did not include distribution to Fort Dent Park and the Boeing Longacres Complex. Westpoint's capital costs for its reclaimed water upgrade was $300,000. King County uses a regional funding system for their large regional wastewater treatment system. The county believes that a regional system benefits everyone through increased wastewater capacity, lower wastewater rates, and improved public and environmental health. With a fair rate structure and capacity charge, everyone pays. This is fair, since everyone benefits from clean, healthy waterways. King County's funding philosophy is that "growth should pay for growth," so it uses a capacity charge. Residential rates are set at $23.40. New connections are charged a $34.05 capacity charge for six months.

The South Plant's sand filters used to treat reclaimed water to Class A standards. Ecology photo

Table 9 describes operation and maintenance costs for the Westpoint and South Treatment Plant.

Table 9: Facility Operation and Maintenance Costs

Facility	Includes	Amount
Westpoint	Chemicals, Labor, Parts, and Electricity	$102,200
South Treatment Plant	Chemicals, Electricity, Labor, and Materials	$95,700

Contact King County:

◆ *Tom Fox*, Water Reuse Coordinator, (206) 296-5279

CITY OF SNOQUALMIE
King County

Manmade reclaimed water storage pond, Eagle Lake. Ecology photo

A unique and successful partnership between the city of Snoqualmie and Weyerhaeuser Development Corporation (WEYCO) brought the city's Class A water reclamation facility into existence in October 1998 – just in time to meet growth and ground water protection requirements.

Reclaimed Water Uses

Snoqualmie's Class A reclaimed water goes to the Snoqualmie Ridge development for direct use or storage in Eagle Lake. The Snoqualmie Ridge PGA Golf Course requires 1.0 million gallons per day of reclaimed water for landscape maintenance. Reclaimed water also irrigates urban landscapes along the Snoqualmie Ridge Parkway and other public areas. Snoqualmie currently has more customer demand than available reclaimed water during the summer irrigation season. During the winter, the treatment plant discharges unused water to the Snoqualmie River.

Snoqualmie Ridge development uses reclaimed water for irrigation. Eagle Lake is in the foreground. Ecology photo

Planning and Outreach

Developer and city needs created the right conditions for Snoqualmie's reclaimed water partnership. In the foothills of the Cascade Mountains and only 30 miles east of Seattle, WEYCO viewed the community of 4,100 as a desirable location for a 1,343 acre planned urban professional (PGA) golf course community, Snoqualmie Ridge. However, the city had limited water rights and their existing wastewater treatment lagoon was violating its discharge permit. Developer funding and reclaimed water use solved both water and wastewater needs.

Both partners realize that public education and outreach are important to success. Home purchasers receive information about reclaimed water use within the development. Informational signs located along Snoqualmie Parkway, Eagle Lake, the Professional Golfers Association (PGA) golf course, and parks notify the public. The city distributes a weekly newsletter, including articles about reclaimed water. The city also provides a detailed description of the treatment processes on its Web site.

As development and home ownership progresses, Snoqualmie anticipates more stresses on limited drinking water supplies and increasing wastewater flows. The city is considering the following:

- Storing reclaimed water produced during the winter for summer demands.
- Constructing reclaimed water distribution for use in historical Snoqualmie.
- Changing the residential sewer and water rate structures.
- Expanding the water reclamation facility.

Wastewater secondary treatment at the Snoqualmie oxidation ditch. Ecology photo

Treatment and Water Quality

The facility design accommodates flows up to 2.08 million gallons per day (mgd). Current summertime flows are approximately 1.0 mgd. The incoming wastewater pumped to the treatment plant receives screening to remove large solids prior to secondary treatment in a modern oxidation ditch, which removes pollutants to levels meeting requirements for river discharge. The secondary effluent then receives chemical coagulation and filtration with a dual media (silica sand and anthracite), traveling bridge filter. Finally, ultraviolet light disinfects the water to meet the stringent Class A standards for irrigation in areas frequented by the public.

The plant has a computerized control system, continuous monitoring, and holding areas to assure that only water meeting Class A quality is distributed for use.

Financing

Weyerhaeuser fully funded the $18 million capital cost of upgrading to the Class A reclamation plant, including all collection, treatment, and disinfection units. Weyerhaeuser spent an additional $4 million for distribution, which includes all utility pipes. Snoqualmie also charges for the reclaimed water at the same cost as drinking water supplies. For the second development phase, Weyerhaeuser will fund the additional equipment to upgrade the treatment plant. Estimates of the operational costs for the treatment facility are $240,000 a year. Table 10 lists residential rates and fees.

Table 10: Residential Sewer Rates

Charge	Snoqualmie Ridge (SR) Residence	Outside SR Residence
Monthly Rate	$24.50	$24.50
System Development Charges and Connection Fee	$100	$2,500

Contact Snoqualmie:

- *Kirk Holmes*, Public Works Director, (425) 831-4919, ext 12
- *Vern Allemand*, Waste Water Crew Chief, (425) 888-4153

Phase 1 construction of the Snoqualmie Ridge development includes over 40 percent of open spaces in parks, trails, wetlands, and the PGA golf course. Ecology photo

HOLMES HARBOR SEWER DISTRICT
Island County

The Holmes Harbor Water District was the first facility in the state to use Class A reclaimed water for golf course irrigation. The planned community could not build homes on many of the residential lots because soil conditions were unable to support on-site septic systems. Class A reclaimed water allowed development with the added benefit of watering the golf course.

Reclaimed Water Uses

Holmes Harbor produces Class A reclaimed water for seasonal irrigation of the Holmes Harbor Golf Course. The Holmes Harbor Golf Course is an 18-hole golf course covering 150 acres. Reclaimed water irrigation occurs from April to October. The facility has two storage lagoons (each with a capacity of 8.0 million gallons) that store the reclaimed water for the entire duration of the wet weather season.

Reclaimed water pond at the golf course. Ecology photo

Planning and Outreach

The Holmes Harbor Sewer District is located in the southern part of Whidbey Island in Island County. The district serves a community of 543 single-family residences (270 residences and 243 vacant lots). The golf course clubhouse restaurant is also connected to the sewer system.

Although the subdivision was platted in the 1970s, some of the homes could not be built due to poor soils, which were unable to support on-site septic systems. The district's original plan proposed a centralized collection system and treatment plant that would discharge the treated effluent through an ocean outfall. Local opposition defeated this plan. In August of 1984, a second plan proposed the use of reclaimed water. This plan failed due to lack of financial support. In September 1990, the district amended the plan. The Departments of Health and Ecology approved the amended plan in January 1991. In 1994, the district formed a utility local improvement district (ULID) and authorized the issuance of revenue bonds to finance construction of the water reclamation facility. The District completed construction of the treatment facility in 1995.

Treatment and Water Quality

Holmes Harbor's Class A reclamation facility has a design flow of 0.10 million gallons per day (mgd). Flows currently average 0.04 mgd during wet weather months and 0.034 during dry weather months. The collection system consists of septic tank effluent pumping (STEP) low pressure sewer lines conveying the wastewater to the treatment facility. Secondary treatment is biological

activated sludge using two Sequencing Batch Reactors (SBRs), followed by equalization. Advanced treatment to meet Class A reclaimed water standards consists of chemical coagulation and flocculation, filtration (traveling bridge sand filter), and chlorine disinfection. A contract operations firm operates the facility. When effluent does not meet the Class A reclaimed water standards, the water is diverted to a quarantine pond for re-treatment. Only water meeting the Class A standard is distributed for use at the golf course.

Sign indicates use of reclaimed water for irrigation at the Holmes Harbor golf course. Ecology photo

Financing

Capital costs for the Holmes Harbor collection system and treatment facility were $3.7 million. Holmes Harbor formed a ULID to finance the facility through sewer revenue bonds and property assessments. The annual operations and maintenance (O&M) budget is $292,000. O&M costs are recovered through monthly residential sewer rates. Rates for permitted homes are $58.33 per month; lots are billed $48.33 per month. The district also assesses a sewer hook up fee of $1,500. These funds are set aside for future capital expenditures.

Contact Holmes Harbor:

- *Ken Ecklebarger*, Office Manager, Holmes Harbor Sewer District, (360) 331-4636
- *Kelly Wynn*, Owner, Water and Wastewater Services, 1-800-895-8821 or (360) 466-4443
- *Jeff Ezzy*, Treatment Plant Operator, (360) 331-4636

Reclaimed water use and signs are visible throughout the golf course. Ecology photo

CITY OF EPHRATA
Grant County

Decorative fountain at the Ephrata water reclamation facility. Ecology photo

High nitrate contamination found in local drinking water supplies motivated local citizens and city officials to upgrade their wastewater treatment processes. Ephrata also needed to plan for future growth. The city chose Class A reclaimed water as a long-term solution to meet their needs.

Selected as one of four demonstration projects, Ephrata's facility produces Class A reclaimed water, primarily to recharge their ground water supply.

Reclaimed Water Uses

Ephrata uses most of their reclaimed water for aquifer recharge. In addition to underground water recharge, Ephrata also uses Class A water to wash down treatment plant equipment and for on-site irrigation. The facility has a decorative fountain that uses reclaimed water. Ephrata has a reclaimed water hydrant system where authorized customers can get water for dust control or construction purposes.

Ground water recharge basin. Ecology photo

Ephrata would like to encourage more reclaimed water use. Due to the cost of distribution infrastructure, Ephrata has proposed to use the reclaimed water to mitigate for additional drinking water supply withdrawals. Because the city is in a basin closed to new water rights, this has not been possible under current law.

Planning and Outreach

Planning began in 1990. High nitrate concentrations in the underground water used for drinking water supplies prompted the city of Ephrata to upgrade their wastewater treatment plant. Additional conditions such as low average rainfall (8 inches) in Central Washington, a limited water supply aquifer and a growing population of 6,855 focused the community on Class A reclaimed water as a long-term solution to meet their needs.

Citizens were supportive because they could understand the benefits of improved water quality and the elimination of nuisance odors from the outdated treatment plant. Ephrata provided the following outreach efforts:

- A public outreach program to gather and address citizen concerns.
- A PowerPoint presentation available to citizens and school children.
- A ribbon cutting ceremony and conducted tours of the reclamation facility.

Ephrata used a computer model to size the ground water recharge basins from the city's previous four-cell lagoon system. The new facility began operation in September 2000.

Treatment and Water Quality

The Class A water reclamation plant has a design capacity of 1.22 million gallons per day (mgd). The average operating flows are approximately 0.55 mgd. Wastewater undergoes secondary biological treatment and nitrogen removal. To make Class A reclaimed water, the secondary treated effluent receives chemical coagulation to precipitate small particles and clump together. Upflow sand filters remove the remaining particles. A high dose of ultraviolet light is used to thoroughly disinfect the water. Ephrata's facility also includes an on-line computerized system that continuously monitors flows and other important parameters. Alarms immediately notify the facility operators and divert inadequately treated water to a lined storage basin to be retreated at the plant. Only reclaimed water meeting the Class A standard leaves the facility.

Ephrata's operators are continuously challenged to meet the reclaimed water standards. Although treating for nitrogen removal is essential, it causes poor settling of the solids removed by the facility. Operators believe this is their main problem and struggle to find a way to meet both needs. The facility has also had difficulty with the hydraulics in their ultraviolet light disinfection channel.

Financing

The city of Ephrata funded project construction through a $1.97 million Centennial Clean Water Fund grant appropriated by the Legislature and a $5.35 million Clean Water State Revolving Fund loan. The project's capital construction cost was $6.8 million. Operation costs for 2003 totaled $238,612, including operation supplies, treatment, salaries, benefits, chemicals, travel, education, electricity, and equipment.

To repay their debt, residential monthly sewer rates are set at $29 per month. There is also a one-time residential connection charge of $750 for new connections to the sewer system. Without the legislative grant, the city would have obtained funding through other sources resulting in significantly higher sewer rates. Ephrata anticipates future cost recovery from the sale of reclaimed water.

Contact Ephrata:

- *Wes Crago*, City Manager, (509) 754-4601
- *Troy Zerb*, Water Reclamation Facility Manager, (509) 754-2992

The clarifier removes solids following secondary treatment.
Ecology photo

Reclaimed water hydrant and water meter.
Ecology photo

CITY OF ROYAL CITY
Grant County

Royal City's extended aeration biological treatment
Ecology photo

The facility's compact design makes the plant easily expandable to allow for future growth.

For this low-income community of 1,800 residents, funding a Class A water reclamation facility was the biggest challenge. The Washington State Legislature made the project possible by selecting Royal City for funding as one of four small community projects demonstrating reclaimed water use within the state.

Reclaimed Water Uses

Royal City's primary reclaimed water use is aquifer recharge through surface percolation basins located at the water reclamation facility. The operators also use reclaimed water for treatment plant equipment wash down, process water, and on-site irrigation. A hydrant is setup for tanker trucks to haul reclaimed water to construction sites.

A 6-inch force main line exists that could be used to transport reclaimed water to an adjacent 11.5-acre sprayfields for irrigation use. However, because the farmer receives a cost advantage from using water from the Columbia Irrigation Basin Project, he does not want to use reclaimed water for this purpose.

The city is exploring ways to build a reclaimed water distribution system for the following uses:

- Irrigation of local parks and schoolyards.
- Toilet water flushing in public restrooms.
- Industrial uses within the city.

Proposed expansions include constructing a water storage tank and installing distribution lines at the same time as street upgrades to reduce construction costs.

Planning and Outreach

Planning began in 1996 to replace an existing lagoon and wastewater disposal sprayfield. With ground water contamination concerns and annual rainfall in Royal City averaging about 9 inches per year, city officials decided that a Class A reclaimed water facility could help solve both water supply and water quality needs. The original plan envisioned using 100 percent of the reclaimed water to enhance local wetlands and lakes during the winter and irrigating a golf course during the summer. After exploring the costs and feasibility of the project, Royal City decided to recharge their aquifer.

Finances governed Royal City's decision. Because the local residents have little ability to pay for services, choosing the most economical option was important.

Other challenges to the small community included:

- Stretching operational budgets to meet operator staffing and testing requirements.
- Assuring the public that properly treated reclaimed water was safe for the proposed uses.
- Convincing the community and decision makers of reclaimed water benefits.
- Incorporating growth management planning into the project.

Royal City's infiltration basins.
Ecology photo

Treatment and Water Quality

The Class A reclaimed water facility began operation on January 2000. The Class A water reclamation facility has a maximum design capacity of 0.25 million gallons per day (mgd), and presently averages 0.15 mgd. Operators achieve secondary treatment using an extended aeration biological treatment system with nitrogen removal. Advanced treatment to Class A standards includes chemical addition and mixing to coagulate particles for more effective removal in filtration, a cloth disk filter, and ultraviolet disinfection. Computerized equipment continuously monitors flow, turbidity, and other important process parameters. Alarms notify operators and immediately divert inadequately treated water to a lined lagoon for retreatment. Only reclaimed water meeting the Class A quality is sent to use areas.

Based on their experience, Royal City recommends the following:

- Do not cut corners. Use reliable equipment and design the facilty for easy operation and maintenance.
- Keep vegetation growth clear from infiltration basin to ensure efficient infiltration.
- Conduct more outreach communication efforts to encourage non-English speaking residents not to discharge oil and grease to the sewers.

Financing

Royal City used a Clean Water State Revolving Fund loan of $73,845 for planning. Without the legislative grant funding for construction, the city would have had to build a less sophisticated facility that would have produced a lower water quality at a higher cost. Design and construction costs totaled $3.7 million.

Table 11: Financial Assistance

Source	Amount
US Department of Agriculture Rural Development Grant	$1.8 million
US Department of Agriculture Rural Development Loan	$640,000
Centennial Clean Water Fund Grant	$985,000
Community Development Block Grant	$750,000
Clean Water State Revolving Fund Loan	$245,525
City Funds	$79,585

Royal City estimates annual operating costs at $260,000. The city is still learning to adjust their budget to meet unanticipated expenses. Royal City has gradually increased residential sewer rates to repay their debt.

Table 12: Residential Sewer Rates

Charge	Cost	Year
System Development Fee	$1,598	N/A
Connection Fee	$550	N/A
Monthly Rate	$39.25 $23.25 $22.00	1999 1997 1996

Contact Royal City:

- *Harry Yamamoto*, Public Works Director, (509) 346-2263
- *Allen Watson*, Operator/Lab Technician, (509) 346-1811

"Water reclamation is costlier than the former facultative lagoon system, but the quality of the water and odorless process is a positive asset to the community."
- Harry Yamamoto, Royal City Public Works Director

"There is no comparison, this plant is a safer and more environmentally sound way of processing municipal waste."
- Plant operator Allan Watson

Vegetated infiltration basin.
Ecology photo

CITY OF QUINCY
Grant County

The addition of deflectors and a cover over the UV channel would promote optimal mixing and prevent dust from entering the disinfection units.

Viewing Class A reclaimed water as a long-term solution to their water and wastewater needs, the city of Quincy embarked on a novel design-build-operate method of financing. Quincy, an economic center for irrigated agriculture and the food processing industry, reduced costs by packaging bids for their industrial wastewater treatment plant with the Class A municipal reclaimed water facility.

Reclaimed Water Use

Quincy's Class A reclaimed water recharges the local aquifer through six infiltration basins located near the water reclamation facility. The city wants to use some of reclaimed water for landscape irrigation of city parks, school fields, and churches. However, the uphill pumping and distribution pipes required to send the water to customers might be too costly to pursue at this time.

Planning and Outreach

The central Washington city of Quincy is water limited with less than 8 inches of rain per year. The area's ground water basin is closed to new water right appropriations. Additional water supplies will be needed to accommodate expected growth.

Quincy operates two wastewater treatment plants – one serves the local industrial needs while the other treats municipal wastewater. In 1998, monitoring results showed high nitrate levels in the ground water. Quincy began planning to reduce nitrates and to meet their 20-year plan for growth.

Seeking a long-term solution, the city decided to incorporate reclaimed water into the plan. Quincy ran a series of local newspaper stories to educate the citizens about their treatment plant upgrades and residential rate increases.

To cut costs, Quincy leveraged city finances by taking advantage of the design-build option offered under Washington's Water Quality Joint Development Act (Ch. 173.240 RCW). The contract provided comprehensive program management, engineering design, construction, operation, and project financing services. Both plants began operating in April 2002.

Quincy is investigating the possibility of obtaining a water right to withdraw ground water closer to the landscape irrigation uses. The proposal would require that the Class A reclaimed water replace all of the new water withdrawn from the aquifer. Since the Quincy basin is closed to additional water right appropriations, any new appropriation would be difficult under current law. Even if a new water right is possible, the proposal would require a detailed assessment to determine whether it would be feasible or cost-effective to pursue.

Advanced treatment and control building. UV channel in foreground. Ecology photo

Treatment and Water Quality

The Quincy facility treats 0.70 million gallons of water per day (mgd) and has a design capacity to treat up to 1.54 mgd. The treatment facility includes two activated sludge lagoons using sequencing batch reactor technology (SBR) to remove nitrogen and attain federal secondary treatment standards. The SBRs discharge to an equalization basin that reduces peak flows to a lower more uniform flow. The reduced flow rate allows smaller sizing of the advanced treatment units that produce the Class A reclaimed water. These units include chemical coagulation, continuous backwash upflow sand filters, and disinfection with ultraviolet (UV) light.

Budget constraints prompted Quincy to reduce capital costs where possible. Some of the cost cutting measures resulted in higher operation and maintenance costs that have offset the intended savings. Operators must control algae and respond to occasional coliform spikes in the effluent.

Ground water recharge basins. Ecology photos

The plant's computerized control system, continuous monitoring, and holding areas assure that only water meeting the Class A standards is sent to the infiltration basins. Because the clay soil in Quincy slows percolation rates, the six ground water recharge basins require over 15 acres of land. Flows to each basin are intermittent so that basins have time to drain. Keeping vegetation out of the infiltration basins has also been a challenge.

Financing

Upgrading both plants at the same time and using only one contractor saved Quincy money. The new municipal facility was also built on the existing treatment plant site and incorporated some of its components. Total capital cost for the reclamation facility project was $5.90 million. A United States Department of Agriculture Rural Development loan for $2.7 million provided some of the costs of the upgrade. Quincy further reduced debt by refinancing loans at a lower interest rate through the Clean Water State Revolving Fund loan in 2001 for the amount of $2.5 million.

Annual operation and maintenance costs are approximately $96,000. Quincy's tight budget was stretched to the maximum to meet these costs during the first two years of operation through user rates. The city increased residential rates by $2.00 increments beginning in 1999 until the rate reached a maximum of $29.00. Residential connection fees are currently $750.

Contact Quincy:

- *Lorin Lowry*, Public Works Director, (509) 787-3523
- *Richard Wolf*, Wastewater Operator Manager, (509) 787-1765

UV channel. Ecology photo

Even with financial assistance, meeting project costs was challenging. Quincy creatively leveraged its financing and made this project work.

Farming trucks in Quincy.
Grant County photo

CITY OF WALLA WALLA

Walla Walla County

Reclaimed water discharging into Mill Creek. Ecology photo

Walla Walla received Ecology's Outstanding Operational Performance Annual Award in 1998, 2002, and 2003. Operations Management International (OMI) runs the treatment plant operations.

The city of Walla Walla operates the oldest active Water Reclamation Plant (WRP) in the Pacific Northwest. Since 1927, Walla Walla's wastewater effluent has irrigated agricultural land. In 1996, Walla Walla and Ecology agreed to a three-phase schedule to upgrade the treatment facility to meet the state's new Class A reclaimed water standards by 2008.

Reclaimed Water Uses

During the irrigation season, two irrigation districts split the 7.2 million gallon per day (mgd) reclaimed water supply from the Walla Walla facility for agricultural use. The remaining reclaimed water discharges into Mill Creek. The United States Army Corps of Engineers, with Ecology's recommendations, diverts most of the Mill Creek flows upstream of the Walla Walla WRP into Yellowhawk and Garrison Creeks to satisfy senior water rights. Table 13 describes where, how much, and when the treated effluent flows to the creek and irrigation districts.

As land use plans change from agriculture to urban development, Walla Walla is optimistic about the potential for future urban uses of the reclaimed water. The city also wants to use reclaimed water discharged into Mill Creek for habitat enhancement and additional irrigation uses.

Table 13: Reclaimed Water Use

Area	Time	Amount (mgd)
Blalock Irrigation District	May – November*	6.06 Max
Gose Irrigation District	May – November*	1.14 Required
Mill Creek	December - April	Averages 5.84**

** Irrigation District may request water year round*
*** Average is based on the average of 2001 through 2004 December through April flows*

Planning and Outreach

A 1927 court-ordered water rights agreement obligates Walla Walla to provide reclaimed water to the irrigation districts. Before 1996, the water received secondary treatment and disinfection before discharge to either the irrigation districts or to Mill Creek. In 1996, Walla Walla and Ecology agreed to upgrade the facility to meet Class A reclaimed water standards for food crop irrigation under a three-phased plan shown in Table 14.

These upgrades will enhance water quality, improve system reliability, reduce chlorine levels, and add oxygen to the water. Water bill inserts and newspaper articles educate the public about Walla Walla's upgrades.

Table 14: Walla Walla's Construction Phases

Phase	Amount	Construction	Activity
Phase 1	$20 million	Ended 2000	Secondary Treatment Advancements
Phase 2	$6.1 million	Ended 2004	Ultraviolet Disinfection and Other Plant Work
Phase 3	$7 million	Ends 2008	Constructs Storage Basins and Rehabilitates the Sand Filters

Treatment and Water Quality

The Walla Walla WRP facility is designed to treat 9.6 mgd, based on a maximum monthly average flow that meets city capacity in 2015. The current maximum average monthly flow during the irrigation season is 5.7 mgd. The wastewater receives advanced secondary treatment using both trickling filters and a carousel oxidation ditch. The plant is designed to remove both phosphorous and nitrogen. This secondary treatment is followed by a traveling bridge sand filter.

Ecology's permit requires reclaimed water to have one part per million chlorine residual. In the summer of 2000, Ecology discovered some of the irrigation district's tail water had a higher chlorine residual at discharge points to Mill Creek. This was a concern because bull trout and steelhead (threatened species under the Endangered Species Act) live in the creek. Walla Walla chose to replace the chlorine with ultraviolet light for disinfection. Ecology then requested the wastewater plant reduce discharge chlorine residual to irrigators. The plant still can produce chlorine on-site for backup disinfection and cleaning.

The Phase 2 upgrades improved reliability, reduced chlorine levels, and added oxygen to the water. With the Phase 2 upgrades, Walla Walla's treatment facility is meeting Class A reclaimed water quality. The Phase 3 improvements are still necessary to obtain additional reliability to assure that only water meeting Class A quality is distributed for use.

Financing

Walla Walla obtained a low cost loan from the Public Works Trust Fund, which kept residential sewer rates at an affordable level. Connection fees are paid by the developer and assessed per foot of pipe. Annual operation and maintenance costs are $1.3 million. Table 15 (right) shows the funding and rates.

Reclaimed water sent to the irrigation districts. Ecology photo

Table 15: Financing and Residential Sewer Rates

Source	Amount
Public Works Trust Fund	$5,159,197
Charge	**Amount**
Monthly Rate	$31.46
Connection Fee (Paid by Developer)	$58/foot

Contact Walla Walla:

- *Frank Nicholson*, Utility Engineer, (509) 527-4537
- *William Breshears*, Treatment Facility Manager, (509) 527-4509

Construction of the UV channel at Walla Walla. Ecology photo

CITY OF COLLEGE PLACE
Walla Walla County

College Place's medium pressure ultraviolet disinfection unit.
Ecology photo

Over 25 percent growth in the last decade pushed College Place to construct an advanced wastewater treatment facility. The new facility meets Class C reclaimed water quality requirements but does not currently meet the reliability criteria required in the state's 1997 for Class A reclaimed water standards. College Place uses the treated effluent for environmental enhancement of the Garrison Creek watershed. Legal and technical issues have delayed other uses of the water.

Reclaimed Water Uses

The College Place facility provides Class C quality water to augment summertime flows in Garrison Creek. This is part of a watershed enhancement program which includes removing vegetation that was choking the streambed and replanting the banks with trees and shrubs for stream cover. Project goals include decreasing instream temperatures and increasing dissolved oxygen levels to improve the health of aquatic life.

The city has continued to have difficultly meeting the temperature limits for discharge into the creek and would like to use some of the Class C quality water for irrigation of a nearby city-owned poplar plantation. This would decrease the impact to the stream, but would also reduce instream flows. The reduced flows could impact existing water rights that divert creek water for agricultural use downstream of the facility discharge point.

Re-aeration of water for discharge to Garrison Creek.
Ecology photo

Planning and Outreach

The rapidly growing city of 8,500 began planning upgrades to their wastewater treatment facility in 1996. The existing piping and secondary treatment units (a trickling filter system) were too small to accommodate all the growth. The polishing ponds also caused problems because spring and summer biological changes and algal blooms prevented the discharge from meeting water quality requirements for Garrison Creek.

The city assembled a citizen advisory committee, held public meetings, provided newsletters, and encouraged community participation in planning the upgrades.

Operation of the new facility began in early 2001. The new treatment facility experienced a significant number of issues that have delayed implementation of reclaimed water use:

- More operator training was needed to operate the advanced treatment facility.
- Problems with the equipment, controls, and treatment units caused permit violations.
- The constructed wetland did not achieve the anticipated temperature reductions.
- Algae growth in the constructed wetland caused violations of total suspended solids (TSS) and pH limits.
- Agricultural growers were concerned about the use of the reclaimed water on food crops.

In 2003, a private party filed a citizen lawsuit (authorized under the provisions of the federal Clean Water Act) for National Pollution Discharge Elimination System (NPDES) permit violations. The lawsuit included violations of reclaimed water reliability criteria established in the permit.

College Place could not divert water to irrigation under compliance since the approved facility plan and permit did not include an irrigation management plan.

College Place has worked diligently to resolve these problems with limited funding available for the needed improvements. The city worked directly with the equipment manufacturers to correct deficiencies and obtain needed on-going operator training and support. College Place is preparing an irrigation management plan and pursuing upgrades in treatment reliability. The city is also working with Ecology to strike a balance between meeting seasonal flow needs in Garrison Creek and other irrigation demands.

Treatment and Water Quality

Current summer wastewater flows are approximately 0.9 million gallons per day (mgd). The facility can treat a maximum capacity of 1.65 mgd. The new facility provides secondary biological treatment using sequencing batch reactor (SBR) technology. The wastewater then receives advanced treatment through chemical coagulation followed by a cloth disk filter and ultraviolet disinfection. The resulting effluent meets Class C reclaimed water quality and flows to a re-aeration basin that adds oxygen prior to discharge into Garrison Creek.

During the summer months, two pumps are available to airlift treated effluent to constructed treatment wetlands before discharge into Garrison Creek. The facility planned to achieve temperature reduction by cooling the water in the wetlands before discharging into the creek. However, the constructed wetland system is apparently too large for the flows received and has not been able to maintain the vegetative cover necessary to shade the water. College Place frequently bypasses the wetlands to prevent sunlight from heating and degrading the water quality with algae.

The city is considering spending between $150,000 and $300,000 to improve plant reliability and meet Class A reclaimed water for additional uses.

Financing

College Place received a $210,000 low interest loan to enhance the Garrison Creek watershed. Design and construction of the advanced wastewater treatment facility cost $16.4 million, including land acquisition, upgrades, design, and construction. Annual operation and maintenance costs are approximately $430,000. Tables 16 and 17 show how the project was funded and the residential sewer charges required to repay the debt.

Figure 16: Residential Sewer Rate

Charge	Fee
Monthly Rate	$46
System Development Charge	$620

Figure 17: Financial Assistance

Source	Amount
Public Works Trust Fund Loan	$7 million
Centennial Clean Water Fund Grant	$2.5 million
Clean Water State Revolving Fund Loan	$5.6 million

Contact College Place:

◆ *Paul Hartwig*, Public Works Director, (509) 529-1200

◆ *Bob Jamison*, Wastewater Treatment Operator III, (509) 529-2859

Garrison Creek flows along side of the popular tree area.
Ecology photo

CITY OF MEDICAL LAKE
Spokane County

Purple pipes at Medical Lake treatment facilty pump the Class A water to Medical Lake and Deep Creek. Ecology photo

A partnership between the city of Medical Lake and the state Department of Social and Health Services (DSHS) resulted in a solution to upgrade both aging wastewater treatment facilities and an aging lagoon system. The solution is a Class A wastewater reclamation facility that maintains water levels and water quality in West Medical Lake.

Reclaimed Water Uses

The Class A reclaimed water from the Medical Lake Wastewater Reclamation Facility is used to maintain water levels in West Medical Lake and to provide irrigation water for the treatment plant facility grounds. Maintaining lake levels in West Medical Lake is essential for enjoyment of recreational sports and the popular state-operated fisheries.

State facilities located near the lake have an appropriative water right to withdraw water from West Medical Lake for on-site irrigation use. As flows increase, the city of Medical Lake anticipates expanding reclaimed water use for city irrigation purposes.

Planning and Outreach

The city of Medical Lake is a rapidly growing community of about 4,000 people located in Eastern Washington, 16 miles west of Spokane. The challenge for Medical Lake involved two aging DSHS secondary wastewater treatment plants that did not meet their permit requirements for wastewater effluent discharge, and the city's aging lagoon system. Before upgrades, the city's lagoon system discharged effluent to a ditch leading into Deep Creek, a tributary to the Spokane River. The DSHS treatment plants discharged wastewater from various state facilities — two hospitals, a pre-release correctional facility, a juvenile detention facility, a school, and an assisted living care facility — into West Medical Lake.

Ecology's compliance order initiated a partnership planning process in 1990. At that time, the concept of reclaimed water was new in the state (the Reclaimed Water Use Act was enacted in 1992). The Medical Lake facility plan was one of the first to move to reclaimed water use. Their plan includes several components of interest:

- The city used several meetings and local news articles to inform the public and gain support.
- Instead of purchasing a pre-packaged wastewater treatment plant, Medical Lake researched and tailored the facility to meet their needs well into the future.
- By conveying the reclaimed water through portions of the former DSHS wastewater treatment facility discharge lines, the project minimized the costs of additional conveyance pipes.
- The public supported the new facility because it was more cost-effective than retrofitting the old treatment facilities.

Currently, the Medical Lake facility sends more reclaimed water to West Medical Lake than DSHS previously discharged into the lake. The city plans to approach the Department of Ecology about revising the West Medical Lake Management Plan to use some of the Class A water for city parks and urban landscape areas.

The conveyance pipes (far right) send reclaimed water into West Medical Lake. Ecology photo

Treatment and Water Quality

The new wastewater treatment facility began operation in 2000. During the summer irrigation season, approximately 45 million gallons of wastewater flow through the city's wastewater treatment

facility. The facility has a design capacity of 1.0 million gallons per day (mgd) of wastewater, with a maximum treatment capacity of 1.85 mgd. Two main wastewater pipes enter the plant – one a force main from DSHS's lift stations and one from the city's collection system. The DSHS force main has a relatively long residency time (approximately 12 hours) which causes odors and makes it more difficult for operators to keep the biological treatment at optimum efficiency. Operators use biofilters for odor control and are considering injecting liquid oxygen at the lift stations to prevent the anaerobic conditions.

The biological treatment process (oxidation ditch) meets the required secondary treatment standards and removes phosphorous and nitrogen. Following secondary treatment, the effluent receives chemical coagulation. This gathers and precipitates any remaining particles so that they can be removed through filtration. The facility uses a dual media (silica sand and anthracite) traveling bridge filter. After filtration, the reclaimed water is disinfected with ultraviolet light to kill any remaining pathogens. The final reclaimed water meets or exceeds both Class A reclaimed water standards and the city's National Pollution Discharge Elimination System Permit (NPDES) for Deep Creek and West Medical Lake.

During maintenance periods, reclaimed water production ceases, wastewater bypasses filtration units and goes into Deep Creek. This effluent meets NPDES Permit requirements for discharge to Deep Creek.

The facility design provides operator flexibility to meet the changing treatment needs. Medical Lake operators use a computerized system to track facility operation and maintenance. This allows the facility to operate with a four-person team. The facility also has a comprehensive laboratory (shown) to perform testing and water quality analysis.

Financing

Table 18 shows funding assistance for the Medical Lake Water Reclamation Facility. The state partner, DSHS, provided $9 million of the $14 million capital cost of the project. However, DSHS does not pay for the use of the reclaimed water, although it benefits by withdrawing irrigation water from West Medical Lake. Operation and maintenance costs are approximately $520,000 per year. City utility rates pay for reclaimed water operations and maintenance and city officials believe that they should receive ongoing compensation for the water supply. Currently, the city is investigating the possibility of rewriting the West Medical Lake Management Plan to allow for future use of some of the reclaimed water for irrigation of city properties.

Table 18: Financial Assistance

Source	Amount
Public Works Trust Fund Design Loan	$96,000
Centennial Clean Water Fund Grant	$2.5 million
Public Works Trust Fund	$1.5 million
Capital Improvement Fund from City	$1.0 million
DSHS	$9.0 million

Table 19: Residential Sewer Rates

Charge	Amount
Monthly Rate	$30.00
Connection Fee	$1,250

Contact Medical Lake:

- *Doug Ross*, Public Works Director, (509) 299-7712
- *Steve Cooper*, Operator, (509) 299-6860

Biological oxidation treatment at the Medical Lake Water Reclamation Facility. Ecology photo

Operators working in the Medical Lake facility laboratory. Ecology photo

CITY OF CHENEY
Spokane County

Collaborating to find solutions, local planners at the city of Cheney and Eastern Washington University (EWU) believe that Class A reclaimed water use is "not just an option, but rather a necessity in order to meet the current and future water needs of this rapidly growing community and university city." The existing state-of-the-art treatment plant produces a high-quality effluent meeting Class D reclaimed water standards. The water flows to a wetlands system that provides habitat to a number of wildlife species.

Reclaimed Water Uses

Wastewater effluent at Cheney's facility meets Class D reclaimed water quality. The Class D water use occurs at the facility for wash down, site irrigation, and wetlands habitat. The effluent discharges into an impressive series of constructed treatment wetlands, which provide habitat to various wildlife species including birds, mountain cougars, elk, and moose. There, the water receives final polishing prior to seasonal discharge into Minnie Creek.

When upgraded, the city of Cheney plans to continue using the Class A reclaimed water for the wetlands and expand use to irrigate city parks, school grounds, and athletic fields. EWU plans to use the Class A water to irrigate the college campus.

Cheney's constructed treatment wetland habitat. Ecology photo

Planning and Outreach

In September 1994, the city of Cheney constructed an award-winning, innovative wastewater treatment and biosolids reclamation facility. The fast growing community of over 9,855 residents and EWU met its 20-year growth capacity projection in just ten years. Cheney and EWU draw their drinking and irrigation water supplies from a limited aquifer, making a new water supply an essential component of their plans to meet growth potential.

Cheney is completing the final stages of a feasibility analysis that includes irrigation demands, environmental impacts, legal and permitting requirements, capital improvement alternatives, and financial impacts. Cheney still faces several challenges including:

- Obtaining funding for the project capital, operation, and maintenance costs.
- Partnering with potential developers to share costs of providing urban water and wastewater services.

◆ Providing effective public outreach supports the long-term benefits of reclaimed water use over short-term solutions of drilling new water wells.

◆ Assuring the public that properly treated reclaimed water is safe to use.

◆ Balancing peak water demand and low flow during summer months.

◆ Supporting important constructed wetlands functions while diverting more water to other uses.

The city provides tours of the facility and ongoing community education. They have developed brochures, a virtual tour of the wastewater treatment and reclamation plant facility, aired a television show on their local channel providing water and wastewater education. Cheney anticipates providing additional educational outreach for the Class A water reclamation upgrades and uses.

Treatment and Water Quality

The existing facility can treat an average annual flow of 1.5 million gallons per day (mgd) and a maximum monthly average flow of 2.7 mgd. Wastewater flows pass through fine screens and grit removal units that remove inorganic material. The wastewater then undergoes secondary biological treatment through an oxidation ditch to remove organics and nutrients, including phosphorus. The facility uses chlorine disinfection to kill pathogens. Residual chlorine is chemically removed (sulfur dioxide) before discharge into a series of constructed treatment wetlands, which provide habitat to various wildlife species including birds, mountain cougars, elk, and moose. There, water receives final polishing prior to seasonal discharge into Minnie Creek.

Chlorine disinfection units at Cheney facility. Ecology photo

To achieve Class A reclaimed water, the treatment facility plans to add filtration units, ultraviolet disinfection facilities, and additional monitoring and control units. EWU plans to use the Class A water to irrigate college campus landscaping and athletic fields. The city plans to use the reclaimed water for irrigating city parks, school grounds, and athletic fields.

Cheney's constructed treatment wetlands. Ecology photo

A view of the Cheney wastewater treatment and biosolids reclamation facility from the constructed treatment wetlands. Ecology photo

Financing

Cheney obtained funding from a variety of sources to build the existing treatment facility. Tables 20 and 21 show capital costs and funding and residential rates for the 1994 treatment plant. Annual operation and maintenance expenses total $793,400.

Table 20: Residential Sewer Rates

Charge	Amount
Monthly Rate	$27
Connection Fee	$808

Table 21: Financial Assistance

Source	Amount
Centennial Clean Water Fund Grant	$3.0 million
US Environmental Protection Agency Innovative and Alternative Treatment Grant	$6.0 million
Public Works Trust Fund Loan	$4.0 million
US Department of Agriculture Rural Development Loan, (Later Refinanced with Clean Water State Revolving Loan)	$2.7 million

The city estimates the cost to upgrade to Class A at approximately $6 million including treatment, storage, pumps, and the distribution system. However, even if the city decides against constructing the Class A facility, the costs of expanding wastewater treatment to accommodate growth and meet the existing NPDES permit requirements will still cost approximately $6 million.

Cheney seeks funding support from state and federal grants, loans and from EWU. The city hopes to minimize increases to customer rates to pay for the Class A reclaimed water facility.

Contact Cheney:

- *Donald MacDonald*, Public Works Director, (509) 498-9293
- *Dan Ferguson*, Facility Lead Operator, (509) 498-9302

The Future of Reclaimed Water Use

Alternative water supplies such as reclaimed water are beginning to take hold as more communities throughout Washington realize their value.

Reclaimed water is a way to stretch our water supplies to meet existing and future needs. The environmental and economic consequences of using water once and throwing it away make reclaimed water use an increasingly attractive alternative.

In some cases, the impetus for using reclaimed water begins with a need to eliminate or decrease wastewater discharges. In other cases, it begins with the need for more water supplies. Most successful projects include elements of both.

For customers, the benefits of reclaimed water use are high. Usually, the reclaimed water is available at a lower cost than drinking water. In addition, because wastewater treatment is an ongoing and essential public service, the resulting reclaimed water supply is drought resistant and relatively assured.

Snoqualmie's Professional Golfer's Association (PGA) golf course uses reclaimed water to irrigate its grounds. Ecology photo

About Washington's Reclaimed Water Use Act

The Reclaimed Water Use Act, Chapter 90.46 RCW, is the law enacting reclaimed water use in Washington.

State law encourages reclaimed water use, requiring consideration in both wastewater and water supply planning (RCW 90.48.112 and 90.46.120). Planning should focus on specific community needs. It is important to begin assessing options as early as possible to assure coordination of wastewater treatment, water supply, various use options, and other planning processes.

LOTT lays down the purple pipe from the Budd Inlet Facility to distribute Class A reclaimed water to points of use.
LOTT photo

Anyone who generates reclaimed water must obtain a state reclaimed water permit before putting the water to use. The reclaimed water permit includes requirements for treatment, public health protection, water quality, monitoring, distribution, and use of reclaimed water. Whenever the water is transferred to another party for distribution or use, the permittee must transfer under a legal contract assuring proper and safe water use.

Reclaimed water is considered a new water supply. The owner of the reclaimed water facility receives an exclusive right to the use, distribution of the water, and exemption from the appropriative water right permitting requirements. However, the owner may not be able to divert reclaimed water from an existing effluent discharge location if this would impair existing downstream water rights.

State law requires that reclaimed water use not impair existing downstream water rights without compensation or mitigation. An impairment analysis is required to evaluate whether existing water right holders might be impaired when a reclaimed water facility decreases or eliminates its discharge of wastewater. In complex situations, Ecology is able to provide assistance with the impairment analysis if contacted early in the planning process.

For More Information

The Washington State Department of Ecology (Ecology) Web site, *http://www.ecy.wa.gov/programs/wq/reclaim/index.html*, provides information on the state standards, engineering design criteria, guidance documents to aid planning processes, and suggested readings. The Web site also links to other resources. Ecology publication #05-10-012 (*Frequently Asked Questions about Reclaimed Water Use*) is particularly helpful. This and many other documents are also available in printed form through Ecology's publications office at 360-407-7472.

For Assistance:

Ecology and the Washington State Department of Health provide information and technical assistance to help planning groups, reclaimed water customers, utilities, and consultants assess and implement reclaimed water plans. Contact Ecology's Water Quality Program in the regional office serving the planned project for assistance.

- **Northwest Regional Office**
(425) 649-7000 (*Island, King, Kitsap, San Juan*, and *Snohomish* counties)

- **Bellingham Field Office**
(360) 738-6250 (*Whatcom* county)

- **Southwest Regional Office**
(360) 407-6300 (*Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Mason, Lewis, Pacific, Pierce, Skamania, Thurston*, and *Wahkiakum* counties)

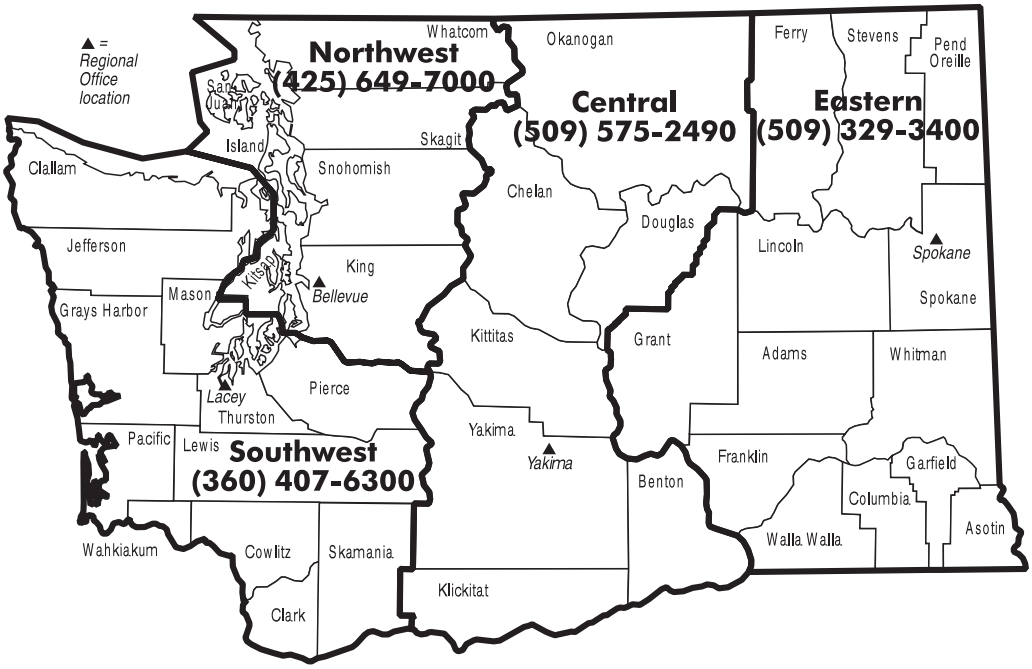
- **Central Regional Office**
(509) 575-2490 (*Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan*, and *Yakima* counties)

- **Eastern Regional Office**
(509) 329-3400 (*Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla*, and *Whitman* counties)

- **Department of Health**
Craig Riley, P.E.; (509) 456-2466
e-mail *craig.riley@doh.wa.gov*

- **Statewide Program Lead** (Ecology), Katharine Cupps, P.E.; (360) 407-6452; e-mail *kcup461@ecy.wa.gov*

Ecology's Regional Offices



MAP OF FACILITIES