A Department of Ecology Report

Water Reclamation and Reuse
The Demonstration Projects

Background

Realizing a need to provide more sustainable water resources, the Washington State Legislature passed the Reclaimed Water Act of 1992. This statute, Chapter 90.46 RCW, provides a framework and methodology to use the state's water resources more wisely by recognizing that wastewater from municipal treatment plants is an asset that can be reclaimed for a wide variety of uses.

To encourage the use of reclaimed water as soon as possible, the legislature directed the Departments of Ecology (Ecology) and Health (Health) to jointly develop standards and implementation processes. The Water Reclamation and Reuse Standards were completed in September 1997 and are some of the most comprehensive in the United States. They provide design, treatment, and use criteria assuring environmental protection – as well as public health and safety. Reclaimed water meeting the standards may be used for irrigation, commercial and industrial uses, recharging our aquifers, improving the water quality in our rivers and streams, enhancing wetland habitat and maintaining stream flows for the benefit of fish and wildlife.

Building on the process with the passage of Substitute House Bill 1817, the 1997 State Legislature directed Ecology and Health to establish and administer a reclaimed water demonstration program. Amendments to Chapter RCW 90.46 provided for a legislative allocation of $10 million dollars from the Centennial Clean Water Fund to help fund five demonstration projects. RCW 90.46.110 (5) states that upon completion of the projects, Ecology shall report to the appropriate committees of the legislature on the results of the program. This report is submitted in fulfillment of that requirement. The Department of Health and representatives of the five demonstration projects provided information that was useful in the completion of this report.

Demonstration Projects

In accordance with RCW 90.46.110, the demonstration projects consist of a feasibility study in Lincoln County and four water reclamation and reuse facility demonstration projects in the cities of Ephrata, Royal City, Sequim and Yelm. The Lincoln County study has been completed and all four facility projects have been constructed and are in operation. These projects are currently providing reclaimed water for a variety of non-potable uses including landscape irrigation, city street cleaning and dust control, wetlands, groundwater recharge and streamflow augmentation.

Each project has unique features in both reclamation technology and uses that provide us with practical information and experience to assess the state standards and processes. A two-page summary of each of the projects is part of this report.

December 2000 *Publication Number 00-10-062*

In addition to the demonstration projects, 10 other reclaimed water projects have been constructed within the state. Fourteen more projects are planned for implementation during the next few years. A list of these projects and contact information is also provided with this report.

Although it is still too early to fully evaluate long-term performance, the experience gained so far in implementing the demonstration and other reclaimed water projects provides a solid base of information identifying existing program strengths and weaknesses. We are also receiving helpful insights from parties seeking more information or requesting technical assistance about the feasibility of reclaimed water. Key areas for agency focus over the next year include coordinated planning, financial aid, technical issues, and program promotion.

Early Coordinated Planning is Essential to Success

Both Ecology and Health have developed and implemented procedures for the consideration of reclaimed water in comprehensive sewer and water planning. Our experience in reviewing these plans indicates that consideration of reclaimed water should ideally occur even earlier in the planning process. Integration of reclaimed water into the initial scoping phases provides the best chance to maximize flexibility, reduce costs, minimize delays and achieve the greatest benefits.

An all too common weakness in water reclamation planning has been a tendency to take the singular viewpoint of the utility proposing the project. Unlike other wastewater treatment and disposal alternatives, water reclamation and reuse provides an opportunity to address several objectives simultaneously including water shortages, conservation and supply needs, environmentally sound wastewater treatment, disposal and watershed enhancement. It also provides an opportunity to identify partners who are both able and willing to use the reclaimed water. Failure to provide coordinated planning has and may continue to result in the implementation of less desirable and ultimately more costly wastewater treatment and water supply solutions. It is therefore important to continue seeking ways to include reclaimed water in both water and wastewater planning.

One of the internal challenges to Ecology has been the inability of regional staff to take on any additional workload. In July 1999, the legislature provided funding to Ecology and Health to staff project review and technical assistance positions. Ecology created two engineering positions dedicated to reclaimed water. In addition, Ecology and Health hired a combined total of five positions focusing on water conservation and reuse. These new positions allow both agencies to take a more active role in the planning process. Ecology and Health are reviewing current procedures with the goal of finding ways to more efficiently integrate reclaimed water into the early stages of planning.

There remains a need to persuade communities and businesses to more fully consider their options. Mandates requiring reclaimed water use for golf courses, landscape irrigation or other nonpotable uses have worked well in other states and should be considered as a tool in Washington. This is beginning to happen at the local level. The city of Yelm has an ordinance that can require the use of reclaimed water if supplies are available. Both water and sewer service providers are requiring water reuse as a condition of service for Cascadia, a proposed employment-based community located in Pierce County.

Financing Reclaimed Water Projects

One of the drivers for the legislative funding of the demonstration projects was the inability of reclaimed water projects to successfully compete with more traditional wastewater facility projects under Ecology's financial assistance programs. To allow these projects to compete more successfully, Ecology recently changed the selection process to provide additional points to applications that include reclaimed water as an element in their project proposals.

The reclaimed water demonstration projects also provided challenges to agency staff when determining the funding eligibility of reuse project components such as irrigation fixtures that do not fit into traditional wastewater categories. Ecology recognizes a need to standardize funding eligibility for these components. One possible solution is to establish an in-house task force for rethinking the funding eligibility requirements.

One of the most difficult issues to assess continues to be the cost of constructing new or additional treatment facilities and reclaimed water transmission and distribution lines. These costs can appear prohibitive when they may actually be the cost-effective alternative after all factors are fully considered. Cost/benefit comparisons should be made that compare total costs for services with or without reclaimed water, rather than simply accounting for costs before and after the project. It is essential to include the avoided costs of developing new potable water sources as well as the expansion costs of wastewater treatment plants that would otherwise occur. Analyses should also factor in the difficult to quantify, avoided costs associated with the prevention of environmental degradation, protection of in-stream flows for fish, and the value of watershed enhancement. They should also project cost recovery from selling reclaimed water.

Financial incentives are still needed to reduce the capital and operational costs sufficiently for reclaimed water to be affordable and successfully compete with other existing water supplies. Current water and wastewater utility rates are not reflective of the true cost of water and wastewater collection, treatment, distribution or disposal. Federal agencies such as the Corp of Engineers and Bureau of Reclamation played a major role in the funding and construction of water supply reservoirs. Most existing municipal water supply and wastewater treatment facilities have also been subsidized at the state or federal levels through low interest loans or grants. Funding agencies other than Ecology also have different priorities and are not always able to include non-quantifiable environmental benefits when determining cost-effectiveness, funding eligibility or priority.

Suggested incentives include funding specifically targeted for reclaimed water facilities, tax exemptions, rate subsidies, and higher fees for wastewater disposal than for reclaimed water use. Surcharges placed on water withdrawals from critical ground or surface water sources are another approach that some states are using. This type of incentive reflects the cost of depleting existing water supplies by raising the costs to equal or exceed the price of supplying reclaimed water.

Technical Issues in Implementation

All four of the facility demonstration projects are Class A reclamation facilities. Class A is the level of treatment required for unrestricted public access to the use areas. It therefore has the most stringent treatment and reliability requirements to assure public health protection. Each demonstration project provided a report to Ecology on issues encountered during the planning, design, construction, start-up and monitoring of the project. Most comments have been positive with an understanding that all parties were working together to implement a new program.

Engineering issues involved interpretations of the public health protection design requirements for coagulation, filtration and disinfection, adequacy of wastewater treatment technology alternatives, monitoring equipment and alarms, storage and distribution system design, and methods for matching water supply and demand requirements. The agencies plan to jointly review the engineering comments and determine an appropriate course of action. Ecology and Health will also investigate ways to incorporate new technologies that may simplify treatment procedures and reduce costs without sacrificing public health and safety or environmental quality.

Constructive suggestions for process improvement included a recommendation to further streamline coordination between Ecology and Health. All facilities noted that the monitoring and reporting requirements were more comprehensive than anticipated and that more information early in the process would make planning and budgeting decisions easier to accomplish. They are also interested in finding less labor-intensive alternatives for monitoring and demonstrating compliance. Several parties mentioned a need for additional technical support to utilities, consultants, and equipment manufacturers/suppliers during project planning and design phases. Facility operators universally stated a need for more initial and continued training on new equipment and laboratory procedures during plant startup and operation.

Ecology, in coordination with Health, has established an engineering workgroup to examine the engineering review and permitting process as well as to determine ways to enhance technical assistance. The advent of electronic technology also offers promising opportunities to improve these efforts via the worldwide web.

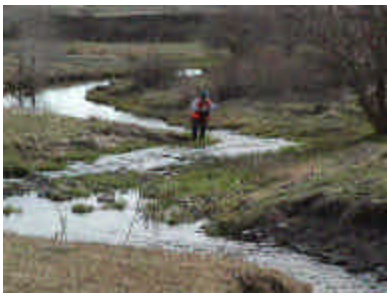
Continued Legislative Support and Promotion

The demonstration projects have been well received and serve as high profile, educational displays that reclaimed water can and does work in Washington State. A growing number of communities are seeking information and technical assistance regarding the planning and funding of reclaimed water facilities.

One of the keys to the success of this program has been the support of the State Legislature. Continued legislative involvement is vital to actively promote the use of reclaimed water, reassure the public about its safety and overcome resistance to change. There remains a need for further consideration of financial and other incentives to encourage and sustain reclaimed water projects.

For More Information

The demonstration and other constructed projects model the use of reclaimed water by example. All facilities welcome visitors and you are encouraged to telephone and visit them. For more information, please contact Megan White at (360) 407-6405 or Kathy Cupps at (360) 407-6452.



Water Reclamation and Reuse
Lake Creek (Lincoln County) Feasibility Study

Project Description

The Lincoln County Conservation District conducted a study for Lincoln County regarding the feasibility of using up to 44 million gallons per day of reclaimed water from the Spokane area to rehydrate and restore depleted streambeds within the Lake Creek watershed. The watershed occupies approximately 91,385 acres. There has been a steady drop in the groundwater level resulting in drying up Lake Creek and several of the fourteen lakes within the watershed during low rainfall years. Lake Creek has been dry for nearly a decade. In addition, there are water quality concerns related to impacts from agricultural and rangeland activities in the upper watershed including runoff, erosion and sedimentation. The project was funded through a $169,688 Centennial Clean Water Fund grant via legislative appropriation.

The project included collection of existing data within the watershed as well as twelve months field monitoring of water quality and stream velocity at 14 sites to generate baseline information, to identify specific water quality concerns and to assess the environmental and hydrological impacts downstream from the addition of reclaimed water. Parameters monitored include temperature, dissolved oxygen, pH, conductivity, turbidity, total suspended solids, nitrogen, phosphorus, fecal coliform, chlorophyll A, phytoplankton, zooplankton, alkalinity, and chlorides.

A newsletter provided information to local landowners and agencies that might be interested in the study. Additional outreach was provided via the Lincoln County Fair, Lake Creek Appreciation Day, and public meetings.

Project Benefits

Possible benefits from using the reclaimed water include re-hydration of numerous streams, lakes and ponds in Lincoln and Grant counties. Also, the project provides a source of water for commercial electric power at Creston, reestablishment of riparian wildlife habitat, wetlands restoration, and fisheries enhancement – as well as increased tourism and recreation and economic development.

Project Results

The study provides useful baseline information on the existing status of the Lake Creek watershed. It is also clear that the addition of reclaimed water would change the characteristics of the watershed both in terms of water quantity and quality.

There are over 70 recorded wells within the watershed boundaries used for irrigation, watering livestock and domestic use. If the permitted withdrawals were taken, it could adversely impact the levels of Lake Creek and the area lakes.



The channel below Seven Springs was identified as the critical section of the Lake Creek drainage. The addition of 33 cfs (cubic feet per second) to the watershed would result in potential flooding at this area. The increase in water would require enlarging the channel capacity or would flood considerable acreage and cause soil erosion until the channel restabilized. Culverts and bridges affected by Lake Creek would also require improvements.

To provide a stable flow volume there would have to be some means of storage and metering of the reclaimed water. Placement of storage ponds over aquifer recharge zones could result in rapid discharge to a series of multiple, interconnected, unconfined and semi-confined aquifers that supply drinking water throughout a wide area.

Next Steps

The study recommends that Lincoln County take the following steps:

- Additional public education and input is needed for prioritization of benefits such as re-establishment of lost wetlands, wildlife enhancement, types of recreational fisheries, economic growth and groundwater quality.

- More investigation on the effects of rehydration on groundwater quality, wetlands, channel stabilization, and flooding potential. Hydrological studies of by-pass channel options for Crab Creek, Sinking Creek, Hawk Creek, Goose Creek and other drainages are recommended.

- Further investigation is needed to determine the impact of water quality parameters that might be present in reclaimed water such as nutrients, heavy metals and synthetic organics.

- Regional planning efforts are needed to implement land use priorities as well as to determine the most appropriate sites and methods of transporting, diverting and storing reclaimed water.

For more information

Bill Graedel, Lincoln County, (509) 725-3031
David Lundgren, Lincoln County Conservation District, (509)-725-4181
Kathy Cupps, Department of Ecology, (360) 407-6452, kcup461@ecy.wa.gov

Water Reclamation and Reuse
City of Ephrata (Grant County) Demonstration Project

Project Description

The city of Ephrata demonstration project's objective was to reclaim and beneficially use their wastewater to recharge the groundwater aquifer and reduce the nitrate concentrations that currently exceed drinking water standards. A reclaimed water permit was issued for the facility on August 12, 1999. The project was competed in June 2000 and grand opening ceremonies were held in September 2000.

Reclamation Plant

The Class A water reclamation plant has a design capacity of 1.12 million gallons per day. The major facility components include: a grit removal channel and a self-cleaning fine screen to remove incoming debris from the treatment processes; an oxidation ditch using extended aeration activated sludge technology for biological treatment and nitrogen removal; two circular secondary clarifiers to settle solids from the wastewater; an automated chemical feed system and in-line static mixer to coagulate solids for more effective filtration; a Waterlink continuous backwash, upflow sand media filtration system; and a Trojan technology low-pressure, low-intensity ultraviolet (UV) disinfection system. The facility also includes an on-line computerized monitoring system providing continuous monitoring of flows, turbidity and other important process parameters. Alarms immediately notify the facility operators and divert inadequately treated water to a lined storage basin to be retreated at the plant at a later time. Only reclaimed water meeting the Class A standard is ever sent to use areas.

Project Funding

The city of Ephrata funded project construction through a $ 1.97 million Centennial Clean Water Fund Grant legislative appropriation and a $5.35 million Clean Water State Revolving Fund Loan. The project's estimated capital construction cost was $6,950,700. The actual capital construction costs were slightly lower at $6,843,000.

To repay their debt, residential 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. In the future, additional cost recovery is anticipated from the sale of reclaimed water. However, without the

legislative grant, the city would have needed to obtain additional funding through loan programs or through conventional municipal bonds. This would have increased monthly residential sewer rates to approximately $40 per month.

Beneficial Uses

Ephrata is using reclaimed water for many uses including treatment plant equipment washdown, process water, and site irrigation. A groundwater recharge system was constructed entirely from the city's previous four-cell lagoon system using a computer model. This method identified an optimum recharge strategy which allows 100 % beneficial reuse on a year round basis without constructing additional infiltration basins.

A key and touch-pad access system was designed to allow the city to dispense reclaimed water to tank trucks for use as construction water without requiring the plant operator to be present. This system will help the city offset the plant operating expenses by selling the reclaimed water to commercial construction contractors and Washington State Department of Transportation (WSDOT) road crews. At the dedication ceremony, officials from the Port District were asking for information on how to become a customer.

Other Notable Features

The city of Ephrata installed an on-line, particle-size analyzer to test the use of particle analysis as a surrogate for total coliform testing. If successful, this could be a method used to measure the effectiveness of UV disinfection on weekends and holidays. This would reduce the staff hours and overtime expenditures required for monitoring the disinfection system.

Ephrata is using an innovative energy efficient design for the nitrogen removal process. An oxidation-reduction potential (ORP) based control system provides the sequential cycles necessary for nitrogen removal within a single oxidation ditch.

A shallow groundwater monitoring system that was originally used to obtain baseline water quality characterization will continue to be used to verify groundwater quality improvements as well as monitor for mounding under the infiltration basins.

For More Information

Jim Cherf, City Manager, city of Ephrata, (509) 754-4601
Kathy Cupps, Department of Ecology, (360) 407-6452, kcup461@ecy.wa.gov

Water Reclamation and Reuse
City of Royal City (Grant County) Demonstration Project

Project Description

The city of Royal City demonstration project's objective was to replace an existing facultative lagoon treatment system and wastewater disposal sprayfield with a water reclamation facility. The original goal was to reclaim and beneficially use 100 % of its discharge to enhance local wetlands and lakes in the winter and potentially to irrigate a golf course. The constructed project was modified to use 100 % of the reclaimed water for aquifer recharge. A reclaimed water permit was issued for the facility on August 25, 1999. Royal City officially started operation on January 1, 2000.

Reclamation Plant

The Class A water reclamation facility has a design capacity of 0.25 million gallons per day. Major facility components include an influent screen, an AeroMod package plant extended aeration biological treatment system with nitrogen removal, an automated chemical feed system and in-line static mixer to coagulate solids for more effective filtration, an Aqua Aerobics disk cloth membrane filter; and a Trojan technology low-pressure, low intensity ultraviolet disinfection system. The facility also includes an on-line computerized monitoring system providing continuous monitoring of flows, turbidity and other important process parameters. Solids treatment includes an aerobic holding tank and two asphalt-lined sludge drying beds. Alarms immediately divert inadequately treated water to a lined bypass lagoon with a return to re-treat rejected water and notify the facility operators. Only reclaimed water meeting the Class A standard is sent to use areas.

Project Funding

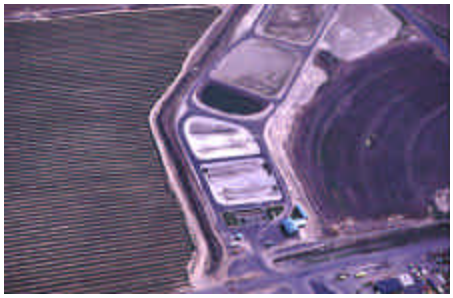
The city funded the project through a $1.8 million USDA-Rural Development grant, a $985,000 Centennial Clean Water Fund (legislative appropriation) grant, a $750,000 Community Development Block Grant, a $640,000 USDA-Rural Development loan, a $245,525 Clean Water State Revolving Fund loan, and $79,585 in city funds.

The project's estimated construction capital cost was $4,059,956.40. The actual capital construction costs were lower at $3,661,668.34.

To repay their debt, residential sewer rates are set at $39.25 per month. There is a residential system development charge of $2,120 plus a connection charge of $550. Without the grant funding, the city would have faced constructing a wastewater treatment system that would have produced a lower water quality at a higher cost than customers could afford.

Beneficial Uses

Royal City is using the reclaimed water for treatment plant equipment washdown, process water and site irrigation. Groundwater recharge is accomplished in three infiltration basins. The existing 11.5-acre sprayfield is still available for use.



Other Notable Features

The Royal City facility provides the opportunity to evaluate the effectiveness of several features that were implemented to reduce costs. Longer-term evaluation is necessary to determine how effective these methods will be in consistently meeting the reclaimed water Class A standards. Three of these are briefly discussed below.

Royal City is the only reclaimed water facility that has used a proprietary "packaged" extended aeration activated sludge secondary treatment process. The AeroMod system was selected to save approximately $250,000 in construction costs. The treatment system took several months of operation before it began to achieve the required effluent quality.

Royal City selected the Aqua Disk filter system, a unique design using a washable cloth-membrane as the filter media. The unit operates on gravity, requires far less area than conventional filtration units and eliminates the use of both sand media and underdrains. The majority of components were assembled prior to shipment, which also reduced installation labor and cost. The effectiveness of this unit following coagulation via an in-line static mixer is being monitored.

Compliance monitoring for total coliform, the indicator for effective disinfection, uses an alternative cost-effective colorimetric method, Autoanalysis Coliert System Quanti-Tray™. The method is EPA approved and is becoming popular at other facilities.

For More Information

John Lasen, city of Royal City, (509) 346-2263
Kathy Cupps, Department of Ecology, (360) 407-6452, kcup461@ecy.wa.gov

Water Reclamation and Reuse
City of Sequim (Clallam County) Demonstration Project

Project Description

The city of Sequim demonstration project's objective was to implement a tertiary treatment system and reuse 100 % of the city's wastewater. As a result, the city wanted to reopen an existing shellfish closure area to benefit state and tribal resources, improve streamflows in the Dungeness River, and provide a sustainable water supply for irrigation purposes. The city established a water reuse task force in November 1995. The treatment plant was upgraded to a Class A reclamation facility and was permitted on March 4, 1998. At that time, the city began planning, design and construction for a comprehensive upland reuse program to use 100 % of the reclaimed water.

Reclamation Plant

The Class A water reclamation facility has a design capacity of 0.67 million gallons per day. It was financed with the aid of a $5.3 million Clean Water State Revolving Fund Loan. The facility uses an existing oxidation ditch biological secondary treatment system and added flow equalization, coagulation/ filtration and disinfection facilities to meet reclaimed water standards. Sequim also extended the marine outfall by 1,320 feet to allow opening of impacted shellfish beds. The coagulation/ filtration components include a lift station, coagulant feeds, metering pump, flocculation chamber, gravity feed anthracite media filter by general filter. The disinfection system is a Trojan low-pressure, low-intensity ultraviolet system. On-line process monitors provide continuous monitoring of flow, turbidity and other important parameters. The reclamation facility also includes alarms to automatically divert substandard flows and notify operators. A holding pond with a recycle pump returns substandard flows for treatment. Only reclaimed water meeting Class A standards is discharged from the facility.

Project Funding

A $3.4 million legislative appropriation from the Centennial Clean Water Fund funded the planning, design and construction of Sequim's upland reuse program. This includes transmission and distribution lines, land purchase and construction of a reclaimed water demonstration site and educational building with restrooms using reclaimed water for toilet flushing at Carrie Blake Park. Residential sewer rates at Sequim are currently $37 per month. The residential connection, general facility charge is $3,000.

Beneficial Uses

Reclaimed water is available for treatment plant equipment washdown and process water, landscape irrigation, constructed wetlands, toilet flushing, municipal non-potable water, and streamflow augmentation.

Other Notable Features

A number of aspects of the project are precedent setting including:

- Purchase of a large land area for use as an irrigation demonstration site, accessible to the general public without physical buffers or night watering schedules.
- Installation of subsurface monitoring systems composed of soil moisture probes to verify organic application rates to maximize conservation of the reclaimed water and minimize leaching below the root zone.
- Augmenting streamflow in a small creek, Bell Creek, that supports salmonid habitat and livestock watering downstream.

The project also incorporates several innovative features including:

- Use of a long underground pipe to passively cool the water and reduce the temperature prior to discharge into Bell Creek.
- Use of a cascade aeration structure to elevate water dissolved oxygen levels prior to discharge into Bell Creek.
- Use of a lined constructed wetland to polish the reclaimed water as well as provide aesthetic enhancement.

Sequim uses ultraviolet disinfection and requested a waiver from the requirement to continuously maintain a 0.5 mg/L chlorine residual in the distribution system. However the city also provided a sodium hypochlorite feed system to chlorinate irrigation water immediately prior to application and maintain a residual if needed for irrigation line maintenance or public health protection.

Sequim also installed shallow groundwater monitoring wells to establish baseline conditions before the project begins and monitor for any effects on groundwater from the reclaimed water.

For more information

James Bay, city of Sequim Public Works Director, (360) 683-4908
Kathy Cupps, Department of Ecology, (360) 407-6452, kcup461@ecy.wa.gov

Water Reclamation and Reuse
City of Yelm (Thurston County) Demonstration Project

Project Description

The city of Yelm demonstration project's objective was to reclaim and beneficially use 100 % of its wastewater to provide an alternative water supply for irrigation, industrial and commercial uses, to offset the increasing demand for water, to protect the Nisqually River chum salmon runs, and to develop wetlands. The reclamation plant went on-line in August of 1999. A reclaimed water permit was issued on October 5, 1999. From the outset, 100 % of the reclaimed water leaving the treatment plant has been used for irrigation and groundwater recharge during the summer months. When there is not sufficient irrigation demand, the reclaimed water is discharged to the Centralia power canal upstream of the electric generator.

Reclamation Plant

The Class A reclamation plant has a design capacity to reclaim 1.0 million gallons per day. Major facility components include: activated sludge biological treatment with nitrogen and phosphorus removal using Sequencing Batch Reactor (SBR) technology; flow equalization; an automated chemical feed system and in-line static mixers to coagulate remaining solids prior to filtration; a Dynansand continuous backwash, upflow sand media filtration system; and chlorine disinfection. A small, reverse osmosis pilot unit was also installed at the plant to demonstrate the potential and higher level of treatment required for direct groundwater recharge. The facility also includes an on-line computer monitoring system. Process monitors provide continuous monitoring of flow and other important parameters. Alarms immediately shut down discharge and notify operators so that only reclaimed water meeting Class A standards is sent to use areas.

Project Funding

The project's actual capital construction cost was $8,177,741. The total project cost including administrative expenses was $9.6 million dollars. The city of Yelm funded the project through a combination of grants and loans including $3,398,500 Centennial Clean Water Fund Grant legislative appropriation, $3,857,000 USDA Rural Development loan, $344,449 USDA Rural Development grant, $2,000,000 Utility Local Improvement District (ULID) and $30,901 in city

funds. Without the legislative appropriation grant, the city could not have afforded the project. To repay the debt, residential sewer rates are set at $35 per month. The charge for a new residential connection is $4,850. Use area agreements also allow the city to collect revenue from users at approximately 80 % of the potable water rate.

Beneficial Uses

Reclaimed water is available for many uses including treatment plant equipment washdown and process water, fire fighting, street cleaning and dust control. The city also provides reclaimed water for landscape irrigation at local churches, city parks and even a private residence along the route.

The showcase of the Yelm project is Cochrane Memorial Park, an aesthetically pleasing constructed wetland park designed to polish the reclaimed water and recharge groundwater. In the center of the park, a fishpond uses reclaimed water to raise and maintain stocked rainbow trout for catch and release.

Other Notable Features

The city of Yelm implemented a highly effective public education and outreach program. Communication through the schools was a very successful tool in gaining public acceptance. Cochrane Memorial Park, a highly visible reuse component that the public wanted and can identify with, has also been a strong positive factor. The city adopted a local reclaimed water ordinance establishing conditions of use. The ordinance has a "mandatory use" clause through which the city may require construction of reclaimed water distribution facilities as a condition of development approval.

Groundwater monitoring has not detected any measurable changes in the groundwater when compared to baseline testing conducted by Ecology prior to the project. Yelm recently received an Ecology grant to provide a more extensive groundwater monitoring study to monitor for any groundwater impacts from the reclaimed water. Yelm's plans for future uses of reclaimed water include an educational wetland at Yelm High School as well as additional industrial and commercial uses.

For More Information

Shelly Badger, Yelm City Administrator, (360) 458-8405, shelly@yelmtel.com
Kathy Cupps, Department of Ecology, (360) 407-6452, kcup461@ecy.wa.gov

Implementing Water Reclamation and Reuse in Washington State
A List of Projects and Contacts

Constructed Demonstration Projects

1. City of Ephrata – Class A reclaimed water for groundwater recharge, irrigation, city and commercial uses (saving 1.12mgd). Contact Jim Cherf at (509) 754-4601.
2. City of Royal City – Class A reclaimed water for groundwater recharge, irrigation uses (saving 0.25 MGD). Contact John Lasen at (509)346-2263.
3. City of Sequim – Class A reclaimed water for irrigation, stream flow enhancement, ground water recharge and city uses (saving 0.67 MGD). Contact Jim Bay at (360) 683-4908.
4. City of Yelm – Class A reclaimed water for irrigation, wetlands and groundwater recharge (saving 1.0 MGD). Contact Shelly Badger at (360) 458-8405.

Other Reclaimed Water Projects Constructed or Under Construction

1. King County – Boeing Chiller project, Class D reclaimed water for cooling water (saving .05 MGD). Contact Tom Fox at (206) 296-5279.
2. King County – city of Renton facility – Class A reclaimed water for landscape irrigation (saving 1.3 MGD). Contact Tom Fox at (206) 296-5279.
3. King County, Westpoint facility – Class A reclaimed water for irrigation and plant process water (saving 1 MGD). Contact Tom Fox at (206) 296-5279.
4. Holmes Harbor Water District (Whidbey Island) – Class A reclaimed water for golf course irrigation (saving .1 MGD); Planned expansion to 0.2 MGD. Contact Mark Dumke at (360) 331-4636
5. City of Snoqualmie – Class A reclaimed water for golf course and landscape irrigation (saving 1.6 - 2 MGD). Contact Kirk Holmes (425) 888-5435.
6. Sunland Water District – Reclaimed water for irrigation (saving 0 .1 - .3 MGD). Contact Dick Stuhr at 360-683-3905
7. City of Medical Lake – Class A reclaimed water for streamflow augmentation (saving 8.0 MGD). Contact Al Prouty at (509) 299-6860.
8. City of Walla Walla – Class A reclaimed water for land application (saving 6.2 MGD). Contact Dick McKinley at (509) 527-4463.
9. City of College Place – Class A reclaimed water treatment installed but does not have alternative disposal site for reliability. Uses include irrigation, stream flow augmentation and wetlands. Contact Van Voorhies at (509) 529-1200.
10. North Bay/Case Inlet – Class A reclaimed water for land application and groundwater recharge (saving 0.4 MGD). Contact Gary Yando at (360) 427-9670, ext. 270.

Planned Reclamation and Reuse Projects

1. WSDOT Indian John Hill Rest Stop – Class A reclaimed water for toilet flushing and landscape irrigation (saving 0.03 MGD). Contact: Judy Hockett at (360) 705-7849.
2. City of Quincy, Grant County – Class A reclaimed water for aquifer recharge (saving 1.54 MGD). Contact Ehman Sheldon at (509) 787-3523.
3. City of Everett/Kimberly Clark – Snohomish County - Class C reclaimed water for industrial cooling (saving 8-14 MGD). Contact Dan Thompson at (425) 257-8860.
4. City of Everett, Snohomish County – Poplar Irrigation, Class C reclaimed water for hybrid poplar tree irrigation (saving 1.5 MGD). Contact Dan Thompson at (425) 257-8860.
5. LOTT, Thurston County – Class A reclaimed water for landscape irrigation and aquifer recharge (saving 1.0 MGD). Contact Mike Sharar at (360) 664-2333..
6. Cascadia/Orting, Pierce County – Class A Reclaimed water for seasonal landscape irrigation golf course, school fields and parks, (saving 0.5 MGD). Contact: James Mercer at (360) 893-2219.
7. King County, Demonstration Project – Class A Reclaimed water for seasonal landscape irrigation (saving 2-5 MGD). Contact: Tom Fox at (206) 296-5279.
8. Crystal Mountain Sewer District – Class A pilot reclaimed water to make snow, seasonal landscape irrigation. Contact Bill Steel at (360) 663-2265.
9. Pierce County – Chambers Creek properties master plan includes reclaimed water use for site restoration and irrigation. Contact Marsha Huebner at (253) 798-4050.
10. Main Street Sewer District, Class A reclaimed water for irrigation and possible toilet flushing (saving .05 MGD). Contact Rick Almberg at (360) 675-2438.
11. San Juan County, San Juan Island – Class A reclaimed water for toilet flushing (saving 1000 gallon per day). Contact Mike Kauffmann, Environmental Health Manager at (360) 378-4474.
12. Spokane County – Class A reclaimed water facility plan development for infiltration to ground water, Spokane River, irrigation, and wetlands. Contact N. Bruce Rawls at (509) 477-3604.
13. City of Pullman/Washington State University – Class A Reclaimed Water proposed for irrigation on campus and ground water recharge uses. Contact Bruce Bensen at (509) 355-5571.
14. Mount Rainier Resort at Park Junction – 100 % reuse for proposed destination resort/golf course (saving 0.3 MGD); Project on hold. Contact Sylvia Cleaver at (503) 282-3357.

There are several additional projects conducting feasibility studies.

For More Information

Please contact Kathy Cupps, Department of Ecology, (360) 407-6452