Section 5

Reclaimed Water System

Section 5 describes the Yelm reclaimed water system and potential uses for reclaimed water it produces, including and O&M analysis, potential impacts of future regulations, water rights mitigation, policies and User Agreements, a BCE of reclaimed water alternatives and resultant selected alternatives, and both necessary and recommended reclaimed water system improvements.

5.1 System Description

The City of Yelm's WRF was one of the first facilities in Washington to treat 100 percent of its wastewater to Class A reclaimed water standards. The WRF currently treats about 0.35 mgd of wastewater on an average annual basis. The WRF is a tertiary treatment process that meets the requirements of the state for Class A reclaimed water. A complete description of the WRF is included in Section 4.

After treatment, approximately 34 percent of the reclaimed water that is produced is distributed for beneficial uses, such as irrigation or groundwater recharge through RIBs. The City also discharges reclaimed water to Centralia Power Canal or directly to the Nisqually River during periods when demand for reclaimed water is low or when treated effluent cannot be treated to Class A standards. The outfall in the Nisqually River is maintained for emergency use only. The reclaimed water produced at the WRF is distributed to customers throughout the service area, including irrigation customers at schools, commercial landscaping, parks, and City streetscapes; commercial applications such as a school bus washing facility; and groundwater recharge at the City's Cochrane Park.

The City's reclaimed water system is currently part of the wastewater utility and is primarily operated by Wastewater Department staff. Water Department staff also operate components of the distribution system, including meter readings and cross-connection control (CCC).

In 2009, the City prepared a Draft Reclaimed Water Plan (Skillings Connolly, 2009). The Draft Plan was never finalized or adopted; this GSP references and incorporates elements of the Draft Plan throughout the reclaimed water system section.

5.1.1 System Ownership and Management

System name:	City of Yelm Water Reclamation System
Ecology NPDES permit no.:	WA0040762
System owner:	City of Yelm, 105 Yelm Avenue West, Yelm, WA 98597
	360-458-8499
Emergency contact:	Tim Peterson, Public Works Director 360-458-8499
	Jim Doty, Water Reclamation Facility Manager 360-458-8411
System operation manager:	Jim Doty, Water Reclamation Facility Manager

System certified operators: Jim Doty, Water Reclamation Facility Manager
Randy Hatch, System Operator
Robert Rhoades, WRF Operator and Lab Technician
Aris McClelland, System Operator

5.1.2 System History

Initially, the City's treatment plant was constructed to provide secondary treatment and discharge into the Centralia Power Canal with emergency discharge into the Nisqually River. However, due to water quality concerns in the Nisqually River, the shoreline substantial development permit for the secondary effluent was challenged. A temporary discharge permit was issued after the City agreed to pursue water reuse with 100 percent upland discharge and to eliminate discharge directly into the Nisqually River. The City replaced the initial aerated lagoon treatment system at the WRF with SBRs in 1999. The SBRs provide secondary treatment. Additionally, the City made changes to add coagulation, filtration, and additional disinfection to meet the reclaimed water standards for tertiary treatment processes. The final shoreline permit, which was completed in 2002, specifies that while the reclaimed water distribution system is the primary and preferred discharge location, the Centralia Power Canal can be used as a standby outfall when there is insufficient demand for reclaimed water or the reclaimed water system is unavailable. The permit also allows emergency discharge to the Nisqually River if the primary and standby outfalls are unavailable. A copy of the permit is included in Appendix 1C.

In 1992, the Washington State Legislature approved the Reclaimed Water Act (RCW 90.46), which encourages the use of reclaimed water for beneficial purposes, such as irrigation and commercial and industrial uses. In order to promote the development of water reclamation facilities, Ecology and Health established a Pilot Project program for treatment facilities that pioneered water reclamation. The City of Yelm received Pilot Project status and began developing plans for beneficial reuse. Initial plans were focused primarily on using reclaimed water for irrigation. However, because irrigation demands vary seasonally, establishing plans for year-round upland discharge were difficult. Modifications to the Reclaimed Water Act in 1995 included provisions for non-consumptive uses of reclaimed water, including surface percolation (infiltration), wetland enhancement, and streamflow augmentation. The City incorporated these provisions into its plan for reuse and completed construction on a groundwater recharge facility at Cochrane Park in 1999. The RIBs located at Cochrane Park provide a year-round demand for reclaimed water.

The City currently uses reclaimed water for beneficial purposes continuously through the year, although use varies seasonally according to irrigation demands. The Centralia Power Canal remains a backup discharge location with the Nisqually River outfall serving as an emergency backup.

5.1.3 Existing System Components

This GSP considers all facilities downstream of the reclaimed water pump station to be part of the reclaimed water system. Treatment components at the WRF are summarized in Section 4. Components of the reclaimed water system are summarized below and are shown in Figure 5-1.

5.1.3.1 Reclaimed Water Pump Station

The reclaimed water pump station is located at the WRF and is described in Section 4.4.2.12. Two Grundfos Model 80S50-5 pumps and two Peerless Pump Impeller Model T84229 pumps are currently in use. The Grundfos pumps, used as maintenance pumps, will provide 70 gpm at 165 feet of head. The Peerless pumps, used as the supply pumps, will provide 600 gpm at 165 feet of head. The supply pumps utilize a VFD to change the operational speed of the pump as needed. Operators report that, during periods of peak demands, the pump station approaches its design capacity. A more detailed

description of the reclaimed water pump station is included in Section 4; the need for expansion of the pump station is described in Section 5.8.1.

During low demand periods, reclaimed water is pumped to the reclaimed water storage tank. During high demand periods, this storage tank is drained into the reclaimed water wet well and subsequently pumped to the reclaimed water reuse facilities.

5.1.3.2 Reclaimed Water Storage Tanks

The primary reclaimed water storage tank, located at the WRF, is 500,000 gallons in volume. During periods when reclaimed water production is greater than demand in the system, water is pumped from the reclaimed water pump station to the storage tank. When demand for reclaimed water exceeds production, water from the storage tank flows by gravity to the reclaimed water pump station, where it is then pumped into the distribution system.

The storage tank, which was constructed in 2004, has a diameter of 53 feet and a height of 31 feet. (The high water line is at 30 feet.) The ground elevation of the tank is 337.5 feet.

Six smaller aboveground reclaimed water storage tanks are also located at Longmire Park. These tanks provide a total of 34,158 gallons of additional storage at the park to supply water for irrigation. Volumes for each tank are as follows:

- Tank 1: 6,238 gallons
- Tank 2: 6,238 gallons
- Tank 3: 8,130 gallons
- Tank 4: 6,238 gallons
- Tank 5: 3,657 gallons
- Tank 6: 3,657 gallons

The park also has a small 10 hp pump that boosts flow to the onsite reclaimed water irrigation system.

5.1.3.3 Distribution Network

The City's reclaimed water distribution system consists of approximately 8.5 miles of piping, ranging in diameter from 2 to 12 inches.

Reclaimed water piping primarily consists of PVC piping. Some hydrant assemblies are constructed with ductile iron pipe wrapped with a purple plastic sleeve. Fittings and valves are primarily cast-iron fittings. In 2011, the City began experiencing issues with corrosion of valves in the reclaimed water system. The City is in the process of testing valves in the system and will determine a valve replacement schedule based on the results of this testing. An additional valve will be installed at the WRF in order to provide control over water entering the distribution system.

All reclaimed water customers are metered. Any onsite irrigation or piping network is considered the property of the owner.

Table 5-1 presents an inventory of existing facilities in the reclaimed water system.

Table 5-1. Inventory of Reclaimed Water Distribution System		
Component	Unit	Quantity
City of Yelm reclaimed water piping		
2"	Feet	4,160
3"	Feet	4,560
4"	Feet	3,560
6"	Feet	2,390
8"	Feet	4,220
10"	Feet	8,400
12"	Feet	17,250
Total piping	Feet	44,510 (8.4 miles)
Hydrants	Each	14
Gate valves	Each	58

5.1.3.4 Rapid Infiltration Basins

The City currently owns and operates a groundwater infiltration facility at Cochrane Park. The facility consists of three RIBs: two aboveground and one beneath the parking lot. The design capacity of the RIBs is summarized in Table 5-2.

Table 5-2. Design Criteria for Cochrane Park		
RIB	Infiltration rate (inches per hour)	Area (square feet)
RIB 1	0.46	6,500
RIB 2	0.56	5,400
RIB 3 (underground)	0.67	4,600

The RIBs were designed to infiltrate approximately 50,000 gpd per basin and were also designed to handle the maximum flow plus a 100-year storm event generated from the surface area of the park's wetlands. The RIBs have been reported to handle flows in excess of their design capacity, and have infiltrated up to 80,000 gpd in the past. The RIBs and wetlands receive flow continuously throughout the year. However, the underground basin is currently not in use due to concerns of premature clogging.

In addition to the RIBs, the facility also includes a constructed wetland and a public facility, including a park and a trout pond. The total hydraulic design capacity of the constructed wetlands at Cochrane Park is 50,000 gpd (35 gpm). The constructed wetlands have been reported by WRF staff to increase the suspended solids concentration to levels that have a high risk of obstructing basin infiltration. Although the underground basin has been removed from service due to concerns related to the increased solids concentrations, the two aboveground basins have not experienced maintenance issues related to solids.

The layout of Cochrane Park is shown in Figure 5-2.

5.1.4 Existing Users and Use

The City's primary outfall is listed as the reclaimed water distribution system, and the City's current policy is to treat all effluent to Class A reclaimed water standards. However, currently only a portion of WRF effluent is discharged to the reclaimed water distribution system, as shown in Table 5-3 and Figure 5-3. For 2008–10, an average of 34 percent of wastewater treated at the WRF was discharged to the distribution system.

Table 5-3. Reclaimed Water Produced, 2008-2010

Description	2008	2009	2010
Total annual plant influent (MG)	120.1	138.2	129.0
Total annual effluent discharged to Power Canal (MG)	57.7	70.0	79.6
Total annual effluent discharged to Nisqually River (MG)	0.0	6.6	6.5
Total annual discharge to reclaimed water distribution system (MG)	39.8	44.4	29.0

Note: The discrepancy between the volume treated and the total discharged is related to reclaimed water used for in-plant purposes and discrepancies between the influent and effluent flow meters. In the future, flow meters will be calibrated annually as described in Section 5.2.3.1.

As shown in Figure 5-4, reclaimed water experiences a strong seasonal demand. Due to irrigation use, demand in the peak summer month is almost equal to the amount of reclaimed water produced. During the winter months, demand is generally limited to groundwater recharge at Cochrane Park.

The City has approximately 20 reclaimed water customers on a regular basis during the summer months. These are generally divided into the following types of customers:

- Irrigation at schools, two single-family residences, parks, City campuses, and streetscapes
- Tanker trucks that use water for construction purposes
- Commercial uses at the school bus garage
- Groundwater recharge

Because demand in peak irrigation months can approach supply, the City generally restricts use in these months according to reclaimed water availability. The City's policies related to reclaimed water use and availability are defined in Section 5.5.5. Typically, in the summer months the City operates at Stage 2 availability, which means reclaimed water is available for most users every other day.

Reclaimed water customers have a flow meter, a reduced pressure backflow assembly device installed on the onsite potable water supply, and an onsite distribution system. The City is responsible for distribution infrastructure up to the meter. Users are responsible for infrastructure downstream of the meter, including onsite piping and backflow assembly devices. Users are required to complete a Reclaimed Water User Agreement with the City prior to receiving reclaimed water. More information on Reclaimed Water User Agreements is included in Section 5.5. The following sections describe existing users in more detail.

5.1.4.1 Irrigation at Schools, Businesses, Residences, Parks, and Streetscapes

The City has agreements with each reclaimed water user that dictate the terms and conditions of their use. These conditions can include a limitation on the overall quantity of water used as well as restrictions on the time of use. For example, timing of reclaimed water use is managed to avoid water shortages or system-wide pressure drops. This timing is based on customer use patterns and water availability by season. A sample reclaimed water agreement is included in Appendix 5A.

A comparison of the average reclaimed water demand versus allocation for each user is shown in Table 5-4. Demand allocations are revisited as part of the User Agreement updating process.

Table 5-4. City of Yelm Reclaimed Water Users and Use

User	Total average annual use, 2008–10	Maximum permitted use (per User Agreement)		Maximum permitted use (per User Agreement)
	Gal/year	Gal/year	Ac-ft/year	gpm
Schools				
Yelm Middle School	1,021,394	4,398,988	13.5	60
Yelm School bus wash	50,827	325,851	1.0	10
Yelm High School	455,283	4,952,935	1.0	120
Mill Pond Elementary School [a]	NA	684,287	15.2	50
Ridgeline Middle School	3,057,989	3,714,701	2.1	100
Business/residence irrigation				
Allen residence	748	325,851	1.0	6
Fetterly residence	17,477	325,851	1.0	3
City Hall*	273,269	325,851	1.0	50
Public Works Facility*	668,463	1,075,308	3.3	35
Water Reclamation Facility irrigation*	1,335,180	619,117	1.9	25
St. Columbian Church	649,478	456,191	1.4	10
United Methodist Church	30	488,776	1.5	NA
TwinStar Credit Union	129,067	325,851	1.0	NA
Park Irrigation				
Yelm City Park*	117,685	1,010,138	3.1	50
Cochrane Memorial Park irrigation*	1,541,753	1,303,404	4.0	35
Longmire Park*	2,950,149	4,790,010	14.7	85
Streetscapes				
Coates Avenue streetscape*	572,744	325,851	1.0	20
Edwards streetscape*	119,892	325,851	1.0	20
Stevens streetscape*	64,522	325,851	1.0	20
Tahoma Boulevard streetscape	395,193	325,851	1.0	30
Thurston County Trailhead*	274,890	553,947	1.7	125
Prairie Line Trailhead*	21,438	586,531	1.8	NA
Total:	13,717,471	27,566,995	85	

a. Mill Pond Elementary School and Ridgeline Middle School share a reclaimed water meter.

NA: Billing record for user was not in historical billing reports or User Agreement was not provided.

** Denotes City-owned account.*

As shown in this table, many users exceed their maximum annual permitted uses, including City-owned accounts. In order to track use more closely, reclaimed water bills could be modified to show the total used per year compared to the maximum permitted use. This would promote water use awareness among customers. The City will begin to monitor reclaimed water use on its own accounts, and will restrict use at its discretion. Additionally, the City will reevaluate the usage allocated in reclaimed water agreements as necessary.

The average amount of reclaimed water used from 2008 through 2010 was approximately 32.6 million gallons (MG). The maximum annual amount permitted was 41.2 MG. Generally, most use occurs in the summer months. For comparison, the average amount of water discharged from the WRF during June through September, 2008–10, was 41.8 MG. This is approximately equal to the maximum permitted use.

5.1.4.2 Tanker Truck Filling

Tanker trucks receive reclaimed water from a hydrant located at the Public Works Department. Use at other hydrants in the system is controlled with hydrant locks. Users who will be filling tanker trucks are required to create an account to record use. They are also required to take a short class on permitted uses and safe handling practices for reclaimed water. Reclaimed water distributed to tanker trucks is charged at the same rate as other reclaimed water uses.

5.1.4.3 Commercial/Industrial Use

The City's only existing commercial user is the school bus garage. This water is metered and billed through the same account as Yelm Middle School (see irrigation users). The school bus garage uses reclaimed water year round.

5.1.4.4 Groundwater Recharge Rapid Infiltration Basins

The City currently operates one existing groundwater recharge facility at Cochrane Park. The facility includes a trout pond, constructed wetlands, and three RIBs. The RIB facility is described in Section 5.1.3.4.

Currently, mitigation requirements associated with the City's water right G2-21613, which allocates 67 acre-feet (ac-ft) per year to the City's downtown wells, is conditioned upon the recharge of not less than 56 ac-ft per year of water at the RIBs (approximately 50,000 gpd). Ecology has issued a Report of Examination for water right application G2-29085, which would allocate an annual withdrawal of 942 ac-ft to a proposed well in southwest Yelm. This water right is currently being appealed; however, if approved as stated in the Report of Examination (ROE) issued on October 21, 2011, the withdrawal will also be conditioned upon completion of projects identified in the City's 2011 Mitigation Plan (City of Yelm Water Right Mitigation Plan, February 2011, Golder Associates). Projects identified in the Mitigation Plan are described in Section 5.4.

5.1.5 Required Level of Treatment

The NPDES permit for the WRF allows up to 1.0 mgd (maximum month flow) of discharge to one of three locations: the reclaimed water distribution system, the Centralia Power Canal, or the Nisqually River. The required level of treatment varies depending on the discharge location. The most stringent permit limit pertains to total nitrogen or ammonia; for the reclaimed water system, the effluent must meet a total nitrogen limit of 10 mg/L, while the effluent discharged to the Centralia Power Canal must meet an ammonia limit of 3 mg/L. Permit limits for reclaimed water are summarized in Section 4.

5.1.6 WRF Performance

A history of WRF performance is provided in Section 4.5. The WRF has had difficulty in reliably meeting permit limitations for ammonia and total nitrogen for periods of 2010 and 2011. Section 4 presents an analysis of plant deficiencies and recommended improvements to reliably produce reclaimed water in the future.

5.2 O&M Analysis

The City's reclaimed water system is operated primarily by staff from the Wastewater utility, with Water staff performing maintenance on the reclaimed water customer meters. This section provides an overview of personnel, existing system operation, and monitoring requirements for the reclaimed water system.

5.2.1 Management and Personnel

In addition to the management and personnel summarized in Section 7.1, City Water Department staff perform maintenance on and read reclaimed water customer meters monthly at the same time that potable water customer meters are read. Figure 5-5 shows Management and Personnel related to the reclaimed water system.

5.2.2 Operator Certification/Training

Wastewater Department staff certifications are summarized in Section 7.1. Additional certifications related to the reclaimed water system's operation are as follows:

Edward B. "Smitty" Smith
Position: Water System Operator
Certification: Water Distribution Manager III and CCS

Tim Peterson
Position: Public Works Director
Certification: Water Distribution Specialist I

Kevin Ray
Position: Public Works Field Supervisor, CCS
Certification: Water Distribution Manager II, CCS, and Backflow Assembly Tester

John Ivey
Position: Water System Operator
Certification: Water Distribution Manager II, CCS, and Backflow Assembly Tester

Timothy Rarick
Position: Water System Operator
Certification: Water Distribution Manager II, CCS, and Backflow Assembly Tester

5.2.3 Existing System Operation

Reclaimed water produced at the WRF flows to the reclaimed water pump station, and is then pumped to various water reuse facilities. This pump station also supplies process water for in-plant uses, which supports the caustic system, the sulfur dioxide system, the chlorine system, the irrigation system, and hose bibs at the plant. This flow is measured by a separate flow meter, which was installed in 2006. This

flow meter is 6 inches in size, and is located in a second below-ground vault adjacent to the vault housing the influent flow meters.

The discharge location for the reclaimed water pump station is dependent upon water quality analysis. When analyses show that effluent does not meet the required specifications, a limit switch opens a control valve installed on a 6-inch-diameter diversion line, and reclaimed water is diverted back into the reclaimed water wet well. Water is then directed to the Power Canal rather than the reclaimed water distribution system.

During low demand periods, reclaimed water is pumped to a reclaimed water storage tank. During high demand periods, this storage tank is drained into the reclaimed water wet well and subsequently pumped to the reclaimed water reuse facilities. During periods of low demand or when water quality analysis prevents discharge to the reclaimed water system, treated effluent is discharged to the Centralia Power Canal or the Nisqually River.

A schematic of the reclaimed water system is shown in Figure 5-6.

5.2.3.1 Flow Meters

In the future, the flow meters at the water reclamation facility will be tested and calibrated annually. Historical volumes of reclaimed water distributed to users are tracked in the City's database of billing records. Reclaimed water used for irrigation or commercial proposes is metered. Meters are read monthly by Water Department staff and bills are processed with potable water use records and billing. Previously, the flow meter at Cochrane Park was manually read by Wastewater Department staff daily. The City installed a radio read meter at Cochrane Park in 2012 to track usage in the RIBs.

5.2.3.2 Storage Tanks

A computerized system as well as the tank level indicator on the side of the WRF storage tank is used to monitor the tank water level. During high demand periods, such as the summer months when demand exceeds production, water is drawn from the tank. During periods of high demands, the Public Works Director may curtail use until conditions change to avoid emptying the storage tank. Policies related to reclaimed water availability are described in Section 5.5.5.

5.2.3.3 Distribution System

Leak detection is not currently performed on the reclaimed water distribution system. However, reclaimed water lines are repaired when and where leaks are detected, and the City plans to implement a reclaimed water leak detection program in the future.

5.2.3.4 Valves

Valve boxes are inspected for excess debris during routine maintenance activities. Debris is removed as necessary for efficient valve operation by the Water Reclamation Plant Manger or assignee. Valves are exercised approximately once every year or two to ensure proper operation. Damaged valves found during inspection are repaired or replaced.

5.2.3.5 Hydrant Testing

All reclaimed water hydrants are equipped with hydrant locks to prevent theft. Hydrants are inspected and operated annually to detect any leaks or damage.

5.2.3.6 Cochrane Park Rapid Infiltration Basins and Wetlands

O&M needs of the RIBs at Cochrane Park are minimal and can prolong the life of the basins. Figure 5-2 shows the configuration of the basins and wetlands. The basins are operated in a series of 3-day wet, 3-day rest cycles. When the RIBs are functioning properly, the water drains entirely from the basins by the

end of the rest cycle. If water is ponded at the end of the rest cycle, the basin has clogged and needs to be cleaned. Cleaning the basins entails removing the top 1–2 inches of soil from the basin and replacing it with clean medium sand. The surrounding area is then hydroseeded and mowed as needed. To date this has not been necessary but may be required in the near future as suspended solids in the wetland effluent have been observed to be increasing.

Minimal maintenance has been performed at the wetlands since they were constructed in 1999. An O&M schedule for the wetlands will be developed in the future and will factor in long-term maintenance needs to provide for the proper functioning of the wetlands over time. The following factors should be included in the maintenance schedule:

- Check weir settings and the inlet and outlet structures.
- Clean off surfaces where solids and floatable substances have accumulated to the extent that they may block flows.
- Treat/remove nuisance species. Maintain records of any invasive species.
- Maintain the appearance of the wetlands and surrounding park.
- Treat for mosquitoes and other pests.
- Inspect the general status of the vegetation and wildlife populations.
- Remove sediment accumulations in forebays.
- Inspect the wetlands for any potential problems and monitor for potential dangers to the wetland ecosystem, such as bioaccumulation, avian botulism, and other avian diseases, vector problems, invasion of non-native plants and animals, debris accumulation, and nuisance conditions.

An initial goal for management activities would be monthly monitoring, followed by quarterly events in the second year. This could potentially be completed in conjunction with quarterly groundwater sampling, required per the WRF's NPDES permit. Maintenance records will hereafter be used to modify the maintenance schedule as necessary. The monitoring frequency will be assessed annually to ensure that monitoring goals are realistic and effective. Contingency plans will be developed to address any issues found during maintenance activities. This will include measures for determining and remediating nuisance conditions and addressing any toxicity observed in the wetland.

Flow from the constructed treatment wetlands is directed to each RIB through a flow control valve assembly. The flow valves are sequenced by a controller that operates the valves automatically. The WRF manager programs the controller to activate the valves on the selected schedule. Currently, the valves are set on a 3-day cycle. The operation of the valve sequencing is periodically tested by the WRF manager.

Figure 5-7 summarizes the current operation of the RIBs at Cochrane Park.

5.2.3.7 Summary of O&M Tasks

O&M tasks are summarized in Table 5-6.

Table 5-6. Summary of O&M Activities for the Reclaimed Water System	
O&M task	**Frequency**
Perform leak detection on the reclaimed water distribution system	Annually
Calibrate flow meters at WRF	Annually
Reclaimed water storage tank: • Inspect for damage to the foundations • Inspect and operate roof entry for proper operation • Inspect overflow to ensure overflow pipe is not blocked or restricted • Inspect water level indicator and pump control system • Inspect the exterior of reservoir and clean or paint as necessary • At a minimum of every 10 years, inspect interior coating and re-coat as necessary • Visually inspect the exterior of the holding tanks at Longmire Park	Annually (except where specified otherwise)
Exercise valves, inspect valve boxes, repair or replace damaged valves	Annually
Operate and inspect hydrants	Annually
Cochrane Park RIBs: • If water is ponding at end of the rest cycle, rehabilitate the basin by removing 1" to 2" of the surface soil and replacing with clean medium sand	As needed
Cochrane Park wetlands: • Check weir settings and the inlet and outlet structures. • Clean off surfaces where solids and floatable substances have accumulated to the extent that they may block flows. • Treat/remove nuisance species. Maintain records of any invasive species. • Maintain the appearance of the wetlands and the park. • Treat for mosquitoes and other pests as necessary. • Inspect the general status of the vegetation and wildlife populations. • Remove sediment accumulations in forebays. • Inspect the wetlands for any potential problems and monitor for potential dangers to the wetland ecosystem, such as bioaccumulation, avian botulism and other avian diseases, vector problems, invasion of non-native plants and animals, debris accumulation, and nuisance conditions.	Monthly; reevaluate frequency in 2013
Conduct groundwater sampling at Cochrane Park	Quarterly

5.2.4 Monitoring Plan

The existing monitoring requirements for reclaimed water are covered under the City's NPDES permit (Appendix 1A) and are summarized below.

5.2.4.1 Outfall 001: Reclaimed Water Discharge

The sampling point for the reclaimed water effluent is the exit from the chlorine contact chamber prior to entering the reclaimed water wet well. The City monitors the effluent according to the schedule in the NPDES permit, as described in Section 7.4.

5.2.4.2 Groundwater Recharge by Surface Percolation

The sampling points for groundwater monitoring are the six monitoring wells located at the infiltration area in Cochrane Park. The locations of the monitoring wells at Cochrane Park are included in Figure 5-2. The NPDES permit requires that a site-specific groundwater sampling plan be submitted to Ecology by August 1, 2012. The City currently performs quarterly sampling of the six monitoring wells at the

Cochrane Park RIB facility. Groundwater enforcement limits are summarized in Table 5-7. At Cochrane Park, these limits apply to downgradient monitoring wells MW2, MW3, and MW4.

Table 5-7. Groundwater Enforcement Limits

Primary drinking water criteria	Sample concentration
Arsenic	10 µg/L
Cadmium	5 µg/L
Chromium	100 µg/L
Mercury	2 µg/L
Nickel	100 µg/L
Nitrate as N	10 mg/L
Nitrite as N	1.0 mg/L
Fecal coliform bacteria	Non-detect [a]
Total trihalomethanes (TTHM)	80 µg/L
Other groundwater criteria	**Sample concentration**
Conductivity	700 umhos/cm
Copper	1,300 µg/L
Fluoride	2.0 mg/L
Lead	15 µg/L
Silver	100 µg/L
Sulfate	250 mg/L
Total dissolved solids	500 mg/L
Zinc	5,000 µg/L

a. *Two consecutive exceedances of an enforcement limit are required for the same parameter at the same well in order to constitute a violation.*

5.2.4.3 Influent to Cochrane Memorial Park RIBs

The sampling point for the influent to the RIBs at Cochrane Memorial Park is from control structure 4 in pond 3. The City monitors the influent to the RIBs according to groundwater enforcement limitations outlined in the City's NPDES permit.

5.2.5 Cross-Connection Control Plan

According to Ecology's *Criteria for Sewage Works Design*, Section E1-3.4.6, in order to receive regulatory approval for all reclaimed water projects and facilities, an approved CCC program is required (Department of Ecology, 2006). Cross-connection control is necessary where the potable water system connects to sites containing reclaimed water treatment facilities or use areas. CCC is implemented on the potable water system. The program manual is a standalone document that was developed in 2001 and updated in 2010. The City's CCC manual is provided in Appendix 7A.

5.2.6 Record-Keeping and Reporting

The City maintains records of reclaimed water use with historical potable water billing reports. Monitoring data and water quality analysis reports are maintained on file with the Wastewater Department, as described in Section 7 of this GSP.

5.3 Potential Impacts of Future Regulations

This section describes the potential impacts of future regulations on the reclaimed water system, including draft reclaimed water rules and the Thurston County Critical Areas Ordinance (CAO).

5.3.1 Draft Reclaimed Water Rules

In 2010, Ecology began drafting an update to the state's reclaimed water rules. Although the Draft Rules were originally scheduled for adoption by the end of 2010, the final revisions and adoption have been delayed until no earlier than June 30, 2013. If adopted in their current form, the Draft Rules would:

- Create an amended list of constituents and lower concentration thresholds than historically required by reclaimed water permits, including anti-degradation requirements (173-219-620 (5), WAC 173-219-620 (7)).
- Require increased investment in the evaluation of treatment system requirements for future reclaimed water projects.
- Establish that the point of compliance for percolation recharge projects is required to be within the groundwater system down-gradient of the recharge site, no farther than the property boundary (173-219-620 (6)). The point of compliance is the point at which the water quality criteria defined in the facility's reclaimed water permit must be met. In addition to the mechanical mixing (diffusion/dispersion) and dilution that occurs after discharge, many constituents with the potential to occur in reclaimed water also have the potential to be degraded within the vadose and saturated zones. Provided that sufficient space is present between the groundwater recharge location(s) and the point of compliance and that appropriate hydrogeologic conditions are present, natural degradation of constituents may be sufficient to achieve the new groundwater quality criteria. However, in order to provide that sufficient space, a large buffer may be required between the recharge site and the point of compliance.
- Require increased investment in the impairment evaluations, potentially including water quality evaluations (173-219-620 (8)). Pursuant to WAC 173-219-110 (2)(f) of the Draft Rule, the generator or water right permittee may change the mitigation water to another type of use if a replacement source of water is provided, the reclaimed water permit is modified, and a change to the mitigated water right is approved by Ecology. Based on these requirements, it is unclear if additional impairment evaluation would be required, or if in-stream flows generated from the mitigation effort would be required in perpetuity, even in the event that the water right is no longer needed or is modified such that the potential for surface water impacts is decreased.

  During periods of peak demand, reclaimed water generated by the City of Yelm is fully utilized. However, during off-peak periods, Class A reclaimed water is discharged to the Centralia Power Canal, which later discharges to the Nisqually River. If the City proposes to modify the conditions of its reclaimed water/NPDES permit, impairment evaluations may be required to assess the potential impacts to flows, levels, and water quality in downstream reaches of the Canal and the Nisqually River based on the cessation or modifications to the discharge. As a result of the Draft Rules, the impairment evaluation process is likely to increase in complexity, effort, and overall planning costs.
- Require that reclaimed water used to augment streamflows or surface waters shall meet the Class B standards established in (the) rule. Additionally, reclaimed water used for any streamflow or surface water augmentation project shall meet all applicable requirements of the Federal Water Pollution Control Act and Chapter 90.48 RCW and shall be issued a combined state and federal NPDES permit in accordance with the requirements of WAC 173-220 and WAC 173-219-700. Requiring reclaimed water discharged to surface water to meet Class A or Class B standards is inconsistent with existing regulation of NPDES permits. NPDES permits throughout the state allow wastewater discharges, which do not meet Class A or Class B reclaimed water standards, to discharge to surface water.

However, if the project is proposed for "streamflow augmentation," it is inconsistent to require any additional treatment or water quality constraints than would be imposed under the NPDES system.

The Draft Rules have the potential to impact many of the City's existing and identified uses for reclaimed water. Potential impacts include:

- **Implementation costs for groundwater monitoring:** Potential requirements to monitor for additional constituents and/or lower detection limits may result in increased analytical testing and personnel requirements. There are 171 constituents for which groundwater recharge projects may become subject to monitoring. By comparison, the City is currently required to monitor for 28 constituents at its existing RIB.
- **Potential to increase treatments costs:** An expanded list of constituents and lower concentration thresholds may result in additional required treatment or modifications to the City's treatment system. Additional treatment technology, such as reverse osmosis (RO) membranes, may be used to generate reclaimed water that meets the proposed point of compliance water quality criteria for groundwater recharge projects; however, RO treatment imposes a considerable cost.
- **Potential to increase the required area of land for infiltration sites:** The areas identified for the City's potential RIBs at the WRF or at the Public Works Facility are relatively compact (approximately 2.5 acres or less). This does not provide for a wide buffer between the RIB and the point of compliance, which must be within the property boundary. In order to increase this buffer, the City would need to acquire additional land, which would increase the project cost considerably.
- **Increased budget and timeline for planning and engineering studies:** To provide evidence that proposed projects do not impact the environment (anti-degradation, water quality, etc.) or other water rights, costs for planning and engineering studies may increase significantly. Increased studies and agency review time required by the Draft Rule would likely result in:
  - Additional groundwater impairment analysis and fate and transport modeling, potentially doubling planning costs
  - Additional permitting time and time to negotiate approval with Health/Ecology, with the potential to increase from one year to many years

5.3.2 Thurston County Critical Areas Ordinance

Thurston County is in the process of updating its CAO with provisions that may affect reclaimed water use in the county. In the draft form published for a public hearing on June 23, 2011, the updates to the Critical Aquifer Recharge Areas (CARA) prevent groundwater infiltration of reclaimed water in any area identified as a CARA. Irrigation with Class A reclaimed water at agronomic rates is permitted in all CARAs. The CAO is not yet finalized.

While the City implements its own CAO that supersedes the County's ordinance, the County's ordinances would still impact future uses of City reclaimed water that might be planned in the UGA. The County anticipates adoption of a revised CAO by the end of 2012.

5.4 Water Rights Mitigation

The City's reuse strategy is tied to its water rights in several key ways. In 2011, the City purchased a water right that is contingent on the continued recharge of Cochrane Park. This water right allows a maximum annual withdrawal of 67 ac-ft at the City's downtown wells (Water Right G2-21613).

The City has also applied for an additional potential 942 ac-ft of water to be used at a proposed well in southwest Yelm (Application G2-29085). Mitigation for the new water right will be completed in a joint partnership between the Cities of Olympia, Lacey, and Yelm. Yelm's proposed mitigation measures, described in the 2011 City of Yelm Water Right Mitigation Plan (Golder Associates), include:

- Habitat restoration at Yelm Creek to mitigate potential impacts to the Nisqually River and Yelm Creek. Possible projects include:
  - Restore creek channel between 103rd Avenue and First Street, with meanders and in-stream habitat features
  - Create a continuous vegetated buffer along the creek
  - Install stream gauge on Yelm Creek (per Watershed Plan)
  - Remove riprap weirs at pipeline crossing
- Continuation of recharge at Cochrane Park RIBs. According to the Mitigation Plan, the City committed to recharge 112 ac-ft/yr at the facility, with a uniform year-round rate (equivalent to approximately 100,000 gpd). In order to achieve this infiltration rate, the existing RIBs will need to be expanded. Section 5.8 describes improvements necessary to expand the RIBs.
- Out-of-kind (financial) participation in the Cities of Lacey and Olympia's land acquisition for riparian preservation at Woodland Creek Basin.
- Joint participation (with Lacey and Olympia) in property and water right acquisition and habitat restoration in the Deschutes River basin.

The City is committed to providing reclaimed water for the applicable projects identified in the Mitigation Plan.

5.5 Policies and User Agreements

YMC Chapter 13.24 (see Appendix 1B) defines regulations related to reclaimed water service for the City of Yelm. Chapter 90.46 RCW defines state regulations for reclaimed water use. All uses in Yelm will be consistent with the YMC and the RCW.

5.5.1 General Policies

City policy is to reclaim 100 percent of the wastewater generated by the City. Reclaimed water shall be used for the preservation of public health, safety and welfare, and the protection of the environment wherever its use is consistent with local and state regulations, is economically justified, and is financially and technically feasible.

It is also the City's policy that the highest and best use for reclaimed water is as a resource for the mitigation of impacts to groundwater and surface waters related to water withdrawals from wells and to reduce potable water demands. In this context, "highest and best use" means the use that is legally allowable, physically possible, financially feasible, and maximally productive.

5.5.2 Reclaimed Water Service Area

The City of Yelm reclaimed water service area is defined as the city limits. The reclaimed water service area is a boundary within which reclaimed water can be used or may be used in the future in lieu of potable water for non-consumptive purposes, including reuse areas and groundwater recharge basins.

5.5.3 Design and Performance Standards

All new development to be connected to the reclaimed water system shall be required to meet the City's design and construction standards as set forth in the City's Development Guidelines, Health/Ecology standards, and as adopted by the YMC. Additional information on the design and construction standards for the reclaimed water system is included in Section 8 of this GSP.

5.5.4 Reclaimed Water Charges

Section 10 provides a financial analysis and detailed evaluation of the rate structure for reclaimed water.

5.5.5 Service and User Agreements

The following are policies related to service and user agreements:

- **Application for reclaimed water service:** The City has a standard application for reclaimed water service. This application is included as Appendix 5B. Reclaimed water service will be provided on a case-by-case basis.
- **User Agreement form:** The City has a standard User Agreement form (included as Appendix 5A). All Users must complete this form prior to receiving reclaimed water service. Use shall not exceed the maximum annual amount, instantaneous demand, or permitted period of use specified in the User Agreement. The end use shall be in accordance with the type of use and location specified in the User Agreement. These agreements are updated every 5 years.
- **Tanker trucks:** Tanker trucks are permitted to fill at the reclaimed water hydrant in front of the Public Works Department. Prior to filling, truck drivers must complete an Application for Reclaimed Water Service and attend an orientation class.
- **Prioritization of users:** Reclaimed water is a valuable resource. During the peak irrigation season, demand often approaches the amount of reclaimed water that is available. During periods of peak demands or limited availability, the City reserves the right to prioritize distribution of reclaimed water. Priority will be given as follows:
  - Priority 1: Cochrane Park RIBs or other sites that utilize reclaimed water for water rights mitigation purposes. Also, public use facilities that require reclaimed water to maintain functionality, such as Longmire Park.
  - Priority 2: Use sites that utilize reclaimed water when operating a commercial business.
  - Priority 3: Use sites that utilize reclaimed water for landscaping or other aesthetic purposes.
  - Priority 4: Tanker trucks that use reclaimed water for dust mitigation at construction sites or for other purposes.
- **Reclaimed water availability:** The availability of reclaimed water can vary throughout the year, depending on WRF performance and demand. The stage of reclaimed water availability is established by the Public Works Director and City Management. Reclaimed water availability can be characterized as follows:
  - Stage 1: Reclaimed water supply exceeds maximum demands. During Stage 1 availability, reclaimed water is available every day. The annual quantity in the User Agreement still applies.
  - Stage 2: Reclaimed water is available every other day. This is the typical schedule for summer irrigation months.
  - Stage 3: Reclaimed water is available every third day.
  - Stage 4: Reclaimed water service is suspended.

5.5.6 Interruption of Service

The City does not guarantee an uninterrupted supply of reclaimed water. The City reserves the right to shut off reclaimed water supply at any time for the purpose of making repairs, completing line extensions, or when reclaimed water is not being produced at the WRF. The City will not be responsible for damage resulting from an interruption of reclaimed water service. When reclaimed water is not being produced at the WRF, City staff will notify reclaimed water users in writing that service has been

interrupted. City staff will also notify customers prior to re-initiating reclaimed water service. Sample notification forms are included as Appendix 5C.

5.5.7 Thurston Highlands MPC

Reclaimed water policies for the Thurston Highlands MPC are included in Section 6.

5.6 Business Case Evaluation of Reclaimed Water Alternatives

As summarized in previous sections of this GSP, the BCE is a seven-step decision-making process that is used to ensure that the best alternative solution is selected. This process includes the following activities:

1. Appoint an expert team
2. Define the problem and set the level of service
3. Collect data on the current situation
4. Identify alternatives based on level of service
5. Screen alternatives and eliminate those that do not meet the required level of service
6. Develop cost information for viable alternatives
7. Compare viable alternatives based on the NPV

For the reclaimed water system, a BCE was performed to prioritize future uses of reclaimed water. The BCE process for the reclaimed water system is described in the following sections.

5.6.1 Problem Statement and Level of Service Goal

The Yelm City Council adopted goals related to reclaimed water production at the initiation of the reclaimed water program. These goals are as follows:

1. Protect and conserve the City of Yelm's water supply and comply with state water quality regulations by reclaiming 100 percent of Yelm's wastewater.
2. Use advanced treatment technology to produce the highest-quality reclaimed water for maximum potential use.
3. Foster public acceptance of incorporating reclaimed water into the community's overall water usage patterns.
4. Promote a sense of community pride in using pioneering methods of water reuse to conserve and extend a precious natural resource.

Additionally, the overall problem statement identified for the BCE was identified as follows:

> What future use of reclaimed water will provide the most benefit to the City and its water/sewer utility customers while meeting City goals for reuse?

A panel that included City management, wastewater utility staff, and the City's engineering consultant evaluated alternatives to address the problem, as described in the following sections.

5.6.2 Identify and Analyze Alternatives

The City has executed service agreements with all current users. The User Agreements allow for discontinuation of reclaimed water service at the City's discretion; however, for planning purposes, it is assumed that the City will continue to provide these users with reclaimed water in the future. It is also assumed that the City will provide reclaimed water for mitigation projects outlined in the 2011 Water Right Mitigation Plan.

The following alternatives were identified in the BCE:

- **Alternative 1: Do nothing.** This alternative assumes that the demand from existing users and identified mitigation requirements will be met in the future, but that no additional uses for reclaimed water are identified. In order to meet the goals adopted in the BCE, this alternative assumes that 100 percent of the WRF effluent is treated to Class A reclaimed water standards in the future, regardless of the discharge location.
- **Alternative 2: Expand Cochrane Park RIBs.** The RIBs at Cochrane Park were designed to receive a maximum flow of 50,000 gpd. However, preliminary analysis completed by Skillings Connolly in 2004 indicates that the RIB facilities have additional capacity beyond the current load of 50,000 gpd. This analysis indicates that the RIBs may have the potential capacity to handle up to 200,000 to 250,000 gpd. In order to increase the flow to the RIBs, the constructed treatment wetlands would need to be bypassed.
- **Alternative 3: Construct additional RIBs.** The following three alternatives exist for constructing new RIBs:
  - Public Works RIBs: Construct two RIBs at the City Public Works Facility. The City has existing unused land and reclaimed water service at this location. Total area available for an RIB is approximately 2.40 acres, and capacity is estimated at approximately 100,000 to 200,000 gpd.
  - WRF RIBs: Construct RIBs at the City Water Reclamation Facility. Previous studies estimated that this site has an infiltration capacity of 100,000 to 200,000 gpd. Similar to the Public Works RIBs, the City would use existing City-owned vacant land. Total area available for an RIB is approximately 2.5 acres.
  - Thurston Highlands RIB: Once development of the Thurston Highlands MPC occurs, an RIB within the MPC area could be constructed. The option for constructing an RIB in the Highlands is considered in Section 6 of the GSP, which evaluates treatment and disposal methods for sewer flow from the MPC. This option is therefore not evaluated in this BCE.

  Because RIBs constructed at the Public Works Facility or the WRF would be similar, these are evaluated as one alternative in the BCE. As described in Section 9, the City will be completing a Facilities Plan in 2013 to plan for expansion of the WRF. Once expansion alternatives and a future site plan have been selected for the WRF, remaining available land should be evaluated to determine whether an additional RIB would be beneficial at this site. Additionally, more detailed soil testing and hydrogeologic testing should be performed at each site to determine the best location for the new RIBs.
- **Alternative 4: Connect future users.** Future users that have been identified would primarily use reclaimed water for irrigation purposes. These users include:
  - Future parks
  - Tahoma Valley Golf and Country Club Golf Course
  - Future streetscapes
  - Future schools

  Previous studies identified the CalPortland (formerly Glacier Northwest Concrete Company) as a potential future user; however, this company is no longer in business and is not considered to be a potential user at this time.
- **Alternative 5: Yelm Creek streamflow augmentation.** Yelm Creek is a tributary stream to the Nisqually River. The City of Yelm 2011 Water Right Mitigation Plan lists several voluntary out-of-kind (financial) mitigation actions to address potential impacts to the Nisqually River. Potential projects listed in the Mitigation Plan include:

  - Restore creek channel between 103rd Avenue and First Street, with meanders and in-stream habitat features
  - Create a contiguous buffer along the creek
  - Install a stream gauge on Yelm Creek (per Watershed Plan)
  - Remove riprap weirs at pipeline crossing

  In addition to the projects specifically identified in the Mitigation Plan, the Draft Reclaimed Water Plan also proposed streamflow augmentation at Yelm Creek as a potential use for reclaimed water. The project would include a constructed treatment wetland and advanced treatment with sand filtration embedded in stream-bank infiltration. The augmentation site would be located adjacent to Yelm Creek, between First Street and the City of Yelm Trailhead, and would enhance low flows in the Creek during certain times of the year.
- **Alternative 6: Tanker truck filling station.** Currently, tanker trucks are filled from a hydrant across the street from the Public Works Department. The City controls use from other fill locations through the use of hydrant locks. Construction of a tanker truck filling station at the WRF near the reclaimed water storage tank could allow gravity flow from the tank to the filling station and would eliminate the need to use the reclaimed water pump station. This could result in energy savings and would also free up capacity for the reclaimed water pump station, which is currently the limiting factor in distribution during peak demand periods. This potential project was determined to not contain substantial benefits and was therefore removed from detailed evaluation.

5.6.2.1 Capital Costs

The BCE includes planning-level capital costs for each alternative, which are summarized below:

- **Alternative 1: Do nothing.** There are no capital costs for Alternative 1. Necessary plant improvements to maintain reliable reclaimed water production are considered separately in Section 4.
- **Alternative 2: Expand Cochrane Park RIBs.** The limiting factor at Cochrane Park is flow through the wetlands. Currently, the configuration is set up such that flow can bypass the fish pond, wetland cell 2, and wetland cell 3. Based on reported past performance, this BCE assumes that flow to Cochrane Park can be increased to approximately 0.25 mgd with only minor piping modifications by utilizing the bypass piping. This alternative would involve bypassing the wetlands and trout pond and placing the underground RIB into service. Bypassing the wetlands would reduce the solids concentrations in the reclaimed water and reduce concerns of the underground RIB clogging. Prior to placing the underground RIB in service, the subsurface piping should be inspected for obstructions. This BCE assumes that the underground RIB would require minimal repair before it is placed back into service. Total estimated project cost is approximately $661,000. This includes project markups and contingency costs.
- **Alternative 3: Construct additional RIBs.** The total estimated project cost for construction of a new RIB at the Yelm Public Works or WRF facility is approximately $1.7 million. This includes a cost to perform site investigation, groundwater modeling, pilot testing, and basin construction. Project markups and contingency costs are also included. Acquisition of additional land to include potential buffer requirements described in Section 5.3.1 is not included.
- **Alternative 4: Connect future users.** The total estimated project cost for connecting new users is estimated to be approximately $82,000 per large demand user, assuming that the user is within approximately 300 feet of the City's reclaimed water distribution system. Line extensions to serve developments or commercial customers would be funded by the customer. The BCE assumes that, if this were the selected alternative, all future users would be connected as soon as additional reclaimed water is available. Based on reclaimed water projections, total estimated future

connections are shown in Table 5-8. Projections assume that new users would use approximately 4,000 gpd, similar to other large users in the existing system.

Table 5-8. Estimated Future Reclaimed Water Connections Added to System

Year	Number of new users connected to reclaimed water
2015	4
2020	7
2030	13

Project markups and contingency costs are included in this estimate. Potential future users include the Tahoma Valley Golf Course, future schools, and landscape irrigation for commercial properties or residential developments. The BCE does not identify specific users to be connected at certain times, but rather assumes that, in general, users would be connected as reclaimed water becomes available.

- **Alternative 5: Yelm Creek streamflow augmentation.** The estimate for the Yelm Creek streamflow augmentation project was based on the project base cost reported in the Draft Reclaimed Water Plan and then modified to include additional piping, project markups, and contingency costs. Total estimated project cost is approximately $465,000. This does not include additional restoration projects mentioned in the Water Right Mitigation Plan that would not make use of reclaimed water, such as creek channel restoration.

5.6.2.2 Annual O&M Costs

Annual running costs, including annual O&M costs, are summarized for each alternative below. The BCE includes only differential costs in the evaluation.

- **Alternative 1: Do nothing.** The City of Yelm currently pays an annual fee to the City of Centralia to discharge to the Power Canal. The fee is based on the number of connections to the sewer system. Under this alternative, the number of connections to the sewer system would increase annually, which would lead to an increased service cost.
- **Alternative 2: Expand Cochrane Park RIBs.** The expansion of the Cochrane Park RIBs will require additional sampling and maintenance associated with placing the underground RIB into service. In addition, increasing the flow to the existing RIBs will likely increase the frequency for cleaning.
- **Alternative 3: Construct additional RIBs.** Maintenance requirements for additional RIBs are assumed to be similar to the requirements for the existing Cochrane Park facility and consist mainly of sampling and occasional basin cleaning.
- **Alternative 4: Connect future users.** Additional maintenance requirements for future users would include additional water meters to read, and increased administrative time for bill and payment processing and User Agreement negotiation. Because connecting additional irrigation users would perpetuate the cycle of seasonal demands and would not reduce or eliminate discharge to the Power Canal in the winter, the BCE includes a cost to discharge to the Power Canal for 9 months of the year, it is assumed that irrigation use would be substantial enough to eliminate discharge during the summer months.
- **Alternative 5: Yelm Creek streamflow augmentation.** Maintenance for the Yelm Creek streamflow site would be similar to that for an RIB, and would include valve and meter maintenance, and additional sampling costs. Additionally, in order to maintain streamflows, Yelm Creek would require more reclaimed water in the summer than in the winter. It is unlikely that Yelm Creek could receive

enough water to eliminate discharge into the Power Canal in the future; therefore, the fee to maintain discharge into the Power Canal is included in the annual cost.

5.6.2.3 Repair and Replacements Costs

None of the identified alternatives include significant R/R costs within the planning horizon.

5.6.2.4 Risk and Benefit Costs

The risk and benefits for each alternative are summarized in the following sections.

- **Alternative 1: Do nothing.** No differential risk and benefit costs are included in Alternative 1.
- **Alternative 2: Expand Cochrane Park RIBs.** Expanding the Cochrane Park RIBs would provide additional year-round demands with a flexible use pattern. Additionally, increasing the groundwater infiltration rate could provide the opportunity for future water rights mitigation. In order to assign a monetary value to the potential mitigation credit, the BCE considers the cost per acre-foot of local water right transactions and assumes that groundwater recharge could provide a 50 percent offset for a one-time water rights transaction in 2025.

  The risk associated with the Cochrane Park RIBs is that after additional study has been completed, the site could be determined to not have additional recharge capacity. The BCE assigns a 10 percent chance that the site is not feasible.
- **Alternative 3: Construct additional RIBs.** The risks and benefits for construction of additional RIBs are similar to those for the expansion of Cochrane Park. The BCE assumes that there is the potential for more infiltration capacity at a new, larger RIB, which increases the potential water rights offset. The risk that the sites could be determined to be unsuitable is higher for Alternative 3 than Alternative 2; the BCE assigns a 15 percent chance that the site is not feasible.
- **Alternative 4: Connect future users.** Connecting future users will provide additional revenue from reclaimed water sales. Additionally, switching large users from potable water to reclaimed water will allow additional connections in the potable water system, extending the life of the water right and increasing potable water revenue.

  Demand from the identified future users would be seasonal. The City currently employs a reclaimed water conservation program during peak months; connecting future irrigation users would require the continuation of the conservation program. Connecting additional irrigation users to the system could reduce the amount of water available to irrigate sites where the City has invested in landscaping and recreational facilities, such as Longmire Park. This risk could be mitigated be prioritizing users; therefore, the BCE assigns a low risk of 2 percent for landscaping loss at Longmire Park.
- **Alternative 5: Yelm Creek streamflow augmentation.** The City's Mitigation Plan identifies several mitigation projects at Yelm Creek, but does not commit the City to providing reclaimed water for streamflow augmentation. Under the Draft Reclaimed Water Rule updates, there is the risk that the augmented streamflow must be maintained as a new baseline flow in perpetuity. Interruption in flow could result in interruption of water rights. Additionally, a commitment to provide flow to Yelm Creek could result in less water availability for other sites, such as Longmire Park. This creates a risk of damage to the landscaping and ball fields at that site. The BCE assigns a 5 percent risk that landscaping at Longmire Park is lost.

5.6.2.5 BCE Results

BCE results are summarized in Table 5-9.

Table 5-9. Summary of BCE Results for Reclaimed Water Alternatives					
BCE input	Alternative 1: Do nothing	Alternative 2: Expand Cochrane Park RIB	Alternative 3: Construct new RIBs	Alternative 4: Connect future users	Alternative 5: Yelm Creek streamflow augmentation
Capital costs	No capital costs	Complete piping modifications to bypass wetlands, place underground RIB into service, basin refurbishment, and groundwater modeling	Complete additional site investigation, groundwater modeling, and construct new RIBs	Expand collection system and connect future users; assumes minimal line extensions necessary	Construct augmentation site at Yelm Creek
	Total capital cost: $0	Total capital cost: $66,,000k	Total capital cost: $1.7M	Total capital cost: $1.98M	Total capital cost: $465,000k
Annual running/O&M costs	Cost to increase discharge to Centralia Power Canal	Additional sampling; more frequent maintenance on the RIBs	Sampling and basin maintenance	Maintenance of new meters and piping; administrative and billing tasks; increased discharge to Power Canal during non-irrigating months	Sampling and site maintenance; increased discharge to the Power Canal
Risks	None identified	Additional studies may determine site is not suitable	Additional studies may determine site is not suitable	Risk of loss of landscaping at facilities if reclaimed water service is interrupted	Under new Reclaimed Water rules, risk of loss or interruption of water right if streamflows are not maintained; landscaping loss at Longmire Park
Benefits	No benefits	Mitigation credit for future water right applications	Mitigation credit timed with future water right application	Future revenue; extend life of water rights	No benefits
Net present value	**(-$928k)**	**(- $507k)**	**(-1.6M)**	**(-1.2M)**	**(-2.8M)**
Benefit over status quo:	**$0**	**$421k**	**-$638k**	**-$269k**	**-$1.8M**

5.7 Selected Reclaimed Water Alternatives

Based on the results of the BCE, the reclaimed water alternative with the most favorable NPV is the expansion of the Cochrane Park RIBs. The alternative with the second-highest NPV is the connection of future users. Connection of new users will be evaluated on a case-by-case basis depending on the availability of reclaimed water after the Cochrane Park facility is expanded.

5.8 Necessary System Improvements

This section describes necessary system improvements to support existing operation or to support future growth of the system.

5.8.1 Reclaimed Water Pump Station

As stated in Section 5.1.3.1, the reclaimed water pump station is equipped with four pumps: two higher-capacity “supply” pumps and two lower-capacity “maintenance” pumps. During periods of low demand,

the maintenance pumps operate at a single speed to supply water to the system. During periods of higher demand, a VFD is used to control the speed of the supply pumps to meet system demand. Use of reclaimed water is regulated through User Agreements, which specify times and days that a user is permitted to use reclaimed water. Irrigation use is permitted only between 7:00 p.m. and 7:00 a.m. Other uses, such as use by the school bus garage, WRF, and tanker trucks are permitted throughout the day. This equalizes pumping requirements and, to the extent possible, minimizes demand on the pump station.

The pump station is able to meet the demand for the existing system, provided that the use schedule outlined in User Agreements is followed. However, during peak demand months, the pump station must operate near its design capacity. Expansion of the Cochrane Park RIBs would add minimal demands on the pump station, because the RIBs have flexible use patterns and can be timed to receive flow when other demands on the system are lower. Connecting additional irrigation users would likely require additional capacity to be added to the pump station. The addition of another large-capacity pump to the existing pump station would allow the City to meet peak hour demands as irrigation use increases in the future and increase reliability and redundancy in the system. Timing for the upgrades to the reclaimed water pump station will depend on the number and type of additional users that are connected to the system in the future.

5.8.2 Second Reclaimed Water Storage Tank

Ecology design criteria recommend that reclaimed water systems maintain a storage volume equivalent to 1.5—2.0 times the average daily flow in the summer months. Based on records from 2008 through 2010, the average summer day demand in Yelm was approximately 213,000 gpd, which equates to a recommended storage capacity of approximately 320,000 to 426,000 gallons. With an existing storage capacity of 500,000 gallons, the system has adequate storage capacity to meet current demands. Based on the results of the BCE in Section 5.6, the City will prioritize the expansion of Cochrane Park RIBs over addition of new users. This will mitigate the need for additional storage in the system, because Cochrane Park represents a flexible demand that could easily handle interruption of flows during peak demand periods. Timing for the construction of an additional reclaimed water storage tank will depend on the number of new users connected to the system. If the City completes the expansion of the Cochrane Park RIBs and adds a large additional irrigation user approximately every 2 years, a second storage tank would be required in approximately 2021.

5.9 Recommended Improvements

The City is committed to producing Class A reclaimed water for beneficial reuse. The expansion of the Cochrane Park RIBs is included in the CIP described in Section 9.

As summarized in Section 4, the WRF has had difficulty reliably producing reclaimed water since late 2010. The City will begin facilities planning efforts in late 2012 to identify alternatives to increase the reliability of the WRF and resume production of reclaimed water. The Facilities Plan will also reevaluate level-of-service goals for the reclaimed water utility. Until this reevaluation is complete, the City has elected to not include construction of new reclaimed water infrastructure beyond the expansion of the Cochrane Park RIBs in its CIP. Once the Facilities Plan is complete, the City will revise the CIP to include the selected reclaimed water alternatives according to the reclaimed water production forecast and the level-of-service goals established in the Plan.

O&M improvements necessary to maintain the existing reclaimed water infrastructure are described in Section 5.2.3.7. These include:

- Install radio read meter at Cochrane Park RIBs (completed in 2012)
- Complete schedule of maintenance activities at Cochrane Park

- Replace damaged reclaimed water valves in the distribution system and install new valve at the WRF
- Inspect the reclaimed water storage tank

Timing and cost of the recommended O&M improvements are described in the CIP in Section 9.

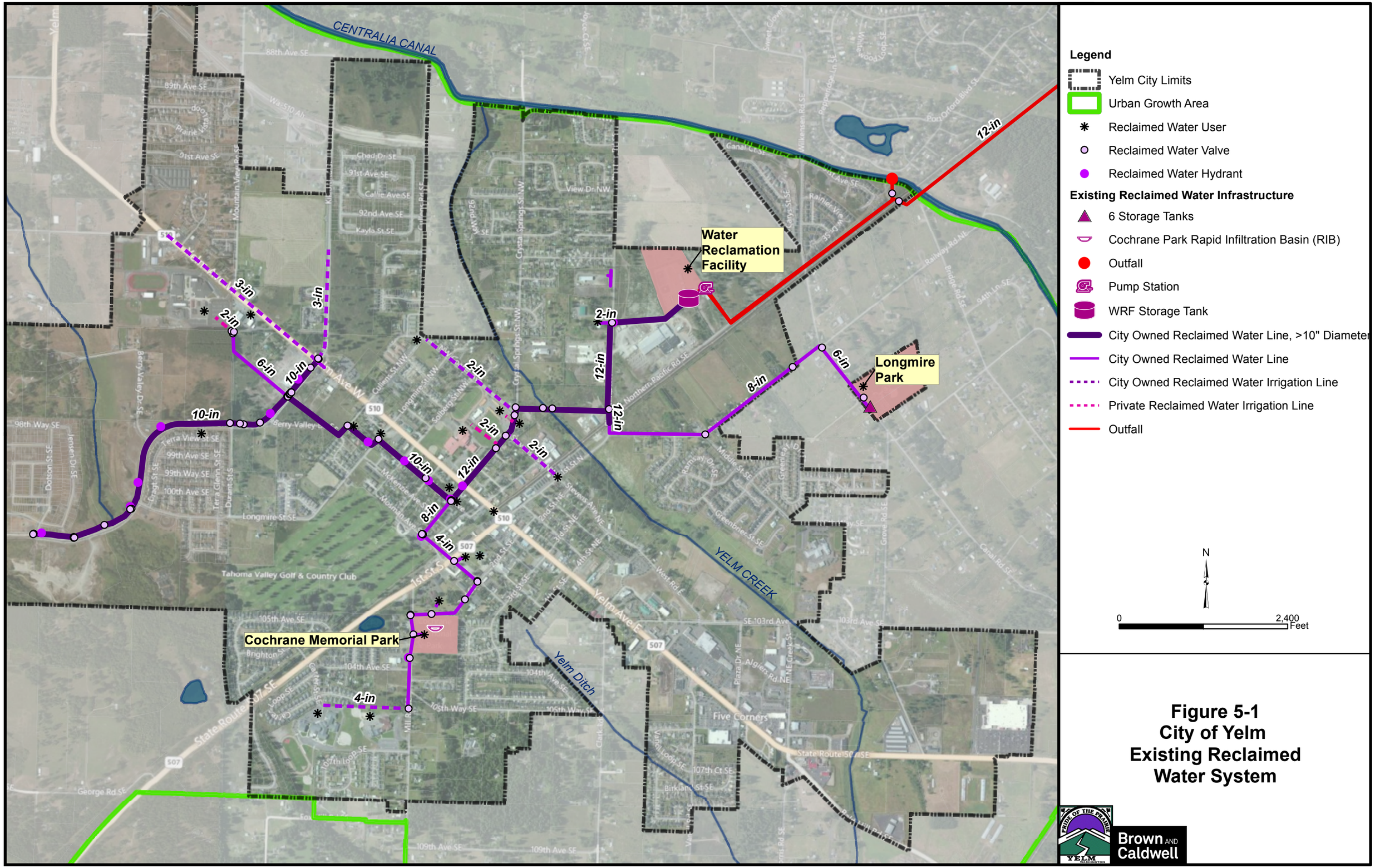

Figure 5-1
City of Yelm
Existing Reclaimed Water System

Brown AND Caldwell

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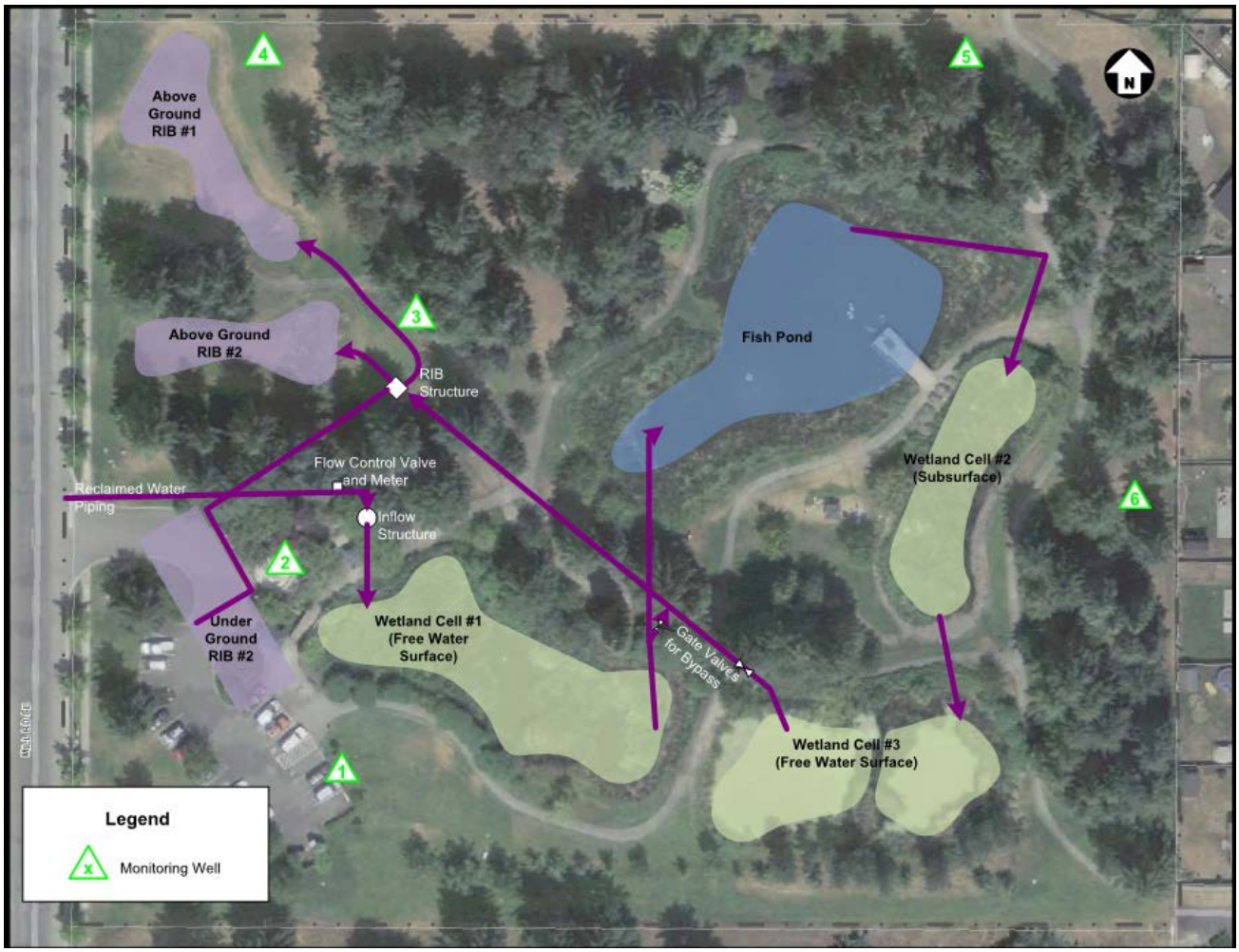

Figure 5-2. Cochrane Park site map

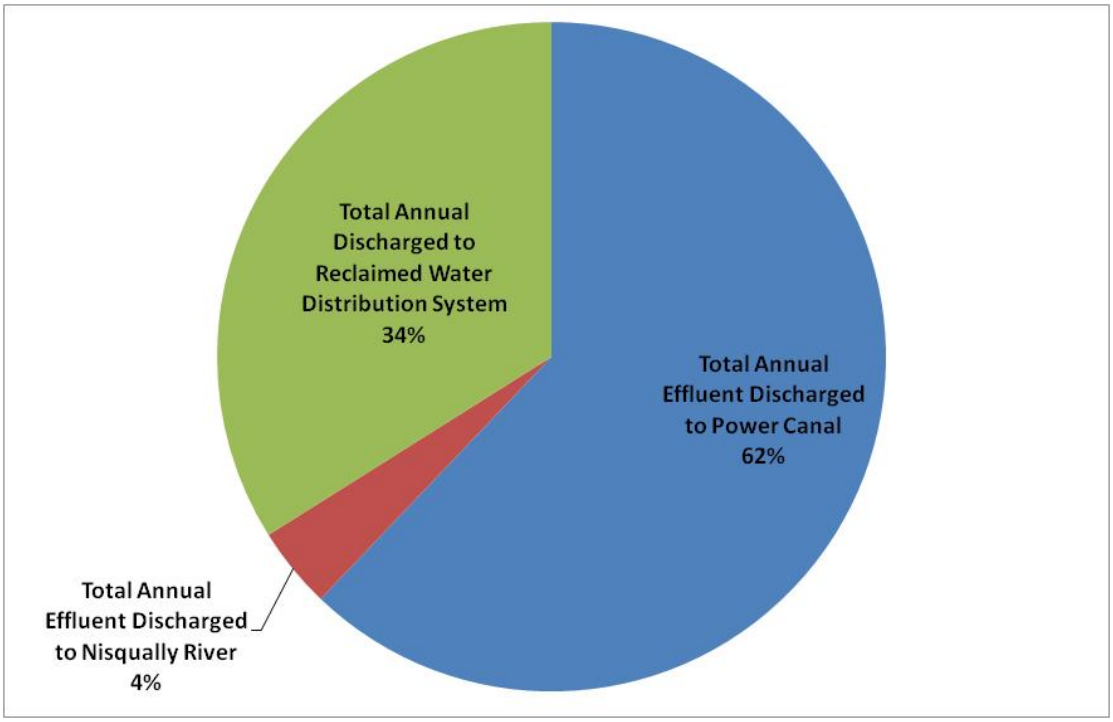

Figure 5-3. WRF effluent average distribution, 2008–10

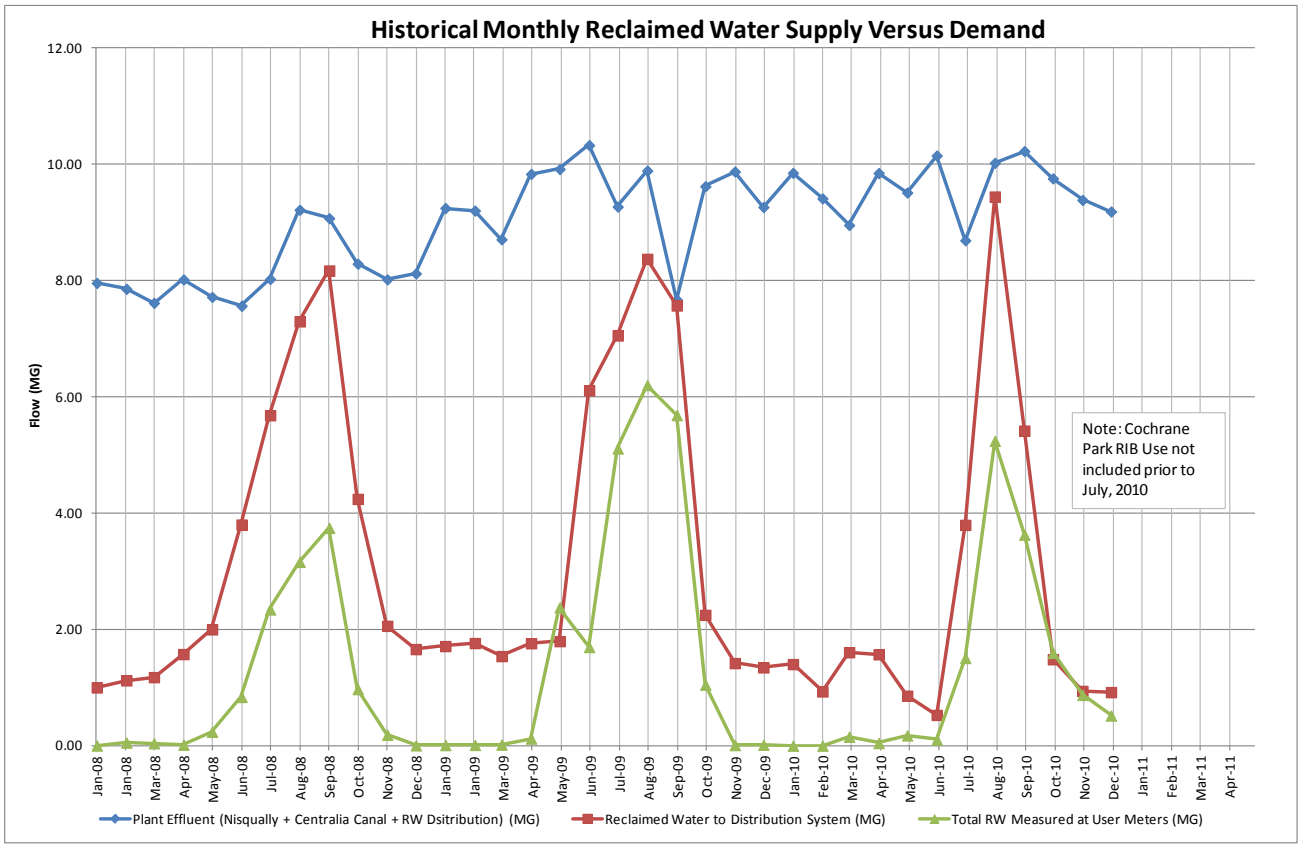

Figure 5-4. Reclaimed water supply vs. demand

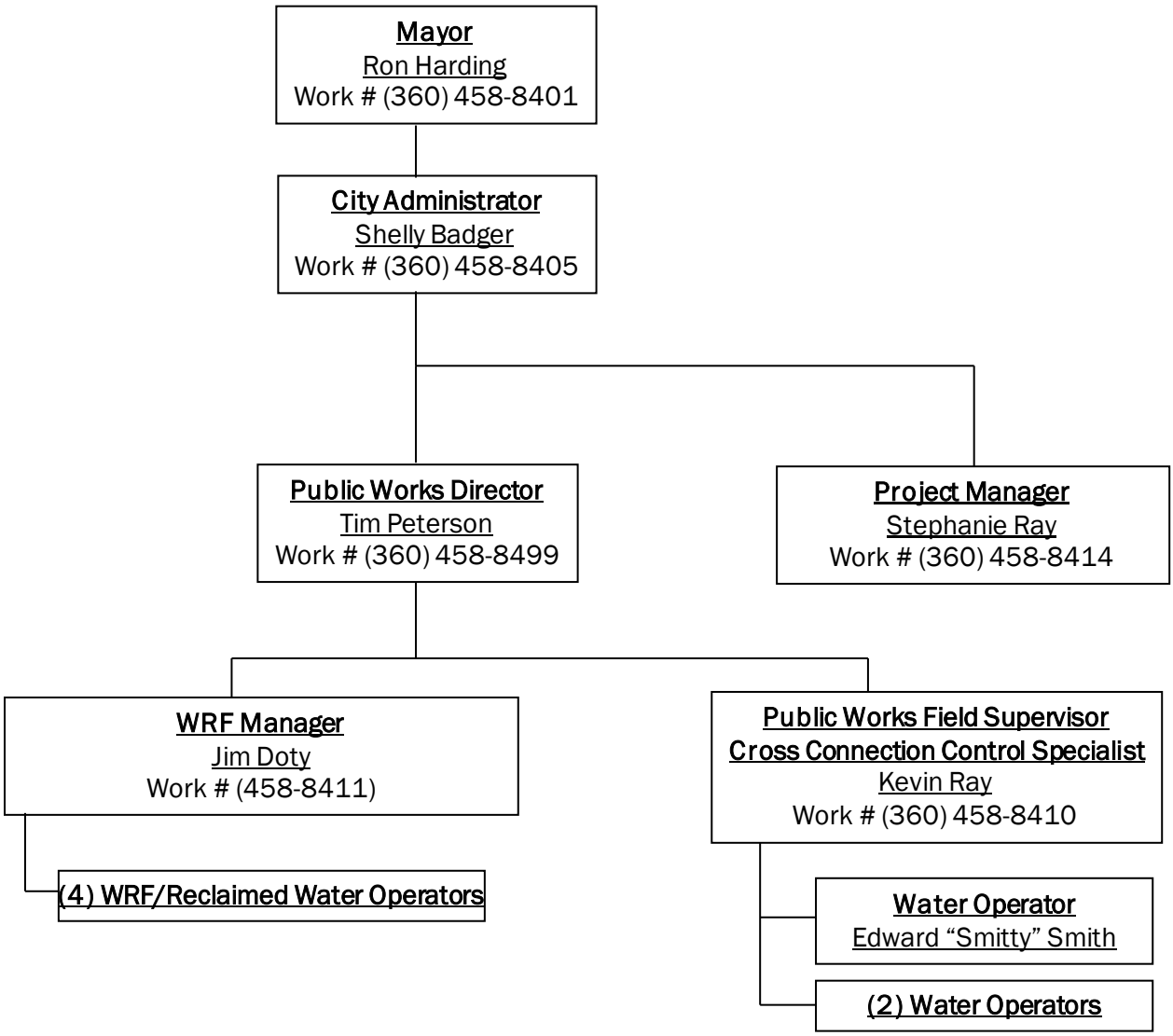

Figure 5-5. Reclaimed water system management and personnel

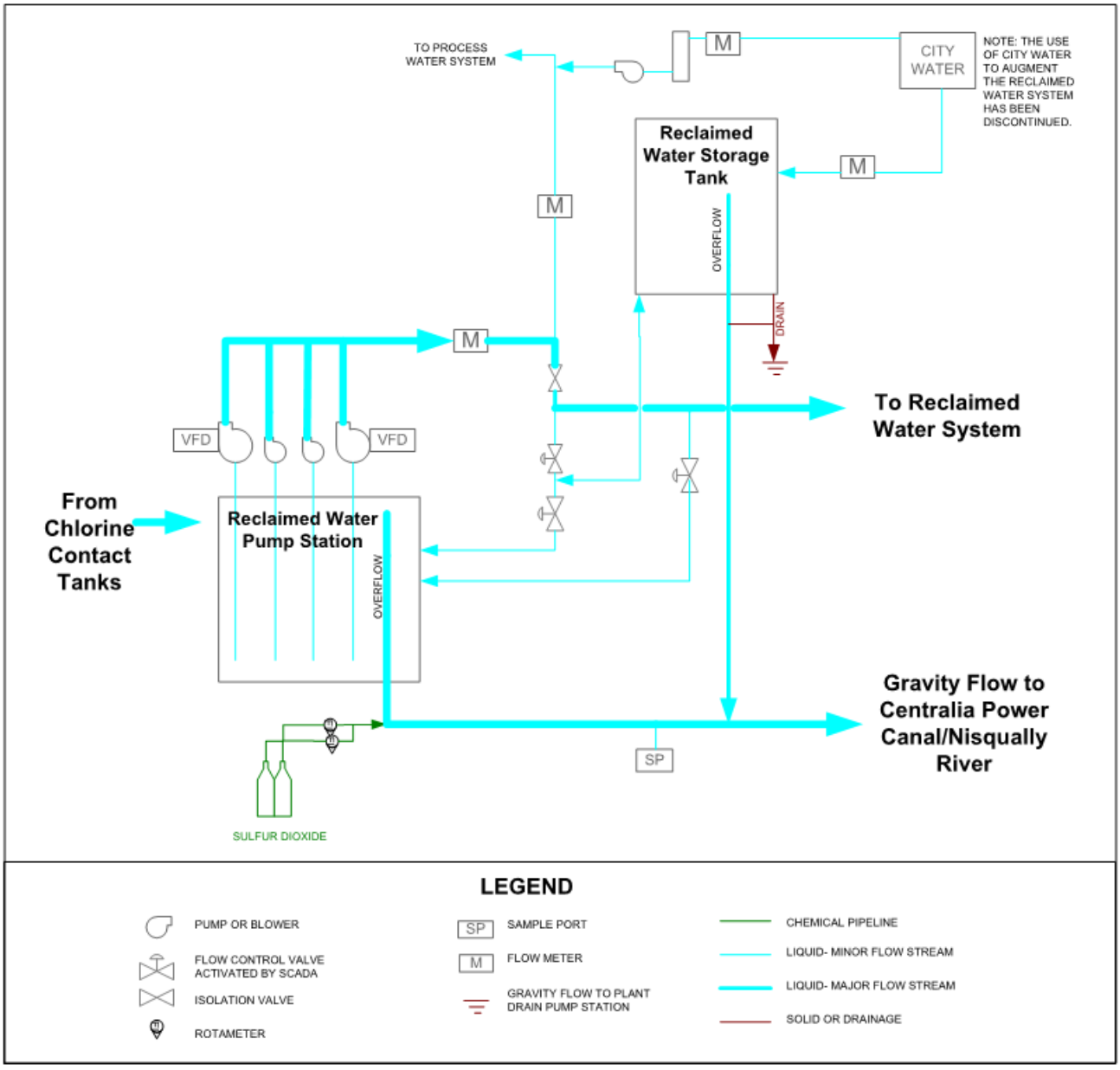

Figure 5-6. Reclaimed water process schematic

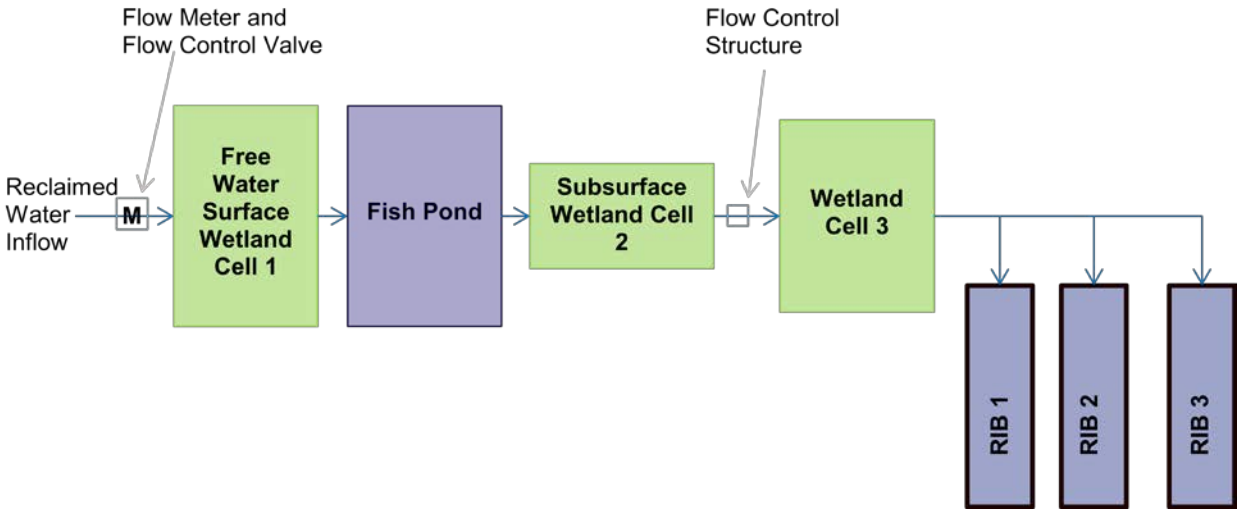

Figure 5-7. Cochrane Park RIB schematic