9.1 INTRODUCTION

This chapter presents the recommended plan developed in detail in Chapter 3, 4, 5, 6 and 7. A wide range of alternatives were considered for meeting Spokane County's wastewater management requirements in the *December 2002 Wastewater Facilities Plan* and the *February 2003 Wastewater Facilities Plan Amendment.* Chapter 3 summarizes the alternatives evaluation process used and identifies the facilities conclusions previously reached in planning. Much of the past facilities planning alternatives analysis and previous conclusions remain valid and are components of Spokane County's wastewater management program. Some revisions are needed to meet the requirements of the Washington Department of Ecology's Dissolved Oxygen Total Maximum Daily Load (TMDL) and the June 30, 2006 *Foundational Concepts for the Spokane River TMDL Managed Implementation Plan.* A detailed discussion of the revised wastewater treatment process and the biosolids management plan are presented in Chapters 6 and 7.

The plan provides a flexible, long-term management strategy for Spokane County, while identifying a phased implementation program to meet capacity and treatment requirements into the future.

The plan encompasses the following components:

- Controlling wastewater generation through use the use of a water conservation program.
- Maximizing use of the County's prior investment in the City of Spokane's Riverside Park Water Reclamation Facility (RPWRF).
- Building the new Spokane County Regional Water Reclamation Facility (SCRWRF) to serve growth and continued implementation of the septic tank elimination program.
- Producing highly-treated effluent meeting Class A reclaimed water standards and suitable for discharge to the Spokane River in accordance with the *Foundational Concepts for the Spokane River TMDL Managed Implementation Plan*.
- Preparing a detailed Reclaimed Water Use Plan that will identify reuse customers, sites, water demands, and distribution system infrastructure required for potential implementation. Pursue effluent reuse opportunities that are affordable and which will augment the region's water resources.
- Beneficially reusing all biosolids produced at the Spokane County Regional Water Reclamation Facility.

9.2 WATER CONSERVATION

Water conservation programs attempt to reduce wastewater flows or loadings in the service area, thus reducing the required capacity of treatment and conveyance facilities. The County already has a number of important water conservation measures in place including a regional ban on phosphorus-containing detergents, an industrial pretreatment program, and a

requirement that all new construction or major remodels use "low volume" plumbing fixtures. Also, the County is fortunate to have a relatively new collection system that receives low quantities of infiltration and inflow during rainfall events. In fact, Spokane County's peak flows during rainfalls are much lower than those experienced by most Northwest wastewater utilities.

The *Foundational Concepts for the Spokane River TMDL Managed Implementation Plan* calls for a water conservation program similar to that of the LOTT Alliance and the activities in the following sections are recommended.

Public Education. The County should participate in a coalition of regional wastewater utilities and water purveyors to jointly develop and implement a public education program focused on water conservation. The objective would be to instill a conservation ethic among the customers. Communication approaches could include newsletters, radio and television announcements, press releases and school education programs. A long-term, continuous program is necessary to avoid reversion to pre-conservation habits.

Physical Devices. The County should consider implementing a plumbing fixture replacement program for older existing homes and businesses not scheduled for replacement or remodels. Specific elements of the program must be determined based on the level of investment that the County would be willing to make. These elements may include: (1) providing some types of low-volume devices free of charge to customers; (2) providing rebates on more expensive fixtures such as washing machines; and (3) providing assistance in the installation of low-flow devices. Customer participation in the program would be voluntary.

Sump Disconnection. Discharges from basement sumps may be generating the modest inflow quantity observed in the collection system. To address this potential source of extraneous flows, the County should increase enforcement of their ordinance banning the connection of sump pumps to the sanitary sewer system.

Pretreatment Focus on Metals. The County has a pretreatment program in place for industrial and commercial dischargers, including a designated coordinator to supervise compliance. While no major revisions to this program are recommended, it is important that the County place a high level of surveillance and enforcement attention on dischargers that contribute toxic materials that may result in: (1) treatment process upsets; (2) effluent quality violations due to inadequate removal across the treatment process; or (3) unacceptable biosolids quality for the intended end use. Of particular concern are lead, zinc and cadmium, which are regulated through a TMDL process in the Spokane River, and other metals, such as copper, nickel and chromium, which have been detected in high concentrations in some Spokane-area discharges. Also, the Washington State Department of Ecology will likely require Spokane County to develop a Mercury Abatement and Control Plan.

High-Strength Surcharges. As part of the rate structure, the County should place a fee on dischargers that contribute wastewater with pollutant strength that is considerably higher than typical domestic sewage. This would be in the form of a "cost per pound" of excess loading that is applied in addition to the basic user charge. The surcharge program would apply to pollutants that are compatible with the wastewater treatment process, but which cost money to remove, such as phosphorus. Affected dischargers may either elect to pay the high

strength surcharge or may construct pretreatment facilities to reduce wastewater strength prior to discharge to the municipal sewer system.

Water Recycling and Waste Minimization. As new industries locate in the service area, and as existing industries expand operations, the County should encourage them to aggressively pursue internal reuse and waste minimization programs. The County should consider establishing incentives to encourage recycling of both water and chemicals.

Leadership in Energy and Environmental Design (LEED). Administered through the United States Green Building Council (USGBC), LEED is a system that focuses on sustainable design and the recognition of "green" buildings. LEED designs may use indigenous materials, low energy consumption appliances, low emission paints and coatings, and water saving or water conserving fixtures. Some municipalities are requiring a minimum level of LEED certification for new, public construction, and even private construction, as a means to reduce impacts to the environment resulting from increased urbanization. LEED should be considered by the City of Spokane Valley and Board of County Commissioners for new buildings, and appropriate regulations developed to implement the program.

9.3 CONVEYANCE AND TREATMENT

9.3.1 Overview

The recommended plan for treatment and conveyance is to fully use the County's current 10 mgd capacity allocation in the RPWRF and to build a new Spokane County Regional Water Reclamation Facility (SCRWRF) to accommodate additional wastewater flows generated in the County's service area. Figure 9-1 (Wastewater Flow Schematic Diagram of the Recommended Plan) presents a schematic diagram of this concept based on future flows. Figure 9-2 (Location of Major Facilities) shows the general location of major facilities that will be required.

At the City's RPWRF, the County owns 10 mgd of capacity based on average dry-weather flows. This capacity will be used to treat all wastewater generated in the County's North Spokane Service Area and a portion of the wastewater generated in the Spokane Valley.

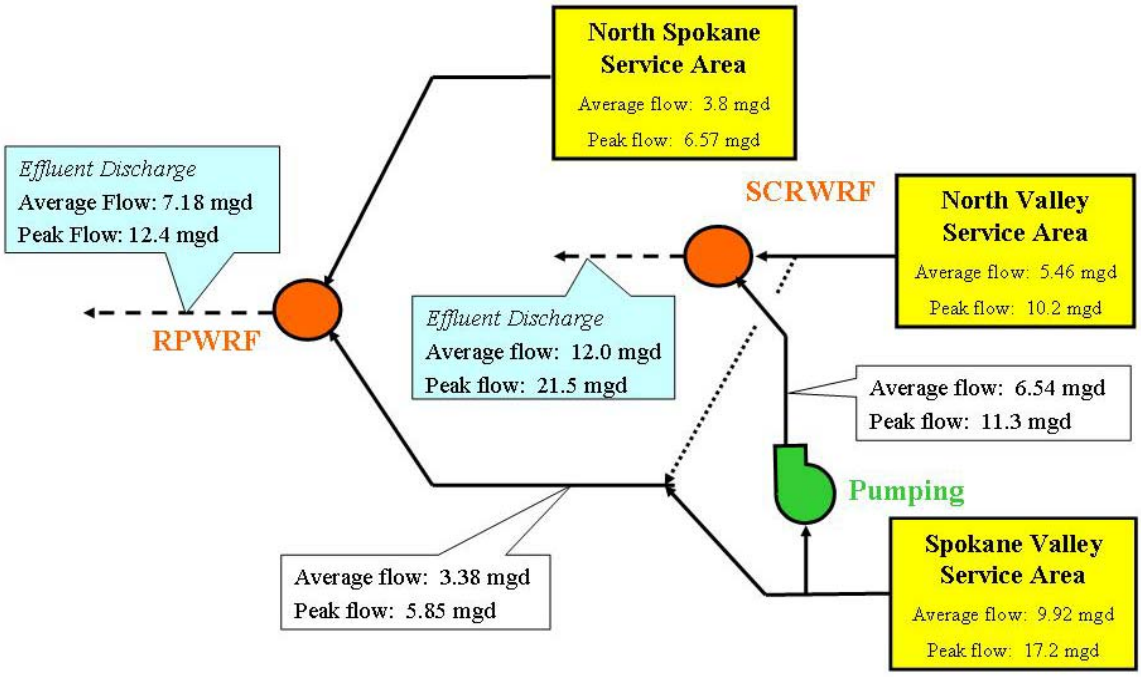

Figure 9-1. Wastewater Flow Schematic Diagram of the Recommended Plan (Distribution Based on Spokane County Future Projected 2030 Flows)

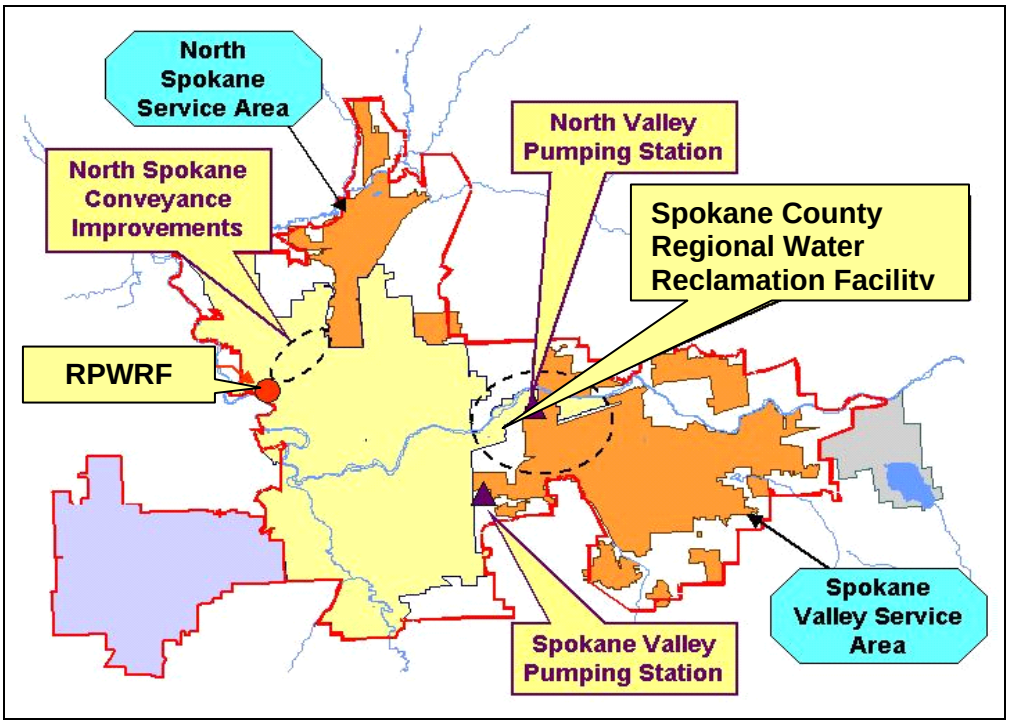

Figure 9-2. Locations of Major Facilities

9.3.2 Conveyance

Several conveyance improvements will be needed to implement the recommended plan. Those improvements associated with major pumping stations, force mains and interceptors are presented here. Collection system improvements located upstream of these facilities are addressed in the *Year 2001 Comprehensive Wastewater Management Plan for Spokane County*.

In considering conveyance requirements, the following design criteria were used:

- Gravity interceptors should be based on flow projections associated with a 50-year planning horizon.
- Force main requirements should also be based on 50-year flow projections, with consideration given to phased installation of parallel pipes to better accommodate near-term hydraulic requirements.
- Pumping station structures should be sized based on 50-year flow projections, but initial mechanical equipment should be sized and installed to meet 20-year flow projections.

North Spokane

Based on the City of Spokane's previous engineering analyses, it appears that the existing City interceptor system lacks capacity to handle projected peak flows from the County's North Spokane Service Area. Resolution of this capacity restriction will require installation of a parallel or replacement sewer along a section of the City's Hollywood Trunk Sewer from the intersection of Rowan and Cannon to the intersection of Everett Avenue and "A" Street. The specific improvements to be implemented will be determined by the City based on their analysis of all capacity and condition issues in this area.

North Valley

North Valley Interceptor (NVI) Pumping Station

There are two potential alternative locations for the NVI pumping station.

- The eastern location is at Elizabeth Street and Marietta Avenue. This is the present location of the County's flow meter, and is where the NVI wastewater enters the City of Spokane wastewater system.
- The western location is at Rebecca Street on the south side of the Spokane River, east of the Spokane Community College.

Based on the boundaries of the service areas of the City of Spokane and Spokane County, the normal location of the NVI pumping station would be the eastern location. However, the western location might be beneficial for pumping into the Stockyards Site because it would require a much shorter force main and lower dynamic pumping head. These two factors should be evaluated during preliminary design to establish whether the western location would be less expensive to construct and to operate. In addition, the routing of the force main from the western location to the treatment plant would parallel the outfall route to the

Rebecca Street discharge location, and so would require only one trenching operation for the pipe routes, rather than two.

North Valley Interceptor (NVI) Forcemain

Eastern Pumping Station Location

From an Eastern Pumping Station location, the force main would be routed west from Elizabeth and Marietta along the southern side of the Burlington Northern Railroad tracks to approximately Fancher Road, and then south to Trent Avenue. The pipe would follow Trent Avenue to the west to Havana, run south to Boone, and then run west to Julia and the entrance to the plant site.

Western Pumping Station Location

The force main would be routed parallel to the outfall from the treatment plant, south from the Spokane River along Rebecca to Mission, and then east to the vacated Julia alignment. An easement would be required south from Mission to Boone. At Boone, the force main would enter the Stockyards site.

Spokane Valley Interceptor (SVI) Pumping Station

The SVI runs in Fourth Avenue parallel to I-90 on the south side and discharges into the City of Spokane wastewater system at Havana Street. The County flow-metering station is located immediately east of Havana. The location where flows would be diverted to the SCRWRF is in this vicinity. However, within the past two years, an interim pumping station was constructed at Havana and Sprague Avenue to convey the Chronicle sewer basin into the interceptor system. It was anticipated that the location of the SVI pumping station would allow the County to eliminate the interim pumping station. Therefore, alternative pumping station sites will be considered along Fourth Avenue, along Havana Street, and along Sprague Avenue. A gravity sewer will be necessary to convey the Chronicle basin flows, and/or convey the SVI flows to the pumping station site, depending on the location selected for the pumping station.

In addition, it is known that the Washington State Department of Transportation is in the early planning stages for the expansion of the I-90 Freeway, and for the connection of the future North-South Freeway. Furthermore, the area on the south side of I-90 is tentatively identified for major widening in the vicinity of Havana. In selecting a pumping station site, the County should strive to avoid future conflicts with these potential projects.

Spokane Valley Interceptor (SVI) Forcemain Routes

Tentative routes for the force main from the SVI pumping station to the SCRWRF would proceed north in Havana Street. The route would continue north in Havana to Boone, west on Boone to Julia, and then into the Stockyards site.

9.4 TREATMENT

The recommended plan combines treatment at the City's RPWRF to fully use the County's current 10 mgd capacity allocation and construction of a new Spokane County Regional Water Reclamation Facility (SCRWRF) located at the Stockyards site.

9.4.1 City of Spokane Riverside Park Water Reclamation Facility (RPWRF)

Spokane County will maintain its 10-mgd capacity allocation in the RPWRF. It is anticipated that the City of Spokane will implement additional treatment improvements to meet effluent quality requirements for phosphorus outlined in the *Foundational Concepts for the Spokane River TMDL Managed Implementation Plan.*

Improved Level of Treatment. To meet effluent quality requirements for Spokane River discharge, advanced levels of effluent filtration will be required for very low effluent phosphorus. As the City implements these improvements at RPWRF, it also will be sizing new facilities and adding treatment components to increase the overall capacity of the SAWTP to meet its future needs. The blending of these initiatives will optimize the overall upgrade and expansion program, and reduce disruptions to the plant, but it will complicate cost allocations to the City and County. For this reason, careful accounting and justification of costs will be needed to ensure that the County and City equitably share in the costs and benefits of the program.

9.4.2 New Spokane County Regional Water Reclamation Facility

Following a detailed analysis of potential water reclamation facility sites, Spokane County selected the Stockyards site as the preferred location for the Spokane County Regional Water Reclamation Facility and purchased the site.

Identification of Treatment Processes

Based on anticipated effluent quality requirements for a new discharge to the Spokane River, a preliminary treatment train has been identified for use in developing estimates of capital costs and operating costs. A schematic diagram of the system is shown in Figure 9-3 (Representative Treatment Process for SCRWRF) and major unit processes are described below.

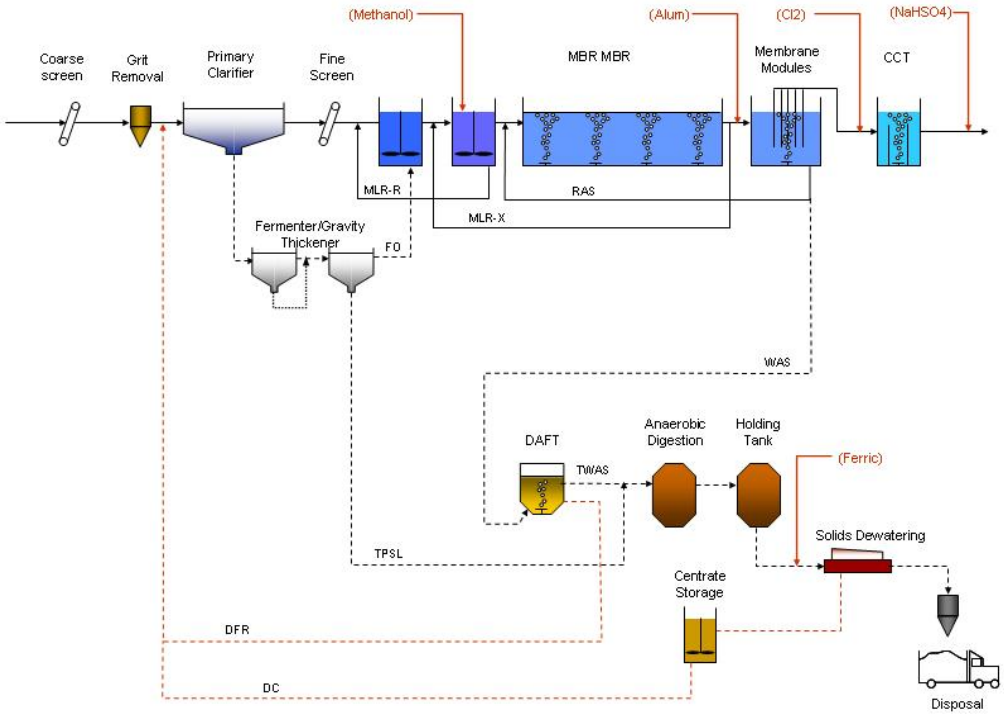

Figure 9-3. Representative Treatment Process for the Spokane County Water Reclamation Facility (SCRWRF)

Liquid Treatment Processes

Septage Receiving. A receiving station would be installed to accept septage from commercial haulers.

Pretreatment. Influent screening and grit removal would be provided. Preliminary requirements are based on mechanical climber screens with 3/8-inch openings and vortex grit removal chambers.

Primary Treatment. Conventional clarification using circular basins with chemical assistance has been assumed.

Biological Treatment and Advanced Filtration. An activated sludge system utilizing membranes or membrane bioreactors (MBRs) is recommended. The system will be capable of meeting Class A reclaimed water standards for effluent reuse with the entire plant flow. A plug flow activated sludge system has been assumed. During the summer, the activated sludge system will be operated with anaerobic, anoxic, and aerobic zones to provide phosphorus removal and nitrification and denitrification (NDN) such that river discharge requirements for phosphorus and ammonia nitrogen are met. Additionally, total nitrogen requirements shall be met for Class A reclaimed water for effluent reuse in urban irrigation, industrial reuse, and wetlands restoration. During the April through October phosphorus removal period anticipated to be required in the NPDES permit, alum may be fed to the MBR system for phosphorus control. Low concentrations of ammonia-nitrogen are not needed in the winter to meet water quality requirements. There may be an economical mode of operation that does not provide full nitrification during the winter permit season. The

SCRWRF may also be operated with nitrification/denitrification year-round for alkalinity and pH control. All equipment associated with mixed-liquor pumping, permeate pumping, waste-activated sludge (WAS) pumping, secondary scum pumping, process air supply, and membrane scour air supply will be provided within the overall MBR facility.

Disinfection and Dechlorination. Disinfection will be provided using a liquid sodium hypochlorite system followed by a liquid sodium bisulfate dechlorination facility.

Postaeration. Anticipating that the effluent quality requirements for a new discharge may include an elevated dissolved oxygen concentration, a postaeration step has been included at the end of the treatment train.

Reclaimed Water Pumping. The County will implement a reclaimed water program, providing Class A reclaimed water for reuse in urban irrigation, industrial reuse, and wetlands restoration. Initially, this program will utilize reclaimed water for irrigation on the water reclamation facility site. Consequently, the site layout and hydraulic profile must accommodate a reclaimed water pumping station. The primary disinfectant for the reclaimed water will be liquid sodium hypochlorite capable of maintaining a disinfectant residual in the reclaimed water distribution system.

Chemical Feed Systems. A chemical feed and storage building will be constructed to house the following feed systems: alum, ferric, sodium hypochlorite, citric acid, polymer, methanol, supplemental alkalinity addition (if required), and other chemical systems necessary to meet effluent phosphorus discharger limits and maintain the membrane system and other plant systems.

Solids Handling Processes

Grit and Screenings Handling. Grit would be washed, classified and hauled to a landfill. Screenings would be washed, compacted and hauled to the municipal refuse incinerator.

Primary Sludge Fermentation and Thickening. A two-stage fermentation/thickening process has been assumed for primary sludge. This process would produce supplemental volatile fatty acids that would be sent to the activated sludge process to improve the performance of the biological phosphorus removal step. The process also would reduce the volume of primary sludge fed to the subsequent digestion process.

Secondary and Chemical Sludge Thickening. The biological and chemical sludge streams would be combined for thickening using a dissolved air flotation process.

Sludge Stabilization. Single-stage, mesophilic digestion has been assumed for sludge stabilization.

Digested Sludge Storage. Seven days of liquid sludge storage would be provided for periods when icy roads prevent hauling of biosolids from the plant site.

Sludge Dewatering. Centrifuge dewatering has been assumed.

Dewatered Sludge Storage. A one-day storage hopper and load-out facility has been assumed.

Centrate Equalization. Centrate from the dewatering would be stored and metered back to the activated sludge process to equalize ammonia loadings to the liquid treatment train.

Aesthetics

The SCRWRF will be designed with pleasing aesthetics that will complement or enhance the surrounding neighborhood in the vicinity of the Stockyards site. It is anticipated that the finished plant will resemble an attractive commercial development in a similar manner to the results achieved in Vancouver and Edmonds, Washington.

Close attention will be paid to odor control. All treatment processes that are generators of noticeable odors will be covered and ventilated, with the foul air sent to state-of-the-art odor scrubbing systems.

Similar attention will be paid to noise and lighting control. All equipment with significant noise generation will be enclosed within buildings or shrouded in sound attenuation structures. Plant lighting systems will be designed to minimize off-site impacts.

The facility site will be landscaped to soften the appearance of the facilities and to provide an attractive buffer between it and adjoining properties. More formal and extensive landscaping will be implemented around the plant entrance of Freya Street. The overall landscaping scheme and choice of materials will be consistent with other attractive industrial campuses in the Spokane area.

9.4.3 Effluent Outfall to the Spokane River

The recommended effluent discharge location for the Spokane County Regional Water Reclamation Facility located at the Stockyards site is at Rebecca Street (also referred to as Green Street), located at River Mile 78.5, just below the outlet from the Upriver Dam. The County prefers the Rebecca Street location based on the evaluation of technical, cost and water quality considerations as part of a 2002 Supplemental Environmental Impact Statement (SEIS). The Rebecca Street outfall is the most cost effective option and will be easier to construct with fewer special crossings and less construction restoration of the City right-of-way. If the Rebecca Street outfall location is unavailable, the secondary discharge location is Springfield Avenue (also referred to as Hamilton Street), located at River Mile 75.8.

9.5 MANAGEMENT OF RECLAIMED WATER

Spokane County is dedicated to the effective management of the region's water resources, and is an active participant in regional water resources planning. In looking toward the future, the County sees beneficial use of reclaimed water as an increasingly important component of the region's water supply. The Spokane County Regional Water Reclamation Facility (SCRWRF) will produce an effluent which meets State of Washington Class A reclaimed water quality standards. This will satisfy the mandatory "target pursuit action" related to reuse in *Foundational Concepts for the Spokane River TMDL Managed Implementation Plan.* Spokane County will also initiate preparation of a detailed Reclaimed Water Use Plan in 2007 that will identify reuse customers, sites, water demands, and distribution system infrastructure required for potential implementation. This will satisfy the elective "target pursuit action" available to the County for reuse. Spokane County will

consider the cost-effectiveness of reuse opportunities in conjunction with the potential for phosphorus loading reduction when selecting reuse projects for implementation.

9.6 BIOSOLIDS MANAGEMENT

All biosolids produced at the RPWRF and the new SCRWRF will be stabilized through anaerobic digestion and dewatered to produce a Class B biosolids. The material will be applied to agricultural land or to reclaimed mining sites. This will beneficially recycle nutrients and organic material to the land. At RPWRF, this represents a continuation of current practice. At the SCRWRF, a biosolids management program must be developed and implemented. Spokane County has initiated preparation of a Biosolids Management Plan that will be submitted to Ecology in 2008.

At the SCRWRF, flexibility will be provided to convert the facility to Class A biosolids production in the future. This conversion to Class A biosolids may be driven by changing regulatory requirements, need for greater diversity in reuse options, or public desire for a compost product. The technical options for future conversion to Class A biosolids include temperature-phased digestion, pre-pasteurization, and composting. The first options could be implemented at the SCRWRF site, whereas composting would likely require a separate remote site.

9.7 COST ESTIMATE

9.7.1 Capital

The SCRWRF will be constructed in two phases to meet projected capacity requirements. Phase 1 will be operational by 2011 and will provide annual average capacity of 8.0 mgd and maximum-month capacity of 8.5 mgd. Phase 2 will increase annual average capacity to 12.0 mgd and the maximum-month capacity to 12.6 mgd. The timing of Phase 2 expansion will depend upon the rate of growth experienced in the service area.

Table 9-1 (Summary of Capital Costs of Spokane County Regional Water Reclamation Facility) presents estimated capital costs for the Phase 1 facility. Estimated capital costs have been escalated to the projected mid-point of construction in January 2010 based upon a straight line extrapolation of historical Northwest construction cost indices.

Table 9-1. Summary of Estimated Capital Costs of Spokane County Regional Water Reclamation Facility

Unit Process	Capital Cost[1] Phase 1 (8 mgd)	
Influent Junction Box	$	105,000
Septage Receiving Station	$	388,000
Preliminary Treatment	$	2,016,000
Primary Treatment	$	2,889,000
Fine Screening	$	2,555,000
Membrane Bioreactors	$	17,416,000
Disinfection	$	806,000
Post Aeration	$	259,000
Chemical Feed and Storage	$	759,000
Dissolved Air Flotation Thickeners	$	748,000
Fermenter	$	1,201,000
Gravity Thickener	$	1,036,000
Anaerobic Digesters	$	5,188,000
Dewatering Facility	$	3,147,000
Centrate Storage	$	238,000
Odor Control	$	1,316,000
Administration and Lab Building	$	1,893,000
Support Facilities/Sitework	$	5,627,000
Subtotal A	**$**	**47,587,000**
Mobilization, Bonds and Insurance (5%)	$	2,379,000
Contractor's Overhead and Profit 10%)	$	4,759,000
Subtotal B	**$**	**54,725,000**
Miscellaneous Items and Contingency (15%)	$	10,945,000
Subtotal C	**$**	**65,670,000**
Washington State Sales Tax (8.1% of C)	$	5,319,000
Subtotal D	**$**	**70,989,000**
Escalation to Midpoint of Construction (13.3%)	$	9,464,000
Subtotal E	**$**	**80,453,000**
Construction Contingency (Change Orders) (5%)	$	4,023,000
Subtotal F (Total Construction Cost)	**$**	**84,476,000**
Engineering, Admin., Legal (25% of F)	$	21,119,000
Total Estimated Project Cost (Phase 1)	**$**	**105,595,000**

[1]Costs are based on December 2006 dollars (ENR-CCI 7911) inflated to the projected mid-point of construction in January 2010

It should be noted that a number of the facilities planned for Phase 1 are anticipated to provide sufficient capacity for Phase 2 as well. These include the septage receiving station, the headworks, the second-stage fine screens, the digester control building, the sludge dewatering and loadout facilities, the odor control system, and the administration, laboratory and maintenance buildings.

Water Reclamation Facility Site Development Costs

Additional site development costs associated with the Stockyards site include clearing to remove existing pavement or structures, and the cost to remediate contaminated soils. Spokane County has already spent approximately $400,000 for remediation consulting and contracting.

In December 2004, Spokane County's consultant, SLR International Inc., presented a Phase 1/Phase 2 Environmental Site Assessment report that identified contamination in: a) near-surface native soils; 2) sediments accumulated in on-site manholes and vault structures; and 3) imported fill materials. The contaminants included polynuclear aromatic hydrocarbons (PAHs), lead, cadmium, and total petroleum hydrocarbons (TPH - gasoline, diesel, and heavy oil). Based on the contaminants detected at the Site, Spokane County contracted with LFR, Inc. (former SLR International staff) to conduct additional site characterization and to develop technical specifications to remediate the property. Spokane County contacted the Washington State Department of Ecology (Ecology) regarding the detected contamination, and initiated site cleanup efforts via the Ecology Voluntary Cleanup Program. In November 2006, Spokane County contracted with NRC Environmental Inc. to clean up contaminated materials at the site, including demolition and disposal of on-site structures (garage and well house).

The clean up project also included abandonment of an existing water supply well at the site. A water sample was collected from the water supply well prior to abandonment. The water sample was analyzed for the contaminants of concern noted above, as well as nitrate. No contaminants were detected in the water sample.

The clean up involved excavation and off site disposal of contaminated soils discovered during the environmental site assessments, followed by collection of soil samples in the remediated areas to confirm the removal of the contaminants. To reduce the volume of contaminated materials for disposal, some of the contaminated soil was screened on-site to remove the larger, uncontaminated materials (particles/debris >2-inches). A total of approximately 2,500 tons of contaminated soil and 1,500 tons of uncontaminated soil, rock and brick debris were hauled off-site for disposal. All materials were disposed at lined, disposal facilities permitted to legally accept the waste streams, including the Graham Road Regional Disposal and Recycling Facility in Medical Lake, Washington and the Finley Buttes Landfill in Boardman, Oregon. As noted above, soil samples were collected from the excavated areas following clean up efforts. None of the soil samples contained contaminants of concern above applicable cleanup levels, thus confirming that the known contaminated soils were effectively removed from the site.

Outfall Costs

Estimated outfall costs are summarized in Table 9-2 (Capital Costs of Outfall Alternatives) for the preferred location at Rebecca Street and the alternative Springfield Avenue location.

Table 9-2. Capital Costs of Outfall Alternatives

Project Component	Capital Cost, $ millions
Rebecca Street Alternative	2.3
Springfield Avenue Alternative	6.2

Other Program Costs

Cost for other program elements such as water conservation activities, effluent management components and the cost to upgrade Spokane County's share of the Spokane RPWRF have not been updated as part of this Facilities Plan Amendment.

Property Costs

Spokane County has purchase the Stockyards site as the location for the Spokane County Water Reclamation Facility. Property costs for the site were approximately $3,500,000.

Total Capital Costs

Table 9-3 (Summary of Capital Costs of Recommended Plan) summarizes the estimated capital costs for the recommended program.

Table 9-3. Summary of Estimated Capital Costs of Spokane County Regional Water Reclamation Facility

Program Elements	Estimated Total Cost, $1,000
Water Conservation	
Water Conservation – Public Education	$250
Water Conservation – Physical Devices	$4,000
Revised Design and Construction Standards (Leadership in Energy and Environmental Design (LEED)	$50
Subtotal	***$4,300***
Conveyance	
Spokane Valley Pump Station	$7,900
Spokane Valley Force Main	$3,700
North Valley Pump Station	$8,300
North Valley Force Main	$1,000
SCRWRF Outfall	$2,300
Subtotal	***$23,200***
Treatment	
SCRWRF – Site Remediation	$400
SCRWRF – DBO Honorarium	$400
SCRWRF – Phase 1 (8 mgd)	$106,000
Subtotal	***$106,800***
Effluent Reclamation and Reuse	
SCRWRF—Facility Site Irrigation	$300
Water Reclamation and Reuse Plan	$500
Water Reclamation Implementation[2]	$10,000
Reuse Conveyance (To be developed in Water Reclamation and Reuse Plan)	TBD
Subtotal	***$10,800***
Land Acquisition	
Spokane Valley Pump Station	$200
North Valley Pump Station	$200
Spokane County Regional Water Reclamation Facility[3]	$3,500
Subtotal	***$3,900***
Total Program	**$149,000**

[1]Costs are uninflated values presented in December 2006 dollars (ENR-CCI 7911)
[2]Cost shown is an allowance for future activities yet to be determined.
[3]Costs previously expended.

9.7.2 Estimated Operating and Maintenance Costs

Estimated operating and maintenance (O&M) costs for the SCRWRF are presented in Table 9-4 (Summary of Projected Operation and Maintenance Costs). These estimates are based on an average plant flow rate of 8.0 mgd. In developing the O&M costs, the following unit costs were used:

- Labor—$31.50/hr
- Electrical power—$0.13/kW-hr
- Aluminum sulfate—$219/ton
- Ferric—$344/ton
- Sodium Hypochlorite—$0.90/gal
- Sodium Bisulfate—$1.40/gal
- Citric acid—$4.09/gal
- Sodium Hydroxide—$0.57/gal
- Polymer—$10.20/dry ton
- Biosolids hauling and disposal—$154/dry ton
- Screenings hauling and disposal—$98/ton
- Grit hauling and disposal—$98/ton

Table 9-4. Summary of Projected Operation and Maintenance Costs for SCRWRF

Item	Cost
Electrical Power	$721,093
Chemicals	$1,148,475
Labor (Operations and Maintenance)	$572,311
Materials	$470,179
Membrane Replacement	$104,428
Biosolids Hauling and Application	$290,000
Screenings and Grit Disposal	$160,965
Lab Services	$148,280
Pretreatment Program	$42,760
Septage Handling Program	$48,036
General Overhead	$285,520
Total	**$3,992,047**
Cost per MG treated	**$1,367**

The costs presented in Table 9-4 comprise only the cost of operating the treatment plant. They do not include any costs associated with operation of the collection system, including the NVI and SVI pumping stations; management of the industrial pretreatment system; utility billing services; or other administrative or customer service activities.

Estimated operating and maintenance (O&M) costs for the NVI and SVI pumping stations are presented in Table 9-5 (Summary of Projected Operation and Maintenance Costs for NVI and SVI Pumping Stations).

Table 9-5. Summary of Projected Operation and Maintenance Costs for NVI and SVI Pumping Stations

Item	Cost
Electrical Power	$509,496
Chemicals	$6,880
Labor (Operations and Maintenance)	$69,888
Materials	$210,000
Lab Services	$6,747
General Overhead	$28,736
Total	**$831,747**
Cost per MG treated	**$285**

9.8 EXPECTED PERFORMANCE AND WATER QUALITY ISSUES

Projected Effluent Performance

With completion of the dissolved oxygen TMDL, it is anticipated that more stringent effluent limits will be established for BOD, ammonia-nitrogen and phosphorus. The more stringent limits form the primary basis for the County's proposal to use membrane technology. The expectation is that membrane process will provide a higher quality effluent than required to meet the anticipated initial NPDES permit effluent limits. Anticipated effluent quality using a membrane process is listed in Table 9-6.

Table 9-6. Projected Performance of Proposed SCRWRF

Parameter	Summer Permit Season	Winter Permit Season
5-Day Carbonaceous Biochemical Oxygen Demand ($CBOD_5$), mg/L	<2	<2
Total Suspended Solids (TSS), mg/L	<2	<2
pH	7 to 9	7 to 9
Ammonia-Nitrogen, mg/L	<0.25	[a]
Nitrate-Nitrogen, mg/L	<1	[a]
Total Nitrogen, mg/L	<10	[a]
Total Phosphorus, mg/L	<0.050	<5
Turbidity, NTU (Daily Average)	<0.2	<0.2
Turbidity, NTU (Maximum)	<0.5	<0.5
Total Coliform Organisms, weekly average, organisms per 100 ml	<2.2	<2.2
Total Coliform Organisms, maximum single sample value, organisms per 100 ml	<23	<23

[a.] Operate facilities in nitrification/denitrification mode in winter season for nitrogen reduction

When reviewing this table, the following should be noted:

- Use of the membranes on a year-round basis will result in low concentrations of BOD, total suspended solids and turbidity during both summer and winter permit seasons.
- It is anticipated that phosphorus removal will be required only during the summer permit season; consequently, chemical precipitation of phosphorus will not be practiced during the winter.
- Nitrate removal is not required to meet anticipated permit limits; however, reducing nitrate levels during the summer season will be required to minimize impacts to groundwater quality if the water is irrigated or infiltrated over the aquifer or if water discharged to the river recharges groundwater.