FINAL PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

Spokane County Reclaimed Water Use Study

Spokane County Public Works Department
1026 West Broadway Avenue
Spokane, WA 99260

July 2009

SPOKANE COUNTY

SPOKANE COUNTY

MEMORANDUM

To: Recipients of the Final Programmatic Environmental Impact Statement for the Spokane County Reclaimed Water Use Study

From: Bruce Rawls/Spokane County Utilities Director

Date: July 30, 2009

Re: Issuance of Final Programmatic EIS

The attached document is the Final Environmental Impact Statement (EIS) on program alternatives that the County could select if it chooses to pursue use of reclaimed water that will be produced from our soon-to-be constructed Spokane County Regional Water Reclamation Facility. This Final Programmatic EIS identifies potential environmental impacts of program alternatives for use of reclaimed water that were identified as the most feasible in the July 2009 Reclaimed Water Use Study. The Study examined a variety of alternatives for use of reclaimed water, but identified the following as the most feasible: 1) urban irrigation; 2) industrial use; 3) wetland creation and/or enhancement; and 4) aquifer recharge. Hypothetical sample projects were developed to provide a basis of comparing the environmental impacts associated with each program alternative. It should be noted that these were only hypothetical project sites and conveyance routes for purposes of program analysis.

All alternatives have similar environmental impacts. The major impacts are associated with construction activities for conveyance lines and appurtenances which are temporary but unavoidable. Residents and businesses near construction areas would be affected. Once operational, impacts to water quality are possible, but use of reclaimed water would provide an overall benefit to water resources in the region.

The County has requested and received valuable input from our citizens throughout the development of the Reclaimed Water Use Study and the EIS. A scoping meeting on developing the Reclaimed Water Use Study and this EIS was held on May 30, 2007. Comments from the scoping meeting and others led to identifying alternatives and the environmental issues were analyzed in a Draft Programmatic EIS which was issued April 24, 2008. Public comments on that Draft EIS together with responses are included in this Final EIS.

While environmental impacts are important criteria in the County's decision making, it is only one among a number of other factors, such as legal, financial, and community issues, that must also be considered. The County appreciates your interest in this important project, and encourages you to continue to participate as we move toward making a decision on whether to pursue use of reclaimed water.

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SPOKANE COUNTY

FACT SHEET

PROJECT TITLE

Spokane County Reclaimed Water Use Study.

PROJECT DESCRIPTION

Spokane County is studying the potential for use of reclaimed water from the Spokane County Regional Water Reclamation Facility (SCRWRF). The impacts of the SCRWRF were evaluated in the 2002 Regional Wastewater Facility Supplemental Environmental Impact Statement (EIS) and the 2006 Addendum to the 2002 Supplemental EIS and 2002 Wastewater Facilities Plan. The County has broken ground on the facility and it is expected that the SCRWRF will be operational in 2012.

Low dissolved oxygen (DO) levels during certain times of the year are a major water quality problem in the Spokane River. The Washington Department of Ecology (Ecology) is developing a Total Maximum Daily Load (TMDL) to address the DO problem, primarily through reductions of phosphorous discharges to the river. Spokane County is studying the use of reclaimed water as a way to reduce phosphorous discharges from the SCRWRF. The use of reclaimed water could also offset withdrawals from the Spokane Aquifer or recharge the aquifer and help avoid water supply problems in the future. The purpose of the Reclaimed Water Use Study is to determine the feasibility of these reclaimed water use program options rather than, or in addition to, discharging treated wastewater from the SCRWRF directly to the Spokane River.

This Final Programmatic EIS analyzes the potential environmental impacts of four types of uses for reclaimed water—irrigation of urban green spaces, industrial use, wetland creation or enhancement, or aquifer recharge described in the Spokane County Reclaimed Water Use Study. The four alternative types of reclaimed water use are compared with a No Action Alternative. At this time Spokane County has not decided whether to pursue the use of reclaimed water and is using the EIS process to help decide whether to select one or a combination of the use alternatives or take no action with regard to the use of reclaimed water and continue with discharge to the Spokane River.

ACTION SPONSOR AND LEAD AGENCY

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PERMITS, LICENSES, AND APPROVALS REQUIRED OR POTENTIALLY REQUIRED

Because the specific projects that could be proposed for reclaimed water use are not yet known, it is not possible to present a complete list of permits, licenses, and approvals that may be required to implement any projects. The following is a list of the most common types of permits, licenses, and approvals generally associated with reclaimed water use projects described in this Programmatic EIS.

Federal Permits, Licenses, and Approvals

- Section 404 permit – U.S. Army Corps of Engineers

State and Regional Permits, Licenses, and Approvals

- Reclaimed Water Use Permits – Ecology and Health
- National Pollutant Discharge Elimination System (NPDES) permit – Ecology
- Section 401 water quality certification – Ecology
- Shoreline conditional use permit, or variance –Ecology
- Water system plan approval – Health
- Hydraulic project approval – Fish and Wildlife
- Notice of Construction and Application for Approval – Spokane Regional Clean Air Agency

Local Permits Licenses and Approvals

The following could be required by the appropriate local jurisdictional agency—Spokane County, City of Spokane, City of Spokane Valley, or City of Millwood:

- Land use approval; conditional use permit
- Street use
- Critical areas review
- Shoreline substantial development permit or shoreline conditional use permit
- Clearing and grading permit
- Building permit

AUTHORS AND CONTRIBUTORS

This Final Programmatic EIS has been prepared under the direction of the Spokane County Public Works Department, Utilities Division. Research and analysis were provided by:

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DATE OF ISSUE OF DRAFT PROGRAMMATIC EIS

April 24, 2008

PUBLIC COMMENT ON THE DRAFT PROGRAMMATIC EIS

Spokane County conducted a public comment period on the Draft Programmatic EIS from April 24, 2008 to May 30, 2008. The County received written comments from three persons. Approximately 15 people attended a public meeting on the Draft Programmatic EIS which was held on May 7, 2008 at the City of Spokane Valley Council Chambers, 11707 East Sprague Avenue, Spokane Valley, WA. No official comments were provided for the record.

DATE OF ISSUE OF THE FINAL PROGRAMMATIC EIS

July 30, 2009

ORGANIZATION OF THE FINAL PROGRAMMATIC EIS

This Final Programmatic EIS reprints the Draft Programmatic EIS with changes incorporated. Any changes made to the draft document are shown in underline and strikeover format. The changes to the text are minor and augment existing information. There have been no changes to the alternatives or assumptions used in the Draft Programmatic EIS. The comments received on the Draft Programmatic EIS are located in Chapter 4 of this Final Programmatic EIS. Responses to those comments are also provided in Chapter 4.

ADDITIONAL ENVIRONMENTAL REVIEW

This Programmatic EIS has been prepared to address probable significant adverse impacts associated with various program options for use of reclaimed water in Spokane County. Additional project-level environmental review will be conducted if the County decides to pursue any of these reclaimed water use options in its reclaimed water program and selects specific reclaimed water use projects for that option. Any proposed reclaimed water use project would also comply with permit and water quality standards established by the Washington State Departments of Health and Ecology.

DISTRIBUTION

Copies of this document or notice of availability have been sent to the agencies, individuals and libraries listed in Chapter 6.

DOCUMENT AVAILABILITY

Copies of this document are available for review at the Spokane County Public Libraries and at the website listed below. Copies of this document are also available for review or purchase at the Spokane County Public Works Office, Utilities Division, located at 1026 West Broadway Avenue, 4th Floor, Spokane, WA. Purchase price in CD format is $5.00; in printed format $10.00. Copies of the Final Reclaimed Water Use Study are available for $10.00.

WEBSITE ACCESS

This document may be viewed on the Spokane County Utilities Division website, http://www.spokanecounty.org/Utilities/WaterReclamation/content.aspx?c=2356 and then click on the listing associated with the Final Programmatic Environmental Impact Statement.

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ACRONYMS AND ABBREVIATIONS

BMPs	best management practices
BOD	biological oxygen demand
cfs	cubic feet per second
DAHP	Department of Archaeology and Historic Preservation
DBP	disinfection by-product
DNR	Department of Natural Resources
DO	dissolved osygen
DOH	Department of Health
EDC	endocrine disrupting chemicals
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
IEP	Inland Empire Paper
LUST	leaking underground storage tank
mgd	million gallons per day
mg/L	milligrams per liter
MBR	membrane bioreactor
MOU	memorandum of understanding
NMFS	National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
NWI	National Wetland Inventory
PHS	Priority Habitats and Species
PVC	polyvinyl chloride
RCW	Revised Code of Washington
RM	river mile
SCAPCA	Spokane County Air Pollution Control Authority
SRCAA	Spokane Regional Clean Air Agency
SEIS	Supplemental Environmental Impact Statement
SEPA	State Environmental Policy Act
SCWRF	Spokane County Regional Water Reclamation Facility
SWDP	Surface Water Discharge Permit
THM	trihalomethanes
TMDL	total maximum daily load
TOC	total organic carbon
TSS	total suspended solids
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife

1.0 PURPOSE AND NEED FOR THE STUDY

1.1 Introduction

1.1.1 Background—Spokane County Regional Water Reclamation Facility

Spokane County is constructing a new regional wastewater treatment facility in the city of Spokane. The purpose of the new facility is to allow the County to complete its decades-long program of eliminating septic tanks located over the Spokane Valley – Rathdrum Prairie Aquifer (Spokane Aquifer) and provide for projected growth in the county. The facility, soon to be located at the former Stockyards site near Freya and Trent Avenues, is now referred to as the Spokane County Regional Water Reclamation Facility, or SCRWRF, to reflect the emphasis of the new facility on treating water for beneficial use.

In 2001 and 2002, the County evaluated alternative methods for expanding existing wastewater treatment capacity. These alternatives were analyzed in the *Spokane County Wastewater Facilities Plan* (Spokane County, 2002a) and the Final Supplemental Environmental Impact Statement (SEIS) on the plan (Spokane County, 2002b). The programmatic EIS also analyzed alternatives for other system components: demand management, effluent end use, and biosolids management.

In early 2003, Spokane County submitted to the Washington State Department of Ecology (Ecology) a draft Wastewater Facilities Plan Amendment that described the anticipated construction and operation of the regional treatment facilities for the Stockyards project along with the other system components. Ecology approved the Amendment in February 2003 (Spokane County, 2003) and in November 2003 indicated its intent to issue a National Pollutant Discharge Elimination System (NPDES) permit for the new regional plant.

In December 2006, the County issued an Addendum to the *2002 Regional Wastewater Treatment Plant SEIS* and the *2002 Wastewater Facilities Plan EIS* (Spokane County 2006a). The Addendum addressed minor modifications to the treatment plant and water conservation program and included new information on water resources. The County ~~is currently in the process of evaluating proposals from firms~~ selected a firm to design, build, and operate the SCRWRF, which is expected to be in operation in 2012. The County broke ground on the SCRWRF in June 2009.

1.1.2 Need for the Study

Since 2003, Ecology and the U.S. Environmental Protection Agency (EPA) have been exploring ways to improve water quality in the Spokane River and Lake Spokane. The river and lake contain an over abundance of phosphorus and other nutrients that promote algae growth and decay, which can deplete the amount of dissolved oxygen (DO) in the water, especially during the months of April through October. Low DO can harm fish and other aquatic organisms, which need oxygen in the water to survive.

As described in the 2002 SEIS, several segments of the Spokane River have been placed on the federal Clean Water Act Section 303(d) list of impaired water bodies. Water bodies are included on the 303(d) list because water quality does not meet state standards to protect "beneficial uses," which include supplying drinking water, swimming, boating, and providing aquatic habitat. Ecology's 303(d) list for the Spokane River includes the constituents of arsenic, cadmium, chromium, lead, polychlorinated biphenyls (PCBs), polybrominated diphenyl ethers (PBDEs), dioxins and furans, sediment, temperature, zinc, and DO which can impair water quality.

For some 303(d) listed water bodies (those that Ecology identifies as Category 5), the State must develop a water quality cleanup plan, or Total Maximum Daily Load (TMDL). A TMDL establishes limits on pollutants that can be discharged to a water body and still allow state standards to be met. At the time the 2002 SEIS was issued, Ecology had established TMDLs for some metals and phosphorus and was in the early stages of developing the TMDL for DO.

In October 2004, Ecology issued a draft water quality cleanup plan called the *Draft Total Maximum Daily Load to Restore and Maintain Dissolved Oxygen in the Spokane River and Lake Spokane (Draft DO TMDL)*. After publication of the Draft DO TMDL, Ecology engaged in discussions with a number of public and private entities, resulting in the *Foundational Concepts for the Spokane River TMDL Managed Implementation Plan (Foundational Concepts),* dated June 2006. Through collaboration with various governmental agencies, tribes, public and private dischargers, and other non-governmental organizations, the Draft DO TMDL will be revised to incorporate implementation measures to achieve significant reductions in the amount of phosphorus being discharged to the river, especially from wastewater treatment facilities. The specific details about how the water quality in the Spokane River and Lake Spokane will be improved will be contained in a TMDL Managed Implementation Plan (MIP) and final TMDL which are being drafted by Ecology so that they are consistent with the *Foundational Concepts*. The *Foundational Concepts* also describe the waste load allocations and "target pursuit actions" that dischargers may employ to reduce phosphorus loading through means other than wastewater treatment technologies.

The *Foundational Concepts* specifically addresses phosphorus requirements for the new SCRWRF. The County will meet the phosphorus allocation target of the TMDL through a combination of advanced treatment at the plant and other offsets to reduce phosphorus loading to the Spokane River. The *Foundational Concepts* also directs the County to explore development of a comprehensive program for reclaimed water production, reuse, and aquifer recharge. The Reclaimed Water Use Study is the response to that directive and is the basis of this programmatic EIS.

1.1.3 Purpose of the Reclaimed Water Use Study

The purpose of the Reclaimed Water Use Study is to explore the potential and feasibility of using reclaimed water from the SCRWRF in the Spokane Valley. The study meets the requirements of the *Foundational Concepts* that the County must consider alternatives to discharging reclaimed water from the SCRWRF to the Spokane River through a

comprehensive program for the use of reclaimed water. The ~~Draft~~ Reclaimed Water Use Study identifies potential:

- Demand for reclaimed water
- Customers and their water needs
- Program impediments
- Costs
- Conveyance routes
- Funding sources

The study presents conceptual alternatives for use of reclaimed water. No specific application or location has been selected although hypothetical project concepts have been presented to provide a basis of comparing potential impacts. Spokane County will use the study as a decision-making tool to determine how to proceed with use of reclaimed water. This ~~Draft~~ Final Programmatic EIS evaluates the potential environmental impacts associated with reclaimed water use in the County. The impact analysis is intended to provide the County with information to use in its decision-making which will also include such factors as legal, financial, and community considerations. As described in Section 1.5, project-level environmental review will be undertaken when the County selects a specific reclaimed water use approach or approaches, if any, as part of its reclaimed water program and specific projects as part of that program.

1.2 Regulatory Framework

1.2.1 Agency Roles

Reclaimed water projects are administered jointly by the Washington Departments of Ecology and Health. Lead roles in permitting and approval are based on the type of use of reclaimed water proposed. Land application (irrigation) of reclaimed water is permitted by Ecology through RCW 90.46.040. Commercial and industrial reclaimed water use is permitted by Health through Ecology's waste discharge permit program consistent with RCW 90.46.030. Both agencies provide review of planning and engineering documents in keeping with roles and responsibilities delineated within a Memorandum of Understanding (MOU) on reclaimed water use and land treatment systems. Many reclaimed water use projects contain both land application and commercial and industrial reclaimed water uses, and applicants must coordinate with each review agency.

The approval process for reclaimed water use projects generally involves the preparation, regulatory review, and approval of planning, design, and implementation products as follows:

- Comprehensive water system plan
- Comprehensive sewer plan
- Facilities plan or project engineering report
- SEPA compliance documentation
- Plans and specifications documents
- Water reuse permit application/permit

1.2.2 Relevant Regulations

Activities involving surface and groundwater are subject to regulatory authority at the federal, state, and local levels. All discharge alternatives are subject to Washington State's anti-degradation policy, which dictates that the receiving water quality must maintain any beneficial uses it is currently serving and that its quality cannot be degraded from its current condition (WAC 173-201A-300~~070~~ (surface water) and WAC 173-200-030 (groundwater)). Discharge from a treatment plant is regulated in accordance with applicable water quality standards as discussed below. Regulations relevant to reclaimed water use are summarized in Table 1-1.

Table 1-1. Applicable Surface and Groundwater Regulations

Statute	*Lead Agency*	*Regulated Activities*
Clean Water Act Section 404 (33 USC 1344)	U.S. Army Corps of Engineers – Seattle district	Discharge of dredged or fill material into waters of the U.S., including navigable waters and wetlands within Corps jurisdiction. Individual or nationwide permits are required, depending on project impacts.
Clean Water Act Section 402 and Chapter 173-220 WAC	Ecology	The National Pollutant Discharge Elimination System (NPDES) permit program oversees the discharge of pollutants and waste materials to surface waters of the state.
Chapter 173-201A WAC	Ecology	Water quality standards to protect beneficial uses of surface waters of the state. Any activity that could affect water quality is subject to these regulations.
Chapters 90.46, 90.48, and 90.54 RCW	Ecology	Reclaimed water and groundwater recharge standards.
Chapter 173-200 WAC	Ecology	Water quality standards for groundwaters of the state of Washington.
State Hydraulic Code (RCW 75.20.100-160)	Washington State Department of Fish and Wildlife	Any construction activity in or near state waters is subject to provisions of the Hydraulic Project Approval (HPA) process.
Chapter 173-14 WAC and local shoreline regulations	Spokane County, City of Spokane, City of Spokane Valley, and City of Millwood	Activities within 200 feet of streams and river segments with a mean annual flow >20 cfs and associated wetlands.
Local regulations	Spokane County, City of Spokane, City of Spokane Valley, and City of Millwood	Sensitive areas review, such as streams and wetlands, must be conducted to determine the classification of the resource, probable impacts, and appropriate mitigation measures.

1.2.2.1 Groundwater Regulations

Ecology regulates groundwater quality under the Water Quality Standards for Groundwaters of the State of Washington (Chapter 173-200 WAC). Chapter 173-200

WAC lists maximum contaminant concentrations for a wide range of groundwater quality parameters and also provides for an anti-degradation policy that prohibits groundwater contamination. Upland discharge of reclaimed water must comply with Ecology's groundwater recharge standards (Chapters 90.46, 90.48, and 90.54 RCW), 1997 Water Reclamation and Reuse Standards, and Washington State regulations (Chapters 173-200 and 173-154 WAC).

1.2.2.2 Reclaimed Water Use

Reclaimed water originates from highly treated municipal wastewater. Wastewater in urbanized areas typically undergoes two treatment processes and disinfection before being released into a nearby waterbody. Reclaimed water receives a third, more advanced level of treatment (or tertiary treatment), so that it can be used for non-potable (or non-drinking) purposes. The Washington State Departments of Health and Ecology have established standards for reclaimed water use, *Water Reclamation and Reuse Standards* (1997). Ecology is currently developing rules on reclaimed water use. These rules are expected to be adopted in 2010. The standards are guidelines that are used to establish best management practices and develop conditions on permits for use of reclaimed water. The standards establish four classes of reclaimed water as shown in Table 1-2. Spokane County proposes to treat all reclaimed water for use to meet or exceed Class A standards. The standards also establish a permit system for reclaimed water use. The Departments of Health and Ecology use the standards as guidance for establishing best management practices and other conditions for reclaimed water use permits.

Table 1-2. Four Classes of Reclaimed Water

Class	*Characteristics*
A	▪ Class A reclaimed water will at all times be oxidized, coagulated, filtered, and disinfected wastewater. State water reclamation and reuse standards call for Class A reclamation water to be filtered to a turbidity level which does not exceed an average operating turbidity of 2 nephelometric turbidity units (NTU), determined monthly, and which does not exceed 5 NTU at any time. Filtration can be achieved by passing oxidized wastewater through natural undisturbed soils or through filter media such as sand or anthracite. ▪ Class A reclaimed water must be disinfected such that the median number of total coliform organisms in the wastewater after disinfection does not exceed 2.2 per 100 milliliters, as determined from the bacteriological results of the last seven days for which analyses have been completed, and such that the number of total coliform organisms does not exceed 23 per 100 milliliters in any sample. ▪ Class A reclaimed water is currently the only reclaimed water class for which the Department of Ecology requires coagulation and filtration. Further, the disinfection requirements for Class A reclaimed water are more stringent than for Class C or D reclaimed water (the disinfection requirements for Class B reclaimed water are identical to those for Class A). Class A reclaimed water must be used where the potential for public exposure to reclaimed water is high.
B	▪ Class B reclaimed water will at all times be oxidized and disinfected wastewater. The wastewater will be considered adequately disinfected if the median number of total coliform organisms in the wastewater after disinfection does not exceed 2.2 per 100 milliliters, as determined from the bacteriological results of the last seven days for which analyses have been completed, and the number of total coliform organisms does not exceed 23 per 100 milliliters in any sample.
C	▪ Class C reclaimed water will at all times be oxidized and disinfected wastewater. The wastewater will be considered adequately disinfected if the median number of total coliform organisms in the wastewater after disinfection does not exceed 23 per 100 milliliters, as determined from the bacteriological results of the last seven days for which analyses have been completed, and the number of total coliform organisms does not exceed 240 per 100 milliliters in any sample.
D	▪ Class D reclaimed water will at all times be oxidized and disinfected wastewater. The wastewater will be considered adequately disinfected if the median number of total coliform organisms in the wastewater after disinfection does not exceed 240 per 100 milliliters, as determined from the bacteriological results of the last seven days for which analyses have been completed.

Source: Based on Ecology and Health, 1997.

Reclaimed water can be used for a variety of purposes, including:

- Agricultural and landscape irrigation
- Industrial cooling and processing
- Dust control
- Construction activities
- Street washing
- Wetland creation or restoration
- Aquifer recharge

The state standards establish requirements for treatment of different uses of reclaimed water. Generally, those uses with high potential for human contact require the use of Class A reclaimed water, while uses with low potential for human contact can use water treated to lower standards. Table 1-3 summarizes the types of use and classes of reclaimed water allowed by the state.

Table 1-3. Allowable Uses of Reclaimed Water and Required Water Quality

Use	***Type of Reclaimed Water Allowed***			
	Class A	***Class B***	***Class C***	***Class D***
Irrigation of Nonfood Crops				
▪ Trees and fodder, fiber, and seed crops	YES	YES	YES	YES
▪ Sod, ornamental plants for commercial use, and pasture to which milking cows or goats have access	YES	YES	YES	NO
Irrigation of Food Crops				
Spray Irrigation				
▪ All food crops	YES	NO	NO	NO
▪ Food crops which undergo physical or chemical processing sufficient to destroy all pathogenic agents	YES	YES	YES	YES
Surface Irrigation				
▪ Food crops where there is no reclaimed water contact with edible portion of crop	YES	YES	NO	NO
▪ Root crops	YES	NO	NO	NO
▪ Orchards and vineyards	YES	YES	YES	YES
▪ Food crops which undergo physical or chemical processing sufficient to destroy all pathogenic agents	YES	YES	YES	YES
Landscape Uses				
▪ Irrigation of restricted access areas (e.g., cemeteries and freeway landscapes)	YES	YES	YES	NO
▪ Irrigation of open access areas (e.g., golf courses, parks, playgrounds, school yards and residential landscapes)	YES	NO	NO	NO
▪ Decorative fountains	YES	NO	NO	NO
▪ Washing of Corporation Yards, Lots, and Sidewalks	YES	YES	NO	NO
Impoundments				
▪ Landscape impoundments	YES	YES	YES	NO
▪ Restricted recreational impoundments	YES	YES	NO	NO
▪ Non-restricted recreational impoundments	YES	NO	NO	NO

Table 1-3. Allowable Uses of Reclaimed Water and Required Water Quality (continued)

Use	*Type of Reclaimed Water Allowed*			
	Class A	*Class B*	*Class C*	*Class D*
Natural Resource Enhancement				
Fish Hatchery Basins	YES	YES	NO	NO
Wetlands				
▪ All wetlands	YES	YES	YES	YES
▪ Non-contact recreational or educational use with restricted access	YES	YES	YES	NO
▪ Fisheries use, or non-contact recreational or educational use with open (unrestricted) access	YES	YES	NO	NO
▪ Potential human contact recreational or educational use	YES	NO	NO	NO
Groundwater (Aquifer) Recharge	YES	NO	NO	NO
Indirect Potable Reuse	YES	NO	NO	NO
Stream Flow Augmentation	YES	NO	NO	NO
Industrial Uses				
Ship Ballast	YES	YES	YES	NO
Washing Aggregate and Making Concrete	YES	YES	YES	NO
Industrial Boiler Feed	YES	YES	YES	NO
Industrial Process				
▪ Without exposure of workers	YES	YES	YES	NO
▪ With exposure of workers	YES	NO	NO	NO
Industrial Cooling				
▪ Aerosols or other mist not created	YES	YES	YES	NO
▪ Aerosols or other mist created (e.g., use in cooling towers, forced air evaporation, or spraying)	YES	NO	NO	NO
Fire Fighting and Protection				
▪ Dumping from aircraft	YES	YES	YES	NO
▪ Hydrants or sprinkler systems in buildings	YES	NO	NO	NO
Miscellaneous Uses				
Flushing of Sanitary Sewers	YES	YES	YES	YES
Toilet and Urinal Flushing	YES	NO	NO	NO
Street Cleaning				
▪ Street sweeping, brush dampening	YES	YES	YES	NO

Table 1-3. Allowable Uses of Reclaimed Water and Required Water Quality (continued)

Use	*Type of Reclaimed Water Allowed*			
	Class A	*Class B*	*Class C*	*Class D*
▪ Street washing, spray	YES	NO	NO	NO
Dust Control (Dampening Unpaved Roads and Other Surfaces)	YES	YES	YES	NO
Dampening of Soil for Compaction (at Construction Sites, Landfills, etc.)	YES	YES	YES	NO
Water Jetting for Consolidation of Backfill Around Pipelines				
▪ Pipelines for reclaimed water, sewage, storm drainage, and gas, and conduits for electricity	YES	YES	YES	NO

Source: Based on Ecology and Health, 1997.

Based on preliminary studies, Spokane County has determined that there are four main types of opportunities for reclaimed water use in the region:

- Irrigation of urban green spaces,
- Industrial reclaimed water use,
- Wetlands creation and enhancement, and
- Aquifer (groundwater) recharge.

These four types of uses are the basis for the alternatives described in Chapter 2.

1.3 Summary of EIS Scoping

Spokane County initiated scoping on the Draft Reclaimed Water Use Study and Draft Programmatic EIS on May 18, 2007. The comment period remained open until June 19, 2007. A public scoping meeting was held May 30, 2007 at the Spokane Valley City Hall. Twenty-nine people signed the meeting attendance sheet. As part of the scoping process, the County requested suggestions for uses of reclaimed water in addition to comments on the scope of the Draft Programmatic EIS.

A number of individuals were favorable about the County studying use of reclaimed water and suggested a wide range of potential uses. Others who commented expressed concerns about the impacts of reclaimed water related to odor, environmental health, air quality, groundwater quality, and surface water quality. There were also several comments on the components of the Reclaimed Water Use Study and what should be included. A summary of the scoping comments is included in Appendix A.

1.4 Summary of Impacts

The major impacts associated with reclaimed water use would be temporary, construction-related impacts. Any reclaimed water project would comply with the strict standards and requirements of the state's Water Reclamation and Reuse Standards

(Washington State Departments of Health and Ecology, 1997) and any permit conditions imposed by Health or Ecology. Therefore, negative impacts to surface or groundwater or environmental health are not anticipated. Because all reclaimed water from the SCRWRF will meet or exceed Class A standards, which is safe for human contact, no impacts are anticipated to people or wildlife.

The use of reclaimed water would result in several benefits to surface and groundwater in the area. Reclaimed water used for the irrigation of urban green spaces and industrial purposes would reduce the amount of water withdrawn from the Spokane Aquifer and would increase ~~groundwater levels and~~ streamflows in the Spokane River. Wetland creation and enhancement with reclaimed water would benefit fish and wildlife and increase surface water flows. Aquifer recharge is not expected to significantly~~would~~ increase groundwater levels in the Spokane Aquifer, however, it ~~Increased groundwater levels~~ may provide minor increases in streamflows in the Spokane River because of the hydraulic connection between the aquifer and the river.

Table 1-4 summarizes the potential environmental impacts of each of the reclaimed water use alternatives discussed in Chapter 3.

1.5 Future Environmental Review

This ~~Draft~~Final EIS was prepared at a programmatic, non-project level. It evaluates the potential impacts of the reclaimed water use options discussed in the County's Reclaimed Water Use Study. After receipt of public comments, the County will finalize these documents and use the Programmatic EIS and the Reclaimed Water Use Study to determine whether use of reclaimed water should be implemented and which types of uses, if any, to pursue. If specific sites are selected for application of reclaimed water, project-level environmental review will be conducted to identify site-specific impacts of selected projects. Implementation of such projects will depend on the availability of funding, and will likely occur over a 10-year period from 2010-2020 to spread out the financial impacts of the projects.

Table 1-4. Impact and Mitigation Summary

Element of the Environment	*Irrigation of Urban Green Spaces Alternative*	*Industrial Reclaimed Water Use Alternative*	*Wetland Creation and Enhancement Alternative*	*Aquifer Recharge Alternative*	*No Action Alternative*
Air Quality	**Impacts:** • Dust from construction activities could contribute to particulate matter in the construction area. • Dust, emissions from construction vehicles and equipment, including odors could be detectable by employees in nearby businesses and passing motorists. • No impacts to air quality for operation of the use of reclaimed water are anticipated.	**Impacts:** • Similar to the Irrigation of Urban Green Spaces Alternative.	**Impacts:** • Similar to the Irrigation of Urban Green Spaces Alternative.	**Impacts:** • Similar to the Irrigation of Urban Green Spaces Alternative.	**Impact:** • None.
	Mitigation: • Implement a dust control plan for construction activities. • Shut off engines when not in use. • Maintain equipment and vehicles in good condition.	**Mitigation:** • Similar to the Irrigation of Urban Green Spaces Alternative.	**Mitigation:** • Similar to the Irrigation of Urban Green Spaces Alternative.	**Mitigation:** • Similar to the Irrigation of Urban Green Spaces Alternative	**Mitigation:** • Not applicable.
Surface Water	**Impacts:** • Soil disturbance during construction could increase erosion and runoff to surface water. • If contaminated materials or spills are encountered during construction, surface water could be contaminated. • Irrigation water could runoff to adjacent surface water, but no impacts are anticipated.	**Impacts:** • Construction impacts similar to the Irrigation of Urban Green Spaces Alternative.	**Impacts:** • Construction impacts similar to the Irrigation of Urban Green Spaces Alternative. • Excavation for wetland creation or enhancement could increase sedimentation and turbidity of surface waters. • Wetland creation or enhancement could alter the hydrology and increase streamflows.	**Impacts:** • Construction impacts similar to the Irrigation of Urban Green Spaces Alternative. • Excavation for infiltration basins could impact surface waters. • Recharge of the Spokane Aquifer could increase base flows in surface waters.	**Impacts:** • Direct discharge to the river could increase phosphorus loading.

Element of the Environment	*Irrigation of Urban Green Spaces Alternative*	*Industrial Reclaimed Water Use Alternative*	*Wetland Creation and Enhancement Alternative*	*Aquifer Recharge Alternative*	*No Action Alternative*
Surface Water (cont'd)	**Mitigation:** • Develop comprehensive erosion and sediment control plans prior to construction for each phase of construction. • Use best management practices for all construction activities to minimize erosion and sedimentation impacts. • Comply with conditions of the Ecology NPDES stormwater general permit for construction. • Develop a spill prevention and response plan to reduce the risk of surface water contamination during construction. • Implement Corps of Engineers and WDFW HPA permit requirements or conditions for installation of conveyance routes over surface waters.	**Mitigation:** • Similar to the Irrigation of Urban Green Spaces Alternative.	**Mitigation:** • Similar to the Irrigation of Urban Green Spaces Alternative. • Implement Corps of Engineers and WDFW HPA permit requirements for installation of conveyance routes over surface waters, and outfall construction in existing wetlands.	**Mitigation:** • Similar to the Irrigation of Urban Green Spaces Alternative.	**Mitigation:** • Discharge to Spokane River would meet water quality standards and permit requirements.
Groundwater	**Impacts:** • Groundwater could be contaminated if spills of fuels or chemicals from construction activities occur and are not properly contained. • If contaminated sites are encountered during construction, groundwater contamination could occur. • Irrigation water could seep to groundwater, but no negative impacts are anticipated. • Irrigation with reclaimed water will replace water that is withdrawn from the Spokane Aquifer, reducing groundwater withdrawals which could increase~~ing~~ streamflows ~~groundwater levels~~.	**Impacts:** • Similar to the Irrigation of Urban Green Spaces Alternative. • The use of reclaimed water for industrial purposes will replace water that is withdrawn from the Spokane Aquifer, reducing groundwater withdrawals which could increase~~ing~~ streamflows ~~groundwater levels~~.	**Impacts:** • Similar to the Irrigation of Urban Green Spaces Alternative. • Excavation during construction could alter groundwater flow. • Water from enhanced wetlands could infiltrate to and recharge the Spokane Aquifer ~~and~~ which could increase streamflows~~regional water supply~~.	**Impacts:** • Similar to the Irrigation of Urban Green Spaces Alternative. • Excavation during construction could alter groundwater flow. • ~~Aquifer recharge could increase the water levels in the Spokane Aquifer and increase regional water supply.~~	**Impacts:** • None.

Element of the Environment	*Irrigation of Urban Green Spaces Alternative*	*Industrial Reclaimed Water Use Alternative*	*Wetland Creation and Enhancement Alternative*	*Aquifer Recharge Alternative*	*No Action Alternative*
Groundwater (cont'd)	**Mitigation:** • Similar to those described in the Surface Water section above. • Develop a spill prevention and response plan to reduce risk of groundwater contamination. • Require monitoring of on-site soils for contamination, and mitigate contaminated soils in accordance with local, state, and federal regulations if encountered during construction. • If needed, develop a dewatering plan that includes strategies for collecting and disposing of dewatering water and a monitoring program for groundwater withdrawal to avoid groundwater contamination.	**Mitigation:** • Similar to the Irrigation of Urban Green Spaces Alternative.	**Mitigation:** • Similar to the Irrigation of Urban Green Spaces Alternative. • Conduct site specific hydrogeologic studies prior to construction.	**Mitigation:** • Similar to the Irrigation of Urban Green Spaces Alternative. • Conduct site specific hydrogeologic studies prior to construction.	**Mitigation:** • Not applicable.
Environmental Health	**Impacts:** • Hazardous materials could be released if contaminated sites are encountered during construction.	**Impacts:** • Similar to those for the Irrigation of Urban Green Spaces Alternative.	**Impacts:** • Similar to those for the Irrigation of Urban Green Spaces Alternative.	**Impacts:** • Similar to the Irrigation of Urban Green Spaces Alternative.	**Impacts:** • None.
	Mitigation: • Incorporate spill prevention and response plan requirements in construction contracts to reduce vehicle and equipment fuels and fluid spills. • If sites are found to be contaminated, implement appropriate measures to initiate hazardous materials cleanup. • Comply with state requirements for labeling pipes and other reclaimed water facilities.	**Mitigation:** • Similar to those for the Irrigation of Urban Green Spaces Alternative.	**Mitigation:** • Similar to those for the Irrigation of Urban Green Spaces Alternative.	**Mitigation:** • Similar to the Irrigation of Urban Green Spaces Alternative.	**Mitigation:** • Not applicable.

Element of the Environment	*Irrigation of Urban Green Spaces Alternative*	*Industrial Reclaimed Water Use Alternative*	*Wetland Creation and Enhancement Alternative*	*Aquifer Recharge Alternative*	*No Action Alternative*
Plants and Animals	**Impacts:** • Construction in undisturbed areas could cause temporary dislocations of animal species and could disturb native plant species. • Plants and animals could be impacted if fuels or other pollutants are spilled and either reach surface water indirectly or result in direct exposure to individual organisms or if contaminated soils are encountered during construction.	**Impacts:** • Similar to those for the Irrigation of Urban Green Spaces Alternative.	**Impacts:** • Similar to those for the Irrigation of Urban Green Spaces Alternative. • Construction activities have a higher potential to disturb wildlife and native plants, including rare plant species, than other alternatives. • Introducing more water to an area could alter the plant and animal species composition.	**Impacts:** • Similar to those for the Irrigation of Urban Green Spaces Alternative. • Excavation during construction could disturb plants and animals. • Aquifer recharge will benefit stream flows and improve fish habitat.	**Impacts:** • None.
	Mitigation: • Locate the conveyance lines along existing developed rights-of-way where possible. • Use BMPs for all construction activities to minimize erosion and sedimentation impacts. • Survey potential routes and construction areas in undeveloped lands for target species prior to design completion. • If rare or endangered species are encountered and are to be removed, all plants should be retained along with entire root system and replanted in similar habitat by a qualified biologist or botanist. • Following construction, disturbed areas should be stabilized and replanted with a native seed mix where native grasses occur, or with native woody tree/shrub species in forested areas.	**Mitigation:** • Similar to those for the Irrigation of Urban Green Spaces Alternative.	**Mitigation:** • Similar to those for the Irrigation of Urban Green Spaces Alternative. • Survey the area for priority plant species prior to construction. • If priority species are present, design concepts should consider habitat requirements. • Water quality, plant diversity/health, and use by wildlife should be monitored prior to construction and for several years following construction.	**Mitigation:** • Similar to those for the Irrigation of Urban Green Spaces Alternative.	**Mitigation:** • Not applicable.

Element of the Environment	*Irrigation of Urban Green Spaces Alternative*	*Industrial Reclaimed Water Use Alternative*	*Wetland Creation and Enhancement Alternative*	*Aquifer Recharge Alternative*	*No Action Alternative*
Land Use and Shorelines	**Impacts:** • Construction activities could disrupt ingress and egress to adjacent properties. • Spokane County would need to obtain construction easements for conveyance facilities that are not located in existing road rights-of-way.	**Impacts:** • Similar to those for the Irrigation of Urban Green Spaces Alternative.	**Impacts:** • Similar to those for the Irrigation of Urban Green Spaces Alternative. • Potential need for property acquisition.	**Impacts:** • Same as those for the Wetland Creation and Enhancement Alternative.	**Impacts:** • None.
	Mitigation: • Alternative access to properties may need to be arranged during construction (see also mitigation measures for transportation impacts).	**Mitigation:** • Similar to those for the Irrigation of Urban Green Spaces Alternative.	**Mitigation:** • Similar to those for the Irrigation of Urban Green Spaces Alternative. • Compensation to property owners would be negotiated by the County.	**Mitigation:** • Same as those for the Wetland Creation and Enhancement Alternative.	**Mitigation:** • Not applicable.
Recreation	**Impacts:** • Ingress and egress to parks could be temporarily disrupted during construction if infrastructure installation occurs near park entrances.	**Impacts:** • Similar to those for the Irrigation of Urban Green Spaces Alternative.	**Impacts:** • Similar to those for the Irrigation of Urban Green Spaces Alternative.	**Impacts:** • Similar to those for the Irrigation of Urban Green Spaces Alternative.	**Impacts:** • None.
	Mitigation: • Alternative access would be maintained by the contractor during construction (see also mitigation measures for transportation impacts).	**Mitigation:** • Similar to those for the Irrigation of Urban Green Spaces Alternative.	**Mitigation:** • Similar to those for the Irrigation of Urban Green Spaces Alternative.	**Mitigation:** • Similar to those for the Irrigation of Urban Green Spaces Alternative.	**Mitigation:** • Not applicable.

Element of the Environment	*Irrigation of Urban Green Spaces Alternative*	*Industrial Reclaimed Water Use Alternative*	*Wetland Creation and Enhancement Alternative*	*Aquifer Recharge Alternative*	*No Action Alternative*
Historic and Cultural Resources	**Impacts:** • Impacts to buried historic or cultural resources are possible as a result of excavation and earth moving activities.	**Impacts:** • Similar to those of the Irrigation of Urban Green Spaces Alternative.	**Impacts:** • Similar to those of the Irrigation of Urban Green Spaces Alternative, except slightly higher potential to encounter undisturbed sites.	**Impacts:** • Similar to those of the Irrigation of Urban Green Spaces Alternative except higher potential to encounter undisturbed sites.	**Impacts:** • None.
	Mitigation: • If cultural resources are encountered during construction, work would immediately stop and the appropriate agencies and Tribes would be contacted.	**Mitigation:** • Same as for the Irrigation of Urban Green Spaces Alternative.	**Mitigation:** • Same as for the Irrigation of Urban Green Spaces Alternative. • Conduct further cultural resources investigations of wetland sites once identified.	**Mitigation:** • Same as for the Irrigation of Urban Green Spaces Alternative. • Conduct further cultural resources investigations of the aquifer recharge infiltration basin once identified.	**Mitigation:** • Not applicable.
Transportation	**Impacts:** • Construction-related transportation impacts along conveyance routes could include, travel delays, lane reconfigurations, and/or detours that could increase volumes on alternate roadways and travel times for motorists.	**Impacts:** • Similar to those of the Irrigation of Urban Green Spaces Alternative.	**Impacts:** • Similar to those of the Irrigation of Urban Green Spaces Alternative.	**Impacts:** • Similar to those of the Irrigation of Urban Green Spaces Alternative.	**Impacts:** • None.

Element of the Environment	*Irrigation of Urban Green Spaces Alternative*	*Industrial Reclaimed Water Use Alternative*	*Wetland Creation and Enhancement Alternative*	*Aquifer Recharge Alternative*	*No Action Alternative*
Transportation (cont'd)	**Mitigation:** • Develop a traffic control plan for construction to ensure continued vehicular access on streets in the project vicinity, including working in conjunction with emergency service providers. • Use flaggers to control and coordinate traffic flow during construction. • Install signage to alert drivers to the presence of construction activities. • Use traffic cones or barrels to direct traffic away from construction areas and into appropriate travel lanes.	**Mitigation:** • Similar to Irrigation of Urban Green Spaces Alternative.	**Mitigation:** • Similar to Irrigation of Urban Green Spaces Alternative.	**Mitigation:** • Similar to Irrigation of Urban Green Spaces Alternative.	**Mitigation:** • Not applicable.

2.0 DESCRIPTION OF ALTERNATIVES

2.1 Introduction

Through the Reclaimed Water Use Study process, Spokane County is evaluating the feasibility of different uses for reclaimed water. At this time, the County is considering a broad range of program alternatives for use of reclaimed water processed at the Spokane County Regional Water Reclamation Facility (SCRWRF) including: (1) irrigation of urban green spaces; (2) industrial use; (3) wetlands creation or enhancement; and (4) aquifer recharge. These alternatives are described in more detail in this chapter, with conceptual example projects to illustrate the range of potential impacts and compare the program alternatives. These example projects are not necessarily projects that the County would propose if the alternative were selected. Project-level feasibility, design, cost, and environmental analysis would need to be conducted on specific projects for a selected program alternative. As the County evaluates these alternatives for use of its reclaimed water, decisions will be made to move forward with one or more of these alternatives or to continue solely with discharge to the Spokane River.

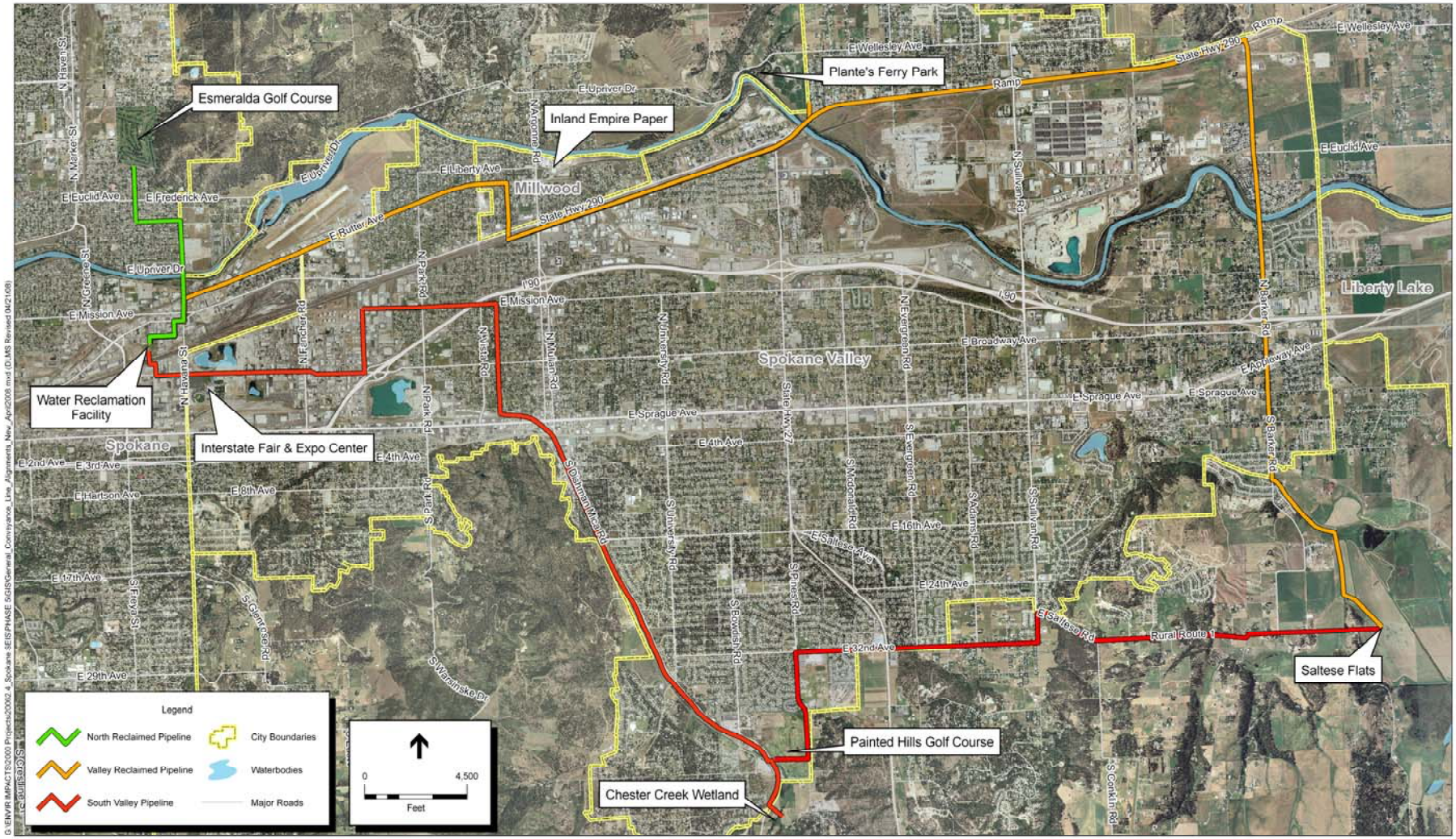
For all the reclaimed water use program alternatives, reclaimed water would be conveyed from the SCRWRF to the areas of application. At startup in 2012, approximately 8 million gallons per day (mgd) of reclaimed water would be processed in the facility and available for use. The facility may be expanded over time to a larger capacity. For all reclaimed water uses, the County would meet or exceed Class A standards and would comply with all water quality requirements of the Departments of Ecology and Health. As required by state law, reclaimed water would be contained in separate pipes from potable water and separated by appropriate distances from potable water lines. To avoid confusion, reclaimed water is conveyed in purple-colored pipe according to industry and state standards.

For the purpose of this analysis, general alignments for the pipelines routes have been developed and evaluated. Other accessory structures (e.g., pump stations) would also be required but at this conceptual level, specifics have not been developed. To the extent possible, pipeline routes would be located in existing road rights-of-way. It is anticipated that the conveyance pipes would range from 6 to 24 inches in diameter and be located from 4 to 10 feet underground. The size of the pipe would depend on the volume of water to be carried. The following general conveyance routes were selected to provide flexibility in distributing reclaimed water to a wide range of potential future customers. The routes evaluated in this EIS (Figure 2-1) are generally described as follows:

The North Pipeline concept lies entirely within the City of Spokane and would generally run north from the new SCRWRF, across the Spokane River, and then to the Esmeralda Golf Course.

The Valley Pipeline concept traverses the City of Spokane, the City of Spokane Valley, the City of Millwood, and terminates in unincorporated Spokane County. This line is proposed to generally run from the SCRWRF to the northeast, across the Spokane River on the existing Trent Avenue bridge to Plantes Ferry Park. The pipeline could be extended to Saltese Flats by continuing to the south along North Barker Road, back across the river.

The South Valley Pipeline concept would travel through the cities of Spokane and Spokane Valley and unincorporated Spokane County. This line would generally run south from the SCRWRF to the Spokane County Interstate Fair and Expo Center, to the east, and north toward E. Mission Ave., then southeast near South Dishman Mica Road to the Painted Hills Golf Course. Another trunk of the line would run from the Painted Hills Golf Course to the Saltese Flats area.



SOURCE: HDR, 2007; WSDOT, 2005, 2007; Ecology, 1990

Spokane County Reclaimed Water Use Study EIS . 200062
Figure 2-1
General Conveyance Line Alignments
Spokane County, WA

Most of the conveyance lines would be installed using an open trench method. A trench would be dug, the reclaimed water use pipes would be laid in the trench, and the trench would be backfilled with the excavated material. At railroad crossings and crossings of Interstate 90, the jack-and-bore method would be used. Using an auger-like device a hole is drilled under ground, while pipe casing is installed at the same time. This method does not require disturbance of pavement or rail lines and avoids traffic and rail delays. To further minimize traffic delays, the County would consider nighttime construction. The North and Valley Pipeline routes would require crossings of the Spokane River. At this early study stage, the County is considering installing the reclaimed water pipe in the river during summer low flows using an open cut in the riverbed and cofferdams to route river flows around the construction area. The cofferdams would be removed following construction.

2.2 Irrigation of Urban Green Spaces Alternative

2.2.1 General Uses

Urban irrigation using reclaimed water is growing in popularity throughout the country, particularly in arid and highly populated regions, and within the Northwest. Urban irrigation involves use of reclaimed water as a supply of water for golf courses, school grounds, parks, cemeteries, or other urban landscapes requiring irrigation water. In the Northwest, this application is seasonal and typically occurs during the drier summer months when the need for water exceeds precipitation. Reclaimed water is currently used in the following Washington cities or counties to irrigate urban green spaces:

- City of Sequim,
- City of Yelm,
- King County,
- City of Snoqualmie, and
- Holmes Harbor Sewer District (Island County).

2.2.2 Possible Sites

Using the County's land use information system, an investigation was conducted to identify green space that could potentially be included in an urban irrigation program. In the Spokane area, the most significant green spaces are those associated with golf courses, parks, cemeteries, and schoolyards. Another potential use of the reclaimed water could be the irrigation of the Washington State Department of Transportation (WSDOT) rights-of-way. WSDOT currently prefers to use low-maintenance native grasses along the Interstate 90 corridor, but the planned North Spokane Corridor may provide an opportunity for installing reclaimed water transmission lines which could supply additional nearby use of reclaimed water.

In the summer of 2006, Spokane County Public Utilities sent Statements of Interest/Requests for Information letters to potential urban reclaimed water use customers. Four potential urban reclaimed water customers were identified:

- Spokane County Interstate Fair and Expo Center,
- City of Spokane Parks Department (Esmeralda Golf Course) (Note that, to date, the City of Spokane has not expressed interested in using reclaimed water from the SCRWRF.)
- Spokane County Parks Department (Plante's Ferry Park), and
- Painted Hills Golf Course.

These sites account for an approximate total irrigable area of 350 acres. The demand for reclaimed water at these sites would average 1.5 million gallons per day (mgd) through the summer months (19 percent of the average reclaimed water production) with 2.8 mgd maximum monthly demand (35 percent of SCRWRF reclaimed water production capacity) in 2012.

At this time, no urban reclaimed water use sites have been selected. These four sites are evaluated in this Programmatic EIS as examples of sites that could hypothetically be used for urban green space irrigation. Discussions with business or property owners have not necessarily occurred.

2.3 Industrial Use of Reclaimed Water Alternative

2.3.1 General Uses

Reclaimed water can be used by industrial facilities for cooling or process applications. In addition to the state's health related requirements, industrial water users may have specific water quality requirements. Additional treatment may be required to meet temperature, color, total suspended solids, and total dissolved solids requirements for a specific industry. Process water after industrial use may be discharged directly to receiving waters or routed to a municipal sewer system for treatment, depending on permits.

2.3.2 Possible Sites

The Reclaimed Water Use Study examined four potential opportunities for industrial use of its reclaimed water—concrete manufacturing plants, Kaiser Aluminum facilities, Inland Empire Paper (IEP), and the Spokane Industrial Park. Many of the industrial facilities in the Spokane area use water from private wells and some, such as Inland Empire Paper, require specific water quality parameters for their processing demands. This makes use of SCRWRF reclaimed water less desirable. For the purposes of the Reclaimed Water Use Study, the IEP facility has been identified as an opportunity for use of reclaimed water for industrial purposes, and is used in this Final Programmatic EIS for purposes of analysis and comparison of program alternatives. Discussions with business or property owners have not necessarily been initiated.

2.4 Wetlands Creation and Enhancement Alternative

2.4.1 General Uses

Reclaimed water can be used to construct wetlands and as a reliable source of water to restore degraded natural wetlands. Because of the permeable soils in the area, there are only a few natural wetlands in and around the Spokane Valley area. Most natural wetlands are located in the western and southwestern portions of the county and along the lower portion of the Little Spokane River.

2.4.2 Possible Sites

The following opportunities were identified as potential areas to create or restore wetlands using reclaimed water:

- Chester Creek wetlands near the Painted Hills Golf Course. There are approximately 40 acres of wetlands that could be restored or enhanced.
- Enhancement of the Saltese Flats wetland complex located southwest of the city of Spokane Valley and east of Liberty Lake. Enhancement of these wetlands could also provide an additional water supply to Shelley Lake, located north of the Saltese Flats area.

The Chester Creek area could accommodate an average 1.5 mgd and a peak 2.0 mgd demand. Saltese Flats is an area of historic wetlands that were drained in the late 1880s or early 1900s for agricultural uses. Two options are being considered for evaluation in this EIS:

- Creation of approximately 40 acres of wetlands potentially utilizing up to 2 mgd (3 cfs) of reclaimed water, and
- Creation of approximately 340 acres of wetlands utilizing the entire 8 mgd output of reclaimed water from the SCRWRF anticipated in 2012 or greater in future phases of the SCRWRF.

2.5 Aquifer Recharge Alternative

2.5.1 General Uses

Wastewater that has been treated to high levels can be used to recharge groundwater supplies. There are two methods for recharge—surface percolation or direct injection. Surface percolation stores water in infiltration lagoons and allows the water to seep into the aquifer through natural percolation. This method uses the soil as an added treatment system to produce water that meets all drinking water and groundwater quality requirements when it reaches the aquifer. The direct injection method pumps reclaimed water directly into the aquifer using injection wells. Because there is no treatment in the soil, the injected water must meet all drinking water and groundwater quality requirements at the point of injection. In addition, the state reclaimed water regulations

only allow direct injection if "reverse osmosis" treatment is provided prior to injection.[1] The SCRWRF will not have reverse osmosis treatment; therefore, the direct injection method would not be used.

Currently the cities of Ephrata, Royal City, and Quincy, Washington, use reclaimed water through surface percolation to recharge their potable aquifers.

2.5.2 Special Considerations

The Spokane Valley overlies the Spokane Aquifer, the primary source of drinking water for more than 400,000 people in Idaho and Washington. In 1978, the U.S. Environmental Protection Agency (EPA) designated the Spokane Aquifer as a "sole source" aquifer under authority of the Safe Drinking Water Act (see Section 3.3.1). In addition to Ecology's water quality requirements for reclaimed water, aquifer recharge in the Spokane Valley must comply with the non-degradation policy for sole source aquifers and the City of Spokane's Wellhead Protection Program.

2.5.3 Possible Sites

As described in Section 3.3.2.2, soil and geologic conditions along with state requirements limit the potential locations for aquifer recharge in the Spokane Valley. If an aquifer recharge program is selected as a reclaimed water use option by the county, detailed hydrogeologic studies would need to be conducted to identify appropriate locations. The most likely locations for aquifer recharge would be in the east Spokane Valley area, which does not overlie the Spokane Aquifer and has the most appropriate soil and geologic conditions for aquifer recharge. Preliminary investigations suggest that a viable option could be to locate a surface infiltration facility along the pipeline route to the Saltese Flats area.

2.6 No Action Alternative

Under the No Action Alternative use of reclaimed water would augment flows through discharge to the Spokane River. For purposes of this Programmatic EIS, the No Action Alternative assumes the SCRWRF along with its associated conveyance lines and other facilities as described in the 2002 EIS and 2006 Addendum, are constructed and operational. As described in previous environmental documents on the SCRWRF, the County may use reclaimed water for irrigation at the facility site and may make reclaimed water available to tank truck haulers and others for activities such as dust control or street cleaning. That water would be provided at the SCRWRF as an alternate supply for non-potable uses. All other wastewater treated and reclaimed at the SCRWRF would be discharged to the Spokane River as described in the 2002 Comprehensive Wastewater Facilities Plan. The impacts of discharge to the river were evaluated in the *2002 Wastewater Facilities Plan EIS* (Spokane County 2002b) and in the 2006 Addendum (Spokane County 2006a).

[1] Reverse osmosis is a water treatment separation process that uses pressure to force a solvent, such as salt water or wastewater, through a semipermeable membrane that retains the solute on one side and allows the pure solvent to pass to the other side. This is the reverse of the normal osmosis process, which is the natural movement of solvent from an area of low solute concentration, through a membrane, to an area of high solute concentration when no external pressure is applied.

2.7 Alternatives Considered but Not Carried Forward

Spokane County considered two additional applications of reclaimed water—irrigation of agricultural lands and irrigation of poplar farms. Reclaimed water could be used to irrigate agricultural land on a seasonal basis and be discharged to surface water the remainder of the year. Distribution and marketing of reclaimed water to agricultural areas would be necessary for success. Irrigation of poplar farms is an emerging management practice for municipal wastewater. It is a variation of agricultural use of reclaimed water in which hybrid poplars are grown for harvest. The county would have to purchase land and establish and maintain the poplar farms. These alternatives were determined to be less cost effective for the county than other alternatives and were removed from further consideration.

3.0 IMPACTS OF ALTERNATIVES AND MITIGATION

3.1 Air Quality

This section discusses the current air quality conditions in the Spokane area. Applicable state and local regulations are summarized. Impacts to air quality associated with new reclaimed water conveyance facilities and use of reclaimed water under each of the alternatives are discussed and mitigation measures are identified.

3.1.1 Affected Environment

The U.S. Environmental Protection Agency (EPA) has established national ambient air quality standards for six common pollutants: carbon monoxide (CO), particulate matter (PM-10, $PM_{2.5}$), ozone, sulfur dioxide, lead, and nitrogen dioxide. For these pollutants, federal law requires meeting the national primary standards that protect public health. The Washington State Department of Ecology (Ecology), as well as a series of regional air quality agencies in the state have established state and local ambient air quality standards that are at least as stringent as the national standards for the same pollutants. The Spokane Regional Clean Air Agency (SRCAA) (formerly SCAPCA) monitors air quality in the project vicinity.

Over the past 25 years, air quality in the city of Spokane has improved substantially from the heavily polluted situation in the 1970s. However, air quality problems persist and are aggravated by the weather and topography in the Spokane area (SRCAA, 2007). Carbon monoxide (CO) is the biggest contributor to Spokane's air quality problems, generally occurring in its highest concentrations during the colder winter months. The majority of Spokane's CO comes from motor vehicles (54 percent). Other CO sources include industrial emissions, wood stoves, and other smaller combustion sources (SRCAA, 2007).

Particulate matter (PM_{10} and $PM_{2.5}$) is also a pollutant of concern for the Spokane area. Particulate matter is made up of small particles of smoke, dust, fly ash, and condensing vapors that can remain suspended in the air for long periods of time. Sources of particulate matter include wood smoke, dust, motor vehicles, and outdoor burning. PM_{10} and $PM_{2.5}$ are pollutants of concern because their small size allows a person to inhale them deeply into their lungs, potentially leading to respiratory problems or disease, such as various forms of cancer.

A Non-attainment Area Maintenance Plan (Ecology, 2004) was adopted in September 2004 and through use of this plan, levels of pollutants in Spokane have dropped below maximum allowable thresholds. In September 2005, the Spokane region was reclassified from a non-attainment area to an attainment area for CO and $PM_{2.5.}$ Prior to September, 2005, levels of those pollutants exceeded the maximum allowable thresholds for clean air.

3.1.2 Impacts

3.1.2.1 Construction

Reclaimed Water Use Alternatives

Construction impacts to air quality would include dust from excavation and construction activities, asphalt fumes from paving operations, and vehicle exhaust from construction equipment, heavy trucks, and workers' vehicles. People in passing vehicles and users of adjacent properties would notice dust or odors in the vicinity of the construction site. Employees or customers at nearby businesses would also experience dust or odors during the construction period, particularly during the initial excavation and grading phases.

Construction activities would be expected to occur intermittently during the allowable hours of 6 a.m. and 10 p.m. The conveyance lines would be installed in block-by-block segments, and construction would last approximately four weeks in any given segment. Even with the implementation of appropriate mitigation measures, short-term, temporary adverse impacts from dust and odors would be expected as a result of construction activities. These impacts are not expected to affect overall air quality conditions in the Spokane Valley or affect the attainment status.

No Action Alternative

Because there would be no construction under this alternative, no construction impacts would be anticipated.

3.1.2.2 Operation

Irrigation of Urban Green Spaces Alternative

Reclaimed water would be applied by sprinkler systems over large turf areas similar to that found at the Esmeralda or Painted Hills Golf Courses or turf/low groundcover areas as in the case of the County Fair and Expo Center or Plante's Ferry Park. Treated reclaimed water is nearly odorless; therefore, no impacts to air quality are anticipated.

Industrial Reclaimed Water Use Alternative

Reclaimed water would be conveyed to an industrial facility, similar to Inland Empire Paper. As a water supply source, reclaimed water could be used in the manufacturing process or for cooling purposes. Reclaimed water would generally be used in a closed system and not exposed to the air until discharged either into surface waters or into the sanitary sewer system. No impacts to air quality are anticipated from this alternative.

Wetlands Creation and Enhancement Alternative

Reclaimed water would be discharged into an existing wetland area, such as Saltese Flats. Because the reclaimed water will be treated to high standards at the SCRWRF, no air quality or odor impacts are anticipated. The natural odors produced by wetland processes

may be diluted with the additional volume of reclaimed water supplying the wetland complex.

Aquifer Recharge Alternative

For the Aquifer Recharge Alternative, reclaimed water would be conveyed through pipelines to the surface percolation site. The reclaimed water would be ponded in the percolation basin and be exposed to the air. Because the water will be treated to high standards at the SCRWRF, the reclaimed water will be nearly odorless so no air quality or odor impacts are anticipated.

No Action Alternative

Reclaimed water from the SCRWRF would be discharged to the Spokane River as described in the 2002 Comprehensive Wastewater Facilities Plan. As described in the 2002 Wastewater Facilities Plan EIS (Spokane County, 2002), water treated at the SCRWRF will not produce odors, so no impacts to air quality are anticipated.

3.1.3 Mitigation

Construction

Mitigation measures for construction impacts would be similar for all reclaimed water use alternatives. Measures that could be implemented to minimize construction impacts to air quality include the following:

- Implement a dust control plan according to SRCAA's *Registration and Notice of Construction* programs.
- Shut off engines when not in use.
- Maintain construction vehicles and equipment in good condition.

Operation

Reclaimed water will be treated to eliminate odors prior to release from the SCRWRF. No mitigation is required for any of the reclaimed water use alternatives since no operation impacts are expected.

No Action Alternative

Because no impacts to air quality are anticipated, no mitigation is proposed.

3.2 Surface Water

This section describes the surface water resources of the project area and the existing water quality of those resources. Groundwater resources are discussed in Section 3.3. Although surface and groundwater are discussed separately, there is a high degree of hydraulic connectivity between these two resources in the Spokane area. This connectivity is discussed in the groundwater section of this document. A general

discussion of impacts of each of the proposed alternatives on surface water resources and surface water quality is included in this section.

3.2.1 Affected Environment

Reclaimed water could be conveyed and/or used in proximity to rivers/streams, wetlands, and lakes in the County. Other than discharge to the Spokane River, no projects have been selected for use of reclaimed water in Spokane County. However, potential sites have been evaluated in the Spokane County Reclaimed Water Use Study (Spokane County, 2008). Those potential sites are used as examples in evaluating likely impacts of reclaimed water use. Spokane River, Saltese Creek, Chester Creek, an unnamed tributary to the Spokane River at Plante's Ferry Park, and Shelley Lake are major surface waters in the areas considered as potential sites for reclaimed water use (Figure 3-1).

3.2.1.1 Spokane River

The major surface water body in the area proposed for use of reclaimed water is the Spokane River, which flows through the City of Spokane Valley and the City of Spokane. The source of the Spokane River is Lake Coeur d'Alene in Idaho. The river is approximately 111 miles long from its origin at the Lake and its confluence with the Columbia River. It drains an area of 6,580 square miles including the Coeur d'Alene and St. Joe Rivers. The river flows in a westerly direction through the Spokane Valley (Figure 3-1). West of the City of Spokane, the river is dammed by Long Lake Dam to form Long Lake (also known as Lake Spokane). Below Long Lake, the river flows over Little Falls Dam and into the Spokane arm of Franklin D. Roosevelt Lake, approximately 29 miles from the confluence with the Columbia River.

There are six hydroelectric dams on the Spokane River between the Idaho border (RM 96) and Lake Roosevelt. These dams are Upriver Dam (RM 79.9), Division Street Diversion Dam (RM 74.4), Monroe Street Dam (RM 73.9), Nine-Mile Dam (RM 57.6), Long Lake Dam (RM 33.9), and Little Falls Dam (RM 29). Post Falls Dam in Idaho (RM 100.8) influences the hydrology of the Spokane River throughout the project area. All of the dams except Long Lake Dam are run-of-river dams, not storage dams. Run-of-river dams back up only enough water to maintain an adequate volume of water for operation of the hydroelectric turbines. Constructing the potential conveyance routes for reclaimed water from the SCRWRF to the points of use north of the Spokane River as well as use of reclaimed water at industrial reclaimed water use sites south of the Spokane River have the potential to impact the Spokane River.

SOURCE: WDFW, 2007 (lakes, streams); Ecology 1998 (lakes); WA Trout, 2006 (lakes); WSDOT 2005

Spokane County Reclaimed Water Use Study EIS . 200062
Figure 3-1
Water Resources
Spokane County, WA

The Spokane River experiences seasonal streamflow fluctuations, with flows peaking during spring snow melt and declining in late summer. Typical streamflows range from substantially less than 2,000 cubic feet per second (cfs) in August to 20,000 cfs in May or June (Spokane County, 2001). Low flows in August and September are typically less than 1,000 cfs and have been as low as 550 cfs in 2001 (USGS, 2004). Historically, peak flows have exceeded 45,000 cfs (USGS, 2002). Low streamflows are a problem in summer and affect water quality. Avista Utilities' agreement with the State of Idaho to maintain the level of Lake Coeur d'Alene limits the amount of flow released to the Spokane River. After the summer lake level is reached in the early summer, streamflows are regulated at the Post Falls Dam operated by Avista. Ecology has a recommended minimum flow for the Spokane River to be used for conditioning new water rights in the basin. Based on Washington Department of Fish and Wildlife (WDFW) recommendations, a minimum flow of 2,000 cfs at the Spokane gauge, located approximately 0.5-mile upstream of the confluence with Hangman Creek is used for water rights decisions, but has not been adopted as an administrative rule.

Water Quality

Several segments of the Spokane River have been placed on the federal Clean Water Act Section 303(d) list of impaired water bodies. Water bodies are included on the 303(d) list because water quality does not meet state standards and technology-based controls are inadequate to achieve those standards. Ecology's 303(d) list for the Spokane River includes the following constituents and parameters affecting water quality: arsenic, cadmium, chromium, dissolved oxygen (DO), lead, polychlorinated biphenyls (PCBs), sediment bioassay, temperature, and zinc. The process for developing the TMDL to address these water quality problems in the Spokane River is described in Section 1.1.2.

3.2.1.2 Unnamed Tributary to Spokane River

A small intermittent and unnamed tributary to the Spokane River flows through Plante's Ferry Park. Plante's Ferry Park has been identified as a potential point of use for the reclaimed water. The unnamed tributary stream drains hillside slopes to the northeast of Plante's Ferry Park (Figure 3-1). Water quality within the unnamed stream is unknown and there are no water quality violations on record for the stream. This does not necessarily mean that there are no water quality issues with respect to the stream, but rather the stream has not been sampled as part of any routine water quality sampling program.

3.2.1.3 Chester Creek

Chester Creek is a small intermittent stream originating from hillside slopes south of the City of Spokane and the City of Spokane Valley. Chester Creek flows in a northwesterly direction at the base of hillside slopes (Figure 3-1). Wetland areas occur along several portions of the stream as identified by the National Wetland Inventory (NWI) mapping. Chester Creek is a seasonal stream that infiltrates into the Spokane Aquifer and does not discharge to another surface water body (USGS, 2005).

Several small wetlands are located adjacent to Chester Creek just south of the Painted Hills Golf Course (Chester Creek Wetland Restoration Area). The use of reclaimed

water at this location has the potential to provide benefits to the surrounding area by providing storage/streamflow augmentation, water quality improvements, wetland restoration, reclaimed water polishing, open space preservation, educational opportunities, and habitat enhancement.

3.2.1.4 Saltese Creek

Saltese Creek originates from hillside slopes south of the City of Spokane Valley and flows north to its endpoint in Shelley Lake also, located within the City of Spokane Valley (Figure 3-1). The outlet of Saltese Creek was lowered approximately 15 feet 100 years ago. The Saltese Flats (see Section 3.2.1.6) drain to Shelley Lake via Saltese Creek. Excess flows into Shelley Lake drain to a Spokane County-owned gravel pit during peak hydrologic events (Golder Associates, 2004). Historical agricultural activity in the Saltese Creek subbasin has altered much of the hydrology of the basin by rerouting much of the Creek's length through a series of irrigation withdrawals and diversion channels in the Saltese Flats area. Saltese Creek flows through a drainage ditch to Shelley Lake. During peak runoff conditions, it also infiltrates into the Spokane Aquifer (USGS, 2005).

3.2.1.5 Saltese Flats

Saltese Flats is located in the southeastern portion of WRIA 57 just south of the city of Spokane Valley and west of Liberty Lake (Figure 3-1). This area was once a seasonal lake and wetland complex that was drained in the late 1800s to support agricultural activities. The area has been identified by both the NWI and Spokane County Critical Area Ordinance as wetland. Residential development is encroaching on this historic wetland area (Spokane County, 2005).

The Saltese Flats area has been recognized as a unique opportunity to benefit storage/streamflow augmentation, water quality improvements, wetland restoration, reclaimed water polishing, open space preservation, educational opportunities, and habitat enhancement (Spokane County, 2005).

Both Quinamose Creek and Saltese Creek contribute to the natural hydrograph in the Saltese Flats area with the majority of water being directed to Shelley Lake for infiltration. Currently this hydrograph peaks in winter or early spring. The Saltese Flats area occurs over a clay and peat layer which allows for storage of inflows and prevents rapid infiltration. However, water that flows to Shelley Lake would likely infiltrate at a higher rate into the Spokane Aquifer because of the more permeable soils in the Shelley Lake area (Spokane County, 2005).

3.2.1.6 Shelley Lake

Shelley Lake is a small lake located within the City of Spokane Valley (Figure 3-1). Shelley Lake sits on top of the Spokane Aquifer and is hydrologically connected with the aquifer. Water is directed to Shelley Lake via a drainage ditch from the Saltese Flats area

to the south of the City of Spokane Valley. Overflow from Shelley Lake is directed to a Spokane County owned gravel pit during peak runoff events (Golder Associates, 2004).

Water quality within Shelley Lake is considered good; however, Ecology has identified a Category 2 listing for total phosphorus for Shelley Lake (Ecology, 2007b). Category 2 waters include those waters where the data are not sufficient for listing a waterbody segment as impaired, but may still raise a concern about water quality (Ecology, 2005).

Water Quality Criteria for Reclaimed Water

Water quality criteria for reclaimed water discharged to natural wetlands require that it be treated to Class D reclaimed water standards (Ecology, 1997.) However, depending on the aquatic use of the resource, these standards may be more restrictive. Where natural and constructed beneficial use wetlands receiving reclaimed water provide potential human contact through recreational or educational activities, discharges are required to meet Class A reclaimed water standards. Where natural and constructed beneficial use wetlands receiving reclaimed water provide fisheries, or potential human non-contact recreational and educational beneficial uses, discharge of reclaimed water is required to meet at a minimum the Class B reclaimed water standards. Where natural wetlands receiving reclaimed water provide potential non-contact recreational and educational beneficial uses through restricted access, discharge is required, at a minimum, to meet Class C reclaimed water standards (Ecology 1997). See Section 1.2 for an explanation of reclaimed water quality standards.

3.2.2 Impacts

3.2.2.1 Construction

Reclaimed Water Use Alternatives

Construction impacts would be similar for all of the proposed reclaimed water use alternatives because construction activities would be similar. The primary construction associated with the alternatives would be the installation of conveyance pipelines to transport the reclaimed water from the SCRWRF to the points of use and other facilities (e.g., pump stations).

In general, conveyance pipelines will be installed using open trench construction. Some portions of the pipeline, will require jack-and-bore construction techniques in particular beneath railroad crossings and I-90. River and stream crossings will be accomplished by open cut construction, which will require placement of cofferdams on either side of construction activities. Installation of conveyance lines within streams and rivers will occur during summer low flow conditions to minimize the height of cofferdams required. In-water construction activities associated with installation of conveyance pipelines are more likely to have significant impacts on surface water resources or impact the water quality of those resources. Potential impacts to surface waters are largely associated with soil disturbing activities and the potential for runoff entering surface waters from upland areas. Increased turbidity and sedimentation of surface waters would likely result from installation and removal of cofferdams and excavation of pipeline trenches during the in-

water portion of work. While these impacts are short-term and temporary and will not persist following construction, these activities will have localized impacts to surface water quality.

Surface water quality could also be impacted if fuels or other pollutants are spilled in proximity to surface waters or if contaminated soils are exposed and runoff occurs. It is possible that contamination could be encountered along the conveyance routes; however, the conveyance lines will be installed in existing rights-of-way to the extent possible, reducing the potential for encountering contamination. See Section 3.4, Environmental Health, for additional information on potential hazardous materials contamination.

In addition to potential impacts that may occur during the installation of conveyance lines, the wetland creation or enhancement and aquifer recharge alternatives could require construction and excavation that could have both permanent and temporary impacts to surface waters. Exposed soils could result in increased turbidity and sedimentation of surface water features if they are not properly stabilized and stormwater runoff were to occur. The conveyance pipelines to Saltese Flats wetland creation/enhancement area and Chester Creek wetland restoration area would require construction and installation of a combination of outfalls, energy dissipaters and/or level spreaders. Depending on the final location of these facilities, there is the potential for impacts to existing wetlands in the form of increased erosion and sedimentation and loss of habitat as a result of fill.

The alternatives that will likely have greater challenges during construction are those that cross, occur within or in proximity to, or discharge to surface water features and include soil disturbing activities. The installation of conveyance lines across the Spokane River and to their points of use at areas such as the Painted Hills Golf Course, Saltese Flats Wetland Enhancement/Restoration Area, and the Chester Creek Wetland Restoration Area would pose the greatest challenges with respect to construction related impacts to surface waters.

No Action Alternative

There would be no construction under the No Action Alternative; therefore, there would be no construction impacts to surface waters.

3.2.2.2 Operation

Irrigation of Urban Green Spaces Alternative

Application of reclaimed water at golf courses, along transportation corridors, and parks is not expected to adversely affect surface water quantity or quality. It is possible that some irrigation water could runoff to adjacent surface waters; however, application rates of reclaimed water and that of irrigation water in general would be monitored. For instance at Painted Hills Golf Course, runoff could affect Chester Creek. Because the water from the SCRWRF will be treated to high water quality standards, no impacts to surface water quality would be anticipated from runoff of reclaimed water.

Some reclaimed water that is used for irrigation could percolate to the groundwater table and contribute to surface water base flows. No impacts to surface water quality are anticipated from percolated reclaimed water. As described in Section 3.3, no water quality impacts are anticipated to groundwater; therefore, there would be no impacts to surface water recharged by groundwater.

Industrial Reclaimed Water Use Alternative

Industrial reclaimed water use is not expected to impact surface water quality or quantity because there would be no runoff or seepage to groundwater. For example, if the IEP industrial site were to receive reclaimed water for use in processing paper products, no reclaimed water would runoff the site or seep to groundwater since reclaimed water would be contained in a closed system for use in manufacturing processes. Water used for industrial purposes is and would continue to be treated on site according to specific criteria before discharge to the river. Industrial users would discharge to the river under conditions of their NPDES permits or would discharge to the municipal wastewater treatment system under industrial pretreatment programs.

Wetlands Creation and Enhancement Alternative

Impacts to wetlands from receiving reclaimed water are primarily beneficial. Additional water delivered to wetlands would provide for greater interaction and exchange of water between the wetland, groundwater sources, and other surface water features such as streams. Supplementing the water regime in wetlands may also contribute to increased base flows for streams that generally dry up in the summer. This would alter vegetative communities by supplying a more consistent water source to the wetland and increasing habitat complexity within the region.

In Washington, the City of Cheney currently uses reclaimed water for wetland enhancement as does the LOTT (Lacey, Olympia, Tumwater, and Thurston County) Wastewater Alliance. LOTT currently uses reclaimed water from its Budd Inlet facility for wetland enhancement and it proposes additional wetland enhancement at its other satellite treatment plants.

Reclaimed water used to create or restore wetlands is required to meet specific water quality standards in addition to the Class A treatment requirements. These include:

- BOD_5 and TSS of less than 20 mg/L (annual average)
- Total Kjeldahl nitrogen of less than 3 mg/L (annual average)
- Total phosphorus of less than 1 mg/L (annual average)
- Un-ionized ammonia less than state chronic toxicity standards
- Metals concentrations less than state surface water standards

The reclaimed water processed at the SCRWRF is expected to meet or exceed these additional standards.

The Saltese Flats area has been identified as a potential site for wetland enhancement with reclaimed water. Since the Saltese Flats wetlands are contiguous with a phosphorus-limited lake (Shelley Lake), the allowable total discharge of phosphorus to the wetland would be determined based on an analysis of the anticipated assimilation capacity of the wetland for total phosphorus and based on the appropriate phosphorus loading to Shelley Lake that will not cause or contribute to a violation of eutrophication standards (Ecology, 1997):

- BOD_5 5 kg/ha/d
- TSS 9 kg/ha/d
- Total Kjeldahl Nitrogen (as Nitrogen) 1.2 kg/ha/day
- Total Phosphorus (as Phosphorus) 0.2 kg/ha/day

As part of the design for a wetland creation or enhancement project, hydrologic modeling would be used during the design phase to determine the loading of contaminants to any sites. Due to the highly treated nature of the reclaimed water from the SCRWRF, it is not anticipated that use of reclaimed water at any wetland creation/enhancement site in Spokane County would have significant impacts on water quality. Two examples are evaluated below.

Providing additional water to the Saltese Flats wetlands could increase the outflow toward Shelley Lake where surface water would infiltrate to the Spokane Aquifer. The use of reclaimed water may shift the hydrograph of water flowing out of the Saltese Flats from the majority of discharge occurring during winter and spring, to a more even distribution throughout the year. This would likely result in some streamflow augmentation to the Spokane River through groundwater recharge in Saltese Flats and Shelley Lake (which receives outflow from Saltese Flats). The additional water applied to the Saltese Flats wetland could also be beneficial to Saltese Creek by improving base flow conditions during the warmer summer months and having a positive impact on water quality by reducing temperatures and increasing dissolved oxygen levels.

Providing additional water to the Chester Creek wetland restoration area could increase base flows of Chester Creek as well as provide a more consistent hydrograph for the Chester Creek drainage. Additional water to the wetland area may provide additional water quality treatment to the reclaimed water and improve water quality conditions in Chester Creek through reduced temperatures and increased dissolved oxygen levels.

Aquifer Recharge Alternative

The use of reclaimed water to provide aquifer recharge would have primarily beneficial impacts to surface waters. Recharge of the Spokane Aquifer would provide increased base flows to the Spokane River and other smaller streams in the project area. As stated previously, reclaimed water would be highly treated. The use of surface infiltration technology of reclaimed water to the Spokane Aquifer would provide additional polishing of reclaimed water and additional improvement in reclaimed water quality.

No Action Alternative

Under the No Action Alternative, there would only be limited use of reclaimed water and most reclaimed water from the SCRWRF would be discharged to the Spokane River. Potential impacts to the Spokane River from discharge of effluent to the river include additional phosphorus loading to the river and subsequent impacts to dissolved oxygen levels. The County is working with Ecology to develop ways to reduce the amount of phosphorus discharged to the river. These impacts were described in more detail in the 2002 SEIS on the treatment facility and the 2006 Addendum to the 2002 EIS (Spokane County, 2002b and 2006a).

In October 2007, the County released an updated study of the mixing zone and water quality analysis (Cosmopolitan Engineering Group, 2007). The study evaluated the effect of the discharge of effluent from the SCRWRF on state water quality standards for temperature, ammonia, and toxic metals including arsenic, chromium, copper, mercury, nickel, and silver. The study concluded that water discharged from the SCRWRF is not expected to result in water quality violations for these parameters.

Benefits of discharging effluent to directly to the Spokane River would include increased base flows to the Spokane River.

3.2.3 Mitigation

3.2.3.1 Construction

Reclaimed Water Use Alternatives

Erosion and sedimentation control measures suitable for the conveyance routes, potential outfalls into existing wetlands, and construction of new wetlands would be included as part of project design and construction to minimize sedimentation. Spokane County would require contractors to:

- Develop comprehensive erosion and sediment control plans prior to construction for each phase of construction. The plans would include elements for site stabilization, slope protection, drainageway protection, and sediment retention.
- Use best management practices for all construction activities to minimize erosion and sedimentation impacts.
- Comply with conditions of the NPDES general permit for construction issued by Ecology.
- Develop a spill control plan to prevent fuel, chemical, or other pollutant spills from reaching any surface water bodies.
- Implement Corps of Engineers and WDFW HPA permit requirements/conditions for installation of conveyance routes within surface waters, and potential outfall construction in existing wetlands.

No Action Alternative

There would be no construction for installation of reclaimed water use facilities under the No Action Alternative; therefore, no mitigation measures are required. Under the No Action Alternative, reclaimed water would be discharged to the Spokane River, which would contribute to phosphorus loading to the stream. Other options to reduce phosphorus loading would need to be evaluated and applied to mitigate for continued phosphorus loading.

3.2.3.2 Operation

Reclaimed Water Use Alternatives

No adverse impacts to surface water are anticipated from any of the reclaimed water use alternatives; therefore, no mitigation measures are proposed.

One of the purposes of the use of reclaimed water in the Spokane Valley is to reduce phosphorus loading by reducing effluent volumes from the SCRWRF to the Spokane River during the warmer summer months when increased phosphorus loading results in increased algal growth. Use of reclaimed water in the region is self-mitigating in the sense that any reduction in reclaimed water volumes from the SCRWRF will improve overall water quality in the Spokane River. Use of reclaimed water may also augment base flows during the warm summer months when many streams and rivers experience low flow conditions. It could also further improve water quality, especially if reclaimed water is applied to the surface and allowed to infiltrate such as in the case of aquifer recharge and wetland enhancement options.

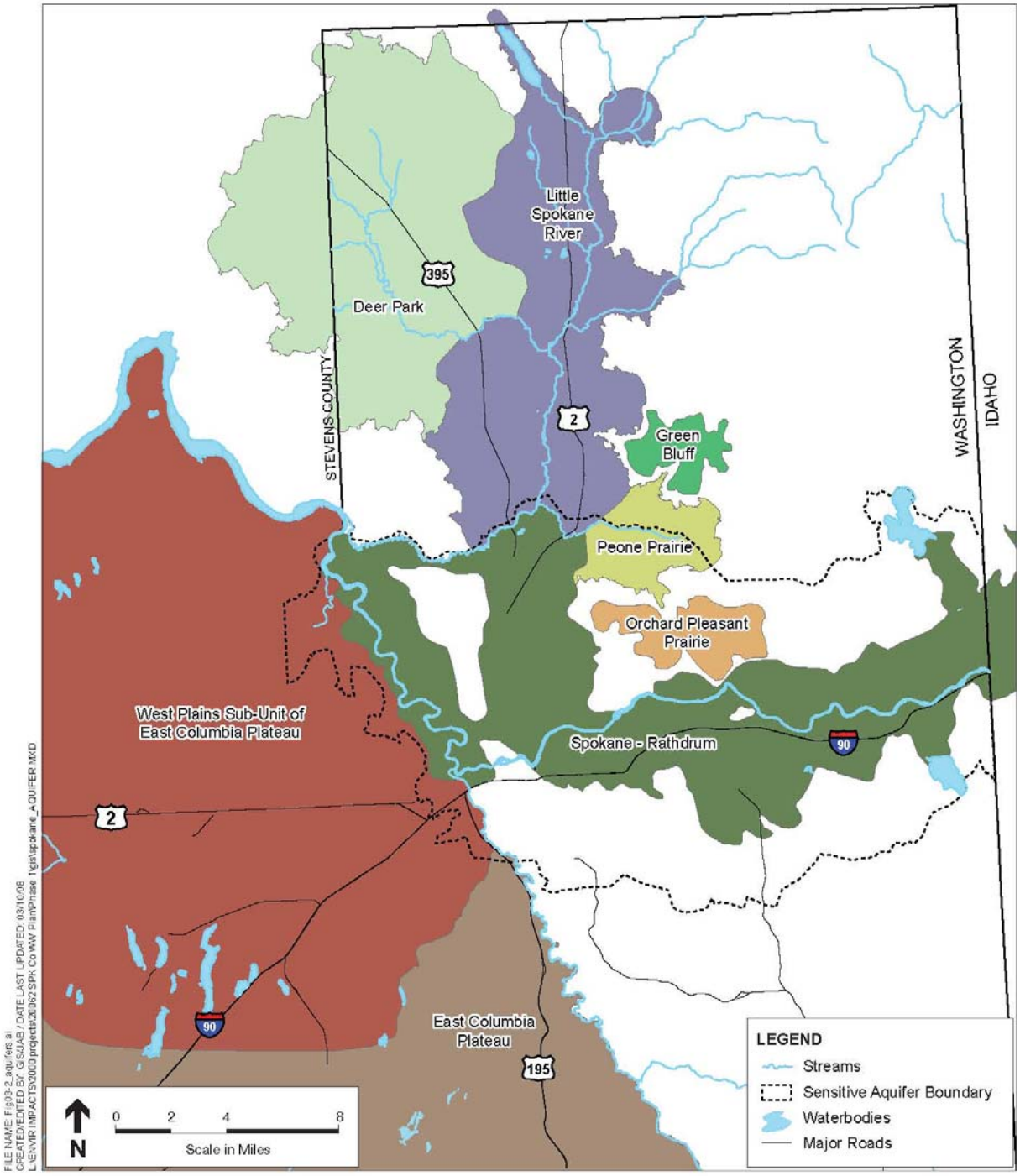
No Action Alternative

Because there would be limited reclaimed water use under the No Action Alternative, no mitigation measures are proposed. Most treated water from the SCRWRF would be discharged to the Spokane River. Mitigation measures for discharge of effluent to the Spokane River were described in the 2002 and 2006 Addendum to the 2002 EISs (Spokane County 2002b and 2006a). These mitigation measures included compliance with the NPDES permit requirements and other water quality standards.

3.3 Groundwater

3.3.1 Affected Environment

The Spokane Valley overlies the Spokane Valley – Rathdrum Prairie Aquifer (referred to here as the Spokane Aquifer) (see Figure 3-2). This is the largest of the numerous groundwater aquifers in the area created by permeable soils and the glacial history of the Spokane area. The Spokane Aquifer extends from Lake Pend Oreille through the Spokane Valley. Other aquifers in the area are the Deer Park Aquifer, the Little Spokane Aquifer, the Greene Bluff, Peone Prairie, and Orchard-Pleasant Prairie Aquifers, and the East Columbia Plateau Aquifer. The latter includes the West Plains Aquifer. Approximately 120 square miles of the Spokane Aquifer's 320 square miles is in Spokane County.



SOURCE: Spokane County GIS, 2001.

Spokane County Reclaimed Water Use Study EIS . 200062

Figure 3-2
Spokane Area Aquifers
Spokane County, Washington

The Spokane Aquifer consists of unconsolidated coarse-grained sand, gravel, cobbles, and boulders (Molenaar, 1988). The aquifer materials were deposited by the series of glacial outburst floods from Glacial Lake Missoula during the Pleistocene Epoch (1.8 million to 11,550 years before present). The coarse-grained sediments make the Spokane Aquifer one of the most productive in the United States. Wells can yield several thousand gallons per minute. The saturated thickness of the aquifer ranges from 50 feet along the aquifer margin and northwest of Spokane to more than 400 feet in the central part of the aquifer near the Idaho-Washington border. Depth to water ranges from less than 50 feet along the Spokane River to more than 400 feet near Athol, Idaho.

The aquifer is unconfined, with a seasonally fluctuating water table. Recharge is primarily through infiltrating rainfall, hillside runoff from surrounding watersheds, leakage from the Spokane River between Post Falls and Sullivan Road east of Spokane, and leakage from Lake Coeur d'Alene and numerous other large lakes around the periphery of the Rathdrum Prairie. Additional recharge occurs from irrigation water and septic tank effluent (Molenaar, 1988). Groundwater flow is generally from east to west. Beneath the city of Spokane, the aquifer splits into two channels. Most of the flow goes north through the Hillyard Trough to the Little Spokane River where it discharges through numerous springs and seeps. The remaining groundwater flow moves through a narrow, gravel-filled channel in the bedrock just north of the Spokane River. This groundwater flow discharges to a section of the Spokane River below Spokane Falls via several springs and seeps.

The Spokane Aquifer is the primary source of drinking water for more than 400,000 people in Idaho and Washington. In 1978 the Environmental Protection Agency (EPA) designated the Spokane Aquifer as a "sole source" aquifer under authority of the Safe Drinking Water Act. A sole source aquifer is defined as an aquifer that supplies at least 50 percent of the drinking water to the area overlying the aquifer and in an area where physical, legal, or economic considerations limit the reliability of an alternative drinking water source (U.S. EPA, 2004). The sole source designation is intended to protect such aquifers from contamination. The primary mechanism for protection is the requirement for EPA review when federal funding is involved with any project that has the potential to contaminate the aquifer. Proposed projects that do not have any federal funding are not required to be reviewed by EPA.

The Spokane Aquifer is hydraulically connected to the Spokane River. At times the river gains flow from the aquifer; at other times the aquifer gains flow from the river. The hydraulic connectivity significantly affects streamflows and the level of the aquifer. Water quality of both the aquifer and the river can be affected by their connectivity.

As a result of the hydraulic connectivity, the Spokane River loses large quantities of water to the Spokane Aquifer. Studies have indicated that more than 140 cfs are lost to the aquifer between Post Falls Dam and Barker Road, approximately 5 miles east of the Idaho border. Hydraulic connectivity is most significant during summer low-flow periods. During summer it is estimated that up to 80 percent of streamflow in the Spokane River is aquifer discharge, whereas in the winter only 20 percent of streamflow is aquifer discharge (Miller, 1996). On the stretch of river between the Idaho border and

the confluence with Latah Creek, the river can be divided into six reaches based on the amount of water gained or lost to the aquifer (see Figure 3-3). Reach 1 is the major losing stretch of river in the area. Reach 6 is also a losing stretch. The amount of water gained or lost from Reach 3 is unknown. Reaches 2, 4, and 5, are all classified as gaining stretches.

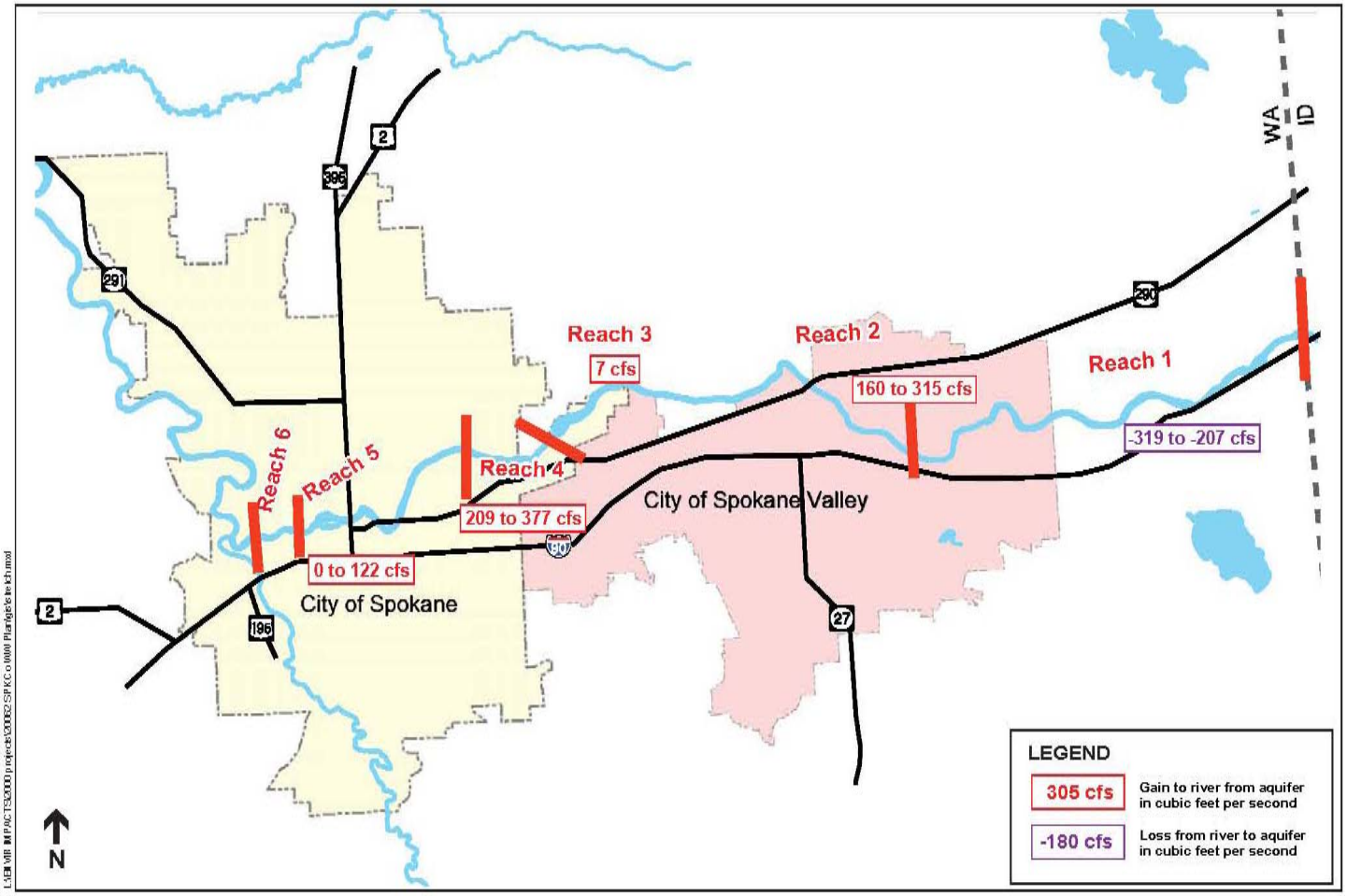
There is still much uncertainty about the hydrology of the region and the amount of water exchange that occurs between the river and the aquifer. Ongoing studies suggest that the connectivity of the river and aquifer is more complex than originally thought (Gearhart and Buchanan, 2000; Caldwell and Bowers, 2003). The ongoing studies suggest that Reaches 4 and 5 are also losing reaches. However, the designation of reaches as "gaining" or "losing" is based on average annual conditions. It is likely that at times during the year, a gaining reach loses water to the aquifer and a losing reach gains water from the aquifer. The gaining or losing nature of a reach depends on the relative elevation of the aquifer surface and river surface.

The City of Spokane has eight municipal wells that withdraw water from the Spokane Aquifer. The City has designated wellhead protection zones around its wells (see Figure 3-4). The protection zones are based on the time of travel to the wells; thus the 1-year protection zone has a travel time of 1 year to the well.

The City adopted its aquifer protection regulations (Spokane Municipal Code 17E.010) in 2005. The purpose of the regulations is to prevent degradation of the Spokane Aquifer. The regulations do not specifically regulate aquifer recharge. Spokane County has also adopted critical aquifer recharge area regulations (Spokane County Code 11.20.075). These regulations also do not regulate aquifer recharge. The City of Spokane Valley has adopted the Spokane County regulations.

3.3.1.1 Groundwater Quality

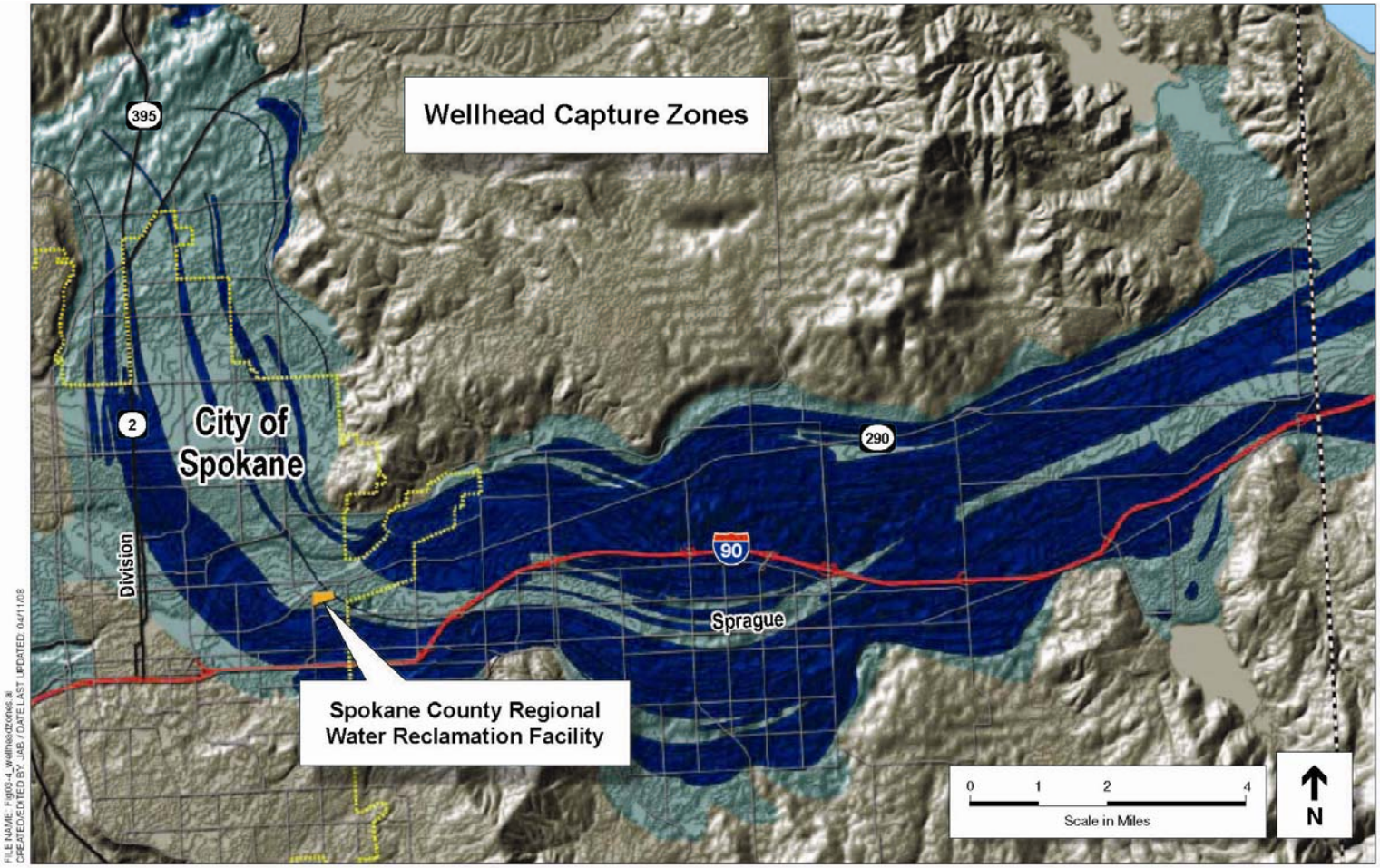
Because the Spokane Aquifer is unconfined, it can be easily contaminated. Any contamination poses a threat to the sole source of drinking water for the region. Because of its sole source aquifer listing, water quality in the Spokane Aquifer has been monitored for over 20 years. Annual monitoring is conducted by Spokane County Water Resources, which implements the Water Quality Management Plan developed in 1979 (Spokane County, 2007a).



SOURCE: Spokane County GIS, 2001.

Spokane County Reclaimed Water Use Study EIS . 200062

Figure 3-3
Gaining and Losing River Stretches
Spokane County, Washington



SOURCE: Spokane County.

Spokane County Reclaimed Water Use Study EIS . 200062

Figure 3-4
Wellhead Protection Zones
Spokane County, Washington

During the monitoring period, aquifer water quality has generally been good to excellent. There have been less than 50 violations of drinking water standards. Through the mid-1980s, water quality declined slightly in terms of inorganic indicators like nitrate-nitrogen and chloride. Nitrate contamination is of particular concern because it is an indicator that other contaminants may be present in the groundwater that could affect human health. The decline was attributed to increased development and associated septic tanks and drainfields and general degradation due to urbanization. These water quality indicators improved steadily in the late 1980s and 1990s as sewer construction increased to replace septic tanks and other management strategies for chemical use and stormwater management were implemented. Septic tanks continue to be a contributor to local declines in water quality. Generally, in areas where sewer systems have been extended, nitrate levels have declined while in areas with residential development and septic systems, nitrate levels have slightly increased (Spokane County, 2007a).

Other potential sources of groundwater contamination in the region have been identified and include stormwater injection through dry wells; chemical storage, transport, and accidental spills; improperly abandoned wells; leakage from underground pipelines and sewers; over-application and spillage of fertilizers; application of road de-icing compounds; leakage from above ground or underground fuel storage tanks and pipelines; improper waste disposal in excavations; sanitary landfills; and gravel pit mining.

The 2006 monitoring results indicate no exceedence of Primary Maximum Contaminant Levels (MCL) as defined by the EPA and the State of Washington. Some individual samples exceeded State Reporting Levels for iron, manganese, nitrate, lead, and arsenic.

3.3.2 Impacts

3.3.2.1 Construction

Reclaimed Water Use Alternatives

Construction impacts would be similar for all of the proposed alternatives because construction activities would generally be similar. The primary construction associated with the alternatives would be the installation of conveyance lines to transport the reclaimed water from the SCRWRF to the points of use.

Construction is unlikely to have significant impacts on groundwater resources or groundwater quality. Groundwater could be impacted if dewatering is required, but that is unlikely for conveyance lines since the depth of excavaction will likely only be 4 to 10 feet. Groundwater quality could be impacted if fuels or other pollutants are spilled and seep to the groundwater table. Groundwater quality could also be impacted if contaminated sites were encountered and disturbed during construction. It is possible that contamination could be encountered along the conveyance route; however, the conveyance lines will be installed in existing rights-of-way to the extent possible, reducing the potential for encountering contamination. See Section 3.4, Environmental Health, for additional information on hazardous materials contamination.

Wetland Creation and Aquifer Recharge Alternatives

In addition to conveyance lines, the wetland creation or enhancement and aquifer recharge alternatives could require construction and excavation that could have limited impacts to groundwater. However, the depth of excavation during construction is not expected to extend to the groundwater table and it is not anticipated that dewatering would be required. Hydrogeologic studies conducted prior to construction would determine the potential for impacts for specific sites.

For example at the Saltese Flats site, the percolation basins would be 5 to 12 feet deep, which would be above the groundwater level. Any construction to improve the Saltese Flats area for wetland habitat would also be above the groundwater level.

No Action Alternative

There would be no construction under the No Action Alternative; therefore, there would be no construction impacts to groundwater.

3.3.2.2 Operation

Irrigation of Urban Green Spaces Alternative

Some of the reclaimed water that is used for irrigation may percolate to the groundwater table. No impacts to groundwater quality are anticipated from the percolating reclaimed water. The reclaimed water would be treated to Class A standards. Additionally, the water would be treated to a 10 mg/L reclaimed water nitrate-nitrogen standard unless the rate of irrigation is limited to the irrigation water requirement for the vegetation being irrigated. Limiting applications to the irrigation water requirement would reduce the amount of water percolating to groundwater and eliminate the need for additional nitrate treatment. Water percolating to the aquifer would provide a small amount of recharge, but would not be a significant benefit because of the small amount of water that would percolate to the groundwater table. The use of reclaimed water for irrigation would replace water that is currently being withdrawn from the Spokane Aquifer. For example, the Painted Hills and Esmeralda Golf Courses have an estimated annual irrigation demand of 68 and 127 million gallons, respectively. Replacement of these withdrawals would have a beneficial effect on water levels in the aquifer. Some of the parks and golf courses proposed in this alternative may overlie the wellhead protection zones for the City of Spokane's wells. No negative impacts are anticipated to the City's wells because of the high quality of the reclaimed water and the limited amount of irrigation water that would percolate to groundwater.

Industrial Reclaimed Water Use Alternative

Industrial reclaimed water use is not expected to impact groundwater quality or quantity. Water used for industrial purposes would not percolate to groundwater and would be treated before discharge to the river. The use of reclaimed water for industrial supplies could reduce the amount of water withdrawn from the Spokane Aquifer and improve groundwater levels. For example, IEP withdraws approximately 4.3 mgd of water from a

private well in the Spokane Aquifer. Using reclaimed water for some of its industrial processes would reduce pumping from the aquifer.

Wetlands Creation and Enhancement Alternative

Reclaimed water used to create or restore wetlands is required to meet specific water quality standards in addition to the Class A treatment requirement as described in Section 3.2.2.2. The reclaimed water from the SCRWRF is expected to meet or exceed these additional standards. As part of the design for a wetland creation or enhancement project, hydrogeologic evaluations would be conducted to determine whether the wetland is an aquifer recharge area. If it is, reclaimed water that would be applied to the site would have to exhibit parameter concentrations 50 percent or lower than the groundwater quality criteria or must otherwise demonstrate that local groundwater quality will not be degraded (Ecology and Health, 1997).

The use of reclaimed water for wetland creation or enhancement is not expected to negatively impact groundwater. The reclaimed water would be treated to the state standards for wetland use and the water would not immediately percolate to groundwater. The wetland would provide additional water quality treatment of the reclaimed water.

The Saltese Flats has been suggested as a potential site for a wetland enhancement project. The area is located on the edge of the Spokane Valley and does not overlie a City of Spokane wellhead protection area. As described in Section 3.2.1.6, the Saltese Flats area overlies a low permeability layer that prevents rapid infiltration.

No water quality impacts to groundwater are anticipated from a wetland enhancement project at the Saltese Flats location. Providing additional water to the Saltese Flats wetlands could increase the outflow toward Shelley Lake where surface water would infiltrate to the Spokane Aquifer. As described in Section 3.2.1.6, the water recharged to the Spokane Aquifer could help increase flows in the Spokane River.

Aquifer Recharge Alternative

Introduction

Aquifer recharge with reclaimed water is being used around the world to restore declining aquifer water levels (World Health Organization, 2003; National Research Council, 2007). The technique is especially useful in addressing water supply problems in arid and semi-arid areas where natural recharge is slow. Aquifer recharge with reclaimed water is used for both potable and non potable water supplies. The areas of the U.S. with the largest number of aquifer recharge projects are Florida and California. Other projects are located in New Jersey, Georgia, and Arizona. No health problems have been reported from any of the jurisdictions in the United States that recharge potable aquifers with reclaimed water.

In the last few years, the cities of Ephrata, Royal City, and Quincy in eastern Washington have established aquifer recharge projects using reclaimed water. These three cities use water treated to Class A standards and use surface percolation to recharge potable aquifers. None of these cities has reported water quality or health problems with the use

of the recharged aquifer. Currently, the City of Airway Heights is developing a new wastewater treatment plant that will not discharge directly to the Spokane River. One of the uses of the treated effluent will be aquifer recharge.

A variety of studies have evaluated the effectiveness and safety of aquifer recharge with reclaimed water (World Health Organization, 2003; National Research Council, 2007). The general conclusions of these studies are that if reclaimed water is treated to recommended water quality standards prior to aquifer recharge (whether through direct injection or surface percolation), there are no health concerns. Water quality problems associated with recharge of potable aquifers primarily occur in areas of the world where there are no water quality standards for the recharge water.

Water Quality Concerns

A primary concern with aquifer recharge in the Spokane Valley is water quality impacts to the Spokane Aquifer, the main source of drinking water for the area. Aquifer recharge with reclaimed water could introduce chemical or microbiological contaminants into the potable water supply if the reclaimed water is not properly treated. Two possible constraints to aquifer recharge with reclaimed water have been identified—potential impacts of emerging contaminants (or microconstituents) on long-term human health and public perception of using reclaimed water for potable uses (World Health Organization, 2003).

A major concern for recharge of potable water supplies is microbial contaminants. Microbial contaminants include bacteria, viruses, and parasites such as *Giardia lamblia* and *Cryptosporidium parvum*. These organisms can cause intestinal illnesses in humans. The membrane filtration system at the SCRWRF will provide a barrier to protozoa and remove G*iardia lamblia* and C*ryptosporidium parvum* from the effluent. The disinfection process will be capable of removing 99.999 percent of the pathogens (a 5-log inactivation of viruses) (HDR, 2002).

Other contaminants of concern are metals, nutrients, and inorganic substances. Ecology has established water quality standards for metals in the Spokane River as part of the TMDL for metals. It is expected that the SCRWRF will meet those standards for lead, zinc, cadmium, arsenic, copper, chromium, nickel, mercury, and silver (Limno-Tech, 2004). The treated effluent from the SCRWRF will also meet water quality standards for nutrients and inorganic substances.

An emerging concern in water quality, including aquifer recharge, are endocrine disrupting chemicals (EDCs). EDCs are natural or synthetic chemicals that interfere with or mimic the hormones that are responsible for growth and development of an organism (King County, 2007b). Some EDCs are found in commonly used products such as personal-care products, industrial by-products, plastics, and pesticides. Table 3-1 describes some of the more common types of these contaminants.

Table 3-1. Endocrine Disruptors in the Environment

Potential EDCs	*Source*
Hormones	
Estrogens including estrone, estradiol, ethynylestriol, and testosterone	Natural and synthetic hormones. Prescription birth control pills, illicit drugs.
Industrial Chemicals	
Some metals	Tributyltin—manufacturing PVC. Cadmium—nicad batteries and other industrial uses.
Bisphenol A	Used to produce epoxy resins and polycarbonate plastics (used in some food and drink packaging).
Phthalates such as diethylhexylphthalate (DEHP)	Plasticizers in plastic wrap, PVC, vinyl flooring, and ink used on plastic containers.
Polychlorinated biphenyls (PCBs) and dioxins (PCDDs)	PCB—formerly used in various electrical applications, no longer used, but can be found in older electrical systems. Banned in U.S. since 1970s. Dioxins—by-product of paper manufacturing, incineration and production of chlorinated aromatics.
Polybrominated biphenyls (PBDEs)	Flame retardant in fabric, foam, plastic.
Personal Care Products	
Phthalates such as diethylhexyphthalate	Used in some cosmetics and packaging of personal care products.
Surfactants (Alkyphenols such as nonylphenol and octylphenol)	Detergents, carriers for some pesticides, plasticizers and UV stabilizers in plastic.
Parabens	Preservative in many cosmetics.
Pharmaceuticals	
Prescription and over-the-counter drugs	Only a small group are known or suspected of being EDCs, mainly synthetic steroids and other synthetic hormones.
Diethylstilbestrol (DES)	Drug used to avoid premature births; no longer used because of EDC effects.
Pesticides	
Pesticides, fungicides, and herbicides such as DDT (banned in U.S.), lindane (banned in U.S.), atrazine, and vinclozolin	Chemicals used to control insects or weeds.
Alkyphenols	Carrier solutions for pesticides.

Source: King County Wastewater Treatment Division, 2007a.

These products can end up in stormwater or wastewater when they are used, disposed of, or excreted by people or animals. The effect of these contaminants on human health and the environment are unknown and are the subject of on-going research. In 2002, the World Health Organization reviewed existing studies on the effects of EDCs on humans and wildlife (World Health Organization, 2002). The report concluded that there is sufficient evidence to conclude that EDCs have affected some wildlife species (see Section 3.5.2.2). The effect on human health is not as clear. It is clear that some environmental chemicals can interfere with normal hormonal process; however, there is

limited evidence that human health has been adversely affected by exposure to EDCs. The World Health Organization cautions that this does not mean that there are no effects, but that the studies to date do not indicate a clear relationship. Existing studies indicate that there are adverse effects from high exposures, but the data for lower level, chronic exposures are not clear. The studies also do not adequately describe the level, timing, and exposure to EDCs relative to the developmental stage of humans. The World Health Organization concludes that the results of its study indicate the need for more rigorous studies.

The World Health Organization study also evaluated potential exposure pathways for EDCs; that is the ways in which humans are exposed to EDCs (World Health Organization, 2002). The conclusion was that the major exposure pathway is through ingestion of food (or for children chewing on materials containing EDCs). In developed countries where drinking water and wastewater are treated, drinking water is not a major pathway for exposure unless unusual contamination has occurred.

In addition to pharmaceuticals and personal care products that are classified as EDCs, other pharmaceuticals and personal care products are being identified in wastewater. These include such common substances as acetaminophen (pain reliever), amoxicillin (antibiotic), and triclosan (household anti-bacterial soap).

These substances are not new to wastewater, but can now be detected by existing technology. In the 1950s and 1960s, water quality testing could detect compounds in parts per million and in the 1970s and 1980s they could be detect in parts per billion. Currently, compounds in parts per trillion and even smaller can be detected. For comparison, a part per billion is the equivalent of one drop of water in a swimming pool.

With advances in testing, EDCs and pharmaceuticals can be detected in concentrations measured at levels in parts per trillion and can fluctuate from one testing period to another. For example, the pain reliever acetaminophen was detected in the City of Portland, Oregon's ground water supply in 2007 at 18 parts per trillion, however in August and November 2008, no pharmaceuticals were detected (City of Portland Water Bureau, 2009). [As a note, at concentrations of 18 parts per trillion, a person would have to drink 10 gallons of water a day, every day, for 4,021 years to ingest the equivalent of two acetaminophen tablets (Portland Tribune, 2008)]. The effect of these substances on human health is unknown, largely because the concentrations are so low. To date, the EPA indicates no evidence has been found of human health effects from pharmaceutical and personal care products in the environment (US EPA, 2009).

To date, no state or federal standards have been established for the majority of these contaminants. Conventional secondary wastewater treatment removes from 50 to 90 percent of many of the known or suspected EDCs (King County, 2007a). The SCRWRF includes a membrane treatment process. Because it is a relatively new wastewater treatment technology, there have been few studies on the effectiveness of membrane treatment for the removal of EDCs. However, membrane technology is expected to be more effective at removal of EDCs than conventional treatment. It also offers the flexibility to be adapted if regulatory standards are established.

Another water quality issue of concern for aquifer recharge is disinfection by-products (DBPs). Chlorine and other disinfection treatments are used to kill disease causing bacteria and viruses in drinking water and wastewater. DBPs are formed when the disinfectants react with natural organic matter or bromides in the source water.

Two DBPs that can form when chlorine is used as a disinfectant are trihalomethanes (THM) and haloacetic acids (known as HAA5) (U.S. EPA, 2006). These by-products are known to cause cancers in laboratory animals and the EPA and Washington Department of Health have established safe levels for drinking water and wastewater. The SCRWRF will use chlorine for disinfection and will dechlorinate the effluent with sodium bisulfate prior to river discharge. Chlorine residual will also be maintained in reclaimed water conveyance (Spokane County, 2006). Since the level of total organic carbon (TOC) in the reclaimed water will be low, the potential for DBPs to be produced in the aquifer would be low.

Water Quality Requirements for Aquifer Recharge

To address water quality concerns, the State of Washington has developed water quality standards and design requirements for aquifer recharge. The standards and requirements are more stringent for recharge of potable aquifers. The state standards are considered conservative and protective of groundwater quality. The standards rely on treatment of the water prior to reaching groundwater rather than relying on the capability of the aquifer to remove contaminants. The state's standards include the components recommended by the World Health Organization (2003).

The state has established aquifer recharge standards for both surface percolation and direct injection methods. One of the requirements for direct injection is that the reclaimed water treatment process must include reverse osmosis (see Section 2.5.1). Since reverse osmosis is not included in the SCRWRF, the direct injection method is not an option for Spokane County.

Reclaimed water may be used for surface percolation if it meets the groundwater recharge criteria as measured in the groundwater beneath or down gradient of the recharge project site. Reclaimed water recharged through surface percolation will undergo some additional treatment in the soil and unsaturated zone beneath the surface before reaching groundwater. Current state requirements for surface percolation are:

- A minimum of Class A reclaimed water quality,
- A reduction of total nitrogen, and
- The percolation basins must be horizontally separated from a potable well by a minimum of 500 feet.

In addition, the generator of the reclaimed water is required to have either an Ecology-approved industrial wastewater pre-treatment program or all industries discharging to the wastewater treatment system must have current waste discharge permits issued by Ecology. Spokane County has an industrial wastewater pre-treatment program, which requires all industries discharging to the County's system to meet certain water quality

criteria. The treatment facilities must also meet standards for reliability, emergency storage, water quality monitoring for chemical constituents, and time of exposure (CT) values for disinfection. Treatment facilities are required to have redundant units for all key treatment processes so that the entire flow can be treated at all times if one unit is out of service.

At this time, Spokane County has not determined that aquifer recharge is a preferred option for reclaimed water use nor has it selected specific sites for aquifer recharge. If the aquifer recharge option is carried forward, the County would prepare additional engineering studies and conduct additional project-specific environmental review under SEPA. To identify specific recharge sites, the County would prepare a comprehensive aquifer recharge facilities plan or project engineering report. The plan or report would include complete hydrogeologic characterization, including existing potable and non-potable wells, viable recharge locations, hydraulic calculations, assessment of impacts and water rights, geotechnical constraints, and verification of drinking water quality.

In the Spokane Valley, locating percolation basins for aquifer recharge is complicated by the extensive area of wellhead capture zones and the large number of wells. As Figure 3-4 illustrates, the wellhead capture zones extend throughout the area east of Spokane.

The area required for percolation basins is determined by the flow rate of the reclaimed water, local hydraulic conductivity, the depth of the infiltration pond, and the depth the water will percolate to reach the aquifer. Preliminary calculations indicate that the size of a percolation basin in the Spokane Valley would be approximately 60 acres ~~range from 25 acres to 61 acres~~ to handle an 8 mgd discharge from the SCRWRF and ~~75 to 80~~ approximately 180 acres for a 24 mgd for discharge. Site-specific studies would determine the exact size needed.

A potential opportunity that the County may consider is aquifer recharge combined with a wetland enhancement project at the Saltese Flats area. If this concept were developed, the surface percolation basins would be located down gradient of the wetland enhancement area. Reclaimed water applied to the wetlands would meet all the water quality requirements for wetland enhancement and creation (see Section 3.2). In addition, the reclaimed water would receive additional water quality treatment while it is in the wetland. This potential site would have the advantage of being located some distance from the wellhead capture zones for the City of Spokane's wells, maximizing the additional water quality treatment in the soil and vadose zone.

Impacts

It is anticipated that the water quality of the Spokane Aquifer will not be negatively impacted as a result of selecting aquifer recharge as a reclaimed water use alternative. Spokane County will comply with all state requirements for treatment and use of reclaimed water. The state requirements were developed to protect water quality and public health. The state requirements include monitoring to ensure that water quality requirements are met.

Aquifer recharge could provide a small increase to flows in the Spokane River. ~~would increase water levels in the Spokane Aquifer providing a benefit for regional water supply.~~

No Action Alternative

Under the No Action Alternative, there would be no use of reclaimed water other than on-site irrigation and the supply of water for non-potable uses, such as construction dust control and street cleaning. All treated wastewater from the SCRWRF would be discharged to the Spokane River. Because reclaimed water would not be applied to the surface or recharged to the aquifer, there would be no direct impacts to groundwater. Because of the high level of treatment that will be provided by the SCRWRF, no impacts to groundwater quality are anticipated from discharge to the Spokane River. The 2002 SEIS on the treatment facility (Spokane County, 2002b) and the 2006 Addendum (Spokane 2006a) provide a more detailed discussion of potential impacts.

Under the No Action Alternative, there would be no use of reclaimed water to offset withdrawals from the Spokane Aquifer and no recharge of aquifer levels. Continued pumping at current levels without augmentation may lead to water supply problems in the Spokane Valley in the future.

3.3.3 Mitigation

3.3.3.1 Construction

Reclaimed Water Use Alternatives

Mitigation measures to minimize construction impacts to groundwater would include those described in Section 3.2, Surface Water. In addition, contractors would be required to meet the following mitigation measures:

- Require monitoring of on-site soils for contamination and mitigate contaminated soils in accordance with local, state, and federal regulations if encountered during construction.
- If needed, develop a dewatering plan that includes strategies for collecting and disposing of dewatering water and a monitoring program for groundwater withdrawal to avoid groundwater contamination.
- Develop a Spill Prevention and Control Plan to prevent fuel, chemical, or other pollutants from reaching groundwater.
- Conduct site specific hydrogeologic studies prior to construction associated with wetland creation or enhancement and aquifer recharge.

No Action Alternative

There would be no construction under the No Action Alternative; therefore, there would be no construction impacts to mitigate.

3.3.3.2 Operation

Reclaimed Water Use Alternatives

Because Spokane County would meet all state water quality requirements for reclaimed water, no water quality impacts to groundwater are anticipated from any of the reclaimed water use alternatives. Therefore, no mitigation is required. Spokane County would develop monitoring programs in accordance with state guidelines to ensure that water quality standards are continually being met. No impacts would occur to groundwater quantity other than the beneficial impacts of augmenting groundwater supplies. The County will continue to monitor ongoing research on the effects of EDCs and potential options for treatment of these compounds. The findings will be incorporated into the County's wastewater management approach as appropriate.

No Action Alternative

There would be limited use of reclaimed water under the No Action Alternative and no impacts from reclaimed water use; therefore, no mitigation is required.

3.4 Environmental Health

3.4.1 Affected Environment

The following section describes the environmental health risks associated with construction of conveyance lines and appurtenant structures to distribute reclaimed water and the use of reclaimed water under the four alternatives. The two environmental health issues associated with implementing a program for the use of reclaimed water are related to the potential for encountering hazardous materials during construction, and the potential for risks to human health from contact with reclaimed water.

All reclaimed water will meet or exceed Class A standards, which have been deemed safe for human contact except for drinking. Refer to Chapter 1 for a detailed description of Class A water treatment standards.

3.4.1.1 Hazardous Materials Overview

Hazardous materials are normally classified based on laws and regulations that define their characteristics and use. Typical categories include hazardous waste, dangerous waste, hazardous substances, and toxic substances.

The U.S. Environmental Protection Agency (EPA) and Ecology maintain databases that monitor sites with potential and confirmed releases of chemicals to the environment and facilities that manage hazardous materials. Ecology's Facility/Site database was accessed on December 5, 2007 and a query for leaking underground storage tanks (LUST) and other hazardous materials was conducted along the potential conveyance lines and at the sites identified for potential use of reclaimed water under the four reclaimed water use alternatives. The only site identified as a hazardous site is the Spokane County Interstate Fair and Expo Center. A hazardous waste generator and an underground storage tank

were both identified in the vicinity of the Fair and Expo Center. Similar searches and additional investigations would be conducted on reclaimed water use sites and conveyance routes if the County selects a specific project as part of its reclaimed water use program.

3.4.1.2 Human Health

A common public concern about the use of reclaimed water is the potential risk to human health that could occur from contact with reclaimed water. Properly treated and managed reclaimed water is safe for many non-potable uses. In other states, reclaimed water has been safely used for decades.

Reclaimed water has been used for over 10 years in Washington State. By the end of 2004, 17 reclaimed water facilities had been constructed or upgraded to operate under the State's Reclaimed Water Act of 1992. Jurisdictions within Clallam, Mason, Thurston, King, Island, Grant, Spokane, and Walla Walla Counties are currently using reclaimed water for crop irrigation, toilet flushing, dust control, construction water, industrial cooling, wetland creation, groundwater recharge, and streamflow augmentation services (Ecology, 2005).

To protect human health, the State of Washington requires that reclaimed water be treated to standards specific to the uses to which it will be put (Washington State Departments of Health and Ecology, 1997). See Section 1.2.1.2 for a description of those standards. The most stringent standards are applied to uses that have potential for human contact. All reclaimed water produced by Spokane County will meet or exceed Class A standards, which is designed to be safe for all human contact except drinking.

Health risks increase when there is human contact with reclaimed water that has been inadequately treated. These potential health risks include gastrointestinal illnesses caused by bacteria, viruses, other pathogens, or parasites in the inadequately treated water. As described in Section 3.4.2.2, it is highly unlikely that these hazards will be encountered through the use of reclaimed water produced at the SCRWRF because of the high level of treatment and high level of redundancy and reliability in the system.

3.4.2 Impacts

3.4.2.1 Construction

Reclaimed Water Use Alternatives

Conveyance pipelines will be built within existing rights-of-way; therefore, it is unlikely that any new hazardous materials would be discovered during construction. Figure 2-1 identifies the potential locations of the conveyance routes. As stated earlier, two known hazardous sites are located in the vicinity of the Spokane County Interstate Fair and Expo Center. No known hazardous sites have been identified at other example reclaimed water use sites or along proposed conveyance routes. If the County implements reclaimed water use, additional studies would be conducted prior to construction to identify any potential hazardous material locations in the areas of construction.

Spills of fuels, oils, lubricants, or other substances could occur during transport of construction materials or equipment or on site during construction. No significant adverse impacts are anticipated as a result of construction related activities. The risk of spills during construction is similar to risks posed by other construction projects.

No Action Alternative

Since no construction would occur with this alternative, there would be no construction impacts.

3.4.2.2 Operation

Reclaimed Water Use Alternatives

No significant human health impacts are anticipated because all reclaimed water processed at the SCRWRF will meet or exceed Class A standards (see Section 1.2.1.2) and will be safe for human contact, except for direct consumption. Conveyance lines will meet state standards to maintain separation between potable and non-potable water pipes. Water spigots and other appurtenances used for reclaimed water will be labeled as non-potable and not safe for drinking.

Reclaimed water could be inadvertently released to the environment from a pipeline break. Routine pipeline maintenance and monitoring would be conducted to detect any malfunctions and minimize the risk of leakage. There would be no significant risk to human health because the water will meet or exceed Class A standards.

Irrigation of Urban Green Spaces Alternative

This alternative has the highest potential for public contact with reclaimed water. Water would be used to irrigate public spaces such as golf courses and parks. Irrigation of golf courses would present a lower potential for human contact than irrigation of parks. Golf courses are primarily used by adults who would have limited contact with irrigated surfaces. Public parks are used by a variety of age groups for a variety of activities and would have an increased potential for human contact with irrigated surfaces. Irrigation with reclaimed water will comply with state guidelines to avoid spraying people, drinking fountains and similar surfaces. Watering will be applied at levels commensurate with vegetation uptake to limit the potential for ponding at irrigated sites. Signage will direct people to avoid consumption of reclaimed water. Because reclaimed water is safe for human contact except drinking, no health problems are anticipated from contact with reclaimed water.

Reclaimed water has been safely used for several years to irrigate public spaces for recreation in several jurisdictions in Washington and in other states. A search of publications and database revealed no reports of health problems associated with treated and properly managed reclaimed water.

Industrial Reclaimed Water Use Alternative

Adverse operational impacts are not expected under this alternative. The water for industrial use will meet or exceed Class A standards and would be contained in closed systems so no exposure to humans would occur. Wastewater from the industrial reclaimed water use would be treated on site prior to discharge to surface waters or would be discharged to the sanitary sewer for treatment. In the example of reclaimed water use at IEP, reclaimed water would be used for non-contact cooling purposes and other general mill uses. The water would be treated on site prior to discharge to the Spokane River or would be discharged to the sewer system through the County's industrial pretreatment program.

Wetlands Creation and Enhancement Alternative

In the Saltese Flats example, the enhanced wetland would be located in a rural area. The County may establish walking or interpretive trails around the wetland to enhance wildlife viewing, but there would be no water-contact recreation at the site. The Chester Creek wetland restoration area example would also have limited public access.

Adverse impacts to human health are not expected with this alternative since reclaimed water produced from the SCRWRF would be safe for non-consumptive human contact.

Aquifer Recharge Alternative

The potential environmental health impacts associated with the use of reclaimed water for aquifer recharge are discussed in Section 3.3, Groundwater. Because the reclaimed water from the SCRWRF will be highly treated, no human health impacts are anticipated from the aquifer recharge alternative.

No Action Alternative

Risks to human health related to discharge of reclaimed water to the Spokane River were analyzed in the 2002 Supplemental EIS on the 2002 Wastewater Facilities Plan and additional information was provided in the 2006 Addendum to the EIS. Because of the high quality of the effluent, no impacts are anticipated.

3.4.3 Mitigation

3.4.3.1 Construction

Reclaimed Water Use Alternatives

Because the construction impacts would be similar for all proposed reclaimed water use alternatives, mitigation measures would be similar. Mitigation measures that would be implemented to minimize risks associated with encountering contaminated soils, to minimize the risk of accidental leaks or spills, and to respond to any adverse effects of hazardous materials during construction would include:

- Compliance with hazardous waste regulations (Model Toxics Control Act (MTCA) rules per Chapter 173-340 WAC) and standard procedures to determine the nature and extent of site contamination.
- Conveyance route-specific inventories would be conducted to identify contaminated or potentially contaminated sites adjacent to pipeline construction areas.
- A hazardous substance management plan would be prepared to specify procedures, including identification, storage, and disposal, for work in areas where contaminated soil could be encountered.
- If contaminated sites were encountered, appropriate measures would be implemented to initiate hazardous materials cleanup. Any contaminated soils encountered would be disposed of at approved sites. Construction could be phased with cleanup activities to avoid contaminated areas in the event those sites are currently undergoing cleanup.
- Site work would be conducted in compliance with the Occupational Safety and Health Administration (OSHA) and Washington Industrial Safety and Health Act (WISHA) standards for the protection of worker health.
- A Spill Prevention, Containment, and Control Plan (SPCCP) would be prepared prior to construction. All applicable safety and environmental regulations for handling chemicals and responding to emergencies would be followed as described in the plan.
- Construction areas would be fenced to prevent public access where appropriate.

3.4.3.2 Operation

Reclaimed Water Use Alternatives

In addition to the water quality standards for reclaimed water uses, the State of Washington has established guidelines for establishing BMPs that are included as permit conditions for areas of reclaimed water use (Washington State Departments of Health and Ecology, 1997). Spokane County would comply with these permit conditions, which are designed to safeguard public health. No additional mitigation is proposed. The state guidelines include:

- The public and employees shall be notified of the use of reclaimed water at all use areas. This shall be accomplished by posting advisory signs at use areas, notices on scorecards, distribution of written notices to residents or employees, or by other methods.
- Precautions shall be taken to assure that reclaimed water will not be sprayed on people or any facility or area not designated for use of reclaimed water, including but not limited to buildings, passing vehicles, and drinking water fountains.
- Maximum attainable separation between reclaimed water lines and potable water lines shall be practiced. A minimum horizontal separation of 10 feet shall be maintained between reclaimed water lines and potable water lines. When

crossing, a minimum vertical separation of 18 inches shall be maintained between reclaimed water lines and potable water lines in accordance with the 1985 Edition of Criteria for Sewage Works Design, Washington Department of Ecology, and the potable water line shall be above the reclaimed water line unless otherwise approved by the Washington Departments of Health and Ecology.

- All reclaimed water valves, storage facilities, and outlets shall be tagged or labeled to warn the public or employees that the water is not intended for drinking. The signage or advisory notification shall be colored purple with white or black lettering. Signs or notification should read "Reclaimed Water Do Not Drink" or other advisory or education language acceptable to the Washington Departments of Health or Ecology.
- All reclaimed water piping, valves, outlets and other appurtenances shall be colored purple to identify the source of the water as being reclaimed water.

No Action Alternative

Because no impacts to environmental health were identified in the 2002 SEIS and 2006 Addendum, no mitigation measures were proposed.

3.5 Plants and Animals

The following section describes the plants and animals in the project area with an emphasis on those that are listed as threatened, endangered, or candidate species by the state or federal government, and on state sensitive species. Impacts of each of the proposed alternatives on plants and animals are discussed.

3.5.1 Affected Environment

Habitat within Spokane County ranges from shrub-steppe in the lower scabland areas to sub-alpine mountainous areas. This habitat diversity supports a wide variety of plant species and wildlife. The project area is located in four jurisdictions including the cities of Spokane and Spokane Valley, the City of Millwood, and Spokane County. The areas of interest have been mostly developed, but contain small undeveloped areas, especially in the more eastern parts of the County.

The City of Spokane (Spokane Municipal Code 11.19.2566(A), Spokane County (Spokane County Code 11.20.060), and the City of Spokane Valley (Spokane Valley Municipal Code 10.20) have all adopted critical area ordinances that are in place to protect plants and animals. All jurisdictions, with the exception of the City of Millwood, use the Washington State Department of Fish and Wildlife (WDFW) Priority Habitats and Species (PHS) Program to identify and regulate critical fish and wildlife habitat conservation areas within their jurisdiction.

3.5.1.1 Threatened, Endangered and Priority Species

Prior to construction of Grand Coulee Dam, several types of anadromous fish migrated through the Spokane River and spawned in the river and its tributaries. Access to the

Spokane River has been blocked since the 1940s. Consequently, there are no threatened or endangered anadromous species in the project area. The Washington Department of Fish and Wildlife's (WDFW) Priority Habitat and Species (PHS) maps for the project area indicate that the Spokane and Little Spokane Rivers are priority habitats for resident rainbow trout (WDFW, 2008). The U.S. Fish and Wildlife Service (USFWS) list of threatened and endangered species for the project area does not list any fish species (USFWS, 2007). See Appendix B for the USFWS species list for Spokane County.

The USFWS lists gray wolf (*Canis lupus*) as an endangered species and the plants Spalding's silene (*Silene spaldingii*), Ute ladies'-tresses (*Spiranthes diluvialis*), and water howellia (*Howellia aqautilis*) as threatened species that may occur in the vicinity of the sample projects (USFWS, 2007). The Washington Department of Natural Resources (WDNR) Natural Heritage Database indicates that water howellia and Spalding's silene are located in the vicinity. It is unlikely that Ute ladies'-tresses are found in the study area since there is no suitable habitat for this species. However, site specific surveys would be required in areas where specific reclaimed water use projects and conveyance lines are proposed. WDFW priority habitat species (PHS) data indicates that gray wolves (currently listed as state endangered in Washington) have been documented as occurring in the hillsides surrounding the Chester Creek drainage (WDFW, 2008). ~~However, the gray wolf was federally delisted from the eastern portion of Washington effective March 28, 2008 due to the fact that targeted recovery goals for the distinct population segment have been met.~~

The PHS maps indicate that priority habitat areas for the following species are found in the study area and include:

- Bird species: In general, the priority habitats for bird species are located along the Spokane River. Mountain quail are located in upland habitat south of the Spokane River. Osprey have been identified in the Saltese Flats area and along the Spokane River near the City of Millwood. Important waterfowl concentrations are also associated with the Saltese Flats area. Merlin, peregrine falcon, gyrfalcon, and tundra swans have also been documented in the vicinity; however, they are several miles from the proposed alignments.

- Butterfly species: Compton tortoiseshell and thicket hairstreak. These butterfly species are listed as monitor species by WDFW. Butterfly habitat is located in the hills north and south of the river. Compton tortoiseshell and thicket hairstreak have been documented along the hills west of Chester Creek and Dishman Road. One area of Compton tortoiseshell habitat is found along the mainstem Spokane River outside the study area.

- Mammals: White-tailed deer habitat is generally associated with hills to the south of the Spokane River and along the hills and riparian corridor associated with the Little Spokane River to the north. Rocky Mountain elk habitat has also been identified south of the Spokane River and includes areas extending into the City of Spokane Valley near Dishman Road and the Chester Creek drainage and areas

surrounding Saltese Flats. Gray wolves have been documented as occurring along hillside slopes in the vicinity of the Chester Creek drainage.

- Fish: Rainbow trout are a resident game fish and may be found within the Spokane River, Little Spokane River, and Hangman Creek. Resident fish have also been identified as occurring in a portion of Saltese Creek from Shelley Lake upstream approximately one-mile.
- Cliffs/Bluffs: Cliff/bluff habitat has been identified immediately west of Plante's Ferry Park.
- Urban Natural Open Space: This habitat is mapped around the majority of the Spokane River, around Shelley Lake and a small portion of Saltese Creek, and includes some of the hills west of Chester Creek.

3.5.1.2 Fish Species

Fish that are present in the Spokane River include:

- speckled dace
- northern pikeminnow
- largescale sucker
- rainbow trout
- kokanee salmon
- brook trout
- yellow perch
- largemouth bass
- redside shiner
- longnose sucker
- cutthroat trout
- Chinook salmon
- brown trout
- brown bullhead
- pumpkinseed sunfish

The Chinook and kokanee salmon in the list are present in the Spokane River because of entrainment from the Lake Coeur d'Alene fishery (National Marine Fisheries Service, 2004). No endangered or threatened fish species occur within the Spokane River or tributary streams within the study area.

3.5.2 Impacts

3.5.2.1 Construction

Reclaimed Water Use Alternatives

Construction impacts associated with installation of conveyance lines and associated structures would be similar for all of the proposed alternatives because construction activities would be similar.

Construction is unlikely to have significant adverse impacts on plants and animals since the majority of construction would occur within existing road rights-of-way. However, proposed installation of conveyance lines across streams and within wetland areas includes open cut trenching and use of cofferdams. The placement and removal of

cofferdams and excavation within streambeds at crossings would likely result in temporary increases in turbidity and sedimentation and temporarily prevent or hinder upstream and downstream migration of fish species.

Plants and animals could be impacted if the construction footprint extends beyond improved rights-of-way into undisturbed sites; however, this is not anticipated for the majority of conveyance lines as discussed above. Conveyance facilities installed in undisturbed areas could potentially result in animal species avoiding the area temporarily during construction activities. They could also abandon habitat for less suitable habitat, a more serious impact, which may result in increased competition for available resources in other areas, including breeding sites, forage areas, and nesting/den sites. If fuels or other pollutants are spilled, individual organisms could be harmed directly or indirectly through contact with contaminated water. Plants and animals could also be impacted if contaminated sites were encountered and disturbed during construction.

Wetlands Creation and Enhancement Alternative

The construction of conveyance lines to wetland creation or enhancement areas has a higher potential to impact plants and animals due to greater potential for excavation to occur outside existing rights-of-way. Saltese Flats has been identified as a potential site for the use of reclaimed water. The WDNR database has identified two state-sensitive and one state and federally threatened plant species in the Saltese Flats area including Canadian St. John's wort (*Hypericum perforatum*) (state sensitive), Wilcox's penstemon (*Penstemon wilcoxii*) (state sensitive), and Spalding's silene (state and federally threatened). Water howellia (state and federally threatened) has been identified as occurring southeast of the intersection of I-90 and Sprague Avenue. Excavation in areas outside road rights-of-way could harm individual species and alter/modify existing habitat to the extent that it does not function to support the species. Potential routes south of the Spokane River should be surveyed for these species prior to construction activities.

The potential Chester Creek wetland restoration area is located in a designated urban natural open space and contains regular concentrations of Rocky Mountain elk and to a lesser degree northwest white-tailed deer (WDFW, 2001). The gray wolf, currently listed as state endangered, has also been observed along the hillsides in the Chester Creek drainage. Saltese Flats is also used by large concentrations of waterfowl. These species are highly mobile and are likely to avoid construction activities but would likely return to the area following construction.

Aquifer Recharge Alternative

Construction of the percolation basins for aquifer recharge could require the excavation of up to 180 acres of land, depending on the reclaimed water flow rate and other factors. This excavation will require the removal of plants and construction could disrupt animal species in the area. The WDNR database has identified two state-sensitive and one state and federally threatened plant species in the Saltese Flats area including Canadian St. John's wort (*Hypericum perforatum*) (state sensitive), Wilcox's penstemon (*Penstemon wilcoxii*) (state sensitive), and Spalding's silene (state and federally threatened). Other

species that could potentially be impacted by construction of the percolation basin include birds, mammals, and reptiles. These species would be permanently displaced from existing grassland habitats. The construction of the percolation basin would also result in the permanent loss of foraging habitat for birds, reptiles, and grazing mammals.

No Action Alternative

Since there would be no construction associated with this alternative, there would be no construction impacts.

3.5.2.2 Operation

Irrigation of Urban Green Spaces Alternative

The use of reclaimed water at any of the potential urban green space sites, including the Spokane County Interstate Fair and Expo Center, Spokane Esmeralda Golf Course, the County Plante's Ferry Park, or the Painted Hills Golf Course, would have minimal impacts to plants and animals. Vegetation at these sites is generally ornamental turf and landscape plantings. No priority habitats or species have been identified as occurring at these sites and are not likely to occur in these or other similarly landscaped areas.

Industrial Reclaimed Water Use Alternative

Potential impacts to plants and animals are minimal for industrial reclaimed water use. Reclaimed water would be used for processing at the facilities. Some industrial users may discharge process water to the Spokane River. These discharges would be required to meet the requirements of their individual NPDES permits in addition to meeting the TMDL requirements imposed by Ecology. The Spokane River contains resident rainbow trout, a priority species. Since, discharges are regulated for protection of several use designations, it is anticipated that reclaimed water discharged to the Spokane River from industrial facilities, such as the IEP, would have no measurable impact to aquatic species or species that rely on them for food, such as osprey and bald eagle.

Wetlands Creation and Enhancement Alternative

The following opportunities have been identified as potential areas to create or restore wetlands using reclaimed water:

- Restoration of the Saltese Flats area located southwest of Spokane Valley.
- Enhancement of the Chester Creek wetland restoration area.

For any site chosen for wetland creation or enhancement, the reclaimed water would be subject to biological criteria set forth in the standards for wetlands receiving reclaimed water (Health and Ecology, 1997). Biological criteria will be used to provide protection for the existing or planned structure and function of the natural or constructed beneficial use wetland.

Biological criteria include wetland structural components such as vegetation, macro-invertebrates, amphibians, fish, and birds. Special biological criteria are established for threatened or endangered species as defined in the WAC. Biological criteria will be used to evaluate pre-existing conditions with respect to discharge to natural wetlands and the mature conditions in constructed beneficial use wetlands. Biological criteria will not be

reduced more than 25 percent compared to pre-existing conditions over the entire area of the natural or constructed wetland and by no more than 50 percent at any one station. Sampling methodology and numbers of stations would be determined on a case by case basis. However, for constructed wetlands, the biological criteria will not be enforced for the first five years of operation (Health and Ecology, 1997).

For example, selection of the wetland creation/enhancement alternatives at the Saltese Flats or Chester Creek wetland restoration areas would result in the discharge of highly treated reclaimed water directly into created, historic, or existing wetland systems. The quality of the reclaimed water would meet surface water quality standards and be further conditioned through the Ecology permit.

The potential impacts to biological resources from the discharge of highly treated water are generally related to nutrients, metals, and temperature. Risks associated with bacteria, viruses, and other pathogens largely relate to human health and are discussed in Sections 3.3 and 3.4.

Nutrients such as nitrogen and phosphorus, and metals including cadmium, lead, mercury, and copper, may be present in highly treated water at very low levels. However, adverse impacts to plants and animals from the presence of excess nutrients or metals, resulting from the wetland creation/enhancement discharge alternative, are not expected because the effluent would meet water quality standards designed to protect humans and biological resources. The temperature of the effluent should be sufficiently cooled by its travel through the length of buried conveyance line, which will not result in adverse impacts to plants and animals at points of discharge.

Impacts to plants and animals could also be associated with introducing water to the created wetland area or to areas where wetlands would be enhanced. The impacts could be positive or negative depending upon the species present. The level of water within the wetland dictates which species occupy and thrive in the environment. In the case of an enhanced wetland, additional water may alter the species composition and diversity within the wetland. A constructed wetland would produce vegetation that responds to the established hydrologic regime. The creation/enhancement of wetlands in open field habitat such as those at Saltese Flats may result in loss of foraging habitat for raptors and large mammals such as deer and elk, displace burrowing mammals, and alter the vegetative community. It may also create new habitat for other species that previously did not utilize the area, including amphibians, wetland plant species, and waterfowl.

The wetlands have essentially no erosive conditions to carry sediment out of the wetlands so they would tend to fill in over time. If this were to occur, the wetlands could cease to provide open water habitat. Maintenance may be required to maintain open water habitats, if desired.

Endocrine Disrupting Chemicals

As discussed in Section 3.3, the tertiary treatment proposed for the SCRWRF, including the MBR treatment, would remove a substantial portion of suspected endocrine disrupting chemicals (EDCs). However, some endocrine disruptors may pass through the

treatment system and be discharged (Stalschmidt-Allner et al., 1997; Ternes et al., 1999). The effects of these chemicals on animals, fish, and birds are uncertain. However, studies performed in laboratory settings suggest that EDCs could adversely impact fish and wildlife species.

The International Programme on Chemical Safety (IPCS) has recently reviewed hundreds of studies related to the effects of EDCs on wildlife including mammals, birds, reptiles, amphibians, fish, and invertebrates in the *Global Assessment of The State-of the-Science of Endocrine Disruptors* prepared for the World Health Organization (WHO), the International Labour Organization, and the United Nations Environmental Programme. Currently there is too little evidence to make direct correlations about EDCs and the population health of fish and wildlife species and/or populations. Currently, state and federal water quality standards and criteria do not consider endocrine disruptor effects. National as well as international research is being conducted on this issue. Spokane County will continue to monitor research results and incorporate findings into its wastewater management approach as appropriate. Appendix C contains a more detailed discussion of potential effects of EDCs on wildlife as described in the IPCS document.

Aquifer Recharge Alternative

Impacts to plants and wildlife are expected to be generally positive from aquifer recharge of reclaimed water. The aquifer recharge alternative could increase groundwater levels. The increased groundwater levels will augment flows in downstream wetlands and water bodies, potentially improving habitat conditions for fish and wildlife.

Highly treated water would be released to constructed percolation basins and would have similar quality to the groundwater once the water reaches the groundwater. The water would filter through the soil and eventually mix with groundwater prior to reaching surface waters. Surface percolation provides additional treatment beyond that achieved at treatment facilities. Therefore, no negative impacts to surface water quality are anticipated.

If the Saltese Flats area is selected as a site for aquifer recharge, impacts to plants and animals would be similar to those of the Wetlands Creation or Enhancement Alternative. Aquifer recharge is also expected to increase flows in the Spokane River, benefiting resident fish.

No Action Alternative

Under the No Action Alternative, the majority of reclaimed water produced at the SCRWRF would be discharged to the Spokane River. Adverse impacts to fish species from the No Action Alternative are considered unlikely because the requirements of the NPDES Permit and further requirements of the TMDL will regulate the quality in the river using criteria which is protective of aquatic life. (See more detailed discussion in the 2002 SEIS and 2006 Addendum.)

3.5.3 Mitigation

3.5.3.1 Construction

Reclaimed Water Use Alternatives

The majority of the proposed reclaimed water will be conveyed along existing road rights-of-way. Therefore adverse impacts to plants or animals are expected to be limited as a result of construction of conveyance facilities. However, in areas where the proposed conveyance lines occur in undeveloped areas such as the Saltese Flats area, there is the potential for disturbance to priority plant species. The following mitigation measures could be implemented to minimize the adverse effect of construction on plants and animals:

- Construct conveyance lines and associated structures along existing developed rights-of-way where possible.
- Use BMPs for all construction activities to minimize erosion and sedimentation impacts.
- Survey potential routes and construction areas in undeveloped lands for target species prior to final design.
- If plant species are encountered and are to be removed, all plants should be retained along with entire root system and replanted in similar habitat by a qualified biologist or botanist.
- Following construction, disturbed areas should be stabilized and replanted with a native seed mix where native grasses occur or be replanted with native woody tree/shrub species in forested areas.

No Action Alternative

There would be no construction impacts under the No Action Alternative; therefore, no mitigation is required.

3.5.3.2 Operation

Reclaimed Water Use Alternatives

Irrigation of open green spaces and industrial reclaimed water use, would have no adverse impacts to plants and animals. Impacts to plants and wildlife from the creation or enhancement of wetlands and aquifer recharge are expected to be beneficial in the long-term. However, impacts to priority plant species could occur from changes in hydrology. These impacts could be mitigated by:

- Surveying the area for priority plant species in potential wetland creation/enhancement areas.
- Design concepts should take into consideration the habitat requirements for priority plant species, if present.
- Water quality, plant diversity/health, and use by wildlife should be monitored prior to construction and for several years following construction.

No Action Alternative

Under the No Action Alternative, reclaimed water would be discharged to the Spokane River. While phosphorus loading would be within requirements of the NPDES permit, the additive effects of increased phosphorus loading from discharge could contribute to problems with low dissolved oxygen levels in the warmer summer months in the lower Spokane River. Impaired water quality would impact fish and wildlife; however, discharge of reclaimed water into the river could increase flows. Mitigation for these impacts would be difficult to address and likely cost prohibitive. Possible mitigation may be to increase water circulation (flow) or providing aeration facilities along the lower river. Mitigation measures for the No Action Alternative, were described in the 2002 SEIS and the 2006 Addendum. In addition to compliance with the NPDES permit, mitigation measures include revegetation of the river bank to increase shade and reduce water temperature and compliance with requirements of the HPA.

3.6 Land Use

This section describes potential impacts to land use associated with the various alternatives identified in the Reclaimed Water Use Study, including consistency with adopted land use plans, policies, and regulations.

3.6.1 Affected Environment

The reclaimed water conveyance routes, associated facilities and potential end-users under consideration fall within the jurisdictions of Spokane County, the City of Spokane, the City of Spokane Valley, and the City of Millwood. As the specific projects have not been identified, the following is a general description of the relevant land use regulations within the study area, including comprehensive plans, zoning codes, and shoreline master programs (SMPs).

3.6.1.1 Comprehensive Planning

The Washington Growth Management Act (GMA) of 1990 requires that cities and counties prepare comprehensive plans that conform to GMA goals and urban growth area designations, and to population projections developed under the GMA planning process.

Spokane County

In November 2001, Spokane County adopted a revised Comprehensive Plan based on revisions to the 1994 *Countywide Planning Policies* document (Spokane County, 2004 and 2007b). The plan has since been revised to reflect the County's priorities for growth in the region. The latest Comprehensive Plan amendment was adopted on April 10, 2007 (Spokane County Resolution 7-0294).

The Spokane County Coordinated Water System Plan (CWSP), the Comprehensive Wastewater Management Plan (CWMP), the Water Quality Management Plan, and the Parks Recreation and Open Space Plan are adopted by reference as part of the Comprehensive Plan (Policy NE.22.1 and PO.1.1, Spokane County, 2007b). The revised Comprehensive Plan, including these other integrated plans, contains goals and policies

for the natural and built environments in Spokane County. More specifically, the Capital Facilities and Natural Environment chapters of the Comprehensive Plan include policies that directly relate to the proposed use of reclaimed water. These policies deal with regional water system planning, water conservation practices, wetlands protection and enhancement, and water quality. More detailed information on these policies and how they apply to the Reclaimed Water Use Alternatives can be found in Section 3.6.2.2.

The Spokane County Wastewater Facilities Plan is consistent with the recently amended Spokane County Comprehensive Plan. The County's Division of Planning and the Utilities Division worked together to develop consistent projections for population, commercial and industrial growth within the County's Sewer Service Area. The estimates of population served by the County's regional wastewater treatment facilities are based on population growth projections, and include extension of service to existing populations in the County not currently served by sewers. These areas have been identified for future connection to the County regional sewer system through the Septic Tank Elimination Program to protect water quality in the Spokane Aquifer.

City of Spokane

The City of Spokane adopted a revised Comprehensive Plan on May 21, 2001 (Spokane, 2001a). The Spokane SMP and the Critical Areas Report are adopted as part of the Comprehensive Plan. The revised Comprehensive Plan, including these other integrated reports, contains goals and policies for the natural and built environments in the City of Spokane. More specifically, the Capital Facilities and Utilities and the Natural Environment chapters of the Comprehensive Plan, and the Water chapter of the Critical Areas Report, include policies that directly relate to the proposed use of reclaimed water. These policies deal with water conservation practices, wetlands protection and enhancement, and water storage. More detailed information on these policies and how they apply to the Reclaimed Water Use Alternatives can be found in Section 3.6.2.2.

City of Spokane Valley

The City of Spokane Valley incorporated on March 31, 2003. The City adopted by reference the Spokane County Comprehensive Plan, while beginning the process to develop and implement its own plan. The City of Spokane Valley Comprehensive Plan was adopted on April 25, 2006 (Spokane Valley, 2006). The Comprehensive Plan contains goals and policies for the natural and built environments in the City of Spokane Valley, and is consistent with Spokane County's Countywide Planning Policies. More specifically, the Capital Facilities and Public Services, SMP, Natural Environment, and Parks and Recreation chapters of the Comprehensive Plan include policies that directly relate to the proposed use of reclaimed water. These policies deal with regional water system planning, water conservation practices, utilities within shoreline jurisdictions, wetlands protection and enhancement, and park planning and maintenance. More detailed information on these policies and how they apply to the Reclaimed Water Use Alternatives can be found in Section 3.6.2.2.

City of Millwood

The City of Millwood, incorporated in October 1927, adopted a Comprehensive Plan on December 3, 2001. The Comprehensive Plan was developed by and for the community to reflect their goals for future growth, how to maintain public services and facilities, and how to protect the natural environment and neighborhood character. The Comprehensive Plan contains policies for GMA compliance, land use, housing, transportation, capital facilities and utilities.

3.6.1.2 Zoning

Spokane County

Spokane County's Zoning Ordinance (Chapter 14) includes reclaimed water conveyance lines and associated facilities in its definition of a Public Utility Distribution Facility. Distribution facilities and appurtenant structures are permitted in all residential, commercial, industrial, mining, and agricultural zones. There are no zoning ordinances prohibiting reclaimed water facilities or its use.

City of Spokane

Development in the City of Spokane is directed by the Spokane Municipal Code (SMC) Title 11 Regulation of Building and Land Use and Title 17 Unified Development code. The City allows sewage treatment plants and related facilities in all zones by Special Permit. A Special Permit can be granted by the Hearing Examiner for reclamation facilities in any zone, subject to conditions and standards as deemed necessary by the Examiner (Article IV: Special Uses, Subsection 11.19.310: Uses by Special Permit in Any Zone, Spokane Municipal Code–Land Use; City of Spokane, 2001b). Special Permit decisions by the Examiner can only be appealed to Superior Court.

City of Spokane Valley

Upon incorporation, the City of Spokane Valley adopted by reference the Spokane County Zoning Code (SVMC 10.30.060). On April 13, 2004, the City adopted its own Municipal Code (SVMC), including zoning regulations. The SVMC was last amended on October 28, 2007. Public Utility Distribution Facilities, including reclaimed water conveyance lines and associated facilities, are a permitted use in all zoning districts (SVMC 19.120).

City of Millwood

Title 17 Zoning of the Millwood Municipal Code (MMC) contains the town's Zoning Ordinances and Map, last amended December 4, 2006. Reclaimed water facilities are not prohibited within any of these zones.

3.6.1.3 Shoreline Master Programs

Portions of specific projects to deliver reclaimed water to end users may require crossing the Spokane River, a state shoreline as defined by RCW 90.58.030(2)d. Generally, development in and within 200 feet of the river are governed under the local government's shoreline master programs developed under the authority of the state's

Shoreline Management Act (SMA) (Chapter 90.58 RCW). Local shoreline master programs (SMPs), which must be approved by Ecology, are intended to protect shoreline ecology, public access, and water-dependent uses, and to require mitigation of impacts where appropriate. The following sections describe the SMP regulations for the jurisdictions within the study area.

Spokane County

The Spokane County SMP was originally adopted in 1975 (Spokane County, 1975). The program regulates development within 200 feet of the ordinary high water mark of streams with flows greater than 20 cubic feet per second (cfs), and lakes, impoundments, and reservoirs larger than 20 acres. ~~The County is currently undergoing the process of updating the SMP, planned for completion in 2008.~~The Spokane County Board of County Commissioners adopted a revised SMP in May 2009 and has forwarded it to Ecology for review and approval.

A shoreline Substantial Development Permit is required for any development within designated shoreline areas. Shorelines in Spokane County are classified in five categories: Natural, Pastoral, Conservancy, Rural, or Urban. Spokane County's SMP allows utility transmission lines, including those used for reclaimed water, in all categories except those designated Natural Area (Spokane County, 1975). Shoreline designations along the Spokane River where reclaimed water pipelines are likely to cross are designated as Conservancy Areas. Transmission lines traversing Conservancy Areas must meet the following conditions (Section 9.2):

- Transmission lines may cross a shoreline area only when necessary to reach the ultimate destination;
- Routes shall be chosen to avoid clear cutting; and
- Transmission lines may cross rivers or streams only by attachment to public roadway bridges or by being constructed below stream bottoms.

City of Spokane

The City of Spokane SMP was adopted in 1975 and last amended in 1977. The program sets goals and policies, regulates activities, and authorizes a permit system in a 200-foot shoreline area adjacent to the Spokane River and Latah Creek in compliance with the State SMA. In 1982, the City Council approved a supplement to the SMP containing revised use regulations and administrative procedures (City of Spokane, 1982). The City of Spokane adopted a revised SMP in December 2008. As of June 2009, the adopted SMP was in the review and comment process. ~~Is currently undergoing the process of updating the SMP, which is scheduled to be complete in 2008.~~ Siting of utility lines, including reclaimed water lines, is permitted outright in all current shoreline environments, subject to the following regulations:

- Facilities that must be placed in a shoreline area shall be encouraged to be located underground wherever feasible;

- Upon completion of installation/maintenance projects, the banks shall be restored to a suitable equivalent and replanted with native or suitable exotic species and maintenance care provided until the newly planted vegetation is established; and
- Major transmission line rights-of-ways shall be incorporated to the greatest extent possible into the program of public access (City of Spokane, 1982).

City of Spokane Valley

Under Title 21 of the City of Spokane Valley Municipal Code (SVMC 21.50.010), the City has adopted by reference the 1975 Spokane County SMP. Any development within designated shoreline areas would require a substantial development permit, as described above.

City of Millwood

The City of Millwood adopted the Spokane County (Millwood) SMP as an appendix to the City of Millwood Comprehensive Plan on December 3, 2001. The environmental designations for areas of the proposed alignment within Millwood shoreline jurisdiction correspond to those within Spokane County described above.

3.6.2 Impacts

3.6.2.1 Construction Impacts

Reclaimed Water Use Alternatives

The primary construction associated with all the proposed reclaimed water use alternatives would be the installation of conveyance lines and appurtenant structures to transport the reclaimed water from the SCRWRF to the points of use. The majority of new facilities would be installed within road rights-of-way and may temporarily impede the ingress and egress of adjacent properties. If specific reclaimed water projects require crossing the Spokane River, there could be temporary impacts to shoreline access and use of the river during construction.

Irrigation of Urban Green Spaces Alternative

Under this alternative, access to, and use of, recreational facilities may be temporarily limited or rerouted during construction and until vegetation is re-established. The installation of reclaimed water irrigation facilities would not change or prohibit any existing uses of urban green spaces.

No Action Alternative

There would be no construction under the No Action Alternative; therefore, there would be no construction impacts to land uses.

3.6.2.2 Operation Impacts

Reclaimed Water Use Alternatives

Table 3-2 lists the regional Comprehensive Plan policies that specifically apply to the potential use of reclaimed water and how this project complies with each.

Table 3-2. Regional Comprehensive Plan Policies for Water Conservation and Use of Reclaimed Water

Policy Number	*Policy Text Summary*	*Project Compliance with Policy*
Spokane County		
CF.6.4	Ensure water system planning is regional in design, utilizing efficiencies of scale and geographic continuity.	The potential Reclaimed Water Use Alternatives would be designed on a regional scale.
CF.6.7	Encourage water purveyors to implement measurable water conservation practices.	The use of reclaimed water is in itself a water conservation practice. Water purveyors would be encouraged to participate in the use of reclaimed water.
CF.7.5	Existing and future sewage disposal systems shall meet or exceed all applicable local, state and federal regulations.	Reclaimed water would meet or exceed all local, state and federal regulations.
NE.13.3	Strive to attain a measurable gain of wetlands function and value.	Implementation of the Wetland Creation and Enhancement Alternative would result in a gain in overall wetlands quantity and quality.
NE.15.6	Protect water quality and quantity within wetlands by preventing overuse of surface and groundwater beyond recharge capacities.	Implementation of the Wetland Creation and Enhancement Alternative would supplement the existing water quantities/baseflow and would contribute to groundwater recharge.
NE.15.13	Recognize and provide protection for wetlands that provide wildlife habitat for priority and species of local significance.	Implementation of the Wetland Creation and Enhancement Alternative would contribute to the overall habitat quantity and complexity.
NE.18.4 and NE.18.10	Promote water conservation practices through education, incentives, and regulations, in cooperation with water purveyors and the public.	By providing an alternative for some uses of potable water, the use of reclaimed water would reduce the amount of water withdrawn from aquifers.
NE.18.11	Special consideration should be given to proposed activities that recycle or find use for wastewater.	Any of the Reclaimed Water Use Alternatives would treat and reuse the wastewater from the SCRWRF.
NE.20.8	Spokane County shall identify causes of water quality problems, and propose and implement solutions where feasible.	The use of reclaimed water would further improve the water quality problems identified in the Spokane River and other water bodies in the area.
NE.22.10	Treated sanitary wastewater shall meet or exceed Ecology standards prior to discharge to surface waters.	Reclaimed water proposed for any of the Reclaimed Water Use Alternatives would meet or exceed all local, state and federal regulations
NE.26.3	Encourage restoration of lost and damaged habitats.	Implementation of the Wetland Creation and Enhancement Alternative would improve the overall quantity and function of existing and/or historical wetland habitats.

Policy Number	*Policy Text Summary*	*Project Compliance with Policy*
City of Spokane		
CFU 5.2	Encourage public and private efforts to conserve water.	Implementation of any of the Reclaimed Water Use Alternatives would enhance potable water availability.
NE 2.1	Begin a water conservation program that decreases household, commercial, industrial, and agricultural water use.	Implementation of any of the Reclaimed Water Use Alternatives would enhance potable water availability.
NE 7.7	Over the long term, increase the quantity and quality of wetlands.	Implementation of the Wetland Creation and Enhancement Alternative would result in a gain in overall wetlands quantity and quality.
Critical Areas, Water – Policy 2	Maximize natural water storage and infiltration opportunities within drainages.	Implementation of the Wetland Creation and Enhancement Alternative would increase the amount of water infiltrating through a natural system.
City of Spokane Valley		
CFP-4.3	Support continued planning for domestic water needs in partnership with water purveyors, the Joint Aquifer Board, Washington State Department of Health and Ecology.	Implementation of any of the Reclaimed Water Use Alternatives would enhance potable water availability.
CFP-4.4	Encourage public and private efforts to conserve water.	Implementation of any of the Reclaimed Water Use Alternatives would enhance potable water availability.
SMP B-Goal 3-Policy 3	Corridors for transportation and utilities should be combined when possible.	Implementation of any of the Reclaimed Water Use Alternatives would design conveyance lines to follow roadway right-of-ways wherever possible, including Spokane River crossings.
NEP-8.6	Encourage public and private groups to consider protection and/or acquisition of wetlands and their buffer areas.	Implementation of the Wetland Creation and Enhancement Alternative would result in a gain in overall wetlands quantity and quality.
NEP-10.1	Participate in cooperative surface and groundwater management efforts with other affected jurisdictions in the region.	The potential Reclaimed Water Use Alternatives would be designed on a regional scale.
PRP-2.4	Encourage innovative strategies and incentives to enhance existing programs for park maintenance, safety and accessibility.	Implementation of the Irrigation of Urban Green Spaces Alternative would reduce the amount of potable water required for irrigation of park and other public lands.
PRP-4.2	Promote appropriate planning and design solutions for parks and recreational facilities to avoid adverse environmental impacts on sensitive areas.	Implementation of the Irrigation of Urban Green Spaces Alternative would provide a means for reducing wastewater discharges to the Spokane River by using reclaimed water to irrigate parks and other public properties.
City of Millwood	There are no specific goals or policies pertaining to the Reclaimed Water Use Alternatives.	

The majority of new pipeline and associated facilities for the conveyance of reclaimed water for the proposed reclaimed water use alternatives would be installed within road rights-of-way or through easements. If a final conveyance route is chosen that requires land acquisition, appropriate compensation will be required. A project-level SEPA analysis will be performed if a preferred project is chosen, which will identify any potential land use impacts from specific pipeline alignments.

Irrigation of Urban Green Spaces Alternative

The use of reclaimed water for irrigation purposes would not change or prohibit any existing uses of urban green spaces. See Chapter 1 for more information on the limitations of reclaimed use, and Section 3.4 for Environmental Health issues.

Wetlands Creation and Enhancement Alternative

Depending on the site or sites chosen, using reclaimed water for the creation or enhancement of wetlands may include the acquisition of land, and a potential change in land use. For example, if the Saltese Flats area were chosen as a wetlands enhancement site, the land would be purchased by the County, changing it from private to public ownership. Although the Comprehensive Plan land use designation would not change from its current "rural conservation," the actual use of the property would change from small-scale agriculture to open space. Both of these uses are consistent with the current land use designation and zoning. This farmland is located outside of designated agricultural centers (Spokane County, 2007b), and as such, its loss would not be considered significant.

If a final application site is chosen that requires land acquisition, appropriate compensation would be required. A project-level SEPA analysis will be performed if and when a preferred project is chosen, which would then identify any potential land use impacts from specific pipeline alignments and wetland sites.

Aquifer Recharge Alternative

Depending on the site or sites chosen, using reclaimed water for aquifer recharge may include the acquisition of land or an easement for installation and operation of the facilities. See also the Saltese Flats example above.

If a final application site is chosen that requires land acquisition, appropriate compensation will be required. A project-level SEPA analysis would be performed if and when a preferred project is chosen, which would identify any potential land use impacts from specific pipeline alignments and recharge sites.

No Action Alternative

Under the No Action Alternative reclaimed water from the SCRWRF would be discharged directly into the Spokane River. No land use impacts are anticipated.

3.6.3 Mitigation

3.6.3.1 Construction Mitigation

Reclaimed Water Use Alternatives

Construction associated with the reclaimed water use alternatives would be subject to all terms and conditions of required construction permits within each jurisdiction, including, but not limited to, building, grading, and shoreline permits. The final project design would undergo a separate SEPA review to analyze the potential for specific project impacts. If necessary, additional mitigation would be specified at that time. Alternative access to adjacent properties may need to be maintained during construction of reclaimed water pipelines and facilities. See Section 3.10.3 for additional traffic mitigation.

No Action Alternative

There would be no land use or shoreline construction impacts associated with the No Action Alternative; therefore, no mitigation is required.

3.6.3.2 Operation Mitigation

Reclaimed Water Use Alternatives

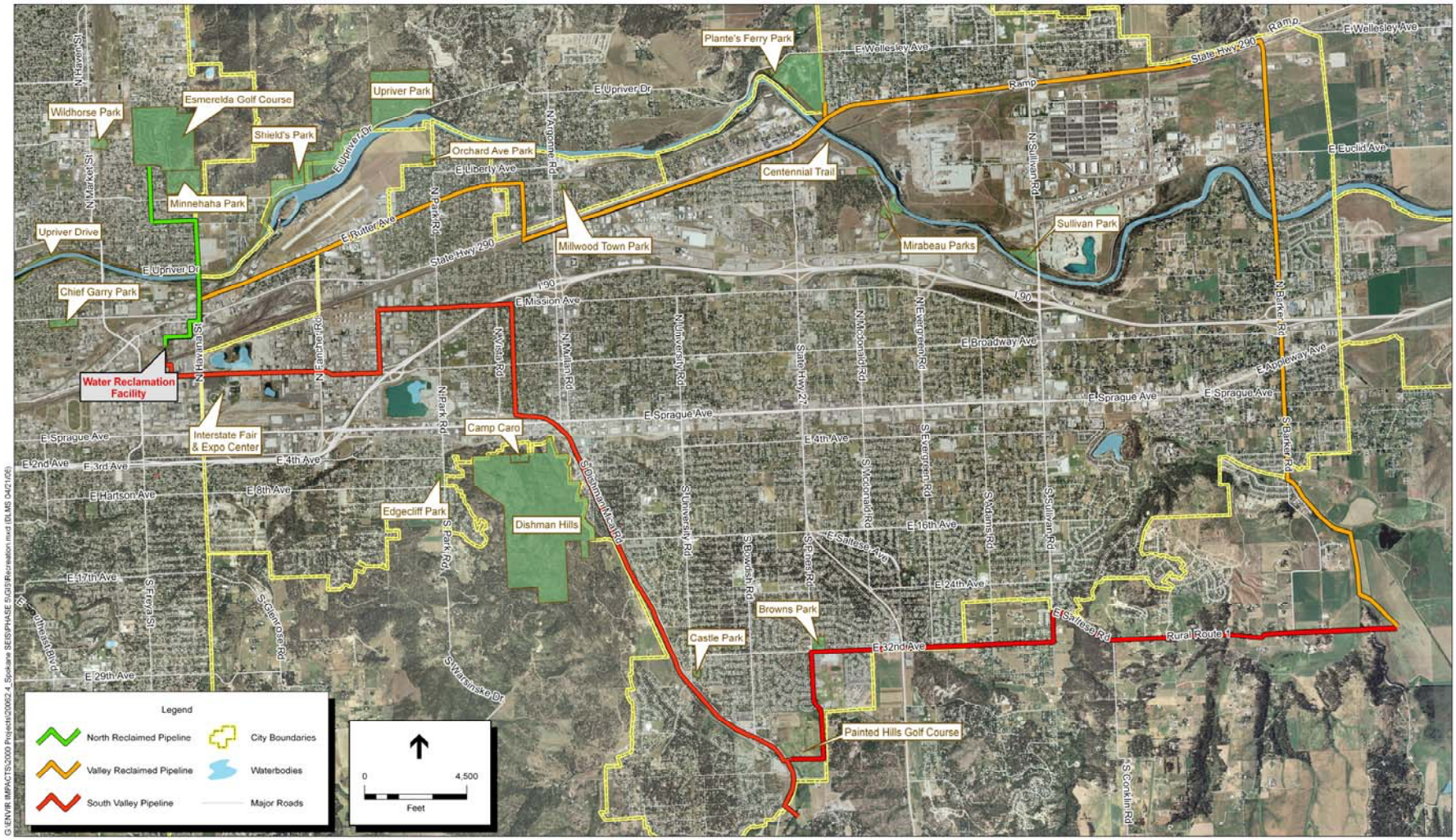
If the County selects a reclaimed water use alternative and identifies a project, a separate SEPA analysis would be conducted for operational impacts, including the potential impacts of land acquisition. If land acquisition is required, the County's property acquisition process would be initiated. For example, if the Wetland Creation and Enhancement Alternative required the acquisition of property, county real estate services would assess the market value and negotiate just compensation for the private property owner.

No Action Alternative

There would be no land use or shoreline operational impacts associated with the No Action Alternative; therefore, no mitigation is required.

3.7 Recreation

This section discusses potential impacts to recreational facilities within the vicinity of the proposed conveyance routes and points of use. See Figure 3-5 for the locations of recreational facilities, parks, and trails within the study area. For purposes of determining the range of impacts, some recreational uses, including parks and golf courses, have been identified as potential end-uses of reclaimed water from the SCRWRF. The facilities described below are within the study area that could be affected by construction of the various Reclaimed Water Use Alternatives. Under the Irrigation of Urban Green Spaces Alternative, recreational facilities may be end users of reclaimed water.



SOURCE: HDR, 2007; WSDOT, 2005, 2007; Spokane County GIS, 2001; Ecology, 1998

Spokane County Reclaimed Water Use Study EIS . 200062

Figure 3-5
Conceptual Conveyance Routes and Existing Recreation Areas
Spokane County, WA

3.7.1 Affected Environment

Washington State

The Centennial Trail extends from the Washington-Idaho state line to Nine Mile Falls, Washington. This 372-acre state park consists of a 37 mile long paved trail that generally follows the Spokane River. There are 15 separate access points to the trail, including some in each of the jurisdictions within the study area. In addition, there are 42 known historical and archaeological sites along the trail, most of which are not marked. Centennial Trail is open during daylight hours to hikers, bikers, skaters, and in some places, equestrians.

Dishman Hills Natural Area is located at 625 Sargent Road. This recreation area is 518 acres of natural area collectively owned and managed by the Washington State Department of Natural Resources, Spokane County, and the Dishman Hills Natural Area Association (DHNAA). Facilities include hiking trails, the Camp Caro lodge, play equipment, public restrooms, and parking.

Spokane County

Plante's Ferry Park is located at 12308 Upriver Drive. This 80-acre park consists of five soccer fields, a ball field, play equipment, shelters and a barbeque area, hiking trails, public restrooms, and parking. Plante's Ferry Park is also a designated historic site (see Section 3.9 for more information).

Shield's Park is located at 5625 Upriver Drive. Also known as Minnehaha Rocks, this 14-acre site contains hiking and biking trails, climbing rocks, public restrooms, and parking. One of the Centennial Trail trailheads is located at Shield's Park.

Orchard Park is located at the northwest corner of East Bridgeport Avenue and North Park Road. This five-acre park has a ball field, play equipment, and parking.

City of Spokane

Esmeralda Golf Course is located at 3933 East Courtland Street, near the intersections of Courtland Street, Freya Street, and Rich Avenue. This municipal course covers approximately 170 acres. The course has 18 holes for golf, a clubhouse, and 50 parking spaces.

Minnehaha Park is located immediately south of Esmeralda Golf Course, near the intersection of Euclid Avenue and Havana Street. This almost 39-acre park contains trails, play equipment, a ball field, and public restrooms. Approximately 32 acres of Minnehaha Park is left in its native state.

Chief Garry Park is located at 2515 E. Sinto Avenue. This neighborhood park is 10.76 acres including covered picnic shelters, play equipment, three ball fields, a spray/wading pool, and public restrooms.

Wildhorse Park is located at 3717 N. Ralph Street. This 2.72-acre neighborhood park contains picnic areas, play equipment, and lawn areas.

Upriver Park and Upriver Drive Parkway are located on Upriver Drive from the eastern Spokane city limits to Mission Avenue. Upriver Park consists of 147 acres of conservation land, with two of those acres developed with picnic areas, a Centennial Trail trailhead, public restrooms and parking. Upriver Drive Parkway is a jogging and bicycle trail encompassing 189 acres along Upriver Drive and the Spokane River. This parkway also coincides with a portion of the Centennial Trail.

City of Spokane Valley

The following recreational uses are found in the study area within the City of Spokane Valley.

Edgecliff Park is located at 800 Park Road. This 4.8-acre park includes covered picnic shelters and barbeque areas, play equipment, a ball field and sport courts, public restrooms, a drinking fountain, and parking. The shelters and ball field can also be reserved for a fee, for private uses.

Castle Park is located at 3415 University Road. This community park is 2.7 acres of open lawn with a gravel turn-around.

Browns Park is located at 3019 South Pines Road. Browns Park is 8.2 acres and includes covered picnic shelters and barbeque areas, four sand volleyball courts, a ball field, play equipment, and public restrooms. The shelters and ball field can also be reserved for a fee, for private uses.

Mirabeau Point Park is located at 13500 Mirabeau Parkway. Mirabeau Meadows, Mirabeau Springs, the Center Place event center, the Spokane Valley Senior Center, the City Parks and Recreation Department offices, and undeveloped land collectively make up the 54-acre Mirabeau Point Park. Mirabeau Meadows is 10 acres of parkland with an open meadow area, covered picnic shelters, a stage, public restrooms, and parking. Mirabeau Springs is 7.5 acres and includes a picnic shelter, a waterfall and pond, a Centennial Trail trailhead, public restrooms, and parking. The CenterPlace event center houses the Senior Center and the City Parks and Recreation Department, as well as conference facilities, class rooms, banquet/event rooms, a full commerical kitchen, restrooms, and parking.

Sullivan Park is locatied at 1901 Sullivan Road. This 10-acre city park includes covered picnic and barbeque areas, the Western Dance Center, a radio-controlled car course, access to the Spokane River, a Centennial Trail trailhead, public restrooms, and parking.

City of Millwood

The City of Millwood has one park located near the center of town. The Millwood City Park is 6.3 acres and includes play equipment, a wading pool, tennis and volleyball courts, a ball field, and public restrooms.

3.7.2 Impacts

3.7.2.1 Construction Impacts

Reclaimed Water Use Alternatives

Access to and from recreational facilities near proposed pipelines and appurtenant structures may be limited, or rerouted, at times, but will be maintained throughout the duration of construction. Although some facilities may experience nuisance noise and fugitive dust from trenching activities, these impacts would be short-term and would not affect public use of the recreational facilities. This would not constitute a significant impact on recreational uses in the project area.

Irrigation of Urban Green Spaces Alternative

Under this alternative, access to, and use of, recreational facilities may be temporarily limited or rerouted during construction and until vegetation is re-established. The installation of reclaimed water irrigation facilities would not change or prohibit any existing uses of recreational facilities.

No Action Alternative

There would be no construction under the No Action Alternative; therefore, there would be no construction impacts to recreation.

3.7.2.2 Operation Impacts

Reclaimed Water Use Alternatives

Operation of the reclaimed water system would not cause any impacts on recreational facilities in the region. All proposed pipelines would be underground and would not change the use of any existing recreational facilities. The use of reclaimed water for irrigation would not limit any property from being used for recreational purposes (for more information, see Section 3.4 Environmental Health).

No Action Alternative

Under the No Action Alternative, reclaimed water would be discharged from the SCRWRF directly into the Spokane River. No impacts were anticipated from the discharge in the *2002 Spokane County WWTP Final Supplemental EIS*. In the unlikely event of a treatment failure at the SCRWRF, untreated wastewater could be discharged to the Spokane River.

3.7.3 Mitigation

3.7.3.1 Construction Mitigation

Reclaimed Water Use Alternatives

There would be no significant impacts to recreational facilities from construction of the proposed project, and therefore, no mitigation is required.

No Action Alternative

There would be no construction impacts to recreation associated with the No Action Alternative; therefore, no mitigation is required.

3.7.3.2 Operation Mitigation

Reclaimed Water Use Alternatives

There would be no significant impacts to recreational facilities from operation of the proposed project, and therefore, no mitigation is required.

No Action Alternative

In the event of a treatment failure at the SCRWRF under the No Action Alternative, the County would provide immediate public notice, including posting signs along the shoreline warning the public that it is unsafe to come in contact with the water. No significant long-term operational impacts that would adversely affect recreational facilities are anticipated from the No Action Alternative.

3.8 Transportation

This section evaluates the potential impacts of the construction and operation of the proposed reclaimed water use alternatives on the transportation network. The conveyance routes for each of the alternatives are shown with the regional roadway network in Figure 2-1. The routes were selected to maximize the potential to provide reclaimed water to future customers from one or a combination of these alternatives.

3.8.1 Affected Environment

The study area falls within unincorporated Spokane County and the cities of Spokane and Spokane Valley, and the City of Millwood. The study area is generally bisected by Interstate 90 (I-90), in the eastern portion of Spokane County. The proposed pipeline segments will traverse both main arterials and side streets. The exact alignments are not yet known; however, three potential routes, as identified in the Reclaimed Water Use Study, are generally described in Chapter 2, Description of the Alternatives. If any of the use alternative are selected, a project-level environmental analysis would be performed to assess potential transportation impacts from specific pipeline alignments on specific roadways.

The North Pipeline route concept would generally run north from the SCRWRF, cross the Spokane River, and then travel to the Esmeralda Golf Course.

The Valley Pipeline route concept traverses the City of Spokane, the City of Spokane Valley, the City of Millwood, and terminates in unincorporated Spokane County. This line is proposed to generally run from the SCRWRF, to the northeast and cross the Spokane River. The pipeline could be continued south, back across the river, and to the Saltese Flats area.

The South Valley Pipeline route concept would travel through the cities of Spokane and Spokane Valley and unincorporated Spokane County. This line would generally run south from the SCRWRF to the Spokane County Interstate Fair and Expo Center, to the east and north towards E. Mission Ave., then southeast near South Dishman Mica Road to the Painted Hills Golf Course. Another trunk of the line would run from the Painted Hills Golf Course, east towards the Saltese Flats area.

3.8.2 Impacts

3.8.2.1 Construction Impacts

Reclaimed Water Use Alternatives

Wherever possible, the proposed alignments will fall within existing road rights-of-way or County-owned abandoned railroad rights of way to minimize the impact of construction on private property owners. Temporary disruptions in traffic would result from trenching activities associated with construction of the reclaimed water pipeline and associated facilities. During this time, lane closures may be required for short periods during the day.

No Action Alternative

There would be no construction under the No Action Alternative; therefore, there would be no construction impacts on the transportation network.

3.8.2.2 Operation Impacts

Reclaimed Water Use Alternatives

Operation of a reclaimed water system would not cause any impacts to the transportation network in the region. All proposed pipelines would be underground except if a pipe is constructed on an existing bridge. Other new facilities, such as pump stations and those associated with aquifer recharge, urban irrigation, and wetland creation and enhancement would generate only periodic truck trips on a quarterly basis for maintenance. No transportation impacts are anticipated.

No Action Alternative

Under the No Action Alternative, reclaimed water would be conveyed through pipelines associated with the SCRWRF for discharge to the Spokane River; therefore, there would be no operational impacts to transportation.

3.8.3 Mitigation

3.8.3.1 Construction Mitigation

Reclaimed Water Use Alternatives

Mitigation measures that could be implemented to minimize construction-related impacts of the reclaimed water use alternatives to transportation could include the following:

- A traffic control plan to ensure continued vehicular access on streets in the project vicinity;

- Flaggers to control and coordinate traffic flow;
- Signage to alert drivers to the presence of construction activities; and
- Traffic cones or barrels to direct traffic away from construction areas and into appropriate travel lanes.

Additionally, the construction of any of the alternatives will be closely coordinated with other planned public works projects to minimize or eliminate transportation impacts in the project vicinity.

No Action Alternative

There would be no construction impacts to transportation associated with the No Action Alternative; therefore, no mitigation is required.

3.8.3.2 Operation Mitigation

Reclaimed Water Use Alternatives

Operation of any of the reclaimed water use alternatives would not cause any transportation impacts; therefore, no mitigation is required.

No Action Alternative

There would be no operation impacts to transportation associated with the No Action Alternative; therefore, no mitigation is required.

3.9 Cultural and Historic Resources

This section discusses the potential cultural and historic resources in the project study area and at the example reclaimed water use locations and along the example conveyance routes. Because no specific sites or routes have been identified, the following discussion is general, exploring potential impacts associated with various action alternatives. Cultural and historic resources in the Spokane Valley area are generally described and the results of database searches for likely conveyance lines and reclaimed water use sites are presented.

3.9.1 Affected Environment

Archaeological investigation reveals the presence of human life along the Spokane River corridor dating back approximately 11,400 years (Spokane Centennial Trail, 2002). For centuries, members of the Colville Confederated Tribes, Spokane Tribe, and Yakama Nation used the Spokane River Valley for hunting and gathering activities during the spring and summer months (Spokane Tribe, 2002). In addition, the historic boundary of the western territory for Idaho's Coeur d'Alene Tribe reached the Spokane area. The Coeur d'Alenes established permanent settlements along the Spokane River (Coeur d'Alene Tribe, 2002).

Fur trading began in the Spokane area in 1810 and the first settlers arrived in 1849. During the 1850s, as settlers continued to arrive, tensions between the settlers and the American Indians began to mount throughout the Columbia Basin. These conflicts eventually led to the creation of the Spokane Reservation in 1881 and the sequestering of indigenous peoples on the reservation.

The City of Spokane was settled in 1871 by James J. Downing and Seth Scranton and in 1881, the Northern Pacific Railroad reached the area and traversed the Spokane Valley from east to west. This encouraged commercial and industrial development along the new rail lines especially on the outskirts of town. In 1889, a fire destroyed the majority of the downtown commercial district due to a failure at the city's pump station but the city was quickly rebuilt and construction of major industrial buildings including the Union Oil Company of California Supply Depot, the White Pine Sash and Woodworking Plants, the W.P. Fuller Company paint factory, and the Armour Company Abattoir and Cold Storage Plant was completed. Some of these buildings, including the Armour Company Abattoir and Cold Storage Plant, were in continual use until the late 20th century (Emerson, 2007).

The northern edge of the project area appears to have been mostly vacant through its history. Agricultural activities might have occurred in the early portion of the 20th century but the topography is rocky and no evidence of irrigation exists (Emerson, 2007).

3.9.1.1 Historic Resources

An online search on the Washington State Department of Archaeology and Historic Preservation (DAHP) website was conducted and Table 3-3 displays known sites near the project area. A search was conducted from just east of the Spokane city limit out to the Washington/Idaho border.

Table 3-3. Known historic sites near study area

Register Name	*Construction Date*	*Historic Use*	*Listing*
Ross Place/Mary's Restaurant	1910	Domestic – Single Dwelling	Washington Heritage Register (WHR)
Esmeralda-Greene Street Bridge	1955	Transportation – Road related	WHR
Rockwood Historic District	1906-1950	Domestic – Single Dwelling	WHR/National Register (NR)
Spokane Public Library	1914	Education - Library	WHR/NR
Frequency Changing Station	1908	Industry - Energy Facility	WHR/NR
Cambern Dutch Shop Windmill	1929	Commercial	WHR/NR

Register Name	*Construction Date*	*Historic Use*	*Listing*
Holy Names Academy Building	1891-1903	Education	WHR/NR
Ackwright House	1914	Domestic – Single Dwelling	WHR/NR
Wilbur, Ralston, and Sarah House	1916	Domestic – Single Dwelling	WHR/NR
Ehrenberg, Gus and Florence, House	1911	Domestic – Single Dwelling	WHR/NR
Felts Field Historic District	1927-1943	Transportation – Air related	WHR/NR
Millwood Historic District	1910-1950	Commercial	WHR/NR
Hutton Settlement District	1917-1920	Education	WHR/NR
Opportunity Township Hall	1912	Government – City Hall	WHR/NR
Solby, William, and Margaret House	1926	Domestic – Single Dwelling	WHR/NR
Koerner House	1912	Domestic – Single Dwelling	WHR/NR
Cascade Laundry Building	1913	Commerce/Trade	WHR
Mission Avenue Historic District	1890-1940	Domestic – Single Dwelling	WHR/NR
Desmet Avenue Warehouse Historic District	1904-1946	Commerce/Trade	WHR/NR
Turner, Luther P., and Jane Marie House	1917	Domestic – Single Dwelling	WHR/NR
West Valley High School	1924	Education	WHR/NR
Spokane River District	various	Industry/Processing/Extraction - Extractive Facility	WHR

Source: DAHP

Plante's Ferry Park is listed on the Washington Heritage Register. Antoine Plante constructed the first residence in the Spokane Valley on the site in 1849 and operated a ferry across the Spokane River from 1852 to 1864 (Spokane Review, 2007). Several other historic events occurred at the site, including a visit from territorial governor Isaac Stevens in 1853 and signing of peace treaties with Indian tribes in 1855. A stone monument marks the site.

3.9.1.2 Archaeological Resources

Plante's Ferry and the Saltese Flats are located in the northeast and southeast portions of the study area, respectively. It is likely that Native Americans used the areas and there is a potential for cultural resources on the sites (Emerson, 2007).

Records on file at the Washington State DAHP do not indicate any traditional cultural properties have been recorded within or near the study area. However, Native Americans are known to have gathered plant resources, as well as fished and hunted, in the general vicinity. Local tribes do ascribe cultural significance to the Dishman Hills vicinity, about 3 miles southeast of the study area (Emerson, 2007).

3.9.2 Impacts

3.9.2.1 Construction

Construction for conveyance lines and associated facilities would occur in existing rights of way to the extent possible. Plante's Ferry Park is the only ~~No~~ known historic or cultural resource~~s~~ located along ~~exist on~~ the proposed conveyance lines or at the proposed reclaimed water use sites. However, ~~but~~ the potential for uncovering cultural resources during construction remains a possibility. The most likely impacts, if any, would occur with cultural resources rather than with historic resources and these potential impacts would be associated with ground disturbing construction activities. If the County selects a reclaimed water use alternative and identifies specific sites, additional studies will be undertaken to identify cultural or historic sites prior to construction. Those sites will be avoided to the extent practical. The potential for encountering cultural resources along the three potential conveyance routes are summarized below.

North Pipeline Route

The North Pipeline route concept crosses the Spokane River at North Greene Street and terminates at Esmeralda Golf Course. Native Americans are known to have fished in the Spokane River and although no known sites exist, it is possible that cultural resources could be discovered especially on or near river banks.

Valley Reclaimed Pipeline Route

The Valley Pipeline route concept crosses the Spokane River at North Argonne Road and terminates at Saltese Flats. As stated above, areas adjacent to rivers are especially likely to house cultural resources; therefore, even though no known cultural resources are present, the possibility of unearthing previously unknown resources during construction exists along this route. The Valley Pipeline route would be located near Plante's Ferry Park and a connection would extend to the park if it is selected as a site for reclaimed water use. The conveyance line and associated facilities would be sited to avoid the historic site and no impacts are anticipated.

South Valley Alternative

The South Valley route concept does not cross the Spokane River at any point and terminates at Saltese Flats. The possibility of unearthing previously unknown resources during construction exists under this alternative, especially near Saltese Flats.

No Action Alternative

Under the No Action Alternative, there would be no reclaimed water use other than the limited uses at the SCRWRF. No additional construction would be required; therefore, no impacts to cultural resources are anticipated.

3.9.2.2 Operation

Reclaimed Water Use Alternatives

No impacts to historic or cultural resources are expected once reclaimed water use systems are operational because ground disturbance will not occur after construction.

No Action Alternative

No impacts to historic or cultural resources are anticipated under the No Action Alternative. The limited uses of reclaimed water at the SCRWRF would not disturb these resources.

3.9.3 Mitigation

3.9.3.1 Construction

Reclaimed Water Use Alternatives

If construction unearths cultural or archaeological resources, construction will be immediately halted and necessary measures will be taken to ensure the protection of the resource. The appropriate agencies would be contacted, including the Department of Archaeology and Historic Preservation (DAHP), Spokane Tribe of Indians, Coeur d'Alene Tribe, Confederated Tribes of the Colville Reservation, and Yakama Nation.

No Action Alternative

No impacts on historic and cultural resources are anticipated under the No Action Alternative; therefore, no mitigation is proposed.

3.9.3.2 Operation

Reclaimed Water Use Alternatives

No impacts are expected with operation of any of the reclaimed water alternatives; therefore, no mitigation is proposed.

No Action Alternative

No impacts are anticipated with the No Action Alternative and therefore no mitigation is proposed.

4.0 COMMENT LETTERS AND RESPONSES TO COMMENTS

To: David Moss, Water Reclamation Manager
From: Rachael Paschal Osborn
Center for Environmental Law & Policy
Date: May 30, 2008
Re: Spokane County, PEIS for Reclaimed Water Use Study

Thank you for the opportunity to provide comments on the Spokane County Draft Programmatic Environmental Impact Statement for the County Reclaimed Water Use Study. These comments are submitted on behalf of the Center for Environmental Law & Policy and Sierra Club Upper Columbia River Group.

Please send a copy of all future draft and decision documents to our offices at 25 West Main, Suite 234, Spokane, WA, 99201.

I. General Comments

1 1. There are a number of assertions and/or conclusions that are not supported by fact or analysis. The PEIS is particularly inadequate to serve as a basis for selecting among alternative reuse projects.

2 2. Spokane County will not be eligible to receive a permit to discharge into the Spokane River during critical months. For example, King County's Brightwater facility is built but remains unpermitted. The proposed septic offset program does not meet state water quality requirements. For this reason, the County should be taking an aggressive approach to its reuse program. The PEIS does not represent such an approach.

3 3. We appreciate the discussion about EDC's and agree this is an issue that will bear on reuse feasibility. Given the uncertainties, it is probably best to frame the issue in terms of appropriate end uses. Aquifer recharge and schoolyard irrigation would seem to be inappropriate uses if concerns exist about endocrine disruption. Therefore, these two alternatives should be eliminated.

4 4. The County should not seek to manufacture new demand for water, such as irrigation of new freeway right-of-way.

5 5. The PEIS should analyze the potential for reclaimed water to offset existing water and consequent benefit to instream flows in the Spokane River.

II. Specific Comments

6 1. **Section 2.3.2**: The statement that industrial end users require special water quality that cannot be supplied by reuse is not supported by the facts. Since

6 industrial use is one of if not THE best opportunity for reuse, this discussion must be expanded.

7 2. **Section 2.4**: Wetland creation is an uncertain prospect. Recent studies by the Department of Ecology and King County have revealed substantial failure rates. In addition, as noted in the PEIS, there are concerns about impacts of
8 EDCs on aquatic ecosystems that would, by design, attract the species that appear to be vulnerable to EDC exposure. Nonetheless, the PEIS does not acknowledge this is a potential impact.

9 3. **Section 2.6**: The "No Action Alternative" does not represent a realistic scenario. The County has not yet presented a facility design that will allow it to obtain a permit to discharge effluent to the Spokane River during the critical season.

10 4. **Section 2.7**: We agree with the decision to eliminate agriculture and poplar irrigation as alternatives.

11 5. **Pages 3-44**: The discussion regarding water quality impacts to ground water is inconsistent. If reclaimed water will percolate into the aquifer and eventually discharge in the Spokane River, either directly or via Shelley Lake, then discussion of potential ground water contamination is needed. We urge the County to adopt the precautionary principle with respect to analysis of EDCs on aquatic species.

12 6. **Pages 3-27 & 3-45**: Virtually all of the examples given of aquifer recharge projects, where aquifer level are declining and water supply is an issue, are not analogous to the SVRP aquifer. Hence the only rationale to discharge of reclaimed water to the aquifer seems to be to "get rid of" the effluent. This is an irrationale basis for an alternative.

13 The conclusion regarding impacts on page 3.3.2 is incorrect. As the report itself discusses, there are a number of contaminants of concern for which no State standards exist. To conclude that compliance with State standards is sufficient to aquifer quality is an oxymoron at best.

14 It is also incorrect that aquifer recharge would increase water levels and that this would create a benefit for regional water supply. Given that the SVRP aquifer is unconfined, there is no factual support for the proposition that ground water levels would increase. Nor does the PEIS contain facts or analysis to show that recharge would benefit regional water supply. This conclusory statement should be struck.

15 Given the substantial water quality concerns, as documented in the PEIS this alternative should be removed from consideration.

RESPONSE TO COMMENT LETTER NO. 1—CENTER FOR ENVIRONMENTAL LAW AND POLICY

1. Your comment regarding the adequacy of the Draft Programmatic EIS is noted. The Reclaimed Water Use Study and the Programmatic EIS are non-project-specific investigations into reclaimed water use alternatives. The two documents are to assist decision makers provide direction on development of a specific program for use of reclaimed water, if any. Additional studies would be undertaken prior to implementing specific reclaimed water use projects under such a program.

2. Your comment regarding a discharge permit to the river is noted. The County continues to work with Ecology on the TMDL and toward obtaining a discharge permit for the Regional Water Reclamation Facility. Construction on King County's Brightwater facility is on-going. According to Mark Henley at Ecology, Ecology expects to issue the discharge permit for Brightwater closer to completion in 2011. This is the normal procedure for a new wastewater treatment plant or water reclamation facility.

3. The County will comply with all appropriate regulations and best management practices in selecting uses for reclaimed water. There is no scientific evidence which concludes that land application or recharging of groundwater with reclaimed water is harmful to public health, so both concepts remain as viable options for County consideration. The County will continue to monitor ongoing research on the effects of EDCs on environmental health and future technologies for treatment of these compounds.

4. Your comment regarding irrigation of highway rights-of-way is noted.

5. The Spokane County Reclaimed Water Use Study is not a water supply study but rather a study of potential opportunities for use of reclaimed water. For this reason the Draft Programmatic EIS did not focus on the benefits to instream flows. This type of analysis may be more appropriate during analysis of relicensing hydropower facilities under FERC and proposals in watershed plans.

6. The statement in the Draft Programmatic EIS is based on input provided by businesses contacted during the development of the Reclaimed Water Use Study. The Final EIS has been revised to clarify that some businesses have special water quality requirements which may limit their interest in using reclaimed water.

7. It is true that past wetland mitigation projects have had low success rates (King County, 2003; Ecology, 2003). However, these studies are based on wetland mitigation that was conducted in the 1990s and were primarily studies related to compensatory mitigation, i.e., projects that were required of development proponents to mitigate wetland impacts of their projects. By their roles, these types of proponents are generally more focused on the success of their development projects and less focused on the success of required mitigation. Lessons have been learned from these studies and there are new guidelines and requirements for design and monitoring for wetland mitigation, such as the guidance included in *Making Mitigation Work* (Ecology, 2008). If the County

selected wetland creation or enhancement as an alternative, it would follow current guidelines and design standards, adopt a watershed-based approach to planning the wetland mitigation project, and commit to on-going monitoring and maintenance. The County would ensure that wetland projects undertaken for reclaimed water use would have a constant water supply and would commit to rectifying any elements of the mitigation project that do not meet stated project goals.

8. The potential effects of EDCs on aquatic ecosystems are noted in Section 3.5.2.2 and Appendix C. As noted in Section 3.5.2.2, the County would continue to monitor research results on the effects of EDCs and incorporate findings into its wastewater management approach, as appropriate.

9. The No Action Alternative represents the SCRWRF now underway as part of the Ecology-approved Spokane County Wastewater Facilities Plan (as amended in December 2007). The County has worked with Ecology on the Spokane River Dissolved Oxygen TMDL Foundational Concepts and development of the Spokane River TMDL. Based on these documents, the County believes that Ecology will issue a permit for discharge of at least a portion, if not all, of the reclaimed water to the river. The County will continue to work with Ecology on a discharge permit and will adjust its wastewater management approach as needed.

10. Your comment regarding agriculture and poplar farm irrigation is noted.

11. Section 3.5.2.2 discusses potential impacts to fish and wildlife from groundwater contamination from both wetland creation and enhancement and aquifer recharge. The main discussion of water quality impacts to groundwater is located in Section 3.3.2.2. A section on the potential effects of EDCs on fish and wildlife is included in Section 3.5.2.2, along with an appendix with additional details. Also see the response to your Comment 8 regarding the effect of EDCs on aquatic species and the County's intention to monitor research on the effects of EDCs.

12. The Foundational Concepts agreement directed the County to prepare a reclaimed water use study and specified that aquifer recharge be included as an alternative. (Please note that the recharge concept studied was surface percolation and not the direct injection method.) If the County decides to further pursue aquifer recharge as a potential use of reclaimed water, it would conduct additional studies as necessary to determine the impact of recharge on the aquifer.

13. The mitigation section of Section 3.3.2 has been revised to clarify that the County will continue to monitor research on the effects of contaminants of concern such as EDCs as well as improvements in treatment technologies.

14. The Draft Programmatic EIS has been revised to state that aquifer recharge is not expected to significantly improve regional water supply, but that it would provide minor increases in streamflow in the Spokane River.

15. As stated in response to your Comment 12, aquifer recharge was a required alternative of the Foundational Concepts for the reclaimed water use study. Spokane County is considering only the surface percolation option under this aquifer recharge alternative. Direct injection to recharge groundwater is not being considered.

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From: Aly Strappazon [mailto:spokaneadopts@yahoo.com]
Sent: Monday, May 05, 2008 2:48 PM
To: Moss, David
Subject: Reclaimed Water Use Study

Dear Mr. Moss:

1 KUDOS! And congratulations!!!! My husband and I moved to Spokane from SW Washington (Vancouver) with our young family five and a half years ago. While we LOVE it here, we had a lot to get used to when it came to thoughts and behaviors regarding the environment. The water reclamation facility and grounds in Vancouver is a wonderful example of what it sounds like you are trying to do here in Spokane County. We are 1000% behind the development of such a plan. I know it has made a significant and positive impact on my former hometown (including the development of new jobs), and I am sure that it will have similar or better results here. The next big ticket item for the county after water reclamation will need to be better curb-side recycling!

Thanks for helping Spokane maintain its awesome livibility while keeping our negative impact on the environment to a minimum. I can't wait to see many more environmentally positive changes to this place we now call home!

Sincerly,
Aly Strappazon

Aly Strappazon, BA, WSRC
A Heart's Destiny Adoption & Family Services
PO Box 142185
Spokane Valley, WA 99214
(509) 218-4624 Office
spokaneadopts@yahoo.com

RESPONSE TO COMMENT LETTER NO. 2—ALY STRAPPAZON

1. Your comment in support of reclaimed water use in Spokane County is noted.

-----Original Message-----
From: Keith V Stracchino [mailto:keithvsg@yahoo.com]
Sent: Tuesday, May 27, 2008 10:44 AM
To: Moss, David
Subject: Reclaimed water

I wish to support the effort to install a reclaimed water system throughout the greater Spokane County area and offer the following comments:

1 It's not a question of whether we do this, it's a question of
1 how soon can we do it. Water is a critical and finite resource being subjected to increasing and poorly planned use. Using potable water for tasks such as street cleaning, car washing, irrigation etc. is a near criminal waste of an under-valued resource. Past planning decisions seem to have treated water as yet another infinite resource, that short-sighted mindset has to be taken out and shot!

2 People being what they are, short-sighted and selfish being the norm, we have to introduce financial incentives to stop wasting potable water and divert usage to non-potable water where that quality of resource is sufficent to the purpose. I suggest that when you
2 introduce your reclaimed water supply the reclaimed water should be priced below the price of potable water, even if that means raising the price of potable water to provide for a differential. Potable water should be priced on an exponentially rising scale to force conservation by the simplest and most effective means, impact on the pocket-book.

3 We should be reminding people loudly and often that there are four critical requirements for human, and other animal life. In order of significance they are:

breathable air, without it life ends within about two minutes.
drinkable water, without it, life ends within about one week.
3 nutritious food, without it life ends within about 30 days.
Shelter, without it life ends in the next cold spell.

4 As a species we have become criminally destructive of these essentials, we need to push these facts into the faces of the general public when we start trying to get people to vote money to install a water reclamation scheme. It's their future and their children's future that is at stake, not the people in the next county!

RESPONSE TO COMMENT LETTER NO. 3—KEITH V. STRACCHINO

1. Your comment regarding the need for reclaimed water use in Spokane County is noted.

2. If Spokane County decides to pursue reclaimed water use, it is expected that the price of reclaimed water will be less than that for potable water to provide incentives for use.

3. Your comment is noted.

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6.0 NOTICE OF AVAILABILITY DISTRIBUTION LIST

6.1 Federal Agencies

Thomas G. Eaton, Director, U.S. EPA, Region 10, Washington Operations Office

Ben Cope, U.S. EPA, Region 10, Water Division

Toni Davidson, U.S. Fish & Wildlife Service, Upper Columbia River Basin Office

Susan Martin, U.S. Fish & Wildlife Service, Upper Columbia River Basin Office

Tim Erkel, U.S. Army Corps of Engineers

Richard Edlund, U.S. Dept of Agriculture, NRCS

6.2 Tribes

Rudy Peone, Director, Spokane Tribe of Indians, Department of Natural Resources

Bill Matt, Sr., Spokane Tribe of Indians, Department of Natural Resources

Brian Crossley, Spokane Tribe of Indians, Water & Fish

Alfred Nomee, Director, Coeur D'Alene Tribe, Natural Resources Department

Michael O. Finley, Chair, Colville Business Council, Natural Resources Department

Ralph Sampson/Ruth Jim, Yakama Tribal Council

6.3 State Agencies

Jay Manning, Director, Washington State Department of Ecology

Pat McGuire, Washington State Department of Ecology, Biosolids Division

Lucy Peterschmidt, Washington State Department of Ecology, Reuse Division

Grant D. Pfeifer, Washington State Department of Ecology, Regional Director

Jim Bellatty, Washington State Department of Ecology, Water Quality Division

Washington State Department of Ecology, Environmental Review Section

Brian Farmer, Washington State Department of Ecology, Shorelines & Wetlands Division

Mike Hibler, Washington State Department of Ecology

Brian Howard, Washington State Department of Ecology

George Schlenger, Washington State Department of Ecology, Water Rights Division

Richard Koch, Washington State Department of Ecology, Facility Planning Division

Dr. Allyson Brooks, SHPO, Department of Archeology & Historic Preservation

Stephenie Kramer, Assistant State Archaeologist, State Office of Archeology

Karin Divens, WA State Department of Fish & Wildlife

Arnie Johnson, WA State Department of Natural Resources

Keith Metcalf, Regional Administrator, WA State Department of Transportation

Chris Regan, Environmental Program Manager, WA State Parks & Recreation Commission, Eastern Region Office

Mark Schulz, Environmental Specialist, WA State Parks & Recreation Commission, Eastern Region Office

Craig Riley, Washington State Department of Health, Wastewater Management

Tim Schultz, Washington State Department of Agriculture

6.4 Spokane County and Regional Governments

Bob Brueggeman, Spokane County Engineer

Kevin Cooke, Spokane County Utilities

Rob Lindsay, Spokane County Utilities

Walt Edelen, Spokane County Conservation District

Ron Edgar, Spokane County Air Pollution Control Agency

Daniela Erickson, Clerk of the Board, Spokane County Commissioners

Commissioner Bonnie Mager, Spokane County Commissioners

Commissioner Todd Mielke, Spokane County Commissioners

Commissioner Mark Richard, Spokane County Commissioners

Mike Schmitz, Spokane County Planning Commission

Randall J. Gillingham, Spokane County Planning Commission

Peter J. Ice, Spokane County Planning Commission

Dave A. Jones, Spokane County Planning Commission

Doug Kelley, Spokane County Planning Commission

Bill Moore, Spokane County Planning Commission

John Pederson, Spokane County Building & Planning

Spokane County Housing & Community Development

Doug Chase, Spokane County Parks & Recreation Department

Spokane County Library, Argonne Branch

Spokane County Library, Valley Branch

Spokane County Library, Otis Orchards Branch

Spokane County Library, North Spokane Branch

Spokane County Library, Argonne Branch

David Swink, Spokane Regional Health District

Ty Wick, Spokane County Water District #3, Spokane Joint Aquifer Board

Susan Winchell, AICP/Director, Spokane County, Boundary Review Board

6.5 City of Spokane

Dale Arnold, Director, City of Spokane Wastewater Management

Lars Hendron, P.E., City of Spokane Wastewater Management

Dave Mandyke, City of Spokane, Public Works & Utilities

Tim Pelton, City of Spokane, Spokane River Phosphorus Technical Advisory Committee

Frank Triplett, City of Spokane, Water & Hydroelectric

Lloyd Brewer, City of Spokane, Environmental Programs

Kristen Griffen, Director, City of Spokane Historic Preservation Office

City of Spokane Fire Department

City of Spokane Library, Downtown Branch

Tony Madunich, City of Spokane Park Operations Department

Barry Russell, Director, City of Spokane Parks & Recreation Department

Leroy Eadie, City of Spokane Planning Services

6.6 Cities of Liberty Lake, Millwood and Spokane Valley

Eva Combs, City of Millwood, City Clerk

Neil Kersten, City of Spokane Valley, Public Works Director

F. Lee Mellish, City of Liberty Lake Sewer & Water, District No. 1

Doug Smith, Community Development Director, City of Liberty Lake

Wendy Van Orman, Mayor, City of Liberty Lake

Spokane Valley Fire Department

6.7 Citizens and Organizations

Shirley Archer

Curtis Archer

Bonne Beavers, Center for Justice

R. Boise

April Brast

Ben Brattero

Erin Casci

Jessica Chess

Allison Esvelt

Kevin Freeman

Rick Fink, Inland Empire Paper

Don and Janela Gouman

Robert Greenup

Cathy Gunderson

Sean Haghighil

William Herrlings

Bud Leiber, Kaiser Aluminum

Rob Lindsay

Alyssa Mazzie

H. Mellist

Stan Miller

Rachel Paschal Osborn

Clarence S.

Ray S.

Marjory Schoener

Joseph Schoener

Keith Stracchino

Aly Strappazon

Albert Trill

Patsy Waits

Diana Washington

Michael Whipple, Center for Justice

APPENDIX A

SUMMARY OF EIS SCOPING

SUMMARY OF 2007 EIS SCOPING

The comment period for scoping the Spokane Reclaimed Water Use Plan Environmental Impact Statement was initiated on May 18, 2007 and closed on June 19, 2007.

In addition to the comments received from five individuals at the public meeting held on May 30, 2007, written comments from 2 organizations were received. Several commenters raised concerns about the cost effectiveness of using reclaimed water. It should be noted that, for purposes of the State Environmental Policy Act (SEPA), economic impacts are not evaluated. However, economic impacts are among the many other important issues that will be considered in the decision making process. Questions during the public meeting included concerns on odor, contaminants in the reclaimed water (prescription drugs, coliforms, nitrates, and metals), byproducts of reclaimed water, disinfection products, and impacts to river water levels during critical periods. A reservoir to store the reclaimed water was suggested. A question was also posed on whether the plant is being designed so that it can easily be retrofitted with up to date technology.

All of the written comments were non site-specific focusing on potential impacts to environmental health and surface and ground water quality. A number of suggestions were made on how to use the reclaimed water. There were also suggestions on what to include in the reclaimed water use plan.

Non Site-Specific Impacts

- **Odor** – 1 comment on whether reclaimed water will have an odor.
- **Environmental Health** – 3 comments related to concerns about contaminants in the reclaimed water (unregulated chemicals such as pharmaceuticals and certain organics). 1 comment about risks from the byproducts of reclaimed water.
- **Air Quality** – 1 comment with concerns about whether the reclaimed water will pollute the air.
- **Ground Water Quality** – 2 comments related to concerns about potential impact of reclaimed water recharge to the aquifer and wellhead capture areas.
- **Surface Water Quality** – 1 comment related to impacts on river water levels during critical periods. 1 comment about potential impacts of elevated nutrient levels on certain wetlands.

Uses for Reclaimed Water

- 7 comments suggested the following potential uses for reclaimed water: parks, schools, fairgrounds, grave yards, golf courses, median strips, dust control, soil dampening for compaction, water jetting for consolidation of backfill around pipelines or other construction purposes, fire fighting and protection, toilet and urinal flushing, car washing and other commercial washing purposes, washing aggregate and making concrete, industrial boiler feed, industrial cooling, wetland enhancement,

aquifer discharge, private lawn watering, city building areas, farming irrigation, new subdivisions, and river discharge.

Plan Components

- **Users –** 1 comment suggested that current and future users of reclaimed water be identified and discussed.
- **Barriers –** 1 comment suggested that barriers to using reclaimed water such as regulatory, financial, social, and political be identified and discussed.
- **Costs and Benefits** – 1 comment suggested that non-financial costs and benefits be identified and discussed for the proposed alternatives.
- **Precautionary Principle** – 1 comment recommended that the plan acknowledge gaps in scientific consensus and information when examining unregulated constituents in the reclaimed water. The plan should also be guided by the precautionary principle.
- **Expanded Scope** – 1 comment suggested that the study utilize expanded scoping so that there is coordination and cooperation with other agencies.
- **Levels of Reclaimed Water Use** – 1 comment stated that some users of reclaimed water may be seasonal in nature. Such fluctuating levels of use should be evaluated as part of the plan.
- **Existing Water Purveyors** – 1 comment recommended that communication with existing water purveyors start early to address any potential friction with the reuse water plan.
- **Distribution of Reclaimed Water** – 1 comment recommended the plan include a discussion on how the reclaimed water will be distributed to the users.
- **Wellhead Protection Areas** – 1 comment would like the plan to include the specific measures that would protect wellhead areas. A monitoring component should also be included to inform future decision-making.

APPENDIX B

US FISH AND WILDLIFE SERVICE SPECIES LIST

SPOKANE COUNTY
Updated 8/8/2007

LISTED

Endangered

Gray wolf *(Canis lupus)*

Threatened

Howellia aquatilis (Water howellia), plant
Silene spaldingii (Spalding's silene), plant
Spiranthes diluvialis (Ute ladies'-tresses), plant

SPECIES OF CONCERN

Animals

Bald eagle *(Haliaeetus leucocephalus)* (delisted, monitor status)
Burrowing owl *(Athene cunicularia)*
California floater *(Anodonta californiensis)*, mussel
Ferruginous hawk *(Buteo regalis)*
Giant Columbia spire snail *(Fluminicola columbiana)*
Loggerhead shrike *(Lanius ludovicianus)*
Long-eared myotis (*Myotis evotis*)
Northern goshawk *(Accipiter gentilis)*
Olive-sided flycatcher *(Contopus cooperi)*
Pallid Townsend's big-eared bat *(Corynorhinus townsendii pallescens)*
Peregrine falcon (*Falco peregrinus*) (Delisted, monitor status)
Redband trout *(Oncorhynchus mykiss)*
Sagebrush lizard *(Sceloporus graciosus)*
Westslope cutthroat trout *(Oncorhynchus clarki lewisi)*

Vascular Plants

Haplopappus liatriformis (Palouse goldenweed)

APPENDIX C

POTENTIAL EFFECTS OF ENDOCRINE DISRUPTING CHEMICALS ON FISH AND WILDLIFE

POTENTIAL EFFECTS OF ENDOCRINE DISRUPTING CHEMICALS (EDCs) ON FISH AND WILDLIFE

MAMMALS

Mammals have undoubtedly been adversely affected by environmental contaminants; however, there is limited evidence that these effects can be attributed to endocrine dependent mechanisms. Factors that complicate the mode of action of environmental contaminants in wild mammals include a general lack of knowledge regarding their species dependent (individual species) endocrinology/reproductive biology and how other environmental stressors contribute to affect these processes (IPCS, 2002).

BIRDS

For birds, the oviparous (egg-laying) reproductive strategy and specific life history requirements create additional exposure routes that make bird species more vulnerable to EDCs than traditional animal models or humans. Although environmental contaminants are known to have dramatic effects on endocrine regulated processes and overall population fitness, the mechanism through which these effects evolve does not necessarily include endocrine disruption. Likewise, the same individuals may experience endocrine disruption, which may or may not be linked to effects on reproduction and population fitness (IPCS, 2002).

REPTILES

There has been little study related to the effects of environmental contaminants on reptiles. However, it is relatively clear that several developmental processes in reptiles, especially sex determination, gonadal development, hormone synthesis, and secondary sex characteristics are susceptible to endocrine disruption. Some populations have been impacted by environmental contaminants with endocrine disrupting properties; however, it is unclear how widespread the problem is. Currently, there is insufficient data to evaluate whether aquatic reptiles are at greater risk in comparison to terrestrial species, for which there is very limited information (IPCS, 2002).

AMPHIBIANS

The role of EDCs in the recent decline in amphibian populations worldwide has not been validated to date. Furthermore, it has not been conclusively shown that environmental contaminants are responsible for the observed deformities and malformations (IPCS, 2002). Additional research is required in this area and more and more studies are focusing on amphibians as potential target species of EDCs (Harris et al, 1998a , 1998b).

FISH

The review of studies has shown that endocrine disruption is undoubtedly adversely affecting wild fish populations all over the world through a variety of pathways including hormone receptor interactions, interference with biosynthesis of sex steroids, disruption of hormonal control by the pituitary or reproductive and adrenal processes. However, in most cases the exact process or mode of action are poorly understood and the data that has been collected is largely confined to a few select species. Chemical compounds responsible for the adverse effects may be due to both synthetic and natural compounds. Currently, there is very little information and limited understanding of how the existing endocrine disruption is affecting population fitness (IPCS, 2002).

INVERTEBRATES

Two main factors influence the lack of knowledge with regard to effects of endocrine disruption on invertebrates including, the large diversity of the phyla and the poor understanding of invertebrate endocrinology. Challenges also include the fundamental differences between vertebrates and invertebrates and that the response to exposure may be dissimilar. Much more study is required in this area to determine the extent of exposure to EDCs on both aquatic and terrestrial invertebrates (IPCS, 2002).