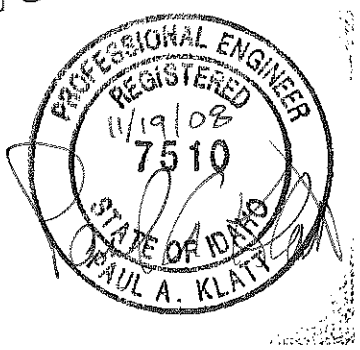
EXECUTIVE SUMMARY

for the
Cities of Hayden, Post Falls and Rathdrum
with Kootenai County

Rathdrum Prairie Wastewater Master Plan

Final Draft



November 2008

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ES-1 Introduction

ES 1.1 Purpose

The primary goal of the Rathdrum Prairie Wastewater Master Plan is to provide the technical evaluations, regulatory review, implementation priorities and cost opinions that the Cities of Hayden, Post Falls and Rathdrum along with Kootenai County with need to guide long-term wastewater service for the Rathdrum Prairie. The plan is intended to accommodate future growth by defining long-term service areas, construction phasing, operational and maintenance concerns.

ES 1.2 Historical Background

Kootenai County has experienced significant growth over the last three decades. Development over the Rathdrum Prairie falls under the "5-acre rule" for wastewater treatment using septic/drainfield systems. Simply stated, the carrying capacity promulgated since 1977 by Kootenai County and the Panhandle Health District (PHD) restricts septic system development over the Rathdrum Prairie Sole-Source Aquifer (RPA) to one equivalent residential unit (ERU) per five acres. Variations of the 5-acre rule have been applied to allow residential, commercial, and industrial subdivisions within the rule. Communities over the Aquifer developed Sewer Management Agreements (SMAs) with the County and PHD that allowed urban and suburban development and boundary expansion only with connection to an approved central sewer collection and treatment system.

The Cities of Hayden, Post Falls, and Rathdrum responded in the 1980s by constructing their systems. Rathdrum pumps their raw wastewater to Post Falls for treatment, disinfection and discharge into the Spokane River. Hayden discharges to the Hayden Area Regional Sewer Board (HARSB) wastewater treatment plant. HARSB is jointly owned and operated by the City of Hayden, Kootenai County, and the Hayden Lake Recreational Water and Sewer District. HARSB discharges to the Spokane River from October through mid-June and reuses their reclaimed wastewater by irrigating to crops and poplar trees from June through September.

As growth continued, Kootenai County, Hayden, Post Falls and Rathdrum signed Area of City Impact (ACI) agreements in 1995 to establish boundaries that would ultimately be annexed into the respective cities. Proposed changes in zoning or development within the ACI requires City notification and input to assure more compatibility and uniform standards to agree with the future annexation. Since the initial development of the ACI agreements, pressure to develop outside the ACI boundaries has increased dramatically. The pressure has resulted from challenges to continue profitable agricultural operations on the prairie, (namely bluegrass farming). It has also come from an influx of residents and businesses attracted to the high quality of life in Kootenai County and surrounding areas.

To address the increased development pressure and dwindling open space on the Prairie, Kootenai County and the surrounding cities entered into a Coordinated Area of City Impact Agreement in September of 2004 (KC Ordinance No. 339 and Ordinance No. 340). The Coordinated ACI Agreement established two tiers of land outside each city's boundary. The "Exclusive Tiers" are comprised of the redefined ACI's and abut the Cities' boundaries. The County committed to apply infrastructure and subdivision standards in the Exclusive Tier identical to those from the respective cities. The County further required that Exclusive Tier

subdivisions and developments be served by public water and sewer systems with those systems extended to the boundaries of the exterior of the development in a direction where subsequent development is likely to occur.

The Coordinated ACI Agreement also defined a "Shared" Tier of land bounded by the Exclusive Tiers, the City of Hauser ACI to the northwest, and the Washington State border to the west. The Shared Tier allows no rezoning of agricultural land for at least five years without 30 days notice to the Coordinated Agreement cities. If any city objects to such a rezoning, the Board of County Commissioners will not approve it unless the Board expressly finds that such a rezone will not adversely affect the potential to eventually provide public wastewater collection and treatment. The County further agreed to prohibit special/conditional use permits within any zone subject to the same conditions as agricultural zoning. **Figure ES-1** at the end of this Executive Summary shows the Rathdrum Prairie area, including surrounding cities, their ACIs (Exclusive Tier), and the Shared Tier.

The Coordinated Agreement required the parties to embark on comprehensive studies of open space preservation and a Wastewater Master Plan to assess the most viable methods to provide for wastewater collections, treatment, and disposal. Upon completion of the studies, the parties will enter into negotiations to provide long-term Area of City Impact Agreements, either shared or independent, to supersede the Coordinated Agreement of 2004.

Continued coordination of land use, Areas of City Impact and annexation policies between Hayden, Post Falls, Rathdrum, and Kootenai County will be crucial for Master Plan implementation. The entities reinforced their original planning intentions with their adoption of "An Endorsement of Shared Principals and Common Goals for the Rathdrum Prairie" (Kootenai County Resolution No. 2008-34, April 2008). Those goals were summarized by the entities as guidance in future land use planning as follows:

- To collaboratively and cooperatively plan for infrastructure in support of future land use on the Prairie, encourage coordinated planning efforts between affected agencies and service providers, and provide adequate levels of public services in an integrated, efficient, and effective manner,
- To establish common principles for land use on the Prairie,
- To protect our shared water resource, consider wildlife habitat in planning, and ensure open space is provided in balance with development, and
- To preserve the unique identity of each City as future development expands existing boundaries.

This historic and proactive approach to address wastewater service for future development over the Rathdrum Prairie Aquifer is led by a steering committee. The Rathdrum Prairie Wastewater Management Committee is comprised of the engineering and planning staff from each community and the County. Special recognition is due to: Hayden's Lisa Key and Jeff Zaugg; Post Falls' Collin Coles, Bill Melvin and Terry Werner; Rathdrum's Chet Anderson and Chris Riffe; and Kootenai County's Scott Clark. Their patience, guidance and hard work in the public's interest are greatly appreciated. The results of the planning effort are summarized in the following sections, but the reader is urged to examine the full details of the Plan's five technical memorandums for a comprehensive understanding of its development.

ES 2 Report Summary

This Wastewater Master Plan has been developed in a series of five technical memorandums, listed below.

- Technical Memorandum No. 1 (TM1) reviews existing master plans from each entity for interceptors, lift stations, force mains, and wastewater treatment plant capacities. TM1 also identifies the 20 largest contiguous parcels in the study area as well as the public water supply wells and critical aquifer recharge areas. This information, along with preliminary future sewer flow basins and potential pipeline alignments appears on the resulting aerial base map. Logical service basins, combined with existing and planned City boundaries, formed the basis for potential future ACIs from each entity.
- Technical Memorandum No. 2 (TM2) utilizes the "most likely" development scenario and committee input to refine flow basins, interceptor alignments, lift station locations, and development flow rates. The information forms the basis for creating the computer flow model of the Shared Tier collection system. TM2 also includes an analysis and recommended routing of future ACI flows through existing and planned pipelines and lift stations. TM1 and TM2 were combined into a single document to facilitate review and finalization.
- Technical Memorandum No. 3 (TM3) determines the existing wastewater treatment system improvements that will be necessary to provide service beyond the 2004 ACI limits. It includes technical evaluations of existing and planned unit processes to meet anticipated river discharge as well as reclamation and reuse permits over the RPA. TM3 also examines the logical location, size, and treatment technology for a potential satellite wastewater treatment plant in the Shared Tier.
- Technical Memorandum No. 4 (TM4) develops planning level infrastructure costs to assign to recommended interceptor piping, force mains, lift stations, manholes, surface repair, treatment process units, reuse operations and land.
- Technical Memorandum No. 5 (TM5) develops a Capital Improvement and Implementation Plan for the infrastructure recommendations. Construction staging priorities and potential funding sources are examined in TM5 along with the ways that existing undeveloped land might be prioritized for acquisition to facilitate future use for public access, utilities, and reuse of reclaimed water.

ES 2.1 TM1 & TM2: Flow Basins, Conveyance, and Computer Model

The study area for the Rathdrum Prairie Wastewater Master Plan includes the 10,460 acres in the Shared Tier plus 1,460 acres that was added to Post Falls' Exclusive Tier as part of the 2004 Coordinated Agreement. Although the outer boundaries of the study area were defined prior to initiating the Master Plan, the internal boundaries separating the individual entities were undefined. Those future boundaries were proposed and discussed with the elected officials and administrative representatives from each of the cooperating entities as well as the cities of Coeur d'Alene and Hauser. The resulting potential future ACIs appear on **Figure ES-2.** These boundaries are currently applicable for wastewater master planning only. Specific agreements and entity planning will be developed at appropriate later dates in accordance with formal Area of City Impact Agreements.

Parallel with the potential future ACI boundary discussions, the Management Committee developed an equivalent population approach to planning wastewater flows. A build-out equivalent of 12 people per acre and limited areas with an equivalent of 20 people per acre is considered the maximum intensities that could be reasonably anticipated in the study area. The areas of increased intensity surround major roadway intersections and where specific development plans are known, as shown on **Figure ES-2**. The equivalent population intensity approach was accepted by the elected officials and administrators from Kootenai County, Hayden, Post Falls, and Rathdrum as well as the cities of Coeur d'Alene and Hauser at a joint meeting on April 12, 2007. Applying the equivalent population approach to the existing and future ACIs produces a maximum build-out population for the Cities and the study area. **Figure ES-3** shows those results and the timeline if that growth occurred and a 3% annual average rate. **Table ES-1** below lists the tabulated values.

Table ES-1 – Maximum Equivalent Population Estimates

Community	Estimated 2005 Population [1]	Estimated Existing ACI Build-Out Population [2]	Rathdrum Prairie Master Plan Equivalent Population [3]	Future ACI Build-Out Equivalent Population [4]
Hayden	11,900	38,000	15,283	53,283
Post Falls	23,160	84,500	101,770	186,270
Rathdrum	5,740	73,000	26,568	99,568
Total	**40,800**	**195,500**	**143,621**	**339,121**

1 *U.S. Census Bureau Coeur d'Alene/Post Falls Press, North Idaho Gold Special Edition, Summer 2006*

2 *Hayden Sewer Master Plan Update, Welch Comer Assoc., December 2006, Page 17; Demographic Analysis Growth Projections for Post Falls, J.P. Stravens Planning, January 2007, Pages 7-10; Rathdrum Provisional Sanitary Sewer Evaluation, June 2006, Welch Comer & Assoc., Pages 5-6*

3 *Rathdrum Prairie Planning and Wastewater Management Committee, Meeting with Elected Officials and City Administrator's Memorandum, April 12, 2007*

4 *Sum of existing plus Rathdrum Prairie Master Plan Study Area*

The equivalent population approach also provides a basis for projecting wastewater flows for master planning purposes. The Management Committee's Technical Advisory Committee (TAC) agreed to apply a flow factor of 73 gallons per day to each equivalent population. This factor is consistent with the entities' current planning values and results in maximum flows of 876 gallons per acre per day from most of the study area. The higher intensity areas could produce up to 1,460 gallons per acre per day under these assumptions. A computer hydraulic model was then assembled to route the flow through gravity piping utilizing the natural drainage pattern of the study area as efficiently as possible. The TAC reviewed and set constraints for important model parameters such as the maximum burial depth, pipe slopes, manhole spacing, etc. Sewer lift stations were placed at low points when gravity piping could no longer stay within those constraints. The resulting pipe network, lift stations, flow basins and peak flows appear on **Figure ES-4** at the end of this Executive Summary.

In some cases, this plan's wastewater flows must be routed through a City's previously planned or constructed Exclusive Tier collection system. Hayden will need to upsize its future H10 Lift Station and force main to accommodate all of future Shared Tier flows. Post Falls will need to upsize its future 12th Avenue Lift Station in the City's northeast quadrant to

accommodate the future Highway 41 and Meyer Road sub-basin flows from the Shared Tier. The rest of Post Falls' future Shared Tier service areas will be served by new piping, lift stations and force mains routed directly to the treatment plant due to the limitations of their existing collection system. Rathdrum's future Shared Tier service areas will have little or no impact on their existing infrastructure under this plan since the gravity flow piping routes through Post Falls' Shared Tier service areas. Table ES-2 lists all the flow basins, service areas and flows that would be generated at the maximum projected intensities for the Rathdrum Prairie Study Area.

Table ES-2 – Future Flow Basin Sizes and Flow Rates

Entity	Flow Basin	Service Area Size (acres)	Service Area Size (equivalent population)	Service Area Average Flow (HYDRA Output cfs)	Service Area Peak Flow (HYDRA Output cfs)
Hayden	RP-H-NORTH	278	3,345	0.38	0.90
	RP-H-CENTRAL	706	8,503	0.95	2.21
	RP-H-SOUTH	285	3,435	0.42	1.01
Post Falls	RP-PF-MEYER	596	7,186	0.84	1.63
	RP-PF-HWY 41	216	2,599	0.39	0.77
	RP-PF-CENTRAL	176	2,123	0.24	0.47
	RP-PF-MAJOR	2,636	31,769	3.83	6.79
	RP-PF-WEST	1,422	17,136	1.93	3.77
	RP-PF-SOUTHWEST	957	11,531	1.36	2.56
	RP-PF-STATELINE	2,442	29,427	3.45	6.74
Rathdrum	RP-R-MAJOR	1,632	19,666	2.24	4.72
	RP-R-CENTRAL	573	6,902	0.77	1.67
TOTAL HAYDEN FLOW BASINS		**1,268**	**15,283**	**1.75**	**4.12**
TOTAL POST FALLS FLOW BASINS		**8,445**	**101,770**	**12.05**	**22.73**
TOTAL RATHDRUM FLOW BASINS		**2,205**	**26,568**	**3.01**	**6.39**
TOTAL TO POST FALLS		**9,714**	**117,053**	**15.06**	**29.12**
TOTAL TO HAYDEN		**1,268**	**15,283**	**1.75**	**4.12**
STUDY AREA TOTAL		**11,918**	**143,621**	**16.81**	**33.24**

ES 2.2 TM3: Wastewater Treatment and Discharge Evaluation

As previously discussed, the City of Hayden pumps wastewater to the Hayden Area Regional Sewer Board for treatment. HARSB manages the treatment and discharge for the City as well as for Kootenai County (Coeur d'Alene Airport) and the Hayden Lake Recreational Water and Sewer District. HARSB's operates an oxidation ditch type of biological treatment process followed by gravity clarifiers and chlorine disinfection. It discharges to the Spokane River from October through May or until the river flows fall below 2,000 cubic feet per second (cfs). When HARSB cannot discharge their finished effluent to the river, they reuse it by irrigating crops and poplar trees on their 476-acre farm. The river discharge is permitted through the U.S. Environmental Protection Agency's National Pollutant Discharge Elimination System (NPDES) program. The reuse operation is permitted through the Idaho Department of Environmental Quality's Wastewater Reclamation and Reuse program.

HARSB's current treatment capacity rating is 2.0 million gallons per day (mgd) at average flows. It has biological capacity for as much as 2.4 mgd. Additional clarification, chlorine disinfection, outfall capacity, reuse irrigation and solids processing facilities will be needed to fully utilize their existing biological capacity. Although current flows average about 1.1 mgd, HARSB has sold capacity totaling more than 1.7 mgd. Planning for HARSB treatment capacity must include flows from the City of Hayden built out to its current ACI as well as their portion of the Shared Tier. Plans must also include flows for the Kootenai County Airport and HLRWSD. The maximum flow planning allocations as well as Hayden's increased flow from the Shared Tier appear in Table ES-3.

Table ES-3 – Flow Planning for HARSB WWTP Maximum Capacity

Entity	Existing ER [1]	Future ER	Maximum Build-out Flow (mgd)
City of Hayden (Exclusive Tier)	5,807	14,552 [2]	2.91
City of Hayden (Shared Tier)	0	5,650	1.13
HLRWSD	2,439	2,439 [3]	0.49
Kootenai County Airport	114	400 [3]	0.08
TOTAL	**8,360**	**8,495**	**4.61**

1 *Hayden Area Regional Sewer Board, December 2007 Board Meeting Packet; includes 891 paid but unconnected ERs (337 Hayden, 525 HLRWSD, 9 Airport, 20 miscellaneous). An ER is defined as 200 gallons per day.*

2 *Welch Comer & Associates, "Hayden Sewer Master Plan Update," December 2006*

3 *J-U-B ENGINEERS, Inc., "Treatment Plant Upgrade Program to 1.65 mgd and Projected Facilities to 4.0 mgd," October 2005*

The City of Post Falls and the City of Rathdrum pump their wastewater flows to the Post Falls wastewater treatment plant. Post Falls also operates an oxidation ditch type of biological treatment process followed by gravity clarification and ultraviolet light disinfection. Post

Falls' processes include biological phosphorus removal to meet the current requirements of their year-round discharge to the Spokane River. As with HARSB, the EPA issues Post Falls' discharge permit under their NPDES program. Their current treatment capacity is 3.1 mgd after recent clarifier and aeration upgrades. With average annual flows of 2.5 mgd and high monthly average of 2.6 mgd in 2008, Post Falls is planning to construct expanded treatment capacity over the next two years up to 4.0 mgd. Build-out planning for Post Falls' treatment capacity includes flow from the City of Post Falls as well as Rathdrum's Exclusive and Shared Tiers. The flow planning allocations are summarized in **Table ES-4.**

Table ES-4 – Flow Planning for Post Falls' WWTP Maximum Capacity

Entity	Exclusive Tier Flow (mgd)	Shared Tier Flow (mgd)	Maximum Build-out Flow (mgd)
City of Post Falls	9.29	7.78	17.07
City of Rathdrum	3.87	1.95	5.82
TOTAL	**13.16**	**9.73**	**22.89**

Numerous regulatory issues can impact wastewater planning endeavors, and those regulations are continually evolving. This plan addresses current and emerging regulations as they relate to wastewater treatment, reclamation, reuse, and discharge. Staying abreast of emerging regulations will be an on-going challenge as elements of the Master Plan move toward implementation.

Of particular concern are the 2007 Draft NPDES Permits that EPA withdrew in September 2008. NPDES permits must be developed so that they do not violate the Water Quality Standards in either Idaho or Washington. The Idaho standards would easily be met with the 2007 Permits. However, the Washington dissolved oxygen standard is not being met during the summer months in the Lake Spokane reservoir formed by Long Lake Dam. Therefore, Washington is required to develop a dissolved oxygen total maximum daily load (TMDL) analysis for its "impaired" water body. They have issued the TMDL several times for review with the latest draft version dated June 2007. Once Washington adopts the TMDL, they will submit it to EPA for approval. EPA must utilize an approved TMDL to evaluate whether "reasonable potential" exists for a discharger to cause or contribute to an excursion above any State Water Quality Standard.

Phosphorus is believed to be a primary contributor to the aquatic plant growth in Lake Spokane that depletes the dissolved oxygen during the warmest summer months. Washington's Draft TMDL includes extremely restrictive allocations for the amount of phosphorus that could be discharged into the Spokane River. The resulting 2007 Draft Permits were the most stringent in the nation and the computer analysis predicted that the Lake's dissolved oxygen concentrations would improve. However, Washington's dissolved oxygen standard can never be achieved. Therefore, they allow 0.2 milligrams per liter (mg/L) of cumulative dissolved oxygen depletion below "natural conditions". The Idaho permits caused a theoretical depletion of 0.15 mg/L but were not taken in conjunction with the depletion created by Washington issuing permits at the same time. Therefore, EPA and the Washington Department of Ecology rescinded the Draft Permits and are reviewing the conditions

necessary for re-issuing them. The Draft Permits are the most current regulatory approach available for analyzing Spokane River discharges. They are the most restrictive in the country and represent "all known and reasonable treatment" methods. Therefore, they are utilized for the planning baseline of this analysis. Biological nutrient removal, chemical coagulation, and filtration are being included as a future standard treatment expectation for HARSB and Post Falls.

With the tightening restrictions on river discharge, wastewater reclamation and reuse will play an increasing role for serving development over the Rathdrum Prairie. The reuse standards are governed by the Idaho Administrative Procedures Act (IDAPA) Part 58, Title 01, Chapter 17 - Rules for the Reclamation and Reuse of Municipal and Industrial Wastewater. Reuse over the RPA is further governed by Special Supplemental Guidelines for Land Application and the Aquifer's Sensitive Resource designation under the Groundwater Quality Rule (IDAPA 58.01.11). While the requirements are significant, HARSB has demonstrated that reuse can be successfully managed over the RPA.

Four wastewater service and treatment scenarios for Rathdrum Prairie build-out are analyzed in this plan. The treatment scenarios are:

Treatment Scenario 1 - Full Shared Tier Build-out

The complete build-out of the Rathdrum Prairie study area utilizes the population density approach recommended by the Management Committee for all land in the Exclusive and Shared Tiers. River discharge would continue as allowed in the 2007 Draft NPDES Permits.

Treatment Scenario 2 - No Service for Mining or Existing Reuse Areas

Scenario 2 reduces the complete build-out scenario by assuming existing mining, mining agreement, and reuse areas will not contribute to the future build-out scenario (i.e. never receive sewer service).

Treatment Scenario 3 - No Service for Mining, Existing Reuse, or Expanded Reuse Areas

This is a further reduction of the complete build-out scenario by assuming existing mining as well as existing reuse plus expanded reuse areas will never be served with municipal sewer.

Treatment Scenario 4 - Scenario 3 with Improved Phosphorus Removal

Scenario 4 also assumes no mining or reuse areas will be served. It further assumes that technology associated with phosphorus removal will improve and total phosphorus treatment will produce reliable reductions in phosphorus to half of the permit limits and permit conditions will remain unchanged so that a larger river discharge volume at lower concentration would be allowed.

Following a detailed examination of the options and costs associated with each Scenario, Scenario 3 is recommended. A summary of the recommended flow planning values is provided on Table ES-5. Scenario 3 results in a more manageable amount of land required for reuse. Scenarios 1 and 2 simply require too much additional land for reuse. While treatment processes continue to advance, Scenario 4 appears to be too optimistic for phosphorus removal at this time. There is currently no proven technology operating at full scale facilities that consistently achieve phosphorus removal below a concentration of 25 parts per billion.

Table ES-5 – Recommended Alternative for Treatment Capacity and Reuse Planning

Flow Scenario 3	HARSB WWTP Flow (mgd)	Additional HARSB Reuse Land (acres)[1]	Post Falls WWTP Flow (mgd)	Additional Post Falls/Rathdrum Reuse Land (acres)[2]
Existing ACI Exclusive Tier Build-out	3.48	435	13.16	1,875
Rathdrum Prairie Shared Tier Build-out	0.56	165	4.87	1,355
TOTAL BUILD-OUT CAPACITY	**4.04**	**600**	**17.83**	**3,230**

[1] *HARSB has 476 acres of reuse land currently.*

[2] *Post Falls and Rathdrum currently own 932 acres for reuse*

The treatment methods to meet the discharge requirements of the 2007 Draft NPDES Permits will include biological nutrient removal and filtration. With relatively minor disinfection upgrades, both Post Falls and HARSB will then meet Class A or Class B reuse standards. Class A standards are the most stringent. They allow the broadest uses for irrigation, dust suppression, and industrial processes with the least restrictions on setbacks, signage, and access by the public. This plan assumes that Class A reuse water will ultimately be produced by both HARSB and Post Falls for irrigation of crops, trees, parks, schools, golf courses, and open spaces. The reuse water may also be attractive for dust suppression and for cooling water to expand the existing natural gas-fired turbine electrical generators. Reuse areas should be as close to one another as possible for more efficient operation and maintenance. **Figure ES-5** shows where existing and potential reuse areas exist throughout the Exclusive and Shared Tiers. With almost 4,000 acres of additional reuse irrigation needed to accommodate build-out growth, all opportunities must be explored.

Significant discussions have centered around the priority and preference for smaller distributed treatment plants on the Rathdrum Prairie. The premise is whether they could more readily accommodate both growth and reuse. TM3 and TM4 presented the criteria and planning level costs for constructing a membrane bioreactor (MBR) treatment plant on Post Falls' farmland. The MBR evaluation utilized the proposed reuse transmission main to discharge reclaimed wastewater to the main plant for river discharge during the non-growing season. This concept minimizes storage and maximizes reuse land availability. Without the non-growing season discharge to the main plant, a 0.5 MGD MBR plant would require as much as 250 acres of reuse land and 110 million gallons of finished water storage.

Distributed treatment is feasible in the Study Area. However, it depends largely on the economics of independent construction and operations as well as establishing suitable long-term ownership parameters. The County's Draft Comprehensive Plan accommodates the cities' desire for limited growth in the Shared Tier with the Urban Reserve land use designation. Subdivisions with up to one "equivalent residential unit" per ten acres can be developed in the Shared Tier under the Urban Reserve. Numerous 10-acre subdivisions could make it difficult for the cities to efficiently aggregate reuse properties in the future. Inclusion in an ACI would allow a City more input into County growth decisions than are afforded in the Urban Reserve. However, the County also requires approval of a City's 20-year CIP before

agreement to expand an ACI. It is, therefore, crucial for the cities and County to closely coordinate planning and development throughout the Exclusive and Shared Tiers in determining the best policy for satellite or other forms of distributed treatment systems.

ES 2.3 TM4: Infrastructure Cost Allocations for Capital Improvement Planning

Technical Memorandum No. 4 details the capital cost opinions for each entity based on 2008 construction estimates. They are summarized below in Table ES.6. The costs provide estimations for potential future CIP comparison purposes. They include collection, treatment, reuse transmission, irrigation, monitoring, and land acquisition for each entity. Necessary upsizing to the existing Exclusive Tier collection systems, wastewater treatment, reuse, and the previously planned infrastructure improvements are included where they are common to the rest of the improvements. Costs attributed to just one entity appear in the footnotes. Upgrade costs anticipated to meet new regulations or rectify deficiencies in the existing systems for existing users appear only in the footnotes because they should be attributed to user fees.

Table ES-6 – Total Capital Improvement Cost Summary

Description	Hayden (Total)	Post Falls w/Rathdrum (Total)[1]
Collection System	$6,462,000	$32,036,000
Treatment/Reclamation	$29,625,000 [2]	$152,484,000
Reuse Transmission, Storage and Irrigation	$11,130,000	$44,551,000
Land Acquisition for Reuse	$18,000,000	$96,900,000
Total	**$65,217,000**	**$325,971,000**

1 *Post Falls' Shared Tier Collection System and upsizing that is not common with Rathdrum will cost $5,618,000 ($8.78/gpd). Rathdrum's Shared Tier Collection System not common with Post Falls will cost an additional $5,854,000 ($6.30/gpd).*

2 *HARSB projected $41,925,000 of treatment improvements is reduced by the $12,300,000 required for the first 2.0 mgd to add BNR and filtration ($6.15 gpd).*

The above costs are assigned assuming a "concentric" growth pattern. Major infrastructure components would be built at the time they are needed outward from the existing city limits and Areas of City Impact (ACI). Table ES-7 shows those costs for each entity based on gallons per day (gpd) of service and compares them with capacity fees in place in October 2008. It should be noted that financing costs are not currently included in any of the entities' current Capital Improvement Plans and are not included here. Capital improvements have been generally made using accumulated reserves rather than borrowing in recent years. This is consistent with the communities policies for growth to pay for itself through the capacity fees.

Table ES-7 – Shared Tier Incremental Capital Cost Summary by City

Description	Hayden ($/gpd)	Post Falls ($/gpd)	Rathdrum ($/gpd)
Collection System [1]	$11.54	$8.78 [2]	$14.31 [3]
Treatment	$14.52	$10.37	$10.37
Reuse: Transmission, Storage, and Irrigation	$5.46	$3.11	$3.11
Reuse: Land Acquisition	$8.70	$8.70	$8.70
Total	**$40.22**	**$30.96**	**$36.49**
Existing Capacity Fee (October 2008)	**$37.19**	**$25.65**	**$33.61**

1 *Common collectors and interceptors 12-inches or larger, as well as lift stations and force mains. Includes required upsizing within existing or planned collection systems required to serve Shared Tier.*

2 *Utilize higher of two costs derived from common and upsizing improvements (within 10% of each other).*

3 *Common basin improvements plus Rathdrum-specific improvements.*

While there are costs assigned to each entity for serving their portion of the Shared Tier, there is no differentiation among the individual flow basins within each City's study area. The unpredictable timing and density that will ultimately be served in each flow basin does not lend itself to further differentiation at this scale of master planning. It is also problematic for long-term tracking and implementation by each entity. Therefore, overall costs attributable to each City's Shared Tier are utilized in this analysis.

ES 2.4 TM5: Capital Improvement and Implementation Plan

Technical Memorandum No. 5 utilizes the master planning information developed in previous TMs to guide implementation planning. Implementation for this large-scale planning requires high levels of intergovernmental cooperation over the next 50-100 years. The Cities of Hayden, Post Falls, and Rathdrum, along with Kootenai County, continue to move this process forward even as specific agreements, regulatory constraints, and funding mechanisms evolve. In conjunction with the intergovernmental efforts, working with affected property owners will be crucial to blend individual goals with the ability to serve them. Implementation of this plan will require continuous review of service areas, treatment standards, revenue sources, and development patterns in order to adapt to changing conditions in a sustainable manner.

The key to collection system staging in the Shared Tier will be incremental outward growth from the existing ACIs. Hayden will likely accommodate Shared Tier development the most easily with its future H10 Lift Station the key to implementation. Rathdrum will likely experience the greatest challenges due to the separation from existing and planned infrastructure. The key for both Post Falls' and Rathdrum's implementation of the plan is construction of the future Major Lift Station with its appurtenant force main to the treatment plant and the gravity collector constructed to Rathdrum's future ACI. **Figure ES-4** shows the collection system color coded by entity. It is important to note that only trunk lines 12-inches and larger, lift stations, and force mains are included in the Capital Improvement Plan (CIP). All smaller piping is considered incidental to development.

TM3 established the basis for how much reuse land would be needed to match crop uptake with reclaimed water production rates and river discharge. **Figure ES-5** shows where the

entities have purchased existing farmland for reuse. Those properties form the initial "backbone" of the reuse system. Permitting those lands for reuse and developing the transmission, storage, and irrigation systems for those sites becomes the next priorities for both Exclusive and Shared Tier master planning. It is also critical to look for opportunities for additional reuse as near as possible to those existing and planned facilities. The proximity will make them more cost-effective to own, operate, and manage.

Large-scale, consolidated reuse operations will make the entities develop new areas of staffing expertise. The entities currently utilize contract farmers to plant and harvest their land. However, farming under the reuse rules requires significantly more oversight in order to minimize the potential for offsite migration and inappropriate public contact. With large-scale farming operations waning in the study area, reuse will create the need for farming and/or silvicultural operators specializing in production with reclaimed wastewater irrigation.

Funding the needed infrastructure to serve the Shared Tier may be the largest challenge to face the cities under this or any Wastewater Master Plan. Communities typically plan based on fees with or without bond financing. Then they utilize those funding sources to match any available grant program or tax increment funds in an effort to keep fees reasonable. Fees fall into two categories; user fees and capacity or impact fees (also referred to as connection or capitalization fees).

User fees are paid on a regular basis (monthly, bi-monthly or quarterly) by those currently connected to the system. Regular operations and maintenance expenses of the system (power, labor, chemicals, repairs, etc.) make up one element of user fees. Fees for a reasonable level of reserves for eventual replacement of system components as they become obsolete make up the second element of user fees. The replacement reserves are usually accounted for separately from the daily operational and capacity expansion costs.

Capacity fees are a one-time fee to replace the capacity required to serve a structure or development (impact on capacity). Most entities charge the fee at the time of the building permit request because the specific impact will be most accurately definable. Capacity fees accrue in a separate account from user fees because they can only be used for expenditures directly related to capacity improvements. The fees are based on an approved Capital Improvement Plan or Wastewater Facilities Plan prepared to keep capacity available for orderly growth. The fees may or may not include financing costs for the projects.

Providing service to the Shared Tier will fall under the definition for capacity fees. Currently, all three cities charge these fees without including the costs for debt financing. The intent is that the existing users of the system have paid for its construction with some incremental capacity available for growth. As each new user pays their capacity fee, adequate capital reserves are generated to construct the next increment of capacity. Table ES-7 shows that how this Master Plan is consistent with the historical approach and estimates relatively modest fee increases to accommodate long-term Shared Tier growth.

As the collection and treatment systems have become larger and more complicated, the cash-only construction approach has been stretched to its limit. The municipal entities may ask users or a judge to authorize a fee increase as a means to secure bond financing with the intent for new connection/impact fees to fully retire the bonds without utilizing the fee increase. Bond funding is often an unpopular choice for communities because users do not

want to guarantee funding for growth. If those requests are moderate, however, voters have traditionally supported utility projects for specific purposes. In this case, user fees would only be affected if a strategic project or acquisition required funding ahead of the reasonably anticipated capacity fee collection.

Finally, there are implementation priorities that need to be included as part of this Master Plan. The following list includes land use and annexation policies; river discharge regulatory policies; and reuse regulatory policies. They will need continual entity and community involvement to sustain long-term development in the Exclusive and Shared Tiers.

Land Use and Annexation Policies:

- Wastewater service priorities should be given to lands within existing City Limits while recognizing that strategic and incremental growth within and beyond the existing ACI can be beneficial to each community.
- Annexation should only occur in a sequential manner outward from existing sewer service basins and only when collection and treatment capacity is available or is reasonably assured to be available when needed. Service basin priorities were described in Section 2 of this Technical Memorandum.
- Land use and annexations in the Shared Tier (north of Prairie Avenue) must be limited to an overall average density of six people per acre.
- At least 40 percent of the current non-mining and non-reuse land in the Shared Tier (north of Prairie Avenue) must become available for future reuse under this Plan.
- Reuse land should be aggregated near existing reuse land to the maximum extent possible to optimize operating efficiencies.
- Reuse land should be connected together and to other public spaces to the maximum extent possible through dedicated public ownership and easements for long-term operations and access.
- Where acceptable reuse land cannot feasibly be included within a proposed annexation, such land or the financial equivalent of such land must be identified.
- The value of reuse land brought forward through annexation must be determined prior to the annexation by appropriate public appraisal methods.
- Land use policies should encourage and maintain existing agricultural operations in the Shared Tier until such time as purchase, lease, or suitable development agreements can be reached to encourage conformance with this Master Plan.

River Discharge Regulations and Policies:

- EPA has acknowledged the regulations will push dischargers beyond the capabilities of municipal treatment systems built to date. This plan anticipates "all known and reasonable treatment technologies" (AKART) will be applied to address the standard.
- All septic systems removed with municipal sewer and other water quality protection measures must now be catalogued for loading offset purposes. Water quality trading is proposed to bridge the gap between what is technologically achievable and what the standards require. As part of our strict management of wastewater over the Rathdrum

Prairie Aquifer in Idaho, the Cities have limited trading opportunities compared to an estimated 16,000 septic tanks and drainfields that have yet to be sewered in Spokane County.

- While it is difficult to make water quality revisions, especially in another state, the Cities and HARSB must continue to work cooperatively with the Washington dischargers, EPA, and WDOE to change the water quality standards through a Use Attainability Analysis (UAA) and site specific criteria. It will likely not change the need to meet AKART treatment levels but could provide an achievable standard in Lake Spokane.
- The entities must participate with the other dischargers, EPA and WDOE to define Avista Corporation's role and responsibility in addressing the dissolved oxygen problem caused by impounding the Spokane River behind Long Lake Dam. Avista may participate directly with load reduction (AKART), lake oxygenation, increasing flows from Lake Coeur d'Alene or water quality trading projects.
- The entities must engage themselves and IDEQ at the highest levels with Washington State and EPA to obtain fair consideration for allowable loading to the Spokane River. Idaho's April 2007 Draft Permits caused a theoretical 0.15 mg/L dissolved oxygen sag. Therefore, Idaho dischargers could conceivably meet the water quality standards with AKART at a sag of 0.10 mg/L (50 percent of that allowed by Washington).
- Entities should be prepared to contact the Idaho Congressional delegation and lobby for EPA, IDEQ, and/or WDOE funding to perform thorough and reliable water quality modeling. Agency resources for water quality modeling to determine acceptable river loading are not technically prepared or funded to adequately address such an important element of the TMDL and permitting process.

Reuse Regulations and Policies:

- Stay engaged with IDEQ as it further defines reuse practices over the RPA in 2009 through interpretation of the Ground Water Quality Rule and RPA supplemental information. The goal should be to establish that statewide reuse rules are protective of the RPA with minimal additional safeguards. If that goal cannot be accomplished within existing rules, then recruit state legislative support for appropriate rule modification that protects aquifer quality and gives reasonable certainty to water reclamation and reuse practices.
- Improve groundwater monitoring at HARSB for better operations and install it at Post Falls' reuse land for determining background conditions. HARSB should construct and test at least one more monitoring well and Post Falls should construct and test two to four wells.
- Establish Reuse Permits for the Post Falls and Rathdrum farm lands. Reuse may be a few years away but the applications, background data, and public review process will likely take a year or more. Establishing these permits will clearly establish the treatment, monitoring, and set-back requirements.
- Work with IDEQ and mining land owners to establish the expected condition for permitting reclaimed mining lands for reuse water irrigation. There is hesitation among regulators, the Cities, and the public due to the proximity of the RPA once

mining operations and reclamation are complete. However, the topsoil originally removed from the site is required to be stockpiled, returned, and revegetated for agricultural, commercial, or residential purposes as part of those mining agreements. Since reuse rules require operations to minimize any chance of irrigation water and nutrients moving beyond the root zone, a strong case can be made that reuse practices would be the most protective of the aquifer in reclaimed mining zones. The practicality of reuse irrigation on the reclaimed properties' side slopes may limit those areas to silviculture, nursery stock, or fruit crops.

- Stay engaged with the Idaho Department of Water Resources' (IDWR's) adjudication process for supporting reuse as a means to conserve and protect existing ground water rights of municipal water purveyors. All of the water that HARSB treats originates from other entities' water rights. Post Falls' potential reuse production will also originate largely from Rathdrum, East Greenacres Irrigation District and Ross Point Water District. HARSB and Post Falls must file claims on those rights for "use to extinction" as reuse water because the water laws in these instances are not clear. IDWR's Groundwater Management Plan for the RPA supports these concepts and states that existing ground water rights will not be forfeited as a result of conservation and reuse.

The above approaches will make this Master Plan adaptable to the evolving growth and regulatory conditions for many years. With them, the cities of Hayden, Post Falls, Rathdrum, and Kootenai County can sustainably manage wastewater to be protective of the Spokane River while also "closing the loop" on reclaimed water for reuse and conservation over the RPA.

Figures

List of Wastewater Planning Acronyms and Abbreviations

A	Area
AC	Asbestos Cement Pipe
ACOE	Army Corps of Engineers
AKART	All Known and Reasonable Treatment (technology)
AOTR	Actual Oxygen Transfer Rate
BNR	Biological Nutrient Removal
BOD_5	5-Day Biochemical Oxygen Demand
CA	Compliance Activities
CBOD	Carbonaceous Biochemical Oxygen Demand
CEC	Cation Exchange Capacity
cf (CF)	Cubic Feet
CFR	U.S. Code of Federal Regulations
cfs	Cubic Feet Per Second
cfu	Colony Forming Units
CMOM	Capacity, Management, Operations, and Maintenance
CMU	Concrete Masonry Units
COD	Chemical Oxygen Demand
CRF	Capital Recovery Factor
CUP	Conditional Use Permit
D	Depth
DBP	Disinfection By-Products
DEQ	Department of Environmental Quality
DIP	Ductile Iron Pipe
DO	Dissolved Oxygen
DMR	Discharge Monitoring Report
E. coli	Escherichia coliform bacteria
EA	Each
EID	Environmental Information Document
EPA	U.S. Environmental Protection Agency
ERU	Equivalent Residential Unit
ESA	Endangered Species Act
fpm	Feet Per Minute
fps	Feet Per Second
ft	Feet
gal	Gallons
GFD	Gallons per Square Foot per Day
GLUMRB	Great Lakes-Upper Mississippi River Board of State Provincial Public Health and Environmental Managers Recommended Standards for Wastewater Facilities (10-States Standards)
gpcd	Gallons Per Capita Day
gpd	Gallons Per Day
gpm	Gallons Per Minute
HARSB	Hayden Area Regional Sewer Board
HDPE	High Density Polyethylene
hp	Horsepower
HRT	Hydraulic Residence Time
HVAC	Heating/Ventilation/Air Conditioning
I/I	Inflow and Infiltration
IDEQ	Idaho Department of Environmental Quality
IDWR	Idaho Department of Water Resources
kW	Kilowatt

Acronyms and Abbreviations (continued)

kwh	Kilowatt-Hour
L	Length
L:D	Length to Depth Ratio
L:W	Length to Width Ratio
lb/day	Pounds Per Day
LS	Lump Sum
MBR	Membrane Bioreactor
MCL	Maximum Contaminant Level
MG	Million Gallons
mg/l	Milligram Per Liter
MGD	Million Gallons Per Day
ml	Milliliter
MLSS	Mixed Liquor Suspended Solids
MLVSS	Mixed Liquor Volatile Suspended Solids
MN	Manhole
MPN	Most Probable Number
MSL (msl)	Mean Sea Level
N/A	Not Available or Not Applicable
ND	Non-Detectable
NH_3-N	Ammonia Expressed as Nitrogen
NO_3-N	Nitrate Expressed as Nitrogen
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
O_2	Oxygen
OSHA	Occupational Safety and Health Administration
POTW	Publicly Owned Treatment Work
ppd	Pounds Per Day
PQL	Practical Quantitation Limit
PVC	Polyvinyl Chloride
RAS	Return Activated Sludge
RD	Rural Development (Division of US Department of Agriculture)
SA	Surface Area
SBC	Submerged Biological Contactor
SBR	Sequencing Batch Reactor
SCFM	Standard Cubic Feet Per Minute
SCS	US Department of Agriculture Soil Conservation Service (Now RD)
sf (SF)	Square Feet
SMP	Solids Management Plan
SOTR	Standard Oxygen Transfer Rate
SRT	Solids Retention Time
SS	Stainless Steel
STEP	Septic Tank Effluent Pump
TDH	Total Dynamic Head
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TMP	Trans-Membrane Pressure
TN	Total Nitrogen
TOC	Total Organic Carbon
TP	Total Phosphorus
TSS	Total Suspended Solids
USGS	United States Geological Survey
UV	Ultra Violet Radiation (disinfection)

Acronyms and Abbreviations (continued)

V (vol)	Volume
VCO	Voluntary Consent Order
VFD	Variable Frequency Drive
VOC	Volatile Organic Compounds
W	Width
WAS	Waste Activated Sludge
WL	Water Level
WLAP	Wastewater Land Application Permit
WWTP	Wastewater Treatment Plant