King County Reclaimed Water
Comprehensive Plan

Reclaimed Water Strategies

For planning purposes only

December 2010 Version

King County
Department of
Natural Resources and Parks
Wastewater Treatment Division

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1.0. INTRODUCTION

This report was prepared to support the development of a Reclaimed Water Comprehensive Plan for King County's Wastewater Treatment Division (WTD). The purpose of the Reclaimed Water Comprehensive Plan is to determine if, how, when, where, and by what funding mechanisms the County's existing reclaimed water program should expand over the next 30 years.

The report was completed as part of Step 3 of the reclaimed water planning process approved by the King County Council in December 2009.[1] It presents the approach and results of an effort to develop conceptual strategies for the production and distribution of reclaimed water to serve potential nonpotable consumptive uses (irrigation, commercial, industrial) and environmental enhancement uses (wetland enhancement, groundwater recharge, direct streamflow augmentation) identified in Step 2 of the planning process.[2] The September 2010 version of this report was revised to incorporate information requested by the Metropolitan Water Pollution Abatement Advisory Committee and to include a summary of comments received from interested parties on the reclaimed water strategies recommended for analysis.

WTD recommends that three strategies move forward to Step 4 of the planning process for planning-level engineering, environmental, and economic analyses. Throughout the process to develop and refine strategies, consideration was given to the three drivers for the Reclaimed Water Comprehensive Plan—regional wastewater system planning, creating resources from wastewater, and protecting Puget Sound water quality.[3] If the Council approves moving forward to Step 4, the Council-approved evaluation criteria (Motion 13211) will be used to assess how the recommended strategies address the drivers.

The strategies presented in this report were developed for planning purposes only and do not represent any implied preference or commitment on the part of any interested parties or potential end users.

[1] A description of the reclaimed water comprehensive planning process is available at http://your.kingcounty.gov/dnrp/library/wastewater/rw/CompPlan/091216_AttachmentA(2009-0513).pdf.

[2] A summary of Step 2 of the reclaimed water comprehensive planning process is available at http://your.kingcounty.gov/dnrp/library/wastewater/rw/CompPlan/1003_RWCP_Step2_SummaryReport.pdf.

[3] Information on the drivers can be found in the plan purpose and need statement at http://your.kingcounty.gov/dnrp/library/wastewater/rw/CompPlan/0907_PurposeNeedStatement_UpdateJune2010.pdf.

2.0. PROCESS TO DEVELOP CONCEPTUAL RECLAIMED WATER STRATEGIES

The process to develop conceptual reclaimed water strategies took place between April and November 2010. It consisted of developing initial strategies, followed by gathering feedback from interested parties, conducting preliminary analyses to screen and refine the strategies, and obtaining additional feedback from interested parties on recommended strategies. The following sections describe this process.

2.1 Develop Initial Strategies

King County staff developed a set of 13 initial reclaimed water strategies for subsequent review by interested parties. The strategies were developed through the following steps:

- Analyzed data collected in Step 2 of the planning process on the volumes and locations of wastewater available for reclamation and on potential uses for reclaimed water:
  - Flow monitoring and modeling data were analyzed to identify points in the regional wastewater system where either raw or secondary treated wastewater would be available for reclamation.
  - Identified nonpotable consumptive and environmental enhancement uses were analyzed to determine where potential uses of reclaimed water are geographically concentrated.
- Applied the following basic engineering factors to help estimate geographic boundaries and infrastructure for each strategy:
  - Potential for reclaimed water to eliminate or delay a planned regional wastewater system capital improvement project
  - Availability of sites in strategy areas for reclaimed water production facilities
  - Elevation differences between potential wastewater system supply points and potential uses, for identifying potential distribution pipeline routes
  - Proximity of roadways or other rights-of-way, for identifying potential distribution pipeline routes

The initial conceptual reclaimed water strategies identified through this process can be viewed at http://your.kingcounty.gov/dnrp/library/wastewater/rw/CompPlan/100429_Workshop04_AttendePacket.pdf.

2.2 Refine Initial Strategies Through Feedback from Interested Parties

Interested parties gave feedback on the initial conceptual strategies during a regional workshop and in individual meetings that followed the workshop. The feedback resulted in elimination of

some strategies and refinement of others, leaving seven strategies for preliminary analyses (see Section 2.3).

2.2.1 Regional Workshop

The fourth in a series of regional workshops was held on April 29, 2010. The purpose of this workshop was to gather input from interested parties about how reclaimed water strategies should be developed. Approximately 50 people representing state and regional agencies, cities, sewer and water districts, local and regional oversight organizations, business interests, and environmental groups attended the workshop. Common themes heard are as follows:

- The County should start out slowly and seek to develop reclaimed water strategies that appear to have the best chances for success and then build on those successes.
- Smaller strategies should be considered that allow for flexibility and scalability.
- More information is needed regarding use of reclaimed water to help manage Lake Washington water levels, and potential water quality concerns need to be addressed.
- Costs and how costs will be allocated need to be addressed.

A complete summary of the workshop and participants is available at http://your.kingcounty.gov/dnrp/library/wastewater/rw/CompPlan/100429_Workshop04_Summary.pdf.

2.2.2 Individual Meetings

From May through July 2010, WTD solicited more feedback on the initial conceptual strategies in a series of individual meetings. Staff met with over 25 groups and individuals representing tribal governments, federal and state agencies, regional associations, cities, sewer and water districts, and environmental groups. Input covered a wide array of topics, including the following:

- The proposed strategies are reasonable.
- Expansion of reclaimed water production and distribution should start small and seek to build on successes.
- Using reclaimed water for groundwater recharge or as mitigation for potable water supply withdrawals is controversial and complex.
- Direct discharges into surface water bodies pose significant regulatory challenges, including potentially stringent reclaimed water quality standards and controversy over use of reclaimed water for mitigation of water withdrawals.
- The potential for seasonal flooding from adding reclaimed water year-round to wetlands that drain to surface water bodies needs to be studied further.
- Water quality is a primary concern, especially in evaluating the potential for using reclaimed water to augment water levels in Lake Washington.

- Small skimming plants may provide flexible small-scale opportunities to make use of reclaimed water.[4]

A summary of feedback received during the individual meetings is available at http://www.kingcounty.gov/environment/wastewater/ReclaimedWater/CompPlan/Library.aspx#3.

2.3 Conduct Preliminary Analyses to Further Refine Strategies

Preliminary analyses were conducted to screen and refine the seven conceptual reclaimed water strategies. Three of the strategies are recommended for further analysis; the other four strategies are not recommended for analysis at this time (see Section 3.0). The preliminary analyses were as follows:

- Reviewed reclaimed water treatment technologies based on the potential end uses of reclaimed water and on background water quality conditions in areas that show potential for environmental enhancement uses. The review included required filtration, nutrient removal, and disinfection levels.
- Using the results of the technology review, developed approximate footprints and estimates of the amount of land needed for reclaimed water production facilities. Available Geographic Information System (GIS) data were used to review land use plans and policies.
- Reviewed available GIS data on groundwater wellhead protection zones, sole source aquifer areas, soils, and surficial geology to refine possible locations in strategy areas for environmental enhancement uses (wetland enhancement and groundwater recharge):
    - — Areas of surficial till and/or poorly drained soils in the strategy areas were considered as possible locations for wetland enhancement. Poorly drained locations where wetlands already exist and where all or most of the land is publicly owned were analyzed in more detail. Preliminary estimates of flow rates were made based on estimates of the area suitable for wetland enhancement and of the reclaimed water flow rate in million gallons per day (mgd) (using an areal application rate of 2 centimeters per day).
    - — Areas of surficial outwash and/or well-drained soils in the strategy areas were considered as possible locations for groundwater infiltration. Preliminary estimates of groundwater infiltration flow rates were based on estimates of the area suitable for groundwater infiltration and of the reclaimed water flow rate in mgd (using an areal application rate of 2 inches per day). The following areas were excluded from consideration:
        - Developed impervious areas
        - Sole Source Aquifer areas

[4] A skimming plant removes some of the raw wastewater from pipelines that carry the wastewater to regional plants for treatment and then treats the wastewater to reclaimed water quality for local distribution.

- Critical Aquifer Recharge areas
- Areas in a 1-year Wellhead Protection Area's 1-year time of travel radius
- Areas in the 1,000-foot-radius Wellhead Protection Zone of Group B wells
- Areas with steep slopes

2.4 Obtain Feedback on Recommended Strategies

From September through November 2010, WTD solicited feedback on its recommendation from a number of interested parties. About 10 interested parties met with staff, including a federal agency, cities, sewer and water districts, and environmental groups. Generally, interested parties expressed support for the recommendation to analyze the three recommended reclaimed water strategies. Interested parties offered a range of perspectives and expressed some concerns that were, on the whole, consistent with earlier feedback:

- Interested parties continued to express an interest in reclaimed water strategies that are small and allow for flexibility and scalability. Many felt that the proposal to analyze the three smaller strategies makes sense.
- A few interested parties thought that the three strategies, while reasonable, are small and cover only a small portion of the planning area. On their own, the strategies would not allow for comprehensive review of the potential for water reclamation regionwide.
- Interested parties indicated they support using reclaimed water to serve environmental enhancement uses. At the same time, they urged King County to obtain additional information about potential impacts associated with such uses.
- One interested party expressed concerns about the Redmond/Bear Creek Basin Brightwater Centralized Strategy, including using reclaimed water in a critical aquifer recharge area and the potential to exacerbate flooding. Another interested party felt that exploring the use of reclaimed water to help with low flows in Bear Creek and Sammamish Slough is a good idea.

A summary of feedback received during the individual meetings is available at http://www.kingcounty.gov/environment/wastewater/ReclaimedWater/CompPlan/Library.aspx#3.

Because the feedback is so similar to earlier feedback, the recommendation to analyze the three strategies is being carried forward unchanged. If the strategies are approved for analysis, these and other suggestions and concerns will be explored. Environmental, engineering, and economic analyses of the reclaimed water strategies will allow WTD to explore the benefits and costs of providing reclaimed water to serve a mix of uses, help answer questions and address concerns raised by interested parties, and provide needed information to decision-makers.

3.0. RECLAIMED WATER STRATEGIES

WTD recommends three of the refined strategies for further analysis in Step 4 of the reclaimed water planning process. The following sections describe these strategies and the four other strategies that were considered but not recommended for analysis at this time.

3.1 Strategies Recommended for Analysis

The three strategies recommended for further analysis share three general characteristics: (1) use existing regional wastewater and reclaimed water infrastructure with flexibility for incremental expansions, (2) represent the range of potential nonpotable consumptive and environmental enhancement uses for reclaimed water identified across the region, and (3) align with the feedback from most interested parties to start expanding the reclaimed water program on a small scale and build on successes over time.

3.1.1 Description of the Strategies

Figure 1 shows the general locations of the three strategies recommended for further analysis. Appendix A contains maps that show locations of specific components of each strategy.

Some of the nonpotable consumptive and environmental enhancement uses identified in the strategies would be year round, and some would be seasonal. If the strategies are approved for analysis in Step 4, the amount of reclaimed water that would be used and the time of year it would be applied will be evaluated further.

The strategies are as follows:

- **Redmond/Bear Creek Basin Brightwater Centralized Strategy** (Figure A-1). This strategy includes the following components:
    - — Production of approximately 9.4 mgd of reclaimed water at Brightwater Treatment Plant[5]
    - — Approximately 14 miles of primary and secondary distribution pipelines, with a portion from Brightwater Treatment Plant site and a portion from the South Segment of the Brightwater reclaimed water pipeline[6]
    - — Nonpotable consumptive uses and wetland enhancement in the City of Redmond and wetland enhancement in the Bear Creek basin

[5] Up to 7 mgd of reclaimed water produced at the Brightwater plant will be reserved for use by the existing reclaimed water program in areas in north King County, south Snohomish County, and the Sammamish Valley when the Brightwater system is complete. The 9.4 mgd of reclaimed water from Brightwater that may be used for the Redmond/Bear Creek Basin Brightwater Centralized Strategy would be in addition to this 7 mgd.

[6] Primary distribution pipelines refer to large reclaimed water pipelines. Secondary distribution pipelines refer to smaller distribution systems that extend from the primary lines and carry reclaimed water to multiple customers.

- **Reclaimed Water Skimming or Polishing Decentralized Strategy** (Figure A-2).[7] This strategy includes the following components:
    - — Preassembled or packaged skimming or polishing treatment plants with up to 0.5 mgd reclaimed water treatment capacity located near and drawing wastewater from a regional conveyance pipeline
    - — For each plant, up to 1 mile of secondary distribution pipelines
    - — Large nonpotable consumptive water uses near a large wastewater conveyance pipeline, minimizing the amount of required reclaimed water distribution pipeline
- **Renton/Tukwila South Plant Centralized Strategy** (Figure A-3). This strategy includes the following components:
    - — Production of approximately 1.7 mgd of reclaimed water at South Treatment Plant[8]
    - — Approximately 18 miles of primary and secondary distribution pipelines
    - — Nonpotable consumptive uses in the Cities of Renton and Tukwila and a wetland enhancement in the City of Renton adjacent to the Cedar River

3.1.2 Rationale for WTD's Recommendation

WTD is recommending that the three strategies undergo the analyses called for in Step 4 of the planning process because each is unique and offers the ability to provide reclaimed water to a wide range of potential uses. A variety of engineering, environmental, and economic analyses would be conducted on each strategy. These analyses will provide important information for helping determine if, how, when, where, and by what funding mechanisms the County's existing reclaimed water program should expand. The results of these analyses will also allow for regional discussion on the following topics:

- Consideration of reclaimed water as a wastewater disposal option for the region as part of the operation of the wastewater system, if conditions lead to greater restrictions on discharges to Puget Sound.
- How reclaimed water strategies could fit into regional wastewater system planning and operations, including their effect on planned improvements and future operation of the regional wastewater system.
- The ability to use small prepackaged or preassembled reclaimed water facilities to produce and distribute reclaimed water. Further exploration of the use of such facilities may also provide useful information for regional efforts to promote local food production and develop eco-industrial parks and districts.

[7] A skimming plant removes some of the raw wastewater from pipelines that carry the wastewater to regional plants for treatment and then treats the wastewater to reclaimed water quality for local distribution. A polishing plant removes some secondary-treated effluent from pipelines exiting regional treatment plants and treats the effluent to reclaimed water quality standards.

[8] The 1.7 mgd is in addition to the approximately 1 mgd of reclaimed water currently produced at South Treatment Plant and available for use in areas of Tukwila and Renton adjacent to the plant.

- The potential effects of reclaimed water strategies on the environment, including the following:
    - Potential for reclaimed water to augment other water supply sources
    - Potential for reclaimed water to enhance watershed basin flows
    - Recovery and reuse of nutrients, such as phosphorus, or production of energy
    - Effects of reclaimed water use on groundwater and surface water quality
    - Energy demands and greenhouse gas emissions associated with strategies
- Changes in existing laws and policies that may be needed in order to allow expanded use of reclaimed water.
- The full range of benefits and costs associated with providing additional reclaimed water to serve both nonpotable consumptive and environmental enhancement uses.

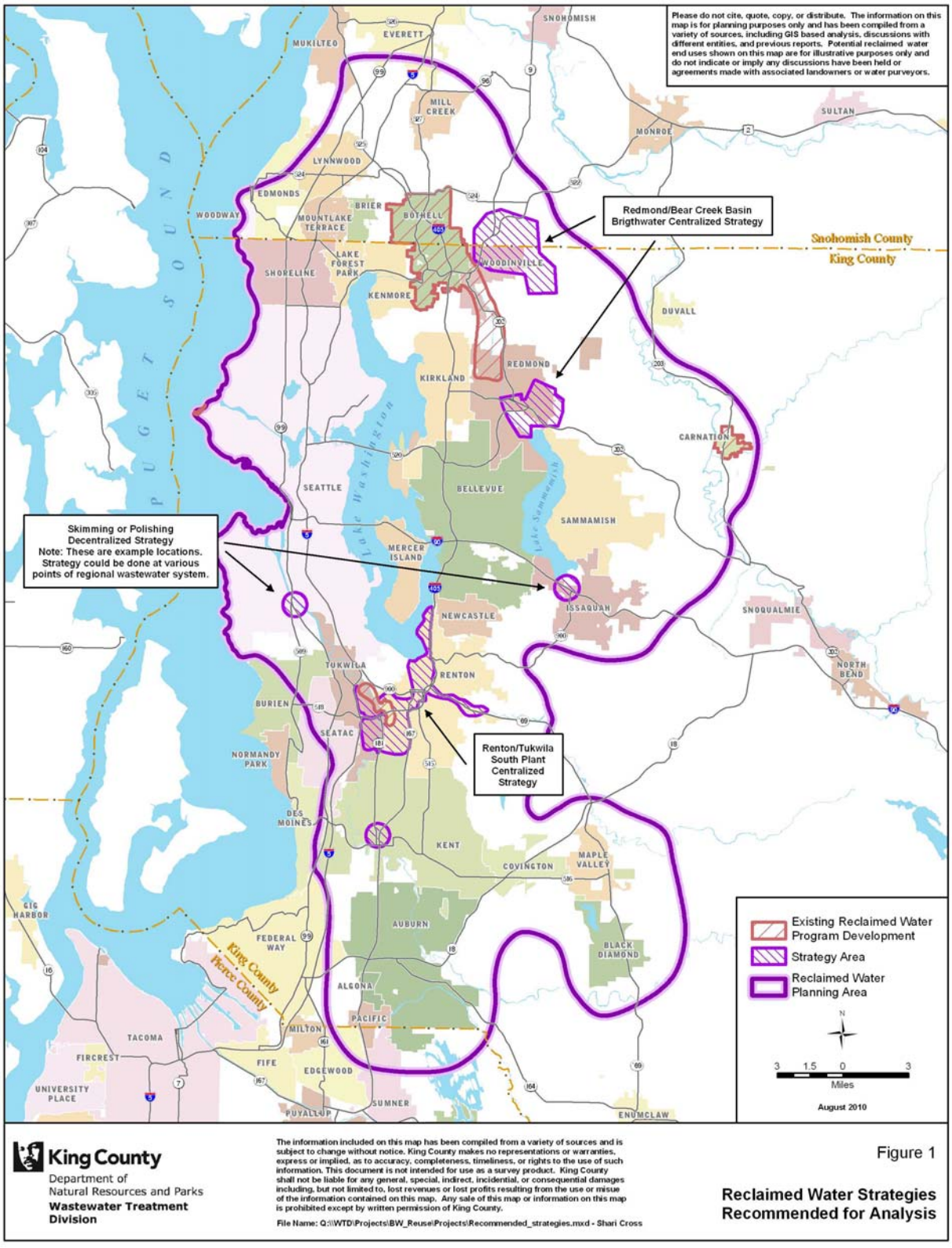


Figure 1. Reclaimed Water Strategies Recommended for Analysis

3.2 Other Strategies Considered

Four strategies were not recommended for further analysis for these reasons:

- They are much larger in scale than the recommended strategies and, thus, do not align with input from interested parties to start small and build on successes over time.
- Interested parties indicated that the potential environmental enhancement uses in some strategies carry regulatory uncertainties that may affect the likelihood of implementation:
    - — Reclaimed water quality standards for direct flow augmentation may be stringent and may require additional treatment to remove nutrients or to meet other standards.
    - — Opinions expressed regarding the use of reclaimed water for mitigation of water withdrawals were very diverse, suggesting that such use is highly controversial.

3.2.1 Description of the Strategies

Figure 2 shows the general locations of the four strategies that WTD is not recommending for analysis in Step 4 of the planning process. Appendix B contains maps that show locations of specific components of each strategy.

Some of the nonpotable consumptive and environmental enhancement uses identified in the strategies would be year round, and some would be seasonal. If any of the strategies are considered for analysis in the future, the amount of reclaimed water that would be used and the time of year it would be applied will be evaluated further.

The strategies are as follows:

- **University Area/Renton/Lake Washington South Plant Centralized and Decentralized Strategy** (Figure B-1). This strategy includes the following components:
    - — Production of approximately 28 mgd of reclaimed water at South Treatment Plant and of 17 mgd at a satellite reclaimed water treatment plant in Seattle[9]
    - — Approximately 13 miles of primary and secondary distribution pipelines
    - — Direct flow augmentation to Lake Washington and nonpotable consumptive uses near the University of Washington and in the City of Renton
- **Auburn/Kent Valley South Plant Centralized Strategy** (Figure B-2). This strategy includes the following components:
    - — Production of approximately 11.7 mgd of reclaimed water at South Treatment Plant
    - — Approximately 60 miles of primary and secondary distribution pipelines

[9] A satellite reclaimed water treatment plant is like a skimming plant in that it removes and treats raw wastewater from regional pipelines, but a satellite plant does not put byproducts of reclaimed water treatment (solids) back into the regional pipelines.

— Nonpotable consumptive uses in the Auburn/Kent Valley area and wetland enhancement in the City of Auburn

- **Auburn/Kent Valley Decentralized Strategy** (Figure B-3). This strategy includes the following components:
  - — Production of approximately 9.4 mgd of reclaimed water at a satellite treatment plant in the City of Kent or Auburn
  - — Approximately 25 miles of primary and secondary distribution pipelines
  - — Nonpotable consumptive uses in the Auburn/Kent Valley area and environmental enhancement uses in the City of Auburn
- **Covington/Soos Creek Basin Decentralized Strategy** (Figure B-4). This strategy includes the following components:
  - — Production of approximately 10 mgd of reclaimed water at a satellite treatment plant in the City of Covington
  - — Approximately 14 miles of primary and secondary distribution pipelines
  - — Nonpotable consumptive uses in the Covington area and groundwater recharge in the Soos Creek basin

3.2.2 Rationale for Future Analysis of Strategies

While not proposed for analysis at this time, several groups that have particular interests in the strategy areas noted that it might make sense to analyze the four strategies in the future. WTD believes the four strategies have merit and may be worth exploring in the future if conditions change. Conditions that may warrant future analysis include the following:

- Changes in water quality standards that require higher levels of wastewater treatment such as nutrient removal
- Changes in water resource regulations that increase the demand for reclaimed water
- Identification of areas where production and use of reclaimed water could serve to substitute in whole or part for capital improvements identified through WTD capital planning, such as conveyance system improvement planning
- Increased demand for reclaimed water arising from various conditions including effects of climate change

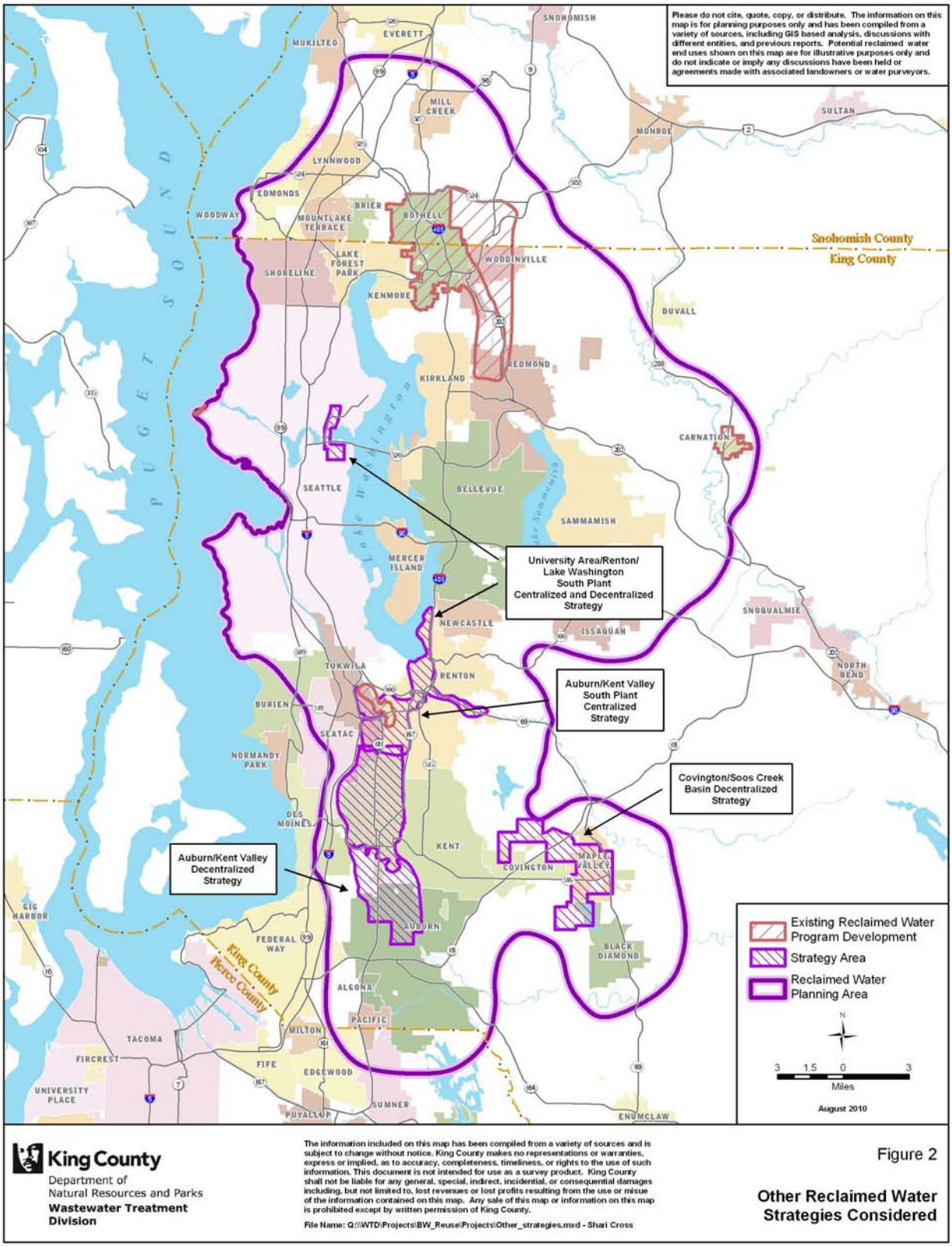
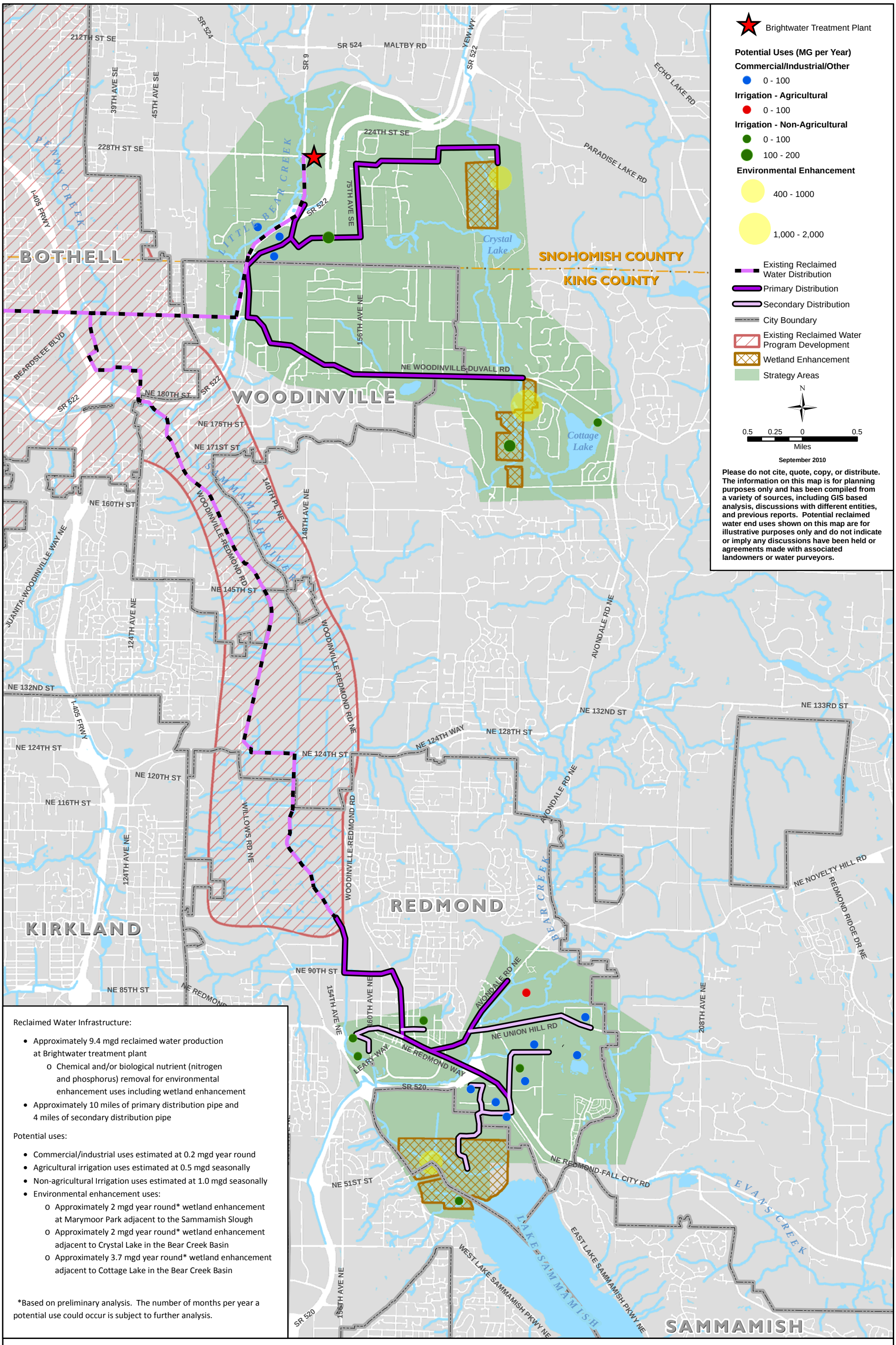


Figure 2. Other Reclaimed Water Strategies Considered

Appendix A

Strategy Maps: Strategies Recommended for Analysis in Step 4 of the Planning Process



Reclaimed Water Infrastructure:

- Approximately 9.4 mgd reclaimed water production at Brightwater treatment plant
  - Chemical and/or biological nutrient (nitrogen and phosphorus) removal for environmental enhancement uses including wetland enhancement
- Approximately 10 miles of primary distribution pipe and 4 miles of secondary distribution pipe

Potential uses:

- Commercial/industrial uses estimated at 0.2 mgd year round
- Agricultural irrigation uses estimated at 0.5 mgd seasonally
- Non-agricultural Irrigation uses estimated at 1.0 mgd seasonally
- Environmental enhancement uses:
  - Approximately 2 mgd year round* wetland enhancement at Marymoor Park adjacent to the Sammamish Slough
  - Approximately 2 mgd year round* wetland enhancement adjacent to Crystal Lake in the Bear Creek Basin
  - Approximately 3.7 mgd year round* wetland enhancement adjacent to Cottage Lake in the Bear Creek Basin

*Based on preliminary analysis. The number of months per year a potential use could occur is subject to further analysis.

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Figure A-1

Redmond/Bear Creek Basin
Brightwater Centralized Strategy

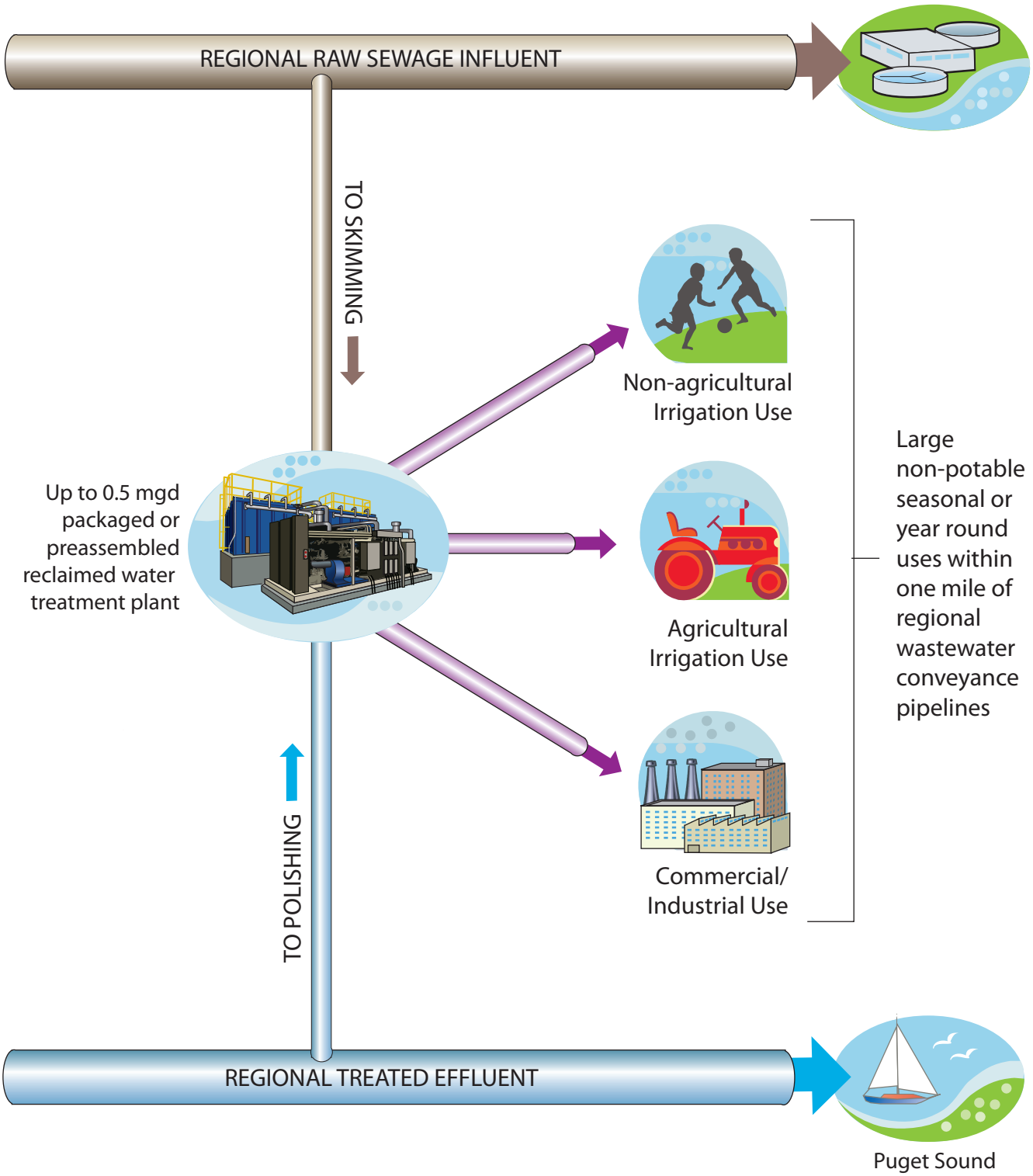

Figure A-2

Reclaimed Water Skimming or Polishing Decentralized Strategy

Reclaimed Water Infrastructure:

- Approximately 1.7 mgd reclaimed water production at South Treatment Plant
  - o Chemical and/or biological nutrient (nitrogen and phosphorus) removal for environmental enhancement uses including wetland enhancement
  - o Membrane filtration to further reduce nutrients for environmental enhancement uses
- Approximately 12 miles of primary distribution pipe and 6 miles of secondary distribution pipe

Potential Uses:

- Commercial/industrial uses estimated at 0.2 mgd year round
- Irrigation uses estimated at 1.0 mgd seasonally
- Environmental enhancement uses:
  - o Approximately 0.5 mgd year round* wetland enhancement at City of Renton land adjacent to Cedar River

*Based on preliminary analysis. The number of months per year a potential use could occur is subject to further analysis.

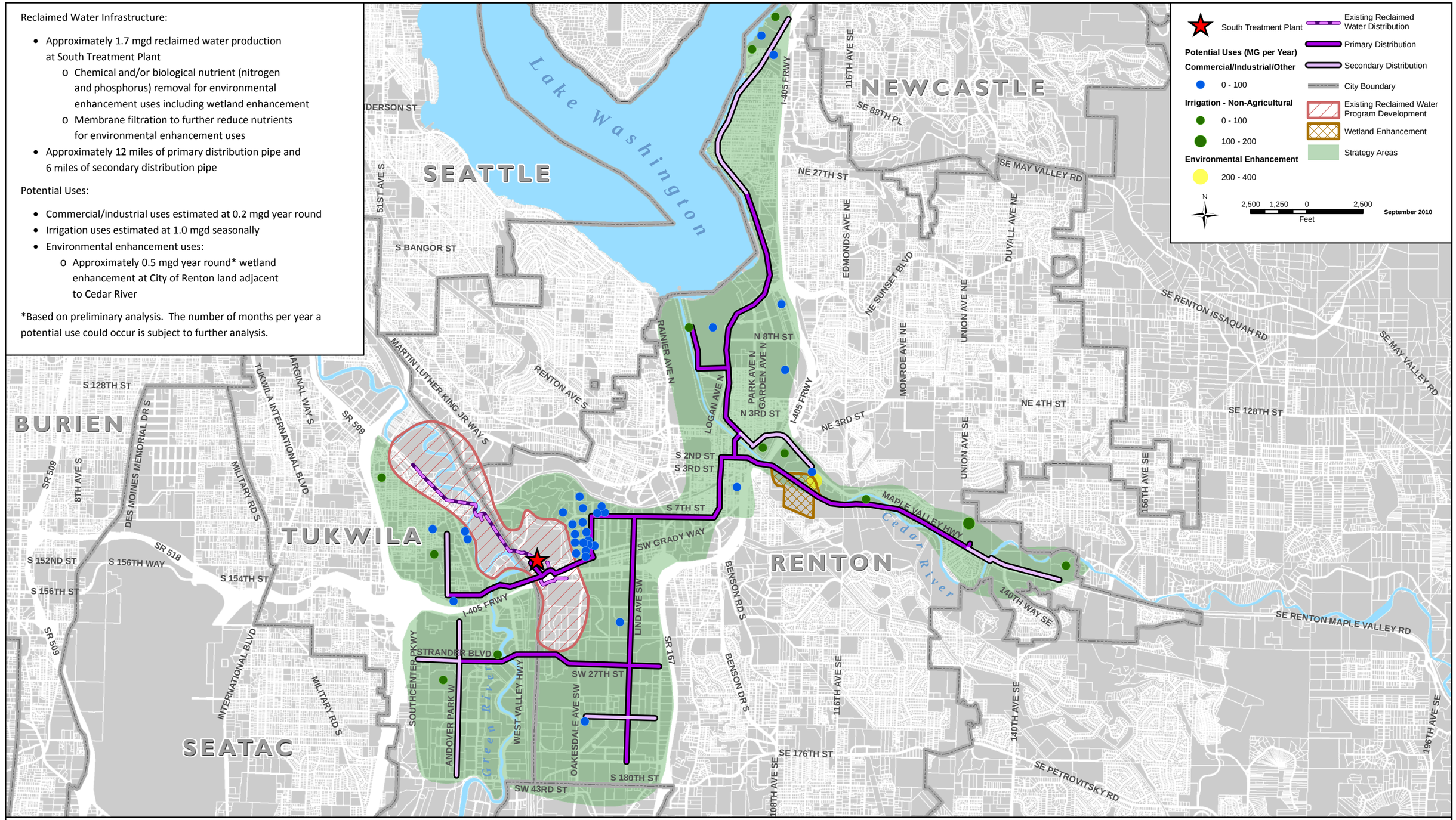

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Figure A-3

Renton/Tukwila South Plant Centralized Strategy

Appendix B

Strategy Maps: Other Strategies Considered

Reclaimed Water Infrastructure:

- Approximately 28 mgd reclaimed water production at the South Treatment Plant and 17 mgd at a satellite treatment plant facility in Seattle.
  - Chemical and/or biological nutrient (nitrogen and phosphorus) removal via biological and chemical process and metals (copper and zinc) removal via reverse osmosis. Nutrient removal process seeks to reduce nutrients to level that will not alter existing nutrient loading in Lake Washington.
  - Membrane and reverse osmosis filtration to further reduce nutrients, metals, and other pollutants to existing background water quality in Lake Washington.
- Approximately 11 miles of primary distribution pipe and 2 miles of secondary distribution pipe.

Potential uses:

- Commercial/industrial uses estimated at 0.2 mgd year round
- Irrigation uses estimated at 2.3 mgd seasonally
- Environmental enhancement uses:
  - Approximately 26 mgd year round direct flow augmentation to Lake Washington at the South end of the lake
  - Approximately 16 mgd year round direct flow augmentation to Lake Washington at the east end of the Ship Canal
  - Approximately 0.5 mgd year round* wetland enhancement at City of Renton land adjacent to Cedar River

*Based on preliminary analysis. The number of months per year a potential use could occur is subject to further analysis.

South Treatment Plant

Potential Uses (MG per Year)

Commercial/Industrial/Other

0 - 100

Irrigation - Non-Agricultural

0 - 100

100 - 200

Environmental Enhancement

200 - 400

4,000 - 10,000

Primary Distribution

Secondary Distribution

Direct Augmentation

City Boundary

Existing Reclaimed Water Program Development

Wetland Enhancement

Satellite RW Treatment Plant

Strategy Areas

N

1 0.5 0 1

Miles

August 2010

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Figure B-1

University Area/Renton/ Lake Washington South Plant Centralized and Decentralized Strategy

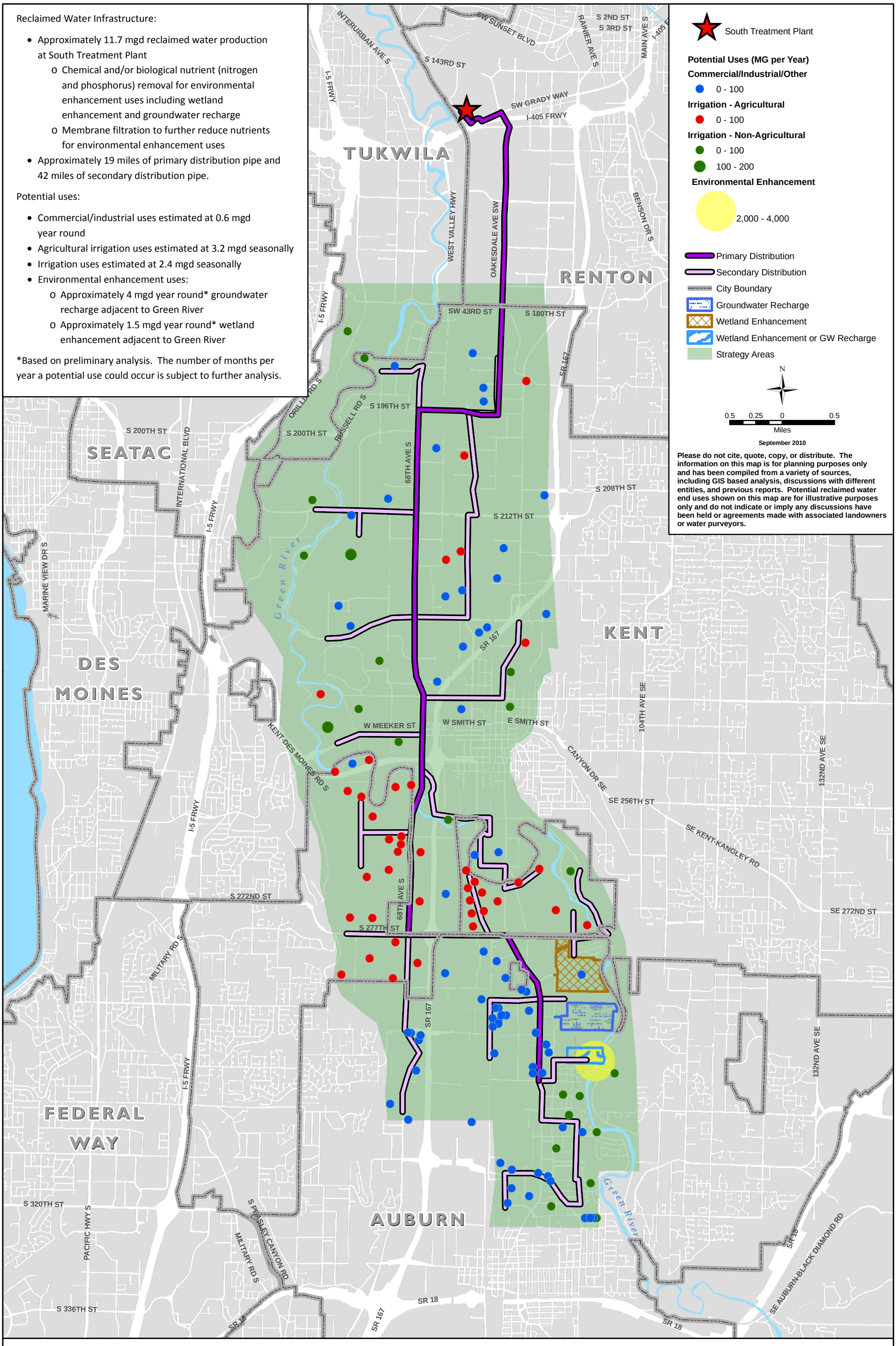
Reclaimed Water Infrastructure:

- Approximately 11.7 mgd reclaimed water production at South Treatment Plant
  - Chemical and/or biological nutrient (nitrogen and phosphorus) removal for environmental enhancement uses including wetland enhancement and groundwater recharge
  - Membrane filtration to further reduce nutrients for environmental enhancement uses
- Approximately 19 miles of primary distribution pipe and 42 miles of secondary distribution pipe.

Potential uses:

- Commercial/industrial uses estimated at 0.6 mgd year round
- Agricultural irrigation uses estimated at 3.2 mgd seasonally
- Irrigation uses estimated at 2.4 mgd seasonally
- Environmental enhancement uses:
  - Approximately 4 mgd year round* groundwater recharge adjacent to Green River
  - Approximately 1.5 mgd year round* wetland enhancement adjacent to Green River

*Based on preliminary analysis. The number of months per year a potential use could occur is subject to further analysis.



South Treatment Plant

Potential Uses (MG per Year)

Commercial/Industrial/Other

0 - 100

Irrigation - Agricultural

0 - 100

Irrigation - Non-Agricultural

0 - 100

100 - 200

Environmental Enhancement

2,000 - 4,000

Primary Distribution

Secondary Distribution

City Boundary

Groundwater Recharge

Wetland Enhancement

Wetland Enhancement or GW Recharge

Strategy Areas

N

0.5 0.25 0 0.5

Miles

September 2010

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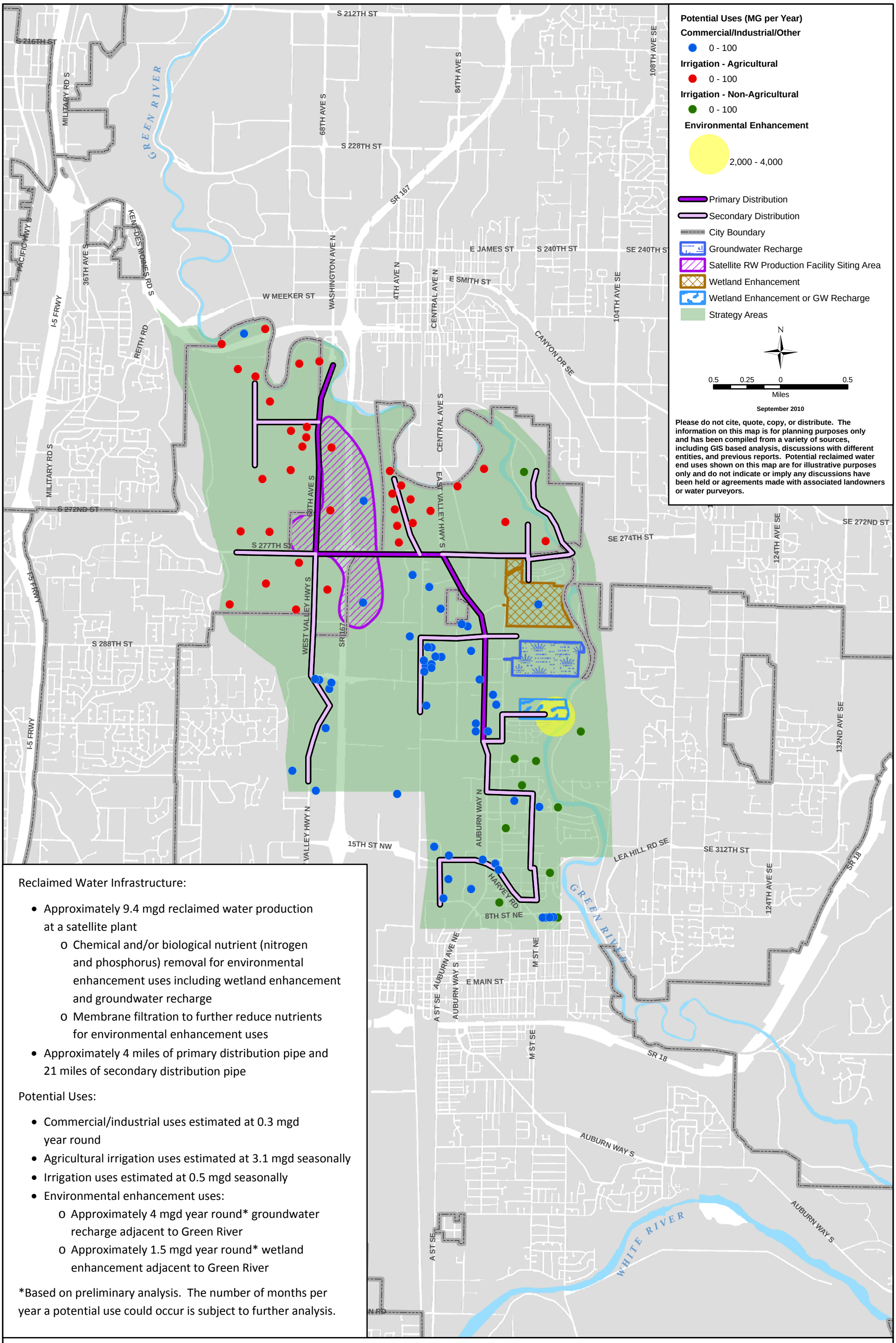
Figure B-2

Auburn/Kent Valley
South Plant Centralized Strategy



Reclaimed Water Infrastructure:

- Approximately 9.4 mgd reclaimed water production at a satellite plant
  - Chemical and/or biological nutrient (nitrogen and phosphorus) removal for environmental enhancement uses including wetland enhancement and groundwater recharge
  - Membrane filtration to further reduce nutrients for environmental enhancement uses
- Approximately 4 miles of primary distribution pipe and 21 miles of secondary distribution pipe

Potential Uses:

- Commercial/industrial uses estimated at 0.3 mgd year round
- Agricultural irrigation uses estimated at 3.1 mgd seasonally
- Irrigation uses estimated at 0.5 mgd seasonally
- Environmental enhancement uses:
  - Approximately 4 mgd year round* groundwater recharge adjacent to Green River
  - Approximately 1.5 mgd year round* wetland enhancement adjacent to Green River

*Based on preliminary analysis. The number of months per year a potential use could occur is subject to further analysis.

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Figure B-3

Auburn/Kent Valley Decentralized Strategy

Reclaimed Water Infrastructure:

- Approximately 10 mgd reclaimed water production at a satellite treatment plant facility in City of Covington
  - Chemical and/or biological nutrient (nitrogen and phosphorus) removal for environmental enhancement uses including groundwater recharge
  - Membrane filtration to further reduce nutrients for environmental enhancement uses
- Approximately 11 miles of primary distribution pipe and 3 miles of secondary distribution pipe

Potential uses:

- Commercial/industrial uses estimated at less than 0.1 mgd year round
- Irrigation uses estimated at 1.9 mgd seasonally
- Environmental enhancement uses:
  - Approximately 1 mgd year round* groundwater recharge adjacent to Jenkins Creek
  - Approximately 4 mgd year round* wetland enhancement adjacent to Jenkins Creek
  - Approximately 3 mgd year round* groundwater recharge adjacent to Covington Creek

*Based on preliminary analysis. The number of months per year a potential use could occur is subject to further analysis.

RENTON
KENT
AUBURN
COVINGTON
MAPLE VALLEY
BLACK DIAMOND
LAKE YOUNGS
LAKE SAWYER
BIG SOOS CREEK
LITTLE SOOS CREEK
JENKINS CREEK
COVINGTON CREEK
GREEN RIVER
SE RENTON MAPLE VALLEY RD
SE PETROVITSKY RD
SE 192ND ST
SE 204TH WAY
SE 208TH ST
SE 240TH ST
SE 256TH ST
SE 272ND ST
SE WAX RD
SR 18
SE COVINGTON-SAWYER RD
SE KENT-KANGLEY RD
SE AUBURN-BLACK DIAMOND RD
SE LAKE HOLM RD
ROBERTS DR
140TH AVE SE
124TH AVE SE
132ND AVE SE
148TH AVE SE
152ND AVE SE
164TH AVE SE
172ND AVE SE
192ND AVE SE
196TH AVE SE
216TH AVE SE
224TH AVE SE
KENT-BLACK DIAMOND RD SE
MAPLE VALLEY-BLACK DIAMOND RD SE
ENUMCLAW-BLACK DIAMOND RD SE
3RD AVE
LAWSON ST
212TH WAY SE

Potential Uses (MG per Year)

Commercial/Industrial/Other
- 0 - 100

Irrigation - Non-Agricultural
- 0 - 100
- 100 - 200

Environmental Enhancement
- 400 - 1000
- 2,000 - 4,000

- Primary Distribution
- Secondary Distribution
- City Boundary
- Groundwater Recharge
- Satellite RW Treatment Plant
- Strategy Areas

N

0.5 0.25 0 0.5
Miles

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King County
Department of Natural Resources and Parks
Wastewater Treatment Division

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Figure B-4

Covington/Soos Creek Basin Decentralized Strategy