Council Meeting Date: March 5, 2012 **Agenda Item:** 7(a)

CITY COUNCIL AGENDA ITEM

CITY OF SHORELINE, WASHINGTON

AGENDA TITLE:	Update on Council Goal No. 7 - Acquisition of Seattle Public Utilities Water System in Shoreline – Due Diligence Review
DEPARTMENT:	Public Works
PRESENTED BY:	Mark Relph, Public Works Director
ACTION:	____ Ordinance ____ Resolution ____ Motion __**X**__ Discussion ____ Public Hearing

PROBLEM/ISSUE STATEMENT:

City Council Goal #7 is stated as the acquisition of the Seattle Public Utilities (SPU) potable water system in the City of Shoreline. In November of 2011, the City of Seattle and the City of Shoreline announced a tentative agreement in principle to the sale of the water system assets at a price of $25 million in the year 2020.

In late 2011, the City began the next step in the process, which is to perform an engineering and financial analysis to test the viability of creating a City water utility. This "due diligence" process will be aided by a citizen steering committee, created by the City Manager to review the analysis and process. The City Manager has tasked this committee to make a recommendation to her, for which she will then evaluate and make a recommendation to City Council as to proceed or not.

This staff report will provide a summary of the work completed to date with the Steering Committee and discuss the next steps in the process.

FINANCIAL IMPACT:

There is no immediate impact to Shoreline residents. However, if the acquisition is to proceed, the financial mechanism to purchase the system would be a Revenue Bond issued at the time of acquisition and paid for only by the utility rate payers within the SPU service area. Citizens who receive their water service from the Shoreline Water District (SWD) are not financially affected by this decision. Repayment of the Revenue Bond, or debt service, would be incorporated within a rate structure approved by City Council.

RECOMMENDATION

No action is required. This is intended as an update and for Council discussion.

Approved By: City Manager: *JU* City Attorney *IS*

INTRODUCTION

The goal to acquire the SPU water system within the City of Shoreline has been a specific Council goal since at least 2009; however, the issue has been discussed perhaps as far back as the time of the City's incorporation. The central issues have been no direct citizen representation on issues such as rates and service, plus decisions that affect infrastructure improvements since the utility is owned and operated by Seattle. The Council's goal with the acquisition has been to address such concerns, but within a rate structure that would be equal to or less than the SPU forecasted rate structure over a reasonable time period. This report is intended to provide a brief review of the progress since the creation of the citizen steering committee and to review the next steps in the process.

BACKGROUND

The SPU water system is located approximately west of I-5 (see attachment A) and serves roughly two thirds of the City. The water system within Shoreline is a distribution system. It includes water storage tanks and pump stations, but does not include a watershed or water treatment. There are larger transmission lines that pass through the City, providing treated water supply to larger wholesale customers (e.g. Shoreline Water District, Olympic View Water & Sanitation District) and south to the Seattle distribution systems. With the SPU system in Shoreline being solely a distribution system, the costs and responsibilities are more narrowly focused and less substantial had it included the water supply.

The infrastructure itself varies in age from the 1930s to present day with a large phase of construction in the 1950s through the 1960s, as the Shoreline area developed into an unincorporated suburb of King County. While the pipelines are perhaps moderate in age, the question that many have raised is whether or not the level of maintenance performed over that time has been adequate, and if the investment in capital improvement programs (CIP) has met the demands of redevelopment and fire protection. This has been one of the central issues staff has discussed with SPU during the past several months as the City negotiated for the acquisition.

On April 18, 2011, staff presented to City Council an update on the negotiations with SPU, including:

1. The reasons for acquiring the system;
2. What are the parameters to decide if the acquisition would be successful; and
3. The extent of the public participation process.

A copy of the full staff report may be found at:

http://cosweb.ci.shoreline.wa.us/uploads/attachments/cck/Council/Staffreports/2011/staffreport041811-7b.pdf

With the announcement of the tentative agreement in principle for the purchase of the water system assets, the City began a more detailed engineering and financial analysis for creating a City water utility. This "due diligence" phase will be completed by the firm EES Consulting. The team assembled has considerable experience in the financial analysis of utilities and has added two key engineering personnel tasked with the development of an operations and maintenance plan for the water utility.

On May 23, 2011, the City Council approved a contract with EES Consulting for this next phase, in anticipation of the City reaching an agreement for the sale of the assets with SPU. EES has begun the work and will complete four key tasks:

1. Performing a preliminary engineering due diligence on the distribution and general plant water system
2. Completing a financial analysis and feasibility study
3. Developing a Business or Operating Plan
4. Providing an overview and study of water supply options in the region

The detailed staff report explaining the contract and this "due diligence" may be found on the City's website at:

http://cosweb.ci.shoreline.wa.us/uploads/attachments/cck/Council/Staffreports/2011/staffreport052311-8a.pdf.

On January 23, 2012, staff provided Council another update on the project and specifically discussed the due diligence work along with the formation and responsibilities for the citizen steering committee. A copy of this staff report may be found at:

http://cosweb.ci.shoreline.wa.us/uploads/attachments/cck/Council/Staffreports/2012/Staffreport012312-8c.pdf.

This staff report will discuss in more detail the work completed to date with EES Consulting, the interaction with the citizen steering committee and the next steps in the process.

DISCUSSION

The City has assembled a steering committee whose task is to review and comment on the engineering and financial analysis prepared by EES Consulting. This Committee has been appointed by the City Manager and began meeting in January. The committee will meet approximately every three weeks through late June. A list of Committee members is included as Attachment B. Attachment C is a copy of the Committee's charter.

The Steering Committee is facilitated by Milenko Matanovic of the Pomegranate Center, whose motto, "bringing people together to build better communities," has been very successful for many communities trying to use collaboration to address complex issues. The Pomegranate Center is a non-profit organization and has been used in the past by the City of Shoreline for the development of the Sunset School Master Plan. More information about the Pomegranate Center may be found at: www.pomegranate.org.

As of this date, a draft preliminary engineering report has been completed by EES and submitted to the Steering Committee. A copy of the draft report is included as Attachment D. This report will become final as additional information from SPU becomes available and after the Steering Committee makes their review and comment.

The draft preliminary engineering report is divided into several sections and includes:

- Status & Condition of Existing System
- Current Maintenance Program
- Current Capital Improvement Program
- Proposed Maintenance Prior to Shoreline Acquisition
- Proposed Post-Acquisition Maintenance Program
- Proposed Post-Acquisition O&M Budget
- Separation Options, Issues & Costs
- Proposed Post-Acquisition Capital Improvements and Budget
- Additional Water Utility Functions
- Further Engineering Review & Evaluation

This information will be used in making such decisions as how much to allocate for the operation and maintenance (O&M) of the utility (e.g. manpower, equipment, tools, levels of service and specific maintenance programs), the level of capital investment (Capital Improvement Plan – CIP) and the costs to separate the system from SPU. These costs will then be added to the financial analysis, or financial model and test if a rate structure can be achieved that is equal to or less than what SPU would charge of some reasonable period of time.

The Steering Committee has begun the discussion and review of the financial model. Presented to date by EES has been the revenue forecast for the system supplied in large part by data from SPU. Two documents have been provided to the Steering Committee to date. They include a summary of financial assumptions and a more detailed explanation of the assumptions; they are included as Attachments E and F, respectively.

As the committee reviews and discusses the revenue assumptions, the draft preliminary engineering report, and other additional information, the financial model will be further developed. A more complete understanding of the revenues, expenditures and rate structure will be better understood in the coming months. It is the goal of the Steering Committee to complete their work and make a recommendation to the City Manager by the spring of this year.

Next Steps:

As the due diligence work continues and as the Steering Committee continues their work, the negotiation with SPU on a formal contract continues to run parallel to the process. This contract with SPU (i.e. City of Seattle) is anticipated to address such issues as the final contract price, the level of system maintenance until the City would take ownership, how the wholesale water contract would be addressed, any services the City may still contract with SPU after ownership (permanently and/or temporarily), separation of the two systems and so on.

All of the due diligence work, the Steering Committee review and the draft SPU contract is anticipated to be complete by the spring of this year. At the conclusion of this work, the City Manager will review the recommendation of the Steering Committee, the draft contract with SPU and supporting information to make her own recommendation to the City Council as to whether or not to proceed with the acquisition. This is anticipated to be complete and submitted to the City Council by late spring or early summer 2012.

If the City Council decides to move forward with the acquisition, then the Council would have to approve the agreement and forward to the City of Seattle. Approval by Seattle City Council would then allow the Shoreline City Council to set the ballot language sometime this summer for a vote of the entire City in November 2012. If Shoreline voters approve the acquisition, then the City would move to the last phase of the project – the detailed development of a transition plan to move the utility from the City of Seattle to the City of Shoreline.

STAKEHOLDER OUTREACH

The City is committed to an extensive public process, which will occur over the next six months. Sharing the details and soliciting input on the level of water service problems, the CIP, maintenance, rates, and expectations on customer service will be important to determine if a proposed budget will meet the public expectations and ultimately the financial parameters established by Council.

Coordinated with the Steering Committee will be other types of opportunities for public participation, and they are likely to include:

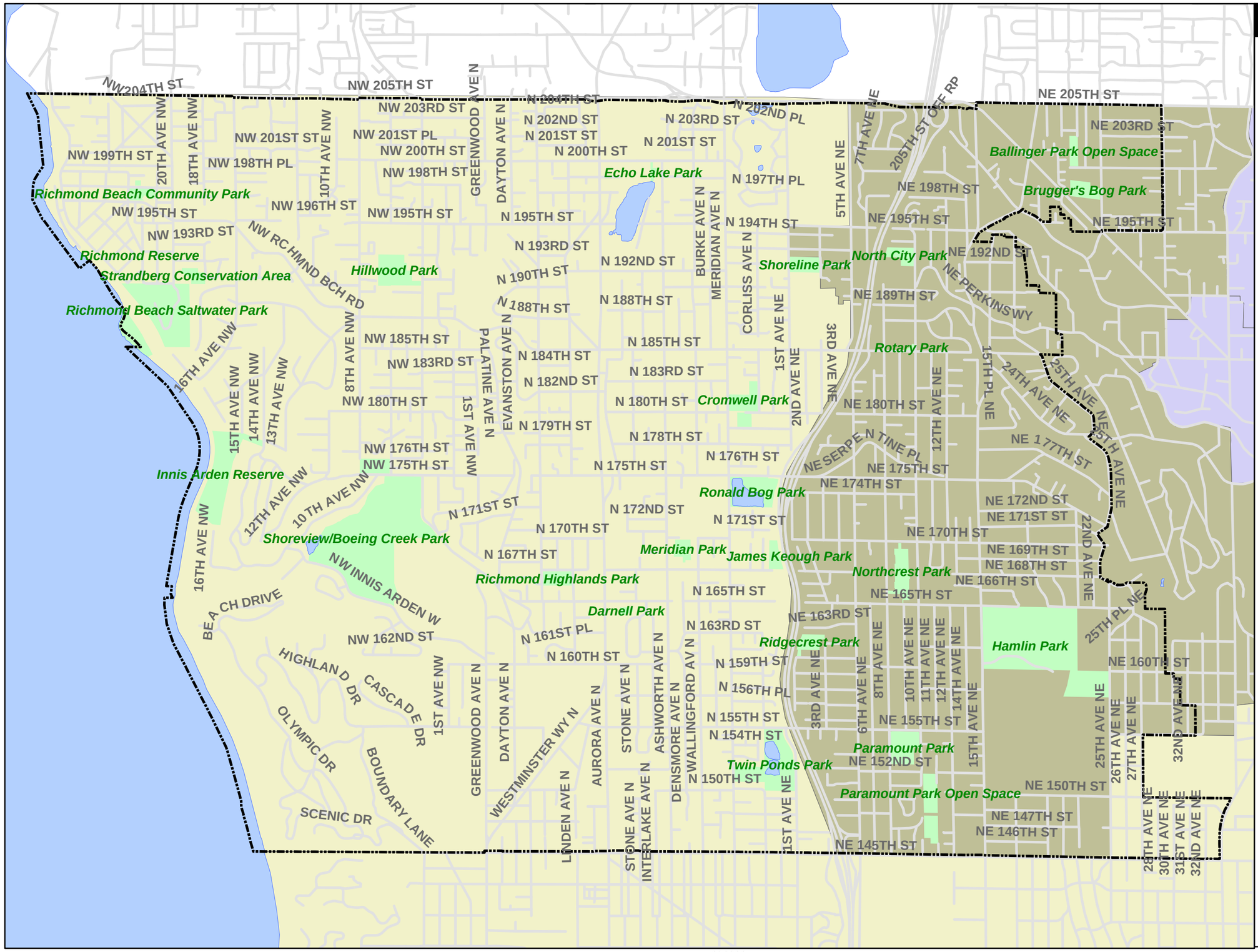
- Attending neighborhood, business, and civic group meetings;
- Providing open houses and workshops;
- Distributing information to neighborhood newsletters, *Currents*, the cable channel, direct mailers to the affected rate payers as well as all the citizens of Shoreline; and
- Conducting formal public hearings.

RECOMMENDATION

No action is required. This is intended as an update and for Council discussion.

ATTACHMENTS

Attachment A – SPU Water Service Area within the City of Shoreline
Attachment B – List of the Steering Committee members
Attachment C – Steering Committee Charter
Attachment D – Draft EES Preliminary Engineering Report
Attachment E – EES Summary of the Financial Assumptions
Attachment F – EES Detailed Financial Assumptions



SHORELINE

Geographic Information System

Shoreline Utilities 2011

Water District

- Other
- Shoreline Water District
- Seattle Public Utilities

Utility districts occupying entire City Limits:
- Ronald Wastewater District
- AT&T Broadband
- Puget Sound Energy
- Seattle City Light

Attachment A

City Boundary

1 inch = 2,000 feet

0 495 990 1,980 2,970 3,960 Feet

Updated on: February 16, 2006

000006

SPU Acquisition Citizen Steering Committee

Name
1. Jim Abbott
2. Gretchen Atkinson
3. Joe Bozick
4. Mark Bunje
5. Cynthia Esselman
6. Kevin Grossman
7. David Harris
8. Marcia Harris
9. Bruce Hosford
10. Joseph Irons
11. Warren Johnson
12. Jeff King
13. Cynthia Knox
14. Lee Michaelis
15. William Montero
16. Edie Loyer Nelson
17. Les Nelson
18. Rick O'Leary
19. Sis Polin
20. Johanna Polit
21. Diane Pottinger
22. Bob Ransom
23. Kyle Roquet
24. Jesse Sycuro
25. Dan Thwing
26. Mark Torrance

SEATTLE PUBLIC UTILITY WATER SYSTEM ACQUISITION STEERING COMMITTEE

The citizen steering committee will assist City staff in validating the final feasibility and technical review process required to be completed prior to the City Manager making a final Seattle Public Utility water system acquisition recommendation to the City Council. Steering committee members are appointed by the Shoreline City Manager and will make recommendations to the City Manager.

Problem Statement

City Council Goal No. 7 is the acquisition of the Seattle Public Utility water system in Shoreline. In order to develop a final acquisition recommendation to the City Council staff must complete a final feasibility analysis and financial plan.

Desired Outcome

The Steering Committee will provide a recommendation to the City Manager on whether the City should proceed with the acquisition of the Seattle Public Utility water system acquisition in Shoreline.

Project Steps

1. *Establish the Steering Committee (November 2011)*: The recommended committee size is 12 to 15 Shoreline residents and/or business owners. The committee should include representatives from major stakeholder groups along with some positions that are at-large from the community.
2. *Review of Financial Feasibility Analysis and System Operation and Maintenance Plan* (December 2011 – June 2012)
3. *Recommendation to the City Manager (July 2012)*: The committee needs to complete its review and deliberation by June 2012 in order to provide a final recommendation to the City Manager by early July 2012. The City Manager will include the Committee's recommendation in her final recommendation to the City Council. The Council will need to determine, based on recommendations from the City Manager, the timing of a public vote on the SPU acquisition.
4. *Election Strategy and Campaigns (If Council chooses to pursue a public vote based on a recommendation from the City Manager)*: At this phase the election strategy and campaign is turned over to citizen volunteers. Under Public Disclosure Commission rules, City involvement is limited to drafting the ballot title and providing factual information to the electorate. In general, at least four to five months lead-time is needed for a good citizen campaign. As with any election, a strong core of active volunteers is needed to raise funds and run the campaign.

Communication

Throughout the process the City Manager will be briefed by staff and the Committee to ensure that the work of the committee is focused on this charter. A communications plan will also be developed to inform the public, neighborhood councils, citizen groups and stakeholders about the process and how to provide input.

Roles and Responsibilities

The City Manager will appoint the members of the Committee. The City Manager will set the charter and parameters for the committee and receive the final recommendations on acquisition of the SPU water system in Shoreline. The committee will receive input from staff, consultants, public survey results, and provide recommendations to the Manager. Staff will provide all necessary information to the committee to support their decision making process, manage consultants and surveys, and ensure good communications to and from the public during this process.

Attachment D

City of Shoreline

Shoreline Water System Engineering Review

Draft

February 2012

Prepared by:

EES Consulting

570 Kirkland Way, Suite 200
Kirkland, Washington 98033

A registered professional engineering corporation with offices in Kirkland, WA; Bellingham, WA; and Portland, OR

Telephone: (425) 889-2700 Facsimile: (425) 889-2725

Contents

Introduction

The City of Shoreline is evaluating the feasibility of acquiring and operating Seattle Public Utilities' water system infrastructure within the city limits of Shoreline. The acquisition would take place in the year 2020. This report provides an initial engineering review of the Seattle Public Utilities (SPU) water system assets which are under consideration for acquisition by the City of Shoreline. The author based the review on his experience of operating and managing staff and infrastructure at a large water utility, along with review of relevant engineering documents related to the Shoreline water system, interviews with SPU and Shoreline staff, and site visits to key facilities. The report outlines the overall operation of the system, including pump stations, storage facilities, pressure reducing stations and distribution system infrastructure. Condition of the facilities is evaluated, and deficiencies and other issues are identified. The Shoreline water system is presently an integral part of the SPU system and will need to be modified to become a separate water system, so separation alternatives, issues and costs are outlined. Operation and maintenance costs of the new utility are estimated, as are staffing levels and capital improvement budgets. Since the acquisition will occur a number of years in the future, recommended maintenance and capital improvements are also listed for the period prior to acquisition. During the years prior to the transfer of assets to Shoreline, additional engineering review and evaluation work will need to be carried out. Next steps in the engineering process are identified in this report.

Status and Condition of Existing System

Summary of Existing Facilities and Operations

Water is supplied to the City of Shoreline from SPU's Tolt system through the 550 Pipeline, although water from the Cedar River system can also be delivered if the Tolt system is unavailable. Most of the system to be acquired from SPU is located to the west of I-5. This area is presently supplied through the North City Pump Station, the Foy Pump Station, and at times, the Bitter Lake Pump Station. A small area in the southeast corner of the City of Shoreline would also be acquired. This area would be fed from the adjacent SPU distribution system through one or more metered connections.

SPU provides wholesale water service to the Olympic View Water District through connections located on the north boundary of the City of Shoreline. Water for these connections is pumped through the Shoreline area by the North City and Foy Pump Stations. SPU also provides wholesale water service to the Shoreline Water District using the North City Pump Station.

Storage in the Shoreline area is provided by the 2 million gallon Richmond Highlands elevated Tank 2, located at Fremont Ave and N 195th Street, the adjacent 1 million gallon Richmond Highlands elevated Tank 1, and by the 1 million gallon Foy Standpipe, located at Dayton Ave N and N 145th Street.

The largest pressure zone in the Shoreline area is the 590 zone, fed by pumping from the 550 Pipeline. The 590 zone supplies the 480, 430, 290 and 210 pressure zones through pressure reducing valves. The lower zones are equipped with pressure relief valves. The closed loop 660 pumped zone is fed by the Dayton Pump Station, located by the Foy Standpipe.

North City Pump Station

Figure 1 – North City Pump Station Interior

North City Pump Station is located on NE 185th Street, between 8th and 9th Ave NE. North City Pump Station is used as the primary feed to the Shoreline area. The underground station was constructed in 1968 and is located adjacent to the 550 Pipeline. The station includes two pumps, each rated at 6,500 gpm and powered by a 250 hp motor. The pumps can be operated in parallel, with a combined output of 11,000 gpm. The inlet flow meter at the pump station is used for operational purposes but would not be suitable as a revenue meter.

Telemetry at the station includes pump start/stop control from SPU's Operations Control Center (OCC), pump status, suction and discharge pressure, inlet flow, and a station intrusion alarm. The station has a flood alarm but not a fire alarm. OCC operators start and stop the pumps as needed to maintain the water level in the Richmond Highlands tanks.

Figure 2 – North City Pump Station Exterior

In the event of loss of power at the pump station, a check valve along with remotely controlled 12" and 24" bypass valves can be opened to allow 550 Pipeline pressure to feed the Shoreline area at sufficient pressure to keep the system pressurized. The bypasses are also used when SPU's Lake Forest Reservoir is taken offline and the 550 Pipeline is operated at 590 feet. The station does not have standby power or a connection for portable standby power.

Foy Pump Station

Figure 3 – Foy Pump Station Interior

Figure 4 – Foy Pump Station Exterior

Foy Pump Station is located at the intersection of 5th Ave NE and NE 145th St. The pump station is an above ground concrete building with a pitched roof. It can draw suction from either the 550 Pipeline or the 430 pressure zone, with the station normally drawing from the 550 Pipeline. The building and piping were originally constructed in 1933. New pumps were installed in the early 1990's, including two 400 hp 4,400 gpm pumps and one 6,000 gpm pump. A separate set of

impellers is kept at the station for use when pumping from the 430 zone; however they are no longer used due to the similarity of pump performance with either set of impellers installed.

Telemetry at the station includes pump start/stop control from the OCC, pump status, suction and discharge pressure, smoke, flood, and station intrusion alarms. A circular chart recorder is installed but is not in use. OCC operators start and stop the pumps as needed to maintain the water level in Foy Standpipe and the Richmond Highlands tanks.

The station does not have standby power or a connection for portable standby power.

Bitter Lake Pump Station

This pump station is located south of Shoreline, at Bitter Lake Reservoir at Linden Ave N and N141st St. It can be used to pump from the reservoir to the 590 zone, and presently can be used as a backup supply to the Shoreline area. The station includes three pumps rated at 4,000 gpm each, one of which has a diesel powered standby generator. This location also includes a pressure relief valve for the 590 zone. The pump station's normal use is to improve turnover of the storage at the reservoir. This pump station would not be acquired by Shoreline, and would continue to serve SPU's portion of the 590 zone. Its relevance to Shoreline is that it provides the only backup source if North City and Foy Pump Stations are offline.

When operated on standby power, the generator must be started onsite, and must be staffed continuously while running. Due to the need to have onsite staffing, this backup source is not immediately available to replace other sources if needed.

Dayton Pump Station

Figure 5 – Dayton Pump Station Interior

Figure 6 – Dayton Pump Station Exterior

The Dayton Pump station was constructed in 1978 to supply the higher elevation area to the north of Foy Standpipe. The pump station building is located in an above ground concrete building next to Foy Standpipe on N 145th St and Dayton Ave N. The station operates as a closed loop system, with two pumps. A 3 hp, 70 gpm pump operates continuously, and a 50 hp, 1,400 gpm pump cycles as needed to maintain pressure within a 20 psi operating band. Two 10,000 gallon hydropneumatic tanks are used to allow the pumps to cycle based on pressure. At peak demands,

the large pump is reported to cycle as much as 80 times a day. The station does not have standby power, but is equipped with check valves to feed from the 590 zone if needed.

Scada includes pump start/stop control, discharge flow and pressure. Alarm functions include intrusion and flood, but no smoke alarm is installed.

Richmond Highlands Tanks 1 and 2

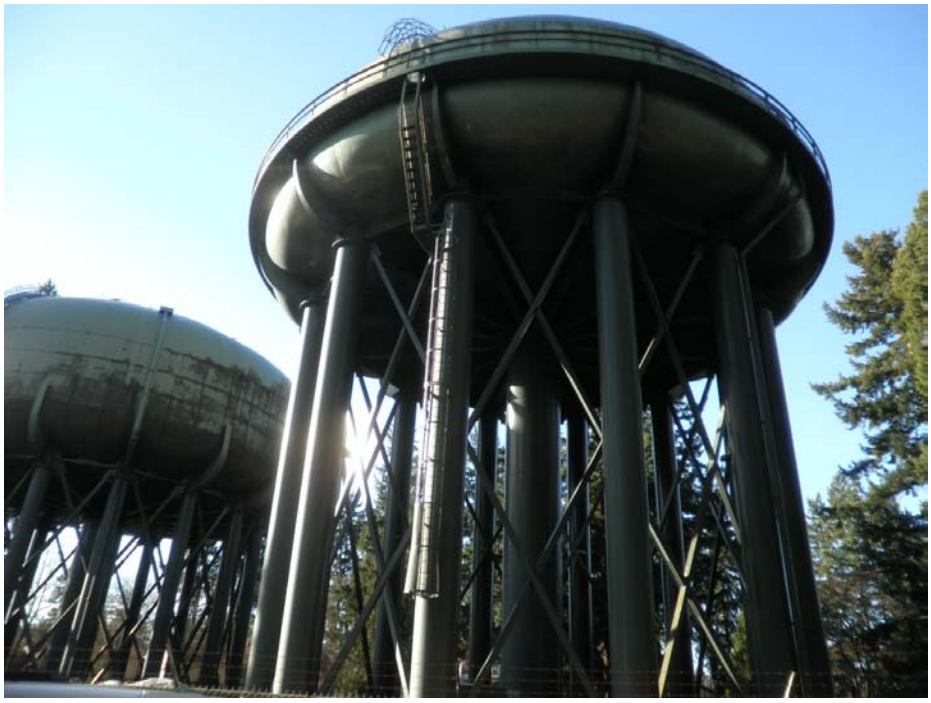


Figure 6 – Richmond Highlands Tank 1 (right) and Tank 2 (left)

The Richmond Highlands Tanks are located at N 195th St and Fremont Avenue N. Both are elevated steel tanks of similar design. Tank 1 was constructed in 1954 and Tank 2 was built in 1958. Both were seismically upgraded in 1994. Tank 1 has a bowl diameter of 86 feet and height of 25 feet, providing 1 million gallons of capacity. Tank 2 has a bowl diameter of 101 feet and height of 35 feet, providing 2 million gallons of capacity. Both tanks have a spill elevation of 590 feet. The top of the concrete base is at elevation 492.5 for Tank 1, and 488.5 for Tank 2.

Tank 1 has interior coal tar lining, which was found to need replacement in the most recent inspection by SPU. The tank bowl's exterior is painted with lead based paint which also was found to need replacement. Tank 1's legs were repainted as part of the 1994 seismic upgrade work, but the coatings on the bowl were not replaced during the seismic work.

Tank 2 is currently being internally and externally recoated, with the exception of the legs and substructure. Tank 1 is planned to be taken out of service once Tank 2 is recoated. The current plan is to leave Tank 1 empty and out of service but intact and physically connected to the system. SPU proposes Tank 1 would be minimally maintained and placed into service in its current

condition during times that Tank 2 is out of service for scheduled cleaning or other maintenance. Tank 1's failed internal and external coatings are not scheduled for replacement, but the tank would be maintained in mothballed condition such that it could be recoated and returned to regular service at some point in the future.

The Richmond Highlands tanks have telemetry to monitor water level. The tanks are not outfitted with internal cathodic protection systems to prevent internal corrosion and subsequent coating failure. The tanks do not have intrusion alarms on the hatches but are padlocked. Ladders are caged with locked gates at the bottom of the cages.

Foy Standpipe

Figure 7 – Foy Standpipe

Foy Standpipe is located on the north side of NE 145th St at Dayton Avenue N. It is a riveted steel standpipe and was constructed in 1933, with a diameter of 46 feet and height of 85 feet. Its capacity is 1 million gallons, of which 130,000 gallons are available to support a minimum pressure of 30 psi in the 590 zone. An additional 290,000 gallons support a minimum pressure of 20 psi. The standpipe is used as an antenna mount by a cellular communications provider.

The tank exterior was last repainted in 1980. An inspection in 2005 found the coal tar interior lining to be in good condition. The roof was determined to need repair and recoating. The exterior coating is presently in poor condition particularly on the south face, and results in periodic complaints from neighbors.

The structure has not been seismically upgraded. Ribbon anodes are reported to be installed.

Telemetry at the site consists of water level. There is no intrusion alarm.

Distribution Mains

SPU's distribution system within the Shoreline city limits consists of 614,962 feet of main, or about 116 miles. The predominant materials are cast and ductile iron, which together make up 89% of the system. The galvanized iron total on Table 1 also includes piping listed as galvanized steel. The miscellaneous materials included in the 'Other' category consist of copper, polyvinylchloride, concrete cylinder, kalamein, plastic, and a small amount of pipe listed as unknown material.

Table 1
Distribution Main Materials

Material	Length (ft)	Percent of Total
Cast Iron	395,487	64.3
Ductile Iron	152,689	24.8
Steel	51,029	8.3
Galvanized Iron	10,221	1.7
Other	5,535	0.9
Total	614,962	100

Table 2 shows the distribution of ages and lengths in feet for the various types of piping used in the system. Note that the oldest material in the system is steel pipe, followed closely by cast iron. SPU transitioned from using unlined cast iron to lined pipe approximately 65 years ago; however a significant amount of lined cast iron appears to have been used well into the 1970's. Unlined cast iron loses capacity over time as internal corrosion reduces available flow area. Cast iron, whether lined or unlined, is more susceptible to main breaks than is ductile iron.

Table 2 Main Material & Length by Age							
	Cast Iron	Ductile Iron	Steel	Galv. Iron	Other	Total, ft	% of Total
0 - 10 years	0	11,524	0	0	131	11655	1.9
10 - 20 years	0	26,547	0	0	12	26559	4.3
20 to 30 years	117	25,051	0	30	336	25535	4.2
30 to 40 years	12,339	79,072	6	30	1,244	92691	15.1
40 to 50 years	146,954	10,215	18,619	310	808	176906	28.8
50 to 60 years	150,766	5	12,228	3,258	503	166760	27.1
60 to 70 years	72,003	0	1,918	3,289	7	77217	12.6
70 to 80 years	11,020	159	18,260	3,155	0	32594	5.3
over 80 years	300	0	0	0	0	300	0.0
unknown	1,986	115	0	90	2,494	4686	0.8

Approximately 75% of the system is over 40 years old. About 6% of the system has been installed in the last 20 years, and 2% has been installed in the last ten years.

Summary of Existing Operations

Most water delivered to the Shoreline area is pumped at North City Pump station, which is manually controlled by the OCC operators as they monitor the water level at Richmond Highlands Tanks. Additional water is pumped by Foy Pump Station using the same manual control method, based on the OCC operators monitoring the water level in Foy Standpipe and in Richmond Highlands Tanks. The Bitter Lake Pump Station provides a third available supply, and is the only one of the three pump stations which has backup power. SPU has determined that backup power is not considered necessary at North City or Foy Pump Stations due to the availability of gravity pressure in the 550 Pipeline. North City Pump Station is equipped with a bypass system, including a check valve and two remotely controlled valves.

Due to power failures caused by storms, North City and Foy Pump Stations have simultaneously failed in the past. In this situation, the 590 zone including the Shoreline area would be fed by storage at Richmond Highlands Tanks and by Foy Standpipe storage. The only available supply to the area would be provided by the Bitter Lake Pump Station; however it requires staff onsite to start the pump station, which takes up to 2 hours. Should storage be depleted before the Bitter Lake pump is started, or should demand exceed the capacity of the Bitter Lake pump, the check valve from the 550 Pipeline at North City Pump Station would open to provide a reduced level of system pressure. The bypass valves at North City can also be manually opened, but not by remote control during a power failure, due to lack of battery backup for the valve operators. Given several hours to reconfigure valves on SPU's transmission system, the 550 Pipeline can be operated at elevation 590, in which case the area could be returned to near normal pressure.

Olympic View Water District has about 5,000 services and is supplied from the 590 zone on the north side of Shoreline. Olympic View has its own 2.5 million gallon tank and several emergency interties with the City of Edmonds. Check valves on the Olympic View supply points would allow

Olympic View to maintain normal pressure in the event of a loss of pressure in Shoreline and the 590 zone.

Water storage at a utility is provided in accordance with Washington Department of Health requirements which break storage capacity into five components. The top portion of storage is defined as operational storage, and consists of the range that the storage fluctuates as pumps are turned on and off. Next is equalizing storage, which is the amount that gets drawn down when demand exceeds pump capacity at peak demands, and which refills in time for the next day's peak demands. Both of these storage components must be available at a minimum of 30 psi to all customers. Next is standby storage, which is provided in order to deal with pump outages or other disruptions that may occur, and which must provide a minimum of 20 psi. The next lower volume of storage is fire suppression storage, which also must be at a sufficient elevation to maintain 20 psi for all customers during fire fighting. Any remaining volume is considered dead storage. In general, standby storage and fire suppression storage can be 'nested' in determining overall storage requirements, in which case the larger of the two components is considered to suffice for both components.

In order to provide sufficient storage to the 590 zone and the Shoreline area, SPU relies on three large reservoirs in the SPU system, Lake Forest Park, Maple Leaf, and Bitter Lake. A portion of the storage in these reservoirs, along with the Richmond Highlands Tanks and Foy Standpipe, provides needed storage for the area. However, should Shoreline become a wholesale customer, the reservoirs outside of the Shoreline boundaries would no longer be designated to provide storage for Shoreline, unless Shoreline were to negotiate an arrangement with SPU which allowed reliance on SPU storage. Without such an agreement, Shoreline would need additional storage capacity, as discussed later in the capital improvements section.

SPU staff has recommended that Foy Standpipe be decommissioned. Once it is out of service, and assuming Richmond Highlands Tank 1 is mothballed as proposed by SPU, Richmond Highlands Tank 2 will be the only operational storage facility at 590 elevation in the zone. When Richmond Highlands Tank 2 is out of service for cleaning or maintenance, the zone will no longer have a storage facility online which can be used to regulate pressure in the zone. One of two methods would need to be used in order to operate without Richmond Highlands Tank 2: Tank 1 could be temporarily returned to service, or water in excess of demand can be pumped at North City or Foy Pump Station, with the excess water released to Bitter Lake Reservoir through the pressure relief valve at that location. The feasibility of temporarily placing Tank 1 in service is unknown and would need to be discussed with the DOH engineer.

Facilities Condition

Based on site visits, review of documentation, and discussions with SPU and Shoreline staff, the following observations on facility conditions are noted:

Pump Stations

North City, Foy and Dayton Pump stations were toured. They were found to be clean, dry and generally appeared in good repair. Paint was in good condition both internally and externally.

Safety measures were in place, including signage and cages around moving parts. All had overhead cranes marked with load limits. The Dayton pump station appeared to be less maintained than the larger North City and Foy pump stations.

North City Pump Station is located in a large underground vault which is not considered by SPU as a confined space. The station is accessed by stairs rather than by ladder, and at the time of the tour, a ventilation fan was in continuous operation.

Chart recorders are no longer in service, which makes it more difficult for field staff to diagnose failures. The control panel for the North City bypass valve did not appear to be functioning correctly and may not have been fully in service. Staff reported they did not carry out wire-to-water pump and motor efficiency testing, and pump performance does not appear to be tracked. Vibration monitoring was carried out at North City pumps in the past but was discontinued. Electrical switchgear is not checked by infrared scan for loose connections or overheated wires, however an annual switchgear inspection is carried out and connections are checked at that time. As part of the annual electrical check, larger motors are reported to be meggered to check winding insulation quality.

SPU staff reported that all stations are checked weekly. North City and Foy Pump Stations are manually controlled by the OCC operators, who operate the stations by monitoring water levels in the receiving reservoirs. While this process easily lends itself to automation, SPU prefers the manual approach as a way to more actively engage the OCC operators in the operation of the water system. SPU also relies on OCC operator intervention to protect pumps against failures such as pump control valves not opening or closing as needed. Standard industry practice relies on automated control systems to protect equipment in the case of local malfunctions.

North City, Foy and Dayton Pump stations are all without backup power systems. In the event of loss of line power, check valves and alternate sources such as the Bitter Lake Pump Station are relied on to provide sufficient pressure to keep the distribution system pressurized once local storage is depleted. Storage at Richmond Highlands Tank 2 would last less than a day at average day demand.

Dayton Pump Station uses a hydropneumatic system, where pumps cycle based on the pressure in two hydropneumatic tanks. The large pump at this station has been reported to cycle off and on up to 80 times per day at peak demands, with the station's discharge pressure cycling between 60 psi and 80 psi. This type of system is not state-of-the-art. Variable speed pump control systems are commonly used in this application which allow the pumps to run at any speed needed to maintain a constant discharge pressure. Pump speed is automatically controlled by altering the frequency of the power supplied to the pump motor. This type of system also has the advantage of being energy efficient.

Control systems at the pump stations appear to be fairly basic. Some flow and pressure readouts are provided but circular charts or data loggers are not in service at the stations. Stations do not appear to have programmable logic controllers (PLC's) for overall station local control, alarms and motor protection; instead some or all functions either appear to be handled by the operator at the OCC or by local relay systems.

Pump controls include Hand-off-Auto control, which allows pumps to be turned on at the station or by the OCC. Transducers are labeled according to function.

All stations had sufficient space to accommodate their equipment and to provide ample work space.

Storage Tanks

The Foy Standpipe and Richmond Highlands Tank sites were toured. Foy Standpipe is in need of exterior paint, with numerous rust streaks visible from the street. Richmond Highlands tanks also need exterior paint, and recoating work on Tank 2 is presently underway. Tank 1 has extensive rusting on the roof, which is visible from the street. The legs of the tanks were repainted in 1994 and the paint remains in fair to good condition, with some oxidation on the south faces and some areas in need of touch up.

The bowl of Richmond Highlands Tank 2 is currently being relined and repainted. The tank's structure was seismically updated and painted in 1994. Richmond Highlands Tank 1 is reported to have poor internal coal tar enamel coating and has poor exterior paint on the tank bowl. SPU plans to take this tank out of service with the possibility of returning it to service at some future time after recoating.

SPU staff has recommended that Foy Standpipe be decommissioned. Its exterior coating is in poor condition and draws complaints from neighbors. The tank has been found to need substantial work if kept in service, including roof repair, new internal and external coatings, and seismic upgrade work. The standpipe has lead based paint on the exterior and coal tar internal coating.

Hydrants

Hydrants do not appear to be exercised by either SPU or by the local fire jurisdiction. SPU responds when a hydrant is reported in need of repair, but does not have a regular hydrant exercising or testing program. SPU relies on local fire jurisdictions to notify SPU if a hydrant is in need of repair. The Shoreline Fire Department reports that there are numerous hydrants with inadequate flow capacity.

Mains, Services & Meters

Gate valves are not routinely exercised. Also, Shoreline staff reported difficulty in getting SPU to raise gate boxes in response to street paving. This, along with the gates not being exercised, increases the possibility that some gate boxes have been paved over or lost.

Mains are not routinely flushed. The local fire jurisdiction reported that mud, sand and rocks are often discharged when hydrants are flowed. Flow tests are infrequently done, and would be SPU's responsibility except in emergency situations.

Services and meters are replaced as needed.

Pressure Reducing Valve Stations

Figure 8 – Pressure Reducing Valve, 9th Ave NW & Innes Arden Way

Discussion with SPU maintenance staff indicated that pressure reducing valves are maintained on a 2 to 8 year interval, depending on criticality rating, activity of the valve, and valve size. The valves and pilot systems are standardized with units from high quality manufacturers. Most pressure zones that are fed by pressure reducing valves are also equipped with pressure relief valves. Pilot lines are copper or, in some cases, stainless steel.

One station was toured, at 9th Ave NW & Innes Arden Way. This station has ductile iron main with galvanized bypass piping. Reducing valves have isolation valves installed. Access is through a standard circular manhole equipped with a steel ladder. The vault is located out of traffic, and provides sufficient space to access and maintain the valves. The vault had no standing water and appeared to be well drained. The floor of the vault was partially covered by sand and gravel. The station appeared to be consistent with standard utility practices, with the minor exception of sand and gravel on the floor. While a rectangular access hatch is preferable to circular manhole access, the industry practice of using rectangular access hatches at pressure reducing valve stations is relatively recent and most pressure reducing vaults in service typically still have manhole access.

The PRV station at 23rd Ave NW and NW 197th St is connected to Scada to monitor the 430 and 290 zone pressures.

Current Maintenance Programs

SPU's maintenance plans, as described in the 2007 Comprehensive Water System Plan (CWSP), are summarized below. Following the description from the CWSP, maintenance practices as reported by SPU staff are noted where different from the CWSP descriptions:

Pump Stations

At pump stations, a mechanic checks the station twice weekly and grounds maintenance staff checks the sites weekly. Pump motor starters are maintained twice a year. Annual maintenance includes a building inspection and valve operator inspection and maintenance. Every two to five years, flow meters are inspected and overhauled if needed, and pressure regulator valves are overhauled. Every five to seven years, pump efficiency is tested and pumps are overhauled if needed. Emergency maintenance is carried out when a critical piece of equipment has failed. Each pump's criticality has been predetermined and is incorporated into SPU's work management system in order to minimize the length of time that critical equipment is out of service.

SPU staff reported they carry out weekly station checks. Pressure regulating valves are serviced monthly based on criticality. Meters are serviced monthly or semiannually depending on lubrication requirements.

Storage Tanks

Elevated storage facilities are inspected every 5 years and internally cleaned every 25 years unless it is determined cleaning is needed sooner for water quality purposes. The water supplying the Shoreline area is filtered so sediment load in the water delivered to Shoreline is negligible. Tanks are painted approximately every 15 years or as needed.

SPU staff reported that tanks are cleaned every three to five years and sanitary inspections are conducted annually.

Hydrants

Maintenance of hydrants consists of repair or replacement of broken or obsolete hydrants. SPU does not routinely exercise or test hydrants, instead relying on local fire jurisdictions to report defective hydrants to SPU. Hydrants are classified either as In Service or as Out of Service. As soon as a hydrant is identified as out of service and until it is repaired, a white engine port cap is installed to alert fire authorities that the hydrant is unavailable. SPU replaces broken or obsolete hydrants when the opportunity arises and as a result of other construction occurring at the hydrant's location. Hydrants are normally repainted on a five year cycle.

Mains, Services & Meters

Maintenance of mains, services and meters is primarily in response to failure of components, such as replacement of broken valves, repair of main breaks, replacement of nonfunctioning small

meters, and replacement of leaking service lines. SPU does not routinely exercise distribution valves. Internal condition of the distribution mains is noted when main breaks are repaired, but there is no overall condition assessment of the internal condition of the mains. Main flushing is carried out as needed to address water quality issues including low chlorine residuals, but is not done routinely throughout the system. Large meters are tested and repaired; however this category of meters consists of only 3% of all retail meters. For smaller meters, particularly residential meters, it is more economical to replace rather than repair the meters. Problems with meters are generally identified through the billing system.

Leaking service lines are replaced with copper lines.

Pressure Reducing Valve Stations

No documented maintenance practices are described in the CWSP for these facilities. Similar pressure regulator equipment at pump stations is overhauled every two to five years

Current Capital Improvement Plan

SPU's 2007 Comprehensive Water System Plan addresses capital improvements, in some cases specifying individual projects, but in other cases focusing more on broad programs. Within the Shoreline area, one specific project in the CWSP was the recoating of Richmond Highlands Tank 2, work on which is presently nearing completion. The CIP also included budget for replacing mains that are impacted by other projects, which would include the Aurora Avenue work in Shoreline. Beyond these two projects, specific work in the Shoreline area cannot be identified. While the CIP includes funding for categories such as relining and replacing mains, replacing leaking services, or replacing service meters, these types of work are system-wide and, while some work can be assumed to fall within Shoreline, it is not specifically identified in the CIP.

An approximation can be made for the proportion of general distribution capital improvement work in the Shoreline area by assuming such work is carried out uniformly across the SPU distribution system. This assumption is likely to be more accurate for general categories such as meter or service replacements and less accurate for categories where the work consists of larger, more discrete projects such as water main relocations or main extensions. Table 3 is based on the premise that the distribution CIP is spread uniformly across the SPU distribution pipe network, which consists of 1640 miles of distribution mains. This number does not include SPU's 160 miles of transmission mains. The City of Shoreline includes 116 miles of SPU mains, or 7.1% of the SPU system. Table 3 allocates 7.1% of SPU's annual distribution CIP to the SPU mains located within Shoreline. Actual expenditures may be less than indicated in the table.

Table 3
SPU Distribution CIP Estimated for Shoreline
Based on Proportional Length of Mains

SPU Distribution CIP Category	SPU Annual CIP	Proportionate Share in Shoreline
Reline or replace aging water mains and improve pressures and fire flows where cost effective.	$5,500,000	$390,500
Extend water mains to new developments.	$1,000,000	$71,000
Relocate water mains impacted by other projects and upgrade water mains in redevelopment areas.	$3,000,000	$213,000
Replace leaking service connections and install new services.	$10,000,000	$710,000
Replace meters.	$600,000	$42,600
Total	$20,100,000	$1,427,100

Proposed Maintenance Prior to Shoreline Acquisition

Shoreline would not be acquiring the SPU water system until 2020, or approximately eight years from the present time. During this period, SPU would continue to own, operate and maintain the system. Shoreline has an interest in having the system be in a well maintained condition at time of acquisition. In addition to SPU's current maintenance practices, the following are recommendations for Shoreline to request of SPU.

Pump stations

Wire-to-water pump and motor efficiency tests should be carried out on each pump at the pump stations to be acquired and data should be provided to the City of Shoreline. Any units needing repair or replacement should be identified and repairs should be made. Wire-to-water efficiency testing evaluates the combined efficiency of the pump and motor, and measures the percent efficiency of the conversion of electrical power input to hydraulic energy output. Acceptable minimum efficiency varies by pump and motor size, but ranges from about 45% for small pumps to 60% for large pumps. Pump units that fall below the normal acceptable range for their size often have older, inefficient motors, worn internal pump clearances, or other condition issues that should be remedied.

Infrared scans should be taken of the electrical switchgear, pumps and motors. Infrared scans detect locations that are hotter than would be expected, such as loose electrical connections. Identifying and correcting such problems can prevent fires, and detect failing bearings, undersized wiring, and other issues which otherwise may not be detected. Any deficiencies should be identified and repaired.

Storage Tanks

Richmond Highlands Tank 2's legs were repainted in 1994 as part of the seismic upgrade, and the reservoir bowl exterior will be repainted in 2012. Based on a 15 year painting cycle, the legs were due to be repainted in 2009, however the 1994 paint remains in fair to good condition at present. The legs and substructure will need repainting prior to 2020.

Richmond Highlands Tank 2 presently does not have an internal cathodic protection system. A system should be installed as soon as possible following completion of recoating the tank interior.

Richmond Highlands Tank 1 is not in service but will still need exterior painting for aesthetic purposes prior to 2020. Prior to repainting the exterior, a determination should be made regarding if the tank will eventually be returned to service or decommissioned.

If not decommissioned, Foy Standpipe will need exterior painting in the near future.

Hydrants

Responsibility needs to be established for monitoring hydrant condition. SPU's policy is that the local fire jurisdiction is responsible for reporting hydrant problems. Hydrants should be tested for basic operation and repaired as needed. Any broken or inadequate hydrants should be clearly marked as out of service.

Mains, Services & Meters

An initial priority should be to exercise distribution gate valves and hydrants. In order to do so without causing widespread dirty water complaints, a planned main flushing program should be carried out, in conjunction with exercising the distribution system gates and hydrants. SPU has used the unidirectional flushing process in the past, a method which would be appropriate in this area. Unidirectional flushing begins at the upstream end of a system and works downstream, so increased velocities due to flushing only occur in mains that have already been flushed, and water always flows in the same direction. Discharged water is dechlorinated and filtered as required by the receiving sewer utility or environmental requirements. Planning a main flushing program is often done using a hydraulic pipe model.

While the water supplying the Shoreline area is presently filtered, most of the Shoreline piping system predates construction of the Tolt filter plant, which began service in 2000. If system-wide flushing was not carried out prior to construction of the filter plant, the mains are likely to still contain significant amounts of settled sediment which restricts flow in the mains and which generates dirty water during fire flows, peak demands, or when flow direction is changed as system valves are operated.

If distribution gates have not been operated for years, it can be expected that some valves will break when operated. A program should be in place to replace or at least identify and document broken valves as they are found.

Pressure Reducing Valve Stations

Pressure reducing valves are presently maintained but specific tasks and frequency are unclear. Pressure reducing valves should be maintained regularly in order to avoid valve failures which can overpressure lower elevation zones. While pressure relief valves can reduce the consequences of over pressurization, they are considered to be a safety feature rather than relied on to allow the main pressure relief valve to run to failure. Pressure reducing and pressure relief valve pressure settings and basic operation should be checked on a six month cycle. Depending on the activity and criticality of the valve, pilot systems should be rebuilt on a one to three year cycle. Galvanized piping in vaults should be inspected and replaced if needed.

Proposed Post-Acquisition Maintenance Program

When Shoreline assumes responsibility for operating and maintaining the water system infrastructure, long-term operation and maintenance plans will be needed. The following maintenance programs and activities are recommended to be implemented upon Shoreline's acquisition of the water system.

General Practices

- Make arrangements for on-call staff to respond to after-hours emergencies
- Maintain written and electronic maintenance records for all equipment
- Determine criticality of equipment and respond to failures accordingly
- Critical equipment will not be run to failure
- Preventive maintenance will be carried out on all equipment
- Staff will be equipped with the tools and training they need
- Spare parts will be stocked for typical repair needs
- A safety program will be established or expanded to include the water utility
- Staff in responsible charge of daily operations will be State certified
- Staff responsible for water quality sampling will be State certified

Pump Stations

- Conduct a weekly station check by a mechanic
- Check and adjust pump control and pressure relief valves in accordance with pressure reducing valve maintenance procedures
- Check and maintain oil levels weekly
- Remove motors for repair as needed
- Change out or repair pumps and meters as needed
- Paint piping and structure as needed
- Rebuild control valve pilots in accordance with pressure reducing valve maintenance procedures
- Overhaul relief valves and control valves in accordance with pressure reducing valve maintenance procedures
- Change charts weekly, or install data loggers at stations
- Electrical maintenance including cleaning switchgear every five years, checking connections, infrared scans and megging motors (checking winding insulation) every five years or more frequently as needed
- Conduct periodic wire to water efficiency tests and track results in a database

Storage Tanks

- Inspect tanks every 5 years to evaluate cathodic protection systems, screens and vents, lining systems and structural integrity.
- Clean tanks at 25 year intervals unless inspection indicates shorter interval

- Periodically clean exterior of tanks as needed (contracted work)
- Remove graffiti within one week if possible
- Conduct weekly site checks
- Perform spot painting as needed
- Check and maintain ladders, climbing systems and security features as needed

Hydrants

- Exercise hydrants and valves annually to ensure working order
- Lubricate the operating shaft bearing as needed
- Check accessibility of control valves
- Clear any brush and debris around the hydrant
- Repair any faults found during inspection
- Paint hydrants every five years or as needed

Mains & Services

- Exercise inline valves every five years or as part of the flushing program
- Repair or replace inoperable valves
- Clean out valve boxes, and ensure they are visible and at grade
- Flush dead end mains as needed to maintain water quality
- Carry out unidirectional flushing to help maintain system capacity and water quality
- Repair or replace service lines as needed
- Install new services as needed
- Abandon old services as needed
- Respond to turn on / turn off requests
- Provide locate service (contract)
- Take water quality samples as required

Meters

- Replace meters 1” and smaller as needed or when renewing service lines
- Test, repair or replace meters 1 ½” and larger based on age or as needed
- Read meters bimonthly

Pressure Reducing Valves

- Visually inspect the pilot valve and related piping every 6 months
- Clean the pilot screen and check the valve operation every 6 months
- Check and reset the pressure annually
- Rebuild the pilot valve every 1 to 3 years, depending on activity of the valve
- Rebuild the main valve every three to five years
- Replace pilot piping in the chamber every five years
- Inspect & replace galvanized piping as needed

Structures

- Clean roofs & gutters annually
- Repair and replace roofs and gutters as needed
- Paint as needed
- Maintain landscaping to a defined standard appropriate to the location

Proposed Post-Acquisition O&M Budget

Projected Annual Labor Expense

SPU presently operates and maintains its system in the Shoreline area with crews that are assigned to work throughout SPU's northern service area. Labor hours and costs are not directly tracked with regard to city boundaries, and complete estimates of labor and cost were not available from SPU at the time this report was written.

In the November 2004 report prepared for the Shoreline Water District, *Seattle Public Utilities within the Cities of Shoreline and Lake Forest Park, Water System Valuation Report,* RH2 Engineers assessed the level of effort needed to operate and maintain the SPU system located within the City of Shoreline, plus a small portion of the SPU system located within Lake Forest Park. RH2 Engineers surveyed the Cities of Bellingham, Renton and Kirkland regarding their water utility staffing and level of effort applied to typical water utility activities. Based on unit levels of effort, RH2 Engineers determined that 15.17 full time equivalent (FTE) staff would be required to service the study area, consisting of 1.54 FTE office/clerical, 11.83 FTE field, and 1.79 FTE supervision.

In evaluating the current validity of the 2004 RH2 Engineers report's staffing evaluation, the following are considered:

- The full area evaluated in the 2004 RH2 report included 626,283 feet of main. Shoreline presently has 614,962 feet of main, or 98% of the amount in the 2004 study area. Adjustment of the results to compensate for the small amount of Lake Forest Park service area in the 2004 report falls within the rounding error and does not affect the results as applicable to Shoreline.
- Census results for the years 2000 and 2010 indicate a stable population at 53,000 in Shoreline.
- No major changes have occurred since 2004 which would alter general productivity or job duties in water utility field or office work.
- The 2004 report was based on the assumption that the additional staff would be added to existing staff at Shoreline Water District (SWD). In the case of the City of Shoreline establishing a new water utility, staff will be required beyond those identified in the 2004 report.

The 2004 RH2 report defined additional staff positions in terms of SWD classifications, but in more general terms, the identified staff positions would consist of 3 customer service staff, 4 lead or senior field crew workers, 4 crew workers and 4 crew helpers. These staff would be needed to support field operations and maintenance, customer service, and meter reading functions.

Since Shoreline would need to form an entirely new water utility, other functions will need to be supported. These include a water utility manager, water operations manager, office manager, mapping technician, water quality technician, warehouse technician and administrative and financial support. Some of these functions may be handled by existing City staff or by utility staff supporting the planned wastewater utility. For estimating purposes, all

these functions with the exception of administrative and financial support will be assumed to be included as water utility staffing. Administrative and financial support expense is included as a separate cost in the O&M budget calculations.

Determination of market based salaries will require salary surveys of utilities considered comparable to the proposed Shoreline water utility. For estimating purposes, the salaries in Table 4 are based on salaries in the 2004 RH2 report, escalated to 2011 dollars. Costs shown are direct costs and do not include overhead expense.

Table 4
Staffing Requirements and Salary Cost

Classification Title	Required Staff	Classification Salary	Total Salary Cost
Water Utility Manager	1	$117,973	$117,973
Water Operations Manager	1	$85,471	$85,471
Water Quality Technician	1	$59,329	$59,329
Mapping technician	1	$63,018	$63,018
Office Manager	1	$64,420	$64,420
Customer Service Assistant	3	$47,468	$142,404
Lead Field Crew Worker	4	$68,354	$273,416
Field Crew Worker	4	$47,468	$189,872
Field Crew Helper	4	$46,107	$184,428
Warehouse Technician	1	$47,468	$47,468
Total	21		$1,227,799

Projected Annual Non-Labor Expense

The 2004 RH2 report also estimated the unit material and supply costs required to support the operation and maintenance of the SPU system within Shoreline, based on SWD unit costs. The report noted that reliance on the SWD unit costs assumes the SPU system is in comparable condition with the SWD system, which appears to not be the case. Material and supply costs for a system in need of more maintenance can be expected to be higher than those for a more updated system. Table 5 shows the SWD unit costs, escalated to 2011 dollars. To reflect increased maintenance materials expenses and engineering services, proposed unit costs for Operations and Engineering are two times the SWD unit costs. Proposed unit costs reflect additional costs for hydrant and valve maintenance and repair, and for additional engineering services related to the transition to an independent water utility.

Table 5 Estimated O&M Material & Supply Costs					
Program Area	**SWD Unit Cost**	**Proposed Unit Cost**	**Measure**	**Number of Units in System**	**Estimated Costs**
Operations	$0.43	$0.86	ft of main	614962	$528,867
Engineering	$0.04	$0.08	ft of main	614962	$49,197
Water Quality	$5.56	$5.56	connections	10739	$59,709
Customer Service	$2.04	$2.04	connections	10739	$21,908
Total					$659,681

Projected Annual O&M Budget

Table 6 includes labor cost from Table 4, materials and supplies from Table 5, employee benefits estimated at 40% of base salary, administrative expense, and utility taxes estimated at 6%. Administrative expense is the general fund overhead estimated cost used in a preliminary 2010 budget prepared by Shoreline staff.

Table 6 Annual O&M Budget	
Category	**Annual Budget**
Labor	$1,227,799
Materials & Supplies	$659,681
Employee Benefits	$491,120
Administrative	$1,500,000
Taxes	$232,716
Total	$4,111,315

Separation Options, Issues & Costs

The water system in Shoreline is presently an integral part of the SPU system. Physically separating the Shoreline portion of SPU's system will involve construction of additional infrastructure in order to enable the two systems to operate independently. At present, most of the storage that supports the Shoreline area is located in large regional reservoirs outside of Shoreline. By policy, SPU does not allow wholesale customers to rely on SPU storage capacity for planning purposes; wholesale customers must provide their own storage as needed to meet regulatory requirements. Any physical separation option may need to include construction of additional storage in Shoreline, or possibly a financial arrangement where Shoreline gains formal access to a portion of existing SPU storage. Additional storage is discussed in the Capital Improvements section.

Separation Options

SPU has presented the following two conceptual or base options:

Alternative A

Shoreline would acquire North City and Foy Pump Stations. Shoreline would also acquire the 24" main in N 145th St. Shoreline would install a new pump station for SPU adjacent to the 550 Pipeline in the vicinity of Foy Pump Station, and approximately 8, 600 feet of 12 and 16" of new SPU main in 145th St. from the new pump station to Greenwood Avenue. Mains and services feeding south from the 24" line in N 145th would be disconnected and transferred to the new main. Shoreline would install a new elevated tank for SPU in the vicinity of Bitter Lake Reservoir, or, if a new tank is not acceptable to the community, Shoreline would refurbish Foy Standpipe for SPU and connect it to the new SPU main in N 145th St. A bi-directional emergency metered intertie would be added at a point along N 145th St. and an agreement would be made between SPU and Shoreline allowing use of the intertie when SPU's 590 zone storage facility is out of service for cleaning or maintenance.

Alternative B

Shoreline would acquire North City Pump Station. Foy Pump Station and the 24" main in N 145th would remain with SPU, and mains and services to the north of N 145th would be disconnected from the main. Shoreline would make modifications elsewhere in its system to replace the function of the 24" main. Foy Pump Station would be modified to operate with the smaller SPU 590 pressure zone. Shoreline would install a new elevated tank for SPU in the vicinity of Bitter Lake Reservoir, or, if a new tank is not acceptable to the community, Shoreline would refurbish Foy Standpipe for SPU. A bi-directional emergency metered intertie would be added at a point along N 145th St. and an agreement would be made between SPU and Shoreline allowing use of the intertie when SPU's 590 zone storage facility is out of service for cleaning or maintenance.

Discussion of Alternatives A and B

An underlying concept for any separation alternative is that SPU's existing 590 zone is being divided into two adjacent but independent zones, each of which will need storage and supply mains. Alternatives A and B are identical with regards to storage needs for SPU, and with regards to a mutually beneficial emergency intertie. The primary difference is in who retains the Foy Pump Station and the existing 24" line in N 145th St. Alternative A requires construction of a new main across I-5. Although not described in Alternative B, Shoreline would need a means to receive water from the 550 Pipeline at or near the southern city limits, and any new Shoreline main from the 550 Pipeline would also need to cross I-5.

Neither alternative addresses the need to transmit water through Shoreline mains from SPU's transmission system to SPU's wholesale customers. If the wholesale water were to continue to be delivered through the existing mains in Shoreline, construction of the proposed bi-directional emergency intertie may not be necessary since the systems would be continuously connected. If SPU were to make alternate arrangements to supply its wholesale customers, then a bi-directional emergency intertie would need to be constructed. In any case, provision for flow in either direction between SPU's 590 zone and Shoreline's 590 zone would need to be provided for the benefit of both utilities.

There are five variations of Alternative B that could be considered as options for Shoreline to replace the function of the 24" main as mentioned in SPU's Alternative B. These each provide a different means to supply the southern part of Shoreline but are otherwise as described by SPU's Alternative B:

Alternative B1

Alternative B1 would have Shoreline construct a new pump station near Foy Pump Station on N 145th, along with 20", 12" and 8" mains in N 145th St, similar to the description in Alternative A. Under Alternative B1, the new pump station and main would be part of the Shoreline system. All mains and services presently connected to the north side of the 24" main in N 145th would be transferred to the new main.

Alternative B2

Alternative B2 is a variation on Alternative B1. Rather than Shoreline constructing a new pump station, Shoreline would build only the portion of new main beginning west of I-5 and extending to Greenwood Ave N., consisting of 7,300 feet of main varying from 20" to 8". This main would connect with all existing mains and services on the north side of N 145th St. and would be fed by SPU through a meter near 1st Ave NE and N 145th St. The connection to the SPU system may require a check valve to prevent the connection from reversing flow as Shoreline filled its storage using the North City Pump Station. SPU would continue to operate Foy Pump Station, and supply to Shoreline through this connection would depend on the level in Shoreline's storage as well as how North City Pump Station was operated. This option has the advantage that if in the future, should Shoreline wish to receive supply through its own pump station from

the 550 Pipeline, the new pump station could be built on N 145th, along with construction of the main from the pump station across I-5 to the main as described in this alternative. It has the disadvantage that the new main would be larger than needed should Shoreline decide not to construct the future pump station.

Alternative B3

Alternative B3 assumes Shoreline does not have future plans to construct its own pump station to replace the functionality of the Foy Pump Station. In this case, Shoreline would construct the 7,300 feet of main in N 145th St between Greenwood Ave N. and I-5, but the diameter would be 8" and 12". A connection to the SPU system would be located at Aurora Ave N. The connection may require a check valve as described in Alternative B2.

Alternative B4

Alternative B4 is similar to Alternative B3 except that the south side of Shoreline would be served by three connections to SPU, at Dayton, Aurora, and Meridian Ave. N. With three feeds, the entire new main in N 145th St. could be 8" diameter. These connections may also need check valves.

Alternative B5

Alternative B5 would have Shoreline construct a pump station adjacent to the 550 Pipeline at N 155th St, and 6,000 feet of 20" main from the new pump station to Aurora Ave N. This alignment would take advantage of the underpass under I-5. Although the N 155th St. alignment provides a less expensive location to cross I-5 than the N 145th St. alignment in Alternative B1, it has the disadvantage that approximately 7,300 additional feet of 6" to 8" main would still need to be constructed in N 145th St. to tie in the existing mains and services that would be disconnected from the 24" main. This main is needed to strengthen the east-west distribution grid in south Shoreline, as well as to connect to dead end mains and customers that would be disconnected from SPU's 24" line. This main needs sufficient capacity to provide fire flows from the Shoreline water system along N 145th St.

Separation of the Southeast Shoreline Area

Approximately 2,300 feet of 8" main would be needed in NE 145th St. to serve the current SPU customers in southeast Shoreline. This section of new main would connect to the mains and services on the north side of NE 145th St, and would be fed by a connection to the 24" SPU line. It would have sufficient capacity to provide fire flows to Shoreline residents along NE 145th St. One wholesale connection and 2,300 feet of 8" main are included in all alternative estimates.

Table 7 summarizes separation alternative costs for the alternatives as discussed above. Unit costs are for ductile iron distribution mains, and are listed in Table 9. Costs include 10% contingency for distribution mains and 25% contingency for all other projects, 5% surveying & permitting, 12% engineering, 8% construction inspection, and 10% sales tax.

Table 7 Separation Alternative Costs						
	A	**B1**	**B2**	**B3**	**B4**	**B5**
6" main				$141,700		$1,591,400
8"main	$538,200	$690,300	$690,300	$1,017,900	$2,293,200	$538,200
12"main	$789,700	$596,000	$596,000	$1,370,800		
16"main	$2,534,700					
20" main		$3,111,850	$2,431,950			$3,138,000
I-5 Crossing	$863,000	$863,000				
Pump stations	$2,215,000	$2,710,000				$2,710,000
Foy Standpipe	$1,765,000	$1,765,000	$1,765,000	$1,765,000	$1,765,000	$1,765,000
Metering	$646,000	$646,000	$646,000	$460,000	$636,000	$646,000
Total	$9,351,600	$10,382,150	$6,129,250	$4,755,400	$4,694,200	$10,388,600

The recommended alternative at this time is Alternative B3. Although the estimated cost is marginally higher than Alternative B4, Alternative B3 has the advantage of requiring only a single service connection with SPU on 145th St west of I-5. Hydraulic modeling will be needed to optimize pipe sizing and to evaluate how the system would operate when supplied by Foy and North City Pump Stations.

Operations Issues Related to System Separation

SPU presently uses mains within the City of Shoreline to deliver water to several of its wholesale customers. When the mains are acquired by Shoreline, water for the SPU wholesale customers will still need to be carried by those mains unless SPU can deliver the supply by other routes. The wholesale customers, SPU and the City of Shoreline will need to arrive at suitable arrangements to provide for transmission of wholesale water through Shoreline mains.

SPU also presently uses the Foy and North City Pump Stations to provide water to these wholesale customers. If SPU retains Foy Pump Station and Shoreline acquires North City Pump Station, operation of the pump stations will need to be coordinated and operating and cost sharing agreements will be needed for North City Pump Station production related to SPU wholesale customer demands. North City and Foy Pump Stations are presently operated using a ten foot range of depth in the storage tanks. If North City Pump Station is modified as discussed below in the Post- Acquisition Capital Improvements section, it will be able to operate with approximately a three foot range of depth. During most times of the year, the result would be that North City Pump Station would carry most of the load, including that attributable to SPU's wholesale customers that are fed by the 590 zone.

Shoreline would also need to establish emergency intertie agreements with SPU's adjacent wholesale customers.

Shoreline may need access to additional storage capacity at the time of system separation. This capacity would either need to be constructed by Shoreline, or provided through an agreement with SPU, possibly on an interim basis until new storage could be constructed in the Shoreline service area.

Proposed Post-Acquisition Capital Improvements and Budget

The necessary capital improvements as well as operations & maintenance costs are dependent on the standards which a utility intends to meet. It is recommended that Shoreline use standards which reflect the industry standard practice and which strive to protect public health.

System Reliability Standards

A key driver of capital improvement costs is the standard of service which the utility establishes for its system. In the *2009 Water System Design Manual,* the Washington Department of Health (DOH) recommends the following standards, intended to promote high levels of water system reliability:

Source

Two or more supply sources are available with a capability to replenish depleted fire suppression storage within 72-hours while concurrently supplying the maximum daily demand (MDD) for the water system.

1. Combined source capacity for the water system is enough to provide the MDD in a period of 18 hours or less of pumping.

2. With the largest source out of service, the remaining source(s) can provide a minimum of the average day demand (ADD) for the water system.

3. Pump stations have power connections to two independent primary public power sources, or have portable or in-place auxiliary power available.

4. The firm yield of surface water sources is consistent with the lowest flow or longest period of extended low precipitation on record.

Booster Pump Stations

1. Multiple pumps are installed with capacity to provide the MDD of the service area when the largest pump is out of service.

2. At least 20 psi at the intake of the pumps under peak hourly demand (PHD) or fire flow plus MDD rate-of-flow conditions is always maintained.

3. An automatic shutoff is in place for when the intake pressure drops below 10 psi.

4. Power connections are available to two independent primary public power sources, or there is a provision for in-place auxiliary power if the pumps provide fire flow or are pumping from ground level storage.

Distribution Storage

1. More than one gravity storage tank (wherever feasible) exists with the ability to isolate each tank while continuing to provide service.

2. Storage is sufficient to give standby capacity of at least two times the ADD for all users, and to ensure that fire suppression service will be available while not allowing pressure to drop below 20 psi at any service connection.

3. A minimum standby volume of 200 gallons per day per residential connection, or equivalent, is provided regardless of the capacity of the sources available.

4. An alarm system is included that notifies the operator(s) of overflows, or when the storage level drops below the point where the equalizing storage volume is depleted. This should only occur during abnormal operating conditions.

Distribution System

1. Distribution mains are looped wherever feasible.

2. Pipeline velocities do not exceed eight feet per second under PHD conditions.

3. All pipelines can be flushed at a flow velocity of at least 2.5 feet per second.

4. All mains and distribution lines have appropriate internal and external corrosion protection.
5. If fire flow is provided, the engineer should conduct a hydraulic analysis to determine whether high fire fighting demands may cause very low pressure (below 30 psi) in the distribution system. Very low water system pressure presents an increased risk of contamination from cross-connections and pathogen intrusion at joints.

DOH recognizes that different communities and utilities may want to operate at different standards of reliability, and notes that doing so is acceptable as long as public health is not put at risk and as long as the standards are consistent with WAC 246-290. DOH requires that all points in the system maintain a minimum of 30 psi at peak hourly demand with all equalizing storage depleted, and a minimum of 20 psi during fire flows at maximum daily demand with all standby and fire suppression storage depleted, in accordance with WAC 246-290.

SPU has established its own design standards, which are included as an appendix to SPU's *2007 Water System Plan.* As a complex system, SPU calculates storage requirements based on hydraulic modeling scenarios rather than on the methodology in the DOH *2009 Water System Design Manual.* New construction in the SPU system is done in accordance with the DOH minimum pressure requirements, but some older areas were built when the minimum pressure

requirement was 20 psi, and some of these areas are unable to meet the current 30 psi requirement.

If the City of Shoreline acquires the water system within its boundaries, it is recommended that the DOH guidelines be used as system reliability standards. Any new construction, such as new storage, will need to be designed in accordance with the current edition of the DOH *Water System Design Manual.*

Storage Capital Improvement Recommendations

As presently operated, Foy Standpipe and Richmond Highlands Tank 1 are in service, with Richmond Highlands Tank 2 out of service for recoating and repainting. Upon completion of the Tank 2 work in May 2012, SPU's intent is to take Tank 1 out of service and only perform minimum aesthetic maintenance on Tank 1 as required. Tank 1 would need recoating and repainting prior to being returned to normal service.

It is recommended that Foy Standpipe not be acquired as part of the Shoreline water system. SPU will still need to use either Foy Standpipe or a replacement as storage for the SPU 590 zone. SPU has proposed that this expense be part of Shoreline's system separation cost. This expense is included in the separation costs listed in Table 7.

The Richmond Highlands Tanks are presently operated with a 10 foot operating range. A 10 foot range is larger than would typically be used for pumped storage, but in this case the large range is necessary in order to avoid excessively cycling the North City and Foy Pump Station pumps off and on. If at least some of the pumps supplying the zone were equipped with variable speed drives, a much narrower range, such as 3 feet, could be used for operational storage.

For a utility the size of the proposed Shoreline system, DOH recommends a minimum amount of standby storage equal to 200 gallons per Equivalent Residential Unit (ERU), or approximately 3,240,000 gallons. If both Tank 1 and Tank 2 were in service and if the operating range were reduced from 10 feet to 3 feet, the tanks would provide approximately 2,874,000 gallons of standby and fire suppression storage. If only Tank 2 were in use, and assuming a 3 foot operating range, only 1,918,000 gallons would be available for standby and fire suppression storage.

To meet the minimum recommended amount of storage per the DOH system reliability standards, additional storage is needed beyond what is available in the existing tanks. In order to provide for future growth while meeting the DOH standards of reliability for standby storage, it is recommended that Tank 1 be decommissioned and a new 2.0 million gallon tank be constructed in its place at the Richmond Highlands location. An alternate approach would be to renovate Tank 1 and return it to service as an interim measure until additional storage could be built at a future date. While this approach falls short of providing the DOH minimum storage recommendation, it provides 89% of the recommended minimum, and with Shoreline's strong

interconnections with the SPU system and the proposed addition of standby power at North City Pump Station, it may be an appropriate solution.

In addition to providing sufficient standby storage, having a second tank in service in the 590 zone improves the utility's ability to carry out planned or emergency maintenance of its storage facilities. With two tanks online, one tank can be quickly taken offline if needed in response to potential contamination or vandalism which potentially endangers water quality.

Estimated cost for the 2.0 million gallon 590 zone tank is $4,072,000, including 25% contingency, 5% surveying & permitting, 12% engineering, 8% construction inspection, and 10% sales tax.

Recoating Tank 1 was estimated to cost $1,075,000 in SPU's 2009 evaluation of storage facilities in the Richmond Highlands 590 zone.

Pump Station & Control System Capital Improvement Recommendations

North City Pump Station

It is recommended that both pumps at this station be equipped with variable frequency drives to allow use of a smaller operating range at the Richmond Highlands tanks. It is also recommended that by the time of system acquisition that this station be equipped with a standby generator sized to operate one pump. The generator installation should include an automatic transfer switch to automatically start the generator and transfer the station to backup power should line power fail. Provision of standby power would reduce reliance on local storage and would allow the Shoreline system to remain at normal operating pressure in the case of extended power outages.

Foy Pump Station

The recommended separation alternative leaves Foy Pump Station with SPU. No capital improvements are recommended at this station.

Dayton Pump Station

It is recommended that the hydropneumatic system used at this station be replaced with a variable frequency drive closed loop pumping system. Such a system allows pumps to run more efficiently and to avoid cycling off and on. The station should also be equipped with a standby generator sufficient to operate the largest pump in the station. This installation should also include an automatic transfer switch for the generator.

Hydraulic modeling of the distribution system may indicate that the Dayton 660 zone could be enlarged to include adjacent areas that have marginal pressure. If so, the existing 50 hp pump at this station may require upsizing, however this cannot be determined until hydraulic modeling is carried out to define the expanded pressure zone boundaries. Costs associated with upsizing the 50hp pump are not included in this report.

Supervisory Control and Data Acquisition (SCADA) System Upgrades

Shoreline will need to establish its own scada system in order to operate the water utility independently of SPU. To do so, Shoreline will need to have its own control center, which would consist of a central PLC, data logger, modems and other equipment including a desktop terminal which would be located in the Water Operations manager's office. The new system would be designed to be much more automated than the existing SPU system, such that the primary operational requirement of staff will be to respond to alarms as needed. The new system should be designed to include an autodialer to direct alarms to an assigned duty person. The pump stations should be equipped with distributed control systems so they can function automatically at times the control center is offline or otherwise unavailable. The pump station systems will require station PLCs that are programmed to respond to reservoir levels and alarm conditions without direction from the control center.

Shoreline's Scada system will connect its central control station to North City Pump Station and Dayton Pump Station, to wholesale meter connections from the SPU system, and to the Richmond Highlands tanks. The system will also need to be connected to SPU's Scada system to obtain status information on Foy Pump Station and SPU's wholesale services to the City of Edmonds and Olympic View Water & Sewer District. If water is supplied to Shoreline Water District through connections fed by North City Pump Station, the new Scada system will also need to be tied to those services.

Cost of the upgraded scada system is dependent on the required complexity of design, software licensing costs, features desired by Shoreline and by the state of the art at the time the system is designed and constructed. For preliminary estimating purposes, cost of the scada system is estimated at $400,000.

Table 8 includes costs for pump station and control system upgrades. Pump station costs include 25% contingency, 5% surveying & permitting, 12% engineering, 8% construction inspection, and 10% sales tax.

Table 8
Pump Station & Control System Capital Improvements

Project	Estimated Cost
North City PS standby power	$339,200
North City PS variable frequency drives	$192,000
Dayton PS variable frequency drive	$14,400
Dayton PS standby power	$188,800
Scada system	$400,000
Total	$1,134,400

Distribution System Capital Improvement Recommendations

Two reports have been written describing improvements needed to provide adequate fire flows and to meet service standards in the SPU service area in Shoreline. The June 2000 SPU report, *590 Richmond Highlands Pressure Zone Hydraulic Analysis Report,* evaluated upgrades for fire flow deficiencies. This report identified the need for 1,263 feet of 6" main and 28, 824 feet of 8" main, including hydrants.

A review of the existing SPU mains in Shoreline was conducted by RH2 Engineers in the November 2004 report, *Seattle Public Utilities within the Cities of Shoreline and Lake Forest Park, Water System Valuation Report,* prepared for the Shoreline Water District (SWD). This report evaluated the distribution mains against SWD's standards, which are substantially equivalent to the DOH system reliability standards. The review identified mains, in addition to those identified in the June 2000 SPU report, in need of upgrade to bring the system into compliance with the SWD standards. The proposed mains within the City of Shoreline consisted of 15,435 feet of 4", 4,990 feet of 6", 71800 feet of 8", 12,260 feet of 12" and 4,345 feet of 16" main.

It is recommended that the lists of deficient mains in the 2000 and 2004 reports be reviewed by the Shoreline Fire Department to ensure that all known areas of deficiency are addressed. Additional areas of deficiency should be further evaluated by hydraulic modeling and flow tests.

Total length of the mains identified in these two reports equals approximately 139,000 feet, which constitutes 23% of the system's 615,000 feet. Replacement of these mains would bring the water system into compliance with the DOH reliability standards and would provide distribution system capacity and hydrants to provide sufficient fire flows.

SPU was not able to provide unit costs for recent distribution main construction. Unit costs in Table 9 are based on 2011 unit construction costs from Tacoma Water, which has an active main replacement program in place, using ductile iron pipe. Unit costs shown in Table 9 include construction cost plus 5% survey & permitting, 12% engineering design, 8% inspection, 10% sales tax and 10% contingency. Contingency cost for distribution main construction is less than the contingency used in this report for other construction types due to the lower level of complexity in main construction. Note that Table 9 does not include any additional deficiencies which the Shoreline Fire Department and additional engineering review may identify.

Table 9
Distribution Main Replacements

Diameter	4	6	8	12	16	Total
Length, ft	15435	6250	100622	12261	4345	138913
Unit cost	187	218	234	298	426	
Total Cost	$2,889,563	$1,361,438	$23,529,298	$3,657,751	$1,850,646	$33,288,695

As with any utility with aging infrastructure, Shoreline can expect to eventually need to replace its entire distribution system as it reaches the end of its service life. Shoreline has an advantage over older utilities in that only 5% of the Shoreline system is currently more than 70 years old. A system that is constructed of good materials and that is well maintained can expect service life of 100 years from its distribution mains. Viewed purely from the perspective of infrastructure age, Shoreline would not need to begin replacing most of its mains until about 25 to 30 years from now. This gives Shoreline a window of opportunity to establish a main replacement program to address the deficiencies in Table 9 during the next 25 to 30 years and then to shift the main replacement program's focus to ongoing replacement of infrastructure due to age. Replacing the mains in Table 9 over a 23 year period would equate to replacing an average of 1% of the system annually, ultimately resulting in replacing the entire system on a 100 year cycle.

Water Utility Buildings, Tools & Equipment Capital Improvement Recommendations

A new water utility will require shops, office space and yard space to store materials. It will also require heavy equipment, service vehicles and tools for the field crews. Some functions, such as office space and a customer service counter, may be incorporated into existing space at City Hall or combined with similar functions at the wastewater utility which is anticipated to be established prior to establishment of the water utility. Similarly, the water utility's office, shop and yard space may be combined with the wastewater utility or with other City field operations facilities.

For estimating purposes, the water utility is assumed to be an independent utility with no shared shops or equipment. Office space is assumed to be available in City Hall, and is estimated at 50% of the cost of new construction. Table 10 shows the estimated required square footage and cost for office and shop space sufficient to support the level of staffing discussed earlier in this report. Estimated costs include construction, outfitting and furnishing the buildings but do not include land or site development cost. The City is presently pursuing options to obtain a suitable site for utility shops through an intergovernmental land trade.

Table 10
Water Utility Buildings

Building	Area, sq ft	Cost
Office	2625	$329,440
Shops	2990	$403,650
Total	5615	$733,090

Crews will require heavy equipment, service vehicles and tools. Table 11 lists estimated quantities and costs of heavy equipment and vehicles. Service van costs include outfitting with work benches, cabinets, generator sets and work lighting. Costs reflect retail internet pricing plus 10% tax. The equipment in Table 11 is intended to meet the routine needs of the utility. Large equipment such as track hoes or mobile cranes are not included and would typically be

rented for jobs where such equipment is needed. In case of emergencies requiring large equipment, mutual aid agreements with other utilities may also provide access to larger or specialized equipment.

Table 11
Heavy Equipment & Vehicle Cost

Equipment	Quantity	Unit Cost	Total
Backhoe	2	$96,800	$193,600
Backhoe trailer	2	$5,500	$11,000
Shoring Box	2	$11,000	$22,000
Shoring box trailer	2	$4,400	$8,800
Dump truck	2	$77,000	$154,000
Boom truck	1	$154,000	$154,000
Service van	3	$66,000	$198,000
Pickup	5	$38,500	$192,500
Total			$933,900

Table 12 lists the initial cost of tools and materials to outfit the utility shops and the field crews. Inventory cost represents a minimum needed to deal with day to day operations and assumes that supplies can be readily replenished by local suppliers. Costs in this table were developed by itemizing typical tools and materials and their estimated costs, plus 10% tax.

Table 12
Initial Tools & Inventory Cost

Category	Estimated Cost
Shop Tools	$46,970
Field Tools	$127,160
Inventory	$101,750
Total	$275,880

Summary, Post-Acquisition Capital Improvements

Table 13 summarizes the capital improvements discussed above but does not include the separation costs shown in Table 7. Separation costs are additive to those in Table 13.

Some capital improvements are recommended to be in place at the time of system acquisition, including all pump station & controls improvements in Table 8. Shoreline will also need access to sufficient storage to meet system reliability standards, which either requires construction of an additional storage tank as listed in Table 13, or a storage access agreement with SPU for use of a portion of capacity at Maple Leaf, Bitter Lake, or Lake Forest Park reservoirs. As discussed earlier, an alternate approach to construction of the 2 million gallon storage tank may be to

renovate the existing Richmond Highlands Tank 1 as an interim measure until the new 2 million gallon tank is constructed at a future date. If this option were found to be feasible, Tank 1's renovation cost of $1,075,000 could be substituted for the construction cost of the 2 million gallon reservoir.

Costs related to starting up the new water utility's operations (Tables 10, 11 & 12) may be incurred at the time of acquisition or may be phased, depending on operating arrangements Shoreline may make with SPU or other utilities.

The largest capital improvement expense facing Shoreline is the cost of bringing the distribution system up to standards. Depending on available funding, this cost could be addressed as soon as economically possible, or could be spread over as much as 30 years if it were approached as an ongoing main replacement program. Assuming the cost was spread over 20 years (starting upon system acquisition in 10 years, and ending 30 years from now when other mains will begin to need replacing due to age), the annual cost of distribution main replacements would be approximately $1.7 million/year.

Table 13
Post Acquisition Capital Improvements

Category	Estimated Cost
2 MG Storage Tank	$4,072,000
Pump Stations & Controls	$1,134,400
Distribution Mains	$33,288,695
Utility Buildings	$733,090
Heavy Equipment & Vehicles	$933,900
Tools & Inventory	$275,880
Total	$40,437,965

Ongoing Capital Improvement Costs

In addition to the capital improvements in Table 13, Shoreline's water utility will also have ongoing capital expenses. Table 14 summarizes estimated annual capital costs, with vehicle replacement and tool replacement costs estimated at 10% of the initial costs from Tables 11 and 12. Costs for distribution main extensions and relocations, and service and meter replacements are as shown in Table 3, based on SPU's capital costs. The main replacement cost shown in Table 3 is not included here since that cost category is represented as a lump sum in Table 13. If the recommended distribution main improvements discussed above are addressed on an ongoing basis, their annual cost would be an additional line item in Table 14. The remaining costs in Table 14 are approximations based on system size.

Table 14 Ongoing Capital Improvements	
Category	**Estimated Cost**
Vehicle Replacements	$93,390
Tool Replacements	$17,413
Distribution main extensions	$71,000
Distribution main relocations	$213,000
Service replacements	$710,000
Meter replacements	$42,600
Hydrant Replacements	$50,000
Valve Replacements	$50,000
Water Quality Improvements	$10,000
Cathodic Protection Improvements	$10,000
Pump & Storage Improvements	$50,000
Scada & communications Improvements	$20,000
Total	$1,337,403

Additional Water Utility Functions

In addition to the core functions supported by a water utility's field operation and maintenance staff, customer service support, and by billing and administrative staff, certain other functions must be addressed. Some may be covered by existing City staff, by contracting, or possibly by addition of utility staff.

Grounds Maintenance

Reservoir and pump station sites, shops and offices grounds, and non-street right-of-way areas will need to be maintained to a level comparable to neighborhood standards. This typically includes mowing, landscaping maintenance, and removal of litter and illegal dumping.

Property Management

Adjacent property owners may have complaints about the utility's property, or may wish to obtain easements, permits, or other property rights on utility property, in particular any undeveloped or right-of-way properties outside of City streets. Cellular phone providers may inquire about installation of antennas on the utility's storage tanks, and any resulting contracts will need to be administered.

Water Quality Testing

Routine bacteriological and chlorine residual sampling is required, as are a number of organic and inorganic samples as required by the EPA. In addition, sampling will be required in order to put newly constructed projects in service or in cases where the system has been subject to contamination. While the utility's water operations manager and water quality technician can track required samples and field staff can take samples under the technician's guidance, the samples will need to be processed by a certified laboratory. SPU has a water quality laboratory that is used by other utilities in the region, and other private laboratories are also available.

Scada Maintenance and Modifications

Expert support is needed when scada components fail or when system changes require programming changes and revision of scada screens. This level of expertise is often provided through contract support from the vendor that originally designed and started up the system.

Electrical Maintenance and Modifications

Some basic electrical work can be performed by the utility's trained field operations and maintenance staff, but more involved work requires a licensed electrician, typically on an as-needed contract.

Cathodic Protection Systems Maintenance and Modifications

Cathodic protection systems are in place on the large diameter steel mains in Shoreline, and are recommended in existing and proposed steel storage tanks. A cathodic protection engineer should verify that all large diameter steel mains in Shoreline are bonded and under adequate levels of protection against external corrosion. After the cathodic protection systems are known to be operating as needed, periodic inspection of the systems is required to ensure continued satisfactory operation. This function is typically contracted out to a cathodic protection engineer.

Meter Reading

The proposed level of staffing provides for meter reading by field operations and maintenance staff. Shoreline may consider contracting this function out to an adjacent utility that has an established meter reading function.

Permits and Inspections

New services will require permits and inspections, which may be a function to be addressed by the City's existing building inspection staff. Other permits will be required such as for the use of hydrants by contractors or other special purposes. Construction inspection of new mains and other capital projects can be provided by existing City inspection staff if available, or can be contracted out to inspection and testing services providers.

Extraordinary Maintenance

Some maintenance functions occur infrequently or are highly specialized, and are typically contracted out, such as cleaning or painting large structures such as storage tanks.

Locating

One-call locating service is often contracted out.

Main Tapping

While smaller service taps such as routine residential connections may be installed by utility staff, larger connections are often made by specialty tapping services.

Large Meter Maintenance

Small residential meters are more economical to replace rather than repair, but larger sized meters are typically tested, repaired and returned to service. This function is commonly carried out by larger water utilities, but Shoreline may find it more cost effective to contract this function out to a utility that has an existing meter testing and repair facility.

Professional Services

Engineering and financial services are typically contracted for tasks such as preparation of comprehensive water system plans, rate setting, long range planning, or for evaluation of complex operational changes.

Further Engineering Review & Evaluation

Shoreline may need additional engineering expertise to provide assistance in negotiations with SPU regarding separation issues, and to provide hydraulic modeling expertise independent of SPU. Engineering support will also be required for evaluating and modeling the operation of the system as outlined below.

Separation Issues

The separation alternatives as presented by SPU are not yet at a detailed level, and the alternatives developed in this report have not yet been hydraulically modeled to verify optimal pipe sizes. As discussions continue with SPU, specific components of the separation plans will need to be reviewed and modeled.

Hydraulic modeling of the overall operation of the proposed Shoreline system will be an important aspect as the separation process develops. A key consideration will be to evaluate how the North City and Foy Pump Stations will be used, in particular if Shoreline's North City Pump Station is updated to allow for a smaller operating range at Richmond Highlands Tanks and SPU's Foy Pump Station is not. SPU's Alternate B calls for modifications at Foy Pump Station if needed due to the reduced size of SPU's 590 zone. However, the recommended Alternate B3 relies on existing capacity at Foy Pump Station to continue to supply Shoreline, in which case modifications as proposed by SPU at Foy Pump Station should not be needed. This needs to be verified by hydraulic modeling. Another issue that will require system modeling is to evaluate how SPU will supply its existing wholesale customers using Shoreline mains and Shoreline's North City Pump Station.

SPU's proposed separation alternatives include new or renovated storage facilities for SPU as a Shoreline expense. While Shoreline's obligation to fully fund renovation or replacement of the depreciated Foy Standpipe remains to be negotiated, engineering assistance will be needed as replacement or renovation proposals are considered.

Additional Review of Distribution Grid Deficiencies

The Shoreline Fire Department has extensive experience in working with the distribution system in Shoreline. As the Department reviews the deficient areas noted in this report, additional areas with insufficient fire flow capacity may be identified. These areas should be hydraulically modeled and reviewed to verify that low flows are a result of undersized mains rather than closed line valves, improperly set pressure regulating valves, or other operational problems. Those areas identified as having undersized mains should be added to the list of known distribution main deficiencies.

The pumped Dayton 660 zone is adjacent to some points in the 590 zone that may have low pressure. Hydraulic modeling of expansion of the 660 zone is required to determine the extent and feasibility of expanding the zone to encompass potential low pressure areas. If the zone

expansion exceeds the capacity of the existing Dayton Pump Station, replacement of an existing pump with a larger size pump, or addition of another pump may be required.

Storage Issues

With only Richmond Highlands Tank 2 in service, Shoreline would have insufficient storage capacity to meet the Department of Health minimum storage recommendations. This engineering review provides an estimate of the additional storage Shoreline would need to construct to meet the recommended minimum reliability standards, but further engineering review would be appropriate to consider the alternate approach of renovating Richmond Highlands Tank 1 as an interim measure. Additional engineering review should also be conducted to optimize the capacity of a new storage facility with regard to payment of wholesale rate storage demand charges to SPU. Shoreline may also have the option of purchasing use of existing storage capacity at SPU's Lake Forest Park Reservoir. If so, this option may warrant consideration in determining an overall plan for meeting Shoreline's storage needs.

Attachment E

EES Consulting

February 7, 2012

TO: Mark Relph

FROM: Anne Falcon
Gail Tabone

SUBJECT Backup Material for February 8 Presentation on Financial Assumptions

The following are some of the details of the current financial projections to be presented on February 8th. These details relate primarily to the revenue projections, basic financial assumptions and comparison to the financial analysis contained in the 2004 Shoreline Water District Report on a Potential Acquisition of the SPU system in Shoreline.

Revenue Projections

- Revenue Components
  - Number of Customers
  - Average Use per Customer
  - SPU Rate Projections – Basic Charge and per CCF

- Resulting Water Revenues
  - Total Water Sales
  - Basic Service Charge Revenues
  - Consumption Revenues
  - By Customer Class
  - 2012-2030

- Development of Customer Forecast
  - Customers by Class for 2006-2011
  - 2006 SPU Load Forecast has average annual growth rate of 0.1% single-family (SF), 1.8% multi-family (MF) and -1% commercial
  - 2006 PSRC (Puget Sound Regional Council) has forecast specific to Shoreline of 0.2% for SF, 1.2% for MF and 0.5% combined

- Propose using PSRC numbers for SF and MF and the combined rate for commercial growth
- No change in number of customers for master meter residential development (MMRD) or fire service

- Development of Sales Forecast
  - CCF by Class for 2006-2011
  - Number of Customers times CCF per Customer
  - Average CCF per Customer Varies by Year due to Weather and Economy – 2011 was particularly low so adjusted to 3-year average
  - 2012-2014 Water Rate Study has sales projected at -1.5% per year for residential and about -1% for commercial
  - 2006 SPU Load Forecast has long term growth rate of -0.5% SF, +1.4% MF and flat for commercial
  - Propose using SPU rates through 2014 and then long-term growth rates in CCF per customer of -0.5% SF, -0.5% for MF and -0.4% for commercial and MMRD
  - Results in long-term growth rates in total CCF of -0.3% SF, +-0.7% for MF, flat for commercial, MMRD and total system

- 2012-2014 Period
  - 2012-2014 Water Rate Study has proposed rates by component
  - Calculated revenues for customers and sales specific to Shoreline
  - Had seasonal consumption from SPU, made assumptions about usage by block to match to 2011 actual revenues
  - Rate increase for Shoreline customers from 2011 to 2014 is 30% SF, 39% MF and 38% commercial

- Long-Term Forecast (2015-2030)
  - 2006 SPU Load Forecast assumed 1% real increase in rates
  - Placeholder of 5% nominal increase

- Short-Term Revenue Projections
  - $8.8 million 2011 Adjusted
  - $11.1 million 2014 Forecast
  - About $2 million (20%) higher than original projections
  - Due to both higher than expected rate increases and higher usage in Shoreline relative to SPU average

- Long-Term Revenue Projections
    - $15 million 2020 Forecast
    - $24 million 2030 Forecast
    - Sensitive to long-term SPU rate increases

General Financial Assumptions

- Inflation 2% per year
- Borrowing cost 5%
- Borrowing 30 years
- 100% Debt Financed
- Financial Policy
    - Same as SPU?
        - Capital financing 30% cash/70% debt
        - Debt service coverage of 1.7x
    - Shoreline general targets?
    - Also depends on the results and what is feasible

Comparison to 2004 Shoreline Water District Report

- Purchase Price
    - 2004 Report had range of $3 to $10 million
    - SPU was asking for $55 million in 2004
    - Agreement for $25 million in 2020
- Book Value x Premium
    - 2004 Report calculated $5 million book value, $3 million after contributions in aid of construction (CIAC)
    - SPU stated book value of $18 million at the time, which hasn't change much since 2004
    - Premium of 1.33 times book after CIAC
    - 2004 Report yielded $5 million value
    - Actual Book value of $18 million, less CIAC, yields $24 to $26 million

- Comparison to Actual Sales in Washington
    - Inflation adjusted price of $19.7 million
    - Equivalent to $1232 per ERU
    - Compares to reported sales in the range of $0 to $3315 per ERU, with average of $1563 per ERU
    - 2004 Report used $821 per ERU – old number and used for negotiating purposes
- Revenue was $7 million in 2004 – not much different from 2010 levels, but large increase through 2012 due to SPU rate increases that was not forecast in the 2004 Report
- Wholesale water costs of about $2 million per year in 2004 Study if adjusted to Water District rates, comparable to our early estimates
- They set Water District rates as the benchmark – would be rolled in with their customers, we will be using SPU rates as the benchmark
- Engineering/separation and operating differences will be discussed at the next meeting

Attachment F

EES Consulting

February 17, 2012

TO: Mark Relph

FROM: Anne Falcon
Gail Tabone

SUBJECT: Backup Material for Water Forecast

The following is a detailed write-up on how the water forecast was developed for Shoreline. Because we are asking for feedback for the Steering Committee on the assumptions that go into this forecast, we thought it was appropriate to distribute this to the group in draft form. This write-up will be edited as needed to reflect any input from the group and will be the basis for the forecast section in the financial analysis report.

The forecast reflects what was discussed at the February 8th meeting, with some adjustments due to a new water forecast that was supplied by SPU this week.

We will be asking for any feedback the committee may have at the meeting on March 14th so that we can finalize the water use forecast.

Development of Post-Acquisition Water Use and Revenues

Overview

Revenues for the new Shoreline water utility are calculated on the basis of many different inputs to best reflect the complexity of the rates. Revenues for Shoreline customers were projected starting with 2011 actual billings, and are forecast through the year 2040. Forecasts were completed for each rate class based on the number of customers times the basic charge plus the projected use per class times the usage charge. This approach takes into account different growth rates for each customer class.

Rates projected for SPU are the baseline for revenues for all years. During the 2011-2019 period Shoreline residents will remain on SPU rates. While we did not complete a full financial evaluation for those years, we did calculate the revenues at SPU rates so that we would have a good basis for the starting revenues in the year 2020 when the acquisition takes place.

SPU rates are established as the baseline with the goal of having rates for the new Shoreline water utility that are no higher than SPU rates. To the extent that there are surplus revenues after

the acquisition, the Shoreline water utility would have the option of reducing rates or improving capital facilities, or some combination of the two.

Components of the Revenues Projections

In order to provide the detailed revenue forecast a series of separate components were forecast individually and then appropriately combined to determine the results. The specific components are as follow:

- Number of customer by class
- Average use per customer by class
- Total water sales by class (Number of customers times average use per customer)
- Basis service charge by class and by meter size
- Consumption charges per CCF by class, including seasonal and block rates

The results provide revenues for 2011 through 2040 for each of the following customer classes:

- Residential Single-family
- Multi-family
- Commercial
- Master Meter Residential Developments (RRMD)
- Fire Service
- Other Revenue

The following sections discuss o of the components of the revenue forecast followed by a summary of the results.

Development of the Customer Forecast

SPU provided Shoreline with the actual number of customers served by SPU within the City of Shoreline for the years 2006-2011. The forecast was developed using the 2011 actual customers and allowing for growth over the 30-year period.

Several different sources were looked at to determine the appropriate customer growth rates for Shoreline. In terms of growth between 2006 and 2011 actual data, the number of customers was relatively flat for the residential (single-family and multi-family) and commercial classes. Because this was a period with a strong recession, these results are not surprising. However, we would not expect customer growth to continue to be flat as we enter into the recovery period. In fact, customers for 2011 are higher than in 2010 for both the multi-family and commercial classes.

SPU provided its own load forecast completed in the *2013 Water System Plan Official Yield Estimate and Long-Range Water Demand Forecast.* Within this forecast SPU has projected average annual population growth of 0.20% per year for single-family households and 1.7% for multi-family households. Employment is projected to grow at an average annual rate of 1.5%. These projections apply to the entire SPU retail area and specific growth rates or forecast numbers are not provided for Shoreline. We do not expect Shoreline to grow in exactly the same manner as the City of Seattle.

To determine projections specific to Shoreline, we looked at projections from the Puget Sound Regional Council (PSRC) 2006 Forecast. Because the PSRC forecast is a few years old, we used the growth rates rather than the actual numbers to provide the forecast of customers. This allows for the correct starting point for 2011 based on the actual results for the year. The PSRC projects single-family growth of 0.21% from 2010 to 2020, 0.18% from 2020 to 2030 and -0.11% from 2030 to 2040. For multi-family households the projected growth rates were 1.21% for 2010 to 2020, 1.22% for 2020 to 2030, and 1.42% for 2030 to 2040.

Although the SPU forecast is more current, it is more specific to the City of Seattle. Therefore, we used the PSRC forecast growth rates to reflect the growth in water customers for single-family and multi-family customers. The growth rate is comparable to SPU's for single-family but has lower growth for multi-family customers than expected by SPU. This is consistent with expectations as Shoreline is not as urban as Seattle and will likely have less multi-family housing. One exception is that while the PSRC forecast has an annual decline in single-family customers from 2030-2040, we have changed this to reflect zero growth in customers.

For commercial customers, SPU does not list a specific growth rate for commercial customers. However, it is forecasting a growth rate of 1.5% for employment and overall commercial usage of around 1% per year on average. The PSRC has an employment projection specific to Shoreline with average annual growth rates of 0.59% for 2010 to 2020, 0.49% for 2020 to 2030 and 0.62% for 2030 to 2040. Another source of data is from the King County Countywide Growth Planning Polices (12/2010) which shows a growth projection of 5,000 new jobs in Shoreline for the period 2006 – 2031. When compared to current employment levels of roughly 28,000 this represents growth of 0.7% per year.

While commercial customers may not grow at exactly the same rate are employment levels, they will be highly correlated. Given the various sources of data, an average growth rate of 0.7% based on the King County forecast is applied to commercial customers for the entire period. This is newer and just above the level of the PSRC forecast growth rate, but lower than the SPU forecast growth rate.

For the MMRD and Fire Service Classes, the number of customers are expected to remain constant.

Table 1 Forecast of Customer Growth Rate by Class						
	2015	2020	2025	2030	2035	2040
Residential	0.21%	0.21%	0.18%	0.18%	0.00%	0.00%
Multi-Family	1.21%	1.21%	1.22%	1.00%	1.42%	1.42%
Commercial	0.66%	0.66%	0.66%	0.66%	0.66%	0.66%
MMRD	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Fire	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Other	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Total	0.24%	0.24%	0.21%	0.21%	0.07%	0.07%

Table 2 Forecast of Customers by Class							
	2011 Actual	2015	2020	2025	2030	2035	2040
Residential	9,671	9,753	9,858	9,946	10,035	10,035	10,035
Multi-Family	236	248	263	279	296	318	341
Commercial	399	410	423	437	452	467	483
MMRD	4	4	4	4	4	4	4
Fire	136	136	136	136	136	136	136
Other	465	465	465	465	465	465	465
Total	10,911	11,016	11,149	11,268	11,389	11,425	11,464

Development of the Water Use Forecast

SPU provided Shoreline with the consumption by month for each class for the years 2006-2011. Water sales are reported in hundred cubic feet (CCF), which is the same unit of measure used for billing purposes. One CCF is equal to 748 gallons of water. The CCF sales figures were divided by the number of customers in each class to develop the average CCF use per customer.

Generally, average use is forecast independently to see the trends in usage separate from the growth in the number of customers. The average use per customer was then multiplied by the number of customers for each year to develop the total sales by class forecast.

Actual average use per customer fluctuated from year to year based on weather conditions. For that reason it is difficult to measure the actual growth rate for the 2006-2011 period. The years 2006 and 2009 appear to have particularly high use while 2008 and 2011 have particularly low use. In looking at the 3-year average for 2006-2008 as compared to 2009-2011, we see that average annual usage per customer decreased by -1.2% for single-family, stayed flat for multi-family, and increased by 0.4% for commercial. As this was during a recessionary period, we would not necessarily expect these trends to continue indefinitely.

Because of weather variations, we used the 3-year average use per customer for 2009-2011 as a smoothed out usage level to better reflect average conditions. This adjusted amount was used as the starting point for 2011 for developing the load forecast.

The SPU forecast did not provide growth rates for usage per customer but did provide growth rates for total use by class. For single-family the total usage is forecast to decrease by about 1% per year. Average use would decline by roughly 1.2% as they are forecasting customers to grow by 0.2%. Multi-family total use is projected to increase by 1% per year. Given the customer growth rate of 1.7%, this means average usage per customer would decline by about 0.7% per year. For commercial, total sales are also forecast to increase by about 1% per year. In all three classes, use per customer is slower through 2020 and then picks up (or levels off in the case of declining use) starting in 2030.

The SPU forecast was used as a guide is setting the growth rates for Shoreline. Single-family usage per customer was projected to decline by 1% per year from 2012 to 2020 and by 0.5% from 2020 to 2030. It was assumed that consumption would be flat after 2030. These annual reductions in average use result in CCF per customer that is over 20% lower than the usage in 2006. Multi-family and MMRD growth rates were forecast to be half of those for multi-family. Commercial use per customer was forecast to increase by 0.5% per year for 2012 to 2020, 0.25% for 2020 to 2030 and remain flat after 2030. This would reflect a shift from smaller to bigger commercial customers. Usage for the MMRD class was projected to decline by half the rate as the single-family and multi-family customers. In all cases it was assumed that a continued percentage increase or decrease in usage was not sustainable due to the exponential nature of percent changes as well as the fact that there is some natural minimum level of consumption expected.

The results of the number of customers times the average use per customer yield resulting sales by customer class that decline by about 0.3% for single-family, increase by 1% for multi-family and increase by 0.8% for commercial. The total system water sales forecast is relatively flat with a small average annual growth rate of 0.2% through 2040.

Table 3
Forecast of Use per Customer Growth Rate by Class

	2015	2020	2025	2030	2035	2040
Residential	-1.00%	-1.00%	-0.50%	-0.50%	0.00%	0.00%
Multi-Family	-0.50%	-0.50%	-0.25%	-0.25%	0.00%	0.00%
Commercial	0.50%	0.50%	0.25%	0.25%	0.00%	0.00%
MMRD	-0.50%	-0.50%	-0.25%	-0.25%	0.00%	0.00%
Fire	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Other	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Table 4
Forecast of Total Annual CCF by Class

	2011 Actual	2015	2020	2025	2030	2035	2040
Residential	732,074	744,585	715,651	704,201	692,934	692,934	692,934
Multi-Family	180,889	196,654	203,655	213,702	223,756	240,106	257,651
Commercial	256,160	295,905	313,512	328,055	343,274	354,741	366,592
MMRD	38,208	43,792	42,708	42,177	41,652	41,652	41,652
Fire	199	798	798	798	798	798	798
Other	34,735	38,366	38,366	38,366	38,366	38,366	38,366
Total	1,242,265	1,320,100	1,314,689	1,327,298	1,340,779	1,368,597	1,397,992

Development of the Revenue Forecast by Class

SPU recently completed a cost of service study and established rates for the 2012 to 2014 period. The new rates represent significant rate increases. Because the rate increases differ by component and rate class, we calculated the revenues for Shoreline customers using the new rates for each year. Revenues consist of both base service charges and commodity charges.

While we were provided with monthly usage by class for Shoreline residents, we did not have a breakdown of usage in the different summer season blocks. In developing revenues for 2012-2014, we first multiplied actual 2011 usage by the 2011 rates to true-up to the reported 2011 actual revenues. Based on actual single-family usage, 57% of consumption fell into the 8-month off-peak season of September 16-May 15. The summer period has a three-tier structure with block 1 up to 5 CCF per month, block 2 for the next 13 CCF, and block 3 for over 18 CCF per month. This results in 13% of usage falling into block 1. We then determined that 26.5% would occur in block 2 based on 5 CCF times the number of customers, another 14% would be within block 2 and the remaining 2.5% would be in block 3. For the multi-family class, the loads were split between 61% off-peak, 3% in block 1, 35% in block 2 and 1% in block 3. For the commercial class there are no block rates and usage was split 53% off-peak and 47% on-peak.

After developing the breakdown of consumption by rate period/block, we could then split the 2012 annual forecast of consumption into the appropriate seasons and blocks. Usage was then multiplied by the SPU rates for 2012-2014 for each season and block. The resulting revenues are $9.4 million in 2012.

Based on average rates per CCF for Shoreline as a whole, the rate increases resulting from the new SPU rates are an average of 6% in 2012, 12% in 2013 and another 9% in 2014. In SPU's latest load forecast report, they are assuming that long-term rates will increase by 0.4% above the rate of inflation.

Table 5
Forecast of Total Annual Revenues by Class

	2011 Actual	2012	2013	2014
Residential	$5,489,547	$6,059,065	$6,549,043	$7,053,795
Multi-Family	$958,677	$1,128,424	$1,272,765	$1,426,212
Commercial	$1,452,391	$1,581,273	$1,976,882	$2,224,593
MMRD	$224,812	$292,744	$317,341	$342,797
Fire	$139,497	$163,411	$178,031	$193,279
Other	$193,997	$186,754	$203,463	$220,889
Total	$8,458,920	$9,411,672	$10,497,526	$11,461,564