SEATTLE PUBLIC UTILITIES
2007 WATER SYSTEM PLAN

III. TRANSMISSION

APPENDIX A
TRANSMISSION SYSTEM ASSETS INVENTORY

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Transmission Pipelines						
Pipeline Name	Upstream Endpoint	Downstream Endpoint	Type (>500 feet)	Dominant Size (inches)	Maximum Size (inches)	Length (feet)
Raw Water Pipelines						
Tolt Pipe Line #1 (TPL1)	Tolt Regulating Basin	Tolt Treatment Facility (TTF)	Concrete, Steel	42-66	66	8,331
Tolt Pipe Line #2 (TPL2)	Tolt Regulating Basin	TTF	Steel	66-87	87	8,565
Landsburg Tunnel & Aqueduct	Landsburg	Tunnel Valve House	Concrete	96	96	10,131
Lake Youngs Supply Line #4 (LYSL4)	Tunnel Valve House	Dog Legs	Steel	78,92	92	35,570
Lake Youngs Supply Line #5 (LYSL5)	Tunnel Valve House	Dog Legs	Steel	78	78	35,511
South Fork Tolt Supply Line	SF Tolt Reservoir	Tolt Regulating Basin	Steel, concrete	24	72	27,465
Tolt Penstock	SF Tolt Reservoir	Tolt Regulating Basin	Steel	54-68	68	26,600
				Approximate Total Length:		**152,173**
Treated Water Pipelines						
Finish Water Pipeline #5 (FWPL5)	Cedar Clearwells	Connection to LYT	Steel	78	78	2,516
Lake Youngs Tunnel (LYT)	Connection to FWPL5	Control Works	Concrete	96	96	15,703
Finish Water Pipeline #4 (FWPL4)	Cedar Clearwells	Control Works	Steel	78	78	15,775
Cedar River Pipeline #4 (CRPL4)	Control Works	WSPL	Concrete, Steel	60	72	57,195
West Seattle Pipe Line (WSPL)	Augusta Gatehouse	West Seattle Reservoir	Steel	48	54	26,284
Cedar River Pipeline #1 (CRPL1)	Control Works	Beacon	Steel	66	72	62,822
Cedar River Pipeline #2 (CRPL2)	Control Works	Beacon	Steel, Concrete, DI	51.5	60	62,765
Cedar River Pipeline #3 (CRPL3)	Control Works	Beacon	Steel	66	72	64,302
Cedar River Pipeline #1 (old CRPL2)	Beacon	18th & Prospect	Steel	54	54	23,338
Cedar River Pipeline #2 (old CRPL1)	Beacon	12th & Olive	Steel	42	42	19,355
Cedar River Pipeline #3 (CRPL3)	Beacon	18th & Prospect	Steel	66	66	22,336
Cedar River Pipeline #3 (CRPL3)	18th & Prospect	Volunteer Reservoir	Steel	66	66	1,755
Maple Leaf Pipeline (MLPL)	18th & Prospect	Maple Leaf Reservoir	Steel	54	54	26,109
550 Pipeline	Lake Forest Park Reservoir	Maple Leaf Reservoir	Steel	66	66	45,738
Tolt Pipe Line #1 (TPL1)	TTF	Harris Creek LV	Concrete, Steel	66	66	18,673
Tolt Pipe Line #1 (TPL1)	Harris Creek LV	Duvall LV	Steel	81	81	19,945
Tolt Pipe Line #1 (TPL1)	Duvall LV	Welcome Road LV	Concrete, DI, Steel	54	66	13,905
Tolt Pipe Line #1 (TPL1)	Welcome Road LV	TESS Junction	Steel, DI	54	66	35,497
Tolt Pipe Line #1 (TPL1)	TESS Junction	Lake Forest Park Reservoir	Concrete, Steel	54	60	32,012
Tolt Pipe Line #2 (TPL2)	Duvall LV	Trilogy LV	Steel	75	81	12,538
Tolt Pipe Line #2 (TPL2)	Trilogy LV	104th LV	Steel	60	81	29,922
Tolt Pipe Line #2 (TPL2)	104th LV	TESSL	Steel, Concrete	54	54	12,550
Tolt Pipe Line #2 (TPL2)	TESS Junction	Lake Forest Park Reservoir	Steel	54	60	34,353
Tolt Tieline	Welcome Road LV	Trilogy LV	Steel	43.5	43.5	7,865
Tolt East Side Supply Line (TESSL)	TESS Junction	TPL2	Concrete, Steel	48	54	24,267
Tolt East Side Supply Line (TESSL)	TPL2	SE 16th	Concrete	36	42	29,346
TESSL Extension	SE 16th	Eastside Reservoir	Concrete, Steel	48	48	12,602
Cedar East Side Supply Line (CESSL)	Cedar Wye	SE 16th	Concrete	36	72	54,613
Mercer Island Pipeline (MIPL original)	CESSL	Mercer Island	Concrete, Steel	30	30	16,628
MIPL (new, across slough)	Lake WA Blvd	Enatai	Steel	16	16	3,808
MIPL (new, E Channel Bridge)	E side of E channel	W side of E channel	DI	16	20	2,541
Bow Lake Pipeline	CRPL4	Des Moines Way Pipeline	Concrete, DI	36	36	5,857
Burien Feeder	CRPL4	Burien Pump Station	Concrete	30	30	5,241
8 Ave S Feeder	Burien PS	Bow Lake Ppeline	Concrete	24	24	4,721
Des Moines Way Pipeline	Bow Lake Pipeline	end	Concrete	24	24	21,305
				Approximate Total Length:		**844,182**

Source: GIS data (March 2006)

Notes:

LV = Line Valve

DI = Ductile Iron

Regional and Sub-Regional System Standpipes and Elevated Tanks

Facilities	Capacity (MG)	Year Const.	Base Elev.[1] (feet)	Overflow Elev. (feet)	Diameter (feet)	Tank Height on Riser (feet)	Tank Material	Date of Last Inspection	Interior Coating		Exterior Coating		Seismic Upgrade (or Date Scheduled)
									Type[a]	Date Applied	Type[b]	Date Applied	
Standpipe													
Foy	1.00	1933	495	590	46	-	Riveted Steel	Feb 98	Vinyl	1980	Lead base	1980	To be determined
Elevated Tanks													
Beverly Park	2.00	1959	460	585	105	35	Welded Steel	Oct 98	CTE/epoxy	1985	Zn/Alkyd	1985	To be determined
Myrtle #1	0.50	1919	506.5	584.5	46	NA	Riveted Steel	Feb 96	vinyl	1982	Lead base	1983	2003
Myrtle #2	1.00	1946	506.5	584.5	84.25	NA	Riveted Steel	Jan 99	CTE/epoxy	1982	Lead base[2]	1983	2003
Richmond Highlands #1	1.00	1954	492.5	590	86	25	Welded Steel	Nov 99[(2)]	CTE	1954	Lead base[2]	1981	1993
Richmond Highlands #2	2.00	1958	488.5	590	86	35	Welded Steel	Nov 98	CTE	1958	Lead base[2]	1981	1994
Others													
Control Works NE Tank	0.34	1925	437	512	NA	-	Riveted Steel	Oct 97	p-urethane	1994	epoxy/urethane[5]	1994	1994
Control Works SW Tank	0.34	1925	437	512	NA	-	Riveted Steel	Nov 97	p-urethane	1994	epoxy/urethane[5]	1994	1994

All elevations based on NAVD 88.

a CTE = Coal Tar Enamel; p-urethane = Monolithic polyurethane lining

b epoxy = NSF epoxy primer and intermediate co: Zn/Alkyd = Zinc yellow primer and silicone alkyd enamel top coat

1. Top of concrete base.
2. Richmond Highlands: 1993 seismic upgrade added all new steel to legs and riser, and coated legs and riser with a non-lead alkyd enamel paint system. The bowls still have the lead based primer as noted.
3. Myrtle #2 has an intermediate layer of aluminum or SS flake alkyd paint.
4. Float inspected in 1990.
5. Base of tank in building. Above the roof: epoxy prime coat and polyurethane top coat (in 1994); Inside the bldg: moisture cured polyurethane primer and top coats (in 1998).

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Regional and Sub-Regional System Reservoirs

Reservoir	Total Capacity (MG)	Year Constructed	Overflow Elev. (feet)[1]	Under-Drain	Construction Type
Covered Reservoirs					
Eastside	31.9	1989/90	560	Yes	Reinforced concrete tank. Below grade.
Lake Forest Park	59.9	1961/62	550	Yes	Hyplon-lined, reinforced concrete slab. Floating cover added in 2003.
Riverton Heights	20.5	1979/80	465	Yes	Reinforced concrete tank. Part below grade.
Soos North	6.5	1989/90	640	Yes	Reinforced concrete tank. Above grade.
Soos South	6.5	1989/90	640	Yes	Reinforced concrete tank. Above grade.
Open Reservoirs					
Maple Leaf	59.1	1910	430	Yes	Unreinforced concrete slab. Hypalon liner.
West Seattle	68.1	1932	440	No	Unreinforced concrete slab. Hypalon liner.

Source: Albarracin and Stumpf, July 1999 and Capron and Mantchev, April 2006.

1. All elevations based on North American Vertical Datum (NAVD).

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Regional and Sub-Regional System Pump Stations								
Pump Station	**Pump #**	**Manufacturer**	**Model**	**Design Flow (gpm)**	**Head (feet)**	**Speed (rpm)**	**Horse-Power**	**Comments**
Augusta	1	Aurora	411 BF	300	102	1,750	15	Pumps 1 and 2 are continuous
	2	Aurora	411 BF	300	102	1,750	15	duty; alternating daily
	3	Aurora	411 BF	1,200	102	1,750	40	
	4	Aurora	411 BF	2,400	113	1,750	100	Fire flow only
Bothell Way	1	De Laval	T36/30	38,200	80	450	900	
Burien	1	Allis Chalmers	209-648-501	2,000	180	1,760	125	Emergency pump connections
	2	Allis Chalmers	209-732-501	3,000	180	1,760	200	for diesel pump.
	3	Worthington	10-LNHS-18	6,000	180	1,775	350	
Control Works	1	De Laval		1,200		1,760	25	Standby use only
Eastgate	1	Byron Jackson	18-KXH-1-STG	4,250	145	1,770	200	
	2	Byron Jackson	18-KXH-1-STG	4,250	145	1,770	200	
	3	Byron Jackson	18-KXH-1-STG	4,250	145	1,770	200	
Fairwood	1	Aurora	411 BF	750	220	1,750	75	Emergency pump connections for
	2	De Laval	A0615L	2,000	215	1,750	150	diesel pump.
Foy	1	Ingersoll Rand	10 LR 18A	6,000	165	1,785	300	
	2	Ingersoll Rand	8 LR-18S	4,440	165/290	1,778	400	165 ft. head with 15.43";
	3	Ingersoll Rand	8 LR-18S	4,440	165/290	1,778	400	290 ft. head with 18" impeller
Highland Park	1	Worthington	10 LNH 18	5,500	175	1,775	300	Can be powered by diesel generator.
	2	Worthington	10 LNH 18	5,500	175	1,775	300	
	3	Ingersoll Rand	6 AFV	1,400	140	1,770	60	
Lake Hills	1	Peerless	8AE17A	5,000	160	1,780	250	New 1999 Emergency pump connections
	2	Peerless	8AE17A	5,000	160	1,780	250	New 1999 for diesel pump
Lake Youngs	1	Fairbanks Morse	7000 AW	7,700	182	1,185	500	
	2	Fairbanks Morse	7000 AW	7,700	182	1,185	500	
Maple Leaf	1	Patterson	18X14 MAC	10,300	156	1,180	500	Can be powered by diesel generator
	2	Patterson	18X14 MAC	7,200	156	1,180	350	
Maplewood	1	Worthington	20 LN 28	17,750	108	720	600	Standby use only, low hours
North City	1	Worthington	12 LN 14	6,500	113	1,775	250	
	2	Worthington	12 LN 14	6,500	113	1,775	250	
	3	Worthington	12 LN 14	6,500	113	1,775	250	
Trenton	1	De Laval		1,000	225	1,845		Water Turbine Powered
	2	De Laval		3,000	225	1,200		Water Turbine Powered
TESS	1	Worthington	8 LP 13	1,600		1,770	100	Emergency pump connections for diesel pump

Notes:
gpm = gallons per minute
rpm = revolutions per minute
Vert. = vertical

Prepared April 2006

SEATTLE PUBLIC UTILITIES
2007 WATER SYSTEM PLAN

III. TRANSMISSION

APPENDIX B

ACCESS TO SEATTLE WATER SYSTEM GUIDELINES

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Access to Seattle Water System Guidelines

Operating Board Approved on July 8, 2003

BACKGROUND

Seattle Public Utilities owns, maintains and is responsible for the reliability and water quality provided by its regional water supply system. Under the new Full and Partial Requirements contracts, the cost of regional assets are shared between Seattle and the Wholesale customers.

Seattle's existing sources of supply include the Cedar River, South Fork of the Tolt River and the Highline Well Field. The major sources of supply come from surface water sources and are protected by watershed management programs that prohibit public access and water quality degradation. This level of watershed protection has allowed Seattle to avoid the need for filtration of the Cedar supply. Seattle's groundwater supply comes from the Highline well field and is used as a backup supply predominately during peak periods and is a combination of Cedar River injected water and water from the aquifer. There is a wellhead protection program that ensures water quality for when the source is used.

Seattle's sources are managed in order to accommodate in-stream flows for fish while providing a 98% level of supply reliability for all of Seattle's customers. In order to accomplish these goals, SPU's resource managers must be able to manage the sources as needed and rely on the transmission system's capacity to provide water from any of the sources, conjunctively throughout the region in a seamless manner.

Other large surface water sources in the region include Tacoma's Green River water and Everett's Sultan River water, both of which include protected, undeveloped watersheds. Most of the region's remaining sources of water supply consists predominately of medium and small groundwater systems.

ISSUE

The advent of additional growth in the region and competing needs for water resources has caused Seattle and other utilities to independently evaluate their water supply operations and availability. At the same time, a number of factors combine to prevent water from existing supplies from being available to people and the environment when and where it is needed. Efforts are underway in various forums to overcome regulatory obstacles blocking solutions to these problems, and individual utilities need to determine their role in the regional framework for this to be successful. Regardless of the result of these efforts, one significant issue that needs addressing is how it would be possible to move new sources through the existing SPU regional water system to a utility that is interested in receiving water that is not part of the SPU water supply.

Engineered solutions to delivering water supply are the easiest of the issues to resolve for making water available. Maximizing existing regional sources and moving water to places in need involves more than engineered solutions; it requires working out issues related to ownership of assets, access to assets, customer responsibilities, maximization of conjunctive use possibilities and coordination of operations. Seattle does not have policies related to access to its system or for service delivery to customers by other water suppliers in its water service area. This paper reviews options that are available to Seattle for allowing access to the regional water system for the purpose of moving new sources to areas in need within SPU's service area.

OPTIONS

There are several options for enabling the delivery of new sources of water to areas in need. In all cases, guidelines are needed to establish the role Seattle will take in allowing access to the regional water system to get water to these customers. While each new source and service delivery would be evaluated for its unique characteristics, guidelines for decision-making are identified for each option. These options are discussed here.

Full Access

Generally the most cost-effective means of delivering water supply to a needy customer, not located near the source, is to use existing infrastructure. Allowing access to excess pipeline and other system infrastructure capacity usually entails blending with the existing source in the system.

Under this full access scenario, the introduction of new sources into the regional water system adds new levels of risk and responsibility for Seattle. The following minimum guidelines should be considered:

Water Quality
Exhibit I identifies the minimum water quality guidelines to be considered prior to introduction of a source into Seattle's existing system.

Operations

- No adverse impact on Seattle's ability to manage the operation of its existing sources.
- No impairment to delivery for existing and planned customers, unless agreed upon by all parties.
- Flows need to be metered to track usage and provide billing information.

Finance

- Evaluation and commitment to pay for risk and cost of regulatory mandates imposed and operating risks as a result of source introduction.
- Establishment and payment of access charges.
- Analysis of infrastructure needs / costs and plan for cost recovery of infrastructure funded by the regional system.

Other

- Enter into contractual arrangement outlining terms and conditions. Consider safeguards such as requiring the utility granted access to the system to build a separate pipeline if an extreme water quality problem occurred from blending water supplies.
- Reach agreement on how regional system would be operated in regards to drought management, conjunctive use, and peaking.
- Public process and consideration of acceptability by customers receiving the new source or blended water.
- Completion of an Environmental Impact Statement, if needed.
- Supplying system has an approved Water System Plan (WSP), or if exempt from preparing a WSP, the utility would have an Operations and Maintenance Plan as required by WAC 246-290-415.

Partial Access

Water from a new source may be introduced into the regional system, but only delivered to a segment of the customer base in a more limited geographic area. In this case, part of the regional system would be isolated from the rest of the system and result in limited or no blending of the new source with existing sources. However, partial access to the regional water system may have an impact on the operational configuration and flexibility of managing the overall system. Specifically, the ease of flow through the system could be impaired by the need to “compartmentalize” the new source. As a result, system modeling would be required. Furthermore, guidelines related to operations would be more central to assessing the impact of this approach and determining if it would be detrimental to the operation of the overall system.

Water Quality
Each utility is responsible for meeting water quality standards within their own distribution area. Since the water from the new source would be delivered only to the utility or utilities that want or consent to receive the new source, water quality guidelines would be of primary interest to the utilities receiving the water. SPU would only allow water that meets state and federal water quality regulations to be wheeled through the regional system.

Operations
- Flow reversal protection and monitoring would be required.
- No impairment to delivery for existing and planned customers, unless agreed upon by all parties.
- Transmission system reliability and operational impacts could not be significantly impaired.
- Flows need to be metered to track usage and provide billing information.

Finance
- Establishment and payment of access charges, which are separate from any agreed upon charges for risk factors associated with allowing access to the system.
- Analysis of infrastructure needs and costs and plan for cost recovery of infrastructure funded by the regional system.

Other
- Consent by purveyors whose customers will receive the new source or may receive blended water.
- Reach agreement on how regional system would be operated in regards to drought management, conjunctive use, and peaking.
- Completion of an Environmental Impact Statement (may not be needed if no blending is involved).
- Enter into contractual arrangement outlining terms and conditions. Consider insurance, mitigation, indemnification as needed to reduce risk to the regional water system.
- Supplying system has an approved Water System Plan, or if exempt from preparing a WSP, the utility would have an Operations and Maintenance Plan as required by WAC 246-290-415 (may not be needed if no blending is involved).

No Access

A wholesale utility could receive a new source of supply without utilizing Seattle’s regional supply system. This could be accomplished in several ways:

1) a new source is introduced directly into the local distribution system of the receiving utility;
2) one wholesale customer wheels water to another; or
3) the utility developing/securing a new source constructs its own, separate, transmission facilities from the new source to its customers.

Under any of these scenarios, the impact on the Seattle regional system would be limited to ensuring there is no adverse impact on delivery to existing and planned wholesale customers.

Exhibit I

Minimum Water Quality Guidelines for Full Access to Seattle Water Supply System

1. The new water source complies with all EPA, DOH and Seattle drinking water standards, including secondary aesthetic standards.
2. Source water complies with expectations of existing customers regarding hardness, pH, and taste. The source must complete a flavor rating analysis of no more than 3.0 as tested by Seattle's Flavor Profile Panel according to the methodology described by the American Water Works Association, or its successor.
3. Source protection plan (watershed or wellhead) has DOH approval.
4. Treatment is appropriate for the quality of the source, and together with source protection provides the same degree of public confidence in the supply, and is equivalent to public health protection and regulatory compliance experienced with the Tolt, Cedar, and Highline Wellfield sources and treatment. Contaminants of emerging concern (e.g., endocrine disrupters and pharmaceuticals) factor into the evaluation. For example, sources that are down stream of a wastewater discharge facility would not be considered acceptable. Unprotected sources may also be undesirable, but would be considered on a case-by-case basis.
5. Treatment is compatible with existing treatment of water in the Seattle regional supply system, including fluoridation, type of disinfectant residual, and method of corrosion control.
6. Chlorine residuals and chlorine demand of project water are acceptable by Seattle and Seattle's wholesale customers.
7. Disinfection By-Products (DBP) levels and precursors of project water are acceptable by Seattle and Seattle's wholesale customers.
8. Project water quality is stable and the water is available for a predictable portion of the year, to facilitate blending and prevent disruption of conditions in retail distribution facilities(e.g., rusty water from dissolution of scale in pipes).
9. The supplier shall provide Seattle with satisfactory results from a blending study to determine the compatibility of the source with existing sources already in the regional water supply system, the appropriate method and level of treatment and the probable distribution of the new supply within the regional system.