Attachment 14 Utilities Appendix

Utilities Appendix

((~~A Inventory of City Utilities, Capacity Information & Future Facility Needs~~

~~Seattle City Light~~

~~Seattle City Light (SCL) is the City-owned electric utility serving approximately 131 square miles, including all of Seattle and some portions of King County north and south of Seattle city limits.~~

~~Seattle City Light: inventory~~

~~SCL generates between 56 percent and 75 percent of the energy that it sells to retail customers from its own facilities. This percent share varies with water conditions because all SCL-owned resources are hydroelectric. The largest facilities are the Boundary Project, on the Pend Oreille River in northeast Washington, and the Skagit Project, which consists of three hydroelectric dams (Ross, Diablo and Gorge) on the Skagit River. The Newhalem Hydroelectric Plant, located on Newhalem Creek, was built in 1921 to supply power to the Skagit Project. It was modernized in 1970 and produces a small amount of energy. The Cedar Falls Dam on the Cedar River and the South Fork Tolt Dam on the South Fork Tolt River are also smaller generating facilities owned by SCL. In addition to these power sources, SCL purchases power from the Bonneville Power Administration (BPA), including firm amounts under the Block Product and a share in the output from the Federal System (Slice Product), which depends on water conditions. SCL also holds firm power purchase contracts with a number of other suppliers in the Pacific Northwest. These contracts include power generated from hydroelectric sources, including a combined-cycle combustion turbine (Klamath Falls in Oregon) and a share in the State Line Wind Project located in Southeast Washington and Northeast Oregon. (See Utilities Figure A-1.)~~

~~SCL owns and maintains approximately 657 miles of transmission lines which carry power from the Skagit and Cedar Falls generating facilities to 14 principal substations. SCL is dependent on other transmission line owners, i.e., the Bonneville Power Administration (BPA), to bring power from its Boundary Dam hydroelectric plant and from other contracted resources, to serve its load in Seattle. The transmission grid interconnection with other utilities also provides additional reliability to meet load requirements. Power is distributed from SCL's principal substations via high voltage feeder lines to numerous smaller distribution substations and pole transformers which reduce voltage to required levels for customers. SCL owns and maintains 2,428 circuit miles of distribution lines within Seattle that deliver power from the 14 principal substations to approximately 365,200 customers. (See Utilities Figure A-2).~~

~~Seattle City Light: existing capacity~~

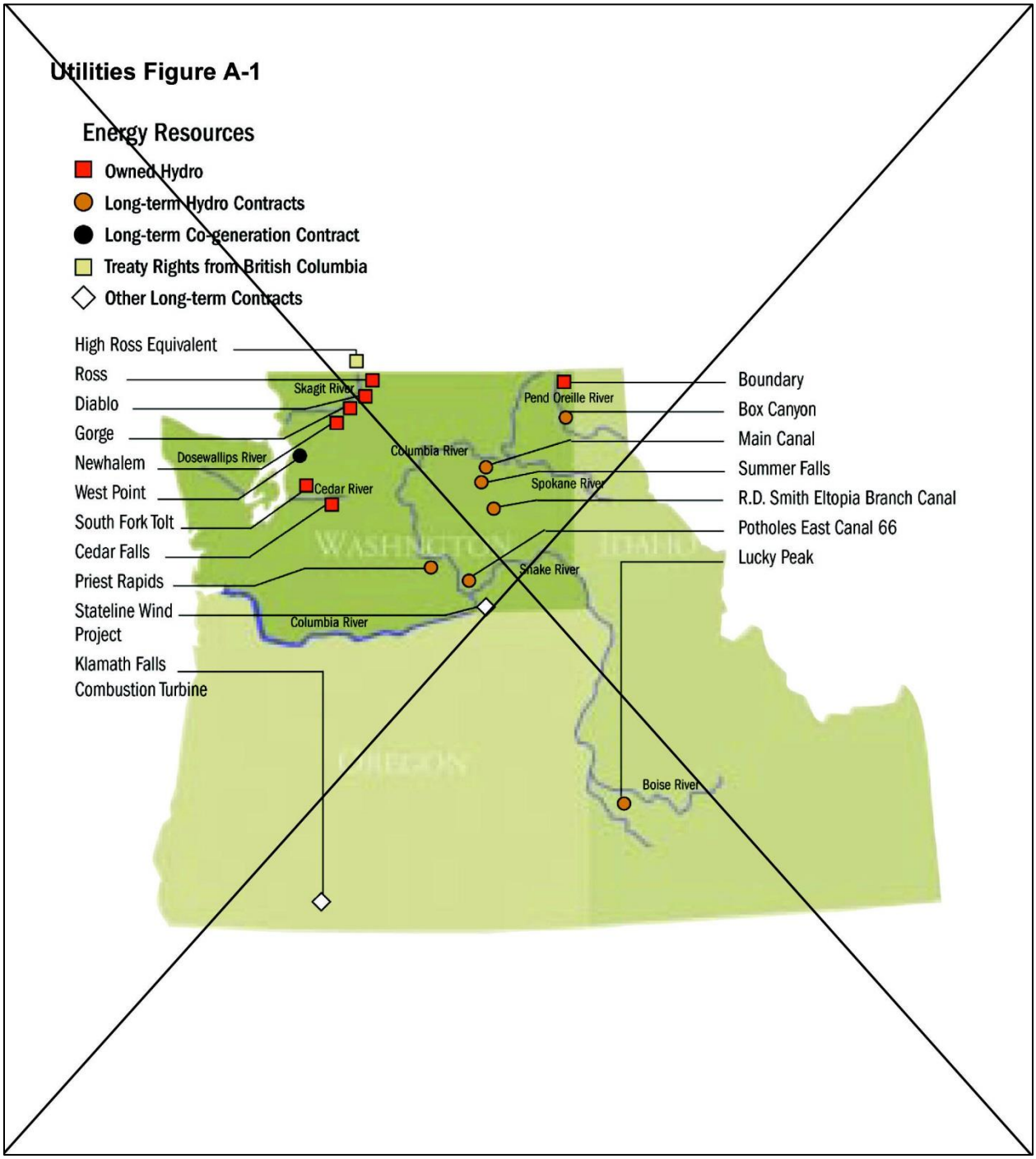
~~SCL's current generation capability (owned and contracted) is adequate to serve existing customers. Because of the nature of City Light's hydroelectric system, the utility is not presently constrained by its ability to meet peak loads (typically referred to as capacity). At times, the system may be constrained in its ability to carry load over periods of heavy load hours (6 a.m. to 10 p.m.) during the winter. On an average monthly basis, City Light currently has sufficient resources to meet expected customer load in the next few years, even under serious drought conditions.~~

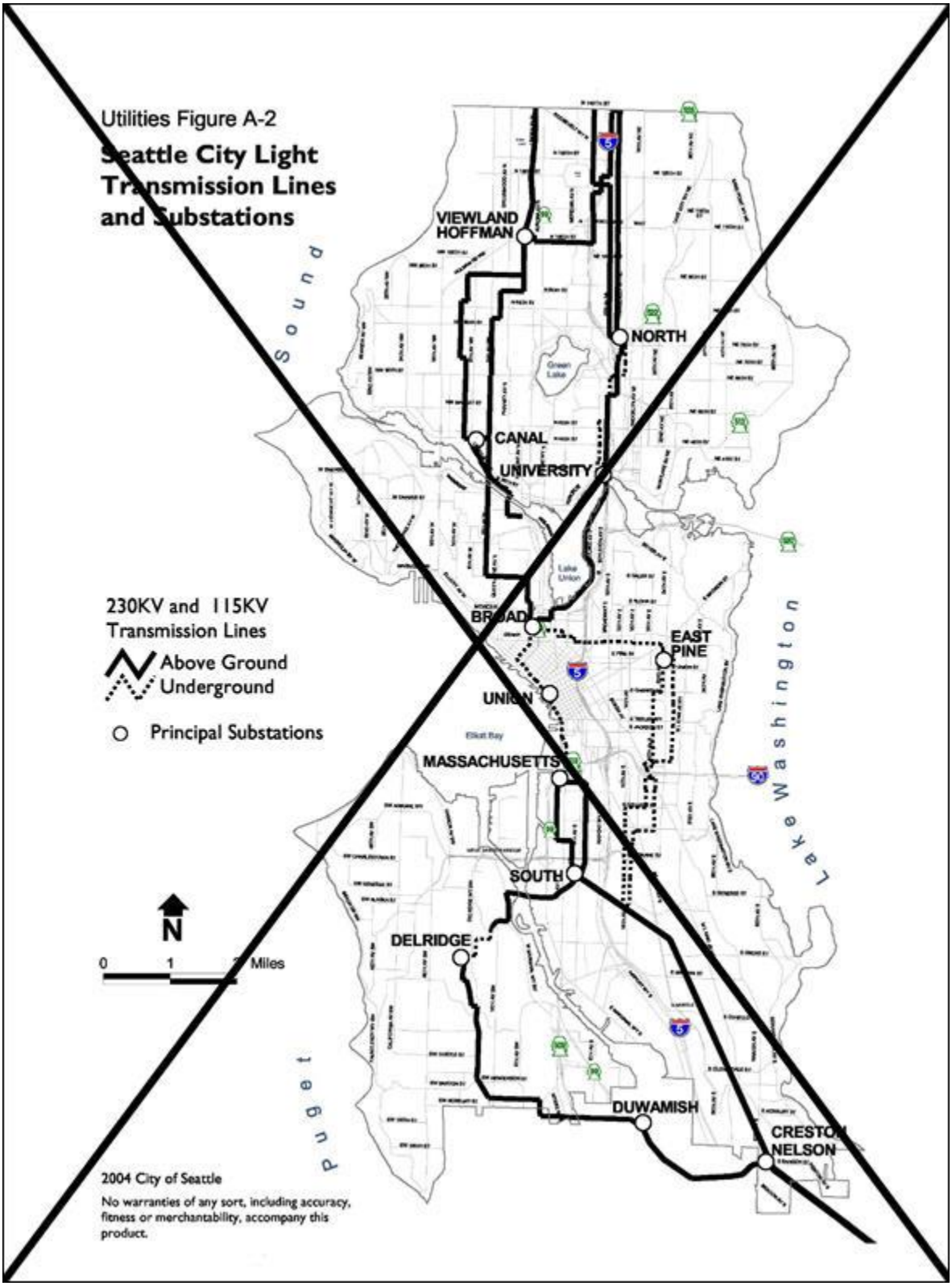
~~SCL sells on the wholesale energy markets the energy it does not need to meet customer load. The utility also buys energy in the wholesale markets to enhance the value of its resource portfolio and to meet occasional short-term energy deficits.~~

~~Seattle City Light: anticipated future facilities~~

~~City Light's current contract with BPA extends through the end of September 2011 and includes an increase in the firm amount of power purchased effective in October 2006. The utility has committed to meet its load growth through 2011 with conservation and renewable resources and is on target to achieve this goal. Given projected customer load growth, no significant resource addition is anticipated until 2005 or 2006.~~

~~For the transmission and distribution components of SCL's system, projected growth will be accommodated by planned transmission and distribution capacity additions. The addition of a transformer at the Bothell Substation in Snohomish County will serve the principal substations from the Snohomish County line to the Lake Washington Ship Canal. Within the Comprehensive Plan's 20 year timeframe a new principal substation will be necessary downtown, with an underground transmission line connection to the South substation. Capacity would also be expanded at the North, Duwamish, Shoreline, University and Creston substations. New substations also may be built in the next five to twenty years at Interbay, in the SODO area and in South Lake Union, depending on load growth projections and emerging real construction. Substations in the Northeast and Northwest parts of the City may also be built in the 20-year period. City Light owns properties for the Interbay, NE and NW substations.~~))


Utilities Figure A-1
Energy Resources
Owned Hydro
Long-term Hydro Contracts
Long-term Co-generation Contract
Treaty Rights from British Columbia
Other Long-term Contracts
High Ross Equivalent
Ross
Diablo
Gorge
Newhalem
West Point
South Fork Tolt
Cedar Falls
Priest Rapids
Stateline Wind Project
Klamath Falls Combustion Turbine
Skagit River
Dosewallips River
Cedar River
Columbia River
Columbia River
Pend Oreille River
Spokane River
Snake River
Boise River
Boundary
Box Canyon
Main Canal
Summer Falls
R.D. Smith Eltopia Branch Canal
Potholes East Canal 66
Lucky Peak


Utilities Figure A-2
Seattle City Light
Transmission Lines
and Substations
230KV and 115KV
Transmission Lines
Above Ground
Underground
Principal Substations
N
0
1
Miles
2004 City of Seattle
No warranties of any sort, including accuracy, fitness or merchantability, accompany this product.
VIEWLAND
HOFFMAN
NORTH
CANAL
UNIVERSITY
BROAD
EAST
PINE
UNION
MASSACHUSETTS
SOUTH
DELRIDGE
DUWAMISH
CRESTON
NELSON
Sound
Lake Washington
Puget

((~~Seattle Public Utilities (water utility)~~

~~Seattle Public Utilities (SPU) provides water service to customers of Seattle and portions of King County. In addition, SPU sells wholesale water to more than two dozen suburban water districts, municipalities, and nonprofit water associations ("purveyors") which serve retail water customers in most of the urban areas in north, east, and south King County, and a small part of southwest Snohomish County. (See Utilities Figure A-3). SPU operates under an Operator's Certificate granted by the State Department of Health. Information about the certificate and the water system can be found in Seattle's Water System Plan.~~

~~Seattle Public Utilities: inventory~~

~~SPU supplies drinking water from two major water supply sources, the Cedar River Watershed and the South Fork of the Tolt River Watershed, and a small amount of water from the Highline Well Field. The Cedar River of the Tolt River watersheds are in the Cascade Mountains, while the Highline Well Field is located north of Seattle Tacoma International Airport. Transmission pipelines carry the water to various reservoirs, standpipes, and tanks for further distribution. (See Utilities Figure A-4)~~

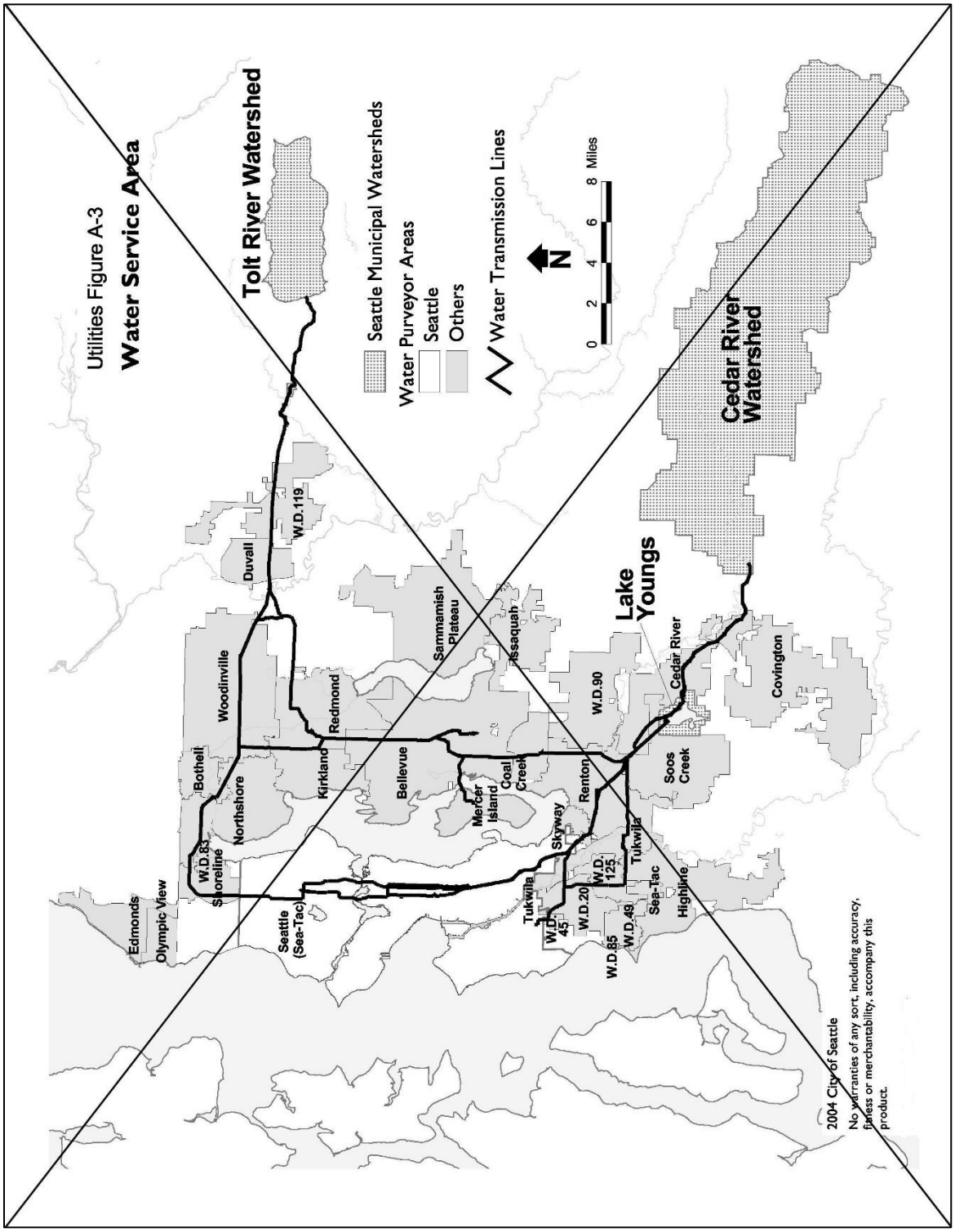
~~Seattle Public Utilities: existing capacity~~

~~SPU's service area extends beyond the City's boundaries, making it impossible to assign for in-city service capacity figures to the supply sources and transmission lines. Snowpack, temperature and precipitation in the watershed areas are important natural factors that determine when and how much runoff will fill the reservoirs. Also affecting SPU's water supply is the environmental impact of the dams on the stream flows. Tribes and business, environmental, recreational and fisheries groups all have interests in the level of water in the streams. The 50-year Cedar River Watershed Habitat Conservation Plan provides certainty for the City of Seattle's drinking water supply and protects and restores fish and wildlife habitats. In addition, the City recently completed a new treatment facility on the Tolt source that adds supply capacity. A new treatment facility on the Cedar source will be come online in 2004 that will improve drinking water quality. Under these current circumstances, SPU expects water supply to be adequate to serve the City's existing and forecast population for at least the next 20 years.~~

~~Distribution and storage facilities that serve Seattle residents have adequate capacity to serve the city. There are, however, a few areas that have substandard mains or experience low water pressure.~~

~~Low pressure areas include the higher elevations and other scattered locations in Maple Leaf (Maple Leaf Tank), Phinney Ridge (Woodland Park Standpipe), and Queen Anne Hill (Queen Anne Standpipe). These areas are all located near standpipe or/tanks and, therefore, receive water at or below the current design standard of 30 pounds per square inch (psi).~~

~~SPU is currently applying an asset management assessment to determine which pipelines would be replaced using the funds available in the six year CIP.~~))


Utilities Figure A-3
Water Service Area
Tolt River Watershed
Seattle Municipal Watersheds
Water Purveyor Areas
Seattle
Others
Water Transmission Lines
N
0 2 4 6 8 Miles
Cedar River Watershed
Lake Youngs
Duvall
W.D.119
Woodinville
Bothell
Northshore
W.D.83
Shoreline
Edmonds
Olympic View
Seattle (Sea-Tac)
Redmond
Kirkland
Bellevue
Sammamish Plateau
Issaquah
Mercer Island
Coal Creek
Skyway
Renton
W.D.90
Cedar River
Covington
Soos Creek
Tukwila
W.D.125
Sea-Tac
Highline
Tukwila
W.D.45
W.D.20
W.D.49
W.D.85
2004 City of Seattle
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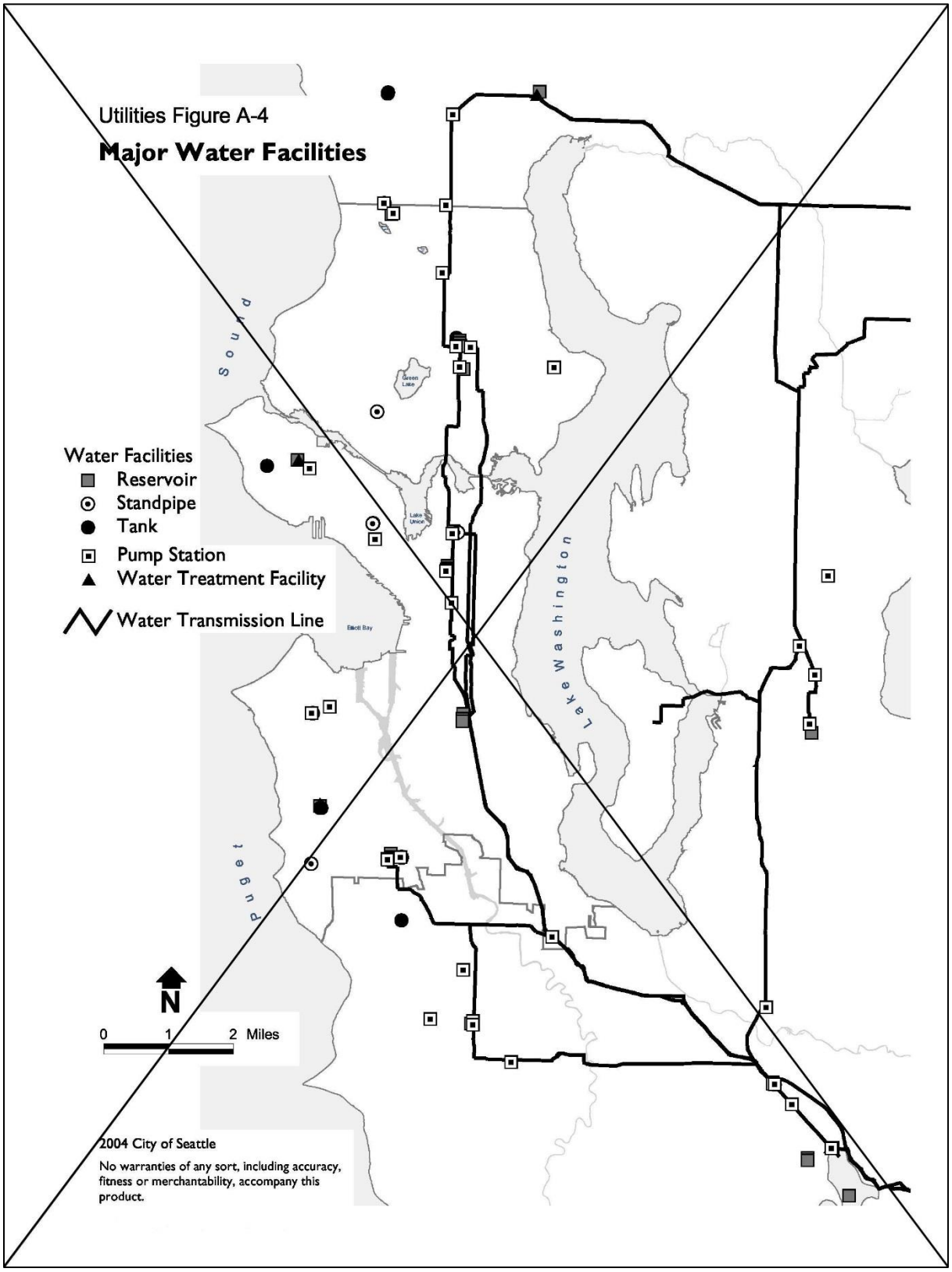

Utilities Figure A-4
Major Water Facilities
Water Facilities
Reservoir
Standpipe
Tank
Pump Station
Water Treatment Facility
Water Transmission Line
Sound
Lake Washington
Puget
Green Lake
Lake Union
Elliott Bay
N
0 1 2 Miles
2004 City of Seattle
No warranties of any sort, including accuracy, fitness or merchantability, accompany this product.

((~~Seattle Public Utilities: anticipated future facilities~~

~~Most of the new households to be added within the city will be in multifamily units, which have a much lower per capita water demand than single family households.~~

~~The major impact of the growth envisioned by the Comprehensive Plan on the City's water facilities will be in the distribution system. Rehabilitation and improvements to the existing distribution system will be needed to support growth over the 20 year life of the Plan. SPU will work with developers to be sure needed infrastructure is in place for the development. Most of the time, developers finance the necessary distribution facilities.~~

~~Seattle Public Utilities: drainage & wastewater~~

~~SPU is charged with managing drainage, surface runoff, and sewer systems to meet public safety, water quality, and resource protection goals. SPU's service area covers the City of Seattle.~~

~~Seattle Public Utilities: inventory~~

~~Although a few small areas are still served by septic systems, almost all areas of the city are served by sanitary sewers. Three types of drainage and waste water systems are used in Seattle: combined sanitary/storm water sewer, partially separated sanitary/storm water sewer, and separate sanitary and storm water sewer systems. The SPU system collects residential, commercial, and industrial wastewater and delivers it to interceptor lines operated by the regional sewage treatment agency (King County). The sewage is then treated at the West Point Sewage Treatment Plant before being discharged into Puget Sound. Two other plants, Alki and Carkeek, have been converted to treat wet weather overflows only. (See Utilities Figure A-5).~~

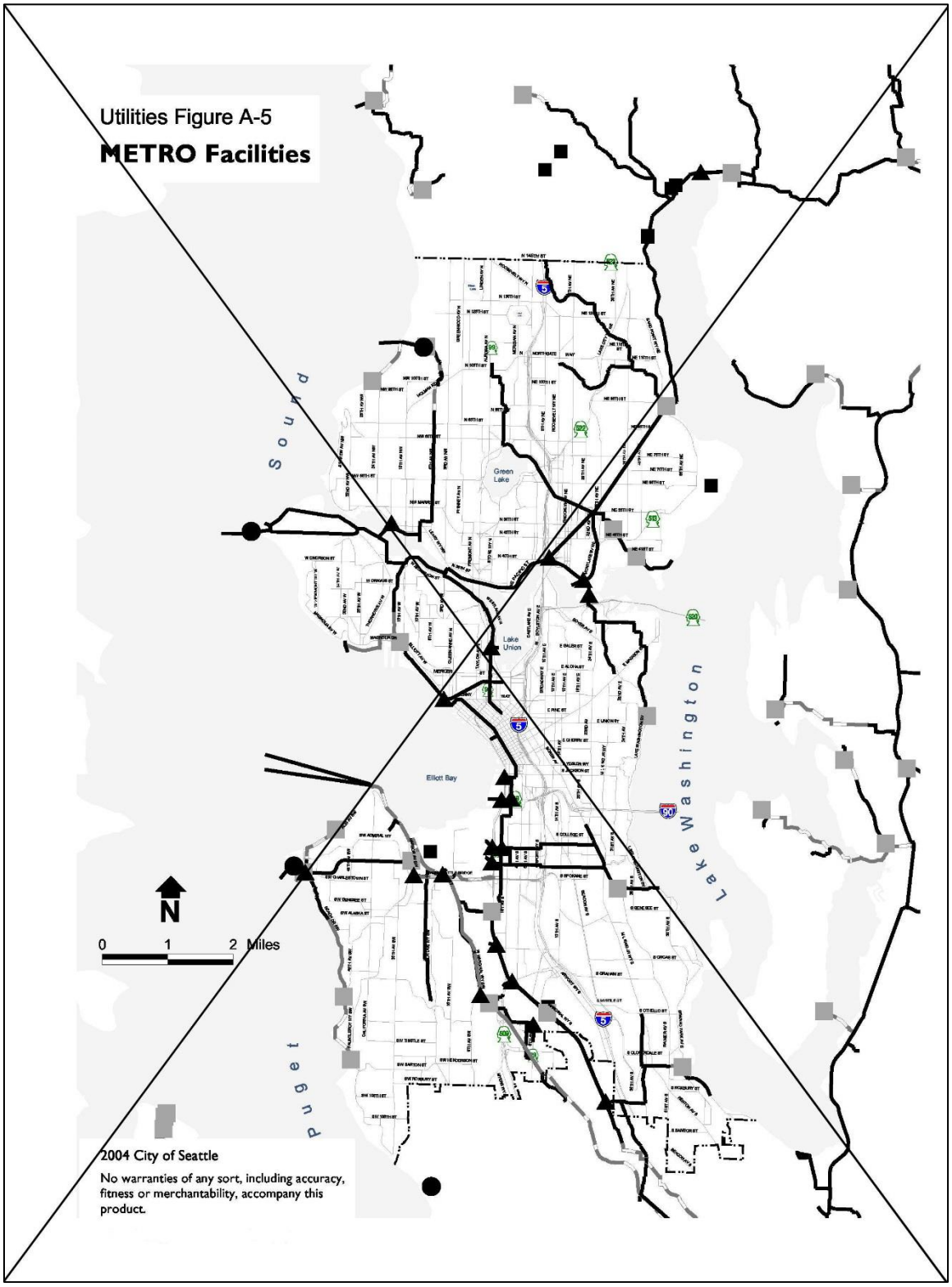
~~Seattle Public Utilities: existing capacity~~

~~**City Drainage and Wastewater System:** The capacity of the wastewater system in some areas is limited when peak stormwater flows enter the combined systems. During or following intense or prolonged periods of rainfall, some of the systems cannot accommodate the combined runoff and sanitary sewage flows, resulting in combined sewer overflows (CSOs) being discharged into area waters. CSOs occur in both the regional and the City systems. Seattle's CSO Control Plan, adopted in 1988, and updated in 2001, addresses specific storage and separation projects to control CSOs and describes costs and schedules in a 20-year timeframe. SPU has already completed improvements to 69 of the 83 CSO locations and by the year 2006, Seattle will have reduced CSO volumes by at least 79 percent. Funding for these improvements is included in the Department's six-year CIP.~~

~~Seattle Public Utilities: regional wastewater treatment system~~

~~The West Point Treatment Plant is a secondary treatment facility, with a capacity of 133 million gallons per day (MGD), monthly average flow. It is designed to handle a peak flow capacity of 440 MGD, with 300 MGD receiving secondary treatment and the remainder primary treatment.~~

~~The West Point Treatment Plant serves 1.3 million people including residents of Seattle, King County north of Seattle, and South Snohomish County.~~)**)**


Utilities Figure A-5
METRO Facilities
Sound
Green Lake
Lake Union
Elliot Bay
Lake Washington
Puget
N
0 1 2 Miles
2004 City of Seattle
No warranties of any sort, including accuracy, fitness or merchantability, accompany this product.

((~~Seattle Public Utilities: anticipated future facilities~~

~~**City Facilities:** Generally, the drainage and wastewater facilities in Seattle have been planned and sized to serve the maximum or build out conditions under zoning at the time and will be adequate to serve the level of increased growth proposed in the Plan. The capacity of the wastewater system is limited in confined areas of the city, where there have been historic hydraulic and system backup problems. These problems are being addressed through developer-funded facility upgrades and by Seattle Public Utilities' CIP.~~

~~**Regional Facilities:** Under King County's Regional Wastewater Services Plan, a third treatment plant is planned to be added in South Snohomish or North King County by about 2010 to handle the region's growth.~~

~~Seattle Public Utilities (solid waste)~~

~~SPU contracts with private firms for the collection of residential solid waste, recyclables, and yard waste and commercial solid waste within the city; collection of commercial recyclables is handled by the private sector, SPU provides for disposal of all solid waste generated within the city through a long-term contract with Waste Management Incorporated.~~

~~Seattle Public Utilities: inventory~~

~~The solid waste transfer system consists of four transfer stations. The two City owned transfer stations receive residential and commercial solid waste, while the two privately-owned transfer stations receive both commercial and other solid waste from within and outside the city of Seattle. Refuse is compacted into containers which are trucked to the Argo Intermodal Facility; from there, the containers are loaded onto trains for long-haul transport to a landfill owned and operated by Waste Management Incorporated in Gilliam County, Oregon. Most recyclable materials are handled by two privately-owned facilities. The City of Seattle also owns and operates two household hazardous waste facilities. (See Utilities Figure A-6 for their location).~~

~~Seattle Public Utilities: existing capacity~~

1. ~~**Solid Waste Collection and Transfer Facility Capacity:**~~
   ~~SPU's North and South Recycling and Disposal Stations (RDS) were designed in the 1960's for the transfer of solid waste, not for the current solid waste management strategy involving separation of recyclable materials. They were designed to handle 1,000 tons of solid waste per day (or 365,000 tons per year). In 2002, approximately 280,000 tons of solid waste were disposed of through the City's two transfer stations as well as more than 63,000 tons of yard waste, 2,000 tons of wood waste, 600 tons of metal appliances and more than 32,000 tons of other recyclables, totaling about 349,000 tons per year.~~

~~SPU is currently evaluating options for increasing the RDS's capacity to handle future self-haul and contractor trips and tons at the transfer stations as part of a comprehensive Solid Waste Facilities Master Plan that will be completed in 2003.~~

~~A portion of the collected commercial solid waste generated in the City is delivered to the two privately-owned transfer stations. These two facilities handle refuse as well as construction and demolition debris and other wastes from both inside and outside Seattle. In 1999, the two private stations handled 225,000 tons of solid waste from the City of Seattle. In recent years, Waste Management Incorporated has also built a new station for separated construction debris. The two private transfer facilities have the capability to handle 300,000 400,000 tons of waste per year including waste from Seattle's businesses. These facilities are located in the South Park area near the City's South Recycling and Disposal Station and south of downtown on South Lander Street.~~

~~Intermodal container loading capacity at Argo Yard is limited and the demand to process other domestic and international cargo through this yard is expected to increase.~~

2. ~~**Recycling Processing Facilities:**~~

~~Two private "material recovery facilities" (MRFs) serve as the processing and transfer facilities for most of the recyclable materials collected from in-City residents and businesses. These facilities are Recycle Seattle and Recycle America and they process and transfer a large proportion of the 320,000 tons of residential and commercial recyclable material that was collected through the City's solid waste system in 2000. Recycle America is located in the South Park area, near the City's South Recycling and Disposal Station, and Recycle Seattle is south of downtown on South Lander Street.~~

3. ~~**Disposal Facilities:**~~

~~Waste is compacted at the transfer stations into containers that are trucked to the Argo rail yard and loaded onto a train for long haul shipment to a landfill in Oregon. Presently, approximately 60 containers per day (each holding 25-28 tons), five days a week, are trucked to the railhead. The train to the landfill operates five times per week, with about 100 containers per trip. Waste containers from King, Snohomish, Island, San Juan, and Whatcom counties are also added to the train. Seattle and Washington Waste Systems (WWS) have a contract extending through March 31, 2028, and the terms of the contract are more than adequate to handle the additional waste volumes generated by projected growth.~~

~~Seattle Public Utilities:~~
~~anticipated future facilities~~

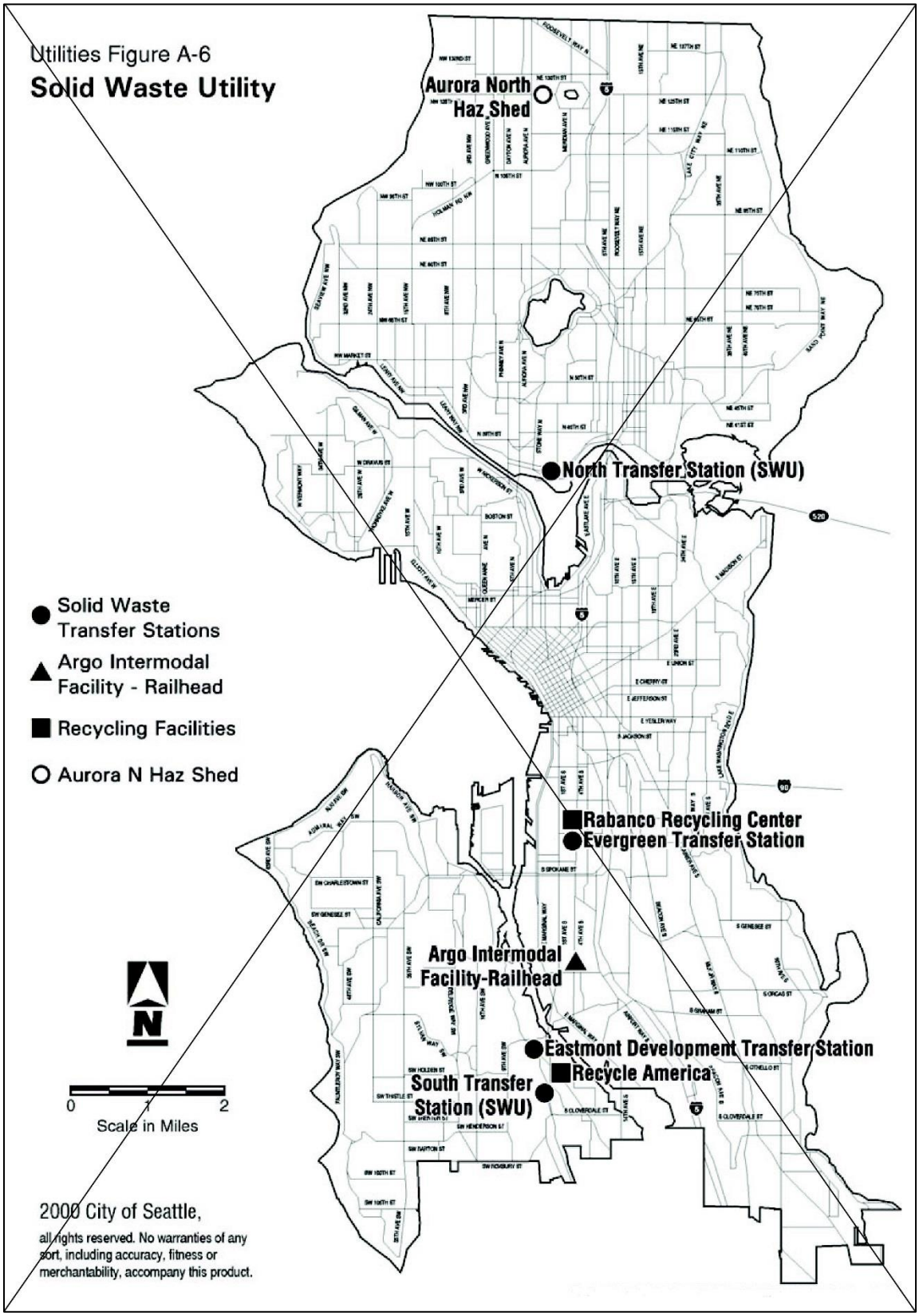
~~The region's landfill capacity is large enough to last for at least the next 40-80 years. Private transfer stations have the capacity to handle projected solid waste tonnages, but SPU transfer facilities will need modifications if they are to adequately handle projected customer visits and to divert waste to effectively contribute to the City's waste reduction and recycling goals. Although the overall amount of waste generated in the city will increase with projected residential and employment growth, the percentage of waste that will be directed to disposal is expected to decrease because waste diversion through recycling is expected to increase. Seattle has adopted the goal of recycling 60 percent of its overall waste by 2008.~~

~~Residential waste is anticipated to comprise a decreasing share of the future combined waste stream. Commercial waste is projected to comprise a larger share of Seattle's waste stream in the future. Increased commercial sector waste disposal needs and an increased demand for recycling contractor services will be handled by private contractors and facilities. Representatives from both private transfer stations have indicated that the increased amount of waste can be handled within the existing facilities.~~

~~The two private materials processing facilities will handle a major share of the increase in volumes of recyclable material that will occur with projected growth. These businesses are dealing with services and markets at a regional level, so the specific impacts of increased Seattle tonnage are difficult to predict.~~

~~It is anticipated that the two City-owned transfer stations will be demolished and rebuilt to accommodate projected customer demand and diversion goals.~~

~~It is also anticipated that a new City-owned waste receiving and compaction station will be built in conjunction with an intermodal loading station. This intermodal solid waste transfer facility will eliminate the need to load containers at the existing Argo Yard.~~))


Utilities Figure A-6
Solid Waste Utility
Aurora North Haz Shed
North Transfer Station (SWU)
Solid Waste Transfer Stations
Argo Intermodal Facility - Railhead
Recycling Facilities
Aurora N Haz Shed
Rabanco Recycling Center
Evergreen Transfer Station
Argo Intermodal Facility-Railhead
Eastmont Development Transfer Station
Recycle America
South Transfer Station (SWU)
0 1 2
Scale in Miles
2000 City of Seattle,
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((~~B Description & Inventory of Investor-Owned Utilities Serving Seattle~~

~~Puget Sound Energy~~

~~Puget Sound Energy (PSE) is an investor-owned electric and natural gas utility serving more than 1.2 million customers in 11 Western Washington counties. In the Seattle area, PSE only provides natural gas service. PSE's distribution of natural gas involves system pressure regulation and the development and maintenance of a network of gas mains to serve the utility's customers.~~

~~PSE is supplied by Northwest Pipeline Corporation, a natural gas wholesaler with interstate pipeline facilities extending from Canada to New Mexico. Two underground transmission lines branch off from the pipeline to serve more than 116,000 natural gas customers in the Seattle area.~~

~~QWEST Communications~~

~~QWEST Communications (QWEST) is the telephone company subsidiary of QWEST, Incorporated—one of the seven regional holding companies resulting from the divestiture of AT&T. QWEST is the principal provider of local telephone and related services in Seattle.~~

~~Of the 11 central switching offices (COs) serving Seattle, 10 are located within the city limits. For local exchange, the COs switch calls in and between the line exchange groupings (these groupings are addressed uniquely by an area code and the first three digits of a phone number). For long distance, the COs switch calls and mediate between the long-distance network and the local originating/terminating network. Due to advances in technology, additional capacity is easily and quickly added to the system.~~

~~Four main cable routes emanate from each CO, running north, south, east, and west. Connected to these main feeder routes are branch feeder routes which support thousands of local loops providing dial tone service to individual subscribers. The COs are connected by inter-exchange trunk lines that may be aerial or buried, and copper or fiber optic line.~~

~~cellular communications~~

~~Seattle is served numerous cellular telephone companies, the largest of which include AT&T Wireless, Cingular, Sprint PCS, T-Mobile and Verizon Wireless. Cellular telephones are radios which send and receive signals from low power, ultra high frequency antennas positioned at several cellular communication ("cell") sites. The "cellular" name is derived from the manner in which coverage is provided by the cell sites. Each cell site has a signal radius, or coverage area, of only a few miles (depending upon terrain and capacity demand for service). As a cellular telephone user~~

~~passes from one cell to the next, the call is transferred to an available channel at an adjacent cell site.~~

~~The cellular phone industry is extremely volatile, so any comprehensive listing of providers or cell sites would be obsolete upon printing. There are over 500 cell sites within the city of Seattle. Ownership of the sites changes as companies enter and leave the market.~~

~~cable television~~

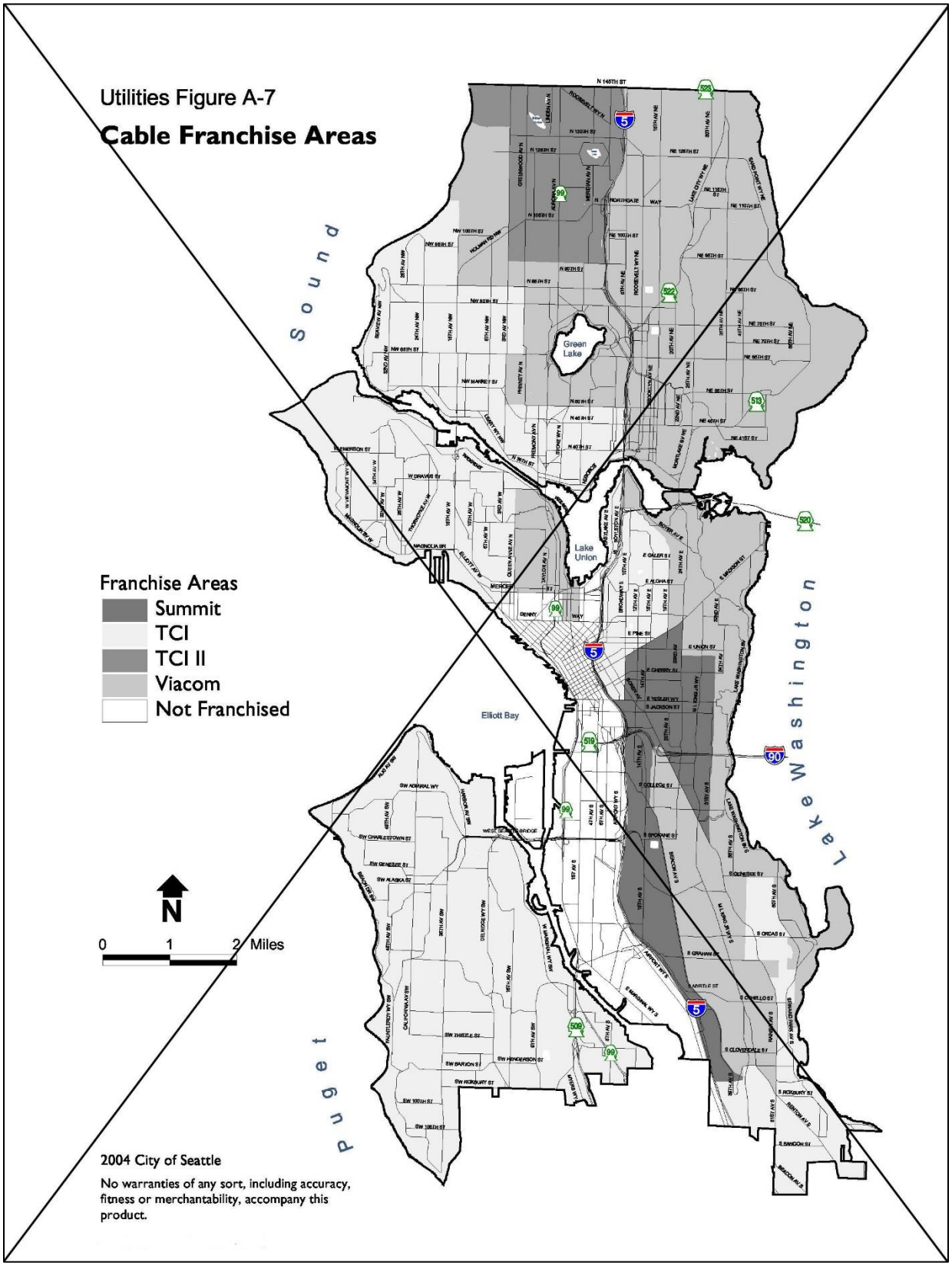
~~Two cable communications companies hold City franchises for serving Seattle residents, Comcast and Millennium Digital Media. (See Utilities Figure A-7.) The City is currently in the franchise renewal period with Comcast whose franchise expires on January 20, 2006. Millennium Digital Media's franchise expires on March 1, 2008.~~

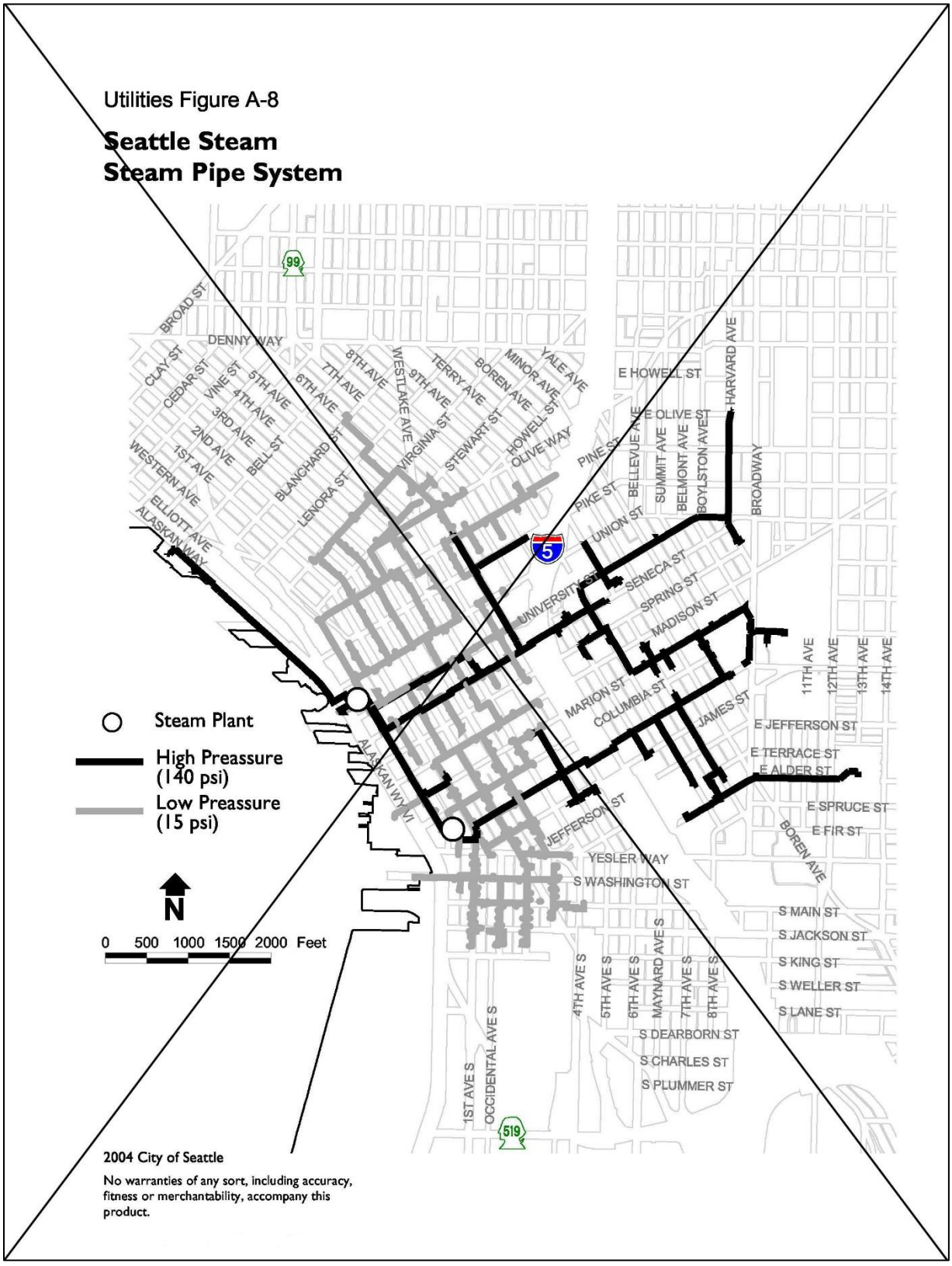
~~One of the primary components of a cable system is the head end site—an electronic control center where the information signal is processed for distribution through the cable system. This signal can be received off a hard line (cable), a satellite dish, microwave antennae, and/or a TV antenna. Comcast has two primary head end sites in the Seattle area. It's cable system passes 264,744 Seattle homes and serves 139,445 households. Comcast has 2,311 Aerial plant miles and 412 Underground plant miles in Seattle (includes both fiber and coaxial cable). Millennium has one head end site in Seattle, along with 155 miles of coaxial cable and 3,240 miles of fiber optic cable serving 14,998 households out of 51,463 homes passed.~~

~~Seattle Steam~~

~~Seattle Steam is a district heating utility franchised by the City. Its service area encompasses roughly a square-mile area of the Central Business District, extending from Blanchard Street to King Street and from the waterfront to 14th Avenue, crossing over First Hill. (See Utilities Figure A-8.) The company provides steam to commercial, residential, and institutional customers for space and hot water heating, along with other uses.~~

~~Two steam-generating plants supply the network. The primary plant is located on Western Avenue at University Street. The secondary plant is located on Western Avenue near Yesler Way—the site of the original plant built in 1893. Total steam generation capacity is 750,000 pounds per hour, with boilers designed to burn either natural gas or residual oil. The network of insulated steel pipe encompasses a total length of over 18 miles beneath city streets and currently serves 220 customers.~~))


Utilities Figure A-7
Cable Franchise Areas
Franchise Areas
Summit
TCI
TCI II
Viacom
Not Franchised
N
0
1
2 Miles
Sound
Puget
Lake Washington
Green Lake
Lake Union
Elliott Bay
2004 City of Seattle
No warranties of any sort, including accuracy, fitness or merchantability, accompany this product.



Utilities Appendix

A City Utilities: Inventory, Capacity and Future Needs Assessment

Seattle City Light: electricity

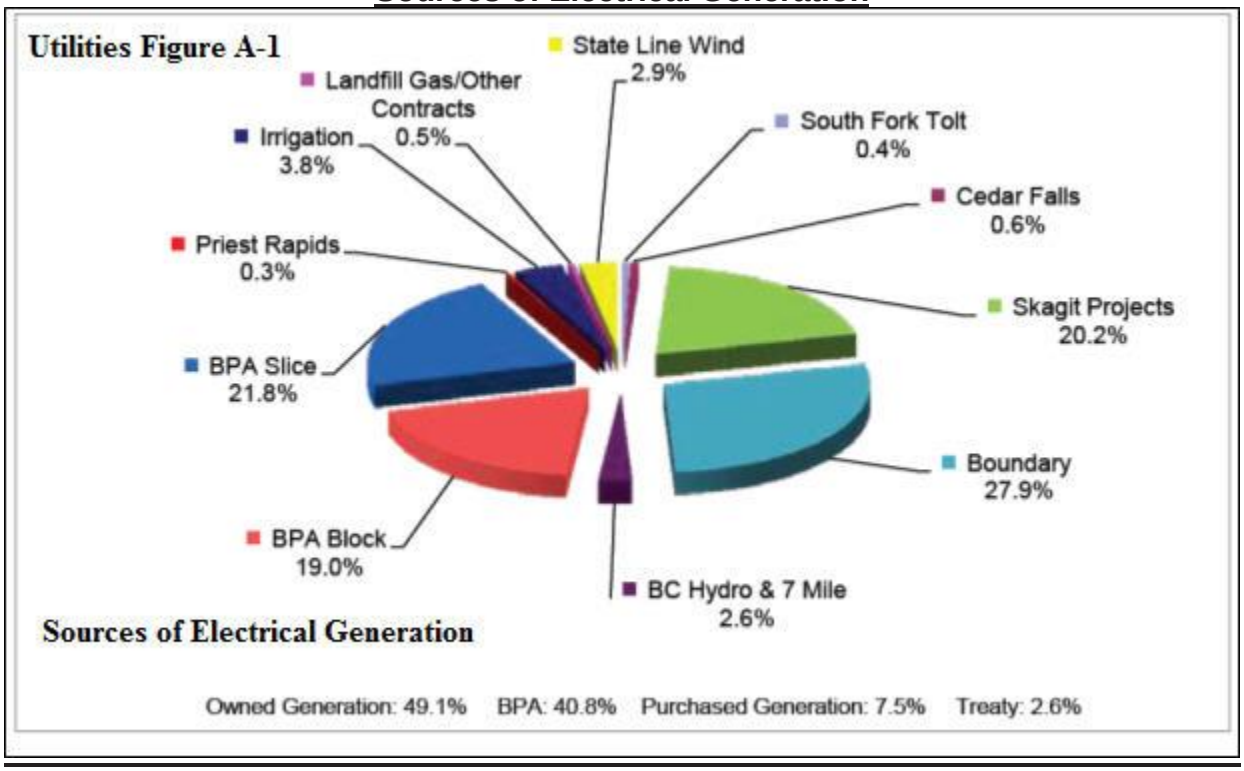
Seattle City Light (SCL) is the City-owned electric utility serving all of Seattle and some portions of other cities and unincorporated King County north and south of the city limits.

Seattle City Light: inventory & capacity

SCL supplies power from a portfolio of sources that includes self-generated assets and purchased power. SCL typically purchases 50% of all power delivered to its customers. Utilities Figure A-1 below shows the sources of power.

Utilities Figure A-1

Sources of Electrical Generation



The current resource portfolio includes SCL-owned generation resources; long-term contract resources supplemented with power exchange agreements, near-term purchases, and sales made in the wholesale power market; and conservation. City

Light-owned generation facilities include the Boundary Project, on the Pend Oreille River in northeast Washington, and the Skagit Project, which consists of three hydroelectric dams (Ross, Diablo and Gorge) on the Skagit River. The Newhalem Hydroelectric Plant on Newhalem Creek, the Cedar Falls Dam on the Cedar River, and the South Fork Tolt Dam on the South Fork Tolt River are also smaller generating facilities owned by SCL.

In addition to these power sources, SCL purchases power from a variety of other sources including:

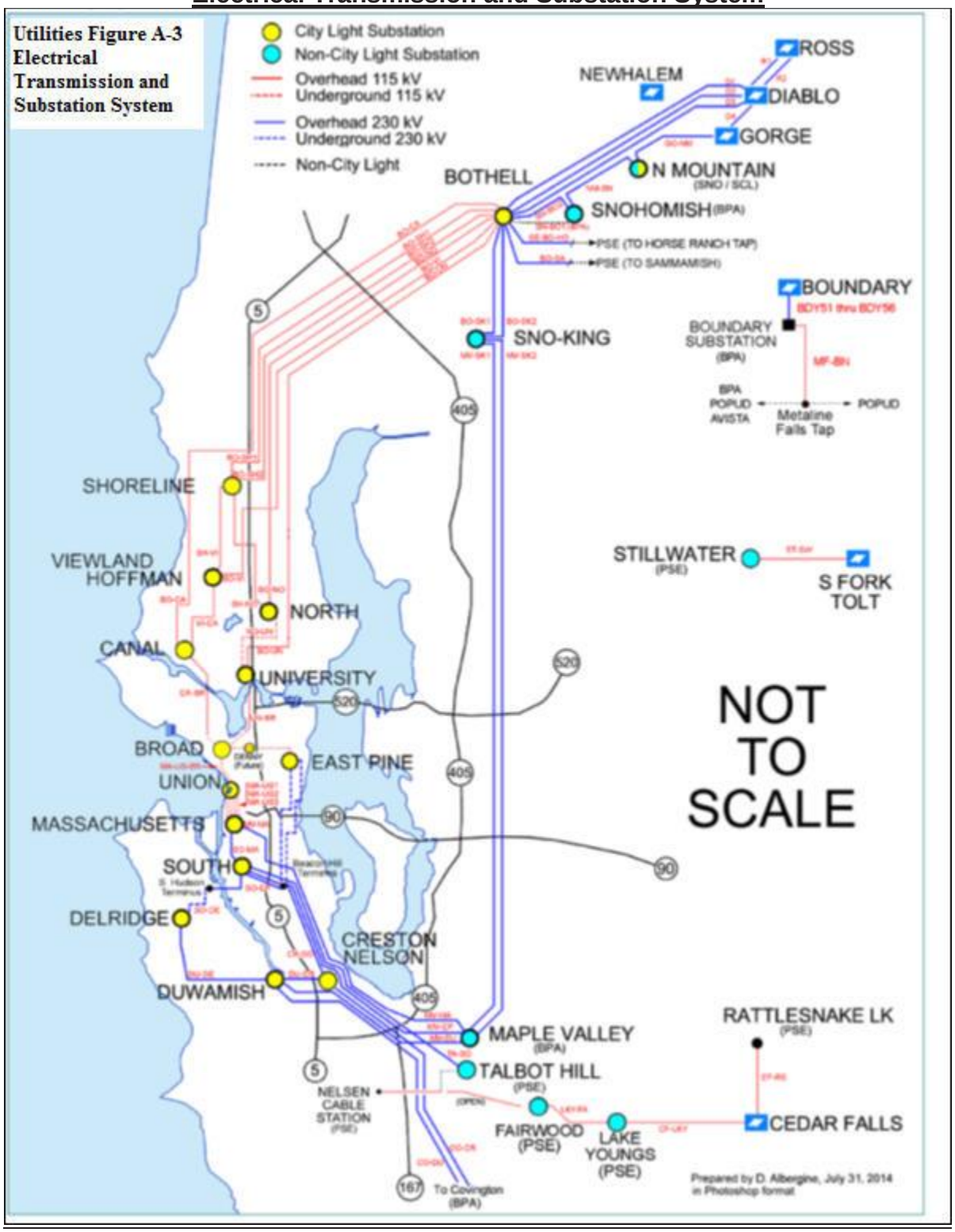
- the Bonneville Power Administration (BPA), including firm amounts under the Block Product and a share in the output from the Federal System (Slice Product), which depends on water conditions
- British Columbia Hydro
- Lucy Peak, a hydro project located near Boise Idaho
- Priest Rapids, a hydro project within the Grant County Public Utility District
- Grand Coulee Project Hydroelectric Authority, a share in the State Line Wind Project located in Southeast Washington and Northeast Oregon
- Biomass and landfill gas through Burlington Biomass, Columbia Ridge Landfill Gas Project and King County West Point Wastewater Treatment Plant.

Under an exchange agreement with the Northern California Power Agency, City Light delivers energy to NCPA in the summer and in exchange NCPA delivers energy to City Light in the winter.

SCL owns and maintains approximately 657 miles of transmission lines which carry power from the Skagit and Cedar Falls generating facilities to 14 principal substations. SCL is dependent on other transmission line owners, i.e., the Bonneville Power Administration (BPA), to bring power from its Boundary Dam hydroelectric plant and from other contracted resources, to serve its load in Seattle. The transmission grid interconnection with other utilities also provides additional reliability to meet load requirements. Power is distributed from SCL's principal substations via high voltage feeder lines to numerous smaller distribution substations and pole transformers which reduce voltage to required levels for customers. SCL owns and maintains 2,428 circuit miles of distribution lines within Seattle that deliver power from the 14 principal substations to approximately 365,200 customers (See Utilities Figure A-2 and A-3).

Utilities Figure A-2
Electrical Generation Resources

Utilities Figure A-3
Electrical Transmission and Substation System



SCL's current generation capability (owned and contracted) is adequate to serve existing customers. Because of the nature of City Light's hydroelectric system, the utility is not presently constrained by its ability to meet peak loads (typically referred to as capacity). At times, the system may be constrained in its ability to carry load over periods of heavy load hours (6 a.m. to 10 p.m.) during the winter. On an average monthly basis, City Light currently has sufficient resources to meet expected customer load in the next few years, even under serious drought conditions.

SCL sells on the wholesale energy markets the energy it does not need to meet customer load. The utility also buys energy in the wholesale markets to enhance the value of its resource portfolio and to meet occasional short-term energy deficits.

Seattle City Light: future needs assessment

New resources will be needed to meet load growth and to comply with I-937 over the next 20 years. The timing of resource acquisition depends on the rate of load growth, hydro volatility, together with the I-937 schedule for acquiring renewable resources and/or renewable energy credits.

For the transmission and distribution components of SCL's system, projected growth will be accommodated by planned transmission and distribution capacity additions. The addition of a downtown substation is being permitted to meet the load growth in the Denny Triangle and South Lake Union.

Capacity would also be expanded at the North, Duwamish, Shoreline, University and Creston substations. New substations also may be built in the next five to twenty years in Interbay, SODO, and the Highline area, depending on load growth projections and emerging real construction. Substations in the Northeast and Northwest parts of the City may also be built in the 20-year period. City Light owns properties for the Interbay, Northeast, and Northwest substations.

Seattle Public Utilities: drinking water

Seattle Public Utilities (SPU) provides drinking water to a service area population of 1.3 million within the greater Seattle metropolitan region of King County and portions of southern Snohomish County. SPU provides retail water service to customers in the City of Seattle, and portions of the cities of Shoreline, Lake Forest Park and Burien, as well as portions of unincorporated King County south of the City of Seattle. SPU also provides retail water service to Shorewood Apartments on Mercer Island and Seattle Tacoma International Airport. In addition, SPU sells wholesale water to 19 municipalities and special purpose districts, plus Cascade Water Alliance, who in turn provide the water to their own retail customers (See Utilities Figure A-4). SPU operates under an annual Operating Permit issued by the Washington State Department of Health. More information about the water system can be found in Seattle's latest Water System Plan.

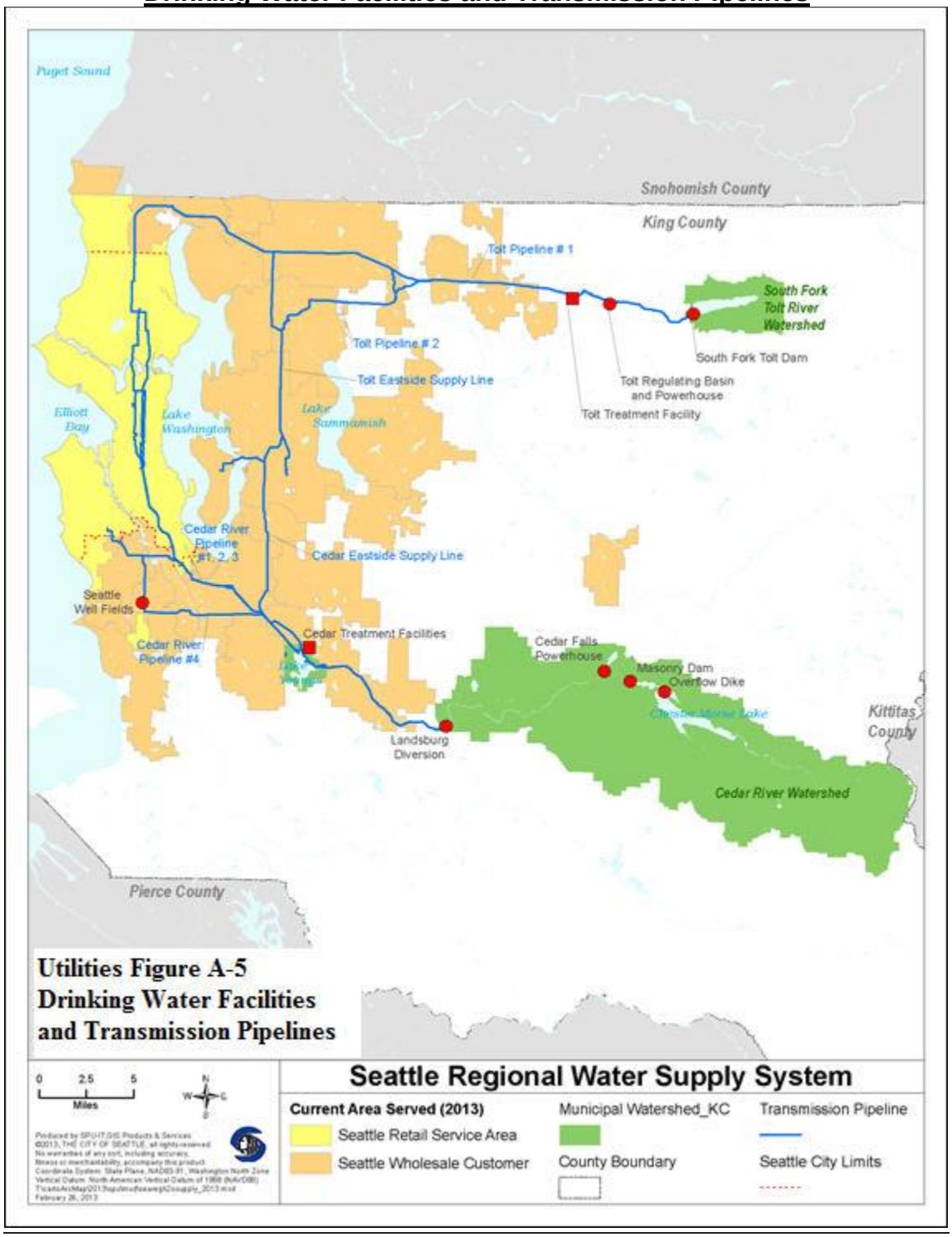
Seattle Public Utilities: inventory & capacity

SPU supplies drinking water from two major water supply sources, the Cedar River Watershed and the South Fork of the Tolt River Watershed, both on the western slopes of the Cascade Mountains. In addition, a small amount of water from Seattle Well Fields, which are located north of Seattle Tacoma International Airport, is available to provide drought and emergency supply. In total, these sources can supply up to 172 million gallons of water per day on an average annual basis. Water from these sources is treated to meet drinking water quality regulations. The treated water is then delivered to Seattle retail and wholesale customers through a network of approximately 1,880 miles of transmission and distribution system pipelines, 400 million gallons of treated water storage facilities (reservoirs, tanks and standpipes), and 31 pump stations. System-wide treatment and transmission capacity is 310 million gallons per day (See Utilities Figure A-4).

Utilities Figure A-4

Drinking Water Service Area

Utilities Figure A-5
Drinking Water Facilities and Transmission Pipelines



Seattle Public Utilities: future needs assessment

SPU expects water supply to be adequate to serve the City's existing and forecast population for at least the next 20 years. This assessment considered an analysis of future climate change impacts on both supply and demand. That analysis indicated that, although available supply could be reduced by as much as 4 percent in 2025 and 6 percent in 2050 under the warmest climate change scenario analyzed, this reduced supply would still exceed climate-impacted demands in those time periods.

One reason for this outlook is the anticipated continued reduction in per capita water use in SPU's service area. Total water use in SPU's regional water system declined by 15% from 2000 to 2013 while the population served has grown by 30%. The regional water conservation program administered by SPU for the Saving Water Partnership – a collaborative program run by Seattle and 18 of SPU's wholesale customers – has been a contributor to this reduction in water use. For the 2013-2018 period, the Saving Water Partnership has set a goal to reduce per capita water use from current levels so that total average annual retail water use of members of the Saving Water Partnership is less than 105 million gallons per day despite forecasted population growth.

Distribution and storage facilities that serve Seattle residents and businesses have adequate capacity to serve the city. There are, however, a few areas where SPU's water system has hydrants that cannot provide fire flows to existing buildings as required under current codes for new buildings. This can be caused by a combination of factors including pipes with small diameters or areas with low water pressure due to older design standards, or pipes whose interiors have been reduced by deposits. There are also areas that were originally built to now-obsolete fire codes. Depending on the location and type of development, parts of SPU's water distribution system may need to be upgraded to meet current fire flow standards for the planned development. Additionally, there are also parts of the retail service area in which water mains need to be extended to serve a particular parcel. SPU will work with developers to have needed water infrastructure in place for the development.

In addition to the distribution system improvements needed to support new development, investments are needed to replace aging infrastructure that has reached the end of its economic life. SPU is currently applying an asset management assessment to determine which facilities would be replaced using the funds available in the six-year CIP instead of being repaired.

Seattle Public Utilities: drainage & sewer

Seattle Public Utilities is charged with managing drainage and sewer systems to meet public safety, water quality, and resource protection goals. SPU's drainage and sewer service area covers the City of Seattle. King County is responsible for operating the sewage treatment plants that treat all City of Seattle sewage as well as the interceptor lines that deliver sewage to these facilities.

Seattle Public Utilities: inventory & capacity

Although a few small areas are still served by septic systems, almost all areas of the city are served by sewer. Three types of drainage and sewer systems are used in Seattle:

- combined drainage and sewer (a single set of pipes carries water from drainage water and sewage)
- separate drainage sewer systems, (the pipes carrying drainage are completely separate from the pipes carrying sewage) and
- partially separated drainage and sewer (one set of pipes carries sewage and some drainage water – general from street runoff, while the other set carries only drainage water).

The SPU system collects residential, commercial, and industrial sewage and delivers it to interceptor lines operated by the regional sewage treatment agency (King County). While King County operates a regional system including various treatment plants, sewage from Seattle is primarily treated at the West Point Sewage Treatment Plant before being discharged into Puget Sound (See Utilities Figure A-5). The West Point Treatment Plant is a secondary treatment facility, with a monthly average capacity of 133 million gallons per day (MGD) and daily peak flow capacity of 440 MGD. Of the daily peak flow capacity, 300 MGD would receive secondary treatment and the remainder would receive primary treatment. The West Point Treatment Plant serves 1.3 million people including residents of Seattle, King County north of Seattle, and South Snohomish County.

The capacity of the drainage and sewer system in some areas is limited during peak storm events. During or following intense or prolonged periods of rainfall, some of the systems cannot accommodate the combined drainage and sewage flows, resulting in combined sewer overflows (CSOs) being discharged into area waters. CSOs occur in both the regional and the City systems. There are two “wet weather” treatment facilities, Alki and Carkeek, that partially treat a portion of this overflow, but in many areas the overflows discharge completely untreated water.

Seattle Public Utilities: future needs assessment

Generally, the City-operated drainage and sewer facilities in Seattle have been planned and sized to serve the maximum or build out conditions under zoning at the time and will be adequate to serve the level of increased growth proposed in the Plan. The capacity of the sewer system is limited in confined areas of the city, where there have been historic hydraulic and system backup problems. In addition, there are areas of drainage deficiencies and water quality issues in the City. These problems are being addressed through developer- funded facility upgrades and by Seattle Public Utilities’ Capital improvement Program (CIP).

Seattle Public Utilities: solid waste

Various state and local regulations and guidelines influence Seattle's solid waste planning. Chief among the regulations is the State of Washington's 1969 legislation Revised Code of Washington (RCW) 70.95 requiring local solid waste plans. Seattle Public Utilities manages this responsibility by regularly reviewing and updating Seattle's Solid Waste Plan. The Plan has a 20-year horizon and provides strategies for future solid waste management needs.

Seattle Public Utilities: inventory & capacity

A network of public and private service providers and facilities collect, transfer, process, and landfill Seattle's discards. All Seattle's Municipal Solid Waste that is not recycled or composted is, by law, under city control.

SPU contracts with private firms to collect residential garbage, recyclables, and yard and food waste (organics). The same contractors collect commercial garbage. Open-market providers collect commercial recycling and organics. Businesses may choose to "self-haul" their solid waste materials.

Transfer and recycling processing facilities consolidate collected solid waste materials and route them to their next destination. Garbage and organics collected by the city's contractors goes to the transfer stations owned and operated by the city. Recycling picked up by the city's contractors goes to the city's contracted recycling processing facility. Recycling picked up from businesses may go to a recycling processor or one of the many local businesses specializing in recycled materials. Other collected materials go to the city's transfer stations, or private transfer stations or processors. Occasionally, residential garbage is taken to private transfer facilities such as when a city station temporarily needs to close.

At the transfer stations, garbage is loaded into rail containers and trucked to Seattle's contracted rail yard. Assembled trains of containers are hauled to the city's contracted landfill. Processed recyclables go to various materials markets. Organics go to the city's contracted organics contractor to be processed into compost.

SPU also runs two moderate risk waste (MRW) collection facilities. Seattle provides this service as a partner in the Local Hazardous Waste Management Program (LHWMP) in King County.

Except for the two city-owned transfer stations, the equipment and facilities necessary to operate Seattle's solid waste system are provided by contracted services.

Seattle Public Utilities: collection

Two collection companies collect all residential solid waste materials and commercial garbage. Current contracts started in March 2009 and run until at least 2017. The companies provide all aspects of collection, including trucks, truck yards, and labor. Service areas and routes are planned to ensure efficient use of collection vehicles and to collect consistent amounts of material each day so that the daily capacity of each

transfer station is not exceeded. Transfer and processing facilities need an even, predictable inflow to avoid having to stockpile incoming materials.

Seattle Public Utilities: transfer stations

The city owns and operates two transfer stations: North Transfer Station in the Wallingford neighborhood, and South Transfer Station in the South Park neighborhood. Two private transfer stations supplement city facilities.

The city's transfer facilities now serve a variety of vehicles and customers and receive a range of discarded materials that include garbage, recyclables, and compostables. In addition to transferring materials delivered by collectors, the stations play an important role in accepting materials unsuitable for curbside collection. Residents with large, bulky items or excess quantities can bring these materials to the stations for recycling or disposal. The stations also serve businesses that choose to self-haul their waste and recyclable materials.

In 2007, the Seattle City Council decided to proceed with improvements to the two city-owned stations, which were originally built in the 1960's. SPU completed construction of the new South Transfer Station in 2013. The new North Transfer Station will be complete in 2016. Demolition of the old South Recycling and Disposal Station and redevelopment of that site is scheduled to be complete in 2018.

The two private transfer facilities are located in the industrial area south of downtown Seattle.

Seattle Public Utilities: recycling and composting

SPU contracts with Rabanco Recycling Center for traditional recycling (newspaper, glass bottles, tin cans, etc.). It is located in the Duwamish Manufacturing/Industrial Center.

Most commercial recycling is provided by private arrangements. Vendors collect both mixed and source-separated materials, and take them to a variety of processors in the Seattle area. Which processor they use depends on the material and any agreements haulers and processors may have.

For organics composting, SPU implemented new contracts in 2014 with two vendors: Lenz Enterprises, Inc., and PacifiClean Environmental of Washington, LLC. Lenz Enterprises is mainly responsible for taking organics from SPU's Seattle's North Transfer Station to its processing facility in Stanwood, Washington. PacifiClean will take mainly organics from SPU's South Transfer station to their processing facility that will be located in central Washington. Both companies have guaranteed access to backup facilities.

Seattle Public Utilities: disposal

The City of Seattle contracts with Waste Management of Washington for rail haul and disposal of all non-recyclable waste at Columbia Ridge Landfill in Gilliam County,

Oregon. After it has been compacted into shipping containers at transfer facilities, garbage is hauled to the Argo rail yard and loaded onto the train. The Argo Yard is owned and operated by the Union Pacific Railroad, and is located in the Duwamish Manufacturing/Industrial Center. Trains leave Seattle six times a week, stacked two-high. Waste Management of Washington owns the containers. The Columbia Ridge Landfill and Recycling Center is owned and operated by Oregon Waste Systems, a division of Waste Management.

Seattle Public Utilities: future needs assessment

As the City of Seattle contracts with private service providers for recycling processing, organics composting, and landfill long-haul and disposal, any programmatic changes would be made through those contracts. Since Public Health-Seattle & King County regulates all solid waste handling facilities in their jurisdiction, their approval is required for any a new public or private facilities for the transfer, recycling, composting and landfilling of solid waste materials.

Although the overall amount of waste generated in the city will increase with projected residential and employment growth over the 20 year plan horizon, the percentage of waste that will be directed to disposal is expected to decrease. Seattle's overall municipal solid waste generation (MSW) has generally followed the ups and downs of economic trends, even as population has steadily increased. Total generation saw a prolonged downward trend after 2007 through the Great Recession and through 2012. SPU expects overall waste generation to increase gradually over the next two decades, not rising to pre-recession levels of about 850,000 tons of material per year until about 2027 or after.

Seattle's diversion goal is to recycle or compost 70% of the city's MSW by 2022. In 2012 Seattle recycled or composted 56% of its MSW. Seattle recently set an additional goal, to recycle 70% of the city's construction and demolition (C&D) waste by 2020. The majority of C&D waste is managed in the private sector, from generation through processing and disposal.

Shifts in consumer patterns change over time. Likewise, new materials and combinations of materials continue to enter the consumption cycle. SPU will conduct waste composition analyses frequently enough to be able to respond to these changes. For example, SPU will continue to work with processors to designate additional recyclable materials, and modify collection programs as needed.

Future Needs Assessment

collection

Seattle will continue with its strategy to competitively contract for collection services. The contractors will adjust to changing service needs, such as more recycling, over time.

transfer

The capacity provided by the rebuild of Seattle's two transfer facilities, in conjunction with private transfer capacity, is projected to satisfy Seattle's solid waste transfer needs for at least as long as the 50-year expected life of the rebuilt facilities. Seattle's new facilities are purposely designed for flexibility in response to a changing mix of solid waste materials over time.

recycling & composting

Recycling capacity at private facilities is considered adequate for at least two decades, and Seattle will continue to contract for these services. Seattle's current contract is guaranteed through 2019. In 2014, Recology Cleanscapes opened a new high capacity mixed-material recycling facility in the Duwamish Manufacturing/Industrial Center. Furthermore, the Washington State Department of Ecology currently lists more than 280 recycling facilities in King, Pierce, and Snohomish counties. In addition to the new Recology Cleanscapes facility, at least 3 of these are large facilities that process mixed recycling and are within 20 miles of Seattle. SPU expects that many other private recyclers that handle limited ranges of materials will continue their presence in the local market.

Current composting capacity is adequate for the 20 year planning horizon. However, statewide there is concern about future capacity as more cities and counties divert more organics. Seattle's two organics contracts are guaranteed, and may be extended through 2024. As regional demand for composting increases, composting service providers are researching and developing new technologies, for example anaerobic digestion.

disposal

Columbia Ridge landfill, Seattle's current contracted landfill, projects that it will be able to receive material beyond the current contract's guaranteed 2028 end date. Seattle plans to continue with contracting for this service. Although Seattle's disposal alternatives are restricted through the life of the contract, the City will continue monitoring emerging alternate technologies. Rail-haul capacity has not been an issue. The contract provides for alternate transportation if rail lines become unavailable.

City communications facilities

The City Department of Information Technology, in collaboration with City Light and other departments, jurisdictions and institutions, installs, owns and/or operates an extensive radio and broadband information and communications technology (ICT) infrastructure, including radio for emergency services and field work, and fiber optic for transmission of voice, video and data for delivery of city services. The City leases some services from private providers, but has steadily increased the network of public infrastructure to city buildings. The City has a fiber sharing agreement with other public agencies that enables joint installation and maintenance of an extensive network of conduit and which minimizes cost, digging and installation of broadband infrastructure. The City also leases excess fiber capacity to private providers.

B Investor-Owned Utilities

natural gas

Puget Sound Energy (PSE) provides natural gas service to more than 780,000 customers in six Western Washington counties: Snohomish, King, Kittitas, Pierce, Thurston, and Lewis. As of 2014, it is estimated that PSE serves over 140,000 customers with the City of Seattle.

Natural gas comes from gas wells in the Rocky Mountains and in Canada and is transported through interstate pipelines by Williams Northwest Pipeline to Puget Sound Energy's gate stations.

Supply mains then transport the gas from the gate stations to district regulators where the pressure is reduced to less than 60psig. Distribution mains are fed from the district regulators and individual residential service lines are fed by the distribution mains.

PSE does not have any major projects planned in Seattle, but new projects may be developed in the future at any time due to:

- New or replacement of existing facilities to increase capacity requirements due to new building construction and conversion from other fuels.
- Main replacement to facilitate improved maintenance of facilities.
- Replacement or relocation of facilities due to municipal and state projects.

cable

The FCC provides limited regulatory authority to local jurisdictions to enable franchise agreements with providers of cable television. As of 2014, the City of Seattle had cable franchise agreements with two companies: Comcast and Wave Broadband. Comcast is the city's largest provider, serving approximately 2/3 of the city. These companies also provide telephone and broadband Internet services. As of 2014, Wave also owns CondoInternet, which offers gigabit Internet service in a limited, but growing area of Seattle.

The franchise agreements provide for consumer protection and public benefits, such as delivery of cable television and public Internet access to City community centers, public

housing, and non-profits providing Internet access and skills training to technology disadvantaged residents. The companies are allowed to compete, though overlapping service areas have been minimal as of 2014. The franchise agreements have generally been for 10 year periods with some adjustment when companies are sold. See seattle.gov/cable/franchises.htm for more detail.

landline telephone

CenturyLink, which purchased QWEST Communications, is the largest telephone company, providing local landline telephone and related retail and wholesale communications services throughout the entire city. They maintain a number of poles, transmission lines and network architecture. Additionally, there are a number of small companies that provide limited telephone service, often by paying for the use of other company's infrastructure.

wireless and cellular

Seattle is served by numerous companies providing wireless and cellular services. These communications utility companies tend to own wireless and cellular transmission facilities as well as fiber backbone to relay the data received in the transmission facilities. Common wireless technologies include point-to-point microwave as well as Wi-Fi internet services. Microwave antennas require location for line of sight transmission. Cellular and Wi-Fi transmitters have limited transmission radius and are also dependent on the strength of the antenna in user's mobile devices. As the number of users and the demand for higher data transfer (e.g. for watching or sending video) grows, the infrastructure will also require expansion. Greater distribution of fiber optics through the city enables higher bandwidth connections to these antennas. The industry is continuing to evolve, so the city is likely to see continued demand for placement of antennas, though technology developments may also result in some reduction of the number required.

radio and broadcast television

Seattle is also served by a number of radio and television broadcast facilities who maintain antennas and transmission equipment in the city which, like cellular equipment, may be located and operated on company sites, or placed on other public or private buildings through leasing arrangements. Some of these companies also operate other communications hosting or networking services. The FCC issued a limited number of low-power FM construction licenses to non-profit entities, starting in 2014, that require siting of small antennas and will enable local information distribution.

district energy

Enwave Seattle is a district energy utility franchised by the City. Enwave produce heat at a centralized plant and distributes steam to commercial, residential, and institutional customers for space and hot water heating, along with other uses, by underground lines. Its service area encompasses roughly a square-mile area of the Central Business District, extending from Blanchard Street to King Street and from the waterfront to 14th Avenue, crossing over First Hill.

Enwave Seattle is a privately-owned utility that provides heat to approximately 200 buildings in Seattle's Central Business District and First Hill neighborhoods. Enwave Seattle's mission is to deliver a reliable, cost-effective and efficient source of heat that benefits its customers, the environment and the Seattle community.

Two steam-generating plants supply the piping network. The primary plant is located on Western Avenue at University Street. The secondary plant is located on Western Avenue near Yesler Way—the site of the original plant built in 1893. Total steam generation capacity is 670,000 pounds per hour, with boilers designed to burn renewable biomass, natural gas or diesel oil if natural gas is not available. The network of insulated steel pipe encompasses a total length of over 18 miles beneath city streets and currently serves approximately 200 buildings.

The City is also working to establish district energy utility systems in South Lake Union, Denny Triangle, and First Hill. Systems for these neighborhoods are in varying planning stages, but each, if established, would likely be a closed-loop water-based utility system providing heating, hot water, and potentially cooling services to building owners. Energy sources for the utility system would largely be comprised of waste heat already in the neighborhood, including waste heat from data centers, sewer lines, and condensate from the nearby Enwave system.