SEATTLE PUBLIC UTILITIES
2013 WATER SYSTEM PLAN

C. POLICIES, PROCEDURES AND STANDARDS

APPENDIX C-5
WATER AVAILABILITY CERTIFICATES

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Seattle Public Utilities

Policy and Procedure

Title	Number
Water Availability Certificates (WACs)	CS-101
Responsibility	**Supersedes**
Drinking Water Division	2003 version
SPU Director's Approval	**Effective Date**
Ray Hoffman	May 9, 2011

1. PURPOSE

To establish policies for Seattle Public Utilities for issuance of Water Availability Certificates (WACs) in response to either certain applications within SPU Water's direct service area for the issuance of building permits, land use permits, or to customer requests for information about SPU's infrastructure and capacity requirements.

2. ORGANIZATIONS AFFECTED

- City of Seattle, Seattle Public Utilities
- City of Seattle, Department of Planning and Development
- City of Seattle, Fire Department
- King County Department of Building and Land Use
- King County Fire Districts
- City of Shoreline, Planning and Development Services
- Shoreline Fire District
- City of Burien
- City of Renton
- City of Lake Forest Park
- Developers/potential developers within SPU Drinking Water's direct service area

3. DEFINITIONS

Condominium is a type of housing consisting of one or more multiple-unit buildings. Each unit is owned separately but the surrounding land is owned in common. For purposes of this policy, the entire condominium is considered a single legal parcel.

Cottage-style development is a type of multi-family housing consisting of detached, separately-owned units with the surrounding land owned in common. For purposes of this policy, the entire cottage-style development is considered a single legal parcel.

Developer is a property owner, or a property owner's designee, who is building a structure to be supplied with water service on at least one legal parcel.

Official copy of signed original.

Engineering standards are Seattle Standard Specifications and Standard Plans, professional and technical society standards (such as AWWA, APWA), and City memoranda specifying design standards.

Frontage, for the purposes of this policy, is a boundary of any legal parcel or unit lot abutting a street right of way which is at least ten feet wide.

If the parent lot of a subdivision has frontage on more than one street right of way, the resulting lots are considered to have frontage on the street right of way nearest to the boundary.

If the parent lot of a subdivision has frontage on only one street right of way, all of the resulting lots are considered to have frontage on the same street right of way as the parent lot.

Landlocked Lot is a parcel or unit lot which has no street right of way within ten feet of any part of the boundary.

Master meter is a metered water service from a SPU-owned water main, serving more than one legal parcel or unit lot.

No-tap main is a water main for which SPU has determined that no new services shall be installed. Examples of no-tap mains are transmission or large diameter feeder mains, substandard mains with capacity inadequate for service, and mains from a different pressure zone. In some circumstances a main may be a no-tap main for services on only one side of the street.

Private water line is the customer-owned water pipe that extends from the end of the SPU water service at the city union point.

Standard water main is an SPU main which meets current size and material engineering standards and which can deliver required flows to service the project and surrounding area.

Townhouse, or *unit lot subdivision*, is a type of high-density residential development consisting of single or multiple-unit buildings. Each unit and its surrounding land are separately owned. For purposes of this policy, each unit lot is considered a separate legal parcel.

Union is a coupling at the end of SPU's water service connecting the public water service to the privately owned water service.

Water service is the portion of the SPU water distribution system dedicated to providing metered water service to a specific account. The water service begins at the water main, continues through the meter, and ends at the city union point.

4. GENERAL POLICIES

A. SPU will offer all customers in like circumstances the same requirements, services, agreements, or privileges.

B. WACs provide information on the SPU water system only. Information about on-site or privately owned water mains and/or hydrants is not included. The WAC document includes the following information:

1) Location of the property, including street address or Assessor's Parcel Number, and SPU map number.
2) Type of certificate (Inquiry, Meter Only, Building Permit or Land Use).
3) Certificate number, date of issue, and certifier's name.
4) Description of existing service(s) if any, including size, type and material.
5) Pressure zone and elevation.
6) Description of existing water main (if any), including size, material, installation date and distance from margin.
7) Description of hydrant, including distance from site and flow test or flow model, if available

C. Requirements for water service will be determined prior to issuing the WAC. An approved WAC is required for approval of building and land use permits.
   1) If an existing water service will be retained with no change, OR if the proposed project does not require water service, OR if water service is available at the project site with no changes to the existing distribution system, the WAC will be approved.
   2) If changes to the distribution system are required to provide water to the project, the WAC will not be approved, and the required changes to the distribution system will be described on the WAC.
   3) An Approved with Contract WAC will be issued when the property-owner/developer signs SPU's Property Owner Contract to Change SPU's Distribution System and pays the required fees.
   4) If the proposed project changes, the WAC will be re-evaluated. Changes to the project may result in increased requirements for water service.

D. SPU may reduce or waive the water main requirements under this policy, or may require an alternate improvement of equal or lesser cost, if such changes best serve the distribution system.

E. In some conditions (e.g., 20 percent or greater slopes, riparian corridors or other geological barriers, poor soil) the public right of way may be inappropriate for water main operation. The requirement to install a water main may be waived in such circumstances. SPU will determine on a case-by-case basis whether engineering remedies exist which would suffice for the construction of a main extension.

F. In special circumstances, the system may be best served by installation of a water main larger than required by this policy. In such cases, SPU will pay the difference in materials cost between the required standard main and the desired size.

G. In some circumstances, including but not limited to state highways, divided roads, presence of active railroad tracks, or other obstructions in the right of way, installation of a standard water main to serve each side of the road may be required.

H. Conditions not specifically described in this policy, including but not limited to multiple households on a single service, relocation of an existing service, increasing the size of an existing service, multiple services to the same legal parcel, and "no-man's land" areas not included in any existing water district, shall be evaluated on a case-by-case basis.

I. The property owner or developer may appeal the requirements made on the WAC by calling or writing to SPU. The WAC Review Committee will review the project and respond within two (2) weeks after receipt of the appeal to all interested parties, including the person appealing and other affected agencies. A revised WAC will be issued if required.

5. REQUIREMENTS FOR NEW WATER SERVICE

A. If no frontage of a parcel or unit lot abuts an existing standard water main, a standard water main will be extended to cross the full frontage of the property, and a portion of the adjoining street and/or alley, if any.

B. Unless landlocked, a parcel or unit lot must have at least ten feet of frontage abutting an existing standard water main to obtain water service from that main. The ten-foot width must be maintained from the frontage to the parcel or unit lot.

C. For parcels or unit lots with frontage on only one street or right of way:
   1) If there is an existing standard water main in that right of way, service shall be provided from that main.
   2) If there is not an existing standard water main in that right of way, a standard main will be extended across the full frontage of the legal parcel, and a portion of the adjoining alley, if any.
   3) SPU shall waive the requirement to install a standard water main if
      a. The parcel is located in a single family zone, AND
      b. The parcel is the last developable, single-family lot on the block, as determined by the permit-issuing agency with jurisdiction over it, AND
      c. There is no existing water main on the block.

D. For parcels or unit lots with frontage on more than one street right of way:
   1) If there are existing standard water mains on more than one frontage, SPU shall determine which main shall provide water service to the parcel.
   2) If a parcel or unit lot has frontage abutting only one existing standard water main, service shall be provided from that main.
   3) If there are no existing standard water mains on any frontage, SPU may require installation of a standard water main across the full frontage of the legal parcel, and a portion of the adjoining alley, if any.

E. If a parcel or unit lot is landlocked (has no frontage within ten feet of any right of way), SPU may require the Developer to install a water main on private property, to be owned by SPU. Landlocked parcel(s) or unit lot(s) for which SPU determines not to require a water main shall be served via private water lines through private easements, or through a master meter.

F. If the parent lot of a subdivision, including unit lot subdivisions, is more than 200 feet deep as measured from the property line at the public right of way to the point farthest away from it, SPU may require the Developer to install a water main on private property, to be owned by SPU.

G. New water mains installed under this policy shall follow current City of Seattle Plans and Specifications and SPU water main design standards.

H. Private water lines shall be on private property unless specifically approved by SPU and SDOT.

I. At SPU's discretion, new services may be installed each in a separate standard meter box (individual), or consolidated together into larger vaults and connected to the main with manifold piping, whereby each group of services is supplied from a single tap on the existing or newly installed water main in the public right of way.

J. The easement for an SPU-owned main on private property must be at least twenty feet wide.

K. Private water lines in easements may be bundled if desired.
   1) Bundled private water lines shall be installed in a casing pipe.
   2) Each private water line in the bundle shall be separately identified.

L. The easement for one private water line or for a casing pipe containing bundled private water lines must be at least 5 feet wide. If more private water lines will be installed in any portion of an easement, a minimum of one additional foot of easement width must be allowed for each additional private water line. The easement must be continuous from the water meter to the parcel or unit lot served by that meter.
   1) The easement must be obtained by the developer, recorded, and a copy provided to SPU at the time of ordering water service.
   2) Individual and bundled private water lines in easements shall be impermeable to petroleum products.

M. Cottage developments shall be served by an SPU master meter. Private submeters may be used if desired.

N. A common fire and/or irrigation service may be installed to serve properties which have individual domestic services (e.g., live/work townhouses with a common garage).

O. A covenant and a homeowners' association are required for legal parcels which are served by a master meter (with or without private submeters) OR by a privately owned water distribution system, OR which share a common fire and/or irrigation service. To order water service for the project, the Developer must provide:
   1) A signed, recorded covenant for each legal parcel/living unit within the boundary of the project stating that SPU will not separate shared water service(s).
   2) Documentation of the creation of a homeowners' association or other entity which will be responsible for the operation, maintenance, repair, replacement of the privately owned piping and/or shared water service as well as the payment of all SPU utility charges.
   3) SPU will not read or bill any privately owned water meters from privately owned water systems.

P. Lot boundary adjustments which have the effect of avoiding water main installation requirements under this policy shall not be considered by SPU when such determination is made.

6. AUTHORITY/REFERENCES

- RCW 80.28.080, Gas, electrical, and water companies
- SMC 21.040.060, Water rates and regulations

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SEATTLE PUBLIC UTILITIES
2013 WATER SYSTEM PLAN

C. POLICIES, PROCEDURES AND STANDARDS

APPENDIX C-6
WATER SERVICE WITHIN THE DIRECT SERVICE AREA

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Seattle Public Utilities - Policy & Procedure

Subject:		Number:
Water Service within the Direct Service Area		SPU-CS-102
		Effective: October 17, 2003
		Supersedes: SPU-CS-010 (12/30/83) 400P-23-05 (9/01/82)
Approved:	**Department:** Seattle Public Utilities	**Page(s):**

1.0 PURPOSE

To establish policies and procedures for Seattle Public Utilities for granting water service connections to its water distribution system within its direct service area.

2.0 ORGANIZATIONS AFFECTED

2.1 City of Seattle, Seattle Public Utilities (SPU)
2.2 City of Shoreline
2.3 King County
2.4 Customers residing near and within SPU's direct water service area

3.0 AUTHORITY FOR RULE

3.1 Revised Code of Washington 35.91; 35.92; 80.28.080
3.2 Seattle Municipal Code 21.04
3.3 Most current SPU Water System Plan

4.0 GENERAL POLICIES

4.1 Standards and Requirements for New Services

4.1.1. All new SPU water service connections will be connected to a standard water main designed to serve that property. (see also Policy SPU-CS-101, Water Availability Certificates)

4.1.2 All water service connections to SPU's water distribution system will be metered and either monthly or bi-monthly bills will be sent to the property owner or owner's designee,

4.1.2.1 The only exception to the above metering and billing policy will be for the fire services on Interstate Highways 5 and 90.

4.1.3 Application for water service by the property owner will be approved when SPU has issued a current, approved Water Availability Certificate, and when SPU has been provided with the following:

4.1.3.1 SPU's application for water service form completed and signed by the property owner, and

4.1.3.2 the common street address and legal description of the parcel to be served, and

4.1.3.3 utility plans showing all existing and proposed utilities

4.1.3.4 all recorded easements needed for private service lines, when applicable.

4.1.3.5 payment of the current standard or estimated deposit fees for installation, and

4.1.3.6 payment of the street use permit if applicable, and

4.1.3.7 payment of the Connection Charge in full (see Policy _____, Connection Charge), or entering into SPU's finance contract for its payment over a 10-year period

4.1.4 Each legal parcel will be served by one domestic water service, except

4.1.4.1 When SPU has allowed or required parcels not abutting a water main to be served by either a privately owned water main or long service lines, a covenant or homeowner bylaws will be filed with those parcels to run with the land and prohibit the property owners of those parcels from requesting individual service directly from SPU's distribution system.

4.1.4.2 Certain parcels may be served by more than one domestic service due to the use of the property, i.e., hospitals, nursing homes and similar facilities, to assure continuous uninterrupted water service. Each service will be from separate water mains abutting the parcel when possible.

4.1.4.3 A community containing more than one legal parcel and either more than 350 feet of private road, or a gated private road of any length, will be served with one domestic meter at the perimeter of that community of legal parcels.

It may be possible that a second SPU domestic service be available to this community's private system from a second SPU-owned water main if needed to provide reliability via a "looped" private water system, i.e., a system having two separate sources of water from the SPU distribution system. Both domestic services would be located at the perimeter of the community of legal parcels. (see also Sec. 4.4.5 of Policy SPU-CS-101, WACs)

4.1.4.4 One very large parcel of land which contains a privately owned water distribution system may be served by more than one domestic service to provide reliability via a "looped" private water system (e.g., the University of Washington campus).

4.1.4.5 One property may not serve another with water service, unless explicitly approved by both SPU and the affected property owners for a temporary, specified time period.

4.1.4.6 Each legal parcel will be eligible for separate water service for irrigation in addition to other domestic service.

4.1.4.7 Each legal parcel will be eligible for separate fire-only service.

4.1.5 Fire-only water services will consist of a detector check valve and a bypass meter assembly.

4.1.5.1. Water may be used at no charge for testing of the on-property fire suppression system monthly as follows:

- 100 cubic feet for fire services 1-to-2inches
- 500 cubic feet for fire services 3-to-5 inches
- 1,000 cubic feet for fire services larger than 5 inches

4.1.5.2. The detector check valve will be changed by SPU, at the property owner's expense, to a fully metered fire service if water used at the property regularly exceeds the above limits set for system testing

4.1.6. If a property's water service will be used solely or in part for an internal fire suppression system (e.g. sprinkler heads), the property shall not be served by a water service less than one inch (1") in size.

4.1.7 Water service to direct service area customers will be from SPU's distribution water main system and not from its supply or transmission pipelines.

4.1.8 Water services up to two inches (2") in size will be charged a reduced installation rate when

4.1.8.1 a new water main to serve the property and to be owned by SPU is installed by a property owner, and

4.1.8.2 the property owner's contractor will trench for SPU's service line and backfill the trench.

4.1.9 Water service to customers within SPU's direct service area may be obtained from a water purveyor whose distribution system abuts the property within SPU's direct service area and SPU requests this purveyor in writing to provide temporary service to a particular property until SPU is ready to serve from its own distribution system.

4.1.10 SPU will consider an application for water service to a property not located within its direct service area only when

4.1.10.1 SPU's water service pipe and meter will be within SPU's direct service area, and

4.1.10.2 the water utility whose direct service area includes this property has requested SPU in writing to serve this property until such time as that utility is prepared to serve it directly, and all other applicable requirements in SPU's policies have been fulfilled.

4.1.11 Temporary water service from the distribution system for less than six months may be authorized via a hydrant use permit or hydrant use meter issued by SPU Customer Services if no other source of water is available. No administrative or water usage charges for hydrant permit holders will be made for water main installation projects sponsored by SPU and for which SPU will pay all project costs.

4.1.11.1 Hydrant use without a hydrant permit or hydrant meter, or use of a restricted hydrant, will result in monetary penalties in addition to all other hydrant use charges:
$ 300 penalty for the first occurrence
$ 500 penalty for the second occurrence
$1,000 penalty for the third and subsequent occurrence

4.1.11.2 Permits may be issued if water use will be for less than 8,000 gallons per day

4.1.11.3 Permit holder will pay a permit fee as well as a daily charge for the water used. Payment may be made either in advance of service, or subsequent to service following a billing by SPU. A billing fee will be charged for payments made subsequent to service.

4.1.11.4 Permit holder will use an SPU supplied (or approved) hydrant valve.

4.1.11.5 Permit holder will pay SPU for any hydrant repairs necessitated by the improper operation of the hydrant at a time and material basis.

4.1.11.6 Hydrant meters will be required either

4.1.11.6.1 at the discretion of SPU Customer Services, or

4.1.11.6.2 under the following circumstances:

- water use will exceed 8,000 gallons per day, and
- use will be longer than 30 days, and
- no other acceptable or practical method of measuring or estimating actual water used is practical, and
- one hydrant only will be used, and
- projected weather conditions will permit the meter to be used without danger of freezing its parts.

4.1.12 Metered service will be required when temporary water is needed from one location for longer than six months.

4.2 Standards and Requirements for Changes to Existing Services

4.2.1. Existing substandard water service will be brought to standard water service whenever possible.

4.2.1.1 When a distribution main is installed which extends the distribution system to abut properties not formerly served by an abutting main, or to serve properties not formerly served by a main designed to serve that property, each property will abandon the service line to the nonabutting main and receive service from the main designed to serve or abutting the property.

4.2.1.1.1 Property owner will not be responsible for the cost either for SPU to retire the existing water service if it is two inches (2") in size or smaller, or for SPU to relocate an existing two-inch (2") or smaller water service. (see also Policy_____ Connection Charge)

4.2.1.1.2 Property owner will be responsible for the SPU costs for retirement and relocation of the existing water service if it is larger than two inches (2"). (see alsoPolicy _____ Connection Charge)

4.2.2. When a water main is replaced, existing water services from that segment of water main will be transferred to the new main, the property owner will not be responsible for either retirement or new installation charges.

4.2.3. When the City or SPU changes the street or other infrastructure abutting a property with substandard water service, that water service will be changed to conform to standard practices in preparation for other changes to or in the street.

4.2.4. Property owners may request changes in the size of their water service, the location of their meter along the frontage of their property, and the type of use of their existing water service.

4.2.4.1. When increasing a service size, SPU will both retire an existing service and tap for a new service and property owner will pay SPU standard or time-and-material charges.
(see also Policy _____ for Connection Charge.)

4.2.4.2. When decreasing a two-inch (2") or smaller service, SPU will reduce the size of the existing meter and property owner will pay on a time-and-material basis. Any subsequent changes to water service size at this property will require a service retirement and new tap.

4.2.4.3. When decreasing a service larger than two inches (2"), SPU will both retire the existing service and tap for a new service and property owner will pay SPU standard or time-and-material charges.

4.2.4.4. Property owner may request a relocation of an existing service to a site along the property's frontage, the new location may not be in a driveway or within five feet (5') of a tree. SPU will both retire the existing service and tap for a new service if the lateral distance between the old and new locations is 31 inches or greater. Property owner will pay SPU standard or time-and-material charges in keeping with the current SPU Standard, Connection and Administrative Charges.

4.2.5. An existing domestic, irrigation or fire service may be changed to another use at the request of the property owner if no change in size or location is needed. (see Connection Charge Policy _____)

4.2.5.1. The property owner will pay for any SPU services required to change a fire-only service to a combination fire and domestic service

4.2.5.2. Any other changes to meter type will be at SPU's discretion at no additional cost to the property owner when no change in water service location or size is requested by the property owner.

4.2.6. Property owner will be charged for SPU repair of damage to the curb stop, meter, meter setter, meter box or lid, or tailrun.

4.2.7. Termination of existing water service

4.2.7.1. Domestic (including irrigation) water service may be shut off by SPU due to either nonpayment of utility charges (see Policy 400P-23-02 Credit and Collection), at the request of the property owner, or to effect maintenance, repair or changes to the water system.

4.2.7.1.1. SPU may remove the meter at owner's expense following shut off of service

4.2.7.1.2. Property owner may request SPU, at owner's expense

- to remove the water meter to stop water and sewer services and charges during an extended vacancy at the property. The eventual reset of the water meter also will be charged to the property owner. Removal of the meter does not stop solid waste services or charges.

- to shut off the water meter to prevent damage to the property from leakage or unauthorized water use

- to retire the domestic or irrigation service to the property.

4.2.7.2. Fire service (either fire-only or combination domestic and fire) will not be terminated by SPU without written request by the property owner and written acknowledgement and concurrence by the local fire department or district.

4.2.8. SPU may retire a domestic water service after 15 years of nonuse and charge the property owner for the cost of the retirement.

4.2.9. If a jumper, not authorized by SPU, is installed to pilfer water, SPU may retire the service and charge the property for the retirement, as well as charge for estimated water and other utility services provided during the time period the jumper was in use, as determined by SPU.

5.0 PROGRAM REVIEW

Periodic review of this policy shall be performed by the SPU Customer Services Branch as changes or conditions warrant in order to ensure that it remains current and effective in guiding SPU employees. Any recommended changes will be submitted to the SPU Director for consideration.

6.0 RESPONSIBILITIES

6.1 Property owner is responsible for

- the installation, replacement or repair of the privately owned service line from the City's union to the building(s) served, including changing a private service line when the service location to the property changes in accord with this Policy
- calling SPU Customer Services for inspection of all private underground water service line installations, repairs or replacements prior to covering
- marking the desired location of a new water service before SPU installs the service
- identifying and correcting water leakage or unauthorized water usage and notifying SPU of corrections allowing SPU to inspect any repairs or corrected water use problems
- notifying SPU of changes in property ownership or owner's designee for receiving the utility billings

6.2 SPU is responsible for

- the installation, replacement or repair of the publicly owned service from the City's water main, including the tap into the main, to the City's union
- timely inspection and other customer services
- responsiveness to customer needs
- offering all customers in like circumstances the same requirements, services, contracts or agreements, or privileges
- notifying property owner of any water usage excesses through fire services to allow owner to correct any problems prior to SPU's changing the fire service from a detector check to a meter.

7.0 DEFINITIONS

7.1 Abutting water main is a main which crosses some amount of the property; it may not be a standard main designed to serve if either the abutting main does not cross the full frontage of the property and there is a developable parcel beyond the property, or if the abutting main is not standard in size or material.

7.2 Direct water service area is the retail service area served by SPU's water distribution system as defined by the most current SPU Water System Plan.

7.3 Domestic service is a type of water service serving all potable water used at a property except fire-only water service.

7.4 Fire-only water service is available to provide stand-by water service for the sole purpose of supporting fire suppression devices on property (sprinklers, private hydrants, etc.) via a detector check meter assembly. A combination fire and domestic service is a domestic water service and is not a fire-only water service.

7.5 Irrigation service is a type of domestic water service designed to provide irrigation-only water at a property; sewer charges are not made on the water used through irrigation-only water services.

7.6 Jumper is a pipe installed to allow domestic or irrigation water to freely flow from the publicly owned service line to the user without being measured or billed by a meter, usually located in the meter box when a meter has been removed or not yet installed.

7.7 Master meter is a metered water service from a SPU-owned water main serving more than one legal parcel due to and in accordance with established SPU policy and procedure.

7.8 Private water service consists of the underground pipe leading from SPU's union to the building(s) being served, including any valves, stopcock, private submeters, backflow devices, etc.

7.9 Retirement of water service occurs when SPU has removed the connection to its distribution system by removing the tap to the water main and all other related water service equipment

7.10 Standard water service exists when a property receives metered water service from a standard water main designed to serve that property

7.11 Substandard water service exists either when a property's water service comes from a water main not designed to serve that property (i.e., it could be an abutting or non-abutting substandard water main or a non-abutting standard main), or when a property's water service comes from a neighboring property's water service.

7.12 Tail run is a short length of pipe installed by SPU from the meter box to SPU's union.

7.13 Termination of water service may include shut off of water at the meter, removal of the water meter, or retirement of SPU's tap and service line to the property

7.14 Transmission or supply pipelines are used to move water from the source to the treatment plant and from the plant to the distribution system.

7.15 Union is a coupling at the end of SPU's water service connecting the public water service to the privately owned water service.

7.16 Water main designed to serve a property is a main either abutting the property or located as close to the property as possible considering barriers such as slope, soil or other conditions which make it unsafe or impractical to bring the water distribution system closer to the property. (see also Standard and Substandard Water Service)

7.17 Water service provides water from the distribution system to residential, industrial and commercial users within the direct service area. It includes a tap into a SPU water main and a SPU service line. (An active water service also includes a meter, tail run and union which connects to the property's private service line; an inactive water service has had the meter removed or not yet installed.)

7.17.1 Domestic water service is available to provide any potable water to a property, excluding fire-only water service.

7.17.2 Fire-only water service is available to provide stand-by water service for the sole purpose of supporting fire suppression devices on property (sprinklers, private hydrants, etc.) via a detector check meter assembly. A combination fire and domestic service is a domestic water service and is not a fire-only water service.

SEATTLE PUBLIC UTILITIES
2013 WATER SYSTEM PLAN

C. POLICIES, PROCEDURES AND STANDARDS

APPENDIX C-7
SYSTEM STORAGE LEVEL OF RELIABILITY

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Seattle Public Utilities
System Storage Level of Reliability
June 2012

A. INTRODUCTION AND BACKGROUND

As the water system evolved over the past century, reservoirs, tanks and standpipes were constructed to meet then anticipated needs for the system as configured at that time. Since the original formation of the City of Seattle, there have been 41 annexations to the City, which have created differences in the water infrastructure, primarily in pipe sizing, and resulted in variations in how that infrastructure met changing design standards. Over time, there has been a benefit of an increasing number of interconnections and amount of redundancy in the overall system. The system is now large and complex, with multiple ways of delivering water within the system. Major improvements include the addition of the Tolt supply, which resulted in a second, multi-pipeline supply source coming into the north end of the system, and substantial improvements to the transmission pipelines.

Another significant change that has occurred over the years is the anticipated water consumption used in planning for the water system. For most of Seattle's history, water consumption increased along with its population. However, that connection was broken around 1990 when consumption reached its highest level. Since then, total annual water consumption has declined by about 30 percent (50 MGD) despite population growth of 15 percent. Peak water demand has fallen even more than annual average demand. In the 1980's hot summer weather could produce peak day consumption of over 330 MGD, but in the last ten years peak day consumption has stayed below 250 MGD, even on the hottest days. As an example of how planning criteria have changed, the System Storage and Reliability Analyses (SSRA) conducted in the mid-1990s used a demand forecast for 2020 of 103.5 MGD average annual and 207.3 MGD peak day demand for the retail system, and 199.0 MGD average annual and 416.2 MGD peak day demand for the total system. The demand forecast in the *2013 Water System Plan* for 2020 indicates 53.5 MGD average annual and 107 MGD peak day demand for the retail system (without non-revenue water), and 133.1 MGD average annual and 266.2 MGD peak day demand for the total system (with non-revenue water), with the demand levels used in the SSRA not forecasted to be reached within the planning horizon (before 2060).

These changing conditions and anticipated needs have allowed SPU to downsize or decommission certain treated water storage facilities. Reservoirs that have been downsized consist of Lincoln, Myrtle, Beacon, and West Seattle Reservoirs. Roosevelt and Volunteer Reservoirs are being considered for decommissioning after testing. Maple Leaf Tank and Woodland Park Standpipe have been decommissioned and Barton Standpipe, Foy Standpipe, and Richmond Highlands #1 Tank will soon be decommissioned. Myrtle #1 Tank is proposed to be decommissioned. Decommissioning these facilities saves capital, operating and maintenance costs over the long-term. Also, the reduction in treated water storage allows for increased system turnover than would otherwise occur, thereby improving water quality. The approach, analysis and results used to determine reservoir sizing and identify facilities for decommissioning are described below.

B. SYSTEM RELIABILITY ANALYSIS

Hydraulic modeling of various scenarios is an effective way to evaluate current and future storage requirements for a complex system such as SPU's. Scenarios representing peak and off-peak demand seasons, as well as a range of emergency conditions, provide the basis for the analysis. SPU has analyzed its entire system to ensure that there is adequate storage to maintain continuity of retail and wholesale service in the future for certain emergencies with current and planned facilities in service or decommissioned. Under certain emergency scenarios and during periods of higher than average demands, SPU would aggressively message to retail and wholesale customers to reduce water use to indoor-use levels within 12 to 24 hours.

While the storage facilities are periodically removed from service for maintenance such as cleaning, the analyses assume all available storage facilities for that scenario are in service. Such maintenance outages slightly increase the water supply risk, but SPU mitigates this risk by scheduling the larger reservoirs for cleaning during the off-peak and shoulder seasons, and by taking only one large reservoir out of service at a time, if possible. Additionally, the frequency of reservoir cleaning is now lower than in the past because of filtration on the Tolt supply and covering of the reservoirs. Planned outages of other major facilities are also scheduled to reduce risks to the water supply whenever possible.

SPU has identified specific emergency scenarios that are appropriate for its system. These scenarios represent abnormal operating conditions associated with unscheduled power outages and facility failures, but without specific identification of the root cause of the outage or failure, although examples are provided for some scenarios. The scenarios analyzed could be caused by natural events such as severe weather storms or earthquakes, intentional or unintentional actions by humans (e.g., vandalism), or failure of a facility component due to age or other cause. Extreme events that may cause more than one scenario to occur concurrently are not considered because these have a very low probability of occurrence and system performance is very difficult to predict. There are three types of emergency scenarios that are used:

1. Transmission pipeline outages
2. Source water treatment facility outages
3. Regional power failure affecting all six individual pumped zones

1. Transmission Pipeline Outages

Transmission pipeline outages were analyzed in detail in the mid-1990s System Storage and Reliability Analyses (SSRA) where specific emergency scenarios were defined, each involving at least two system components serving a certain part of the system being unavailable. (For more details on the SSRA please refer to SPU's 2007 WSP.) Through detailed modeling it was demonstrated that retail and wholesale service can be maintained at average day demand levels which were much higher in the mid-1990s than they are now for at least seven days, which is a little more than twice the expected 3-day maximum repair time for any large pipeline break. (The 3-day maximum repair time is part of SPU's wholesale continuity of service level of service and is based in part on

actual experience with the 1987 Tolt Pipeline break repair.) This analysis also demonstrated that Roosevelt and Volunteer Reservoirs could be decommissioned, and affirmed that Lincoln, Myrtle, Beacon, and West Seattle Reservoirs could be downsized to what is now in place.

2. Treatment Facility Outages

The first set of scenarios examines the reliability of the system in the event of loss of treated water delivery from one of the two primary treatment facilities. These scenarios could be due to the loss of treatment capability at the treatment plant itself, or loss of transmission to or from the treatment plant. It should be noted that both the Tolt and Cedar Water Treatment Facilities have backup electrical power supplies, as well as dual treatment trains, which reduce the likelihood of full loss of treated water supply. The Tolt Water Treatment Facility has a maximum treatment capacity of 120 MGD, and the Cedar Water Treatment Facility has a maximum treatment capacity of 180 MGD.

These scenarios were analyzed as part of the Tolt/Cedar Transfer Improvements Study conducted in 2006 and 2007. The study analyzed five emergency scenarios that represent complete outage of the Tolt or Cedar supply, both during peak week and the off-peak season, and complete Tolt outage during a shoulder (spring or fall) season. The different system-wide demand levels were as follows:

- Off-peak demand (November through March) of 110 MGD
- "Shoulder season" demand level (June and September) of 170 MGD
- Peak day demand of 250 MGD, with reduction to indoor water use only demand of 120 MGD under emergency mandatory water use restrictions within 12-24 hours.

Tolt Outage. This scenario examines complete failure of the Tolt Water Treatment Facility during the summer or shoulder season, requiring s days to repair. The scenario assumes that the clearwell and Tolt transmission pipelines are in service. The results indicate that off-peak water demands can be met indefinitely without any supply from Tolt, and without storage drawdown. If the emergency were to occur during higher demands, public messaging would be implemented to bring demand down to indoor levels within 12-24 hours, during which time service would be maintained by drawing down transmission and distribution reservoirs while maintaining at least 20 psi in the distribution system.

Cedar Outage. This scenario examines complete failure of Cedar Water Treatment Facility during summer, requiring 7 days to repair. It is assumed that the Clearwells would be available and Control Works would be functional. The operating strategy would be to reconfigure several transmission pipeline junctions (some remotely, while others manually in the field) so that available supply from the Tolt could be delivered far south into the area typically served by the Cedar. Additionally, the Seattle Wells would be activated without on-site treatment, if necessary, within 8 hours of the onset of the emergency. The analysis demonstrated that normal service can be maintained for up to 7 days at indoor water use levels through a combination of supply from the Tolt and the Seattle Wells and from drawing down reservoirs while maintaining at least 20 psi in the

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distribution system. If the emergency were to occur during higher demands, public messaging would be implemented to bring demand down to indoor levels within 12-24 hours. It was also noted in the course of the analysis that the Cedar Water Treatment Facility is much more distributed in nature than the Tolt, such that a problem with one component it less likely to affect the entire facility.

The results from the Tolt/Cedar Transfer Improvements Study affirmed that the reduced reservoir volumes identified in the SSRA provided the necessary level of reliability for these scenarios. In addition, this study indicated the need to install the modulating valve at Maple Leaf Gatehouse and improvements to the TESS Junction Pump Station.

3. Extended Regional Power Outage

This emergency scenario would involve disruption to the regional power grid that lasts for several days, similar to those experienced recently in the Northeast United States and the San Diego Metropolitan Area. Approximately 80 percent of SPU's system is supplied (directly or via reservoirs) by gravity from the clearwells of the two treatment facilities, which in turn are equipped with full capacity backup power generators. An extended power outage would therefore not be expected to affect the operation of the treatment facilities, nor the gravity flow to a large part of the system.

Six pressure zones (Richmond Highlands 590, Magnolia 480, Queen Anne 530, Volunteer 530, West Seattle 585 and West Seattle 498) that are normally supplied by pumping have been analyzed in greater detail to determine storage needs to maintain service through a combination of storage drawdown and pumping with non-electric pumps. This analysis resulted in the decision to provide a remote manual start for the permanent diesel pump at Bitter Lake pump station.

The operating strategy would be to meet demands at the onset of the outage through gravity flow out of elevated storage until pumped supply from larger ground-level storage or from transmission pipelines was actuated using power sources that are not dependent on the commercial power grid. SPU requires and plans for enough gravity storage to the pumped zones to allow for at least 15 minutes for activation of remote controlled facilities or at least three hours for activation of locally controlled facilities that pump water to the zone. SPU assumes average day demands in the zone at the onset of the power outage when determining the necessary gravity storage volume (deliverable at no less than 20 psi) to keep up with demand until the alternative pumping facilities can be activated. These alternative pumping facilities include hydraulic turbines and diesel powered pumps that receive regular maintenance and are periodically operated to ensure readiness.

The above approach is not applied to pressure sub-zones with booster pump stations, such as the Augusta 550, the Scenic Heights 550, the Queen Anne 580, and the Dayton Avenue 650 zones. For these zones, if the booster station fails or loses power, check valves at the pump station and the pressure zone boundary automatically open and the zone reverts to the surrounding zone's pressure, maintaining at least 20 psi pressure.

SPU has three hydraulic turbine-driven pumps that do not rely on electric power to run, but instead use the force of water flowing by gravity from higher pressure zones or

pipelines to lower pressure zones to drive turbines that turn pumps to lift water from the same source to other higher pressure zones. These turbines can provide water to five of the six pressure zones that rely on pumps. The turbines are used regularly and controlled remotely from SPU's system control center. These non-electric pumping facilities provide water from gravity-fed ground level storage or from transmission pipelines operating at pressures lower than the zone's.

Table 1 below summarizes how supply to each of the six pumped-only zones would be maintained in the event of an extended regional power outage through a combination of gravity supply at first, and alternative pumping later. The amount of gravity standby storage provides adequate time to remotely or locally activate the non-electric pumping facilities, even under peak day demands. However, delivery to Magnolia 480, Queen Anne 530 and Volunteer 530 would be limited to the capacity of Lincoln Turbine, and emergency curtailments to reduce demands to indoor use only would be needed in these areas if a widespread power outage were to occur during peak season.

C. CONCLUSION

In conclusion, SPU has analyzed the performance of the water system under the above emergencies. Results show that at least five days of indoor water use can be met through year 2040 and possibly beyond. If the emergency were to occur during peak consumption periods, such as the summer irrigation season, SPU will request its customers to curtail discretionary water use until the emergency has been resolved.

SPU will make storage sizing and decommissioning decisions consistent with this emergency scenario based model for system storage reliability. Storage that is deemed necessary will be maintained (e.g., regular recoating, cleaning, sanitary surveys, structural inspections, etc) and storage that is deemed unnecessary will be physically disconnected from the system. Some decommissioned steel storage may be kept in a 'mothballed' state (e.g., aesthetic painting on the outside and left standing).

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Table 1. Pumped Zones Summary

Pressure Zone	Average Day Demand, MGD[1]	Source of Gravity Standby Storage	Total Volume, MG (Depth, feet)	Operating Storage, MG (Operating Band, feet)	Dead Storage, MG[2]	Available Gravity Standby Storage, MG[3]	Amount of Time Provided, hours[4]	Actions Taken	Source of Non-Electric Powered Pumped Standby Storage
Richmond Highlands 590	3.95	Richmond Highlands Tank No. 2	2.0 (35')	0.5 (10')	1.4	0.1	0.6	Diesel engine driven pump at Bitter Lake Pump Station activated within 15 minutes.	Bitter Lake Reservoir via Bitter Lake Pump Station diesel engine pump (4000 gpm), remote manual startup (15-minute minimum start-up). Bitter Lake Reservoir is supplied by gravity from Lake Forest Park Reservoir, which is gravity-fed from the Tolt Water Treatment Facility and Clearwell.
Magnolia 480	0.82	Magnolia Tank	1.0 (25')	0.4 (10')	0.0	0.6	17.5	Lincoln Turbine activated within 15 minutes. Manually operated butterfly valve at 12 Av W & W Howe opened within 3 hours to re-activate 530 Armory Way feeder.	Cedar Water Treatment Facility and Clearwells via Lincoln Turbine (4000 gpm), remote manually controlled (15-minute minimum start-up).
Queen Anne 530	1.21	Queen Anne Standpipe	1.9 (58.5')	0.3 (10')	1.4	0.2	4.0	Lincoln Turbine is activated within 15 minutes.	Cedar Water Treatment Facility and Clearwells via Lincoln Turbine (4000 gpm), remote manually controlled (15-minute minimum start-up).
Volunteer 530	1.50	Volunteer Standpipe	0.9 (60')	0.1 (10')	0.4	0.3	4.8	Lincoln Turbine activated within 15 minutes.	Cedar Water Treatment Facility and Clearwells via Lincoln Turbine (4000 gpm), remote manually controlled (15-minute minimum start-up).

Table 1. Pumped Zones Summary (continued)

Pressure Zone	Average Day Demand, MGD[1]	Source of Gravity Standby Storage	Total Volume, MG (Depth, feet)	Operating Storage, MG (Operating Band, feet)	Dead Storage, MG[2]	Available Gravity Standby Storage, MG[3]	Amount of Time Provided, hours[4]	Actions Taken	Source of Non-Electric Powered Pumped Standby Storage
West Seattle 498	2.70	Charlestown Standpipe	1.3 (64')	0.2 (10')	0.9	0.2	21.3	35th & Morgan PRV activated within 15 minutes. Trenton Turbines activated within 15 minutes. Burien Pump Station diesel driven pump activated no earlier than 3 hours from the outage.[5]	Combination of West Seattle Reservoir via Trenton Turbines (4000 gpm), which is remote manually controlled (15-minute minimum start-up), and Riverton Heights Reservoir via Burien PS diesel-powered pump (6000 gpm), which has local manual start-up (3-hour minimum start-up). Both reservoirs are gravity-fed from the Cedar Water Treatment Facility and Clearwells.
		Myrtle Reservoir	5.0 (27')	1.2 (7')	1.5	2.2			
West Seattle 585	1.99	Myrtle Tank No. 2	1.0 (26')	0.4 (10')	0.2	0.5	14.4	Trenton Turbines activated within 15 min. Burien Pump Station diesel driven pump is activated no earlier than 3 hours from the outage.[5]	Combination of West Seattle Reservoir via Trenton Turbines (4000 gpm), which is remote manually controlled (15-minute minimum start-up), and Riverton Heights Reservoir via Burien PS diesel-powered pump (6000 gpm), which has local manual start-up (3-hour minimum start-up). Both reservoirs are gravity-fed from the Cedar Water Treatment Facility and Clearwells.
		Beverly Park Tank	2.0 (35')	0.4 (10')	0.9	0.7			

1. Average Day Demand based on metered water consumption in 2009 for each pressure zone.
2. Dead storage is storage below 20 psi, as measured as static pressure to nearest service connection.
3. Available gravity standby storage is available exclusively to pressure zone shown, and excludes operating storage and dead storage volumes.
4. Amount of time provided is the available gravity standby storage divided by average day demand, and converted to hours.
5. If electrical generation at West Seattle Reservoir is available from the portable generator permanently kept at the site, then West Seattle Low Service and Highland Park Pump Stations would be started instead.

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SEATTLE PUBLIC UTILITIES
2013 WATER SYSTEM PLAN
APPENDIX D

MISCELLANEOUS

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SEATTLE PUBLIC UTILITIES
2013 WATER SYSTEM PLAN

D. MISCELLANEOUS

APPENDIX D-1
CAPITAL FACILITIES PLAN

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Seattle Public Utilities - 2013 Water System Plan

Capital Facilities Plan

2011 Dollars (in $1000s)

Business Area	Project / Program	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Water Resources	Morse Lake Pump Plant	$1,922	$1,790	$4,998	$8,357	$6,145	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Overflow Dike Improvements	$619	$2,981	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Landsburg Flood Passage Improvements	$192	$942	$554	$91	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Dam Safety	$100	$25	$23	$23	$22	$500	$275	$250	$300	$0	$0	$0	$0	$0	$500
	Regional Conservation Program	$1,850	$1,850	$1,850	$1,850	$1,850	$1,700	$1,700	$1,700	$1,700	$1,700	$1,700	$1,700	$1,700	$1,700	$1,700
	Low Income Conservation Assistance	$650	$650	$650	$650	$650	$650	$650	$650	$650	$650	$650	$650	$650	$650	$650
	Water System Plan	$25	$0	$0	$100	$480	$395	$50	$0	$44	$90	$450	$395	$50	$0	$44
Water Resources Total		$5,359	$8,239	$8,076	$11,070	$9,147	$3,245	$2,675	$2,600	$2,694	$2,440	$2,800	$2,745	$2,400	$2,350	$2,894
Water Quality and Treatment	Landsburg Chlorination	$700	$1,135	$1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Reservoir Covering-Volunteer	$0	$0	$92	$100	$100	$1,500	$10,000	$10,000	$1,000	$0	$0	$0	$0	$0	$0
	Reservoir Covering-West Seattle	$24	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Reservoir Covering-Maple Leaf	$4,133	$94	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Roosevelt Reservoir Retirement	$0	$0	$0	$0	$500	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Lake Forest Park Burying/Floating Cover Replacement	$0	$0	$0	$0	$0	$0	$0	$0	$0	$500	$1,000	$8,000	$500	$0	$0
	Bitter Lake Reservoir Burying/Floating Cover Replacement	$0	$0	$0	$0	$0	$0	$500	$1,500	$5,000	$11,000	$11,000	$0	$0	$0	$0
	Water Quality Equipment	$135	$135	$1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Treatment Facility/WQ Improvements	$96	$94	$92	$91	$100	$100	$100	$400	$500	$100	$100	$100	$600	$600	$250
Water Quality and Treatment Total		$5,088	$1,458	$187	$190	$700	$1,600	$10,600	$11,900	$6,500	$11,600	$12,100	$8,100	$1,100	$600	$250
Transmission	Cathodic Protection Program	$1,600	$1,600	$1,600	$1,600	$1,600	$1,600	$1,600	$1,600	$1,600	$1,600	$600	$600	$600	$600	$600
	Transmission Pipeline Rehabilitation	$1,010	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
	Purveyor Meter Replacements	$96	$94	$92	$91	$200	$200	$200	$200	$200	$200	$200	$200	$200	$200	$200
	Air Valve Chamber Replacements	$108	$110	$113	$113	$113	$113	$113	$113	$113	$113	$113	$113	$113	$113	$113
	Water System Dewatering Program	$96	$94	$92	$91	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100
Transmission Total		$2,910	$2,898	$2,898	$2,894	$3,013	$3,013	$3,013	$3,013	$3,013	$3,013	$2,013	$2,013	$2,013	$2,013	$2,013
Distribution	Distribution System Improvements	$3,967	$4,619	$5,545	$6,342	$7,104	$7,104	$7,104	$7,104	$7,104	$7,104	$7,104	$7,104	$7,104	$7,104	$7,104
	Transportation & Multiple Utility Relocations	$8,097	$4,539	$4,402	$3,574	$3,155	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500
	Watermain Rehabilitation	$1,538	$1,508	$3,000	$3,000	$3,000	$3,970	$4,082	$4,197	$4,313	$4,433	$4,555	$4,679	$4,804	$4,933	$5,064
	Watermain Extensions	$650	$750	$750	$750	$750	$750	$750	$750	$750	$750	$750	$750	$750	$750	$750
	New Taps	$4,000	$4,000	$4,000	$4,000	$3,922	$3,922	$3,922	$3,922	$3,922	$3,922	$3,922	$3,922	$3,922	$3,922	$3,922
	Service Renewals	$5,500	$5,500	$5,900	$5,900	$5,900	$5,900	$5,900	$5,900	$5,900	$5,900	$5,900	$5,900	$5,900	$5,900	$5,900
	Meter Replacement	$683	$600	$599	$598	$603	$603	$603	$603	$603	$603	$603	$603	$603	$603	$603
	Hydrants	$502	$502	$447	$446	$395	$395	$395	$395	$395	$395	$395	$395	$395	$395	$395
	Valves	$300	$300	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100
	Chamber Upgrades	$25	$25	$25	$25	$25	$25	$25	$25	$25	$25	$25	$25	$25	$25	$25
	Pump Station Improvements	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500
	Tank Improvements	$336	$1,413	$1	$1	$1	$250	$250	$250	$250	$250	$250	$250	$250	$250	$250
Distribution Total		$26,098	$24,257	$25,270	$25,237	$25,455	$25,019	$25,131	$25,246	$25,362	$25,482	$25,604	$25,728	$25,853	$25,982	$26,113
Major Watersheds	Cedar River Watershed Habitat Conservation Plan	$3,241	$3,439	$2,721	$2,254	$1,606	$1,756	$1,756	$1,756	$1,354	$1,354	$1,354	$1,354	$1,354	$1,354	$1,354
	Watershed Stewardship	$995	$687	$554	$543	$533	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100
Major Watersheds Total		$4,236	$4,125	$3,275	$2,797	$2,139	$1,856	$1,856	$1,856	$1,454	$1,454	$1,454	$1,454	$1,454	$1,454	$1,454
Other	Technology	$7,410	$8,184	$5,964	$5,358	$5,327	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000
	SCADA	$466	$457	$443	$408	$355	$400	$400	$400	$400	$400	$400	$400	$400	$400	$400
	Security	$1,922	$1,884	$1,847	$1,811	$1,793	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
	Heavy Equipment Purchases	$2,951	$1,934	$2,979	$2,156	$1,931	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500
	In-Town Facilities	$1,514	$3,775	$2,225	$2,547	$2,387	$2,550	$1,100	$1,350	$1,200	$1,200	$900	$1,150	$1,150	$1,400	$1,400
	Regional Facilities	$3,296	$3,315	$4,227	$4,494	$8,480	$2,450	$2,250	$2,250	$1,700	$700	$500	$500	$500	$850	$850
	Emergency Storm Response	$48	$47	$46	$45	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	1% for Art	$174	$224	$231	$191	$224	$134	$160	$164	$147	$162	$162	$150	$128	$127	$128
Other Total		$17,781	$19,820	$17,963	$17,010	$20,497	$15,034	$13,410	$13,664	$12,947	$11,962	$11,462	$11,700	$11,678	$12,277	$12,278
Grand Total		$61,471	$60,797	$57,668	$59,199	$60,951	$49,767	$56,684	$58,278	$51,970	$55,951	$55,433	$51,740	$44,498	$44,676	$45,002

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2011 Dollars (in $1000s)

Business Area	Project / Program	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2013-2040 Total
Water Resources	Morse Lake Pump Plant	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$23,213
	Overflow Dike Improvements	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,600
	Landsburg Flood Passage Improvements	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,779
	Dam Safety	$0	$0	$0	$250	$250	$250	$0	$0	$100	$100	$400	$25	$0	$3,393
	Regional Conservation Program	$1,700	$1,700	$1,700	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$31,350
	Low Income Conservation Assistance	$650	$650	$650	$650	$650	$650	$650	$650	$650	$650	$650	$650	$650	$18,199
	Water System Plan	$90	$450	$395	$50	$0	$44	$90	$450	$395	$50	$0	$44	$90	$4,271
Water Resources Total		**$2,440**	**$2,800**	**$2,745**	**$950**	**$900**	**$944**	**$740**	**$1,100**	**$1,145**	**$800**	**$1,050**	**$719**	**$740**	**$85,806**
Water Quality and Treatment	Landsburg Chlorination	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1,836
	Reservoir Covering-Volunteer	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$22,792
	Reservoir Covering-West Seattle	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$24
	Reservoir Covering-Maple Leaf	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,227
	Roosevelt Reservoir Retirement	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$500
	Lake Forest Park Burying/Floating Cover Replacement	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$10,000
	Bitter Lake Reservoir Burying/Floating Cover Replacement	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$29,000
	Water Quality Equipment	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$270
	Treatment Facility/WQ Improvements	$850	$2,200	$1,900	$500	$500	$1,000	$850	$600	$600	$600	$850	$100	$100	$13,973
Water Quality and Treatment Total		**$850**	**$2,200**	**$1,900**	**$500**	**$500**	**$1,000**	**$850**	**$600**	**$600**	**$600**	**$850**	**$100**	**$100**	**$82,623**
Transmission	Cathodic Protection Program	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600	$600	$26,800
	Transmission Pipeline Rehabilitation	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$28,010
	Purveyor Meter Replacements	$200	$200	$200	$200	$200	$200	$200	$200	$200	$200	$200	$200	$200	$5,173
	Air Valve Chamber Replacements	$113	$113	$113	$113	$113	$113	$113	$113	$113	$113	$113	$113	$113	$3,156
	Water System Dewatering Program	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$2,773
Transmission Total		**$2,013**	**$2,013**	**$2,013**	**$2,013**	**$2,013**	**$2,013**	**$2,013**	**$2,013**	**$2,013**	**$2,013**	**$2,013**	**$2,013**	**$2,013**	**$65,912**
Distribution	Distribution System Improvements	$7,104	$7,104	$7,104	$7,104	$7,104	$7,104	$7,104	$7,104	$7,104	$7,104	$7,104	$7,104	$7,104	$190,963
	Transportation & Multiple Utility Relocations	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$1,500	$58,267
	Watermain Rehabilitation	$5,198	$5,334	$5,473	$5,614	$5,758	$5,904	$6,053	$6,204	$6,358	$6,515	$6,675	$6,836	$7,001	$135,999
	Watermain Extensions	$750	$750	$750	$750	$750	$750	$750	$750	$750	$750	$750	$750	$750	$20,908
	New Taps	$3,922	$3,922	$3,922	$3,922	$3,922	$3,922	$3,922	$3,922	$3,922	$3,922	$3,922	$3,922	$3,922	$110,118
	Service Renewals	$5,900	$5,900	$5,900	$5,900	$5,900	$5,900	$5,900	$5,900	$5,900	$5,900	$5,900	$5,900	$5,900	$164,400
	Meter Replacement	$603	$603	$603	$603	$603	$603	$603	$603	$603	$603	$603	$603	$603	$16,958
	Hydrants	$395	$395	$395	$395	$395	$395	$395	$395	$395	$395	$395	$395	$395	$11,379
	Valves	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$3,200
	Chamber Upgrades	$25	$25	$25	$25	$25	$25	$25	$25	$25	$25	$25	$25	$25	$700
	Pump Station Improvements	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$14,000
	Tank Improvements	$250	$250	$250	$250	$250	$250	$250	$250	$250	$250	$250	$250	$250	$7,503
Distribution Total		**$26,247**	**$26,383**	**$26,522**	**$26,663**	**$26,807**	**$26,953**	**$27,102**	**$27,253**	**$27,407**	**$27,564**	**$27,724**	**$27,885**	**$28,050**	**$734,395**
Major Watersheds	Cedar River Watershed Habitat Conservation Plan	$1,354	$1,354	$1,354	$1,354	$1,354	$1,354	$1,354	$1,354	$1,354	$1,354	$1,354	$1,354	$1,354	$45,608
	Watershed Stewardship	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$5,612
Major Watersheds Total		**$1,454**	**$1,454**	**$1,454**	**$1,454**	**$1,454**	**$1,454**	**$1,454**	**$1,454**	**$1,454**	**$1,454**	**$1,454**	**$1,454**	**$1,454**	**$51,221**
Other	Technology	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000	$170,242
	SCADA	$400	$400	$400	$400	$400	$400	$400	$400	$400	$400	$400	$400	$400	$11,329
	Security	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$32,258
	Heavy Equipment Purchases	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$69,451
	In-Town Facilities	$2,400	$2,900	$1,900	$900	$1,200	$1,200	$1,200	$900	$900	$900	$900	$900	$900	$42,948
	Regional Facilities	$850	$600	$500	$1,100	$1,600	$1,100	$600	$500	$500	$500	$500	$500	$500	$45,712
	Emergency Storm Response	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$187
	1% for Art	$129	$134	$134	$124	$125	$127	$126	$127	$128	$127	$129	$126	$127	$4,166
Other Total		**$13,279**	**$13,534**	**$12,434**	**$12,024**	**$12,825**	**$12,327**	**$11,826**	**$11,427**	**$11,428**	**$11,427**	**$11,429**	**$11,426**	**$11,427**	**$376,292**
Grand Total		**$46,283**	**$48,384**	**$47,068**	**$43,604**	**$44,499**	**$44,691**	**$43,985**	**$43,847**	**$44,046**	**$43,858**	**$44,520**	**$43,597**	**$43,784**	**$1,396,249**

SEATTLE PUBLIC UTILITIES
2013 WATER SYSTEM PLAN

D. MISCELLANEOUS

APPENDIX D-2
LAND USE AND ZONING MAPS

LAND USE AND ZONING MAPS

Land Use Zoning Maps provided here were downloaded on February 22, 2012, from the following websites, except as noted. For maps not provided, please refer to the website listed below.

City of Seattle

Generalized Zoning (attached):
HTTP://WWW.SEATTLE.GOV/DCLU/RESEARCH/GIS/WEBPLOTS/SMALLZONEMAP.PDF

Zoning Maps Online: http://www.seattle.gov/dpd/Research/Zoning_Maps/default.asp

City of Shoreline

http://www.cityofshoreline.com/index.aspx?page=125

http://cosweb.ci.shoreline.wa.us/uploads/attachments/gis/maps/complu.pdf
(downloaded and added 6/1/2012)

http://cosweb.ci.shoreline.wa.us/uploads/attachments/gis/maps/Zoning.pdf

City of Lake Forest Park

http://www.lakeforestca.gov/civica/filebank/blobdload.asp?BlobID=3663

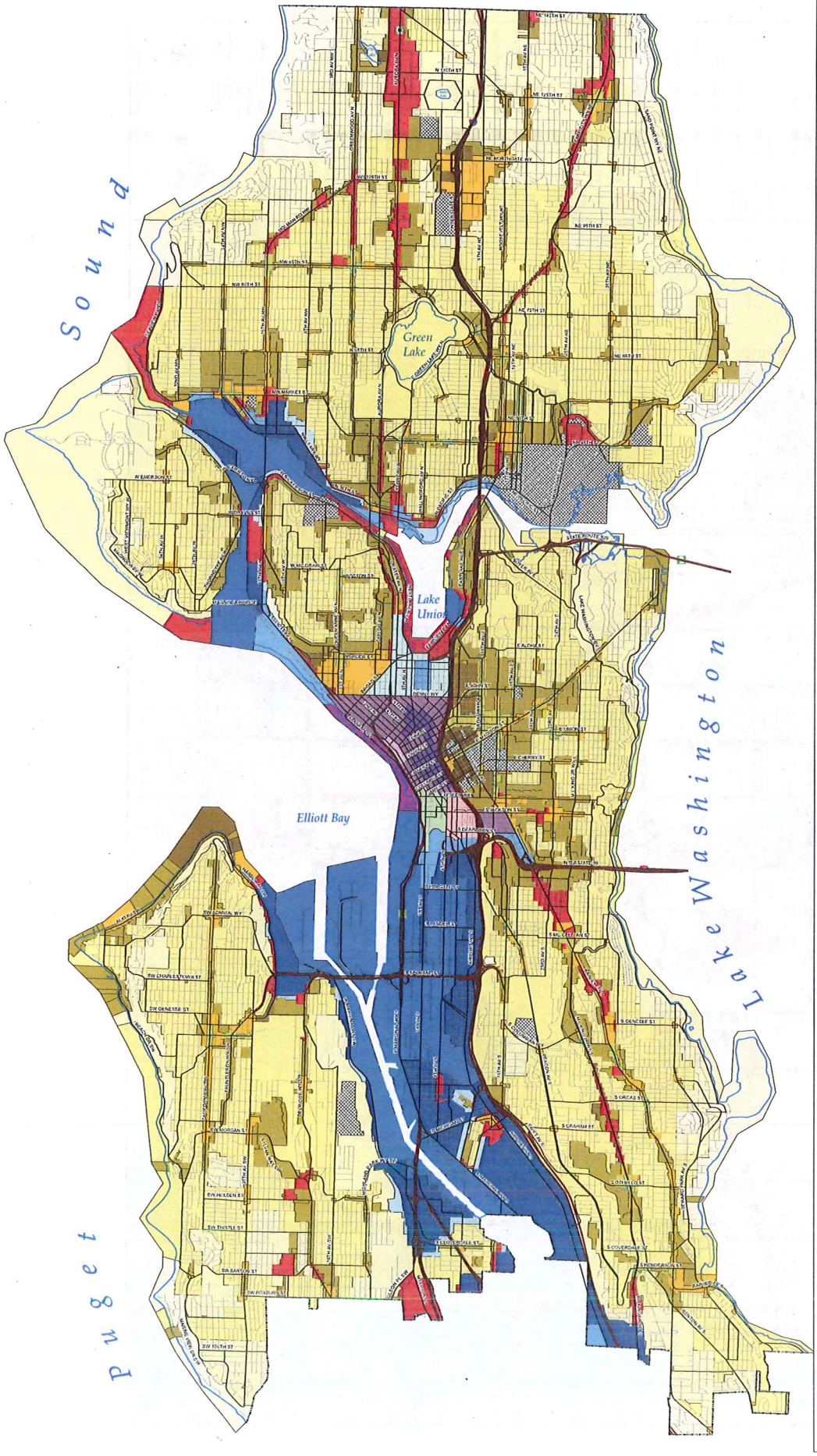
City of Burien

http://www.burienwa.gov/index.aspx?nid=717 http://www.burienwa.gov/DocumentView.aspx?DID=665

King County

http://www.kingcounty.gov/operations/GIS/Maps/VMC/Planning.aspx#DCC1A71A09194E73A35D915B4A3FE271

http://www.kingcounty.gov/operations/GIS/Maps/VMC/~/media/operations/GIS/maps/vmc/images/zoning_2004.ashx



City of Seattle

Generalized Zoning

as of January 27, 2012

Legend

- Single Family 5000
- Single Family 7200
- Single Family 9600
- Residential Small Lot
- Lowrise
- Midrise
- Highrise
- Seattle Mixed
- Neighborhood Commercial
- Neigh/Comm Incentive
- Commercial
- Downtown Office Core
- Downtown Harborfront
- Downtown Mixed
- International District
- Pike Market Mixed
- Pioneer Square Mixed
- Industrial Buffer
- Industrial Commercial
- Industrial General 1
- Industrial General 2
- Major Institution
- Pedestrian Areas

Note: This map is a view of generalized zoning only. For precise zoning information, please call or visit the Seattle Municipal Tower, Department of Planning and Development at 700 5th Ave Suite 2000, 206-684-8850.

0 1 2 Miles

Prepared by:

Department of Planning and Development

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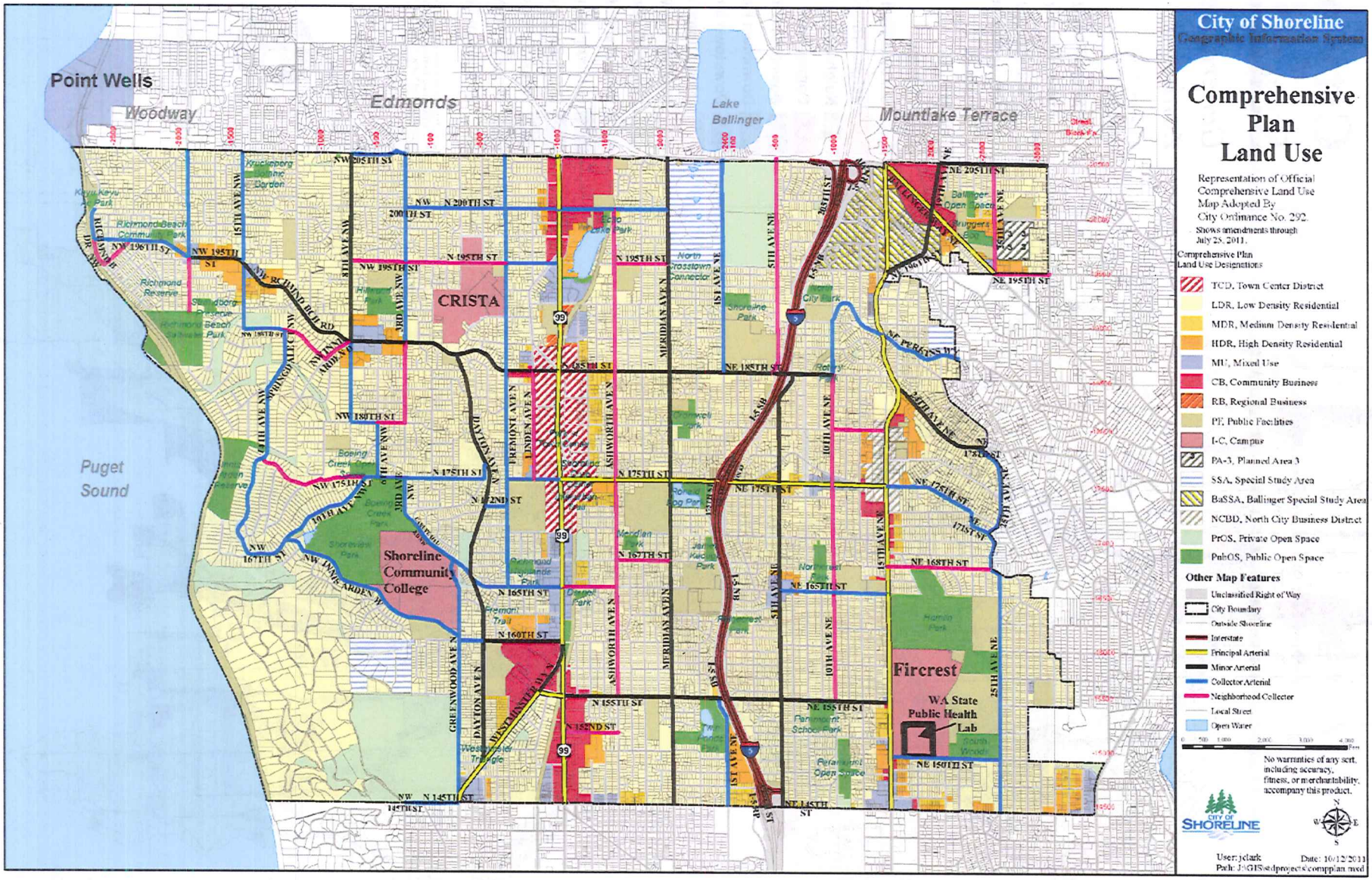
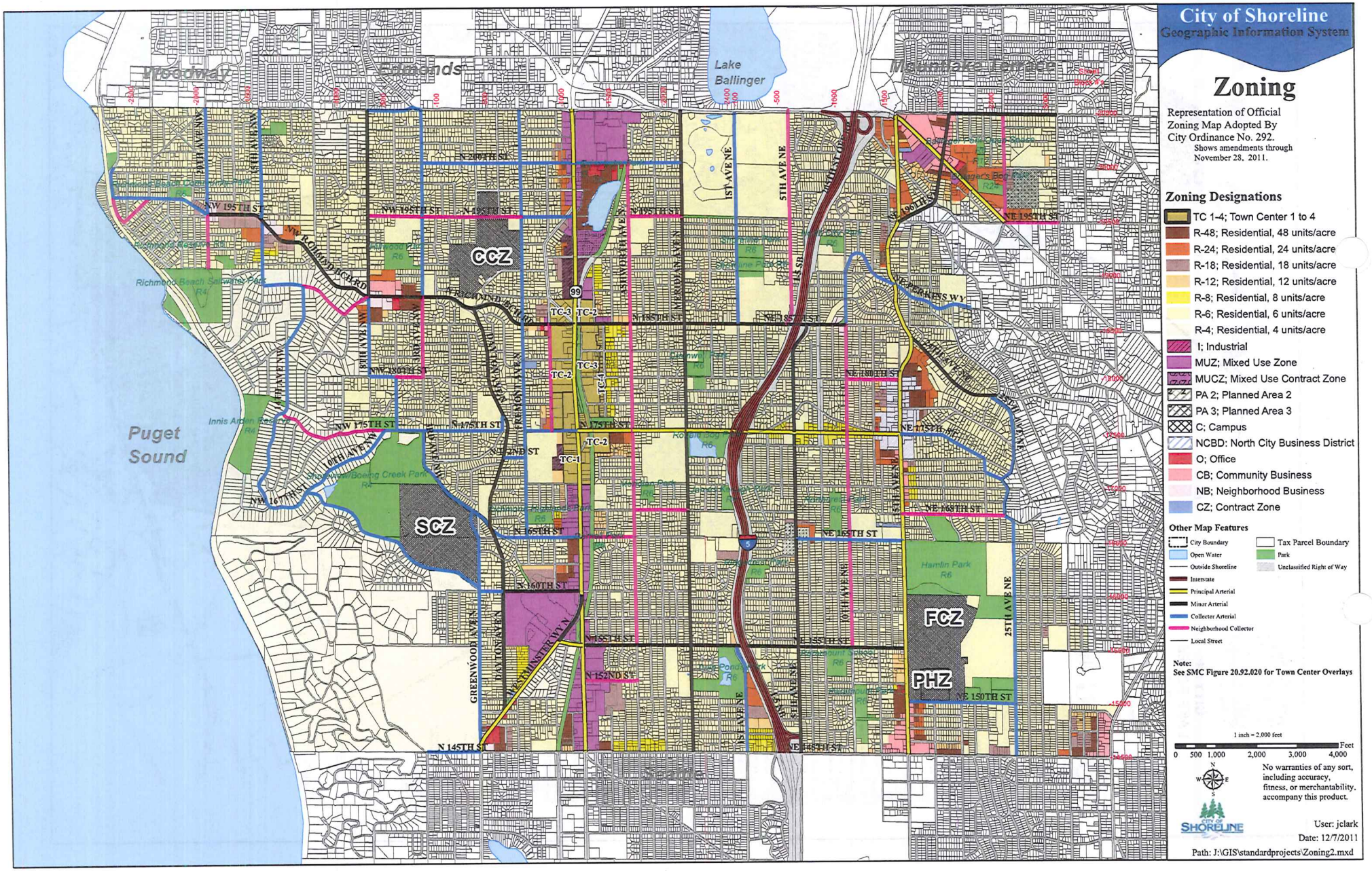
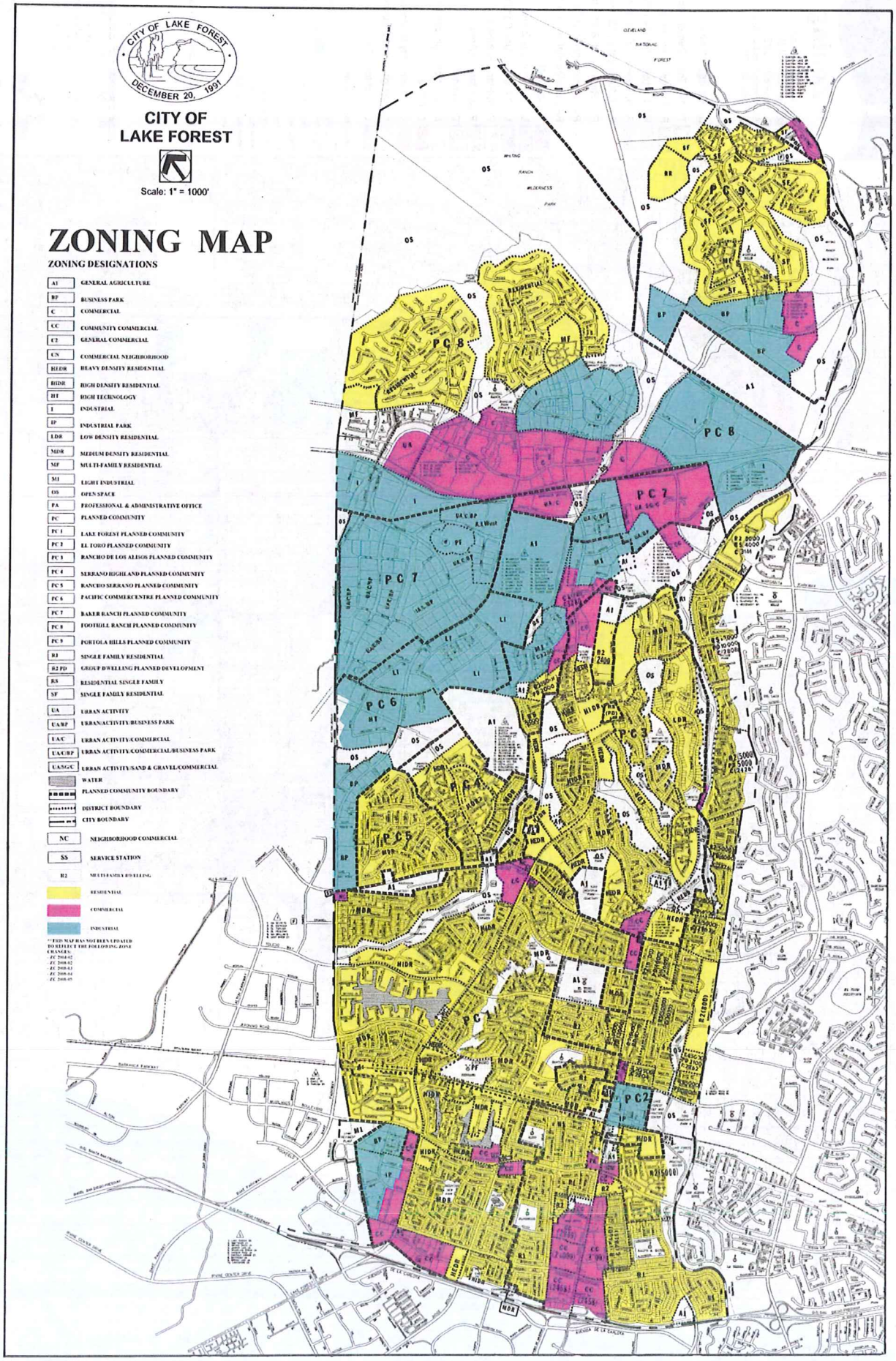
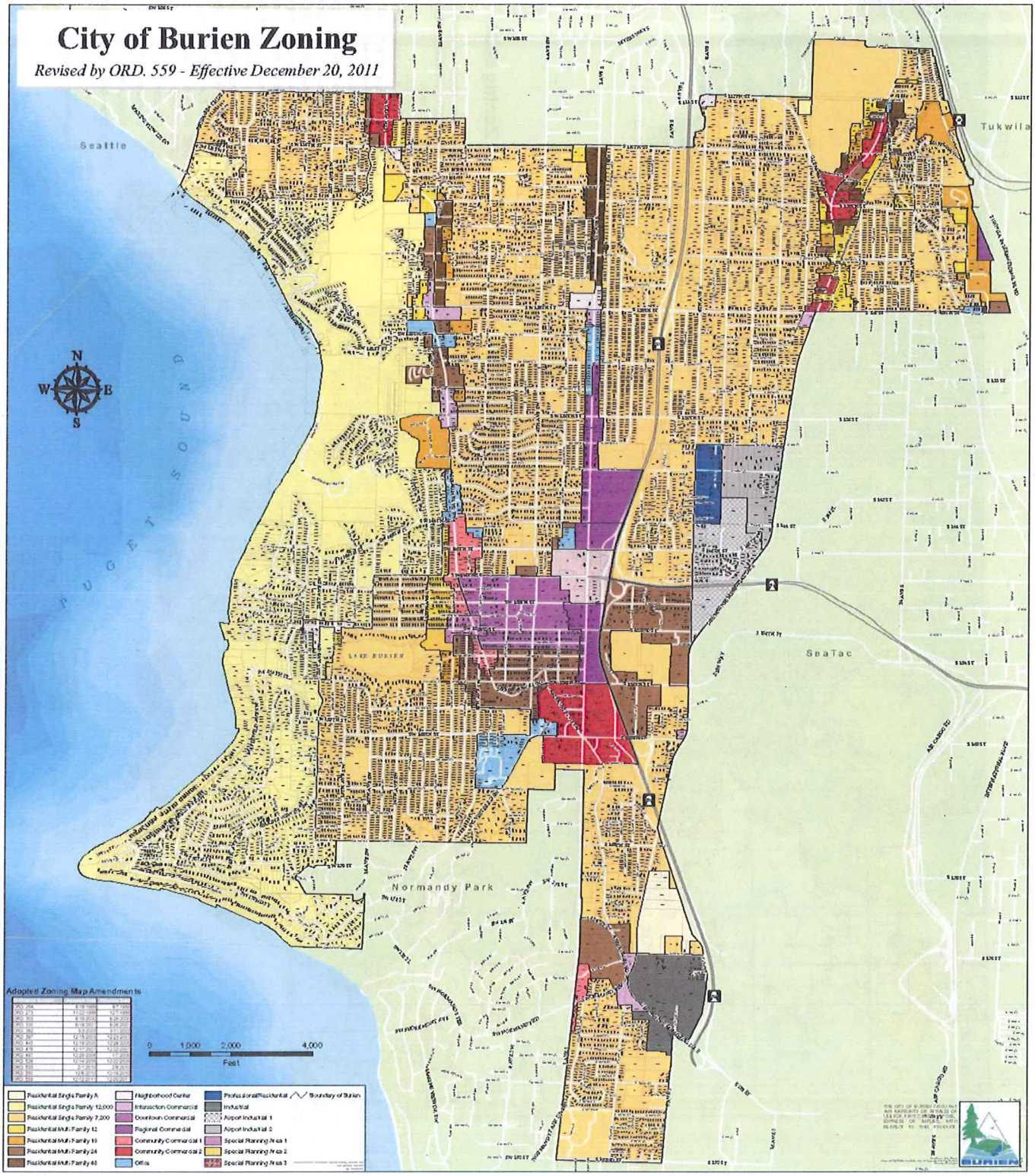
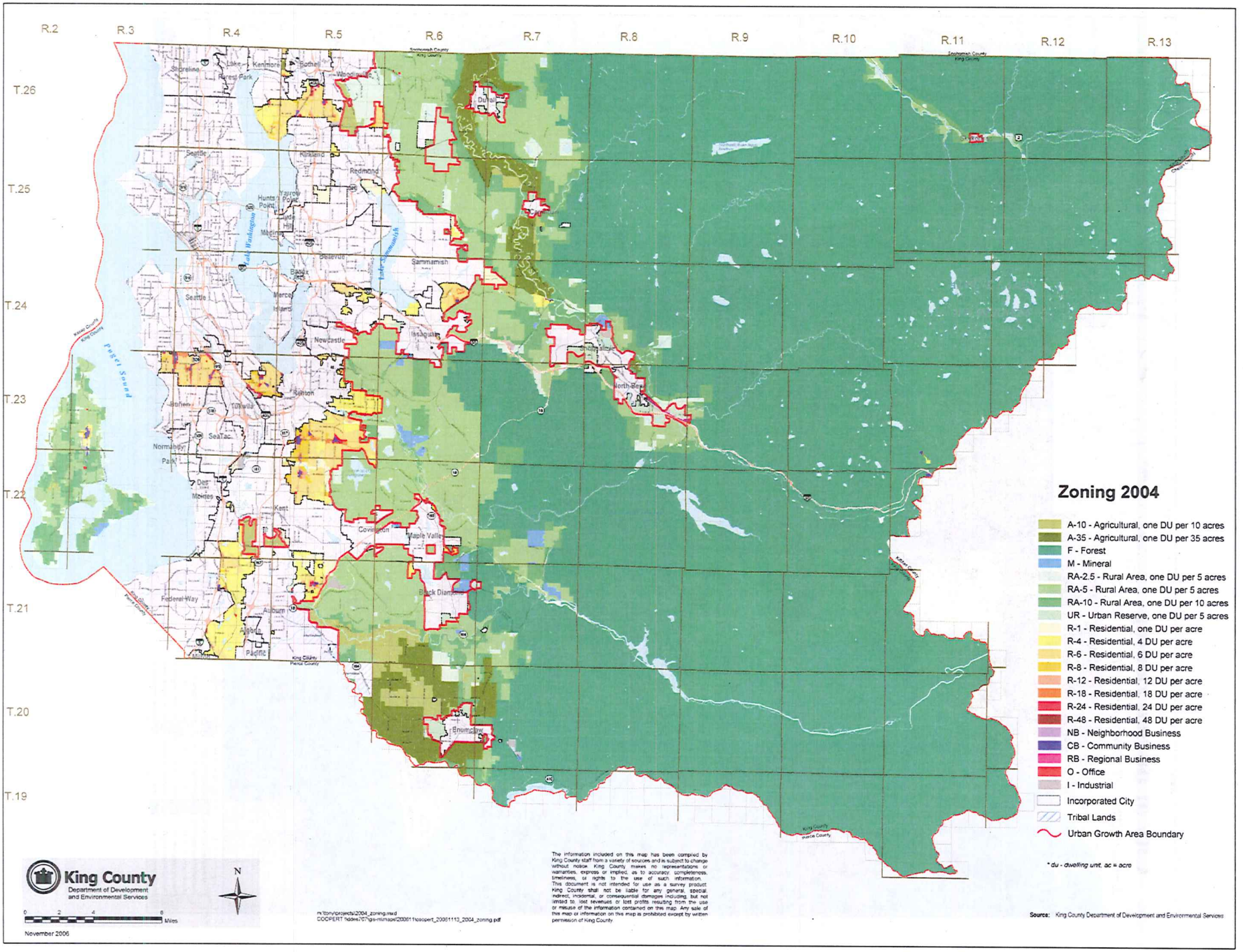

Point Wells
Woodway
Edmonds
Lake Ballinger
Mountlake Terrace
Puget Sound
CRISTA
Shoreline Community College
Fircrest
WA State Public Health Lab
NW 205TH ST
NW 200TH ST
NW 195TH ST
NW 185TH ST
NW 175TH ST
NW 167TH ST
N 165TH ST
N 160TH ST
N 155TH ST
N 152ND ST
NW N 145TH ST
NE 205TH ST
NE 195TH ST
NE 185TH ST
NE 175TH ST
NE 168TH ST
NE 165TH ST
NE 155TH ST
NE 150TH ST
NE 145TH ST
15TH AVE NW
8TH AVE NW
3RD AVE NW
1ST AVE NW
5TH AVE NE
10TH AVE NE
15TH AVE NE
25TH AVE NE
MERIDIAN AVE N
ASHWORTH AVE N
DAYTON AVE N
GREENWOOD AVE N
99
Richmond Beach Community Park
Richmond Reserve
Shoreline Park
City Park
Hamlin Park
Paramount School Park
Paramount Open Space
Boeing Creek Park
Richmond Highlands Park
Darnell Park
Meridian Park
Jackson Park
Cromwell Park
Ronald Bog Park
Fremont Trail
Interurban Trail
Westminster Triangle
Aldercrest
Rotary
Bruggers Bog
Kruckeberg Botanic Garden
Echo Lake Park
North Crosstown Connector
Sunset Park
Twin Ponds Park
Ballinger Open Space
Ballinger Special Study Area
City of Shoreline
Geographic Information System
Comprehensive Plan Land Use
Representation of Official Comprehensive Land Use Map Adopted By City Ordinance No. 292.
Shows amendments through July 25, 2011.
Comprehensive Plan Land Use Designations
TCD, Town Center District
LDR, Low Density Residential
MDR, Medium Density Residential
HDR, High Density Residential
MU, Mixed Use
CB, Community Business
RB, Regional Business
PF, Public Facilities
I-C, Campus
PA-3, Planned Area 3
SSA, Special Study Area
BaSSA, Ballinger Special Study Area
NCBD, North City Business District
PrOS, Private Open Space
PubOS, Public Open Space
Other Map Features
Unclassified Right of Way
City Boundary
Outside Shoreline
Interstate
Principal Arterial
Minor Arterial
Collector Arterial
Neighborhood Collector
Local Street
Open Water
No warranties of any sort, including accuracy, fitness, or merchantability, accompany this product.
CITY OF SHORELINE
User: jclark
Date: 10/12/2011
Path: J:\GIS\std\projects\compplan.mxd


City of Shoreline
Geographic Information System
Zoning
Representation of Official Zoning Map Adopted By City Ordinance No. 292.
Shows amendments through November 28, 2011.
Zoning Designations
TC 1-4; Town Center 1 to 4
R-48; Residential, 48 units/acre
R-24; Residential, 24 units/acre
R-18; Residential, 18 units/acre
R-12; Residential, 12 units/acre
R-8; Residential, 8 units/acre
R-6; Residential, 6 units/acre
R-4; Residential, 4 units/acre
I; Industrial
MUZ; Mixed Use Zone
MUCZ; Mixed Use Contract Zone
PA 2; Planned Area 2
PA 3; Planned Area 3
C; Campus
NCBD: North City Business District
O; Office
CB; Community Business
NB; Neighborhood Business
CZ; Contract Zone
Other Map Features
City Boundary
Open Water
Outside Shoreline
Interstate
Principal Arterial
Minor Arterial
Collector Arterial
Neighborhood Collector
Local Street
Tax Parcel Boundary
Park
Unclassified Right of Way
Note:
See SMC Figure 20.92.020 for Town Center Overlays
1 inch = 2,000 feet
0 500 1,000 2,000 3,000 4,000 Feet
No warranties of any sort, including accuracy, fitness, or merchantability, accompany this product.
User: jclark
Date: 12/7/2011
Path: J:\GIS\standardprojects\Zoning2.mxd
Puget Sound
Lake Ballinger
Edmonds
Mountlake Terrace
Woodway
CCZ
SCZ
FCZ
PHZ
TC-1
TC-2
TC-3
TC-4
N 200TH ST
NW 195TH ST
N 195TH ST
NE 195TH ST
NW 185TH ST
N 185TH ST
NE 185TH ST
NW 180TH ST
N 180TH ST
NE 180TH ST
NW 175TH ST
N 175TH ST
NE 175TH ST
N 172ND ST
NW 165TH ST
N 165TH ST
NE 165TH ST
NE 163RD ST
N 160TH ST
N 155TH ST
NE 155TH ST
N 152ND ST
NE 150TH ST
N 145TH ST
NE 145TH ST
Richmond Beach Saltwater Park
Innis Arden Reserve
Shoreline Boeing Creek Park
Shoreline Park
Ronald Bog Park
Hamlin Park
Twin Ponds Park
Meadowdale Beach Park
Richmond Beach Rd
Aurora Ave N
99
5
1ST AVE NE
5TH AVE NE
8TH AVE NE
15TH AVE NE
25TH AVE NE
3RD AVE NW
8TH AVE NW
15TH AVE NW
24TH AVE NW
GREENWOOD AVE N
MERIDIAN AVE N
FREMONT AVE N
WEST PLAZA NW
WEST PLAZA NE
EAST PLAZA NE


CITY OF LAKE FOREST
DECEMBER 20, 1991
CITY OF
LAKE FOREST
Scale: 1" = 1000'
ZONING MAP
ZONING DESIGNATIONS
A1 GENERAL AGRICULTURE
BP BUSINESS PARK
C COMMERCIAL
CC COMMUNITY COMMERCIAL
C2 GENERAL COMMERCIAL
CN COMMERCIAL NEIGHBORHOOD
HEDR HEAVY DENSITY RESIDENTIAL
HIDR HIGH DENSITY RESIDENTIAL
HT HIGH TECHNOLOGY
I INDUSTRIAL
IP INDUSTRIAL PARK
LDR LOW DENSITY RESIDENTIAL
MDR MEDIUM DENSITY RESIDENTIAL
MF MULTI-FAMILY RESIDENTIAL
MI LIGHT INDUSTRIAL
OS OPEN SPACE
PA PROFESSIONAL & ADMINISTRATIVE OFFICE
PC PLANNED COMMUNITY
PC 1 LAKE FOREST PLANNED COMMUNITY
PC 2 EL TORO PLANNED COMMUNITY
PC 3 RANCHO DE LOS ALISOS PLANNED COMMUNITY
PC 4 SERRANO HIGHLAND PLANNED COMMUNITY
PC 5 RANCHO SERRANO PLANNED COMMUNITY
PC 6 PACIFIC COMMERCENTRE PLANNED COMMUNITY
PC 7 BAKER RANCH PLANNED COMMUNITY
PC 8 FOOTHILL RANCH PLANNED COMMUNITY
PC 9 PORTOLA HILLS PLANNED COMMUNITY
R1 SINGLE FAMILY RESIDENTIAL
R2 PD GROUP DWELLING PLANNED DEVELOPMENT
RS RESIDENTIAL SINGLE FAMILY
SF SINGLE FAMILY RESIDENTIAL
UA URBAN ACTIVITY
UA/BP URBAN/ACTIVITY/BUSINESS PARK
UA/C URBAN ACTIVITY/COMMERCIAL
UA/CBP URBAN ACTIVITY/COMMERCIAL/BUSINESS PARK
UA/SG/C URBAN ACTIVITY/SAND & GRAVEL/COMMERCIAL
WATER
PLANNED COMMUNITY BOUNDARY
DISTRICT BOUNDARY
CITY BOUNDARY
NC NEIGHBORHOOD COMMERCIAL
SS SERVICE STATION
R2 MULTI-FAMILY DWELLING
RESIDENTIAL
COMMERCIAL
INDUSTRIAL
**THIS MAP HAS NOT BEEN UPDATED TO REFLECT THE FOLLOWING ZONE CHANGES:
- ZC 2004-02
- ZC 2008-02
- ZC 2008-03
- ZC 2008-04
- ZC 2008-05
PC 1
PC 2
PC 3
PC 4
PC 5
PC 6
PC 7
PC 8
PC 9


City of Burien Zoning
Revised by ORD. 559 - Effective December 20, 2011
Seattle
Tukwila
SeaTac
Normandy Park
LAKE BURIEN
PUGET SOUND
N
W
E
S
Adopted Zoning Map Amendments
0
1,000
2,000
4,000
Feet
Residential Single Family A
Residential Single Family 12,000
Residential Single Family 7,200
Residential Multi Family 12
Residential Multi Family 18
Residential Multi Family 24
Residential Multi Family 48
Neighborhood Center
Intersection Commercial
Downtown Commercial
Regional Commercial
Community Commercial 1
Community Commercial 2
Office
Professional/Residential
Industrial
Airport Industrial 1
Airport Industrial 2
Special Planning Area 1
Special Planning Area 2
Special Planning Area 3
Boundary of Burien



R.2
R.3
R.4
R.5
R.6
R.7
R.8
R.9
R.10
R.11
R.12
R.13
T.26
T.25
T.24
T.23
T.22
T.21
T.20
T.19
Zoning 2004
A-10 - Agricultural, one DU per 10 acres
A-35 - Agricultural, one DU per 35 acres
F - Forest
M - Mineral
RA-2.5 - Rural Area, one DU per 5 acres
RA-5 - Rural Area, one DU per 5 acres
RA-10 - Rural Area, one DU per 10 acres
UR - Urban Reserve, one DU per 5 acres
R-1 - Residential, one DU per acre
R-4 - Residential, 4 DU per acre
R-6 - Residential, 6 DU per acre
R-8 - Residential, 8 DU per acre
R-12 - Residential, 12 DU per acre
R-18 - Residential, 18 DU per acre
R-24 - Residential, 24 DU per acre
R-48 - Residential, 48 DU per acre
NB - Neighborhood Business
CB - Community Business
RB - Regional Business
O - Office
I - Industrial
Incorporated City
Tribal Lands
Urban Growth Area Boundary
* du - dwelling unit, ac = acre
King County
Department of Development and Environmental Services
N
0 2 4 8 Miles
November 2006
m:\tony\projects\2004_zoning.mxd
COOPERT fiddes707\gis-m\maps\200611\coopert_20061113_2004_zoning.pdf
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Source: King County Department of Development and Environmental Services