

## **APPENDIX A – WATER FACILITIES INVENTORY**

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# WATER FACILITIES INVENTORY (WFI) FORM - Continued

<b>1. SYSTEM ID NO.</b> 39800 P	<b>2. SYSTEM NAME</b> KING COUNTY WATER DISTRICT #49	<b>3. COUNTY</b> KING	<b>4. GROUP</b> A	<b>5. TYPE</b> Comm
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	ACTIVE SERVICE CONNECTIONS	DOH USE ONLY! CALCULATED ACTIVE CONNECTIONS	DOH USE ONLY! APPROVED CONNECTIONS
<b>25. SINGLE FAMILY RESIDENCES (How many of the following do you have?)</b>		6426	Unspecified
A. Full Time Single Family Residences (Occupied 180 days or more per year)	3166		
B. Part Time Single Family Residences (Occupied less than 180 days per year)	0		
<b>26. MULTI-FAMILY RESIDENTIAL BUILDINGS (How many of the following do you have?)</b>			
A. Apartment Buildings, condos, duplexes, barracks, dorms	366		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	3260		
C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year	0		
<b>27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)</b>			
A. Recreational Services and/or Transient Accommodations (Campsites, RV sites, hotel/motel/overnight units)	0	0	
B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.	476	476	
<b>28. TOTAL SERVICE CONNECTIONS</b>		6902	

<b>29. FULL-TIME RESIDENTIAL POPULATION</b>													
A. How many residents are served by this system 180 or more days per year? <span style="float: right;">16065</span>													

<b>30. PART-TIME RESIDENTIAL POPULATION</b>	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many part-time residents are present each month?												
B. How many days per month are they present?												

<b>31. TEMPORARY &amp; TRANSIENT USERS</b>	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many total visitors, attendees, travelers, campers, patients or customers have access to the water system each month?												
B. How many days per month is water accessible to the public?												

<b>32. REGULAR NON-RESIDENTIAL USERS</b>	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. If you have schools, daycares, or businesses connected to your water system, how many students daycare children and/or employees are present each month?												
B. How many days per month are they present?												

<b>33. ROUTINE COLIFORM SCHEDULE</b>	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
* Requirement is exception from WAC 246-290	15	15	15	15	15	15	15	15	15	15	15	15

<b>34. NITRATE SCHEDULE</b>	QUARTERLY	ANNUALLY	ONCE EVERY 3 YEARS
(One Sample per source by time period)			

**35. Reason for Submitting WFI:**

☐ Update - Change   
 ☐ Update - No Change   
 ☐ Inactivate   
 ☐ Re-Activate   
 ☐ Name Change   
 ☐ New System   
 ☐ Other \_\_\_\_\_

**36. I certify that the information stated on this WFI form is correct to the best of my knowledge.**

**SIGNATURE:** \_\_\_\_\_ **DATE:** \_\_\_\_\_

**PRINT NAME:** \_\_\_\_\_ **TITLE:** \_\_\_\_\_



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KING COUNTY WATER DISTRICT NO. 49

KING COUNTY, WASHINGTON

RESOLUTION NO. 05-1196

A RESOLUTION OF THE BOARD OF COMMISSIONERS OF WATER DISTRICT NO. 49, KING COUNTY, WASHINGTON, REVISING AND READOPTING A CROSS CONNECTION CONTROL PROGRAM; AND RESCINDING RESOLUTION NO. 01-1176.

WHEREAS, Water District No. 49, King County, Washington ("District") provides water supply to residents and property located within its corporate and service area boundaries; and

WHEREAS, the District is required by law to develop and implement a cross connection control program to eliminate cross connections in the District's public water supply system whenever possible or, when cross connections cannot be eliminated, to control such cross connections by installation of approved backflow prevention devices commensurate with the degree of hazard relating to the cross connection; and

WHEREAS, Washington Administrative Code 246-290-490 (WAC) requires that all community water systems comply with the cross connection control requirements specified in such regulations, to include a written description of the cross connection control program in the water system plan for a community water system required under WAC 246-290-100 and to include the minimum program elements described in WAC 246-290-490(3) in such cross connection control program; and

WHEREAS, pursuant to RCW 57.08.005(3), the District has full authority to regulate and control the use, content, distribution and price of water supplied by the District to its customers and properties; and

WHEREAS, the District has updated and revised its cross connection control program, such revised and updated cross connection control program being attached hereto as Exhibit A and incorporated herein by this reference (the "Revised Cross Connection Control Program"); and

WHEREAS, the purpose of the District's Revised Cross Connection Control Program is to protect the public water system from contamination via cross connections by eliminating cross connections or, when cross connections cannot be eliminated, by controlling cross connections through the installation of backflow prevention assemblies; and the development and implementation of the Revised Cross Connection Control Program is necessary to protect public health and safety; now, therefore,

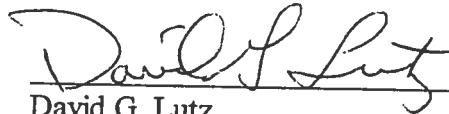
BE IT RESOLVED, by the Board of Commissioners of Water District No. 49 as follows:

1. The Revised Cross Connection Control Program as set forth in Exhibit A attached hereto is hereby approved and adopted for implementation.
2. All District resolutions, policies and procedures, including Resolution No. 01-1176, are hereby rescinded, superseded and/or amended to be in accordance with the Revised Cross Connection Control Program approved and adopted herein.
3. This resolution shall be effective the date set forth below.

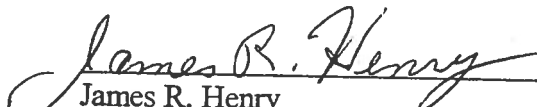
ADOPTED by the Board of Commissioners of Water District No. 49 at a regular open public meeting held on September 14, 2005.

Individual Commissioner's  
Vote on Resolution


In Favor Of: \_\_\_\_  
Opposed: \_\_\_\_  
Abstained: \_\_\_\_  
Absent: \_\_\_\_

  
\_\_\_\_\_  
David G. Lutz  
President and Commissioner

In Favor Of: \_\_\_\_  
Opposed: \_\_\_\_  
Abstained: \_\_\_\_  
Absent: \_\_\_\_

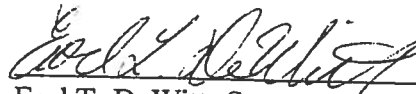
  
\_\_\_\_\_  
James R. Henry  
Vice-President and Commissioner

In Favor Of: \_\_\_\_  
Opposed: \_\_\_\_  
Abstained: \_\_\_\_  
Absent: \_\_\_\_

  
\_\_\_\_\_  
Earl T. DeWitt  
Secretary and Commissioner

Certificate

I, Earl T. DeWitt, Secretary of the Board of Commissioners of Water District No. 49, King County, Washington, do hereby certify that the foregoing resolution is a true and correct copy of Resolution No. 05-1196 of such Board, duly adopted at a regular meeting thereof held on the 14th day of September, 2005, signed by the members of such Board in attendance at such meeting and attested by myself in authentication of such adoption.

A handwritten signature in dark ink, appearing to read "Earl T. DeWitt", is written over a horizontal line.

Earl T. DeWitt, Secretary  
Board of Commissioners  
Water District No. 49  
King County, Washington.

# **Cross Connection Control Written Program and Backflow Incident Response Plan**

*For*

## **King County Water District #49**

Prepared by: Backflow Management Inc.  
17752 NE San Rafael  
Portland, OR 97230



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# **Section 1**

## **Written Program Plan**

## Cross-Connection Control Written Program Plan for

### **King County Water District #49**

#### **A. Requirement for Program**

**King County Water District #49, ID #39800P**, hereinafter referred to as "the District", has the responsibility to protect the public water system from contamination due to cross connections. A cross connection may be defined as *"any actual or potential physical connection between a potable water line and any pipe, vessel, or machine that contains or has a probability of containing a non-potable gas or liquid, such that it is possible for a non-potable gas or liquid to enter the potable water system by backflow."*

All public water systems are required to develop and implement cross-connection control (CCC) programs. The CCC requirements are contained in Washington Administrative Code (WAC) 246-290-490 of the Group A Drinking Water Regulations. The minimum required elements of a CCC program are:

1. Establishment of legal authority and program policies;
2. Evaluation of premises for cross-connection hazards;
3. Elimination and/or control of cross connections;
4. Provision of qualified personnel;
5. Inspection and testing of backflow preventers;
6. Quality control of testing process;
7. Response to backflow incidents;
8. Public education for consumers;
9. Record keeping for CCC program; and
10. Special requirements for reclaimed water use.

Other CCC program requirements include:

1. Coordination with the Local Administrative Authority (LAA), i.e., the local building or plumbing official regarding CCC activities;
2. Prohibition of the return of used water into the public water system (PWS) distribution system; and
3. Inclusion of a written CCC program in a Water System Plan (WSP) or a Small Water System Management Program (SWSMP).

Note: Throughout the CCC program plan the term *customer* is used. *Customer* as used herein means the property owner and/or occupant of the premises served by the PWS (i.e., whoever interfaces with the PWS regarding water service). Also, unless otherwise defined, all CCC-related terms used in this example program have the same definitions as those contained in WAC 246-290-010 of the Washington State Drinking Water Regulations.

## B. Program Objective

The objectives of the CCC program are to:

1. Reasonably reduce the risk of contamination of the public water distribution system; and
2. Reasonably reduce the District's exposure to legal liability arising from the backflow of any contaminant originating from the customer's plumbing system and then supplied to other customers; and
3. Cooperate with the LAA by joint operation of program administrative tasks.

## C. Summary of Program Decisions

The following table summarizes the major policy and program decisions adopted for King County Water District #49. The items in the table represent CCC program areas that have more than one acceptable approach or option.

**CCC Program Decision Summary Table for the  
King County Water District #49**

Decision Item	Decision
<b>1. Type of Program [General, WAC 246-290-490(2)(e)]</b>	
a. Premises isolation only	
b. Premises isolation and in-premises protection (combination program)	*
<b>2. Extent of Coordination with LAA [WAC 246-290-490(2)(d)]</b>	
a. Information exchange	*
b. Interaction	In transition to interactive
c. Joint program	
<b>3. Relationship with Customer [Element 1]</b>	
a. Signed service agreement or contract	
b. Ordinance/resolution; implied service agreement	*
<b>4. Enforcement of Corrective Action [Element 1]</b>	
a. Rely upon shut-off of water service	*
b. Rely upon purveyor-installed premises isolation	
<b>5. Assessment and Re-assessment of Hazard [Element 2]</b>	
a. By District's staff or equivalent	*
b. By cross-connection control specialist (CCS) employed by customer; report reviewed by District's CCS	* In some cases
<b>6. Location and Ownership of Premises Isolation Assembly [Element 3]</b>	
a. On District's service line	
b. On customer's service line	*
<b>7. CCS Option – District's Program Management [Element 4]</b>	
a. District's staff member certified	
b. Inter-agency agreement or use other agency's CCS	
c. Contract with consultant CCS	*

Decision Item	Decision
<b>8. Testing of Assemblies [Element 5]</b>	
a. By District's staff or District-employed backflow assembly tester (BAT)	
b. By customer-employed (contractor) BAT	*
<b>9. Cost Recovery [WAC 246-290-100(4)(h) and -105(4)(p)]</b>	
a. Borne by all customers (general water rates)	
b. Assessed to specific class (commercial meters)	
c. Each customer directly bears cost	*

## D. Required Elements of Program

The drinking water regulations for Group A public water systems in Washington, WAC 246-290, require CCC programs to include certain minimum elements. The elements are listed in WAC 246-290-490(?). This section describes how the water system intends to comply with each of the required program elements. Elements are numbered the same as they appear in the WAC.

***Element 1:*** *Adoption of a written legal instrument authorizing the establishment and implementation of a CCC program.*

King County Water District #49 has adopted a resolution (Resolution #05-1196), reproduced as Exhibit A, which authorizes the District to implement a CCC program. The resolution also authorizes the system to terminate water service to consumers who do not comply with the resolution. However, the primary method for protection of the distribution system will be the installation of a backflow preventer by the customer, at the customer's expense.

The attached service contract referred to in the resolution shall be the primary enforcement authority for all new customers.

For customers supplied prior to the adoption of the attached resolution, an implied service contract allows the District to protect the distribution system from contamination through a District-installed backflow preventer on a customer's service.

***Element 2:*** *Development and implementation of procedures and schedules for evaluating new and existing service connections to assess the degree of hazard.*

### Initial Cross-Connection Hazard Surveys

The procedures for evaluating the backflow prevention requirements for new and existing customers are as follows:

1. For all ***new non-residential services***, the District will require that the customer submit with the application for water service an evaluation by the District's DOH-certified cross-connection control specialist (CCS) of the hazard posed by the proposed plumbing system,

with recommendations for the installation at the meter of either a double-check valve assembly (DCVA) or a reduced-pressure principle backflow assembly (RPBA), or commensurate in-premises backflow protection.

As an alternative to the above requirement for a survey by a CCS, the customer may agree to install an approved air gap (AG) or RPBA for premises isolation as a condition of service.

2. For all *new residential services*, the District will require that the customer submit with the application for water service a completed "Water Use Questionnaire" (reproduced as exhibit B). If the customer's questionnaire indicates special plumbing, such as a lawn sprinkler system, or hazardous water use on the premises, Water District #49 will cause an evaluation by the District's DOH-certified CCS to occur of the hazard posed by the proposed special plumbing system, with recommendations for the installation at the meter of either a DCVA or an RPBA, or commensurate in-premises protection.

As an alternative to the above requirement for a survey by the District's DOH-certified CCS, the District, at their discretion, may specify the backflow preventer required to be installed as a condition of service.

3. For all *existing non-residential services*, the District will require the customer to allow the District, within nine months of notification, to conduct an evaluation by the District's DOH-certified CCS, of the hazard posed by the plumbing system, with recommendations for the installation at the meter of either a DCVA or an RPBA, or commensurate in-premises backflow preventers.

As an alternative to the above requirement for a survey by the District's DOH-certified CCS, the customer may agree to install an AG or RPBA for premises isolation within 90 days of notification by the District or an alternate time period acceptable to the District.

4. For all *existing residential services*, the District will require the customer to submit to the District, within four months of notification, a completed "Water Use Questionnaire." If the customer's reply indicates special plumbing or water use on the premises, the customer shall allow an evaluation by the District's DOH-certified CCS of the hazard posed to the water system by the customer's plumbing system, with recommendations for the installation at the meter of either a DCVA or an RPBA, or commensurate in-premises backflow preventers.

As an alternative to the above requirement for a survey by a CCS, the District may specify the backflow preventer required to be installed as a condition of service. The District's CCS will provide guidance on the type of backflow preventer to be installed.

5. For all existing services, should the customer fail to supply the required information for a hazard assessment or fail to submit a completed "Water Use Questionnaire," the District may have the assessment made by a CCS employed by the District, require the installation of an RPBA for premises isolation, or take other such actions consistent with the previously stated policies and bill the customer for the associated costs.

### Cross-Connection Hazard Survey Schedule for Initial Hazard Assessments

The schedule for initial hazard assessment is outlined in the following table. The schedule starts from the date the CCC program is established.

Initial Assessment Task	Schedule
Assessment of all new connections	At time of application for water service
Identification and assessment of high-hazard premises which are listed on Table 9 of Washington Administrative Code (WAC) 246-290-490	Within nine months
Identification and assessment of hazardous premises supplemental to Table 9 of WAC 246-290-490	Within 12 months
Identification of residential connections with special plumbing facilities and/or water use on the premises	Within 15 months

### Cross-Connection Hazard Survey Schedule for Subsequent Hazard Re-Assessments

For subsequent cross-connection hazard surveys, procedures for evaluating the backflow prevention requirements are:

1. For **residential services**, the District will require the customer to submit to the District, within two months of District notification, a completed "Water Use Questionnaire." The procedure used for evaluating the hazard re-assessment and the potential change in the required backflow prevention will be the same as used for the initial hazard assessment.
2. For all **non-residential services**, the customer will be required to allow the District, within two months of notification, to conduct a hazard re-assessment by the District's DOH-certified CCS.

The frequency of hazard re-assessments will be as shown in the table below:

Type of Service	Frequency of Re-Evaluation
Any services with reduced-pressure principle backflow assembly (RPBA) installed for premises isolation	None required as long as the RPBA passes annual tests and inspections
Commercial services with double-check valve assembly (DCVA) installed for premises isolation	Every two years and upon change in use or ownership
Commercial services when District relies upon in-premises protection	Every two years and upon change in use, ownership, or plumbing system
Residential services with special plumbing where the District relies upon compliance with Uniform Plumbing Code (UPC)	Every 2-3 years (questionnaire)
Residential services with DCVA installed for premises isolation	Every 4-5 years (questionnaire)
Residential services with no known special plumbing or water use on the premises	Every 4-5 years and upon change in use, ownership, or plumbing system (questionnaire)

The District will inform the customer that the District's survey of a customer's premises (whether by a representative of the District or through the evaluation of a questionnaire completed by the customer) is for the sole purpose of establishing the District's minimum requirements for the protection of the public water supply system, and that the required backflow protection will be commensurate with the District's assessment of the degree of hazard.

The District will also inform the customer or any regulatory agencies that the District's survey, requirements for the installation of backflow prevention assemblies, lack of requirements for the installation of backflow prevention assemblies, or other actions by the District's personnel or agent do not constitute an approval of the customer's plumbing system or an assurance to the customer or any regulatory agency of the absence of cross connections.

***Element 3:*** *Development and implementation of procedures and schedules for elimination and/or control of cross-connections.*

### **Backflow Preventer Requirements**

The following service policy shall apply to all new and existing customers:

1. The District will require that water service to all **non-residential customers** be isolated at the meter by a DOH-approved DCVA or RPBA acceptable to the District. All high-hazard connections of the type described in Table 9 of WAC 246-290-490 shall be isolated with an RPBA. In lieu of isolation with a DCVA, other non-residential customers, with the concurrence of the District's CCS, may install in-premises protection commensurate with the degree of hazard, as determined by the District's CCS.
2. The District will require all **residential customers** with facilities of the type described in Table 9 of WAC 246-290-490 to be isolated with an RPBA. All other residential customers with special plumbing or water use on the premises will be isolated with a DCVA. "Special plumbing" includes, but is not limited to, the following:
  - a. A lawn irrigation system;
  - b. A solar heating system;
  - c. An auxiliary source of supply, e.g., a well or creek;
  - d. Piping for livestock watering, hobby farming, etc.;
  - e. Residential fire sprinkler system; and
  - f. Property containing a small boat moorage.
3. The District has chosen to supplement Table 9 of WAC 246-290-490(4) by identifying additional premises or premises types for which premises isolation is mandated. Such premises will include aircraft and automotive manufacturers, pulp and paper mills, military bases, tall buildings, premises with complex plumbing, premises with plumbing subject to frequent changes, plumbing with a repeat history of cross-connections being established or reestablished.



4. Residential customers not required to be isolated with an RPBA may install in-premises protection in accordance with the Uniform Plumbing Code (UPC) in lieu of isolation with a DCVA.
5. For all customers served by Water District #49, a required premises isolation DCVA or RPBA shall be:
  - Purchased and installed by the customer (at the customer's expense) immediately downstream of the water meter in accordance with the District's standards described hereinafter; and
  - Maintained, tested, and inspected in accordance with the District's standards described hereinafter.

For new customers, the District will not turn on water (except for testing purposes) at the meter until the customer complies with the above requirements.

In the event of failure of the customer to comply with the District's installation and maintenance requirements the District may then proceed with corrective action provisions stipulated in Resolution #05-1196

#### **6. Approved Backflow Preventers and Installation**

All backflow preventers relied upon by the District to protect the public water system shall meet the definition of "approved backflow preventer" as contained in WAC 246-290-010. The District will obtain and maintain a current list of assemblies approved for installation in Washington State from the DOH Office of Drinking Water.

All backflow preventers will be installed in:

- The orientation for which they are approved;
- A manner and location that facilitates their proper operation, maintenance, and testing or inspection;
- A manner that will protect them from weather-related conditions such as flooding and freezing; and
- Compliance with applicable safety regulations.

Installation standards contained in the most recently published edition of the Pacific Northwest Section, American Water Works Association (PNWS-AWWA) *CCC Manual* or the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research (USCFCCCHR) *CCC Manual* shall be followed unless the manufacturer's requirements are more stringent.

The District has no regulatory responsibility or authority over the installation and operation of the customer's plumbing system. The customer is solely responsible for compliance with all applicable regulations and for prevention of contamination of his plumbing system from sources within his/her premises. Any action taken by the District to survey plumbing, inspect or test backflow prevention assemblies, or to require premises isolation (installation

of DCVA or RPBA on service) is solely for the purposes of reducing the risk of contamination of the District's distribution system.

The District will inform the customer that any action taken by the District shall not be construed by the customer as guidance on the safety or reliability of the customer's plumbing system. The District will not provide advice to the customer on the design and installation of plumbing other than through the general public education program discussed in Element 8.

Except for easements containing the District's distribution system, the District will not undertake work on the customer's premises.

#### 8. Schedule for Installation of Backflow Preventers

The following table shows the schedule that the District will follow for installation of backflow preventers when they are required (based on the hazard evaluation).

Type of Service	Schedule
New connections with cross-connection hazards	Before service is initiated
Existing connections with Table 9-type hazards and other high cross-connection hazards	Within 90 days after notification
Existing connections with other than Table 9 of WAC 246-290-490 or high cross-connection hazards	Within 180 days after notification (suggested)
Existing fire protection systems using chemicals or supplied by unapproved auxiliary water source	Within 90 days after notification
Existing fire protection systems not using chemicals and supplied by District's water	Within 1 year after notification (suggested)

The District may consider granting an extension of time for installation of backflow preventer for an existing connection if requested by the premises owner.

**Element 4:** *Provision of qualified personnel, including at least one person certified as a CCS, to develop and implement the CCC program.*

1. **Program Administration:** The responsibility for administration of the CCC Program rests with the District. General policy direction and risk management decisions are established by the board of commissioners. By an inter-agency agreement, the Local Administrative Authority (LAA) may undertake certain administrative tasks, and the District may undertake additional tasks to assist the LAA.
2. The District will employ or have on-staff at least one person certified by DOH as a CCS to develop and implement the CCC program. As an alternative, or when no staff or employees are properly qualified, the District may retain a DOH-certified CCS on contract to provide the necessary expertise and services.

3. The following cross-connection related tasks will be performed by or under the direction of the District's certified CCS (on staff or under contract):

- Preparation of and recommendations regarding changes to the CCC program;
- Performance of and/or reviews of CCC hazard evaluations;
- Recommendations on the type of backflow preventer to be installed;
- Recommendations on schedules for retrofitting of backflow preventers;
- Inspections of backflow preventers for proper application and installation;
- Reviews of backflow preventer inspection and test reports;
- Reviews of backflow testing quality control information;
- Recommendations and/or the granting of exceptions to mandatory premises isolation;
- Participation in or cooperation with other water utility staff in the investigation of backflow incidents and other water quality problems;
- Completion of Backflow Incident Reports; and
- Completion of CCC Activity and Program Summary Reports.

4. The District may delegate other CCC program activities to other personnel who are not certified CCSs, including clerical support staff. These activities include:

- Administration of paperwork associated with service agreements;
- Mailing, collecting, and initial screening of hazard evaluation/water use questionnaires;
- Mailing of assembly testing notices;
- Receiving and screening of assembly testing reports;
- CCC program database administration and record keeping;
- Dissemination of public education material; and
- Assisting tasks associated with coordination with the LAA. The following table identifies the current CCS employed or retained on contract by the District to manage the District's CCC program and/or act as the CCC technical resource for the District:

Name of CCS	Backflow Management Inc.
Address	17752 NE San Rafael
City, State, Zip	Portland, OR 97230
Telephone Number	(503)255-1619
CCS Certification Number	#9662

**Element 5:** *Development and implementation of procedures to ensure that approved backflow preventers are inspected and/or tested (as applicable).*

#### **1. Inspection and Testing of Backflow Preventers**

All backflow preventers that the District relies upon for protection of the water system will be subject to inspection and, if applicable, testing. This includes backflow preventers installed for in-premises protection that the District relies upon for protection of the water systems.

Inspection and testing of backflow preventers will be as follows:

- The District's DOH-certified CCS will inspect backflow preventers for proper application (i.e., to ensure that the preventer installed is commensurate with the assessed degree of hazard).
- Either a DOH-certified CCS or Local Administrative Authority will perform inspections of backflow preventers for correct installation.
- A DOH-certified backflow assembly tester will test all assemblies relied upon by the District to protect the public water system.

## **2. Frequency of Inspection and Testing**

Inspection and testing of backflow preventers will be conducted:

- At the time of installation;
- Annually after installation;
- After a backflow incident; and
- After repair, reinstallation, relocation, or re-plumbing.

The District may require a backflow preventer to be inspected and/or tested more frequently than once a year, when it protects against a high-health hazard or when it repeatedly fails tests or inspections.

## **3. Responsibility for Inspection and Testing**

The District will be responsible for inspection and testing of all District-owned backflow preventers.

The District will require the customer to be responsible for inspection and testing of backflow preventers owned by the customer. The customer shall employ, at customer expense, a DOH-certified BAT pre-approved by the District to conduct the inspection and test within the time period specified in the testing notice sent by the District. The test report shall be completed and signed by the BAT, then countersigned and returned by the customer to the District, before the due date specified by the District. The customer may request an extension of the due date for returning a test report by submitting a written request to the District. The District may grant one extension up to 90 days.

## **4. Approved Test Procedures**

The District will require that all assemblies relied upon to protect the public water system be tested in accordance with DOH-approved test procedures as specified in WAC 246-290-490(7)(d). Any proposal to use alternate test procedures must be approved by the District's CCS.

The District will require all assembly tests to be reported on the form shown in **Exhibit C** and returned as specified above.

## **5. Notification of Inspection and/or Testing**

The District will notify in writing all customers who own backflow preventers that are relied upon to protect the public water system to have their backflow preventer(s) inspected and/or tested. Notices will be sent out not less than 10 days before the due date of the inspection and/or test. The notice will also specify the date (up to 30 days after the due date of the inspection and/or test date) by which the inspection/test report must be received by the District.

## **6. Enforcement**

When a customer fails to send in the inspection/test report within 15 days after the due date specified, and the District has not approved an extension to the due date, the District will take the following enforcement action:

- The District will send a second notice giving the customer an additional 15 days to send in the inspection/test report.
- If the customer has not sent in the inspection/test report within 10 days of the due date given in the second notice, the District will send a third notice, by certified mail, giving the customer an additional 15 days to send in the report. The notice will also inform the customer that failure to satisfactorily respond to this notice will result in water service shut-off.
- The District will send copies of the third notice to the owner and occupants of the premises (if different from the customer) and to the LAA.
- If the owner and/or occupants have not responded satisfactorily to the District within 10 days of the due date specified in the third notice, the District will implement water service shut-off procedures.

**Element 6:**    *Development and implementation of a backflow prevention assembly testing quality assurance/quality control program.*

### **1. List of Pre-Approved BATs**

The District will maintain a list of local, DOH-certified BATs that are pre-approved by the District to perform the following activities:

- Backflow preventer inspection for proper installation; and
- Backflow assembly testing

### **2. Pre-Approval Qualifications**

BATs who wish to be included on the District's pre-approved list and/or provide testing in the District's service area must apply to the District and furnish the following information:

- Evidence of current DOH certification in good standing;
- Make and model of testing equipment (BAT listing only); and
- Evidence of test equipment verification of accuracy and/or calibration within the past 12 months (BAT listing only).

### 3. Quality Assurance

The District's CCS will review within 30 days of receipt the backflow preventer inspection/test report forms submitted by the customer.

The District's CCS will provide follow up on test reports that are deficient in any way.

The District's CCS will report incidences of fraud or gross incompetence on the part of any BAT to the DOH Operator Certification program staff.

**Element 7:**    *Development and implementation (when appropriate) of procedures for responding to backflow incidents.*

#### 1. Backflow Incident Response Plan

The District's CCS will participate in developing a backflow incident response plan that will be part of the water system's emergency response program as required by WAC 246-290-415(2). The incident response plan will include, but will not be limited to:

- Notification of affected population;
- Notification and coordination with other agencies, such as DOH, the LAA, and the local health jurisdiction;
- Identification of the source of contamination;
- Isolation of the source of contamination and the affected area(s);
- Cleaning, flushing, and other measures to mitigate and correct the problem; and
- Apply corrective action to prevent future backflow occurrences.

#### 2. Technical Resources

The District will use the most recently published edition of the manual, *Backflow Incident Investigation Procedures*, published by the PNWS-AWWA as a supplement to the Backflow Incident Response Plan for King County Water District #49.

**Element 8:**    *Development and implementation of a cross-connection control public education program.*

#### 1. Customer Education

The District will distribute with water bills or some other means, at regular intervals, public education brochures to system customers. For residential customers, such brochures will describe the cross-connection hazards in homes and the recommended assemblies or devices that should be installed by the homeowner to reduce the hazard to the public water system. The education program will emphasize the responsibility of the customer in preventing the contamination of the public water supply. The District's staff will produce the public education brochures.

The information distributed by the District will include, but not be limited to, the following subjects:

- Cross-connection hazards in general;
- Irrigation system hazards and corrective actions;
- Fire sprinkler cross-connection hazards;
- Importance of annual inspection and/or testing of backflow preventers; and
- Thermal expansion in hot water systems when backflow preventers are installed for premises isolation.

The District will distribute information brochures to all customers every two to three years, and to every new customer.

## **2. Public Outreach**

In cooperation with other water utilities, the District may participate in an outreach program consisting of:

- Distribution of cross-connection control information to hardware and plumbing stores serving the area;
- Participation in fairs, exhibits, and other events; and
- Special education sessions for irrigation contractors, fire sprinkler contractors, local backflow assembly testers, etc.

### ***Element 9: Development and maintenance of cross-connection control records.***

#### **1. Types of Records and Data to be Maintained**

The District will maintain records of the following types of information required by WAC 246-290-490:

- Service connections/customer premises information including:
  - Assessed degree of hazard; and
  - Required backflow preventer to protect the public water system.
- Backflow preventer inventory and information including:
  - Air gap (AG) location, installation and inspection dates, inspection results and person conducting inspection;
  - Backflow assembly location, assembly description (type, manufacturer, make, model, size, and serial number), installation, inspection and test dates, test results and data, and person performing test; and
  - Information on atmospheric vacuum breakers used for irrigation system applications, including manufacturer, make, model, size, dates of installation and inspections, and person performing inspections.

The District will maintain records on all assemblies that protect the public water system from contamination. At a minimum, the District will maintain records on all premises isolation assemblies required to protect the public water system. Where applicable, the above information will also be maintained for backflow preventers installed for in-premises protection that are relied upon by the District to protect the public water system.

## **2. Reports to be Prepared and Submitted to DOH**

The District will prepare the following reports required by WAC 246-290-490 including:

- Cross-connection control program activities report for the calendar year, to be sent to DOH when requested;
- Cross-connection control program summary information, when required, or when there are significant policy changes;
- Backflow incident reports to DOH (and voluntarily to the PNWS-AWWA CCC Committee); and
- Documentation when exceptions to mandatory premises isolation are granted.

At a minimum, the District's CCS will prepare and sign the exceptions reports.

The District's CCS will prepare and sign all CCC-related reports required by WAC 246-290-490.

The manager of the public water system shall sign the CCC reports before submission to DOH.

### ***Element 10:*** *Additional cross-connection control requirements for reclaimed water.*

At this time King County Water District #49 does not receive or distribute reclaimed water. In the event that reclaimed water use is proposed within the Districts service area, the District will make all cross-connection control requirements mandated by the Permitting Authority in accordance with Chapter 90.46 RCW part of the written CCC program plan and comply with such additional requirements.

## **E. Other Provisions**

### **1. Coordination with Local Administrative Authority**

Both WAC 246-290-490 and the Uniform Plumbing Code amended for Washington require coordination between the water District and the Local Administrative Authority (LAA) in all matters pertaining to cross-connection control.

The District will provide a copy of this CCC program to **The City of Burien Community Development/Building Department**. The District will inform the LAA of any changes in policy or procedure that may impact the LAA.



The District will provide information to the LAA in a timely manner regarding any:

- Requirement imposed on a residential customer for the installation of a DCVA or an RPBA on the service, with a description of the cross-connection hazard identified;
  - Upgrade of the premises isolation backflow preventer, i.e., from a DCVA to an RPBA;
  - Action taken to discontinue water service to a customer; and
  - Backflow incident known by the District to have contaminated the public water system or a customer's plumbing system.
2. The District will pursue development of a written agreement with the Local Administrative Authority regarding the details of the coordination on CCC issues between the two parties. The agreement will include, but not be limited to, the following items:
- The purpose of the written agreement;
  - Identification of the parties and other interested agencies;
  - Delineation of responsibilities;
  - Procedures regarding new service connections;
  - Procedures regarding existing and changes to existing services;
  - Special policies and procedures, such as for fire protection and irrigation services;
  - Procedures regarding water service shut-offs, backflow incidents, and other events;
  - Communications between parties; and
  - Other contingencies.

3. **Prohibition of Return of Used Water.** King County Water District #49 must prohibit the intentional return of used water to the District's distribution system per WAC 246-290-490 (2)(1).

Used water is defined as water that has left the control of the District. This includes water used for heating and cooling purposes and water that may flow back into the distribution system from customers with multiple connections.

It is the policy of King County Water District #49 to:

- Prohibit the intentional return of used water to the distribution system by any customer served by the public water system; and
  - Require that all customers with multiple connections, where the hydraulics permit the potential return of used water, to install a backflow preventer (DCVA or RPBA) commensurate with the degree of hazard at each point of connection.
5. **Unapproved Auxiliary Supplies.** All water supplies other than those owned by the District are considered unapproved auxiliary supplies as defined in WAC 246-290-010. The District will require backflow protection for customers with auxiliary supplies on their premises as follows:
- King County Water District #49 requires a backflow assembly for premises isolation whether or not there is a physical connection between the unapproved auxiliary supply and the District's water system.

- The District will require the installation of a DCVA for premises isolation at the service connection to any customer with an unapproved auxiliary water supply not interconnected with the District's water system. The District will require a RPBA in circumstances where the unapproved auxiliary supply is interconnected with the District's supply in accordance with WAC 246-290-490 Table 9.

6. **Tanker Trucks.** The District may allow tanker trucks or other mobile units to obtain water from the District's water system under the following conditions:

- The tanker truck is equipped with an approved AG or an approved RPBA with a current satisfactory inspection or test report.

7. **Interties and Wholesale Water Customers.** The District will require that interties with other public water systems or wholesale customers (such as mobile home parks) be isolated at the point of delivery by:

- A minimum of a DCVA; and
- A minimum of an RPBA if the District considers the purchasing system or wholesale customer to pose a high-health hazard to the District's system.

The District may waive or reduce the level of protection at the intertie, if the purchasing public water system or wholesale customer:

- Has a CCC program that complies with WAC 246-290-490 and which has been approved by DOH; and
- Implements the CCC program at a level satisfactory to the District.

## **F. Relationship to Other Planning and Operations Program Requirements**

The District will consider the requirements and consequences of the CCC program on the utility's planning and operations requirements. Such considerations include, but are not limited to ensuring:

- And promoting adequate communication between CCC program personnel and other water utility staff;
- That adequate training is provided to all staff to recognize potential cross-connection control problems;
- That cross-connection issues be considered in water quality investigations;
- That the design of the water distribution system makes adequate provisions for expected head losses incurred through the installation of experienced by backflow assemblies;
- That CCC program personnel be consulted in the design of water and wastewater treatment facilities and when proposals are made to receive or distribute reclaimed water;
- That operations under normal and abnormal conditions do not result in excessive pressure losses; and
- That adequate financial and administrative resources are available to carry out the CCC program.

## **Section 2**

# **Exhibits to Written Program Plan**

**EXHIBIT A**

*TO*

**RESOLUTION NO. 05-1196**

**WATER DISTRICT NO. 49**

**KING COUNTY, WASHINGTON**

**REVISED CROSS CONNECTION  
CONTROL PROGRAM POLICY**

**(Adopted September 14, 2005)**

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## 1:01 DEFINITIONS

Except where specifically designated herein, all words used in this document shall carry their customary meanings. Words used in the present tense include the future and plural words include the singular. The word "shall" is always mandatory, and the word "may" denotes a use of discretion in making a decision. Any definition not found in this section will take its meaning from the WAC (246-290), or as amended, or in the most recent edition of the *Manual of Cross Connection Control* published by the Foundation for Cross Connection Control and Hydraulic Research, University of Southern California.

- (1) "Approved backflow prevention assembly" or "backflow assembly" or "assembly" shall mean an assembly to counteract backpressures or prevent backsiphonage. This assembly must appear on the list of approved assemblies issued by the Washington State Department of Health. The assembly must be purchased and installed as a complete unit including two shut-off valves and test cocks.
- (2) "Auxiliary supply" shall mean any water source or system other than the District's water.
- (3) "Backflow" shall mean the flow of water or other liquids, gases or solids from any source back into the distribution system. The flow of water in the opposite direction of its intended flow.
- (4) "Backflow Assembly Tester" shall mean a person holding a valid BAT certificate issued in accordance with the Washington Administrative Code 246-290-490 and the RCW 18.106, 18.27 and 70.119.
- (5) "Backpressure" shall mean backflow due to water pressure on the downstream side of the meter which exceeds the operating pressure of the public potable water supply.
- (6) "Backsiphonage" shall mean backflow due to a negative or reduced pressure within the public potable water supply.
- (7) "Contamination" shall mean the entry into or presence in a public water supply system of any substance which may be harmful to health and/or quality of the water.
- (8) "Cross connection" shall mean any physical arrangement where a public water system is connected, directly or indirectly (actual or potential), with any other non-drinkable water system or auxiliary system, wells, sewer, drain conduit, swimming pool, storage reservoir, plumbing fixture, swamp coolers, or any other device which contains, or may contain, contaminated or polluted water, sewage, used water, or other liquid of unknown or unsafe quality which may be capable of imparting contamination or pollution to the public water system as a result of backflow. Bypass arrangements, jumper connections, removable sections, swivel or changeover devices, or other temporary or permanent devices through which, or because of which, backflow may occur are considered to be cross connections.

- (9) "Cross Connection Specialist" or "Specialist" shall mean a person holding a valid Cross Connection Specialist Certificate issued in accordance with the Washington Administrative Code and that is employed by or under contract with the District.
- (10) "Degree of hazard" shall mean the low or high hazard classification that shall be attached to all actual or potential cross connections.
- (11) "District" shall mean King County Water District No. 49.
- (12) "DOH" shall mean Washington Department of Health.
- (13) "Guidance Manual" shall mean the most recent edition of the Guidance Manual written specifically for the District.
- (14) "High health hazard" shall mean the classification assigned to an actual or potential cross connection that could allow a substance of a physical, toxic, or biological nature to backflow into the potable water supply. This substance could cause illness or death.
- (15) "In-premises protection" shall mean a method of protecting the health of consumers served by the customer's plumbing system (i.e. located within the property lines of the customer's premises) by the installation of an approved air gap, backflow prevention assembly or device at the point of hazard.
- (16) "Local administrative authority" shall mean the local official, board, department or agency authorized to administer and enforce the provisions of the Uniform Plumbing Code and all other plumbing codes recognized by the State of Washington.
- (17) "Manager" shall mean the District Manager or the Manager's designee.
- (18) "Mobile unit" shall mean a unit connecting to the water system through a hydrant, hose bibb, or other appurtenance of a permanent nature that is part of the District water system or a permanent water service to premises. Examples can include but are not limited to the following: water trucks, pesticide applicator vehicles, chemical mixing units or tanks, waste or septage hauler trucks or units, sewer cleaning equipment, carpet or steam cleaning equipment, rock quarry or asphalt/concrete batch plants, or any other mobile equipment or vessel. Uses that are excluded from this definition are recreational vehicles at assigned sites or parked in accordance with applicable municipal codes and regulations pertaining to recreational vehicles, and homeowner devices that are used by the property owner in accordance with this Policy or other applicable municipal codes or regulations pertaining to the provision of water service to premises.
- (19) "Person" shall mean a natural person (individual), corporation, company, city, partnership, firm, limited liability company, joint venture company or city, and other such entity.

- (20) "Plumbing hazard" shall mean an internal or plumbing-type cross connection in a consumer's potable water system that may be either a pollutional or a contamination-type hazard. This includes, but is not limited to, cross connections to toilets, sinks, lavatories, wash trays, domestic washing machines and lawn sprinkling systems. Plumbing-type cross connections can be located in all types of structures including but not limited to homes, manufactured homes, apartment houses, hotels and commercial or industrial establishments.
- (21) "Pollutional hazard" shall mean an actual or potential threat to the physical properties of the water system or the potability of the public or the consumer's potable water system but which would not constitute a health or system hazard, as defined. The maximum degree of intensity of pollution to which the potable water system could be degraded under this definition would cause a nuisance or be aesthetically objectionable or could cause minor damage to the system or its appurtenances.
- (22) "Potable water supply" shall mean any system of water supply intended or used for human consumption or other domestic use and meets all requirements established by the Safe Drinking Water Act and the DOH regulations.
- (23) "Premises" shall mean any piece of property to which water is provided including, but not limited to, all improvements, mobile structures and structures located on it.
- (24) "Premises isolation" shall mean a method of protecting a public water system by installation of an approved double check valve assembly or a reduced pressure backflow assembly at the point of service (where the District loses control of the water supply) to separate the customer's plumbing system from the purveyor's distribution system.
- (25) "Reduced pressure principle backflow prevention assembly" or "reduced pressure principle assembly" or "RP assembly" shall mean an assembly containing two independently acting approved check valves together with a hydraulically-operated, mechanically independent pressure differential relief valve located between the check valves. The assembly shall include properly located test cocks and tightly closing shut-off valves at each end of the assembly.
- (26) "RCW" shall mean Revised Code of Washington.
- (27) "Thermal expansion" shall mean the pressure created by the expansion of heated water.
- (28) "Used water" shall mean any water supplied by the District to a customer's property after it has passed through the service connection and is no longer under the control of the District.
- (29) "WAC" shall mean the most recent edition of the Washington Administrative Code.



## **1:02 PURPOSE**

The purpose of the District's cross connection control program policy (referred to hereinafter as the "Policy") is to protect the water system of the District from contamination or pollution due to any existing or potential cross connections as defined in WAC 246-290-010, or as amended and this Policy.

## **1:03 CROSS CONNECTIONS REGULATED**

- (1) No cross connections shall be created, installed, used or maintained within the area served by the District, except in accordance with this Policy.
- (2) The Specialist for the District shall carry out or cause evaluations to be carried out to determine if any actual or potential cross connections exist. If found necessary, an assembly commensurate with the degree of hazard will be required to be installed at the service connection.
- (3) The owner, occupant or person in control of the property is responsible for all cross connection control within the premises.
- (4) All premises which are identified and/or defined in Table 9 of the WAC section 246-290-490, or as amended, are required to have premises isolation by installing a reduced pressure principle assembly in accordance with this Policy.
- (5) It is the responsibility of the property owner/occupant to purchase, install, test, repair, and maintain all backflow assemblies.

## **1:04 APPLICATION AND RESPONSIBILITIES**

This Policy applies throughout the District and to every premises and property served by the District. It applies to any premises, public or private, regardless of date of connection to the District water. Every owner, occupant and/or person in control of any concerned premises is responsible for compliance with the terms and provisions contained herein.

## **1:05 BACKFLOW PREVENTION ASSEMBLY REQUIREMENTS**

A Specialist employed by or under contract with the District shall determine the type of backflow assembly to be installed within the area served by the District. All assemblies shall be installed at the service connection unless it is determined by the Specialist/Manager to be acceptable at an alternate location.

The cross connection shall be eliminated or an assembly shall be required to be installed at the service connection in each of the following circumstances, but the Specialist is in no way limited to the following circumstances:

- (1) The nature and extent of any activity on the premises, or the materials used in connection with any activity on the premises, or materials stored on the premises, could contaminate or pollute the potable water supply.

- (2) Premises having any one or more cross connections or potential cross connections as that term is defined in this Policy and the WAC.
- (3) When a cross connection survey report form is required by the District and has not been received.
- (4) Internal cross connections are present that are not correctable.
- (5) Intricate plumbing arrangements exist or plumbing subject to frequent changes are present that make it impractical to ascertain whether or not cross connections exist.
- (6) There is a repeated history of cross connections being established or re-established.
- (7) There is unduly restricted entry so that evaluations for cross connections cannot be made with sufficient frequency to assure that cross connections do not exist.
- (8) Materials, chemicals or any substance or apparatus is being used that if backflow occurred contamination would result.
- (9) Installation of an approved backflow prevention assembly is deemed to be necessary in the judgment of the Specialist/Manager to accomplish the purpose of this Policy.
- (10) Any premises having an auxiliary water supply.
- (11) In the event an in-premise assembly has not been tested or repaired or is not commensurate with the Specialist's assessed degree of hazard as required by the WAC 246-290-490, or as amended, and this Policy.
- (12) If it is determined that additions or rearrangements have been made to the plumbing system without obtaining proper permits as required by the District and/or the local administrative authority.
- (13) When a garden hose attachment is connected to the premises plumbing without in-premises backflow protection, including but not limited to fertilizer applicators, pesticide applicators, and radiator flush kits.
- (14) Wherever the potential of backpressure exists.
- (15) Wherever used or reclaimed water is used on premises.
- (16) On all new non-residential construction.

#### **1:06 IRRIGATION SYSTEMS**

All irrigation systems shall be protected in accordance with the Uniform Plumbing Code. In the event any system is equipped with an injector system, or has submerged heads, a reduced pressure principle assembly will be required. If the irrigation system comes directly off the main with a designated line, a minimum of a double check assembly is required. If there is irrigation water supplied by a separate system and that system can be connected to the potable system, an assembly will be installed as required by the WAC.

## **1:07 FIRE SYSTEMS**

An approved double check backflow prevention assembly shall be the minimum protection on all new fire sprinkler systems using piping material that is not approved for potable water use, and/or that does not provide for periodic flow-through. A reduced pressure principle backflow prevention assembly must be installed, if any solution other than the potable water can be introduced into the sprinkler system. Retrofitting on fire sprinkler systems will be required in each of the following circumstances:

- (a) where improper maintenance has occurred;
- (b) on all high health hazard systems;
- (c) wherever the District's Specialist deems necessary; and
- (d) wherever required by the WAC.

In the event an assembly is installed on a designated lateral, a detector assembly commensurate with the degree of hazard will be required.

## **1:08 TEMPORARY METERS AND HYDRANT VALVES**

Backflow protection will be required on all temporary meters and hydrant valves before any use. The type of assembly will be commensurate with the degree of hazard and will be determined on a case-by-case basis by the District's Specialist.

## **1:09 MOBILE UNITS**

Any mobile unit or apparatus, as defined in Section 1:01, which uses the water from any premise within the District's water system, shall first obtain a permit from the District and/or the local administrative authority and be inspected to assure appropriate backflow prevention is installed in accordance with the most recent edition of the District's Guidance Manual.

## **1:10 RIGHT-OF-WAY ENCROACHMENT**

- (1) No person shall install or maintain a backflow prevention assembly upon or within any City or County right-of-way except as provided in this Section.
- (2) The District reserves the right to have an assembly installed in a public right-of-way.
- (3) A backflow prevention assembly required by the District may be installed upon or within a public right-of-way only if the owner proves to the District that there is no other feasible location for installing the assembly, and installing it in the right-of-way will not interfere with traffic or utilities. The District retains the right to approve the location, height, depth, enclosure, and other requisites of the assembly prior to its installation.

- (4) All permits required to perform work in the right-of-way shall be obtained from the applicable municipal entity responsible for the right-of-way.
- (5) A property owner shall, at the request of the District and at the owner's expense, relocate a backflow prevention assembly which encroaches upon any public right-of-way, when such relocation is necessary for street or utility construction or repairs for purposes of public safety.

#### **1:11 WHOLESALE CUSTOMERS**

Any customer that has a wholesale contract for water services with the District must have an active, ongoing cross connection control program. The cross connection program must be in compliance with WAC requirements pertaining to public water systems. The District reserves the right at all times to require a reduced pressure principle assembly at the interconnect. Wholesale Customers shall provide annually to the District a copy of their cross connection control summary report which was submitted to the DOH.

#### **1:12 PLUMBING CODE**

As a condition of water service, customers shall install, maintain, and operate their piping and plumbing systems in accordance with all Washington State Plumbing Codes and the 2003 edition of the Uniform Plumbing Code, or as amended.

#### **1:13 TESTING AND REPAIRS**

Backflow prevention assemblies shall be tested and repaired in accordance with the requirements set out in the WAC, the RCW, and this Policy.

If an assembly is found not to be functioning properly, the assembly owner is responsible to have the assembly repaired or replaced within 72 hours of the assembly's initial failing test.

All presently installed backflow prevention assemblies that do not meet the requirements of this Policy, but were approved assemblies for the purpose described herein at the time of installation, are commensurate with the degree of hazard and that have been properly maintained, shall, except for the inspection, testing, and maintenance requirements, be excluded from the requirements of these rules so long as the District is assured that they will satisfactorily protect the system. Whenever the existing assembly is moved from the present location, requires more than minimum maintenance, or parts are no longer available, the unit shall be replaced by an approved backflow prevention assembly.

#### **1:14 BACKFLOW ASSEMBLY TESTER RESPONSIBILITIES**

All backflow assembly testers operating within the District will be required to provide the District with the following information: 1) proof of current certification by the Washington Department of Health; 2) proof of gauge accuracy verification within the past 12 months; and 3) certificate of liability insurance with a minimum of \$300,000 coverage.

The District requires backflow assembly test results to be reported on the Pacific Northwest Section (PNWS) of the American Water Works Association's (AWWA) test report forms or other form acceptable to the Manager.

Reports of completed backflow assembly tests need to be submitted to the District within 72 hours of a completed assembly test.

It is the responsibility of an assembly owner to have an assembly repaired or replaced within 72 hours of the assembly's initial failing test.

#### **1:15 MAINTENANCE OF ASSEMBLIES**

Backflow prevention assemblies shall be maintained in accordance with the requirements set out in the WAC, or as amended, and the most recent edition of the District's Guidance Manual. The assembly owner is responsible for protecting their assembly from freezing and vandalism.

#### **1:16 INSTALLATION REQUIREMENTS AND SPECIFICATIONS**

Backflow prevention assemblies shall be installed in accordance with the requirements set out in the WAC and the most recent edition of the PNWS AWWA Cross Connection Control Manual.

In the event the Specialist allows a premises isolation assembly to be installed at an alternate location, there shall be no inter-ties or connections between the meter and the premises isolation assembly unless backflow protection is provided commensurate with the Specialist's assessed degree of hazard.

#### **1:17 THERMAL EXPANSION**

If a closed system has been created by the installation of a backflow prevention assembly, it is the responsibility of the property owner to eliminate the possibility of thermal expansion.

#### **1:18 NEW CONSTRUCTION AND/OR OCCUPANCY CHANGE**

On all new non-residential construction, an approved backflow assembly shall be installed at the service connection. The type of the assembly shall be commensurate with the degree of hazard as determined by the District's Specialist.

#### **1:19 RETROFITTING**

Retrofitting shall be required at all service connections where an actual or potential cross connection exists, and wherever else the District deems retrofitting necessary to comply with the WAC, this Policy, and the most current edition of the District's Guidance Manual.

#### **1:20 COSTS OF COMPLIANCE**

All costs associated with the purchase, installation, inspections, testing, replacement, maintenance, parts, and repairs of the backflow assembly are the responsibility of the property owner, their renter, lessee, agent, or personal representative.

## **1:21 RECOVERY OF COSTS**

Any water customer violating any of the provisions of this Policy and who causes damage to or impairs the District's water system, including, but not limited to, allowing contamination, pollution, any other solution or used water to enter the District's water system, shall be liable to the District for any expense, loss or damage caused by such violation. The District shall collect from the violator for the cost incurred by the District for any cleaning, purifying, repair or replacement work or any other expenses caused by the violation. Refusal to pay the assessed costs shall constitute a violation of this Policy and shall result in the termination of service.

All cost associated with any disconnect fees resulting from the enforcement of this document are the sole responsibility of the property owner.

## **1:22 TERMINATION OF SERVICE**

Failure on the part of any property owner, their renter, lessee, agent or personal representative to discontinue the use of a cross connection, meet testing and maintenance requirements, or to abide by all the conditions of this Policy is sufficient cause for the immediate discontinuance of water service by the District to the premises.

For the above conditions, the District may choose to install a reduced pressure backflow assembly at the service connection to the premises at the expense of the property owner.

## **1:23 EMERGENCY SUSPENSION OF SERVICE**

The Manager or the Manager's designee may, without prior notice, suspend water service to any premises when such suspension is necessary to stop the eminent threat of any actual or potential cross connection as defined in this Policy and the most recent edition of the District's Guidance Manual.

## **1:24 NON-EMERGENCY SUSPENSION OF SERVICE**

The Manager or the Manager's designee may suspend, with 24 hours notice, the water supply to any premises where the conditions of this Policy or the most recent edition of the District's Guidance Manual have been violated.

## **1:25 FALSIFYING INFORMATION**

Any person who knowingly makes any false statement, representation, record, report or other document filed or required to be maintained pursuant to this Policy, or who falsifies, tampers with, or knowingly renders inaccurate any backflow assembly, device or method required under this Policy shall, (in addition to civil and/or criminal penalties provided by state law) be guilty of a misdemeanor subject to the general penalty clause of District's Guidance Manual.

## **1:26 CONSTITUTIONALITY AND SAVINGS CLAUSE**

If any provision, section, sentence, clause or phrase of this Policy, or the application of same to any person or set of circumstances are for any reason held to be unconstitutional, void, invalid, or for any reason unenforceable, the validity of the remaining portions of this Policy or its application to other persons or circumstances shall not be affected thereby, it being the intent of the Board of Commissioners of the District in adopting this Policy that no portion hereof or provision or regulation contained herein shall become inoperative or fail by reason of any unconstitutionality or invalidity of any other portion, provision, or regulation.

**Exhibit B**  
***"KING COUNTY WATER DISTRICT NO. 49***  
**CROSS CONNECTION SURVEY REPORT FORM**

---

1. Is this residential or commercial property? Residential ☐ Commercial ☐  
If commercial, please specify business name: \_\_\_\_\_
2. Are you renting or do you own this property? Rent ☐ Own ☐  
If renting, please provide name and address of owner:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
3. Your water meter serves how many homes? \_\_\_\_\_ How many buildings? \_\_\_\_\_
4. Do you have any of the following?
- |  |                              |                             |
|--|------------------------------|-----------------------------|
| a. Swamp cooler                        | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| b. Hot tub                             | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| c. Swimming pool                       | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| d. Jacuzzi                             | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| e. Underground sprinkler system        | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| f. Drip irrigation system              | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| g. Greenhouse                          | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| h. Solar system                        | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| i. Utility sink with threaded faucet   | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| j. Fire sprinkler system               | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| k. Ghost pipes (unidentifiable piping) | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| l. Waterbed                            | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
5. Do you use:
- |  |                              |                             |
|--|------------------------------|-----------------------------|
| a. Antifreeze flush kits                               | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| b. Insecticide sprayers (that attach to a garden hose) | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| c. Darkroom equipment                                  | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
6. Does anyone on the premises use a portable dialysis machine?
7. Do you have a bathtub that fills from the bottom or does not have an overflow drain and is not air gapped? Yes ☐ No ☐
8. Do you have a water softener or any other treatment system connected to your drinking water supply? Yes ☐ No ☐



9. Do you have an auxiliary water supply on your premises? Yes ☐ No ☐
10. Do you have livestock (i.e., horses, cows, etc.) and use a water trough? Yes ☐ No ☐
11. Is your home or building elevated above your water meter? Yes ☐ No ☐
12. Does a creek, river, or spring run near your property? Yes ☐ No ☐
- a. Do you pump or draw water from this source? Yes ☐ No ☐
13. Do you have a booster pump, well pump, or any other type of water pump? Yes ☐ No ☐
14. Do you receive irrigation water from a different source? Yes ☐ No ☐
15. Do you have a backflow preventer on your property now? Yes ☐ No ☐
- Where? \_\_\_\_\_
16. Do you have any situation that you are aware of that could create a cross connection? Yes ☐ No ☐
17. Do you have any other water using equipment on your property not mentioned above? Yes ☐ No ☐

Comments: \_\_\_\_\_

\_\_\_\_\_

Please notify the Association if any of the above conditions ever change on your property.

\_\_\_\_\_  
Signature of Water Client

\_\_\_\_\_  
Phone Number

\_\_\_\_\_  
Print Your Name

\_\_\_\_\_  
Best time to make phone contact

\_\_\_\_\_  
Today's Date

\_\_\_\_\_  
Mailing address:

\_\_\_\_\_  
Physical address of property:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Please answer all of the above questions and return the questionnaire within 60 days. This form will be kept on file.

RETURN TO:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# Exhibit C

## Backflow Prevention Assembly Test/Air Gap Inspection Report

PROPERTY ID \_\_\_\_\_ WATER SYSTEM NAME \_\_\_\_\_ COUNTY \_\_\_\_\_

ACCOUNT # \_\_\_\_\_ BACKFLOW PREVENTER ID \_\_\_\_\_ TEST REPORT ID \_\_\_\_\_

NAME OF PREMISES \_\_\_\_\_ Commercial ☐ Residential ☐

SERVICE ADDRESS \_\_\_\_\_ CITY \_\_\_\_\_ ZIP \_\_\_\_\_

CONTACT PERSON \_\_\_\_\_ PHONE ( ) \_\_\_\_\_ FAX ( ) \_\_\_\_\_

LOCATION OF ASSEMBLY \_\_\_\_\_

DOWNSTEAM PROCESS \_\_\_\_\_ DCVA ☐ RPBA ☐ PVBA ☐ OTHER \_\_\_\_\_

NEW INSTALL ☐ EXISTING ☐ REPLACEMENT ☐ OLD SER. # \_\_\_\_\_ PROPER INSTALLATION? YES ☐ NO ☐

MAKE OF ASSEMBLY \_\_\_\_\_ MODEL \_\_\_\_\_ SERIAL NO. \_\_\_\_\_ SIZE \_\_\_\_\_

<b>INITIAL TEST</b> <b>PASSED</b> <input type="checkbox"/> <b>FAILED</b> <input type="checkbox"/>	<b>DCVA / RPBA CHECK VALVE NO.1</b> <b>LEAKED</b> <input type="checkbox"/> _____ PSID	<b>DCVA / RPBA CHECK VALVE NO.2</b> <b>LEAKED</b> <input type="checkbox"/> _____ PSID	<b>RPBA</b> OPENED AT _____ PSID #1 CHECK _____ PSID AIR GAP OK? _____	<b>PVBA/SVBA AIR INLET</b> OPENED AT _____ PSID DID NOT OPEN <input type="checkbox"/>
<b>NEW PARTS AND REPAIRS</b>	CLEAN REPLACE PART <input type="checkbox"/> <input type="checkbox"/> _____ <input type="checkbox"/> <input type="checkbox"/> _____ <input type="checkbox"/> <input type="checkbox"/> _____ <input type="checkbox"/> <input type="checkbox"/> _____	CLEAN REPLACE PART <input type="checkbox"/> <input type="checkbox"/> _____ <input type="checkbox"/> <input type="checkbox"/> _____ <input type="checkbox"/> <input type="checkbox"/> _____ <input type="checkbox"/> <input type="checkbox"/> _____	CLEAN REPLACE PART <input type="checkbox"/> <input type="checkbox"/> _____ <input type="checkbox"/> <input type="checkbox"/> _____ <input type="checkbox"/> <input type="checkbox"/> _____ <input type="checkbox"/> <input type="checkbox"/> _____	<b>CHECK VALVE</b> HELD AT _____ PSID <b>LEAKED</b> <input type="checkbox"/> _____ CLEANED <input type="checkbox"/> REPAIRED <input type="checkbox"/>
<b>TEST AFTER REPAIRS</b> <b>PASSED</b> <input type="checkbox"/> <b>FAILED</b> <input type="checkbox"/>	<b>LEAKED</b> <input type="checkbox"/> _____ PSID	<b>LEAKED</b> <input type="checkbox"/> _____ PSID	OPENED AT _____ PSID #1 CHECK _____ PSID	AIR INLET _____ PSID CHK VALVE _____ PSID

AIR GAP INSPECTION: Required minimum air gap separation provided? Yes ☐ No ☐ Detector Meter Reading \_\_\_\_\_

REMARKS: \_\_\_\_\_ LINE PRESSURE \_\_\_\_\_ PSI

\_\_\_\_\_ CONFINED SPACE? \_\_\_\_\_

*I certify that this report is accurate, and I have used WAC 246-290-490 approved test methods and test equipment.*

TESTERS SIGNATURE: \_\_\_\_\_ CERT. NO. \_\_\_\_\_ DATE \_\_\_\_/\_\_\_\_/\_\_\_\_

TESTERS NAME PRINTED: \_\_\_\_\_ TESTERS PHONE # ( ) \_\_\_\_\_

REPAIRED BY: \_\_\_\_\_ DATE \_\_\_\_/\_\_\_\_/\_\_\_\_

FINAL TEST BY: \_\_\_\_\_ CERT. NO. \_\_\_\_\_ DATE \_\_\_\_/\_\_\_\_/\_\_\_\_

CALIB/VERIF DATE \_\_\_\_/\_\_\_\_/\_\_\_\_ GAUGE # \_\_\_\_\_ MODEL \_\_\_\_\_ SERVICE RESTORED? YES ☐ NO ☐

SPECIALTY) PLUMBER CERT. NO. \_\_\_\_\_ CONTRACTOR LICENSE NO. \_\_\_\_\_

## **Section 3**

# **Backflow Incident Response Plan**

## **Backflow Incident Response Plan for King County Water District #49**

### **A. General**

This Backflow Incident Response Plan is considered a supplement to King County Water District #49's Emergency response Plan.

**King County Water District #49 will begin a backflow incident investigation whenever an initial evaluation of a water quality complaint indicates that:**

- 1. A backflow incident has occurred (i.e., drinking water supply has been contaminated) or may have occurred; or**
- 2. The complaint can't be explained as a "normal" aesthetic problem.**

Also, whenever a water main break (or power outage for pumped systems) causes a widespread loss of water pressure in the system (creating backsiphonage conditions), the district will initiate a check of distribution system water quality as a precursor to the need for a backflow incident investigation.

King County Water District #49 will notify DOH, the City of Burien building department and local health jurisdiction as soon as possible, but no later than the end of the next business day when a backflow incident contaminates the potable water supply (in the distribution system and/or in the customer's plumbing system).

An investigation will be made by or initially led by the DOH-certified Cross-Connection Control Specialist employed by the District. The investigation team may include state health (regional) staff, local health personnel and/or local plumbing inspectors.

### **B. What to do....List of priorities**

#### **1. Customer Notification**

- a. As soon as possible, King County Water District #49 will notify customers not to consume or use water in affected service area.
- b. The District will start the notification with the customers nearest in location to the assumed source of contamination (usually the customer(s) making the water quality complaint).
- c. The District will inform the customer about the reason for the backflow incident investigation and the District's efforts to restore water quality as soon as possible. The District will let the customer know that customers will be informed when they may use water, the need to boil water used for consumption until a satisfactory bacteriological test result is obtained from the lab, etc.

- d. Where a customer cannot be contacted immediately, the District will place a written notice on the front door handle, and a follow-up visit will be made to confirm that the customer received notice about the possible contamination of the water supply.
- e. When dealing with a backflow incident, the District will let customers know that it could take several days to identify the source and type of contaminant(s) and to clean and disinfect the distribution system.

## **2. Identification of Source of Contamination**

- a. The District will give consideration to the distribution system as a potential source of the contaminant (e.g., air valve inlet below ground).
- b. The District's CCS will fill out a backflow incident report form during the investigation of the incident (**exhibit D**). The data will then be transferred to the DOH web based backflow incident form at [www.doh.wa.gov](http://www.doh.wa.gov), following investigation.
- c. The District will not start flushing the distribution system until the source of contamination is identified (flushing may aggravate the backflow situation, and will likely remove the contaminant before a water sample can be collected to fully identify the contaminant).
- d. The District will conduct a house-to-house survey to search for the source of contamination and the extent that the contaminant has spread through the distribution system. Note: a check of water meters may show a return of water (meter running backward) to the distribution system.
- e. When the cross connection responsible for the system contamination is located, the District should discontinue water service to that customer, until the customer completes the corrective action ordered by the District.

## **3. Isolation of Contaminated Portion of System**

- a. The District will isolate the portions of the system that are suspected of being contaminated by closing isolating valves; leave one valve open to ensure that positive water pressure is maintained throughout the isolated system.
- b. The District will be sure to notify all affected customers in the isolated area first and then notify other customers served by the system.
- c. The District will cause any backflow assembly between the source of identified contamination and the public water supply to be tested for proper operation in accordance with WAC 246-290-490

## **4. Public Health Impacts**

- a. The District will seek immediate input from and work with state and local health agencies to accurately communicate and properly mitigate potential health effects resulting from the backflow incident.

- b. If appropriate, the District will refer customers that may have consumed the contaminant or had their household (or commercial) plumbing systems contaminated to public health personnel and Local Administrative Authorities (plumbing inspectors).

## 5. Cleaning/Disinfecting the Distribution System

- a. The District will develop and implement a program for cleaning the contaminated distribution system consistent with the contaminant(s) identified.
- b. Where both chemical and bacteriological contamination has occurred, the District will disinfect the system after the removal of the chemical contaminant.
- c. Where any bacteriological contamination is suspected, the District will provide field disinfection.

## C. Additional Information on Cleaning/Disinfecting the Distribution System

Most chemical or physical contaminants can be flushed from the water distribution system or customer's plumbing system with adequate flushing velocity. However, this may not be the case in systems where scale and corrosion deposits (e.g., tuberculation on old cast iron mains) provide a restriction to obtaining adequate flushing velocity, or where chemical deposits or bacteriological slimes (biofilm) are present (on which the chemical contaminant may adhere).

To remove a chemical or physical contaminant from the distribution system, Districts may need to:

1. Physically clean the affected area using foam swabs (pigs); and/or
2. Alter the form of the chemical contaminant (e.g., through oxidation using chlorination or addition of detergents).

When adding any chemical (including chlorine) to remove a contaminant from the distribution system, it is essential that the District fully understand the chemistry of the contaminant. **Adding the wrong chemical could make the contaminant more toxic to customers and/or more difficult to remove from the distribution system.**

To disinfect water mains using the "slug" or "continuous flow" method, a field unit should be used for chlorine injection, such as a chemical feed - metering or proportioning pump for sodium hypochlorite. The District will contact the appropriate DOH regional office to discuss proposed approaches to contaminant removal and disinfection prior to taking corrective action



# **Cross-Connection Control Program** **BACKFLOW INCIDENT REPORT FORM**

*Note: Use this form to comply with WAC 246-290-490(8)(g).*

## **Part 1: Public Water System (PWS) Information**

PWS ID:	PWS Name:	County:
---------	-----------	---------

## **Part 2: Backflow Incident Information**

### **A. Incident Identification**

Incident date:	Time of incident:	Incident ID (DOH use):
----------------	-------------------	------------------------

### **B. Information on Premises where Backflow Originated**

Name of premises:		
Premises physical address:		
City:	,WA	Zip:
Premises type: non-residential <input type="checkbox"/> residential <input type="checkbox"/>		
Premises category/description (Table 9 category*, if applicable):		
Most recent hazard evaluation prior to incident (mm/dd/yyyy): None <input type="checkbox"/>		
PWS's assessed hazard level:	<i>Premises isolation</i> required by PWS? Yes <input type="checkbox"/> No <input type="checkbox"/>	
Type of backflow preventer required by PWS:	PWS relies on <i>in-premises protection</i> ? Yes <input type="checkbox"/> No <input type="checkbox"/>	
Other hazard evaluation information:		

\*See WAC 246-290-490(4)(b)(i).

### **C. Method of Discovery of Backflow**

<b>How the backflow was discovered (check all that apply):</b>	Direct observation .....	<input type="checkbox"/>	Water quality complaint .....	<input type="checkbox"/>
	Meter running backwards .....	<input type="checkbox"/>	Illness/injury complaint .....	<input type="checkbox"/>
	Water use decrease .....	<input type="checkbox"/>	Result of Investigation .....	<input type="checkbox"/>
	Disinfectant residual monitoring ...	<input type="checkbox"/>	Other (Describe):	<input type="checkbox"/>
	Water quality monitoring .....	<input type="checkbox"/>		
<b>Incident reported to the public water system by:</b>	PWS Personnel <input type="checkbox"/>	Premises Owner/Occupant <input type="checkbox"/>	Other PWS Customer <input type="checkbox"/>	
	Backflow Assembly Tester <input type="checkbox"/>	Other (Specify):		

### **D. Contaminant Information**

<b>Contaminant type (check all that apply):</b>	Microbiological <input type="checkbox"/>	Chemical <input type="checkbox"/>	Physical <input type="checkbox"/>
<b>Describe contaminant (for example, the organism name, chemical, etc.). Please attach lab analysis or MSDS, if available.</b>			

## E. Extent and Effects of Contamination

Estimated extent of contamination:	Contained within premises <input type="checkbox"/> Entered PWS distribution system <input type="checkbox"/>
Estimated number of connections affected:	Residential <input type="checkbox"/> Non-residential <input type="checkbox"/>
Estimated population affected or at risk:	Residential <input type="checkbox"/> Non-residential <input type="checkbox"/>
Number water quality complaints:	Describe water quality complaints:
Number illnesses reported:	Describe illnesses/irritation (specific illnesses, if known):
Number physical injuries(e.g. burns) or irritation(e.g. rashes) cases reported:	

## Part 3: Cross-Connection Control Information at Backflow Site

### A. Source of Contaminant

<b>Source of contaminant or fixture type (check all that apply):</b>	Air conditioner/heat exchanger .....	<input type="checkbox"/>	Industrial/commercial process	
	Auxiliary water supply .....	<input type="checkbox"/>	water/fluid.....	<input type="checkbox"/>
	Beverage machine .....	<input type="checkbox"/>	Medical/dental fixture .....	<input type="checkbox"/>
	Boiler, hot water system .....	<input type="checkbox"/>	Reclaimed water system.....	<input type="checkbox"/>
	Chemical injector/aspirator .....	<input type="checkbox"/>	Swimming pools, spa .....	<input type="checkbox"/>
	Fire protection system .....	<input type="checkbox"/>	Wastewater (sewage) system .....	<input type="checkbox"/>
	Irrigation system (PWS supplied) .....	<input type="checkbox"/>	Other (specify): .....	<input type="checkbox"/>
			.....	

### B. Distribution System Pressure Conditions in the Vicinity of the Backflow Incident

<b>Type of backflow:</b>	Backsiphonage <input type="checkbox"/>	<b>Typical distribution system pressure in vicinity of incident</b> (if range, enter lower end of range):	psi	
	Backpressure <input type="checkbox"/>			
<b>Main/pressure status at time of incident (check all that apply):</b>	Normal .....	<input type="checkbox"/>	Source/plant outage .....	<input type="checkbox"/>
	Main break .....	<input type="checkbox"/>	Scheduled water shutoff by PWS .....	<input type="checkbox"/>
	Fire fighting .....	<input type="checkbox"/>	Unscheduled/emergency shutoff .....	<input type="checkbox"/>
	Other high usage .....	<input type="checkbox"/>	Unknown .....	<input type="checkbox"/>
	Power outage .....	<input type="checkbox"/>	Other (specify) .....	<input type="checkbox"/>

<b>Describe causes and circumstances leading to backflow:</b>

### C. Backflow Preventer Information/Installation/Approval Status at Site of Backflow

Complete the tables in C and D for the *premises isolation* preventer for either of the following situations:

- If a premises isolation backflow preventer is installed **and** the contaminant entered the PWS distribution system.
- If the premises isolation assembly is the only backflow preventer at the site.

In all other cases, complete tables in C and D for the *in-premises* backflow preventer installed at the fixture. If more than one backflow preventer was involved in the backflow incident, copy tables C and D and complete them for the additional preventer(s).



If no backflow preventer was installed at the time the incident occurred, check this box ☐ and go directly to Part 4. Don't fill out the tables below (in C and D).

<b>Backflow preventer information:</b>	Type installed:	Installed for:
	Make:	Model:                      Size:
	Serial number:	Date installed:
<b>Installation status (check all that apply):</b>	Properly installed/plumbed <input type="checkbox"/> Improperly protected bypass present <input type="checkbox"/> Improperly installed/plumbed <input type="checkbox"/> If so, explain:	
<b>Commensurate with assessed degree of hazard?</b>	Yes <input type="checkbox"/> No <input type="checkbox"/>	If not, explain:
<b>DOH/USC-approved at time of backflow incident?</b>	Yes <input type="checkbox"/> No <input type="checkbox"/>	If not, approved when installed? Yes <input type="checkbox"/> No <input type="checkbox"/>

#### D. Backflow Preventer Inspection/Testing Information at Site of Backflow

<b>Most recent inspection/test information <i>prior</i> to backflow incident. Attach test report(s), if available.</b>	No test report on record ..... <input type="checkbox"/>
	Date tested/inspected: Passed test/inspection <i>without</i> repairs ..... <input type="checkbox"/> Failed initial test/inspection, passed <i>after</i> repair ..... <input type="checkbox"/> Failed test/inspection, no repairs made ..... <input type="checkbox"/>
	<b>Inspection/test information <i>after</i> backflow incident [per WAC 246-290-490(7)(b)]. Attach test report.</b>
	Not tested/inspected ..... <input type="checkbox"/> Date tested/inspected: Passed test/inspection <i>without</i> repairs ..... <input type="checkbox"/> Failed initial test/inspection, passed <i>after</i> repair..... <input type="checkbox"/> Failed test/inspection, no repairs made..... <input type="checkbox"/>
<b>Preventer failure information , if applicable (check all that apply):</b>	Fouled check ..... <input type="checkbox"/> Damaged seat .... <input type="checkbox"/> Debris ..... <input type="checkbox"/> Other: <input type="checkbox"/> Weather-related damage ..... <input type="checkbox"/>
<b>If preventer failed inspection/test, did failure allow backflow?</b>	Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, explain:

#### Part 4: Corrective Action/Notifications

<b>Action taken by PWS to restore water quality (check all that apply):</b>	None ..... <input type="checkbox"/>	Other treatment (describe): <input type="checkbox"/>
	Flushed/cleaned mains ..... <input type="checkbox"/>	
	Flushed/cleaned plumbing... <input type="checkbox"/>	Replaced mains ..... <input type="checkbox"/>
	Disinfected mains ..... <input type="checkbox"/>	Replaced plumbing ..... <input type="checkbox"/>
	Disinfected plumbing ..... <input type="checkbox"/>	Other: <input type="checkbox"/>
<b>Action ordered by PWS to correct cross-connection (check all that apply):</b>	None ..... <input type="checkbox"/>	Change <b>existing</b> preventer <input type="checkbox"/>
	Eliminate cross-connection... <input type="checkbox"/>	Repair/replumb ..... <input type="checkbox"/>
	Remove by-pass ..... <input type="checkbox"/>	Reinstall correctly ..... <input type="checkbox"/>
	Install <b>new</b> preventer ... <input type="checkbox"/>	Replace with same type <input type="checkbox"/>
	For <i>premises isolation</i> <input type="checkbox"/>	Upgrade type ..... <input type="checkbox"/>
	For <i>fixture protection</i> <input type="checkbox"/>	Other: <input type="checkbox"/>
<b>Action ordered accomplished?</b>	Yes <input type="checkbox"/> Date:                      No <input type="checkbox"/> If no, explain:	
<b>Agency notifications per WAC 246-290-490(8)(f) (check all that apply):</b>	DOH <input type="checkbox"/> Local Health Agency <input type="checkbox"/> Local Adm. Authority <input type="checkbox"/> Issued by end of next business day:	
<b>Notifications of consumers in area of incident (check all that apply):</b>	Population at risk <input type="checkbox"/> Public notification (PN per DOH regs.) <input type="checkbox"/> Boil Water Advisory <input type="checkbox"/> Other (describe):	
<b>Other enforcement/corrective actions (describe):</b>		

**Part 5: Cost of Backflow Incident (optional)**

Item	PWS Personnel Hours Expended	Cost to PWS (\$)	Cost to Premises Owner (\$)
Investigation			
Restoration of water quality			
Correction of cross-connection situation			
Litigation and/or settlement			
Other not included in above			

**Part 6: Further Information/Documentation**

Additional information about this incident such as pictures, sketches, newspaper/journal articles, water quality analyses, epidemiological reports, etc. would be helpful. Information may be in electronic form or hard copy.


**Part 7: Form Completion Information**

*Note: Form should be completed by a person currently certified as a Cross-Connection Control Specialist.*

I certify that the information provided in this Backflow Incident Report is complete and accurate to the best of my knowledge.			
CCC Program Mgr. Name (print):			Title:
Signature:		CCS Cert. Number:	Date:
Phone:		E-mail:	
I have reviewed this report and certify that the information is complete and accurate to the best of my knowledge.			
PWS Mgr./Representative Name (Print):			Title:
Signature:		Op. Cert. Number:	Date:

***Please send completed backflow incident form:***

***By mail to:***

Washington State Department of Health  
Office of Drinking Water – CCC Program Manager  
P O Box 47822  
Olympia, WA 98504-7822

***By email to:*** [cccprogram@doh.wa.gov](mailto:cccprogram@doh.wa.gov)

**Please send questions, comments, or suggestions about this form to us at the address above or e-mail them to [cccprogram@doh.wa.gov](mailto:cccprogram@doh.wa.gov)**

For people with disabilities, this document is available on request in other formats. To submit a request, please call 1-800-525-0127 (TDD/TTY call 711).

## **APPENDIX C – DISINFECTION BYPRODUCT RULE PLAN APPROVAL**

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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10**

1200 5th Avenue, Suite 900  
Seattle, Washington 98101-3140

December 4, 2008

Reply To: OWW-136

Mike Harris  
King County Water District No. 49  
415 SW 153<sup>rd</sup> Street  
Burien, Washington 98166

**RE: Approval of Stage 2 Disinfection Byproducts Rule (Stage 2 DBPR)  
Initial Distribution System Evaluation (IDSE) Standard Monitoring Report  
King County Water District No. 49 ID # WA5339800 - King County**

Dear Mr. Harris:

I am writing to inform you that the Stage 2 DBPR IDSE standard monitoring report for King County Water District No. 49 has been approved.

Before you begin Stage 2 DBPR compliance monitoring you must prepare and submit to the Washington Department of Health (DOH) a Stage 2 DBPR monitoring plan. The monitoring plan should include the monitoring locations and dates identified in your IDSE standard monitoring report; the compliance calculation procedures also included in your IDSE report; and monitoring plans for any other systems in the Seattle Public Utilities combined distribution system if DOH is allowing reduced monitoring for the systems in the combined distribution system (check with DOH regarding this requirement).

Stage 2 DBPR compliance monitoring at the four sites identified in your IDSE report will begin the second quarter of 2012. As described on page 8 of your IDSE report, that would be the second week of June 2012.

If you have any questions, please contact me at (206) 553-1890 or [marshall.wendy@epa.gov](mailto:marshall.wendy@epa.gov).

Sincerely,

Wendy Marshall  
Environmental Scientist

cc: Ethan Moseng - DOH



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10

1200 Sixth Avenue  
Seattle, WA 98101

October 26, 2006

Reply to  
Attn Of: OWW-136

Dale Cap  
King County Water District #49  
415 SW 153rd  
Burien, Washington 98166

RE: Stage 2 Disinfection Byproducts Rule (Stage 2 DBPR) Initial Distribution System Evaluation (IDSE) Standard Monitoring Plan

Dear Mr. Cap:

I am writing to inform you that the Stage 2 DBPR IDSE standard monitoring plan for King County Water District #49 has been approved.

IDSE monitoring must be conducted at each of the monitoring locations and dates listed in your standard monitoring plan. Please remember, if you deviate from the approved plan for any reason, you must include an explanation for the deviation in your IDSE report, which is due no later than January 1, 2009. During each sampling event, you must collect a dual sample set at each monitoring location. One sample must be analyzed for TTHM and the other must be analyzed for HAA5. EPA-approved methods must be used for analysis of your TTHM and HAA5 samples.

Additional reference information is attached for your use. If you have any questions, please contact me at (206) 553-1890 or [marshall.wendy@epa.gov](mailto:marshall.wendy@epa.gov). For more information regarding the Stage 2 DBPR visit the Stage 2 DBPR website at [www.epa.gov/safewater/disinfection/stage2](http://www.epa.gov/safewater/disinfection/stage2).

Sincerely,

A handwritten signature in cursive script that reads "Wendy Marshall".

Wendy Marshall  
Environmental Scientist

Enclosure

cc: Ethan Moseng - DOH



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**City of Seattle**  
Seattle Public Utilities

March 31, 2015

Mike Harris, General Manager  
King County Water District 49  
415 SW 153<sup>rd</sup> St  
Seattle, WA 98166

Re: Modification to Exhibit I of Wholesale Water Supply Contract:

Dear Mr. Harris:

Seattle Public Utilities has made the following additions to your Exhibit I of your Full Requirements Contract for the Supply of Water to Water District 49:

- Added information to intertie with WD 20 @ 144<sup>th</sup> & Ambaum
- Added information to intertie with WD 20 @ 4<sup>th</sup> & 152nd
- Added information to intertie with WD 20 @ 16<sup>th</sup> Ave SW & SW 152nd
- Added information to intertie with WD 20 @ 21<sup>st</sup> Ave SW & SW 154<sup>th</sup>
- Added information to intertie with WD 20 @ SW 144<sup>th</sup> St & 1<sup>st</sup> Ave S
- Added information to intertie with Highline Water District @ S 176<sup>th</sup> St & 10<sup>th</sup> Ave S
- Added information to intertie with Highline Water District @ SW 170<sup>th</sup> St & 27<sup>th</sup> Ave SW

Please keep this document for your records. If you have any questions, please contact me at (206) 684-7975.

Thank you for your attention to this matter.

Sincerely,

Terri Gregg  
Wholesale Contracts Manager

Ray Hoffman, Director  
Seattle Public Utilities  
PO Box 34018  
Seattle, WA 98124-4018

Tel (206) 684-5851  
Fax (206) 684-4631  
TDD (206) 233-7241  
<http://www.seattle.gov/util>

## **EXHIBIT I**

List of documents, commitments, adjustments, reductions, agreements, and/or written approvals by Seattle regarding the supply, purchase and/or resale of water according to Sections I.B. and II.B. of this Contract:

### **1. Intertie Agreements:**

Entity/location	Meter Size	Capacity	Type of Service	Comment
KCWD #20: 144 <sup>th</sup> & Ambaum	8"	2,000 gpm @ 20 psi	Two-way Emergency intertie	closed 8" valve manually operated - 1977
KCWD #20: 4 <sup>th</sup> & 152 <sup>nd</sup>	6"	2,500 gpm @ 20 psi	Two-way Emergency intertie	closed 8" valve manually operated - 1978
KCWD #20: 16 <sup>th</sup> Ave SW & SW 152 <sup>nd</sup>	6"		Two-way Emergency intertie	Automatically controlled - 2004
KCWD #20: 21 <sup>st</sup> Ave SW & SW 154 <sup>th</sup>	8"		Two-way Emergency Intertie	Automatically controlled - 2004
KCWD #20: SW 144 <sup>th</sup> & 1 <sup>st</sup> S	8"		Two-way Emergency Intertie	Closed valve manually operated - 2011
Highline Water District: S 176 <sup>th</sup> St and 10 <sup>th</sup> Ave S	6"		Emergency	August 2005
Highline Water District: SW 170 <sup>th</sup> St & 27 <sup>th</sup> Ave SW	6"		Emergency	August 2005

### **2. Independent Well Sources:**

None

### **3. Water Supply Contracts To Other Water Utilities:**

a.



# Seattle City Attorney

Peter S. Holmes

Kristin M. Lamson  
Assistant City Attorney  
(206) 233-2188  
kristin.lamson@seattle.gov

December 22, 2014

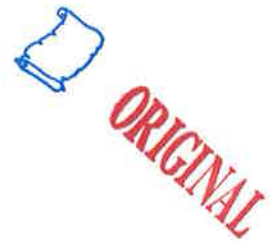
Mr. Eric C. Frimodt  
Inslee Best Doezie & Ryder, P.S.  
10900 NE 4<sup>th</sup> Street, Suite 1500  
P.O. Box 90016  
Bellevue, WA 98009-9016

Dear Eric:

Your client's letter, dated December 5, 2014, requesting clarification of certain terms of the City of Seattle Full Requirements Contract for the Supply of Water to King County Water District 49 ("Contract") was referred to me for response.

The last column of Exhibit II of the Contract includes a "maximum flow rate up to which the minimum hydraulic gradient applies" for each service connection and a total for all service connections to Water District 49. The service connections identified as "back up" do not have a specific flow rate identified, but they are limited by the total maximum flow of 2500 gallons per minute ("gpm"). The flows identified in that column relate to specific conditions of service under Section III.A of the Contract, including Seattle's obligations as to the level it must maintain and operate the transmission system. It does not reflect an absolute maximum flow rate, nor does it reflect the actual capacity of the transmission system at any given time. Accordingly and as we briefly discussed by phone, Water District 49 would not be in breach of the Contract if it exceeded the maximum flow rate reflected in Exhibit II for a particular service connection or the total 2500 gpm for a limited period (e.g., 3-4 hours); however, Seattle would not have the obligation to deliver water at the minimum hydraulic gradients in that case.

It is also important to note that the Contract explicitly states that water is provided at a "Wholesale Level of Service" as that term is defined in Section I of the Contract and further conditioned under Sections II.C and III.A.



**KING COUNTY WATER DISTRICT NO. 49**

**KING COUNTY, WASHINGTON**

**RESOLUTION NO. 11-1234**

**A RESOLUTION OF THE BOARD OF COMMISSIONERS OF WATER DISTRICT NO. 49, KING COUNTY, WASHINGTON, APPROVING THE FULL REQUIREMENTS CONTRACT BETWEEN THE CITY OF SEATTLE AND WATER DISTRICT NO. 49, WHICH CONTRACT PROVIDES FOR THE SUPPLY OF WATER TO THE DISTRICT UNTIL JANUARY 1, 2062.**

WHEREAS, the City of Seattle currently serves 11 water utilities and cities under long-term full and partial requirements contracts for water supply that were authorized in 2001 by Seattle Ordinance 120362; and

WHEREAS, Water District No. 49 is one of eight water utilities and cities that remained under long-term water supply contracts signed in 1982, or similar contracts, which contracts are due to expire on January 1, 2012; and

WHEREAS, Seattle has completed negotiations with six of the water utilities and cities, including Water Districts 49, 90, and 119, and the cities of Bothell, Duvall, and Renton for long-term full or partial requirement contracts, that are substantially similar to the existing full and partial requirements contracts authorized by Seattle Ordinance 120362, which will make for consistent and easier wholesale customer contract management; and

WHEREAS, the six water utilities and cities entering into these full and partial requirements contracts will become members of the existing Operating Board for the Seattle Regional Water Supply System and be subject to the same provisions as the existing full and partial contract holders including, the same cost allocation and rate-making principles and procedures, participation in the regional conservation program, a contract expiration date of January 1, 2062, and opportunities to amend the contract in 2021 and 2041; and

WHEREAS, Seattle has also completed negotiations with the remaining two entities, the City of Edmonds and the Lake Forest Park Water District, for long-term emergency intertie agreements since their requirements for future water supply from Seattle are limited to emergency purposes; and

WHEREAS, the Board of Commissioners of Water District No. 49 believes it is in the best interest of its current and future customers that the District enter into a new full requirements water supply contract with Seattle which provides for a long-term supply of water to the District until January 1, 2062, now, therefore,



**ORIGINAL**

**CITY OF SEATTLE**  
**FULL REQUIREMENTS CONTRACT**  
**FOR THE**  
**SUPPLY OF WATER**  
**TO**  
**KING COUNTY WATER DISTRICT 49**



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**FULL REQUIREMENTS CONTRACT**  
**BETWEEN**  
**THE CITY OF SEATTLE**  
**AND**  
**KING COUNTY WATER DISTRICT 49**  
**FOR THE SUPPLY OF WATER**

THIS CONTRACT is entered into between the CITY OF SEATTLE (“Seattle”), a municipal corporation of the State of Washington, and the KING COUNTY WATER DISTRICT 49 (“Water Utility”), a municipal corporation of the State of Washington.

**RECITALS**

1. Seattle owns and operates a system for the supply, transmission, and distribution of potable water and is authorized to sell and distribute water to its residents and to other persons and customers located outside the corporate limits of Seattle.
2. Seattle's water system is integral to the health and welfare of the residents located within the water service area shown in Seattle's Water System Plan. Seattle intends to provide water from the system to meet the current and future needs of the residents of such water service area when such service is requested from Seattle.
3. In meeting this service commitment, Seattle must ensure that this role does not place financial burdens on its retail customers for which they do not receive a corresponding benefit.
4. This contract and contracts of a similar nature with other wholesale customers of Seattle located within Seattle's service area are intended to provide those customers with the security of a long term service commitment and to describe the terms and conditions associated with that commitment.

5. Under this contract, Seattle intends to provide wholesale water to Water Utility at an equivalent Wholesale Level of Service with the same pricing and operational principles as it provides itself.
6. Given the extensive growth of Seattle and the surrounding areas and the impacts upon infrastructure and costs, this contract is intended to provide sufficient water for growth. As a general philosophy for cost sharing purposes, the parties desire to adopt the principle that “growth should pay for growth.”
7. Seattle and Water Utility, together with other Wholesale Customers of Seattle, have agreed to establish an Operating Board comprised of representatives pledged to represent the best interests of the region in order to provide overall direction to the Administrator of the Seattle Regional Water Supply System.

NOW, THEREFORE, in consideration of mutual covenants herein, it is agreed as follows:

#### SECTION I. DEFINITIONS

For the purposes of this contract, the following terms have been defined as:

“1982 Water Purveyor Contract” – That certain Water Purveyor Contract between Water Utility and Seattle having an effective date of September 8, 1982 and expiring on December 31, 2011.

“Administrator” - The Director of Seattle Public Utilities or any other title given to that person who maintains the authority to operate and manage the Seattle Regional Water Supply System.

“Block Purchase Contract” – A contract in which Seattle sells a fixed quantity of water to a wholesale customer on a take or pay basis.

“Existing Supply Resources” - Current components of the Seattle Regional Water Supply System which consist of the Cedar River storage, treatment and diversion facilities, the Tolt River storage, treatment and diversion facilities, and the Seattle Well Fields as set forth in Exhibit VII.

“Full Requirements Contract” – A contract in which Seattle supplies a Wholesale Customer with its Full Water Requirements.

“Full Water Requirements” - All of the water needed by Water Utility to meet the needs of its present and future water customers within its service area as shown in Water Utility’s water system plan and on Exhibit X.

“Operating Board” – A board of representatives established by Section V hereof and having the powers and duties set forth in Sections II, III, and IV hereof.

“Partial Requirements Contract” - A contract in which Seattle supplies a Wholesale Customer with that portion of its Full Water Requirements above that provided by the Wholesale Customer’s own supply.

“Partial Water Requirements” – The amount of water over and above Water Utility’s own sources of supply as identified in Exhibits I and XIII and in accordance with this contract needed to meet the needs of its present and future water customers within its service area as shown in Water Utility’s water system plan and on Exhibit X.

“Rate of Return on Investment” - Seattle’s Average Cost of Debt, plus 1.5 percent.

“Regional Water Conservation Program” - A program which addresses water conservation goals for the Seattle Regional Water Supply System for Seattle, Wholesale Customers, and other customers who enter into a water supply contract with Seattle that includes participation in the Program.

“Seattle’s Average Cost of Debt” - The weighted average interest rate on Seattle’s water system debt outstanding over the course of a calendar year calculated at the end of each calendar year during the term of this contract.

“Seattle Retail Distribution System” – Seattle’s retail water distribution system consisting of its retail customers within the Seattle retail service area as defined in its Water System Plan, and including storage facilities, distribution mains, pumps, disinfection facilities, service connections, and all other facilities not included in the Seattle Regional Water Supply System.

“Seattle Regional Water Supply System” - Seattle's water supply system consisting of dams, impounded water, supply and transmission mains, pumps, treatment facilities, and all other facilities utilized in conveying water to the Seattle Retail Distribution System, Water Utility, and other wholesale customers. This definition does not include the Seattle Retail Distribution System.

“Seattle Transmission Facilities” – Those facilities serving the transmission needs of the Seattle Regional Water Supply System as set forth in Exhibit VIII.

“Seattle Water System Plan” - Seattle's Water System Plan dated April, 2007, and amendments thereto, prepared by Seattle to comply with the requirements of WAC 246-290-100, and successor regulations.

“Service Connection” - The water meter and associated appurtenances, including everything from the outlet from the supply pipeline to the end of the Seattle Public Utilities vault, through which water is delivered from the Seattle Regional Water Supply System to a Wholesale Customer's water system.

“Stranded Costs” – Those water supply and related costs that Seattle and others have invested for the region which may not be recovered as a result of lost revenues.

“Wholesale Customer” – Those customers who purchase water from Seattle under a Full or Partial Requirements Contract for the purposes of reselling to others.

“Wholesale Level of Service” – Water delivered by Seattle in accordance with this contract to the Service Connection intended for Wholesale Customers’ distribution to their retail customers. Seattle is not responsible for compliance with Department of Health (“DOH”) standards, including fire flow, emergency back-up and water quality within Water Utility’s retail service area.

## SECTION II. TERM OF CONTRACT AND GUARANTEES

### II.A. Term of Contract

1. Term. This contract shall be in effect beginning at 12:01 AM on the Effective Date of this contract and shall remain in effect until 12:00 AM on January 1, 2062.
2. Effective Date. This contract shall be effective upon the date that both parties have signed the contract after approval by their respective legislative bodies (“Effective Date”).
3. Subsequent Right of First Refusal. At the end of the term of this contract, Water Utility shall have a right of first refusal to continue to purchase the amount of water then purchased from Seattle at the time of contract expiration.
4. Periodic Review and Right to Change Certain Terms and Conditions. The parties may review and change certain terms and conditions governing the sale of water hereunder by January 1, 2022 and January 1, 2042, or as soon as practicable thereafter, as follows.

- a. Consensual Process. On or before January 1, 2021, and then again on or before January 1, 2041, either party may provide the other with a written proposal to amend the contract terms. The parties shall then meet and consider the proposal. If the parties agree to the proposal prior to January 1, 2022 and January 1, 2042, respectively, a written amendment to this contract shall be approved and executed by both parties and this contract shall be amended accordingly.
- b. Seattle' s Right to Amend. If the parties are unable to agree on a proposal by Seattle pursuant to subsection a above within the respective one-year periods, Seattle may propose in writing its desired amendment to the Operating Board. Seattle and the Operating Board shall meet and consider the proposed amendment and use reasonable efforts to resolve any differences in the proposal. After 90 days from Seattle's written proposal to the Board, Seattle may propose its desired amendment to the Seattle City Council. If the Operating Board does not agree with such proposal, it may submit a revised proposal to the Seattle City Council within 90 days of Seattle's submission of its proposal to the Seattle City Council. After receiving the Operating Board's alternate proposal, or after the lapse of the 90 day period for the Operating Board to make an alternate proposal, the Seattle City Council may then deny both proposals or approve one of them and issue an amendment to this contract which shall be in effect for the remaining term of the contract from the date of issuance, unless later amended pursuant to subsection a above, or by mutual agreement.
- c. Limitation on Seattle's Right to Amend. Notwithstanding subsection b above, Seattle shall not have the right to: (i) reduce its obligation to provide the Full or

Partial Water Requirements of Water Utility, as appropriate; (ii) cease to provide wholesale water to Water Utility at an equivalent Wholesale Level of Service as it provides to itself; (iii) charge a higher wholesale rate for water supply and transmission to Water Utility than that charged to the Seattle Retail Distribution System; (iv) reduce its water quality obligations hereunder; (v) change the methodology for calculating Rate of Return on Investment; (vi) restrict Water Utility's right to terminate the contract or reduce its purchase commitment; (vii) disband or significantly reduce the powers of the Operating Board; or (viii) amend any contract provision that will apply only to Water Utility.

#### **II.B. Agreement to Supply and Purchase Water**

1. Full Requirements Commitment. Seattle shall supply the Full Water Requirements of Water Utility for the term of this contract. Except as set forth in Exhibit I and section II.B.5 below, Water Utility shall purchase its Full Water Requirements from Seattle.
2. Adjustments in Water Utility's Service Area. In the event Water Utility acquires additional service area that is: 1) located outside of the service area identified in Exhibit X and 2) which is not already served with water from the Seattle Regional Water Supply System, then Seattle shall supply the Full or Partial Water Requirements, as appropriate, of the additional service area subject to a) the availability of water in the Seattle Regional Water Supply System determined on the same basis as would be applied to determine the availability of water for new or expanded wholesale service customers of Seattle; b) the limitation of geographical boundaries in Seattle's water rights claims or permits; and c) Water Utility's payment of Facilities Charges ("FCs") for the service connections in that additional service area.

3. Assumption or Transfer of Responsibilities. In the event Water Utility's entire service area and service responsibilities are assumed by or are transferred to another utility or utilities, then this contract shall become null and void at the time the assumption or transfer becomes effective; provided, however, if the transferee of the service area is a Wholesale Customer, Seattle shall provide water to the transferee according to the terms of the transferee's water supply contract with Seattle. If the transferee is not a Wholesale Customer, then Seattle shall issue the transferee a water supply contract for such area subject to terms and conditions as Seattle shall determine.
4. Annexation by Seattle. If the entire service area of Water Utility is annexed to Seattle, then this contract shall become null and void upon the effective date of Seattle's assumption of Water Utility's water system.
5. Water Utility's Right to Terminate or Reduce Purchase Commitment. Water Utility's commitment to purchase water from Seattle under this contract may be terminated or reduced subject to the terms and conditions set forth below. Water Utility shall provide Seattle at least 5 years written notice of termination or reduction, provided, however, if Seattle unilaterally amends the terms and conditions of this contract pursuant to Section II.A.4 above, Water Utility may terminate this contract at any time within 1 year thereafter by giving Seattle 1 year written notice.
  - a. Automatically Permitted Reductions. Water Utility may, without restriction, upon five years written notice to Seattle, reduce its water purchases from Seattle by an amount not to exceed 10 million gallons per day ("MGD") of its average annual demand.



- b. Reductions Requiring Permission. Water Utility may reduce quantities of water purchased from Seattle by more than 10 MGD or by providing less than five years advance notice of such reduction if in the judgment of the Operating Board, using the criteria listed below, it determines that such reduction is in the best interest of the Seattle Regional Water Supply System as a whole.
- c. Criteria. The criteria to be used by the Operating Board in determining the best interest of the Seattle Regional Water Supply System shall include but not be limited to the following:
  - i. The potential for Stranded Costs and impacts on rates to either the remaining Wholesale Customers or Seattle;
  - ii. The cost of new resources;
  - iii. The feasibility and benefit of reallocating to Seattle or other customers the amount of water foregone by Water Utility; and
  - iv. Environmental aspects of the proposed change.

The Operating Board shall act promptly and reasonably in evaluating and deciding upon Water Utility's request. The Operating Board may approve, with or without reasonable conditions, or deny Water Utility's request based on the above criteria. Approval conditions may include a requirement that Water Utility waive its rights to be served its Full Water Requirements. If the approval conditions are unacceptable to Water Utility, it may elect in writing to withdraw its request and this contract shall continue in full force and effect.

### **II.C. Continuity of Service within the Term of the Contract**

1. Parity of Service. Seattle shall provide wholesale water to Water Utility at an equivalent Wholesale Level of Service that it provides to itself. In the event of a general emergency or weather-related water shortage affecting the entire Seattle Regional Water Supply System, general restrictions placed upon water deliveries to Water Utility shall be determined by the Operating Board and applied consistently to other Wholesale Customers and the Seattle Retail Distribution System. In the event of localized emergency problems, Water Utility acknowledges temporary, localized service interruptions may occur for the duration of the emergency.
2. Emergency Curtailment Measures. It is recognized by both parties that emergency water use curtailment measures may have to be adopted by Seattle to implement on a regional basis in order to meet an emergency condition or a regional water shortage. The procedures to be used in the event of a weather-related regional water shortage, or shortages caused by other emergency factors, shall be as described in Seattle's Water Shortage Contingency Plan in effect as of the effective date of this contract, or successor contingency plans. Successor water shortage contingency plans shall be developed and implemented by Seattle in consultation with the Operating Board. Water Utility shall assist with and support all procedures or emergency curtailment measures that are implemented under the Water Shortage Contingency Plan, or its successor.
3. Other Emergencies. Seattle may temporarily interrupt or reduce deliveries of water to Water Utility if Seattle determines that such interruption or reduction is necessary or reasonable in case of system emergencies or in order to install equipment, make repairs, replacements, investigations and inspections or perform other maintenance work on the

Seattle Regional Water Supply System. Except in cases of emergency, and in order that Water Utility's operations will not be unreasonably interrupted, Seattle shall give Water Utility and the Operating Board reasonable notice of any such interruption or reduction, the reasons for and the probable duration. Seattle shall use its best efforts to minimize service interruptions to Water Utility.

4. Waiver Of Charges. If interruption or reduction in deliveries of water to Water Utility requires that Water Utility draw water supply in a manner that subjects Water Utility to demand charges (as described in Exhibit III hereto), Seattle shall waive such charges during the period of such interruption or reduction.

#### **II.D. Water Quality**

1. Seattle Regional Water Supply System. Seattle shall be responsible for water quality within the Seattle Regional Water Supply System as set forth below. Seattle shall construct, operate and maintain water quality treatment facilities and use its best efforts to carry out its water quality responsibilities in the most cost-effective manner for the region.
2. Applicable Standards. Seattle shall at all times during the term hereof deliver water to Water Utility's system that meets or exceeds all applicable Federal, State and local regulations as the same may change from time to time.
3. System-wide Water Quality Plan. Seattle, in consultation with the Operating Board, may develop and maintain a system-wide regional water quality plan. The plan shall describe, at a minimum, goals, objectives, procedures and the means to satisfy legal requirements and industry standards for water quality, monitoring, information exchange, best management practices, adaptive management practices, public health protection, and

cross connection control. The Operating Board may form a technical subcommittee to provide input and review of such plan. Seattle shall share available water quality data and technical expertise with all Wholesale Customers.

4. Distribution Systems. Water Utility shall be responsible for compliance with all applicable federal, State and local water quality laws and regulations applicable to water in its distribution system including any water from its own supply sources.
5. Monitoring. Water quality monitoring shall be performed by Seattle in the Seattle Regional Water Supply System and by Water Utility in its distribution system to comply with federal, State and local water quality regulations, to verify the condition of water that is passing from one entity to the other, to enhance system operation and to document the aesthetic qualities of the water. Notwithstanding the foregoing, Water Utility may contract with Seattle for water quality monitoring services as an elective service under section IV.F. hereof.
6. Water Quality Notifications to Customers (Consumer Confidence Reports). Each party shall prepare at its sole cost periodic water quality notifications to its respective retail customers and regulatory agencies as required by law. Seattle shall provide Water Utility all water quality data in a timely manner regarding the Seattle Regional Water Supply System that Water Utility may be legally required to report in such notices.
7. Water Quality Best Management Practices and Adaptive Management Practices. The Operating Board may develop best management practices ("BMPs") and adaptive management practices ("AMPs") as reasonably necessary to protect water quality within the Seattle Regional Water Supply System. The BMPs and AMPs will include recommendations to prevent deterioration of water quality in transmission and

distribution systems. The parties shall use reasonable efforts to comply with the BMPs and AMPs.

8. Flushing. Water Utility shall be solely responsible for flushing water mains within its system. Flushing allowances will be provided by Seattle only when the Operating Board determines that flushing is required to maintain or improve regional water quality.
9. New Water Sources. Prior to the introduction of any new water supply source, including any direct or indirect potable reuse water, by Water Utility which mixes with water in the Seattle Regional Water Supply System, the proposed source must be evaluated using customary and reasonable water quality criteria developed in consultation with the Operating Board to ensure compatibility with Seattle water and approved in writing by Seattle. The proposed Water Utility source must also meet all federal, state and Seattle water quality and treatment standards. Upon Seattle's request, Water Utility shall also provide Seattle with satisfactory results from a blending study to determine the compatibility of the source with existing sources already in the Seattle Regional Water Supply System, the appropriate method and level of treatment and the probable distribution of the new supply within the Seattle Regional Water Supply System. Water Utility shall also complete a flavor rating analysis of no more than 3.0 as tested by Seattle's flavor profile panel according to the methodology described by the American Water Works Association, or its successor. Water Utility shall obtain all necessary and appropriate regulatory permits, reviews, and approvals for rights to and operational use of such water supply source.

The Operating Board may form a technical subcommittee to develop water quality standards and review and advise on the water quality evaluation criteria for proposed new

sources. Such criteria for new sources shall be the same for surface water and ground water.

10. Transfers Outside the Seattle Regional Water Supply System. If, with the written consent of Seattle, water from the Seattle Regional Water Supply System is transferred between Water Utility and another water utility in a manner that does not use the Seattle Regional Water Supply System, Water Utility, the other water utility, or both, shall be fully responsible for meeting all applicable water quality standards related to the transfer of such water between their respective systems. Seattle will not be responsible for water quality outside of the Seattle Regional Water Supply System or Seattle Retail Distribution System except as may be agreed to under Section II.D.5.

#### **II.E. Conservation**

The parties acknowledge that conservation prolongs the time before new supply resources are needed and thus constitutes an important ongoing tool in managing the water resources of the region. Accordingly, Water Utility hereby adopts and agrees to be bound by the Regional Water Conservation Program, as it may be amended from time to time during the term of this contract. In accordance with Part 1, Section B.1.5 of the Settlement Agreement between the Muckleshoot Indian Tribe and the National Marine Fisheries Services and the City of Seattle (Civ. No. 03-3775JLR), Water Utility will implement, through its participation in the Regional Water Conservation Program, conservation measures that are substantially similar to those implemented by Seattle within the Seattle Retail Distribution System.

1. Performance Measurements. For the purposes of determining water conservation performance, Water Utility's water use shall be measured in conjunction with the use of all other participants in the Regional Water Conservation Program. The Operating Board

may develop reasonable criteria to measure the participants' water conservation performance in accordance with such program.

2. Conservation Above the Regional Water Conservation Program. Water Utility acknowledges that water conservation beyond the Regional Water Conservation Program may be required as a condition of State or federal regulations, court orders, settlements or agreements made to avoid litigation, fines or penalties, or as otherwise determined to be reasonably necessary by the Operating Board. The Operating Board may adopt reasonable additional conservation measures and targets for such purposes. Such conservation measures and targets shall apply in the same manner to all holders of Full and Partial Requirements Contracts and the Seattle Retail Distribution System. Except as provided in the next subsection, Water Utility shall implement such additional water conservation measures and meet the additional adopted targets.
3. Water Utility's Option to be Conservation Service Provider. Water Utility may elect to provide its own water conservation program, beyond its commitment to the Regional Water Conservation Program to meet conservation targets adopted by the Operating Board, or more stringent targets. Water Utility shall bear the additional costs thereof and shall be solely responsible for its implementation. Under this option, Water Utility shall be evaluated for meeting the additional water conservation targets solely by its own performance.
4. Incentives and Penalties. The Operating Board may adopt penalties for shortfalls in water conservation and rewards for meeting or exceeding adopted targets. In the event Water Utility or Seattle fails to meet the adopted targets set by the Operating Board, the Operating Board may assess a penalty. Penalties may not exceed the cost of Seattle

undertaking those conservation measures reasonably needed to achieve the adopted target.

5. Postponing the Need for New Water Supply Facilities. In order to avoid the necessity of developing new physical water supply facilities for as long as reasonably practicable, any water saved through conservation in either Seattle's or Water Utility's retail service areas shall be dedicated first to the municipal and industrial water supply requirements of the Seattle Regional Water Supply System before any other use of such water may be undertaken.

### SECTION III. CONDITIONS OF SERVICE

#### III.A. Minimum Hydraulic Gradient

1. Initial Minimum. Seattle shall maintain a minimum hydraulic gradient or head at a maximum flow rate in amounts and at locations described in Exhibit II attached hereto for each Service Connection from the Seattle Regional Water Supply System to Water Utility's distribution system. Such gradients and locations shall be contained in Seattle's and Water Utility's future water system plans. Seattle shall operate and maintain the Seattle Transmission Facilities necessary to carry out such obligation. If Seattle and the Operating Board find that a project resulting in the modification of such minimum gradient or head would benefit the Seattle Regional Water Supply System as a whole, the minimum hydraulic gradient or head described in Exhibit II may be modified by Seattle if such modification is feasible from an economic, land use and engineering perspective taking into account the facilities required to carry out and for Water Utility to adapt to such modification. Seattle may make these modifications only once during any fifteen



(15) year period provided that four (4) years advance written notice is given to Water Utility, unless a shorter notice is approved by the Operating Board.

2. Emergencies. If Seattle is prevented by emergency circumstances from providing such minimum hydraulic gradient, Seattle shall supply not less than the volume of water equivalent to the maximum 24-hour average flow rate required by Water Utility as shown on Exhibit II for each 24 hour period that the minimum hydraulic gradient is interrupted.
3. Additional Service Connections. Additional Service Connections between Water Utility's and Seattle Regional Water Supply System's water systems or adjusted minimum gradients may be established from time to time by mutual agreement between Seattle and Water Utility subject to approval by the Operating Board. Exhibit II shall be appropriately revised to reflect such additions or adjustments.

### **III.B. Resale to Other Parties**

Water Utility may sell water supplied by Seattle to other water utilities located outside of Water Utility's existing or future service area only upon the prior written consent of Seattle (or oral, in case of emergency). Agreements for resale of water by Water Utility listed in Exhibit I are hereby approved by Seattle subject to whatever written terms, conditions and limitations that Seattle has imposed on such resale.

### **III.C. Interconnection With Other Systems**

1. Prohibition on Interconnection. Water Utility shall not interconnect any part of its system supplied with water from Seattle with other water systems without the prior written approval of the Operating Board, or, in case of emergency, upon oral approval by Seattle, which shall not be unreasonably withheld. Any such interconnection shall be subject to the approval of the Washington State Department of Health and the installation of a meter. Such other systems must be in compliance with all applicable local, State and federal laws and regulations including the requirement that they have a valid operating permit issued by the Washington State Department of Health.
2. Requests by Seattle to Interconnect. Seattle may request that Water Utility interconnect its water system to the water system of an adjacent Wholesale Customer. Water Utility shall comply with that request subject to the terms and conditions set forth below.
  - a. Requirement for Interconnection. If Water Utility does not consent to Seattle's request for interconnection, Seattle may propose the interconnection of Water Utility's water system to the adjacent Wholesale Customer to the Operating Board. Water Utility may present facts and arguments to the Operating Board in opposition to the interconnection and document its costs in making the interconnection and conveying water to the adjacent Wholesale Customer. The Operating Board shall hear and consider the matter. Upon (a) a written finding by the Operating Board that the proposed interconnection with an adjacent Wholesale Customer is feasible taking into account Water Utility's capabilities, limitations, and obligations, (b) a written finding by the Operating Board that such interconnection benefits the Seattle Regional Water Supply System and (c) a

written demand of the Operating Board that Water Utility carry out the interconnection, Water Utility shall be required to interconnect its facilities to the adjacent Wholesale Customer for the purpose of supplying water to that Wholesale Customer through the distribution system of Water Utility, provided that the adjacent Wholesale Customer agrees to perform the interconnection in a location and according to a schedule which does not unduly disrupt Water Utility's operations, and to be responsible for the payment and indemnity obligations in Section III.C.2.b below.

- b. Payment and Indemnity. Water Utility shall be paid its actual costs of providing such interconnection and water transmission service by the adjacent Wholesale Customer receiving the water, plus a reasonable amount for overhead, administration and rate of return (equal to Rate of Return on Investment) on such costs, and Water Utility shall be indemnified from any liability that may result from providing such interconnection by the adjacent Wholesale Customer. The Operating Board shall adopt a standard methodology for calculating costs that ensures that Water Utility is fairly compensated for such service.

#### **III.D. Development of Regional Supply and Transmission**

##### **Infrastructure**

Final decisions and authority to approve construction of capital infrastructure related to the Seattle Regional Water Supply System shall rest with the Seattle City Council. Capital construction activities include, but are not limited to installations, renewals, replacements, upgrades, expansions, and any other costs included in Seattle's comprehensive capital facilities plan.

### **III.E. Metering Equipment**

Seattle shall own and perform testing, cleaning and recalibration on appropriate metering devices and associated appurtenances to measure the amount of water delivered to Water Utility at the Service Connection pursuant to this contract. Seattle shall perform all other work at Water Utility's expense regardless of the cause provided that the cause is consistent with AWWA and safety standards and practices. Water Utility shall operate and maintain its water system in a manner that the water flowing through the Service Connection meter operates within the normal operating range for the meter as specified by the manufacturer.

Until such time as Seattle determines it to be economical to install metering devices to measure the amount of water delivered from the Seattle Regional Water Supply System to the Seattle Retail Distribution System, the amount of water delivered to the Seattle Retail Distribution System shall be measured indirectly by subtracting the metered water delivered to all of Seattle's wholesale customers from 98% of the total amount of water exiting Seattle's sources of supply as measured by the supply meters.

### **SECTION IV. COST OF WATER SUPPLY & TRANSMISSION**

Cost-based rates are a water industry accepted practice and the historical practice of Seattle and the Wholesale Customers. The rate-making principles, policies and methodologies set forth in this Section IV are intended to meet the objective of equitable and cost-based rates.

#### **IV.A. Rate-making and Cost-allocation Principles**

The parties will apply the following general principles and policies to the establishment of all rates, charges, and cost allocations for water supply, transmission, and related services under this contract.

1. No expenses attributable to electric power development may be allocated to the cost pools identified herein unless the pools are allocated a commensurate share of revenue derived from such development.
2. Seattle shall utilize generally accepted accounting principles, as may be amended from time to time, consistently applied as a basis for developing the financial information upon which rates and charges are based.
3. Abrupt changes in financial policies should be avoided.
4. The rate structure should encourage the efficient use of water, conservation and the timely development of new environmentally responsible water sources and should incorporate seasonal rates and other pricing approaches to encourage efficient use.
5. The rate structure should be innovative, flexible and adaptive whenever it is cost effective and beneficial in furthering the rate-making policies.
6. The rate structure should be simple to administer and easily understandable.
7. The rate structure should be fair and equitable while balancing the needs of all parties.
8. Capital costs which benefit only a new Wholesale Customer shall be allocated to that customer and not to any cost pool described in this contract.
9. Capital costs associated with improvements or facilities which benefit or serve individual Wholesale Customers or the Seattle Retail Distribution System may be allocated to a sub-regional or regional cost pool to the extent necessary to alleviate a disproportionate

adverse impact to that Wholesale Customer or the Seattle Retail Distribution System from a regional or sub-regional capital improvement and where (i) such impact could have been reasonably avoided through a different project design, or (ii) the other Wholesale Customers, including the Seattle Retail Distribution System, receive tangible benefits, directly or indirectly, from the adopted capital facilities plan.

10. The Seattle Retail Distribution System shall be treated as the equivalent of a Wholesale Customer of the Seattle Regional Water Supply System for the purpose of charging Seattle the same wholesale rates and charges as Water Utility for water supply and transmission. Costs calculated under the costs pools described below shall apply to all Wholesale Customers and to the Seattle Retail Distribution System.
11. The allocation of costs associated with capital construction activities within the Seattle Regional Water Supply System shall be the responsibility of the Operating Board. The Operating Board shall use its best efforts to determine and approve a cost allocation method for infrastructure projects prior to the capital project obtaining construction approval from the Seattle City Council. Failure of the Operating Board to determine and approve a cost allocation method shall not hinder the Seattle City Council from approving capital infrastructure projects in order to assure Seattle's ability to fulfill the requirements of this contract.
12. All parties will use best efforts in establishing rates and cost allocations that reflect the rate-making and cost allocation principles set forth in this Section IV.A.

#### **IV.B. Ratemaking Framework**

Subject to the foregoing principles, wholesale rates and charges for the services described in this contract shall be developed by Seattle based on the following framework:

1. Water Supply and Transmission Service. The costs of water supply and transmission of water shall be accounted for separately in the water supply and transmission cost pools described below. The price for each service shall be recovered through separate rates for each service. All direct costs incurred in providing water supply and transmission services shall be allocated to the appropriate cost pool and recovered through the rates for each service. In addition, certain indirect costs consisting of a reasonable overhead and administration cost shall be allocated to the appropriate cost pool and recovered through rates for each service.
2. Water Supply - Basic and Elective Services. The costs of supplying water falls into two categories – basic and elective services. Basic service costs include direct and indirect costs attributable to the delivery of water to the Wholesale Customers and to Seattle’s Retail Distribution System pursuant to the foregoing principles. Elective services are optional services, such as water quality laboratory services and specific engineering support that Seattle makes available.
3. Conservation. Costs incurred by Seattle for the Regional Water Conservation Program shall be allocated to the New Supply Cost Pool and the Operating Board will determine how to recover those costs either through rates or Facility Charges “FCs” from Wholesale Customers and Seattle.

#### **IV.C. Water Supply Pricing – Basic Services**

1. Two Water Supply Cost Pools. For the purposes of determining costs of water supply, there shall be two cost pools: An existing supply cost pool ("Existing Supply Cost Pool") and a new supply cost pool ("New Supply Cost Pool").
  - a. Existing Supply Cost Pool. The Existing Supply Cost Pool shall be accounted for as follows:
    - i. A basic services rate for water supply shall be charged to recover the full costs of operating, maintaining, repairing, renewing and replacing the Existing Supply Resources incurred by Seattle.
    - ii. All regional conservation programs undertaken by Seattle prior to January 1, 2002, shall be considered an Existing Supply Resource cost.
    - iii. Renewal and replacement of Existing Supply Resources will be an Existing Supply Resource cost.
  - b. New Supply Cost Pool. The New Supply Cost Pool shall be accounted for as follows:
    - i. Water supply resources developed after January 1, 2002 that expand the capacity of the Seattle Regional Water Supply System ("New Supply Resources"), including the costs of the Regional Water Conservation Program from January 1, 2002, shall be included in the New Supply Cost Pool. If any portion of a New Supply Resource project enhances reliability of Existing Supply Resources, the costs thereof may be allocated to the Existing Supply Cost Pool if the Operating Board and Seattle both agree.



- ii. The cost of New Supply Resources plus Rate of Return on Investment may be recovered either through FCs or new supply rates charged to the holders of Full and Partial Requirements Contracts and the Seattle Retail Distribution System. The new supply rate shall be applied to all holders of Full and Partial Requirements Contracts and the Seattle Retail Distribution System.
  - iii. The Operating Board shall determine the portion of the New Supply Resource costs that shall be recovered through FCs or through new supply rates. The FCs and new supply rates may be scalable to create an incentive for developers to build housing or commercial units with efficient water usage levels. Water Utility, as well as each other Wholesale Customer and Seattle in setting rates for retail customers shall be free to choose the method of incorporating FCs or new supply rates into their own retail rates and charges.
  - iv. Holders of Full and Partial Requirements Contracts who have not purchased water from Seattle under the 1982 Water Purveyor Contract shall be assessed the full marginal costs of the operation, including Rate of Return on Investment, of the New Supply Resources. This assessment may be satisfied by either paying FCs and new supply rates or arranging a special water supply rate in lieu of paying FCs.
- c. Emergency Surcharge. In the event of a drought, catastrophe, or other extraordinary condition that requires emergency expenditures to maintain a sufficient water supply, Seattle may impose an emergency surcharge on all

holders of Full and Partial Requirements Contracts in order to pay for such expenditures or maintain financial stability of the Seattle Regional Water Supply System, or both. Any such emergency surcharge shall be presented to the Operating Board prior to adoption by the Seattle City Council. Seattle shall consider the comments of the Operating Board but shall nevertheless have the full authority to adopt the emergency surcharge.

#### **IV.D. Transmission Pricing - Basic Services**

1. Transmission Costs Pools. For purposes of determining the cost of the transmission of water to the Wholesale Customers there shall be three transmission cost pools consisting of an existing transmission cost pool ("Existing Transmission Cost Pool"), a new transmission cost pool ("New Transmission Cost Pool") and a "Southwest Sub-region Cost Pool".
  - a. Existing Transmission Cost Pool. Costs to be allocated to the Existing Transmission Cost Pool shall consist of the following: operation, maintenance, repairs, renewals, and replacements to the Seattle Transmission Facilities.
    - i. The Seattle Transmission Facilities are owned and operated as a regional network by Seattle to convey water to wholesale customers and to the Seattle Retail Distribution System. Therefore, the price of transmission for water transmitted within the Seattle Transmission Facilities shall be calculated on the same basis to holders of Full and Partial Requirements Contracts and the Seattle Retail Distribution System.

- ii. Costs incurred for purposes of transmission reliability may be included in the Existing Transmission Cost Pool subject to the approval of the Operating Board and Seattle.
- b. New Transmission Cost Pool. The cost of new transmission facilities shall be included in the New Transmission Cost Pool. The renewal, replacement, upgrade, expansion, or modification of existing Seattle Transmission Facilities which create an expansion of transmission capacity may be allocated to the New Transmission Cost Pool. The Operating Board shall decide what portion of costs of renewal, replacement, upgrade, expansion or modification of existing Seattle Transmission Facilities may be allocated to the New Transmission Cost Pool and what portion of costs of a transmission project that extends the geographic extent of the transmission system that shall be allocated to the New Transmission Cost Pool or recovered from a new Wholesale Customer if the project benefits only that new Wholesale Customer. Except for costs allocated to a specific Wholesale Customer, New Transmission Cost Pool costs shall be recovered through new transmission rates or FCs as determined by the Operating Board. The new transmission rate shall be applied in a uniform manner to all holders of Full and Partial Requirements Contracts and the Seattle Retail Distribution System.
- c. Southwest Sub-region Cost Pool. Water Utility is served, in part, by the sub-regional water transmission facilities listed in Exhibit XI. The costs of operating, maintaining, repairing and replacing these facilities shall be included in the Southwest Sub-region Cost Pool, together with any other costs Water Utility and Seattle agree to include.

2. Demand Charge.

- a. Seattle may adopt a demand charge in accordance with the methodology described in Exhibit III. The demand charge rate (i.e., dollars per 1000 gallons of deficient storage) shall be based on the equivalent cost of providing the deficient storage.
- b. The proceeds of the demand charge will be treated in rate setting as a credit to the New Transmission Cost Pool.
- c. Seattle shall suspend the demand charge rate in the event of emergencies and unforeseen conditions.

3. Cost of New or Changed Service Connection. If Seattle requests a change in the location of the Service Connection to Water Utility for the benefit of the Seattle Regional Water Supply System, then the costs, including any retirement costs of the old Service Connection, shall be included in the appropriate transmission cost pool. If Water Utility requests a new Service Connection or a change in location of an existing Service Connection, then Water Utility shall pay the costs of the new or changed Service Connection, including any retirement costs of the old Service Connection regardless of the cause provided that the cause is consistent with AWWA and safety standards and practices.

**IV.E. Allocation of Costs and Revenues into Cost Pools**

- 1. Accounting. Seattle shall maintain a cost accounting system consistent with the provisions of this contract and generally accepted accounting principles, as amended from time to time, consistently applied in developing the financial information for

determining the costs of acquisition, construction, repair, renewal, replacement, upgrade, expansion, maintenance, and operation of the facilities in each cost pool.

- a. Asset Accounts. An asset account shall be maintained for each facility and within that account Seattle shall record the original cost of that facility plus betterments and less retirements.
  - b. Depreciation. Facilities shall be depreciated according to industry-standard water system asset lives and a record of life-to-date depreciation shall be maintained for each facility. No depreciation shall be recorded in the first calendar year of operation of a facility. A full year's depreciation shall be recorded in every subsequent year.
  - c. Net Book Value. The net book value of any facility shall be its original cost plus betterments and less retirements as recorded in its facility asset account, less life-to-date depreciation.
2. Infrastructure Costs. Each cost pool shall include the infrastructure costs for its respective facilities, calculated on a utility, cash or other basis depending upon the facility and the cost pool as set forth below.
- a. Utility Basis. The utility basis shall be used to calculate the infrastructure costs for all Existing Supply Resources and Seattle Transmission Facilities, as well as their replacements and betterments. The utility basis may also be used for New Supply Resources and new transmission facilities in Seattle's discretion. Under the utility basis, the infrastructure cost for a facility in any year shall be the sum of (i) the annual depreciation expense recorded for that facility and (ii) the

product of the net book value of that facility and the Rate of Return on Investment.

At Seattle's discretion, interest costs may be considered current infrastructure costs during the construction of a facility. However, any such interest costs must be considered contributions in aid of construction, and not included in the Net Book Value of the facility for purposes of calculating Utility Basis costs in future years.

- b. Cash Basis. The cash basis may be used in Seattle's discretion for New Supply Resources and transmission facilities or a portion thereof. Under the cash basis, the infrastructure cost for a facility in any year shall be the actual cash expenditure made by Seattle in that year for either the payment of construction costs or actual principal and interest costs on debt issued to finance its construction. In the event that the depreciation lifetime of the facility is less than the term of the debt issued to finance all or a portion of the facility, debt maturities will be selected such that the construction cost of the facility will be fully amortized at the end of its depreciation lifetime.
  - c. Other Basis. Seattle, with the approval of the Operating Board, may determine one or more other bases on which to calculate infrastructure costs and may apply these bases to facilities in the New Supply and New Transmission Cost Pools. Disposition of any facilities under another basis will be determined at the same time in accordance with Section IV.E.4.
3. Operations Costs. The costs of operating the assets assigned to a cost pool shall be included in the cost pool. The annual operations costs of a cost pool shall be the labor,

materials, equipment and other direct costs required for the operation, maintenance, and repair of the facilities in that cost pool, together with any net profit or expense from the disposition of facilities in that pool. Operations costs shall include the cost of general and administrative overhead applied in a manner consistent with its application to capital construction projects.

- a. Existing Supply Operations Costs. The parties agree that an efficient way of handling operations costs for the Existing Supply Cost Pool shall be as follows: The operations cost base in the Existing Supply Cost Pool for the year 2010 shall be determined in accordance with the line item labeled “2010 Costs in identified activities” under Existing Supply in Note 2 – Operations Costs, Notes to the Wholesale Statements for the City of Seattle, Seattle Public Utilities, Water Fund, during the annual cost-audit process for 2010 in accordance with Section IV.E.10, which occurs by the end of 2011 and applies to all Wholesale Customers and Seattle. Seattle will notify Water Utility of the actual 2010 operations cost base in the Existing Supply Cost Pool in writing, which shall become incorporated as part of this contract at that time. In each succeeding year, the amount of the operations cost base from the previous year shall be adjusted by the percentage increase in the operations cost in the Existing Supply cost centers identified in Exhibit IX, as amended from time to time.
- b. Existing Transmission Operations Costs. The parties agree that an efficient way of handling operations costs for the Existing Transmission Cost Pool shall be as follows: the operations costs base in the Existing Transmission Cost Pool for the year 2010 shall be determined in accordance with the line item labeled “2010

Costs in identified activities” under Existing Transmission in Note 2 – Operations Costs, Notes to the Wholesale Statements for the City of Seattle, Seattle Public Utilities, Water Fund, during the annual cost-audit process for 2010 in accordance with Section IV.E.10, which occurs by the end of 2011 and applies to all Wholesale Customers and Seattle. Seattle will notify Water Utility of the actual 2010 operations cost base in the Existing Transmission Cost Pool in writing, which shall become incorporated as part of this contract at that time. In each succeeding year, the amount of the operations cost base from the previous year shall be adjusted by the percentage increase in the operations cost in the Existing Transmission cost centers identified in Exhibit IX, as amended from time to time.

- c. New Supply Operations Costs. The operation costs of the Regional Water Conservation Program after January 1, 2002, together with the costs of operating facilities assigned to the New Supply Cost Pool and any other costs allocated by the Operating Board, shall be assigned to the New Supply Cost Pool. The operations cost base in the New Supply Cost Pool for 2010 shall be determined in accordance with the line item labeled “2010 Costs in identified activities” under New Supply in Note 2 – Operations Costs, Notes to the Wholesale Statements for the City of Seattle, Seattle Public Utilities, Water Fund, during the annual cost-audit process for 2010 in accordance with Section IV.E.10, which occurs by the end of 2011 and applies to all Wholesale Customers and Seattle. Seattle will notify Water Utility of the actual 2010 operations cost base in the New Supply Cost Pool in writing, which shall become incorporated as part of this contract at that time. In each succeeding year, the amount of the operations cost base shall



be adjusted by the percentage increase in the operations costs in the New Supply cost centers as identified in Exhibit IX, as amended from time to time.

- d. New Transmission Operations Costs. The actual costs of operating facilities assigned to the New Transmission Cost Pool and any other costs allocated by the Operating Board, shall be assigned to the New Transmission Cost Pool.
  - e. Southwest Sub-region Operations Costs. The actual costs of operating facilities assigned to the Southwest Sub-region Cost Pool, together with any additional operations costs approved by Water Utility and Seattle.
4. Disposition Costs. The costs of disposing of assets within a cost pool shall be included in the cost pool. Net disposition costs shall be calculated as follows:
- a. Disposition Under the Utility Basis. The net book value of the facility, less any sales, salvage, or other revenues derived from the disposition of that facility.
  - b. Disposition Under the Cash Basis. The value of principal of unpaid maturities of debt used to finance the construction cost of the facility, less any sales, salvage or other revenues derived from the disposition of that facility.
  - c. Disposition Under Other Basis. Disposition of any facilities whose infrastructure costs are calculated on another basis under section IV.E.2.c. above shall be determined by the parties as part of the definition of such other basis.
5. Creation of Additional Cost Pools. Seattle, in its discretion, may create additional cost pools to provide equity and flexibility in payment arrangements and the allocation of costs as the Seattle Regional Water Supply System expands to include new infrastructure, operations, and customers. The costs in an additional cost pool, or a portion thereof, may

be added to an existing cost pool subject to the consent of the Operating Board if the costs to be allocated satisfy the criteria for allocation to the existing cost pool.

6. Facilities Charge Revenues. Supply FC revenues, which consist of those revenues from FCs the Operating Board has determined are to recover a certain portion of New Supply Resources costs, shall offset infrastructure costs in the New Supply Cost Pool. Surpluses and deficits in actual Supply FC revenues over costs to be recovered through the Supply FC shall be carried forward and earn simple interest at Seattle's Average Cost of Debt.

Any current-year deficit (including any surplus balance available from previous years) shall be paid by rates for the New Supply Cost Pool. New Supply Cost Pool rates shall be discounted by surplus Supply FC revenues until any deficit Supply FC balance is repaid, except the amount of this discount shall not exceed, without the agreement of the Operating Board, twice the maximum annual deficit paid by the rate for the New Supply Cost Pool in any one year.

In the event that Supply FC surplus balances exceed the Net Book Value of assets whose costs are allocated to the Supply FC, the difference between the Supply FC balance and the Net Book Value of these assets shall be used to discount the rate for the New Supply Cost Pool (and the Supply FC surplus balance shall be reduced by the amount of this discount). The use and accounting for transmission FCs shall be done in a like manner to supply FCs. Seattle and Water Utility agree that FC revenues are the sole property of Seattle.

7. Allocation of Cost Pools by Customer Class. The costs in cost pools shall be allocated within the pools as follows:

- a. Allocation of Existing Supply Cost Pool. The total cost of the Existing Supply Cost Pool shall be allocated to two customer classes as follows:
  - i. Block Purchase Customer Class. The portion of costs in the Existing Supply Cost Pool allocated to holders of Block Purchase Contracts shall be determined pursuant to those contracts.
  - ii. Full and Partial Requirements Customer Class. The holders of Full and Partial Requirements Contracts and the Seattle Retail Distribution System shall be allocated the remaining costs in the Existing Supply Cost Pool.
- b. Allocation of New Supply Cost Pool. The costs allocated to the New Supply Cost Pool shall be:
  - i. Block Purchase Customer Class. The holders of Block Purchase Contracts shall be allocated no costs from the New Supply Cost Pool.
  - ii. Full and Partial Requirements Customer Class. The holders of Full and Partial Requirements Contracts and the Seattle Retail Distribution System shall be allocated all costs in the New Supply Cost Pool.
- c. Allocation of Existing Transmission Cost Pool. The costs of the Existing Transmission Cost Pool shall be allocated as follows:
  - i. Block Purchase Customer Class. The proportion of costs in the Existing Transmission Cost Pool allocated to holders of Block Purchase Contracts shall be determined pursuant to those contracts.
  - ii. Full and Partial Requirements Customer Class. The holders of Full and Partial Requirements Contracts and the Seattle Retail Distribution System

shall be allocated the remaining costs in the Existing Transmission Cost Pool.

d. Allocation of New Transmission Cost Pool.

i. Block Purchase Customer Class. The holders of Block Purchase Contracts shall be allocated no costs from the New Transmission Cost Pool.

ii Full and Partial Requirements Customer Class. The holders of Full and Partial Requirements Contracts and the Seattle Retail Distribution System shall be allocated all costs in the New Transmission Cost Pool.

e. Allocation of Additional Cost Pools. At the time an additional cost pool is created by Seattle pursuant to Section IV.E.5, the additional cost pool will be allocated by customer class.

f. Allocation of Southwest Sub-region Cost Pool. All costs in the Southwest Sub-region Cost Pool shall be allocated according to Exhibit XII.

8. Facilities Charges. If Seattle establishes FCs as authorized herein, then such charges shall be calculated as follows:

a. ERU Definition. Seattle shall develop a definition of an Equivalent Residential Unit ("ERU") based on, meter size as set forth in Exhibit VI, number of residential units, water use, or other basis which shall be consistent with accepted industry standards. The Operating Board shall have the right to review and comment on the definition and Seattle shall consider the Operating Board's comments.

b. Record-Keeping. Water Utility shall provide Seattle with an annual accounting, in a form acceptable to Seattle, of its retail water service connections by January

31<sup>st</sup> of each year, which shall be accurate as of December 31<sup>st</sup> of the preceding year. Water Utility shall report the size of the meter and other pertinent data such as the number of residential units or square footage served or water use. Seattle shall provide Wholesale Customers with an annual accounting of its retail service connections on the same basis. Upon reasonable notice, Water Utility shall make its billing and connection records available to Seattle for inspection and copying during normal business hours and Seattle's billing and connection records shall be made available to any Wholesale Customer on the same basis.

- c. Annual Calculation of ERUs. Until such time as Seattle develops another basis, the calculation of ERUs in any year shall be the annual growth in the number of meters installed by Water Utility during the year taking into account the size of each meter.
- d. Imposition of Facilities Charges. Seattle shall collect and Water Utility shall pay FCs based on the following:
  - i. the number of ERUs added during the previous month determined by the number of meters installed. Seattle shall pay FCs into the accounts of the Seattle Regional Water Supply System on the same basis.
  - ii. Seattle Report on ERUs. Seattle shall prepare and distribute a report no later than March 31<sup>st</sup> of each year showing the ERU count of the Seattle Retail Distribution System and each Wholesale Customer on such basis for the previous year and each year since the effective date of this contract.
- e. Rate Setting. The structure of FCs or water rates charged to the holders of Full and Partial Requirements Contracts shall be determined by Seattle, at its sole discretion,

except that the price may not, without the consent of Water Utility, be set to collect more than the costs forecast under Section IV hereof and Rate of Return on Investment. FCs shall be calculated as set forth on page 1 of Exhibit VI.

9. Cost Audit. At the end of each fiscal year, Seattle shall provide a statement of actual costs allocated to each cost pool and other costs and revenues received, which statement may be audited by an external auditor selected by the Operating Board. In addition, Water Utility may have the statement audited by an external auditor of its choice, solely at Water Utility's expense.

10. Transition.

- a. Settling the Purveyor Balance Account. The parties agree that they will settle the Purveyor Balance Account, as that term is used in Section III.I of the 1982 Water Purveyor Contract, in the following manner no later than December 31, 2011, unless the parties enter into a payment agreement in accordance with this subsection. The Purveyor Balance Account shall be credited if there is a surplus or charged if there is a deficit, to the Wholesale Customers who remained under the 1982 Water Purveyor Contract until the Effective Date of this contract. The Purveyor Balance Account as of December 31, 2010 (which will be finally audited in the 3<sup>rd</sup> quarter of 2011), shall be prorated by each of those Wholesale Customer's share of the total Purveyor demand (e.g flow) since the most recent year that the balance was at zero. There will be separate proration for the Old Water and New Water accounts as those terms are defined in the 1982 Water Purveyor Contract. In the event the appropriate credits or charges are not or cannot be paid in full by December 31, 2011, the parties shall be entitled to pay

the appropriate credits or charges over a term of up to three years with the then current interest at Seattle's Average Cost of Debt. The specific terms of any payment agreement between the parties shall be reasonable and subject to the review and approval of the parties.

- b. Prior Operating Board Decisions. Water Utility acknowledges and agrees it will be bound by decisions the Operating Board has made under the authority in this contract that have been made prior to the Effective Date of this contract so that such decisions apply to all holders of Full and Partial Requirements Contracts.
- c. Application of Facilities Charges based on Meter or Connection Size. Seattle and Water Utility acknowledge and agree that Water Utility has unresolved concerns relating to guidance issued by the Operating Board in 2002 regarding the application of FCs based on meter or connection size where other requirements (e.g. operational, regulatory) may dictate the meter or connection size, and therefore, may not be an appropriate indicator of the annual demand placed on water supplies. The parties agree that circumstances have changed since that guidance was issued that warrant reconsideration of the guidance. Therefore, Seattle will initiate a discussion with the Operating Board in 2011, which Water Utility may participate in to present its concerns, and will endeavor to resolve the issue for action by the Operating Board as soon as practicable after Water Utility becomes represented by the Operating Board.
- d. Waiver of Facilities Charges. Seattle shall not charge Water Utility FCs until January 1, 2012 if the amount of water it purchases from Seattle does not exceed its old water allowance under the 1982 Water Purveyor Contract. This waiver,

however, shall not relieve Water Utility from the record-keeping requirement of subsection IV.E.8 above.

- e. Transition Growth Surcharge. A transition growth surcharge of \$0.60 per CCF shall be applied to the rates of Water Utility for delivery of water in excess of the old water allowance of the 1982 Water Purveyor Contract through December 31, 2011. The revenue from this surcharge shall be used to discount the base rates of the holders of Full and Partial Requirements Contracts by not more than \$0.16 per CCF. In the event that the revenues generated by the surcharge exceed those required to fund the discount, Seattle may keep the difference.
- f. Early Contract Signing Fee. Within two months of the Effective Date of this contract, Water Utility agrees to pay to Seattle an Early Contract Signing Fee of \$22,843.00. If Water Utility requires a longer period, it may pay the fee in monthly increments until December 2011 at 1% interest.
- g. Transfer to Full and Partial Rates and Facilities Charges.
  - i. Within two months of the Effective Date of this contract, Seattle will: 1) make appropriate changes to its billing system to charge Water Utility for water supplied under this contract at the then current rates for Full or Partial Requirements Contracts under Seattle Municipal Code (“SMC”) Section 21.04.440.E.2 (“Billing System Change Date”); and 2) credit back to Water Utility the difference between the amount Water Utility paid for water supplied at the then current rates for Water Purveyor Contracts under SMC 21.04.440.E.1 and what the Water Utility would have paid for water supplied at the then current rates for Full or Partial Requirements



Contracts under SMC 21.04.440.E.2 from January 1, 2011 until the Billing System Change Date.

- ii. Within two months of the Effective Date of this contract, Water Utility will submit to Seattle an accounting of the number of retail connections made to its water system between January 1, 2011 and the Effective Date of the contract and payment of any FCs at the then current FC rate under SMC 21.04.440.E.2 that would have been paid in accordance with this contract from January 1, 2011 until the Effective Date of this contract.
- h. Existing Regional Deficit. The parties acknowledge and agree that as of December 31, 2010, there may be an existing regional deficit or surplus in the running balance under Section IV.I.1 that was created by Wholesale Customers signing contracts prior to 2011 and the Seattle Regional Distribution System. Although Water Utility did not contribute to the existing deficit or surplus, it will have to pay higher or lower rates in the 2012-2014 rate period to help eliminate the deficit or surplus, respectively. In the event of a deficit, Seattle agrees to credit back to Water Utility, 70% of the amount that Water Utility will contribute to eliminating the existing deficit through higher rates. In the event of a surplus, Water Utility agrees to pay Seattle 70% of the amount that Water Utility will benefit from eliminating the existing surplus through lower rates. The actual amount of the existing deficit or surplus will be determined during the annual cost audit process for 2010, which is targeted for third quarter 2011. The amount to be credited or charged will be based on Water Utility's percentage of 2010 annual flow times the total existing regional deficit or surplus times 70%. Upon the

completion of the 2010 annual cost audit process, Seattle will provide Water Utility with an accounting of the total credit or charge in writing. Beginning January 2012, Seattle will provide one or more monthly credits or charges on Water Utility's water bill until the entire credit or charge balance is paid off. Seattle or Water utility, as appropriate, will pay the entire balance by December 31, 2012. Any outstanding credit or charge balance will accrue interest at Seattle's average cost of debt from December 31, 2010 until the entire balance is paid off.

#### **IV.F. Elective Services**

1. Water Supply Services. Seattle may provide certain elective services (e.g. conservation, engineering) to Water Utility upon request by Water Utility. Such services shall be negotiated and contracted for separately between Water Utility and Seattle.
2. Transmission Wheeling. In consultation with the Operating Board, excess transmission capacity may be made available by Seattle for a fee for purposes of wheeling water between points within the Seattle Regional Water Supply System to Water Utility or to others.
3. Water Quality. So long as Seattle owns and operates a water quality lab, Water Utility may request the services of that lab based on its published rates.

#### **IV.G. Rate Adjustment**

1. Rate Adjustment. Upon 120-days notice to Water Utility of its intent to do so, Seattle may adjust water service rates and FCs to Water Utility subject to the terms of this contract. Rate adjustments will be effected only within five years of the completion of a cost of service study to be conducted by Seattle, which shall include an analysis of the

allocation of operation, maintenance and capital costs between cost pools. Such study shall be prepared in accordance with accepted industry standards. In addition, Seattle shall review the Operating Board's comments and recommendations on the rate proposal and provide a written explanation of any recommendations that are not accepted.

2. Rate Consultant. An independent rate consultant shall be selected by Seattle in consultation with the Operating Board. Detailed information and progress reports from the consultant will be made to Water Utility during the course of the study upon drafting of each major study section directly affecting Water Utility and other Wholesale Customers. A final consultant report shall be made available to Water Utility not less than 30 days before Seattle formally transmits any resulting rate adjustment proposal to the Operating Board.

#### **IV.H. Retail Rate-Setting**

Each party to this contract shall have sole authority for establishing retail rates, connection charges and other fees and charges within its respective jurisdiction.

#### **IV.I. Truing Actual Costs and Actual Revenues**

A mechanism for reconciling revenue targets for the various cost pools and the actual revenues received during each year shall be implemented by Seattle as follows:

1. For each previously identified class of customers in each cost pool, Seattle shall maintain a running balance of the excess or deficit of actual rate revenues collected less actual expenses incurred. Each balance shall earn simple interest at the rate of Seattle's Average Cost of Debt. At the end of each year, each balance shall be adjusted to reflect the operating results of that year. The statement of these balances shall be reviewed and approved by an external auditor.

2. FC balances shall be carried forward as set forth in Section IV.E.6.
3. Each wholesale rate study shall adjust rates to eliminate the cost pool balances. ERU fees shall be based on the costs of increments in supply and transmission capacity, and shall not be adjusted to reflect surpluses or deficits in FC revenues.

## SECTION V. **OPERATING BOARD**

1. Purpose. The purpose of the Operating Board is to provide certain limited authority to a board of representatives over policy and operational matters as they affect the Seattle Regional Water Supply System.
2. Structure and Authority. The Operating Board shall have the powers and authority as set forth herein. Exhibit IV describes the structure and authority of the Operating Board. In the event of a conflict between provisions of this contract which grant specific powers to the Operating Board and Exhibit IV, such grants of specific powers shall control.
3. Review. The structure and authority of the Operating Board may be reviewed as of January 1, 2012 and every five years thereafter to determine its effectiveness in addressing regional and contractual issues. The review may address the composition of the Board and its powers and authority as set forth herein and in Exhibit IV, provided that notwithstanding any other term or provision of this contract, Seattle shall not have the power to disband the Operating Board nor take away or diminish the powers vested in the Operating Board as set forth in Sections II, III and IV of this contract. Either party may initiate the review. The reviewing party shall provide the other with its comments and proposals. The parties agree to consider the other party's comments and proposals and to respond in writing stating its reasons for rejecting any proposals and the reasons for its own counter-proposal. After consideration of all comments and proposals at each five

year interval, Seattle may make changes in the structure and authority of the Operating Board that are not inconsistent with the provisions of this subsection.

## **SECTION VI. PLANNING**

### **VI.A. Reporting of Planning Data**

1. By no later than April 1 of each year, Water Utility shall report to Seattle and the Operating Board as follows:
  - a. Its annual and peak day total system demand for each year, during the term of this contract, as of December 31<sup>st</sup> of the previous year.
  - b. Its forecast of Full or Partial Water Requirements, as appropriate, for the year including estimates of annual water consumption and maximum 24-peak demand for the ensuing calendar year, and for the fifth, tenth, and fifteenth year in the future. Such forecasts shall reflect the best judgment of Water Utility.
2. Water Utility shall report other data relating to water supply and demand as may be reasonably requested by Seattle for water planning purposes.
3. Records relevant to water supply and consumption within the possession of Seattle or Water Utility shall be provided to the other upon reasonable request.

### **VI.B. Submittal of Water Utility Water System Plans**

Water Utility shall provide a copy of its water system plan, including any amendments, to Seattle for review.

### **VI.C. Seattle as Water Planning Agency**

Seattle shall be the lead agency and primary planning authority for the purposes of fulfilling its obligations to provide for the Full or Partial Water Requirements of Water Utility, as appropriate. Seattle, in consultation with the Operating Board, shall examine and investigate water supplies

suitable and adequate to meet the present and reasonable future needs of Seattle and the Wholesale Customers. Seattle shall prepare and adopt a plan for acquiring such water supplies in a timely fashion. The plan shall provide for the lands, waters, water rights and easements necessary therefor, and facilities for retaining, storing and delivering such waters, including dams, reservoirs, aqueducts and pipelines to convey same throughout the Seattle Regional Water Supply System. In preparing or adopting the plan, Seattle shall consider as possible alternatives or additional water supply sources, the acquisition of water from sources controlled or developed by individual water utilities, legally constituted groups of water utilities or utilities which are not presently supplied by the Seattle Regional Water Supply System. Seattle has final responsibility for the plan and for fulfilling the obligations of this contract. However, the Operating Board may participate in developing the plan by proposing goals and objectives for the Seattle Regional Water Supply System, by making any additional suggestions and by acting in a review capacity.

#### **VI.D. Comprehensive Capital Facilities Plan**

Before ordering any major improvements to fulfill the requirements of this contract, Seattle shall adopt and maintain a comprehensive capital facilities plan for the Seattle Regional Water Supply System, which provides for such improvements. Any capital facilities plan adopted by Seattle for the Seattle Regional Water Supply System shall comply with and implement the Rate-making and Cost Allocation Principles in Section IV.A of this contract. This plan shall identify any reasonable costs for capital improvements to alleviate a disproportionate adverse impact to the distribution system(s) of Water Utility, another Wholesale Customer represented on the Operating Board or Seattle, to the extent it is caused by a capital improvement in the capital facilities plan for the Seattle Regional Water Supply System. When such plan is updated or amended, it shall be reviewed by the Operating Board prior to submission to the Seattle City

Council. The Operating Board shall respond within 60 days of receipt of the plan, or its approval shall be presumed to be given. The response submitted by the Operating Board regarding facilities substantially affecting Water Utility and other Wholesale Customers shall be seriously considered by Seattle. Seattle shall reply to the Operating Board within 90 days with its comments. The Operating Board and Seattle shall use their best efforts to arrive at a mutually acceptable plan.

#### **VI.E. Emergency Planning**

An emergency plan shall be prepared and maintained by Seattle as part of its Water System Plan to provide for water supply in the event of drought or disaster. Such plan shall be prepared pursuant to the procedure outlined in Section VI.D. Water Utility shall use reasonable efforts to comply with the provisions of such plan, or alternatively, Water Utility may adopt its own emergency plan if it believes it is prudent to do so.

### **SECTION VII. PAYMENT**

#### **VII.A. Collection of Money Due City**

Seattle shall bill Water Utility on a monthly basis for all charges due under this contract. Water Utility shall pay such charges within 60 days of the billing date.

#### **VII.B. Penalties for Late Payment**

All late payments, and any refund of an amount in dispute that was paid under protest, shall accrue interest at 1% per month.

#### **VII.C. Billing Disputes**

Water Utility may dispute the accuracy of any portion of charges billed by Seattle by notifying Seattle in writing within the 60-day payment period of the specific nature of the dispute and paying the undisputed portion of the charges. This provision is not intended to limit Water

Utility's right to dispute billing errors or charges that are not reasonably discoverable by Water Utility within the 60-day payment period.

Seattle shall consider and decide any billing dispute in a reasonable and timely manner. Any billing disputes that remain after such consideration shall be reconciled pursuant to the dispute resolution procedures of this contract.

#### **SECTION VIII. CONTRACT AMENDMENTS**

Seattle shall notify Water Utility and all other holders of Full or Partial Requirements Contracts of any amendments to such contracts within 30 days of the execution of such amendment. Water Utility shall then have 90 days to decide whether to include such amendment in this contract by giving written notice to Seattle of its election to do so. Upon the issuance of such notice, Seattle shall issue the amendment to Water Utility and the amendment shall be final and binding upon both parties upon mutual execution.

#### **SECTION IX. DISPUTE RESOLUTION**

Dispute resolution shall proceed as follows:

##### **IX.A. Operating Board Review**

Any dispute regarding this contract that remains unresolved after good faith negotiations between Water Utility and Seattle shall be referred to the Operating Board for consideration and recommendation. Each party shall submit a written statement regarding the dispute to the Operating Board.

1. If the dispute cannot be resolved in discussions with the Operating Board, then the Operating Board shall provide written recommendations to each party within 60 days of the above submittal setting forth its interpretation of the applicable facts and law.



2. If either party rejects the written recommendation of the Operating Board, that party shall, within 10 days, notify the other party in writing of its reasons.

#### **IX.B. Seattle City Council Review**

The written statements of the parties, the recommendations of the Operating Board, if applicable, and the written reasons for either party's rejection of those recommendations shall then be submitted to the Seattle City Council for review.

1. Within 60 days of the submittal of the written materials, the Seattle City Council shall provide written recommendations to resolve the dispute.
2. If either party rejects the written recommendation of the Seattle City Council, that party shall, within 10 days, notify the other party in writing of its reasons.

#### **IX.C. Non-binding Mediation**

Within 10 days of receiving the written rejection of the Seattle City Council's recommendations by one or both parties, each party shall designate in writing not more than 5 candidates it proposes to act as a non-binding mediator.

1. If the parties cannot agree on one of the mediators from the combined list within 5 days, the Operating Board shall, within an additional 5 days, select one of the mediators from either list to serve as mediator.
2. Upon selection of the mediator, the parties shall use reasonable efforts to resolve the dispute within 30 days with the assistance of the mediator.

#### **IX.D. Resort to Litigation**

If mediation fails to resolve the dispute within 30 days of selection of the mediator, the parties may thereafter seek redress in court subject to Section X.H below.

### **IX.E. EFFICIENCY OF REVIEW**

In order to facilitate a more efficient review of disputes under this Section, the Parties agree to skip the step in Section IX.A above in order to avoid a redundant act. The Parties may also mutually agree to skip the step in Section IX.C, if it is in the best interests of the Parties in resolving the dispute.

### **SECTION X. MISCELLANEOUS**

#### **X.A. Notification**

Whenever written notice is required by this contract, that notice shall be given to the following representatives by actual delivery or by the United States mail (registered or certified with return receipt requested,) addressed to the respective party at the following addresses or a different address hereafter designated in writing by the party):

<u>SEATTLE:</u>	<u>WATER UTILITY:</u>
Director	Manager
Seattle Public Utilities	King County Water District No. 49
Seattle Municipal Tower	415 SW 153 <sup>rd</sup> Street
PO Box 34018	Burien, WA 98166
700 Fifth Ave., Suite 4900	
Seattle, WA 98124-4018	

The date of giving such notice shall be deemed to be the postmarked date of mailing.

#### **X.B. Severability**

The purpose of this contract is to provide for long-term water supply planning and certainty for both Seattle and Water Utility through adoption of orderly plans calling for the expenditure of significant sums of money for regional water supply and transmission facilities. It is the intent of the parties that if any provision of this contract or its application is held by a court of competent jurisdiction to be illegal, invalid, or void, the validity of the remaining provisions of this contract or its application to other entities, or circumstances shall not be affected. The remaining provisions shall continue in full force and effect, and the rights and obligations of the parties shall be construed and enforced as if the contract did not contain the particular invalid provision; provided, however, if the invalid provision or its application is found by a court of competent jurisdiction to be substantive and to render performance of the remaining provisions unworkable and non-feasible, is found to seriously affect the consideration and is inseparably connected to the remainder of the contract, the entire contract shall be null and void.

#### **X.C. Consent**

Whenever it is provided in this contract that the prior written consent or approval of either party is required as a condition precedent to any actions, in each such instance said consent or approval shall not be unreasonably withheld, and in each such instance where prior consent is sought, failure of the party to respond in writing within 90 days of the request shall be deemed as that party's consent or approval unless expressly stated herein. This provision does not apply to requests for amendments of this contract.

#### **X.D. Emergency Situations**

Nothing in this contract shall be deemed to preclude either party from taking necessary action to maintain or restore water supply in emergency situations and such action shall not be deemed a violation of this contract.

#### **X.E. No Joint Venture - Individual Liability**

This is not an agreement of joint venture or partnership, and no provision of this contract shall be construed so as to make Water Utility individually or collectively a partner or joint venturer with any other Wholesale Customer or with Seattle. Neither party is an agent of the other. Neither Seattle nor Water Utility shall be liable for the acts of the other in any representative capacity whatsoever.

#### **X.F. Complete Agreement**

This contract represents the entire agreement between the parties hereto concerning the subject matter hereof. This contract may not be amended except as provided herein.

#### **X.G. Relinquishment of Prior Contract**

Upon the Effective Date of this contract, Water Utility relinquishes its then existing 1982 Water Purveyor Contract with Seattle and the terms and conditions of that 1982 Water Purveyor Contract shall have no further force and effect.

#### **X.H. Venue, Jurisdiction and Specific Performance**

In the event of litigation between the parties, venue and jurisdiction shall lie with the King County Superior Court of the State of Washington. The parties shall be entitled to specific performance of the terms hereof.

#### **X.I. Default**

In the event of default of any provision of the contract, the non-defaulting party shall issue written notice to the other party setting forth the nature of the default. If the default is for a monetary payment due hereunder, the defaulting party shall have thirty (30) days to cure the default. In the event of other defaults, the defaulting party shall use its best efforts to cure the default within ninety (90) days. If such default cannot be reasonably cured within such ninety (90) day period, the defaulting party shall, upon written request prior to the expiration of the ninety (90) day period be granted an additional sixty (60) days to cure the default.

#### **X.J. Force Majeur**

The time periods for the parties' performance under any provisions of this contract shall be extended for a reasonable period of time during which a party's performance is prevented, in good faith, due to fire, flood, earthquake, lockouts, strikes, embargoes, acts of God, war and civil disobedience. If this provision is invoked, the parties agree to immediately take all reasonable steps to alleviate, cure, minimize or avoid the cause preventing such performance, at their sole expense.

#### **X.K. Successors**

This contract shall inure to the benefit of and be binding upon the parties and their successors and assigns.

#### **X.L. Exhibits**

Exhibits I through XII are attached hereto and are hereby incorporated by reference as if set forth in full herein.

INTENTIONALLY BLANK

SIGNATURE PAGE

IN WITNESS WHEREOF, the parties hereby execute this contract.

KING COUNTY WATER DISTRICT 49

BY: David J. Lutz  
TITLE: President of the Board  
DATE: March 23, 2011

AUTHORIZING LEGISLATION: ORDINANCE/RESOLUTION 11-1234

THE CITY OF SEATTLE

BY: Ray Hight  
Director, Seattle Public Utilities  
DATE: 5/5/11

AUTHORIZING LEGISLATION:

ORDINANCE No.





## **LIST OF EXHIBITS**

- I. Contract Sections II.B and III.B list
- II. Service Connections, Minimum Hydraulic Gradients, and Maximum Flow Rates of Water Supplied
- III. Demand Charge Methodology
- IV. Operating Board Structure
- V. Reserved
- VI. Calculation of ERUs as a Part of Facilities Charges
- VII. Seattle Supply Facilities
- VIII. Seattle Transmission Facilities
- IX. Cost Centers used for Operations Cost Indexes
- X. Water Utility Service Area
- XI. List of Southwest Sub-region Transmission Facilities
- XII. Allocating Costs and Setting Rates for the Southwest Sub-region

## EXHIBIT I

List of documents, commitments, adjustments, reductions, agreements, and/or written approvals by Seattle regarding the supply, purchase or resale of water according to Sections II.B. and III.B of this Contract:

### 1. Intertie Agreements:

Entity/location	Meter Size	Capacity	Type of Service	Comment
Emergency Intertie Agreement W.D. No. 20 Ambaum Blvd. & SW 144 <sup>th</sup> St.	None			December 6, 1977
Emergency Intertie Agreement W.D. No. 20 4 <sup>th</sup> Ave. S. & S. 152 <sup>nd</sup> St.	None			April 18, 1978
Emergency Intertie Agreement W.D. No. 20 SW 152 <sup>nd</sup> St. & 16 <sup>th</sup> Ave. SW	6"			August 17, 2004
Emergency Intertie Agreement W.D. No. 20 21 <sup>st</sup> Ave. SW & SW 154 <sup>th</sup> St.	6"			August 17, 2004
Emergency Intertie Agreement W.D. 20 SW 144 <sup>th</sup> St. & 1 <sup>st</sup> Ave. S.	None			June 16, 2010
Emergency Intertie Agreement Highline Water District South 176 <sup>th</sup> St. & 10 <sup>th</sup> Ave. S.	6"			August 26, 2005
Emergency Intertie Agreement Highline Water District SW 170 <sup>th</sup> St. & 27 <sup>th</sup> Ave. SW	6"			August 26, 2005

### 2. Independent Well Sources:

### 3. Water Supply Contracts To Other Water Utilities:

## SERVICE CONNECTIONS, MINIMUM HYDRAULIC GRADIENTS, AND MAXIMUM FLOW RATES OF WATER SUPPLIED

SERVICE CONNECTION <sup>(1)</sup>				MINIMUM HYDRAULIC GRADIENT FOR PLANNING PURPOSES AT STATION UPSTREAM OF METER (FEET NAVD-88 Datum)	MAXIMUM FLOW RATE UP TO WHICH THE MINIMUM HYDRAULIC GRADIENT APPLIES (gpm) <sup>(3)</sup>
LOCATION	STATION NUMBER <sup>(2)</sup>	PIPELINE SEGMENT NUMBER <sup>(2)</sup>	SIZE OF METER (IN.)		
8 <sup>th</sup> Ave S & S 160 <sup>th</sup> ST	140	22	12	430	1,000
Des Moines Way & S. 168 <sup>th</sup>	25	14	8	420	backup
8 <sup>th</sup> Ave SW & SW 146 <sup>th</sup> ST	142	19	8	550	850
10 <sup>th</sup> Ave SW & SW 149 <sup>th</sup> ST	139	19	10	540	650
Des Moines Way & Ambaum Blvd S	143	14	10	395	backup
				TOTAL:	2,500

**Notes:**

- (1) Water is provided to Service Connections at a Wholesale Level of Service.
- (2) Station and Pipeline Segment Numbers pertain to cost allocations and the demand metering program.
- (3) City of Seattle's estimate of Water Utility's average daily demand for 2030 with a peaking factor of 2.0 for peak day use.

## **DEMAND CHARGE METHODOLOGY**

The policy of Seattle Public Utilities is to supply water to its Wholesale Customers at, as near as is practical, the twenty-four hour average flow rate, during the peak demand season (June through August). To comply, the Wholesale Customers have to construct adequate storage volume within their individual systems, or sometimes collectively, so as to avoid excessive peak flow withdrawals from the Seattle Transmission Facilities. The Demand Metering Program is established to set performance standards, and to monitor the Wholesale Customer's compliance with this policy. If an individual Water Utility exceeds the prescribed threshold, a "demand charge" is calculated.

Except where other agreements supersede the provisions of this contract, each Water Utility shall be subject to a demand charge based on effective deficient storage, as determined by the peak instantaneous flow rate, and the equivalent financing costs to provide storage. The demand charge rate (i.e., dollars per 1000 gallons of deficient storage) shall be based on the equivalent cost of providing the deficient storage. This rate will be determined as part of each rate study.

The Demand Metering Program is charged with implementation of the "demand charge" methodology. It shall be the responsibility of Seattle, in consultation with the Operating Board, to determine the appropriate means to achieve the program's purpose. The options that may be considered range from temporary suspension on a year by year basis to full activation, as described below.

There shall be no requirement for Seattle to install demand-metering equipment at each Service Connection in order to assess a demand charge. Seattle may choose to apply "demand metering" selectively to certain parts of the Seattle Transmission Facilities that are designated as "critical" from the standpoint of hydraulic capacity or other operational considerations. Seattle may choose to apply "demand metering" intermittently in various parts of the Seattle Transmission Facilities for the purpose of monitoring for compliance by individual Wholesale Customers or groups of Wholesale Customers on a given line segment.

## **OPERATING BOARD STRUCTURE**

1. **Structure.** The Operating Board (or “Board”) shall be structured as follows:
  - a. The Board shall consist of seven (7) members, composed of three members representing Seattle Public Utilities (SPU), three members representing Seattle’s Wholesale Customers selected as described below and one independent party selected as set forth below to be a tie-breaker as needed. Board members shall, to the best of their ability, act in the best interests of the Seattle Regional Water Supply System as a whole and shall not represent the interest of a group of utilities or an individual utility.
  - b. The term of each Board position shall commence on January 1 and shall be for four (4) years. Terms of each Board position shall be staggered such that no more than two positions are renewed in any single year. Board members may serve not more than three successive terms.
  - c. Three Board members representing the Wholesale Customers will be selected from the holders of Full and Partial Requirements Contracts . Wholesale Customers will be sorted into three categories based on utility size. The selected categories will be small, medium and large utilities, which will be made up from approximately equal numbers of holders of Full and Partial Requirements Contracts. Each category of utility may elect, by majority vote (one vote per utility) its representative to the Operating Board. The Board will be recomposed on January 1, 2012 and every 5 years thereafter.
  - d. The seventh member of the Board shall be a person having expertise in the operations of regional water supply systems. Such person shall be selected by majority vote of the other Board members. In the event of a deadlock in selecting the independent representative, the independent Board member shall be selected by Judicial Arbitration and Mediation Services Inc., of Seattle, Washington or its successor. The seventh member shall not vote on issues coming before the Board unless there is a deadlock in the voting among the other six Board members. The seventh member may nevertheless express his or her opinions in Operating Board discussions. Such member shall have no employment, financial or contractual relationship with Seattle nor any Wholesale Customer or any other actual or apparent conflict of interest in holding this position.
2. **Voting.** Except as otherwise provided above, each member of the Board shall have one vote on all matters coming before the Board. Each Board member may appoint an alternate to vote in his or her absence. A quorum of four (4) Board members present shall be required for any vote. Members of the Board may not grant proxies for any vote.
3. **Chairperson.** The Board shall have a Chairperson who will be selected and have duties as defined below:
  - b. The Chairperson shall be selected at the first regularly scheduled meeting of each new year.

- c. All Chairpersons shall be selected by the Board using a nomination and voting process.
- d. Nomination for the position of Chairperson shall be taken from Board members. The Chairperson shall be selected based upon the simple majority vote of Board members. Should the Board fail to elect a Chairperson at the first regularly scheduled meeting of the new year, a designated representative from SPU shall be the Acting Chairperson until such time as the Board elects a Chairperson.
- e. The Chairperson shall have the responsibility to call meetings, determine the agenda and preside over meetings. In the absence of the Chairperson, for whatever reason, a designated representative from SPU shall be the Acting Chairperson for that meeting. The Chairperson shall also act as the spokesperson for the Board and liaison between the Administrator and the Seattle City Council's Committee on Seattle Public Utilities & Neighborhoods or successor committees.

4. Schedule/Procedures. The Board shall adopt a regular meeting schedule and notify all Wholesale Customers of the schedule. The Operating Board may adopt its own internal procedures. The latest edition of Roberts Rules of Order shall, in the absence of agreement by the Operating Board on procedural matters, govern all meetings and votes of the Operating Board.

5. Reporting. The Board will provide reports to the Wholesale Customers and to the Seattle City Council Committee on Seattle Public Utilities & Neighborhoods, or successor City Council committee, on its decisions and recommendations in a timely manner.

6. Responsibilities and Authority of the Board. Where no clear responsibility or authority on an issue is established in this contract the responsibility and authority shall rest with the Seattle City Council.

7. Expenses. The Board shall be authorized to incur reasonable expenses which will be allocated by the Board to either or both of the New Transmission or Supply Cost Pools.

**EXHIBIT V - RESERVED**

## **Calculation of ERUs as a Part of Facilities Charges**

The ERU Fee is:

- the flat debt service payment required to finance the facility providing the ERU over the lesser of (i) the facility life or (ii) the period over which new demand will fully utilize the facility's supply  
- divided by -
- the number of new ERUs of demand expected in each year.

Seattle's Average Cost of Debt shall be used as the interest rate in this calculation. In the event that several New Supply Resources are added simultaneously, the facilities may be considered together as providing a total new supply capacity for a total construction cost.

Example: A new facility costing \$100 million is built with a capacity of 100,000 ERUs. Growth of 5,000 ERUs per year is expected over the next 20 years, so the facility is projected to be supplying its full capacity in 20 years. Were this facility financed over 20 years at 6% interest, the flat annual debt service payment would be \$8.7 million. Each ERU would cost 0.02% of this annual amount, or about \$1,740.

At the time a New Supply Resources is added, the ERU price for this supply shall be calculated. This ERU price shall then be averaged with the then-current ERU Fee. This average shall be weighted by the number of unpurchased ERUs available at the then-current ERU fee and the number of new ERUs being added at the new ERU price. This weighted average shall be the new ERU Fee, and the number of ERUs available at the fee shall be the sum of the unsold ERUs at the previous fee and the ERU capacity of the new facility.

Example: 10 years ago, a \$100 million facility was constructed that can supply 100,000 ERUs. Growth and demand projections have proven accurate, and now 50,000 ERUs have been purchased, each for \$1,740. The facility also has an additional 50,000 ERUs still available at the same price. This year, we construct a facility worth \$70 million, with a capacity of 40,000 ERUs. Based on demand projections, this facility (on its own) would be fully utilized in 10 years, and its ERU price is therefore \$2,375. The average price of any of the 90,000 available ERUs is therefore \$2,022.



**ERUs by Connection Size**

<b><u>Connection Size</u></b>	<b><u>Number of ERUs</u></b>
3/4" and smaller	1
1"	2
1 1/2"	5
2"	8
3"	22
4"	31
6"	66
8"	112
10"	169
12"	238

**ERU Proving Methodology**

The size of the water service connection used to serve an establishment depends upon both the total demand of that establishment and the instantaneous flow required by that establishment. For this reason, connection size is only a general indicator of the annual demand placed on water supplies by the establishment.

## **Seattle Supply Facilities**

### **1. Cedar Source**

- All roads, buildings, structures, water supply facilities, recreational and educational facilities, and fisheries enhancement and mitigation facilities located within or close to the Cedar River Hydrographic Watershed boundary as defined by Seattle land ownership, including the land itself, and any capitalized studies related to the above. Excepted are facilities solely owned by Seattle City Light for the purpose of power generation. Facilities shared by Seattle City Light and Seattle Public Utilities shall be part of the Seattle Regional Water Supply System only to the extent of SPU share or responsibility.
- All facilities located within the Lake Youngs Reservation as defined by Seattle ownership of the land except for conveyance facilities used to transport finished water during non-emergency operation
- All facilities located within the Lake Youngs Aqueduct, the Landsburg Tunnel, and the Lake Youngs Supply Lines right-of-way, including the right-of-way itself
- Existing Morse Lake Floating Pump Stations

### **2. Tolt Source**

- All roads, buildings, structures, water supply facilities, recreational and educational facilities, and fisheries enhancement and mitigation facilities located within or close to the South Fork Tolt River Hydrographic Watershed boundary as defined by Seattle land ownership, including the land itself, and any capitalized studies related to the above. Excepted are facilities solely owned by Seattle City Light for the purpose of power generation. Facilities shared by Seattle City Light and Seattle Public Utilities shall be part of the Seattle Regional Water Supply System only to the extent of SPU share or responsibility.
- Tolt Treatment Facility

### **3. Seattle Wellfields**

- Riverton Wells, including all pumping and treatment equipment, original yard piping, to the connection to CRPL4, and the low flow piping to Riverton Reservoir
- Boulevard Well, including all pumping and treatment equipment, and all piping up to the connection to CRPL4

### **4. Other**

- One Percent Conservation Program through December 31, 2001
- GIS Projects related to facilities identified herein as part of the Seattle Regional Water Supply System

## **Seattle Transmission Facilities**

### **1. Pipelines**

- Tolt Pipeline No. 1 from the Tolt Regulating Basin to Lake Forest Reservoir, including any transfer and ancillary small diameter parallel pipes
- Tolt Pipeline No. 2 (where constructed), including any transfer and ancillary small diameter parallel pipes
- Tolt Tieline
- Tolt Eastside Supply Line (from TESS Junction to the intersection of SE 16<sup>th</sup> ST and 145<sup>th</sup> Place SE)
- Tolt Eastside Line Extension (from the intersection of SE 16<sup>th</sup> ST and 145<sup>th</sup> Place SE to Eastside Reservoir)
- The 540 head Pipeline from Maple Leaf Reservoir to Lake Forest Reservoir
- Lake Youngs Bypass No. 4 from the outlet of each of the Cedar Treatment Facility clearwells to Control Works
- Lake Youngs Bypass No. 5 from the outlet of each of the Cedar Treatment Facility clearwells to the Lake Youngs Tunnel
- The Lake Youngs Tunnel (from the original lake outlet to Control Works)
- The Maple Leaf Pipeline (from the intersection of 18<sup>th</sup> Avenue E. and E. Prospect Street to Maple Leaf Reservoir)
- Cedar River Pipeline No. 1 from Control Works to Volunteer Reservoir
- Cedar River Pipeline No. 2 from Control Works to Lincoln Reservoir
- Cedar River Pipeline No. 3 from Control Works to the intersection of 18<sup>th</sup> Avenue E. and E. Prospect Street
- 30" intertie between Cedar River Pipelines 2 and 3 in east Olive Street
- Cedar River Pipeline No. 4 from Control Works to the West Seattle Pipeline
- Cedar Eastside Supply Line (from the Cedar Wye to the intersection of SE 16<sup>th</sup> St and 145<sup>th</sup> Place SE)
- West Seattle Pipeline from Augusta Gatehouse to Cedar River Pipeline 4
- The 8<sup>th</sup> Avenue S. Pipeline between S. 146<sup>th</sup> Street and S. 160<sup>th</sup> Street
- The Bow Lake Pipeline (between 8<sup>th</sup> Avenue S. and CRPL 4, and as relocated outside runways at Seatac Airport)
- The Burien Feeder (in S. 146<sup>th</sup> Street between 8<sup>th</sup> Avenue S. and CRPL 4)
- The Fairwood Line (between Fairwood Pump Station and Soos Reservoirs)
- The 24-inch discharge pipeline of Lake Youngs Pump Station up to Soos Reservoirs
- The 12-inch discharge pipeline of Lake Youngs Pump Station up to Soos Reservoirs
- The 630 head pipeline between Lake Youngs Pump Station and the Cedar River WSD pump station at the eastern boundary of the Lake Youngs Reservation

2. Reservoirs, Tanks, and Standpipes, including overflow pipes, all valves, appurtenances, and disinfection facility located on the premises of each storage facility, unless otherwise noted

- Lake Forest Reservoir
- Eastside Reservoir
- Riverton Reservoir
- Maple Leaf Reservoir (excluding Roosevelt Way Pump Station and its suction and discharge piping, Maple Leaf Tank and 520 zone piping, except where solely serving the disinfection facility)
- Soos Reservoirs

3. Pump Stations, Major Valve Structures, and other Facilities

- Eastgate Pump Station
- TESS Junction Pump Station
- Lake Hills Pump Station
- Maplewood Pump Station
- Maple Leaf Pump Station
- Bothell Way Pump Station
- Fairwood Pump Station
- Lake Youngs Pump Station
- The Control Works
- Augusta Gatehouse

4. Service Connections to Wholesale Customers installed before January 1, 2002 are part of the Seattle Transmission Facilities. Service Connections to Wholesale Customers installed after December 31, 2001 shall not be part of the Seattle Transmission Facilities.

The Seattle Transmission Facilities include all necessary and convenient appurtenances, including, but not limited to, rights of way, line valves, system meters, and remote automation devices.

**EXHIBIT IX (as amended)**

**Cost Centers Used for Operations Cost Indices**

The following costs centers or successor cost centers, as reflected in the amended Exhibit IX, and as amended further from time to time, that capture the direct costs of operation of Existing Supply Facilities, Seattle Transmission Facilities and the Regional Water Conservation Program shall be used as the indices for operations cost in the Existing Supply Cost Pool, Existing Transmission Cost Pool and for the Regional Water Conservation Program in the New Supply Cost Pool.

**Supply**

<b>Program</b>	<b>Project</b>	<b>Project Name</b>	<b>Activity</b>
Communications	N1203	Communications Activity Group	N120304 Purveyor Relations
Audit & Accounting	N3303	Customer Audit	N330303 Purveyor Audit
Watershed Management	N5401	Program Management	N540194 Department Support
Watershed Management	N5401	Program Management	N540195 General Expense
Watershed Management	N5401	Program Management	N540196 General Management
Watershed Management	N5401	Program Management	N540197 Training
Watershed Management	N5401	Program Management	N540198 Safety
Watershed Management	N5401	Program Management	N540199 Personnel
Watershed Management	N5401	Program Management	N540289 Capital Purchase
Watershed Management	N5403	Support Services	N540301 Modified Duty
Watershed Management	N5403	Support Services	N540302 Procuring/Paying/Receiving
Watershed Management	N5403	Support Services	N540303 Vehicle Equipment Downtime
Watershed Management	N5404	Watershed Protection	N540401 Hydrological Data Collection
Watershed Management	N5404	Watershed Protection	N540402 Fire Protection
Watershed Management	N5404	Watershed Protection	N540403 Inspection
Watershed Management	N5404	Watershed Protection	N540404 Boundaries
Watershed Management	N5405	Facility Management	N540501 WS Grounds
Watershed Management	N5405	Facility Management	N540502 WS Buildings
Watershed Management	N5405	Facility Management	N540503 WS Facilities & Roads
Watershed Management	N5406	Watershed Road Maintenance	N540601 Grade/Gravel/Ditching
Watershed Management	N5406	Watershed Road Maintenance	N540602 Bridges/Streams Culvert
Watershed Management	N5406	Watershed Road Maintenance	N540603 Roads/Row/Vegetation Cutting
Watershed Management	N5406	Watershed Road Maintenance	N540604 Tolt Roads & Streams
Watershed Management	N5407	Watershed Operations Support	N540701 Veh/Equipment Management
Watershed Management	N5407	Watershed Operations Support	N540702 Veh/Equip/Tool Repair
Watershed Management	N5408	Water Quality & Hydrology	N540801 Water Quality Monitoring
Watershed Management	N5408	Water Quality & Hydrology	N540802 Hydrological Monitoring
Watershed Management	N5409	Public/Cultural Programs	N540901 Recreation Planning
Watershed Management	N5409	Public/Cultural Programs	N540902 Management & Research
Watershed Management	N5409	Public/Cultural Programs	N540903 Watershed Education
Watershed Management	N5409	Public/Cultural Programs	N540904 Watershed Public Information
Watershed Management	N5410	Wildlife & Fisheries Programs	N541001 Program Planning & Evaluation
Watershed Management	N5410	Wildlife & Fisheries Programs	N541002 Interagency/Public Involvement
Watershed Management	N5410	Wildlife & Fisheries Programs	N541003 Ecological Monitoring & Research
Watershed Management	N5410	Wildlife & Fisheries Programs	N541004 Habitat & Species Inventory
Watershed Management	N5410	Wildlife & Fisheries Programs	N541005 Habitat Enhancement/Restoration
Watershed Management	N5411	Resource Information Mgmt	N541101 Program Plan/Evaluation
Watershed Management	N5411	Resource Information Mgmt	N541102 Information Maintenance

Watershed Management	N5411	Resource Information Mgmt	N541103 Information Services
Program	Project	Project Name	Activity
Watershed Management	N5412	Special Projects	N541202 Silviculture
Watershed Management	N5412	Special Projects	N541205 Land Exchanges/Acquisitions
Watershed Management	N5415	Cedar HCP	N541501 ASSESS OF EXPAND FOREST STAND
Watershed Management	N5415	Cedar HCP	N541502 ASSESS EXPAND FOREST ATTRIBUTE
Watershed Management	N5415	Cedar HCP	N541503 AUGMENT FOREST HABITAT INV
Watershed Management	N5415	Cedar HCP	N541504 LONG-TERM FOREST HABITAT
Watershed Management	N5415	Cedar HCP	N541505 OLD-GROWTH CLASSIFICATION
Watershed Management	N5415	Cedar HCP	N541506 RIPARIAN RESTOR PROJECT MONIT
Watershed Management	N5415	Cedar HCP	N541507 UP0LAND FOREST RESTOR PROJ MONT
Watershed Management	N5415	Cedar HCP	N541515 GIS DATA COMPATIBILITY STUDY
Watershed Management	N5415	Cedar HCP	N541516 FOREST HABITAT MODELING
Watershed Management	N5415	Cedar HCP	N541517 SPECIE HABITAT RELATION MODEL
Watershed Management	N5416	Cedar HCP	N541601 CRHCP GIS SUPPORT
Watershed Management	N5416	Cedar HCP	N541603 CRHCP TECHNICAL SUPPORT
Watershed Management	N5417	Cedar HCP	N541701 ROAD MAINTENANCE
Watershed Management	N5418	Cedar HCP	N541801 EXPERIMENTAL STREAM MONITORING
Watershed Management	N5418	Cedar HCP	N541802 LONG-TERM STREAM MONITORING
Watershed Management	N5418	Cedar HCP	N541803 AQUATIC RESTORATION MONITORING
Watershed Management	N5418	Cedar HCP	N541804 BULL TROUT SURVEYS (ADULT)
Watershed Management	N5418	Cedar HCP	N541805 BULL TROUT SPAWNING SURVEY
Watershed Management	N5418	Cedar HCP	N541806 BULL TROUT FRY/JUVENILE SURVEY
Watershed Management	N5418	Cedar HCP	Riparian Zone Studies
Watershed Management	N5418	Cedar HCP	N541809 BULL TROUT STREAM DISTRIBUTION
Watershed Management	N5418	Cedar HCP	N541810 BULL TROUT REDD INUNDATION STU
Watershed Management	N5418	Cedar HCP	N541811 COMMON LOON MONITORING
Water Quality & Supply	N5503	Water System Operations	N550301 Water Management
Water Quality & Supply	N5503	Water System Operations	N550302 Water System Control
Water Quality & Supply	N5503	Water System Operations	N550303 Anadromous Fishery Mgmt
Water Quality & Supply	N5503	Water System Operations	N550304 SCADA Management
Water Quality & Supply	N5503	Water System Operations	N550305 Highline Well Field
Water Quality & Supply	N5503	Water System Operations	N550306 Morse Lake PS
Water Quality & Supply	N5503	Water System Operations	N550307-SAFETY PROCESS MGMT COMPLIANCE
Water Quality & Supply	N5503	Water System Operations	N550308-EPA RISK MGMT COMPLIANCE
Water Quality & Supply	N5504	Water System Analysis	N550401 Eng Analysis/Modeling
Water Quality & Supply	N5504	Water System Analysis	N550402 Water Rights Mgmt
Water Quality & Supply	N5504	Water System Analysis	N550403 DEMAND METERING
Water Quality & Supply	N5505	Surface Water Trtmnt Rule	N550501 Monitoring, Reporting & Admin
Water Quality & Supply	N5505	Surface Water Trtmnt Rule	N550502 Cholrination Facilities O&M
Water Quality & Supply	N5505	Surface Water Trtmnt Rule	N550503 Watershed Management
Water Quality & Supply	N5506	Total Coliform Rule Compl.	N550601 Monitoring, Reporting & Admin
Water Quality & Supply	N5508	Lead & Copper Rule Compl.	N550801 Monitoring, Reporting & Admin
Water Quality & Supply	N5508	Lead & Copper Rule Compl.	N550802 Corrosion Trtmnt Facil O&M
Water Quality & Supply	N5509	Fluoridation Program	N550901 Fluoridation Program O&M
Water Quality & Supply	N5510	Other Reg Comp/Monitoring	N551001 Otr Reg/Operational Analysis
Water Quality & Supply	N5510	Other Reg Comp/Monitoring	N551002 Disinfection By-Product Rule
Water Quality & Supply	N5510	Other Reg Comp/Monitoring	N551003 Limnology
Water Quality & Supply	N5510	Other Reg Comp/Monitoring	N551005 WQ Lab
Water Quality & Supply	N5510	Other Reg Comp/Monitoring	N551006 DW Reg Dev & App Research
Water Quality & Supply	N5510	Other Reg Comp/Monitoring	N551007 Public Information/Notification
Water Quality & Supply	N5511	Special Projects	N551104 LIMS & QA/QC
Program	Project	Project Name	Activity

Water Quality & Supply	N5512	Cedar HCP	N551201 INTERIM CHINOOK COHO
Water Quality & Supply	N5513	Cedar HCP	N551301 HCP STREAMFLOW GAUGING
Water Quality & Supply	N5513	Cedar HCP	N551302 SWITCHING CRITERIA STUDY
Water Quality & Supply	N5513	Cedar HCP	N551303 STEELHEAD REDD MONITORING
Water Quality & Supply	N5513	Cedar HCP	N551304 CHINOOK STUDIES
Water Quality & Supply	N5513	Cedar HCP	Salmonid Studies
Water Quality & Supply	N5514	WQ Monitoring	N551403 DRINKING WATER QUALITY MONITOR
Water Quality & Supply	N5515	HCP Fisheries	N551501 FRY CONDITION AT RELEASE
Water Quality & Supply	N5515	HCP Fisheries	N551502 FRY MARKING & EVALUATION
Water Quality & Supply	N5515	HCP Fisheries	N551503 FRY TRAPPING & COUNTING
Water Quality & Supply	N5515	HCP Fisheries	N551504 FISH HEALTH
Water Quality & Supply	N5515	HCP Fisheries	N551505 SHORT-TERM FRY REARING
Water Quality & Supply	N5515	HCP Fisheries	N551506 LAKE WASHINGTON PLANKTON STUDY
Water Quality & Supply	N5515	HCP Fisheries	N551508 ADULT SURVIVAL DISTRIBUTION
Water Quality & Supply	N5515	HCP Fisheries	N551509 PHENOTYPIC & GENETIC STUDY
Water Quality & Supply	N5516	Tolt DBO	N551601-CONTRACTOR PAYMENTS
Water Quality & Supply	N5516	Tolt DBO	N551603-MANAGEMENT COSTS
Resource Planning	N5609	Water Resource & Habitat Issues	N560903-ESA

Transmission			
Program	Project	Project Name	Activity
Water Operation	N6540	WT - Headwork/Storage	N654001 Program Maintenance
Water Operation	N6540	WT - Headwork/Storage	N654002 Event Driven Repairs
Water Operation	N6541	WT - Transmission Pipeline Maint	N654101 Program Maintenance
Water Operation	N6541	WT - Transmission Pipeline Maint	N654102 Event Driven Repairs
Water Operation	N6542	WT - Value Op/Maint - Water Tran	N654201 Program Maintenance
Water Operation	N6542	WT - Value Op/Maint - Water Tran	N654202 Event Driven Repairs
Water Operation	N6543	WT - Grounds/Roads/ROW	N654301 Grade/gravel roads - P
Water Operation	N6543	WT - Grounds/Roads/ROW	N654302 Grade/gravel roads - E
Water Operation	N6543	WT - Grounds/Roads/ROW	N654303 Bridges/culverts - P
Water Operation	N6543	WT - Grounds/Roads/ROW	N654304 Bridges/culverts - E
Water Operation	N6543	WT - Grounds/Roads/ROW	N654305 Fences/gates - P
Water Operation	N6543	WT - Grounds/Roads/ROW	N654306 Fences/gates - E
Water Operation	N6543	WT - Grounds/Roads/ROW	N654307 Mow ROW - P
Water Operation	N6543	WT - Grounds/Roads/ROW	N654308 Mow ROW - E
Water Operation	N6543	WT - Grounds/Roads/ROW	N654309 Mow Other
Water Operation	N6544	WT - Facility Maintenance	N654401 Program Maintenance
Water Operation	N6544	WT - Facility Maintenance	N654402 Event Driven Repairs
Water Operation	N6545	WT - Castings	N654501 Casting Adjustments
Water Operation	N6546	WT - Customer Services	N654601 Communications/Dispatch
Water Operation	N6546	WT - Customer Services	N654602 Locating/Marking
Water Operation	N6547	WT - Damage by Others	N654701 P/L/ROW/Facility
Water Operation	N6548	WT - Transmission Shops	N654801 Shops/Fabrication
Water Operation	N6549	WT - General Expenses	N654905 Tools/small equipment
Water Operation	N6549	WT - General Expenses	N654906 Standby
Water Operation	N6549	WT - General Expenses	N654907 Truck Inventory
Water Operation	N6549	WT - General Expenses	N654908 Downtime - Job Related
Water Operation	N6549	WT - General Expenses	N654909-DISASTER-EMERG RESPONSE

**Regional Water Conservation Program**

Program	Project	Project Name	Activity
Community Services	N5303	Resource Conservation	N530301 1% Conservation



## Cost Centers Used for Operations Cost Indices

**amended 12/31/2009**

### Existing Supply

Program	Project	Project Name	Activity	Description
SPU General Expense	N0108	Emergency Response	NN90036	4/23/09 Tolt Trmt Plant Emrgcy
SPU General Expense	N0503	Water Fund Contracts	N050302	Tolt DBO Contract Payments
SPU General Expense	N0503	Water Fund Contracts	N050303	Cedar DBO Contract Payments
Branch Administration	N3106	Water Wholesale Contracts	N310601	Wholesale Water Contracts Mgmt
Customer Billing Services	N3303	Customer Audit	N330303	Purveyor
Cedar & Tolt Watershed Srvc	N5401	Program Management	N540198	Safety
Drainage & Wastewater	N6210	Landsburg Mgmt & HCP Support	N621001	Opnrt of Passage Facility-HCP
Drainage & Wastewater	N6210	Landsburg Mgmt & HCP Support	N621002	Interim Hatchery Ops-HCP
Water Operation	N6510	Misc Water Operations	N651004	Alternative Duty
Water Operation	N6540	Headwork/Storage	N654003	(Cedar) Chlorination Facility O&M
Water Operation	N6540	Headwork/Storage	N654004	Fluoridation Program O&M
Water Operation	N6540	Headwork/Storage	N654005	RMP/PSM Compliance
Water Operation	N6573	In-Town Reservoir Treatment	N657304	Highline Well F(Location Code)
Asset Data Systems	N6903	SCADA Development & Support	N690301	SCADA SYSTEM PLANNING
Asset Data Systems	N6903	SCADA Development & Support	N690302	SCADA INFRASTRUCTURE O&M
Asset Data Systems	N6903	SCADA Development & Support	N690303	DAM SAFETY SCADA
Surface Water LOB	N7311	Landsburg Mtgtn & HCP Support	N731101	Fry Condition @ Release - HCP
Surface Water LOB	N7311	Landsburg Mtgtn & HCP Support	N731102	Fry Marking & Evaluation - HCP
Surface Water LOB	N7311	Landsburg Mtgtn & HCP Support	N731103	Fry Tapping & Counting - HCP
Surface Water LOB	N7311	Landsburg Mtgtn & HCP Support	N731104	Fish Health - HCP
Surface Water LOB	N7311	Landsburg Mtgtn & HCP Support	N731105	Adult Survival Distribution - HCP
Surface Water LOB	N7311	Landsburg Mtgtn & HCP Support	N731106	Pheno & Gen Study - HCP
Surface Water LOB	N7311	Landsburg Mtgtn & HCP Support	N731107	Zooplnktn Stds (Sprmg) - HCP
Surface Water LOB	N7311	Landsburg Mtgtn & HCP Support	N731108	HCP Support
Surface Water LOB	N7311	Landsburg Mtgtn & HCP Support	N731109	Operation of Passage Facility - HCP
Surface Water LOB	N7311	Landsburg Mtgtn & HCP Support	N731110	Landsburg Fish Ladder - HCP
Surface Water LOB	N7311	Landsburg Mtgtn & HCP Support	N731111	DW Quality Monitoring - HCP
Surface Water LOB	N7311	Landsburg Mtgtn & HCP Support	N731112	Interim Hatchery Ops - HCP
Surface Water LOB	N7311	Landsburg Mtgtn & HCP Support	N731113	Adaptive Mgmt - Sockeye Hatch
Drinking Water LOB	N7503	Water LOB Planning & Perf	N750303	Network Hydraulic Model Dev
Drinking Water LOB	N7504	Water Resource Business	N750403	Hydrology Model Dev & Maintenance
Drinking Water LOB	N7504	Water Resource Business	N750404	Water Resource Operation Mgmt
Drinking Water LOB	N7504	Water Resource Business	N750406	Morse Lake Pump Plant
Drinking Water LOB	N7504	Water Resource Business	N750407	Anadromous Fishery Mgmt
Drinking Water LOB	N7504	Water Resource Business	NN90053	Tolt Spillway Leak Repair
Drinking Water LOB	N7505	HCP Instream Flow Monitor & Res	N750501	Existing Stream Gage At Cedar F
Drinking Water LOB	N7505	HCP Instream Flow Monitor & Res	N750502	Exist. Stream Gage Below Landsburg
Drinking Water LOB	N7505	HCP Instream Flow Monitor & Res	N750503	New Stream Gag Above Powerhouse
Drinking Water LOB	N7505	HCP Instream Flow Monitor & Res	N750504	New Gage At Renton
Drinking Water LOB	N7505	HCP Instream Flow Monitor & Res	N750505	Temporary Gages In Lower River
Drinking Water LOB	N7505	HCP Instream Flow Monitor & Res	N750506	Accretion Flow Study
Drinking Water LOB	N7505	HCP Instream Flow Monitor & Res	N750507	Switching Criteria Study
Drinking Water LOB	N7505	HCP Instream Flow Monitor & Res	N750509	Instream Flow Commission
Drinking Water LOB	N7505	HCP Instream Flow Monitor & Res	N750511	Dead Strg Bull Trout Dlta Mdl
Drinking Water LOB	N7505	HCP Instream Flow Monitor & Res	N750512	Steelhead Redd Monitoring
Drinking Water LOB	N7507	Water Quality & Treatment Business Area	N750705	Tolt Management Costs
Drinking Water LOB	N7507	Water Quality & Treatment Business Area	N750707	Cedar DBO Management Costs
Drinking Water LOB	N7509	Operations Plan & System Control	N750802	Water System Monitor & Control
Drinking Water LOB	N7511	Landsburg Mitigation, & HCP Support	N751101	Fry Condition @ Release - HCP

Drinking Water LOB	N7511	Landsburg Mitigation. & HCP Support	N751102	Fry Marking & Evaluation - HCP
Drinking Water LOB	N7511	Landsburg Mitigation. & HCP Support	N751103	Fry Trapping & Counting - HCP
Drinking Water LOB	N7511	Landsburg Mitigation. & HCP Support	N751104	Fish Health – HCP
Drinking Water LOB	N7511	Landsburg Mitigation. & HCP Support	N751105	Adult Survival Distribution - HCP
Drinking Water LOB	N7511	Landsburg Mitigation. & HCP Support	N751106	Pheno & Gen Study – HCP
Drinking Water LOB	N7511	Landsburg Mitigation. & HCP Support	N751107	Zooplnktn Stds (Sprmg) - HCP
Drinking Water LOB	N7511	Landsburg Mitigation. & HCP Support	N751108	HCP Support
Drinking Water LOB	N7511	Landsburg Mitigation. & HCP Support	N751109	Operation of Passage Facility - HCP
Drinking Water LOB	N7511	Landsburg Mitigation. & HCP Support	N751110	Landsburg Fish Ladder - HCP
Drinking Water LOB	N7511	Landsburg Mitigation. & HCP Support	N751112	Interim Hatchery Ops - HCP
Tech systems	N7705	SCADA Development & Support	N770501	SCADA System Planning
Tech systems	N7705	SCADA Development & Support	N770502	SCADA Infrastructure O&M
Watershed Management	N7801	Program Management	N780196	General Management
Watershed Management	N7803	Support Services	N780301	Procuring/Paying/Receiving
Watershed Management	N7804	Watershed Protection	N780401	Hydrological Data Collection
Watershed Management	N7804	Watershed Protection	N780402	Fire Protection
Watershed Management	N7804	Watershed Protection	N780403	Inspection
Watershed Management	N7804	Watershed Protection	N780404	Boundaries
Watershed Management	N7804	Watershed Protection	N780405	Facilities Security
Watershed Management	N7805	Facility Management	N780501	WS Grounds
Watershed Management	N7805	Facility Management	N780502	WS Buildings
Watershed Management	N7805	Facility Management	N780503	WS Edu Facilities Mgmt
Watershed Management	N7806	Watershed Road Maintenance	N780601	Grade/Gravel/Drain
Watershed Management	N7806	Watershed Road Maintenance	N780602	Bridges/Streams Culvert
Watershed Management	N7806	Watershed Road Maintenance	N780603	Roads/ROW/Vegetation Cutting
Watershed Management	N7806	Watershed Road Maintenance	N780604	Tolt Roads & Streams
Watershed Management	N7807	Watershed Operations Support	N780701	Vehicle/Equipment Management
Watershed Management	N7807	Watershed Operations Support	N780702	Vehicle/Equip/Tool Repair
Watershed Management	N7808	Water Quality & Hydrology	N780801	Hydrological Monitoring
Watershed Management	N7809	Public/Cultural Programs	N780901	Recreation Planning
Watershed Management	N7809	Public/Cultural Programs	N780902	CR Management & Research
Watershed Management	N7809	Public/Cultural Programs	N780903	Watershed Education
Watershed Management	N7809	Public/Cultural Programs	N780904	Watershed Public Information
Watershed Management	N7809	Public/Cultural Programs	N780905	Educational Center Operations
Watershed Management	N7809	Public/Cultural Programs	N780906	Cedar River Watershed Institute
Watershed Management	N7809	Public/Cultural Programs	N780907	Tolt WS MP Impl Cultural Rest
Watershed Management	N7810	Wildlife & Fisheries Programs	N781001	Program Planning & Evaluation
Watershed Management	N7810	Wildlife & Fisheries Programs	N781002	Interagency/Public Involvement
Watershed Management	N7810	Wildlife & Fisheries Programs	N781003	Ecological Monitoring & Research
Watershed Management	N7810	Wildlife & Fisheries Programs	N781004	Habitat & Species Inventory
Watershed Management	N7810	Wildlife & Fisheries Programs	N781005	Habitat Enhancement/Restoration
Watershed Management	N7811	Resource Information Mgmt	N781101	Information Services
Watershed Management	N7812	Special Projects	N781201	Silviculture
Watershed Management	N7813	CRHCP WS Terestrl Mnitr/Resrch	N781301	Assess Of Expand Forest Stand
Watershed Management	N7813	CRHCP WS Terestrl Mnitr/Resrch	N781302	Assess Expand Forest Attribute
Watershed Management	N7813	CRHCP WS Terestrl Mnitr/Resrch	N781303	Long-Term Forest Habitat Inventory
Watershed Management	N7813	CRHCP WS Terestrl Mnitr/Resrch	N781304	Old-Growth Classification
Watershed Management	N7813	CRHCP WS Terestrl Mnitr/Resrch	N781305	Riparian Restoration Project Monitoring
Watershed Management	N7813	CRHCP WS Terestrl Mnitr/Resrch	N781306	Upland Forest Restoration Project Mont
Watershed Management	N7813	CRHCP WS Terestrl Mnitr/Resrch	N781308	Experimental Murrelet Habitat
Watershed Management	N7813	CRHCP WS Terestrl Mnitr/Resrch	N781309	Spotted Owl Baseline Survey
Watershed Management	N7813	CRHCP WS Terestrl Mnitr/Resrch	N781311	OPTION SPECIES/HABITAT SURVEYS
Watershed Management	N7813	CRHCP WS Terestrl Mnitr/Resrch	N781312	GIS Data Compatibility Study
Watershed Management	N7813	CRHCP WS Terestrl Mnitr/Resrch	N781313	Species Habitat Relation Modeling
Watershed Management	N7814	CRHCP Program Support	N781401	CRHCP Technical Support
Watershed Management	N7814	CRHCP Program Support	N781402	BPA Mitigation Program - Watershed
Watershed Management	N7815	CRHCP Watershed Road Managment	N781501	Road Maintenance
Watershed Management	N7816	CRHCP WS Aquatic Monitr/Resrch	N781601	Long-Term Stream Monitoring

Watershed Management	N7816	CRHCP WS Aquatic Monitr/Resrch	N781602	Aquatic Restoration Monitoring
Watershed Management	N7816	CRHCP WS Aquatic Monitr/Resrch	N781604	Bull Trout Spawning Survey
Watershed Management	N7816	CRHCP WS Aquatic Monitr/Resrch	N781605	Bull Trout Fry/Juvenile Survey
Watershed Management	N7816	CRHCP WS Aquatic Monitr/Resrch	N781606	Bull Trout Stream Distribution
Watershed Management	N7816	CRHCP WS Aquatic Monitr/Resrch	N781607	Common Loon Monitoring
Watershed Management	N7817	Watershed Svc MIT Implement	N781701	Watershed Tribal Relations Coordination
Watershed Management	N7818	Tolt WS MP Impl Habitat Rest	N781801	Tolt WS MP Impl Habitat Rest
Laboratory Services	N7903	WQ Regulatory Compliance	N790301	SWTR Monitoring, Reporting & Adm
Laboratory Services	N7903	WQ Regulatory Compliance	N790302	TCR Monitoring, Reporting & Adm
Laboratory Services	N7903	WQ Regulatory Compliance	N790303	LCR Monitoring, Reporting & Adm
Laboratory Services	N7903	WQ Regulatory Compliance	N790304	DBP Monitoring, Reporting & Adm
Laboratory Services	N7903	WQ Regulatory Compliance	N790305	Public Information/Notification
Laboratory Services	N7903	WQ Regulatory Compliance	N790306	Regulatory Support
Laboratory Services	N7904	WQ Monitoring	N790402	Operations Support
Laboratory Services	N7904	WQ Monitoring	N790403	Limnology
Laboratory Services	N7905	Customer Support	N790502	Applied Research
Laboratory Services	N7906	Lab Systems	N790601	WQ Lab Facility O&M
Laboratory Services	N7906	Lab Systems	N790602	Lab System Administration & Support
Laboratory Services	N7906	Lab Systems	N790603	QA Admin
Pre-Capital	N5001	E - Water Fund	E100078	Cedar Falls Railroad Hazard
Pre-Capital	N5001	E - Water Fund	E101008	Rock Creek Fishway
Pre-Capital	N5001	E - Water Fund	E105018	BPA - Rd Improve
Pre-Capital	N5001	E - Water Fund	E105019	BPA Roads Other Decommission
Pre-Capital	N5001	E - Water Fund	E105035	BPA Forest ROW Plant Removal
Pre-Capital	N5001	E - Water Fund	E105036	BPA Forest ROW Wood Rplment
Pre-Capital	N5001	E - Water Fund	E105038	BPA Old Forest Restore
Pre-Capital	N5001	E - Water Fund	E107004	Watershed Emergency/Opportunity
Pre-Capital	N5001	E - Water Fund	E107015	Watershed Vegetation Management
Pre-Capital	N5001	E - Water Fund	E107016	Muckleshoot Agreement Implementation Plan
Pre-Capital	N5001	E - Water Fund	E107019	Restoration Thinning Slash Tree
Pre-Capital	N5001	E - Water Fund	E109001	BPA Cedar Invasive Vegetation Mgmt
Pre-Capital	N5001	E - Water Fund	E109002	BPA Restoration Slash Treatment
Pre-Capital	N5001	E - Water Fund	E109003	BPA Information Mgmt Systems

## Existing Transmission

SECTION XL	PR	Project	Project Name	Activity
<b>OGRAM</b>				
Water Operation	N6540	WT - Headwork/Storage	N654001	Program Maintenance
Water Operation	N6540	WT - Headwork/Storage	N654002	Event Driven Repairs
Water Operation	N6541	WT - Transmission Pipeline Mai	N654101	Program Maintenance
Water Operation	N6541	WT - Transmission Pipeline Mai	N654102	Event Driven Repairs
Water Operation	N6541	WT - Transmission Pipeline Mai	NN90043	CRPL4 at Airport Expressway
Water Operation	N6542	WT - Valve Op/Maint-Water Tran	N654201	Program Maintenance
Water Operation	N6542	WT - Valve Op/Maint-Water Tran	N654202	Event Driven Repairs
Water Operation	N6543	WT - Grounds/Roads/Row	N654301	Grade/Gravel Roads - P
Water Operation	N6543	WT - Grounds/Roads/Row	N654302	Grade/Gravel Roads - E
Water Operation	N6543	WT - Grounds/Roads/Row	N654303	Bridges/Culverts - P
Water Operation	N6543	WT - Grounds/Roads/Row	N654304	Bridges/Culverts - E
Water Operation	N6543	WT - Grounds/Roads/Row	N654305	Fences/Gates - P
Water Operation	N6543	WT - Grounds/Roads/Row	N654306	Fences/Gates - E
Water Operation	N6543	WT - Grounds/Roads/Row	N654307	Mow Row - P
Water Operation	N6543	WT - Grounds/Roads/Row	N654308	Mow Row - E
Water Operation	N6543	WT - Grounds/Roads/Row	N654309	Mow Other
Water Operation	N6543	WT - Grounds/Roads/Row	NN90042	Derby Creek and Tolt ROW
Water Operation	N6544	WT - Facility Maintenance	N654401	Program Maintenance
Water Operation	N6544	WT - Facility Maintenance	N654402	Event Driven Repairs
Water Operation	N6545	WT - Castings	N654501	Casting Adjustments
Water Operation	N6546	WT - Customer Services	N654601	Communications/Dispatch

Water Operation	N6546	WT - Customer Services	N654602	Locating/Marking
Water Operation	N6547	WT - Damage By Others	N654701	P/L/Row/Facility
Water Operation	N6548	WT - Transmission Shops	N654801	Shops/Fabrication
Water Operation	N6549	WT - General Expenses	N654905	Tools/Small Equipment
Water Operation	N6549	WT - General Expenses	N654906	Standby
Water Operation	N6549	WT - General Expenses	N654907	Truck Inventory
Water Operation	N6549	WT - General Expenses	N654908	Downtime - Job Related
Water Operation	N6549	WT - General Expenses	N654909	Disaster-Emergency Response

### New Supply

Program	Project	Project Name	Activity
Customer Service	N3904	Resource Conservation	N390401 Water Conservation
Customer Service	N3904	Resource Conservation	N390412 Water Conservation-Landscape

### New Transmission

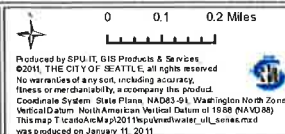
Program	Project	Project Name	Activity
Branch Administration	N3106	Water Wholesale Contracts	N310602 Operating Board Website

**Water Utility Service Area**

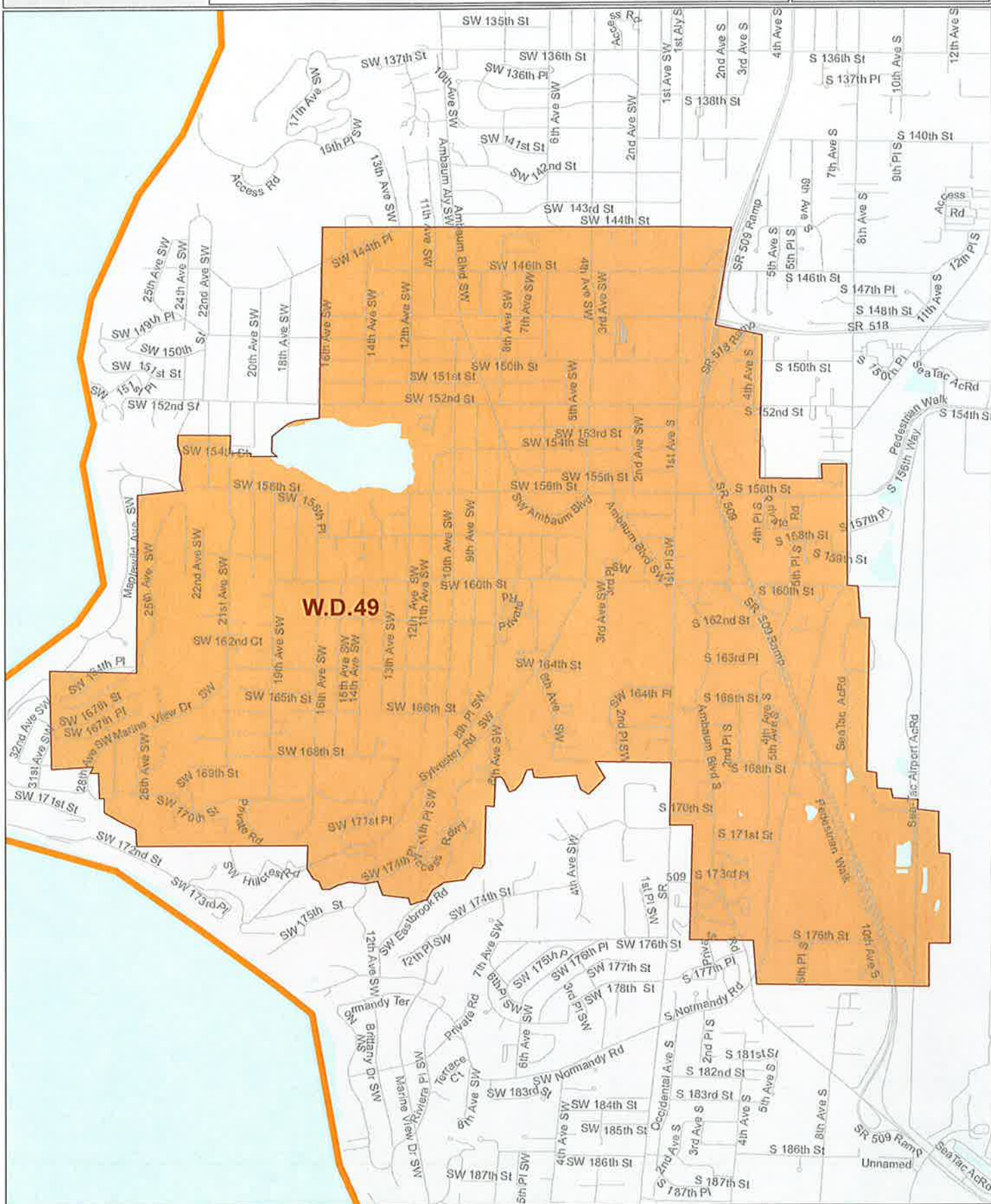
SEE NEXT PAGE

**W.D. 49  
ULTIMATE SERVICE  
AREA**

W.D.49 King County Boundary



Produced by SPU IT, GIS Products & Services  
©2011 THE CITY OF SEATTLE, all rights reserved.  
No warranty of any sort, including accuracy,  
fitness or merchantability, is accompanying this product.  
Coordinate System: State Plane, NAD83, Washington North Zone  
Vertical Datum: North American Vertical Datum of 1988 (NAVD83)  
This map is a derivative of the map titled "W.D. 49 Ultimate Service Area" and was produced on January 11, 2011.



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## **List of Southwest Sub-region Transmission Facilities**

### **585 ZONE FACILITIES**

#### **Pipelines**

1. The discharge pipeline of Burien Pump Station, from the pump station to Ambaum Boulevard SW
2. The pipeline in 8 Ave SW from SW Kenyon Street to SW 108 Street
3. The discharge pipeline of Highland Park Pump Station to SW 108<sup>th</sup> Street.
4. The 585 Pipeline in SW 108<sup>th</sup> Street between 4<sup>th</sup> Avenue SW and 12<sup>th</sup> Avenue SW
5. The 585 head Pipeline in 4<sup>th</sup> Avenue SW between SW 108<sup>th</sup> Street and SW 146<sup>th</sup> Street
6. The 585 Pipeline in 12<sup>th</sup> Avenue SW and Ambaum Boulevard SW between SW 108<sup>th</sup> Street and SW 146<sup>th</sup> Street
7. The 585 Pipeline in Ambaum Boulevard SW between SW 146<sup>th</sup> Street and SW 149<sup>th</sup> Street
8. The 585 pipeline in SW 149<sup>th</sup> Street between Ambaum Boulevard SW and 14<sup>th</sup> Avenue SW
9. The 585 pipeline in 12 Ave SW from SW 108 Street to SW 106 Street
10. The discharge of the Trenton Turbines pump station within the West Seattle Reservoir property, and up to SW Cloverdale Street
11. The 585 pipeline in 5 Ave SW from SW Cloverdale Street to SW Kenyon Street
12. The 585 pipeline in SW Kenyon Street from 5 Ave SW to 8 Ave SW
13. The 585 pipeline in SW Kenyon Street from 8 Ave SW to 35 Ave SW
14. The 585 pipeline in 35 Ave SW from SW Kenyon Street to SW Myrtle Street
15. The 585 pipeline in SW Myrtle Street from 35 Ave SW to Myrtle Tanks.

#### **Pump Stations**

1. Burien Pump Station, including its suction line from the 24-inch tee to the pump station
2. Highland Park Pump Station, including its suction line from the tee off the 42-inch West Seattle Reservoir inlet-outlet line to the pump station
3. Trenton Turbines Pump Station, including the suction/supply line from the pump station to the 36x36x20 tee

#### **Tanks**

1. Beverly Park Tank, and all associated appurtenances and connections to the 585 zone
2. Myrtle Tanks, and all associated appurtenances and connections to the 585 zone



### **WEST SEATTLE RESERVOIR**

1. The reservoir Gate House, except for the West Seattle Low Service Pump Station
2. App reservoir appurtenances, including but not limited to the reservoir drain , washout, and overflow pipelines
3. The reservoir bypass from the tee off the West Seattle Pipeline to the reservoir easterly outlet pipeline

### **WEST SEATTLE PIPELINE**

From the connection to Cedar River Pipeline No. 4 to the West Seattle Reservoir Gate House

### **DES MOINES WAY PIPELINE**

1. From the connection to the Bow Lake Pipeline as relocated outside Seatac Airport, to S 168 Street
2. South 168 Street to the terminus of the pipeline near S 218 Street (until purchased by the Highline WD)

### **MILITARY ROAD FEEDER**

### **THE EAST MARGINAL WAY FEEDER**

From the West Seattle Pipeline to S 115 Street, including pressure reducing and pressure relief facilities from the West Seattle Pipeline to that feeder.

Wholesale customer tap and meter installations shall not be part of the Southwest Sub-region Transmission Facilities. The cost of improvements to such installations shall be borne by the wholesale customer served by the installation regardless of the cause for the improvements provided that such cause is consistent with AWWA and safety standards and practices.

The facilities include the appurtenance of these transmission facilities including but not limited to rights of way, line valves, system meters and remote automation devices.

Seattle may from time to time eliminate facilities from this list provided that it secures the written consent of Water Utility in the event that Water Utility is served by a tap or meter installation on the facility being eliminated. Seattle shall provide Water Utility with 120 days prior written notice of any change.

## **Allocating Costs and Setting Rates for Southwest Sub-region**

In any year, Southwest Sub-region Wholesale Customer means a Wholesale Customer that is served in whole or in part by a tap or meter installation on a Southwest Sub-region Transmission Facility listed in Exhibit XI, or successor facilities.


In each year, the cost of each Southwest Sub-Region Transmission Facility listed in Exhibit XI shall be allocated between Seattle and Southwest Wholesale Customers as a group based on Peak 7 Day flows through that facility. In the event that Peak 7 Day flow data is not available, Peak Month flows may be substituted.

Southwest Sub-region Wholesale Customer(s) shall pay a uniform rate to collect the Southwest Sub-Region Transmission Facilities costs allocated to the Southwest Sub-region Wholesale Customer(s) under the terms of the prior paragraph. This rate shall apply to every unit of water delivered to a Southwest Sub-region Wholesale Customer(s) by Seattle, without regard to the specific location at which that water was delivered.

Actual costs and actual revenues for the Renton Sub-Region shall be trued up in a manner consistent with Section IV.I.



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 ORIGINAL

**EMERGENCY AND FIRE PROTECTION INTERTIE AGREEMENT  
BETWEEN KING COUNTY WATER DISTRICT NO. 20  
AND KING COUNTY WATER DISTRICT NO. 49**

This Emergency and Fire Protection Intertie Agreement ("Agreement") is entered into between King County Water District No. 20 ("WD 20") and King County Water District No. 49 ("WD 49") (referred to collectively as the "Districts" or "Parties") effective January 9, 2015 for the purposes set forth herein.

**Recitals**

Whereas, WD 20 and WD 49 are each municipal corporations organized and operating under Title 57 RCW and other applicable laws of the State of Washington; and

Whereas, the State of Washington, Department of Health encourages water service agreements between adjacent water utilities to improve reliability of public water systems, enhance their management, and more efficiently utilize limited water resources; and

Whereas, both WD 20 and WD 49 have previously entered into long term Full Requirements Contracts with the City of Seattle, Seattle Public Utilities ("SPU") pursuant to which the Districts obtain their water supply on a wholesale basis; and

Whereas, WD 20 and WD 49 have previously entered into four (4) separate and mutually beneficial emergency intertie agreements which provide for and govern five (5) water system interties, as follows:

Location	Date	Operation
Ambaum & SW 144 <sup>th</sup>	12-6-1977	Manual
4 <sup>th</sup> Ave S & S 152 <sup>nd</sup>	4-18-1978	Manual
16 <sup>th</sup> Ave SW & SW 152 <sup>nd</sup>	8-17-2004	Automatic
21 <sup>st</sup> Ave SW & SW 154 <sup>th</sup>	8-17-2004	Automatic
SW 144 <sup>th</sup> & 1 <sup>st</sup> Ave S	6-16-2010	Manual

(referred to herein collectively as the "Intertie Agreements"); and

Whereas, the Intertie Agreements were previously approved by SPU and such Intertie Agreements are referenced in the Districts' Full Requirements Contracts with SPU and in the Districts' respective water system plans; and

Whereas, the Intertie Agreements were entered into at different times and include different and varying terms and conditions which the Districts believe should be updated to address current conditions; and

Whereas, WD 20 and WD 49 desire to enter into this Agreement to supersede and replace the Intertie Agreements so that all of the terms and conditions relating to the Districts' intertie connections are contained in one agreement; and



Whereas, WD 20 and WD 49 believe that it is in their mutual best interests, and that of their respective customers, to enter into this Agreement; now therefore, WD 20 and WD 49 agree as follows:

### **Agreement**

1. Location, Description and Purpose of Intertie Connections. The intertie connections between WD 20 and WD 49 subject to this Agreement are as follows:

A. Ambaum Blvd. and SW 144<sup>th</sup> St. This intertie is a two-way intertie consisting of an eight inch (8") intertie connection located at Ambaum Blvd. and SW 144<sup>th</sup> St. This intertie is manually operated and the gate valve is kept in a closed position. In the event of an emergency or fire, either WD 20 or WD 49 may open the intertie to provide water for emergency or fire protection purposes. The cost of any required maintenance, repairs and replacement of this intertie connection shall be shared equally between the Districts.

B. 4<sup>th</sup> Ave. S and S 152<sup>nd</sup>. This intertie is a two-way intertie consisting of a six inch (6") intertie connection located at 4<sup>th</sup> Ave. S and S 152<sup>nd</sup>. This intertie is manually operated and the gate valve is kept in a closed position. In the event of an emergency or fire, either WD 20 or WD 49 may open the intertie to provide water for emergency or fire protection purposes. The cost of any required maintenance, repairs and replacement of this intertie connection shall be shared equally between the Districts.

C. 16<sup>th</sup> Ave. SW and SW 152<sup>nd</sup>. This intertie is a two-way intertie consisting of a six inch (6") water meter, flow control valve, sump pump, electrical facilities and other related appurtenances located at 16<sup>th</sup> Ave. SW and SW 152<sup>nd</sup>. This intertie is automatically controlled by a flow control valve. The flow control valve shall be set so that it will open and provide flow to either WD 20 or WD 49 in the event of an emergency or fire. The gate valves shall remain open at all times, except during periods of routine maintenance of the intertie facility. Both Districts shall have unrestricted access to the intertie vaults in order to read the water meters at intervals to be established and agreed upon by both Districts in accordance with their water meter reading programs. WD 49 shall own this intertie facility. However, the cost of any required maintenance, repairs and replacement of this intertie facility shall be shared equally between the Districts. WD 49 shall also be responsible for paying for the electrical service to this intertie facility. WD 20 shall arrange for the water meters to be calibrated and maintained every two (2) years as part of WD 20's meter maintenance program, the cost of which shall be shared equally between the Districts.

D. 21<sup>st</sup> Ave. SW and SW 154<sup>th</sup>. This intertie is a two-way intertie consisting of an eight inch (8") water meter, flow control valve, sump pump, electrical facilities and other related appurtenances located at 21<sup>st</sup> Ave. SW and SW 154<sup>th</sup>. This intertie is automatically controlled by a flow control valve. The flow control valve shall be set so that it will open and provide flow to either WD 20 or WD 49 in the event of an emergency or fire. The gate valves shall remain open at all times, except during periods

of routine maintenance of the intertie facility. Both Districts shall have unrestricted access to the intertie vaults in order to read the water meters at intervals to be established and agreed upon by both Districts in accordance with their water meter reading programs. WD 49 shall own this intertie facility. However, the cost of any required maintenance, repairs and replacement of this intertie facility shall be shared equally between the Districts. WD 49 shall also be responsible for paying for the electrical service to this intertie facility. WD 20 shall arrange for the water meters to be calibrated and maintained every two (2) years as part of WD 20's meter maintenance program, the cost of which shall be shared equally between the Districts.

E. SW 144<sup>th</sup> St. and 1<sup>st</sup> Ave. S. This intertie is a two-way intertie consisting of an eight inch (8") intertie connection located at SW 144<sup>th</sup> St. and 1<sup>st</sup> Ave. S with a gate valve located on each District's side of the intertie connection. This intertie is manually operated and the gate valve is kept in a closed position. In the event of an emergency or fire, either WD 20 or WD 49 may open the intertie to provide water for emergency or fire protection purposes. WD 20 and WD 49 agree that each District shall be responsible for inspecting and maintaining the gate valve located on their respective side of the intertie connection and shall pay for the costs of such inspections and maintenance. The cost of any required maintenance, repairs and replacement of this intertie connection shall be shared equally between the Districts.

The intertie connections described in Section 1(A)-(E) above are referred to herein collectively as the "Interties." A diagram depicting the location of the Interties is attached hereto as **Exhibit A**. The Interties provide emergency and fire protection reliability to the areas served and benefits both Districts. The Interties may also be used for special maintenance purposes as further described in Section 2(C) below which benefits both Districts. The Interties shall be operational on a year-round basis, subject to the limitations set forth in this Agreement and in the Districts' Full Requirements Contracts with SPU.

The Districts agree to inspect the Interties annually or more often as required. The Interties shall be opened and tested annually or bi-annually as part of both Districts' regular maintenance programs. The Districts agree that water used during any testing and/or maintenance activities will be minimized to the extent reasonably possible. The Districts shall mutually cooperate in providing such inspection and maintenance of their respective valves to ensure proper functioning of the Interties. The Districts shall advise each other of their respective inspections, maintenance and repair activities.

The Districts' General Managers shall have the authority to develop and agree to Standard Operating Procedures ("SOPs") relating to the inspection, maintenance, repair and/or use of the Interties, provided that the SOPs are not in conflict with the terms and conditions contained in this Agreement. In the event of a conflict between this Agreement and any adopted SOPs, the terms of this Agreement shall prevail.

2. Limitations on Use of Water Through the Interties: The Districts shall limit the use of water through the Interties for "Emergency Use," "Firefighting Protection" and "Special Maintenance Purposes" as such terms are defined below.



A. "Emergency Use" means an event such as a power outage, pump(s) or other mechanical equipment failure, a rupture in the distribution system, contamination of the water supply, earthquake or other natural disaster which would impair the ability of WD 20 or WD 49 to maintain either system capacity or the capacity of their storage tank/reservoir for firefighting protection or consumption by the public. This emergency use would terminate upon restoration of the electrical power, or repair to the pump(s) or other mechanical equipment and/or damaged distribution system, or elimination of the contamination of the water supply.

B. "Firefighting Protection" means:

(1) An event in which WD 20's reservoir and water system capacities are inadequate to combat a conflagration from water mains in WD 20, in which case water from the Interties may be used to extinguish the fire; or

(2) An event in which WD 49's reservoir and water system capacities are inadequate to combat a conflagration from water mains in WD 49, in which case water from the Interties may be used to extinguish the fire.

C. "Special Maintenance Purposes" means a planned maintenance event agreed upon by the Districts in advance where water from the Interties will be necessary to accomplish the maintenance activity.

3. Maintenance, Repair, Inspections and Associated Costs. The Districts shall cooperate with each other in the performance of any inspections, maintenance or repairs on the Interties. The Districts shall advise each other of their respective inspections, maintenance and repair activities. The costs associated with any inspections, maintenance, repair, or replacement activities on the Interties shall be paid for by the Districts as provided in Section 1(A)-(E) above.

4. Notice. A District using water through the Interties shall to the extent feasible notify the other District immediately after the use of an Intertie for emergency or firefighting protection purposes. The notice shall include a description of the nature of the use, the date and time period of such use, and the estimated or actual quantity of water used through the Interties. If the use of the Interties continues after the initial notice was provided, the District using water through the Interties shall provide a supplemental notice regarding the date and time period of such use, and the estimated or actual quantity of water used once the use has ceased.

5. Costs of Water Supplied. A District using water through the Interties shall pay the supplying District for the amount of water used based on the applicable SPU wholesale water customer rate in effect on the date the water is used, including any applicable demand charges incurred as a result of such use. The cost of water used shall be billed by the supplying District and payment shall be made within thirty (30) days of the date of such billing. Any billings not paid within the 30-day period shall accrue interest at the rate of 12% per annum until paid.

The Districts reserve the right to negotiate with SPU to obtain a waiver of any demand charges incurred by either District as a consequence of the other District's use of the Interties.



Any waiver of a demand charge agreed to by SPU shall be in writing in order to document the waiver. A District receiving a written waiver from SPU shall provide the other District with a copy of the written waiver. If a District is unable to obtain an agreement with SPU to reduce or waive the demand charge caused by a District's use of water through the Interties, then any applicable demand charge to be paid shall be fairly allocated to one or both Districts based on the demand charge methodology used by SPU, as provided in the District's Full Requirements Contracts with SPU, so that the District(s) causing a demand charge pays its fair and equitable share of the demand charge.

6. Indemnification. Each District agrees to indemnify and hold harmless the other District, and its officials, employees and agents, from any and all claims, damages, costs, and other liabilities caused or resulting from the negligence or intentional acts of the indemnifying District arising by reason of participation in or relating to the performance of this Agreement. This indemnification provision shall include, but is not limited to, all claims against the indemnified District asserted by an employee or former employee of the indemnifying District or its contractors and, as to such claims, the indemnifying District expressly waives all immunity and limitation of liability under Title 51 RCW. This waiver has been mutually negotiated and agreed to by the Districts.

Each District understands and acknowledges that the other District makes no warranties or assurances as to water availability, pressure or volume at any given time relating to the Interties. Further, it is understood and agreed that if a District's water service to the Interties is temporarily interrupted for repair, in an emergency, or for any other reason, the District supplying water service is not obligated to provide the other District with an alternative source of water supply. Each District does, however, warrant that it will not, except for reasons relating to emergencies, maintenance or other necessary repairs, interrupt the water supply to the Interties.

7. Term and Termination. This Agreement shall continue indefinitely unless either District notifies the other of its intention to terminate the Agreement by giving at least five (5) years advance written notice of termination. The Districts acknowledge that the 5 year notice of termination requirement is reasonable in order to allow a District time to plan for and address the loss of water supply for emergency use and firefighting protection as provided by this Agreement.

8. Prior Intertie Agreements Superseded. This Agreement supersedes and replaces the Intertie Agreements referenced above in the Recitals. Upon full execution of this Agreement, the Intertie Agreements shall be terminated and shall have no further force or effect.

9. No Third Party Beneficiary. This Agreement is entered into for the benefit of the Parties to this Agreement only and shall confer no benefits, direct or implied, on any third person.

10. Compliance with Laws and Regulations. Each District shall, with respect to its duties, responsibilities and operations under this Agreement, comply with all applicable laws, rules and regulations.

11. Interpretation. Each of the Districts was represented by legal counsel with respect to this Agreement, or was given a reasonable opportunity to consult with their own legal counsel, and have had ample opportunity to review this Agreement. This Agreement shall not be interpreted in favor of or against either District by reason of whose attorney originally drafted it.

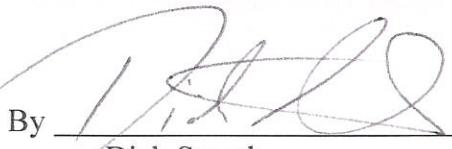
12. Governing Law; Severability. This Agreement shall be governed by, and construed in accordance with, the laws of the State of Washington. If any court of competent jurisdiction shall determine that any portion of this Agreement is unenforceable, then, to the extent possible, the remaining portions hereof shall be unaffected thereby.

13. Dispute Resolution and Attorneys' Fees. If a dispute arises out of or relates to this Agreement, and if the dispute cannot be settled through voluntary negotiations, the Districts agree to first try to settle the dispute by participating in a mediation before resorting to litigation. If the dispute is not resolved through voluntary negotiations or mediation and if either party commences legal action relating to this Agreement, the prevailing party shall be entitled, in addition to all other amounts to which it is otherwise entitled to under this Agreement, to all costs of litigation, including but not limited to, costs, expert witness and reasonable attorneys' fees, including all such costs and fees incurred on appeal.

14. Entire Agreement. This Agreement constitutes the entire agreement between the Parties with respect to the subject matter hereof and may be modified only by an agreement in writing signed by both Parties hereto.

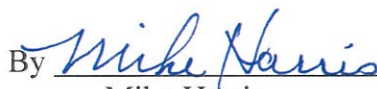
15. Effective Date. This Agreement shall be effective upon the approval of the Agreement by the Board of Commissioners of both Districts and the execution of the Agreement by the Districts' authorized representatives.

King County Water District No. 20

By   
Dick Swaab  
General Manager

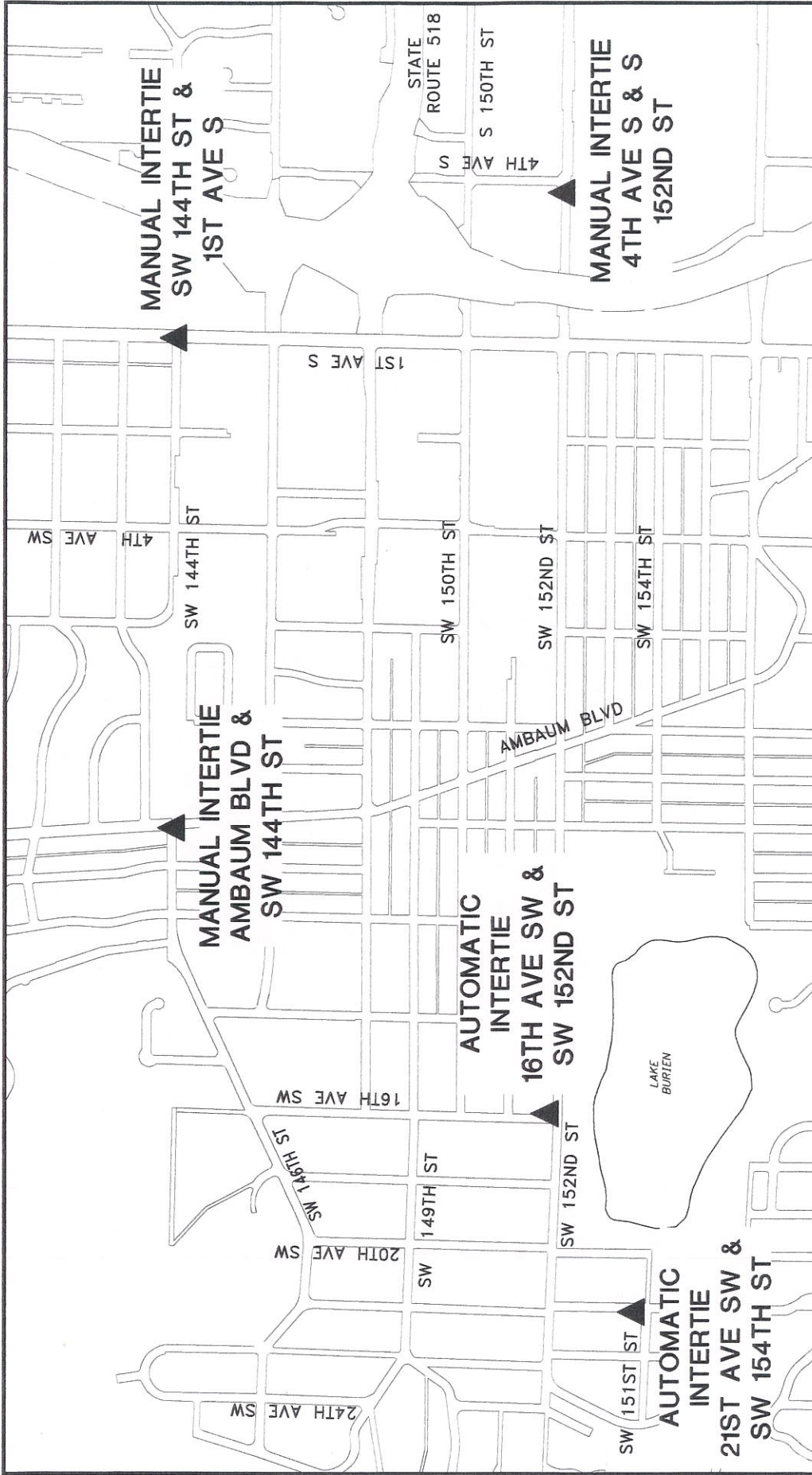
Date 1-9-15

King County Water District No. 49

By   
Mike Harris  
General Manager

Date 1-9-15





**EMERGENCY AND FIRE  
PROTECTION INTERTIE  
AGREEMENT**

**EXHIBIT A - INTERTIES**

**CHS**  
12507 BEL-RED ROAD SUITE 101  
BELLEVUE, WA 98005-2500  
TEL (425) 637-3683 FAX (425) 637-3694

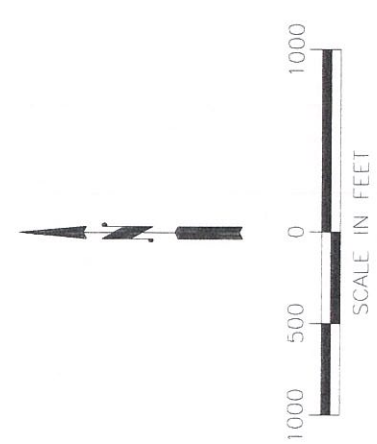
**CHS ENGINEERS, LLC**

Scale  
1" = 1000'

Sheet  
1 / 1

Drawn by NS Project #           

Checked by EZ Date 01-08-15



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FIRE PROTECTION AND INTERTIES AGREEMENT  
BETWEEN HIGHLINE WATER DISTRICT AND KING  
COUNTY WATER DISTRICT NO. 49

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THIS FIRE PROTECTION AND INTERTIES AGREEMENT (the "Agreement" or "this Agreement") is made this 26<sup>th</sup> day of August 2005 between Highline Water District, a municipal corporation in King County, Washington ("Highline"), and King County Water District No. 49, a municipal corporation in King County ("WD 49"); collectively referred to as "the parties" or "the Districts").

WHEREAS both Highline and WD 49 operate under the laws of the State of Washington; and

WHEREAS the State of Washington, Department of Health encourages water service agreements between adjacent water utilities; and

WHEREAS the Comprehensive Plans of Highline and WD 49 anticipate providing fire protection and emergency services to its service area customers; and

WHEREAS at least one boundary of Highline is parallel with and abuts at least one boundary of WD 49; and

WHEREAS Highline and WD 49 desire to enter into a Fire Protection and Emergency Interties Agreement to serve the customers of Highline and WD 49.

NOW THEREFORE, it is agreed as follows:

1. Location of Facilities: WD 49 agrees to allow Highline an emergency standby source of water through an intertie connection between the parties' water systems at the location of S.W. 170<sup>th</sup> Street and 27<sup>th</sup> Avenue SW. Highline agrees to allow WD 49 an emergency standby source of water through an intertie connection between the parties' water systems at the location of S. 176<sup>th</sup> Street and 10<sup>th</sup> Avenue S. (referred to herein as the "Interties"). The Interties will be for one-way flow to each respective District. The Interties shall be operational on a year-round basis, subject to the limitations set forth in this Agreement.
2. Limitations on Use of Water From Intertie: The Districts shall limit the use of water obtained through the Interties for firefighting purposes and for other emergency use. Each District's use of the Interties shall also be limited as set forth below:
  - a. Peak Flow Limitation. The maximum flow rate through each Intertie shall be limited to 2,000 gpm.
  - b. Residual Pressure Limitations. Residual water pressure in the supplying District's distribution system shall not drop below 20 psi during any usage.

The limitations and conditions described above are essential during Seattle Public Utilities' ("SPU") demand season (presently June, July and August of each year). During periods other than summer demand season, the flow limitations may be relaxed by written

FIRE PROTECTION AND INTERTIES AGREEMENT  
BETWEEN HIGHLINE WATER DISTRICT AND KING  
COUNTY WATER DISTRICT NO. 49

agreement of the parties.

3. Definitions for Purposes of this Agreement:

- a. "Firefighting Protection" means in the event a District's source, storage and/or distribution capacities are inadequate, water from the Intertie may be used to supplement necessary fire flows.
- b. "Emergency Use" means an event including but not limited to power outages, a pump system mechanical failure or a rupture in the distribution system, which would impair the capacity of Highline or WD 49 to maintain its system capacity for firefighting purposes and public consumption. Emergency use terminates when the system capacity of the benefiting District is restored to pre-emergency status.

4. Maintenance, Repair, Inspections and Associated Costs. Each District is responsible for the initial cost of designing, permitting and constructing the intertie benefiting their system. The Districts acknowledge that the supplying District will own and maintain the meter installed at the Interties. The supplying District shall be responsible for performing regular inspections and maintenance for the meter owned by the District. Downstream of the meter, the benefiting District will maintain any other related equipment, appurtenances (CLA-valves), etc, at its cost. Each District shall advise the other 48 hours in advance of any scheduled work to be performed. The notice shall include a description of the work, and the name and qualifications of the contractor who proposes to do the inspection and maintenance work. Each District shall have the right to review and approve the contractor proposed by the other, but approval shall not be unreasonably withheld.

Each District or its representative annually shall test the meter it owns, or as often as required, and shall advise the other District of the results of the inspections. Each District shall pay all costs to repair the meter it owns to ensure the meter is functioning properly.

5. Notice. The benefiting District shall notify the other entity within five (5) days after use of the respective Intertie for firefighting purposes or other emergency use. The notice shall state the nature of the emergency use, the date and time of use and the quantity of water used through the Intertie.
6. Costs of Water Supplied. Each District shall pay the other District for use of water through the interties based on the Seattle Public Utility wholesale rate in effect for the supplying District on the date the water is used.

The cost of water through the Intertie shall be billed by the supplying District to the benefiting District, and payment shall be made within thirty (30) days of the date of such billing. Any billings not paid within the 30-day period shall accrue interest at the rate of 12% per annum until paid.



FIRE PROTECTION AND INTERTIES AGREEMENT  
BETWEEN HIGHLINE WATER DISTRICT AND KING  
COUNTY WATER DISTRICT NO. 49

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7. Seattle Public Utilities Charges. To the extent that water use (through the Interties by either District during any month) that causes the other District to incur an SPU demand charge (or "new" water charge during the same time period), the benefiting District agrees to pay the demand charge at the SPU rate in effect on the date the water was used, pursuant to the terms of payment set forth in Paragraph 6.
8. Indemnification. Each District agrees to indemnify and hold harmless the other, its employees and agents from any and all claims, damages, costs, and other liabilities caused by the sole negligence or concurrent negligence of the District, but only to the extent of the District's concurrent negligence arising because of participation in or relating to the performance of this Agreement.
- Each District understands and acknowledges that the other District makes no warranties or assurances as to water availability, pressure or volume at any given time relating to the Interties. Further, it is understood and agreed that if a District's water service to the Intertie is temporarily interrupted for repair, in an emergency, or for any other reason, the supplying District it is not obligated to provide the other District with an alternative water supply source. Each District warrants that it will not interrupt the water supply to the respective Intertie, except for reasons relating to emergencies, maintenance or other necessary repairs. (See Paragraph 4: Maintenance, Repair, Inspections, et al).
9. Term. This Agreement shall continue in five (5) year terms unless either party notifies the other in writing of its intention to terminate the Agreement by giving a thirty (30) day written notice prior to the end of each anniversary date. The parties may, but are not obligated to, review the terms of this Agreement on an annual basis. However, no amendment to this Agreement shall be binding until formally approved by the respective Boards for each District and executed by their duly authorized representatives.
10. Assignment. This Agreement may not be assigned without the prior written consent of the parties, which consent shall not be unreasonably withheld.
11. Attorney Fees. If either District commences legal action pursuant to the terms of this Agreement, the prevailing party shall be entitled to all costs of litigation, including but not limited to costs for expert witnesses and reasonable attorneys fees, in addition to all other amounts to which it may be otherwise entitled to under this Agreement, including all such costs and fees incurred on appeal.
12. Entire Agreement. This Agreement constitutes the entire agreement between the parties with respect to the subject matter hereof and may be modified only by an agreement in writing signed by both parties hereto.
13. Benefits. This Agreement is entered into for the benefit of the parties to this Agreement only and shall confer no benefits, direct or implied, on any third person.

FIRE PROTECTION AND INTERTIES AGREEMENT  
BETWEEN HIGHLINE WATER DISTRICT AND KING  
COUNTY WATER DISTRICT NO. 49

DATED THIS 26<sup>th</sup> Day of August 2005.

HIGHLINE WATER DISTRICT  
A municipal corporation

By Matt Everett  
Matt Everett  
Its General Manager

STATE OF WASHINGTON)  
)  
COUNTY OF KING)

I certify that I know or have satisfactory evidence that Matt Everett is the person who appeared before me and said person acknowledged that he/she signed this instrument on oath and stated that he/she was authorized to execute the instrument and acknowledged it as the Fire Protection & Emergency Intertie Agreement between Highline Water District and WD #49, and he/she signed the document as the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

I, POLLY DAIGLE, am a Notary Public in King County, WA whose commission expires June 20, 2009 and reside in Normandy Park, WA.

Polly M. Daigle  
Signature

DATED: 8-26-05 2005.

(seal or stamp)



KING COUNTY WATER DISTRICT 49  
A municipal corporation

By Dale A. Cap  
Dale Cap  
Its General Manager

STATE OF WASHINGTON)  
)  
COUNTY OF KING)

I certify that I know or have satisfactory evidence that Dale Cap is the person who appeared before me and said person acknowledged that he/she signed this instrument on oath and stated that he/she was authorized to execute the instrument and acknowledged it as the Fire Protection & Emergency Intertie Agreement between Highline Water District and WD #49, and he/she signed the document as the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

I, Polly M. Daigle, am a Notary Public in King County, WA whose commission expires 6-20-09 and reside in King County, WA.

Signature

DATED: 8-26-05 2005.

(seal or stamp)



**KING COUNTY WATER DISTRICT NO. 49  
KING COUNTY, WASHINGTON**

**RESOLUTION NO. 03-1190**

**A RESOLUTION OF THE BOARD OF COMMISSIONERS  
OF WATER DISTRICT NO. 49, KING COUNTY,  
WASHINGTON, AUTHORIZING SERVICE AREA  
AGREEMENT WITH HIGHLINE WATER DISTRICT.**

WHEREAS, the owner of two parcels of real property located in King County, Washington (King County Tax Parcel Nos. 2923049180 and 2923049260) requested water service from Highline Water District ("HWD"); and

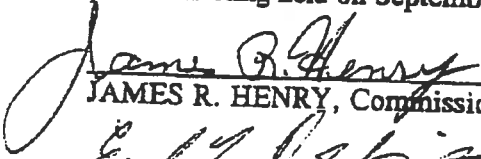
WHEREAS, in connection with this request for water service it was determined by HWD that its Comprehensive Water System Plan identifies these parcels, plus an adjacent parcel (King County Tax Parcel No. 2923049343), as being within the service area of Water District No. 49, but that King County's records reflect that these parcels are within the service area of HWD; and

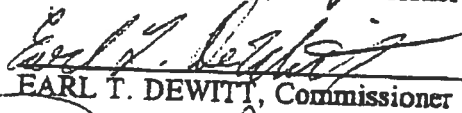
WHEREAS, Water District No. 49 has water mains located adjacent to these three parcels and is better situated to provide water service to these parcels; and

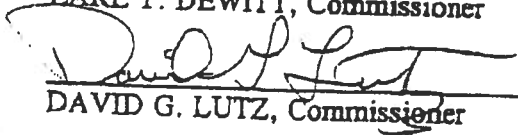
WHEREAS, Water District No. 49 and HWD have agreed to enter into an agreement authorizing Water District No. 49 to provide water service to the subject parcels; NOW THEREFORE,

BE IT RESOLVED by the Board of Commissioners of Water District No. 49, King County, Washington, that the President of Water District No. 49, or his designee, is authorized to sign the Agreement attached hereto as Exhibit A relating to Water District No. 49's agreement to provide water service to the subject parcels.

ADOPTED by the Board of Commissioners of Water District No. 49 at a regular open public meeting held on September 24, 2003.

  
JAMES R. HENRY, Commissioner

  
EARL T. DEWITT, Commissioner

  
DAVID G. LUTZ, Commissioner

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FRANCHISE AGREEMENT BETWEEN  
THE CITY OF BURIEN, WASHINGTON

 ORIGINAL

AND WATER DISTRICT NO. 49

WHEREAS, RCW 35A.11.020 grants the City of Burien ("City" or "Burien") broad authority to regulate the use of the public right-of-way; and

WHEREAS, RCW 35A.47.040 authorizes the City "to grant nonexclusive franchises for the use of public streets, bridges or other public ways, structures or places above or below the surface of the ground for ... conduits, tunnels, ... structures, pipes and ... appurtenances thereof for transmission and distribution ... for water..."; and

WHEREAS, the City has adopted a goal to promote and facilitate the delivery of the most cost-effective water utility services to residents within the City's urban growth boundary; and

WHEREAS, the City is currently served by numerous water purveyors, including King County Water District 49 ("WD 49"), that operate independently of the City making the City's water utility service coordination efforts, development permitting, capital planning, emergency preparedness and response complicated and inefficient; and

WHEREAS, the close coordination of water utility services with the City would improve development coordination and improve capital coordination and efficiency thereby providing more efficient governmental service; and

WHEREAS, it is the intent of the City and WD 49 that WD 49 would be allowed to carry out its responsibilities, as found herein, without interference from the City; and

WHEREAS, it is the intent of the City and WD 49 to establish a collaborative franchise relationship that allows for the coordination of their respective comprehensive and capital project planning and scheduling, emergency preparedness and mutual aid, and utility and street engineering standards, and that WD 49 be available to the City to consult on development of water policy issues; and

WHEREAS, it is the intent and goal of the City to establish a one-stop development permit system consolidated at City of Burien Permit Center but where WD 49 would retain control of its own permit review and approval; and

WHEREAS, the City finds that it is in the best interests of the health, safety and welfare of residents of the Burien community to grant a nonexclusive franchise to WD 49 for the operation of a water utility within the City right-of-way; NOW, THEREFORE,

1. **Definitions.** The following terms contained herein, unless otherwise indicated, shall be defined as follows:

- 1.1. **Administrator:** The City Manager of the City of Burien or designee.
- 1.2. **Construction or Construct:** Shall mean laying, installing, testing, operating, extending, renewing, removing, replacing, repairing, and using a water utility and its appurtenances.
- 1.3. **Days:** Calendar days.
- 1.4. **Maintenance, Maintaining, or Maintain:** Shall mean and include relaying, repairing, replacing, examining, adjusting, testing, inspecting, removing, digging, excavating, and restoring operations incidental thereto.
- 1.5. **Facilities:** Used either in the singular or plural shall mean and include the pipe lines, mains, structures, manholes, connections, and all attachments, appurtenances, and appliances necessary and incidental thereto or in any way appertaining to the conveyance of and use of water, and which are located within public right-of-way, whether the same be located over or under ground, utilized by WD 49 in the operation of activities authorized by this Franchise. The abandonment by WD 49 of any Facilities as defined herein shall not act to remove the same from this definition.
- 1.6. **Franchise:** This franchise agreement ("Franchise"), which sets forth the terms and conditions of the parties' agreement relating to WD 49's use of City's rights-of-way.
- 1.7. **Person:** An entity or natural person.
- 1.8. **Right-of-way:** As used herein shall refer to the surface of and the space along, above, and below any street, road, highway, freeway, lane, sidewalk, alley, court, boulevard, parkway, drive, utility easement, and/or road right-of-way now or hereafter held or administered by the City of Burien.

2. **Franchise Granted.**

- 2.1. Pursuant to RCW 35A.47.040, the City hereby grants to WD 49, subject to the terms and conditions hereinafter set forth, a nonexclusive franchise beginning on the effective date of this Franchise. This Franchise shall not in any manner prohibit the City from granting other and further franchises over, upon, and along the City of Burien that do not interfere with WD 49's rights under this Franchise. This Franchise shall not prohibit or prevent the City from using public rights-of-way or affect the jurisdiction of the City over the same or any part thereof.
- 2.2. This Franchise shall grant WD 49 the right, privilege, authority and franchise, subject to the terms and conditions hereinafter set forth, to construct, maintain, operate, and use facilities in, upon, over, under, along, across and through the present and future rights-of-way of the City of Burien, and as they may change during the term of this Franchise, to provide for the transmission and distribution of water.
- 2.3. This Franchise is granted upon the express condition that it shall not in any manner prevent the City from granting other or further franchises in, along, over, through,



under, below or across any right-of-way. Such Franchise shall in no way prevent or prohibit the City from using any right-of-way or other City property or affect its jurisdiction over them or any part of them, and the City shall retain the authority to make all necessary changes, relocations, repairs, maintenance, establishment, improvement, dedication of the same as the City may deem fit, including the dedication, establishment, maintenance, and improvement of new right-of-way or other public properties of every type and description.

3. **Franchise Term, Right to Amend & Termination, Renegotiation.**

- 3.1. **Term of Agreement:** The term of the Franchise granted hereunder shall be for the period of fourteen (14) years counted from the last day of the calendar month in which this Franchise becomes effective. During the final year of this Franchise, WD 49 may apply for renewal, extension, or a new franchise by written request to the City. Upon receipt of such request the terms of this Franchise shall continue for one (1) year pending the granting of a new franchise.
- 3.2. **Right to Amend & Termination:** The City reserves for itself the right at any time upon ninety (90) days written notice to WD 49, to change, amend, modify or amplify any of the provisions or conditions herein enumerated to conform to any state statute or order of the Washington Utilities and Transportation Commission or City of Burien ordinance relating to the public welfare, health, safety or right-of-way regulation, as may hereafter be enacted, adopted or promulgated. This Franchise may be terminated by the City at any time that WD 49 is in material breach of any Franchise term. This Franchise may also be terminated at any time that WD 49's Facilities are not operated or maintained in accordance with applicable statutes, WUTC orders, city ordinances, or other regulation; provided, however, that WD 49 shall have 90 days after receiving notice from the City to correct any material failure to comply with such statutes, orders, ordinances, or regulations. If any such material failure to comply by WD 49 cannot be corrected with due diligence within such 90 day period, the City may extend the time within which WD 49 may so comply for such time as may be reasonably necessary and so long as WD 49 commences promptly and diligently to effect such compliance.
- 3.3 **Administrative Fee and Later Enacted State Law.** In consideration of the actual administrative cost to the City to implement and monitor the terms of this Franchise, WD 49 shall pay to the City on or before January 31 of each calendar year during the term of this Franchise an administrative fee to be determined by the parties through good faith negotiations. The parties agree that the administrative fee shall not exceed the actual costs incurred by the City relating to the administration of this Franchise. WD 49 shall have the right to review the administrative fee on a periodic basis in order to ensure that the administrative fee does not exceed the City's actual administrative costs associated with the Franchise. Notwithstanding this section, and upon not less than sixty (60) days' advance written notice to WD 49, the City shall further be entitled to implement the terms of any state law or regulation duly adopted after the effective date of this Franchise which authorizes the City to establish a franchise or other similar fee, in addition to actual administrative costs, on the use by WD 49 of the City's rights-of-way. Further, notwithstanding this section, if (1) a

Washington superior court in a case where both the City and WD 49 are parties, or (2) a Washington appellate court regardless of whether the City and WD 49 are parties thereto, issues a final decision from which no appeal is taken which authorizes municipalities to collect a franchise fee or other similar fees from special purpose districts utilizing the municipalities' rights-of-way, then WD 49 and the City shall negotiate the amount of such franchise fee or other similar fee and shall amend this Franchise accordingly to implement the collection of the fee.

4. **Coordination Between City and WD 49.**

- 4.1. **Comprehensive and Capital Project Planning And Scheduling:** In the development and scheduling of capital plans and improvements, WD 49 and the City agree to meet regularly, no less than quarterly, to review proposed plan amendments or updates and annual construction schedules.
- 4.2. **Cooperative Bidding and Cost Sharing:** WD 49 and the City agree to cooperatively bid, where feasible and pursuant to Chapter 39.34 RCW, for the construction of coinciding capital plans and improvements. Furthermore, WD 49 and the City agree to enter into appropriate agreements, on a project-by-project basis, to share the costs of certain right-of-way improvements and overlays. The precise terms of such agreements will be mutually agreed upon with both parties negotiating in good faith.
- 4.3. **Emergency Preparedness and Mutual Aid:** The City and WD 49 agree to meet periodically to coordinate the City's emergency preparedness planning and participate in joint training activities. WD 49 and the City also agree to provide mutual aid with available personnel and equipment if needed.
- 4.4. **Utility and Street Engineering Standards:** The City is developing standards for all City infrastructure including streets, sidewalks, storm drainage, streetlights, and utility undergrounding for electrical and telecommunications services. The City wishes to adopt similar uniform standards for water utilities. WD 49 agrees to assist the City in developing and setting uniform standards for its service area and will cooperate with the City to establish a GIS for the City of Burien. Consistent with the submittal requirements applicable to other contractors and developers within the City, WD 49 shall submit any digital mapping using the following specifications:
- a. Coordinate System – Washington State Plane, North Zone
  - b. Horizontal Datum – NAD 83/91; and
  - c. Vertical Datum – NAVD 88.

In the event that the City amends the digital mapping specifications applicable to all contractors and developers during the term of this Franchise, then WD 49 shall likewise conform to any such amended digital mapping specifications.

- 4.5. **One-Stop Permit Center:** The City of Burien is responsible for coordinating with other utilities and fire districts to issue timely permits for development of residential and commercial properties within its boundaries. To effectively carry out this duty, the City will establish a one-stop City of Burien Permit Center. WD 49, without

compromising its responsibility to review and approve water permits, will cooperate with the City so that developers will be able to come to the City's Permit Center to seek permits from the City and its water purveyors, sewer utilities, electrical and gas utilities and fire districts.

- 4.6. Street Light Services. In March of 2002, WD 49 adopted Resolution No. 02-1183 expressing its future intent to transfer the billing function it provided for streetlights back to the utility providers. WD 49 ceased billing its customers for streetlights owned, operated and maintained by Seattle City Light and PSE in October of 2002. Efforts were undertaken after this time by Seattle City Light, PSE and other entities to make alternative billing arrangements for the streetlights formerly billed by WD 49. In November of 2003, the Washington Supreme Court issued a ruling in *Okeson v. Seattle* that prohibits a utility operated by a city from charging the utility ratepayers the cost to operate and maintain streetlights. As a result of the *Okeson* case, billing issues for streetlights have become more difficult than previously anticipated and the parties have reviewed various options in order to address the streetlight issues.

Under *Okeson* and RCW 57.08.060, WD 49 has express authority to operate and maintain a streetlight system. Under RCW 35.43.040 (11), the City also has the authority to establish a local improvement district for the purpose of providing a streetlight system. However, given WD 49's prior role as a billing agent for streetlight services, WD 49 has the ability to re-initiate billing its customers for streetlights relatively quickly in comparison to the time and expense that would have to be incurred by the City to form a new streetlight utility and/or to develop or procure an appropriate billing software program to accomplish the necessary billing. Accordingly, WD 49 has agreed to re-establish a customer account with Seattle City Light to be effective as of January 10, 2006, and shall pay Seattle City Light for the costs to operate and maintain streetlights within that portion of Burien served by WD 49, provided that an appropriate contract is entered into between Seattle City Light and WD 49 for the re-initiation of a customer account.

Nothing in this Franchise shall require WD 49 to re-initiate billing for streetlights located in Burien that are owned, operated and maintained by PSE. Further, nothing in this Franchise shall require WD 49 to bill for streetlights that are installed without the express consent and approval of WD 49.

WD 49's obligation to re-establish a customer account with Seattle City Light for the streetlights located within that portion of Burien served by WD 49 shall remain in effect until August 31, 2008. During this period, the City shall not exercise its express statutory authority to assume the assets and facilities of WD 49 that lie within Burien.

During the period before August 31, 2008, the City and WD 49 shall meet and confer with other special purpose districts and other interested parties to create by interlocal agreement, or otherwise, an arrangement to ensure that streetlight services in Burien

are fully provided and/or to review whether appropriate legislative changes could be adopted to address the billing issues resulting from the *Okeson* case. If such an interlocal agreement is created or legislative changes are adopted WD 49 shall provide reasonable assistance to transfer the billing function for streetlights to the new responsible entity. Provided, however, in the event that alternative billing arrangements are not made before August 31, 2008, WD 49 shall not be obligated to maintain a customer account with Seattle City Light beyond August 31, 2008 and bill its customers for streetlights.

5. **Reservation of Police Power.** All the rights herein granted shall be subject to and governed by this Franchise. Provided, however, the Burien City Council expressly reserves unto itself all its police power to adopt ordinances necessary to protect the health, safety and welfare of the general public in relation to the rights hereby granted.

6. **Right-of-Way Management.**

6.1. **Permits Required:** Except in the case of an emergency, prior to commencing construction or maintenance work on rights-of-way covered by this Franchise, WD 49 shall first file with the City detailed plans, specifications and profiles of the intended work as may be prescribed by the Burien City Council and Administrator, and shall receive an appropriate permit or permits from Burien prior to commencing such work. WD 49 shall comply with all terms, conditions, standards, and insurance coverage as may be required under the terms of the permit. In the case of emergency repairs, WD 49 shall notify the City of Burien promptly and initiate the permit application process on the next business day.

6.2. **Entry Upon Rights-of-Way:** After obtaining the necessary permit from the Administrator in the manner prescribed by Ordinance, WD 49 may enter upon, dig, and excavate the rights-of-way covered by this Franchise of the City of Burien as hereinabove specified, as now laid out or which may hereafter be established or acquired, for the purpose of constructing, laying, operating, and maintaining, WD 49's system, either in whole or in part, used, to be used, or which may be used in conveying water from any point or points within the City. The work will be done in accordance with the terms of the permits and ordinances of the City of Burien regulating the opening and breaking of rights-of-way and all building and fire codes and ordinances of the City of Burien.

6.3. **Location of Improvements:** In all cases where practicable, the Facilities of WD 49 shall be maintained and improved so as not to unnecessarily or unreasonably tear up the streets except where necessary and required to cross streets as determined by WD 49 and approved by the Administrator. The location of all Facilities, and their depth below the surface of the ground or grade of any rights-of-way, shall be consistent with City standards and applicable regulations of federal or state agencies having jurisdiction over WD 49. In the event circumstances arise where locations and depths of WD 49 Facilities may need to deviate from the City standards, WD 49 may request the City to modify its standards to accommodate the specific circumstances and the City shall not unreasonably withhold its approval of WD 49's request.

- 6.4. Preference in Installations: The City shall have prior and superior right to the use of its streets and alleys and rights-of-way for installation and maintenance of its utilities and other governmental purposes, and should a conflict arise with WD 49's lines, WD 49 shall, at its own expense and cost, conform to the utilities and other government purposes of the City in the event that a reasonably feasible alternative is available. WD 49 shall have preference over the owners of all utilities, other than City's, installed in such rights-of-way after installation of the Facilities of WD 49. Such preference shall continue in the event of the necessity of relocating or changing the grade of any such rights-of-way. WD 49 shall pay all reasonable costs and expenses necessarily incurred by City in the examination, inspection and approval of all plans and specifications for, and all details of construction of, all Facilities involved herein.
- 6.5. Relocation of Facilities Required by the City: If the City should pave or otherwise improve rights-of-way, including utility facilities, relocate the same or change the grade thereof, or provide for the relocation of any such street, and the City determines that such work reasonably requires the relocation or moving of any portion of the system of WD 49, including relocating or readjusting the elevation of its Facilities to conform to such new grades as may be established, such work shall be done expeditiously by WD 49 at its own cost and expense. All work to be performed by WD 49 under this Section shall be performed as may be required by the terms of this Franchise. If relocation of facilities is determined to be required, the City agrees to give preferences to WD 49's relocation of its Facilities within the City's rights-of-way.
- 6.6. Relocation of Facilities Requested by Others: When any Person, other than the City, requires the relocation of WD 49's Facilities to accommodate the work of such Person, then WD 49 shall have the right as a condition of such relocation to require such Person to make payment to WD 49 at a time and upon terms acceptable to WD 49 for all reasonable costs and expenses incurred by WD 49 in the relocation of WD 49's Facilities.
- 6.7. Construction Standards: All Facilities shall be laid and installed in conformity with the maps and specifications filed with the City except in instances in which deviation may be allowed thereafter in writing by the Administrator pursuant to application by WD 49. Provided, however, WD 49 shall be entitled to make minor field revisions to the maps or specifications in order to address site conditions or other factors which arise during the performance of any work without obtaining the advance written authorization from the Administrator. All plans and specifications shall specify the class and type of material to be used, manner of excavation, construction and installation, backfill, erection of temporary structures, erection of permanent structures, and the traffic control mitigation measures as provided by the Manual on Uniform Traffic Control Devices, or similar standards as may be applicable from time to time. Except in emergency situations, no such construction shall be commenced without WD 49 first securing a permit in writing from the Administrator. All such work shall be subject to the approval of and shall pass the inspection of the City by and through its Administrator or other designated official. All such construction shall

meet the standards set forth in the Control Zone Guidelines promulgated by the State of Washington, Department of Transportation for protection of utility objects in traffic hazard areas to the extent the Guidelines are applicable.

- 6.8. Supervision of Installation: Notwithstanding any provision herein to the contrary, any excavations and installations by WD 49 in any of the rights-of-way within the corporate limits of the City shall be done in accordance with such reasonable rules, regulations, resolutions, and ordinances of general application now enacted or to be enacted by the Burien City Council, relating to excavations in rights-of-way of the City of Burien, and under the direction and supervision of the Administrator. WD 49 shall pay for Burien's reasonable administrative expenses directly related to such supervision no later than thirty (30) days after receipt of invoice.
- 6.9. Repair of City's Infrastructure: WD 49 shall leave all City infrastructure, including streets, avenues, roads, alleys, lanes, public places, and other rights-of-way, after laying and installing WD 49's Facilities and doing construction work, making repairs to equipment, and the like, in as good and safe condition in all respects as is practicable, as they were before the commencement of such work by WD 49, its agents, or contractors. In case of any damage to said streets, avenues, utilities systems, roads, alleys, lanes, public places and rights-of-way, to the pavement, turnouts, gutters, ditches, walks, utility lines, rails, bridges, trestles, wharves or landings, and other improvements owned by the City, WD 49 or its agents or contractors shall immediately repair all damage at WD 49's sole cost and expense. The City may at any time, after giving prior written notice to WD 49 and a reasonable opportunity to perform the work, do, order and have done any and all work considered necessary to restore to a safe condition any such streets, avenues, utility systems, roads, alleys, lanes, public places and ways, or wharves or landings left by WD 49 or its agent in a condition dangerous to life or property, and WD 49, upon demand, shall pay to the City all costs of such construction or repair work. In the event of any excavation through a paved right-of-way, WD 49 shall restore the paved area to a standard and condition reasonably acceptable to the Administrator as specified in the permit to be issued for the work. Patching methods approved by the Administrator to repair the excavation and the surface of the paving to as near the standards of the original pavement as is possible may include the use of a thermal in-place asphalt patch or approved equal and/or the full overlay of the paved area, for asphalt paved streets, and the replacement of the affected portion of the panel to the nearest existing expansion joints for concrete paved streets.
- 6.10. Other Permits Required: Nothing in this Franchise shall relieve WD 49 of the obligations to obtain any and all necessary federal, state and City permits for the construction, reconstruction, maintenance and operation of its Facilities within Burien.
- 6.11. Record of Installations: WD 49 shall at all times keep full and complete as-built plans, specifications, profiles and records, including in electronic form if available, showing the exact location and size of all Facilities, heretofore laid within the City of Burien rights-of-way, and showing the location of all manholes, catch basins, outlets and such plans, specifications, profiles, and records shall be kept current by WD 49.

These records shall be subject to inspection at all reasonable times by the proper officials and agents of the City, and a copy of these plans, specifications, profiles and records shall be furnished to the City upon request.

- 6.12. **Vacation of Right-of-Way:** If at any time the City of Burien shall vacate any street or right-of-way or other City of Burien property which is then used for utility purposes pursuant to the rights granted by this Franchise, the City will reserve a continuing grant of easement to WD 49 for the construction, repair and maintenance of its existing or future Facilities.

7. **Indemnification and Hold Harmless.** Burien and WD 49 agree that each party shall defend, indemnify, and hold harmless the other party and its officers, officials, agents employees, and volunteers from any and all claims, injuries, actions, damages, losses or suits including reasonable attorney's fees, which arise out of, are connected with, or due to any errors, omissions or negligent acts in the performance of this Franchise, except for each party's own comparative negligence. To this extent, each party waives whatever rights against such suit it may have by virtue of the State Worker's Compensation laws. This waiver is specifically and mutually negotiated.

8. **Alternate Dispute Resolution.** If the WD 49 and the City are unable to resolve disputes arising from the terms of this Franchise, prior to resorting to a court of competent jurisdiction, the parties shall submit the dispute to a non-binding alternate dispute resolution process agreed to by the parties. Unless otherwise agreed between the parties or determined herein, the cost of that process shall be shared equally. Provided, however, either party may resort to immediate judicial legal action for the purpose of obtaining a temporary restraining order or injunction in situations where immediate and irreparable injury, loss or damage is likely to occur without such action being taken. In the case of any such judicial legal action, the prevailing party shall be entitled to an award of its attorneys fees, expert witness fees, and other costs of suit.

9. **Abandonment of Facilities:** In the event WD 49 decides to permanently discontinue using and abandons any of its Facilities, or the City reasonably determines that WD 49 has permanently discontinued using and abandoned any of its Facilities, WD 49 shall, at its sole cost and as directed by the City, abandon its Facilities in a manner rendering them completely safe. Abandoning Facilities in place shall not relieve the WD 49 of the obligation and/or costs to remove or alter such facilities in the event the City determines and requests WD 49, in writing, to remove or alter such facilities as is necessary for the installation, operation, or maintenance of any City-owned utility or for the health and safety of the public, in which case the WD 49 shall perform such work in a timely manner at no cost to the City. In the event WD 49 does not perform such work within a reasonable time following written notice from the City, the City may do, order, or have done, any and all work on such abandoned facilities, and the WD 49, upon demand, shall pay to the City all reasonable costs of such work. WD 49 shall be responsible for any environmental review required for the abandonment of any Facility and payment of any costs of such environmental review.

10. **Emergency Response Plan:** WD 49 shall prepare and file with the City an emergency management plan for responding to any emergency condition related to the operation and maintenance of its Facilities. The plan shall designate responsible officials and emergency 24-hour on-call personnel and the procedures to be followed when responding to an emergency.

After being notified of an emergency, WD 49 shall cooperate with the City and make every reasonable effort to respond as fast as practical with action to minimize damage and to protect the health and safety of the public.

11. **Survival.** All of the provisions, conditions and requirements of this Franchise that may be reasonably construed to survive the termination or expiration of this Franchise shall survive such termination or expiration. All of the provisions, conditions, regulations and requirements contained in this Franchise shall further be binding upon the heirs, successors, executors, administrators, legal representatives and assigns of the parties hereto and all privileges, as well as all obligations and liabilities of each party shall inure to their respective heirs, successors and assigns.

12. **Severability.** If any Section, sentence, clause or phrase of this Franchise should be held to be invalid or unconstitutional by a court of competent jurisdiction, such invalidity or unconstitutionality shall not affect the validity or constitutionality of any other Section, sentence, clause or phrase of this Franchise.


13. **Most Favored Nation Provision.** The City agrees that if it enters into a franchise or other agreement with another special purpose district after the date of this Franchise, and any term or condition of such agreement is more favorable than the terms contained in this Franchise, the same terms shall be offered to WD 49 with the same effective date. Further, the City agrees that WD 49 shall not be required to pay a franchise fee or similar fee unless the fee to be paid by WD 49 applies to all special purpose districts operating within the jurisdiction of the City of Burien in a fair and consistent manner.

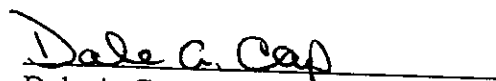
14. **Effective Date.** This Franchise shall be effective upon the date of full execution of the parties.

DATED this 14 day of December, 2005.

CITY OF BURIEN

WATER DISTRICT NO. 49

  
Gary P. Long, City Manager

  
Dale A. Cap, District Manager





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**TABLE E.1  
KING COUNTY WATER DISTRICT NO. 49  
BILLED CONSUMPTION BY MONTH & CLASS**

		(1) Total Retail Billed Consumption		(2) Single Family Residential		(3) Multi-Family Residential		(4) Commercial/Industrial		(5) Wholesale	(6) Non-revenue
	Purchased From Seattle	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	in ccf
<b>1993</b>											
JAN		64,475	2,121	23,003	1,684	21,899	179	19,573	258	-	-
FEB		33,961	1,770	19,154	1,509	4,999	75	9,808	186	-	-
MAR		55,318	2,157	20,139	1,721	19,417	179	15,762	257	-	-
APR		34,247	1,764	19,368	1,498	5,024	77	9,855	189	-	-
MAY		65,262	2,155	23,669	1,714	21,986	180	19,607	261	-	-
JUN		37,572	1,771	21,549	1,509	5,222	76	10,801	186	-	-
JUL		70,887	2,148	29,664	1,708	22,382	178	18,841	262	-	-
AUG		46,743	1,778	28,184	1,517	5,956	76	12,603	185	-	-
SEP		79,576	2,137	37,151	1,700	23,204	178	19,221	259	-	-
OCT		55,013	1,810	34,891	1,535	6,795	79	13,327	196	-	-
NOV		83,989	2,168	30,529	1,719	23,673	179	29,787	270	-	-
DEC		41,704	1,777	25,783	1,520	5,541	76	10,380	181	-	-
<b>TOTAL</b>	<b>639,973</b>	<b>668,747</b>	<b>3,928</b>	<b>313,084</b>	<b>3,222</b>	<b>166,098</b>	<b>256</b>	<b>189,565</b>	<b>452</b>	<b>-</b>	<b>(28,774)</b>

(6) Non-Revenue = Purchased from Seattle - Total Retail Billed

		(1) Total Retail Billed Consumption		(2) Single Family Residential		(3) Multi-Family Residential		(4) Commercial/Industrial		(5) Wholesale	(6) Non-revenue
	Purchased From Seattle	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	in ccf
<b>1994</b>											
JAN		67,537	1,864	24,289	1,455	23,524	162	19,724	247	-	-
FEB		35,446	1,762	20,505	1,501	5,337	76	9,604	185	-	-
MAR		56,436	2,156	20,747	1,710	19,333	180	16,356	266	-	-
APR		34,594	1,786	19,517	1,527	5,152	75	9,925	184	-	-
MAY		67,374	2,474	24,213	1,968	21,154	212	22,007	294	-	-
JUN		41,637	1,781	24,917	1,518	5,649	75	11,071	188	-	-
JUL		85,585	2,164	38,897	1,720	25,244	180	21,444	264	-	-
AUG		60,552	1,788	42,275	1,524	6,175	76	12,102	188	-	-
SEP		101,149	2,177	42,435	1,728	36,117	183	22,597	266	-	-
OCT		54,619	1,792	36,765	1,524	6,328	77	11,526	191	-	-
NOV		73,090	2,172	27,769	1,726	22,524	183	22,797	263	-	-
DEC		44,942	1,790	30,204	1,516	5,538	87	9,200	187	-	-
<b>TOTAL</b>	<b>700,404</b>	<b>722,961</b>	<b>3,962</b>	<b>352,533</b>	<b>3,242</b>	<b>182,075</b>	<b>270</b>	<b>188,353</b>	<b>450</b>	<b>-</b>	<b>(8,484)</b>

(6) Non-Revenue = Purchased from Seattle - Total Retail Billed + 14,073 Purchased From Others

		(1) Total Retail Billed Consumption		(2) Single Family Residential		(3) Multi-Family Residential		(4) Commercial/Industrial		(5) Wholesale	(6) Non-revenue
	Purchased From Seattle	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	in ccf
<b>1995</b>											
JAN		66,125	2,169	24,150	1,720	22,592	180	19,384	269	-	-
FEB		35,764	1,785	20,789	1,517	5,665	83	9,311	185	-	-
MAR		67,943	2,169	32,070	1,732	19,553	179	16,320	258	-	-
APR		33,753	1,779	19,239	1,511	5,631	78	8,884	190	-	-
MAY		65,070	2,176	24,430	1,734	20,621	179	20,020	263	-	-
JUN		45,381	1,799	29,413	1,527	6,356	79	9,612	193	-	-
JUL		88,483	2,175	43,978	1,733	24,685	182	19,820	260	-	-
AUG		67,663	1,795	49,769	1,527	6,564	79	11,330	189	-	-
SEP		86,727	2,171	43,290	1,727	23,224	180	20,213	264	-	-
OCT		47,857	1,804	29,398	1,529	6,402	81	12,057	194	-	-
NOV		77,574	2,165	34,740	1,725	21,794	179	21,040	261	-	-
DEC		44,605	1,786	21,350	1,518	5,528	78	17,726	190	-	-
<b>TOTAL</b>	<b>712,027</b>	<b>726,946</b>	<b>3,951</b>	<b>372,614</b>	<b>3,243</b>	<b>168,615</b>	<b>257</b>	<b>185,718</b>	<b>451</b>	<b>-</b>	<b>(437)</b>

(6) Non-Revenue = Purchased from Seattle - Total Retail Billed + 14,482 Purchased From Others

**TABLE E.1 (CONTINUED)**  
**KING COUNTY WATER DISTRICT NO. 49**  
**BILLED CONSUMPTION BY MONTH & CLASS**

		(1) Total Retail Billed Consumption		(2) Single Family Residential		(3) Multi-Family Residential		(4) Commercial/Industrial		(5) Wholesale	(6) Non-revenue
	Purchased From Seattle	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	in ccf
<b>1996</b>											
JAN		64,557	2,175	23,277	1,738	22,618	180	18,662	257	-	-
FEB		38,655	1,776	22,229	1,511	5,816	78	10,609	186	-	-
MAR		57,704	2,190	22,240	1,744	21,032	182	14,432	264	-	-
APR		30,587	1,783	17,391	1,518	4,976	80	8,220	185	-	-
MAY		59,742	2,183	22,934	1,741	19,899	182	16,909	260	-	-
JUN		39,684	1,782	23,190	1,512	6,012	79	10,482	191	-	-
JUL		88,900	2,203	39,850	1,754	25,238	179	23,812	270	-	-
AUG		60,903	1,796	42,844	1,526	7,259	79	10,800	191	-	-
SEP		90,246	2,183	46,869	1,742	24,625	180	18,752	261	-	-
OCT		47,199	1,803	29,884	1,529	6,610	81	10,704	192	-	-
NOV		67,634	2,181	26,037	1,737	22,859	182	18,736	256	-	-
DEC		39,419	1,781	21,562	1,508	6,318	81	11,508	187	-	-
<b>TOTAL</b>	<b>762,238</b>	<b>685,230</b>	<b>3,964</b>	<b>338,307</b>	<b>3,245</b>	<b>173,262</b>	<b>263</b>	<b>173,626</b>	<b>443</b>	<b>-</b>	<b>91,266</b>

(6) Non-Revenue = Purchased from Seattle - Total Retail Billed + **14,258** Purchased ccf From Others

		(1) Total Retail Billed Consumption		(2) Single Family Residential		(3) Multi-Family Residential		(4) Commercial/Industrial		(5) Wholesale	(6) Non-revenue
	Purchased From Seattle	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	in ccf
<b>1997</b>											
JAN		65,361	2,187	25,347	1,745	23,132	180	16,882	262	-	-
FEB		42,214	1,813	19,673	1,535	6,131	84	16,411	194	-	-
MAR		58,981	2,189	23,804	1,743	18,722	180	16,455	266	-	-
APR		35,866	1,816	18,798	1,540	5,739	81	11,328	195	-	-
MAY		65,999	2,190	28,747	1,744	20,423	182	16,829	264	-	-
JUN		43,573	1,815	26,347	1,539	6,347	83	10,878	193	-	-
JUL		77,470	2,211	33,696	1,764	23,996	182	19,778	265	-	-
AUG		55,017	1,815	33,938	1,536	10,016	85	11,063	194	-	-
SEP		86,413	2,210	43,220	1,759	23,569	180	19,624	271	-	-
OCT		47,339	1,808	28,911	1,533	7,017	83	11,410	192	-	-
NOV		71,014	2,191	26,763	1,741	22,942	181	21,309	269	-	-
DEC		40,186	1,802	22,609	1,530	6,509	84	11,068	188	-	-
<b>TOTAL</b>	<b>689,335</b>	<b>689,433</b>	<b>4,023</b>	<b>331,852</b>	<b>3,271</b>	<b>174,544</b>	<b>295</b>	<b>183,037</b>	<b>457</b>	<b>-</b>	<b>9,297</b>

(6) Non-Revenue = Purchased from Seattle - Total Retail Billed + **9,395** ccf Purchased From Others

		(1) Total Retail Billed Consumption		(2) Single Family Residential		(3) Multi-Family Residential		(4) Commercial/Industrial		(5) Wholesale	(6) Non-revenue
	Purchased From Seattle	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	in ccf
<b>1998</b>											
JAN		63,893	2,180	24,917	1,743	23,371	180	15,605	257	-	-
FEB		34,481	1,784	20,112	1,515	6,086	84	8,283	185	14	-
MAR		57,209	2,183	22,105	1,742	20,784	184	14,320	257	35	-
APR		33,472	1,787	19,287	1,519	5,893	84	8,292	184	7	-
MAY		62,577	2,170	25,355	1,725	21,455	186	15,767	259	8	-
JUN		38,717	1,796	23,479	1,523	6,181	82	9,057	191	-	-
JUL		73,358	2,186	31,465	1,735	23,698	187	18,195	264	13	-
AUG		53,794	1,812	36,795	1,535	7,325	84	9,674	193	111	-
SEP		88,036	2,185	45,482	1,729	23,995	184	18,559	272	6	-
OCT		52,539	1,806	34,122	1,535	7,614	85	10,803	186	37	-
NOV		71,048	2,188	28,236	1,738	24,768	186	18,044	264	14	-
DEC		31,788	1,800	19,316	1,534	5,316	86	7,156	180	13	-
<b>TOTAL</b>	<b>689,310</b>	<b>660,912</b>	<b>3,980</b>	<b>330,671</b>	<b>3,262</b>	<b>176,486</b>	<b>269</b>	<b>153,755</b>	<b>449</b>	<b>258</b>	<b>37,351</b>

(6) Non-Revenue = Purchased from Seattle - Total Retail Billed + **8,990** ccf Purchased From Others + **37** ccf wholesale

**TABLE E.1 (CONTINUED)**  
**KING COUNTY WATER DISTRICT NO. 49**  
**BILLED CONSUMPTION BY MONTH & CLASS**

		(1) Total Retail Billed Consumption		(2) Single Family Residential		(3) Multi-Family Residential		(4) Commercial/Industrial		(5) Wholesale	(6) Non-revenue
	Purchased From Seattle	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	in ccf
<b>1999</b>											
JAN		65,929	2,192	24,341	1,738	24,493	188	17,095	266	-	-
FEB		35,881	1,819	21,988	1,545	6,039	89	7,854	185	-	-
MAR		54,255	2,206	19,843	1,752	20,049	189	14,363	265	-	-
APR		32,828	1,800	19,039	1,529	5,422	85	8,367	186	-	-
MAY		64,154	2,153	23,950	1,710	22,029	182	18,175	261	-	-
JUN		37,117	1,814	22,182	1,545	6,152	86	8,783	183	-	-
JUL		81,111	2,181	32,369	1,725	23,294	183	25,448	273	-	-
AUG		50,981	1,826	34,302	1,555	6,870	85	9,809	186	-	-
SEP		83,923	2,180	36,179	1,727	25,560	182	22,184	271	-	-
OCT		45,827	1,812	29,860	1,538	6,793	88	9,174	186	-	-
NOV		70,748	2,150	26,867	1,693	23,779	181	20,102	276	-	-
DEC		45,708	1,802	30,839	1,530	6,141	90	8,728	182	-	-
<b>TOTAL</b>	<b>685,368</b>	<b>668,462</b>	<b>3,989</b>	<b>321,759</b>	<b>3,265</b>	<b>176,621</b>	<b>271</b>	<b>170,082</b>	<b>453</b>	<b>76</b>	<b>23,696</b>

(6) Non-Revenue = Purchased from Seattle - Total Retail Billed + **6,866** ccf Purchased From Others - Wholesale

		(1) Total Retail Billed Consumption		(2) Single Family Residential		(3) Multi-Family Residential		(4) Commercial/Industrial		(5) Wholesale	(6) Non-revenue
	Purchased From Seattle	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	0
<b>2000</b>											
JAN		64,270	2,145	23,059	1,698	23,462	183	17,749	264	-	-
FEB		34,072	1,785	20,337	1,520	6,042	85	7,693	180	-	-
MAR		59,700	2,192	20,577	1,742	21,962	183	17,161	267	-	-
APR		34,574	1,816	19,808	1,535	6,042	87	8,724	194	-	-
MAY		62,124	2,127	22,217	1,674	22,284	183	17,623	270	-	-
JUN		37,595	1,824	22,232	1,547	5,772	83	9,591	194	-	-
JUL		75,343	2,114	30,192	1,658	24,416	181	20,735	275	-	-
AUG		53,783	1,836	34,842	1,556	6,673	83	12,268	197	-	-
SEP		87,979	2,089	39,088	1,627	25,432	182	23,459	280	-	-
OCT		47,203	1,844	28,982	1,551	6,591	83	11,630	210	-	-
NOV		65,776	2,090	23,483	1,620	22,383	183	19,910	287	-	-
DEC		33,089	1,826	19,397	1,531	5,557	84	8,135	211	-	-
<b>TOTAL</b>	<b>673,791</b>	<b>655,508</b>	<b>3,949</b>	<b>304,214</b>	<b>3,210</b>	<b>176,616</b>	<b>267</b>	<b>174,678</b>	<b>472</b>	<b>70</b>	<b>20,391</b>

(6) Non-Revenue = Purchased from Seattle - Total Retail Billed + **2,178** ccf Purchased From Others - Wholesale

		(1) Total Retail Billed Consumption		(2) Single Family Residential		(3) Multi-Family Residential		(4) Commercial/Industrial		(5) Wholesale	(6) Non-revenue
	Purchased From	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	in ccf
<b>2001</b>											
JAN		59,813	2,093	20,912	1,637	23,200	181	15,701	275	-	-
FEB		32,727	1,811	19,190	1,531	5,542	82	7,995	198	-	-
MAR		56,099	2,084	19,926	1,626	20,213	182	15,960	276	-	-
APR		31,293	1,821	17,894	1,539	5,444	80	7,955	202	-	-
MAY		59,743	2,054	20,929	1,597	21,081	183	17,733	274	-	-
JUN		36,913	1,819	22,107	1,539	5,993	76	8,813	204	-	-
JUL		68,809	2,073	25,683	1,611	22,869	181	20,257	281	-	-
AUG		42,296	1,818	26,878	1,539	5,942	77	9,476	202	-	-
SEP		80,656	2,074	31,150	1,611	25,828	182	23,678	281	-	-
OCT		39,971	1,814	25,147	1,532	5,688	77	9,136	205	-	-
NOV		70,826	2,065	21,524	1,603	20,872	182	28,430	280	-	-
DEC		33,723	1,816	19,680	1,535	5,565	77	8,478	204	-	-
<b>TOTAL</b>	<b>616,644</b>	<b>612,869</b>	<b>3,890</b>	<b>271,020</b>	<b>3,150</b>	<b>168,237</b>	<b>260</b>	<b>173,612</b>	<b>480</b>	<b>-</b>	<b>3,775</b>

(6) Non-Revenue = Purchased from Seattle - Total Retail Billed

**TABLE E.1 (CONTINUED)**  
**KING COUNTY WATER DISTRICT NO. 49**  
**BILLED CONSUMPTION BY MONTH & CLASS**

		(1) Total Retail Billed Consumption		(2) Single Family Residential		(3) Multi-Family Residential		(4) Commercial/Industrial		(5) Wholesale	(6) Non-revenue
	Purchased From Seattle	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	in ccf
<b>2002</b>											
JAN		56,260	2,056	20,041	1,606	20,470	180	15,749	270	-	-
FEB		31,567	1,819	18,624	1,541	5,626	78	7,317	200	-	-
MAR		56,278	2,063	19,367	1,598	20,132	182	16,779	283	-	-
APR		30,138	1,816	18,060	1,541	4,950	77	7,128	198	-	-
MAY		56,634	2,060	20,101	1,604	20,319	184	16,214	272	-	-
JUN		34,784	1,823	21,094	1,535	5,538	80	8,152	208	-	-
JUL		68,600	2,070	27,555	1,604	21,658	181	19,387	285	-	-
AUG		49,009	1,854	32,301	1,561	5,963	78	10,745	215	-	-
SEP		86,110	2,054	37,687	1,589	24,848	180	23,575	285	-	-
OCT		46,977	1,841	31,031	1,549	5,569	78	10,377	214	-	-
NOV		65,305	2,066	24,426	1,593	21,464	182	19,415	291	-	-
DEC		32,561	1,826	19,526	1,537	5,460	81	7,575	208	-	-
<b>TOTAL</b>	<b>625,111</b>	<b>614,223</b>	<b>3,891</b>	<b>289,813</b>	<b>3,143</b>	<b>161,997</b>	<b>260</b>	<b>162,413</b>	<b>488</b>	<b>-</b>	<b>10,888</b>

(6) Non-Revenue = Purchased from Seattle - Total Retail Billed

		(1) Total Retail Billed Consumption		(2) Single Family Residential		(3) Multi-Family Residential		(4) Commercial/Industrial		(5) Wholesale	(6) Non-revenue
	Purchased From Seattle	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	in ccf
<b>2003</b>											
JAN		56,154	2,057	20,082	1,593	19,912	184	16,160	280	-	-
FEB		31,797	1,817	18,864	1,536	5,522	77	7,411	204	-	-
MAR		53,771	2,058	19,076	1,597	18,909	182	15,786	279	-	-
APR		28,537	1,818	17,035	1,540	4,573	77	6,929	201	-	-
MAY		56,556	2,054	20,308	1,596	20,349	181	15,899	277	-	-
JUN		35,675	1,825	21,784	1,541	5,171	77	8,720	207	-	-
JUL		79,487	2,070	32,836	1,604	22,785	181	23,866	285	-	-
AUG		58,691	1,848	40,913	1,548	6,980	79	10,798	221	-	-
SEP		94,346	2,082	41,212	1,606	24,492	180	28,642	296	-	-
OCT		48,392	1,832	30,686	1,533	5,735	82	11,971	217	-	-
NOV		70,177	2,075	24,329	1,599	24,277	182	21,571	294	-	-
DEC		31,433	1,819	18,210	1,538	4,807	77	8,416	204	-	-
<b>TOTAL</b>	<b>611,986</b>	<b>645,016</b>	<b>3,891</b>	<b>305,335</b>	<b>3,143</b>	<b>163,512</b>	<b>260</b>	<b>176,169</b>	<b>488</b>	<b>10</b>	<b>(33,040)</b>

(6) Non-Revenue = Purchased from Seattle - Total Retail Billed - Wholesale

		(1) Total Retail Billed Consumption		(2) Single Family Residential		(3) Multi-Family Residential		(4) Commercial/Industrial		(5) Wholesale	(6) Non-revenue
	Purchased From Seattle	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	in ccf
<b>2004</b>											
JAN		42,970	1,450	14,621	1,065	17,105	138	11,244	247	-	-
FEB		33,416	1,824	19,594	1,541	5,380	80	8,442	203	-	-
MAR		47,717	2,056	16,727	1,590	17,667	184	13,323	282	-	-
APR		30,814	1,833	17,679	1,550	5,068	84	8,067	199	-	-
MAY		61,909	2,081	22,629	1,588	21,595	188	17,685	305	-	-
JUN		38,493	1,847	24,262	1,548	4,929	86	9,302	213	-	-
JUL		74,457	2,078	29,339	1,592	23,141	183	21,977	303	-	-
AUG		54,980	1,838	38,208	1,541	5,625	82	11,147	215	-	-
SEP		90,904	2,081	36,076	1,593	25,591	183	29,237	305	-	-
OCT		40,134	1,828	24,908	1,535	5,209	81	10,017	212	-	-
NOV		68,542	2,081	21,179	1,595	21,544	184	25,819	302	-	-
DEC		26,509	1,839	17,915	1,542	5,534	88	3,060	209	-	-
<b>TOTAL</b>	<b>640,512</b>	<b>610,845</b>	<b>3,806</b>	<b>283,137</b>	<b>3,047</b>	<b>158,388</b>	<b>260</b>	<b>169,320</b>	<b>499</b>	<b>-</b>	<b>29,667</b>

(6) Non-Revenue = Purchased from Seattle - Total Retail Billed

**TABLE E.1 (CONTINUED)**  
**KING COUNTY WATER DISTRICT NO. 49**  
**BILLED CONSUMPTION BY MONTH & CLASS**

		(1) Total Retail Billed Consumption		(2) Single Family Residential		(3) Multi-Family Residential		(4) Commercial/Industrial		(5) Wholesale	(6) Non-revenue
	Purchased From Seattle	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	in ccf
<b>2005</b>											
JAN		61,627	2,061	20,872	1,584	20,789	178	19,966	299	-	-
FEB		31,860	1,835	19,167	1,542	4,815	81	7,878	212	-	-
MAR		53,121	2,112	18,296	1,603	19,944	183	14,881	326	-	-
APR		29,885	1,830	17,682	1,540	4,715	81	7,488	209	-	-
MAY		55,306	2,091	19,192	1,596	19,569	184	16,545	311	-	-
JUN		31,780	1,844	19,575	1,556	4,188	79	8,017	209	-	-
JUL		67,230	2,102	24,950	1,607	22,478	186	19,802	309	-	-
AUG		44,831	1,844	28,989	1,553	5,033	81	10,809	210	-	-
SEP		81,072	2,100	33,340	1,606	24,658	185	23,074	309	-	-
OCT		47,512	1,855	30,184	1,554	5,311	79	12,017	222	-	-
NOV		72,402	2,096	21,690	1,607	21,653	183	29,059	306	-	-
DEC		29,294	1,847	18,372	1,549	4,467	81	6,455	217	-	-
<b>TOTAL</b>	<b>587,490</b>	<b>605,920</b>	<b>3,937</b>	<b>272,309</b>	<b>3,150</b>	<b>157,620</b>	<b>264</b>	<b>175,991</b>	<b>523</b>	<b>-</b>	<b>(18,430)</b>

(6) Non-Revenue = Purchased from Seattle - Total Retail Billed

		(1) Total Retail Billed Consumption		(2) Single Family Residential		(3) Multi-Family Residential		(4) Commercial/Industrial		(5) Wholesale	(6) Non-revenue
	Purchased From Seattle	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	in ccf
<b>2006</b>											
JAN		60,652	2,095	21,640	1,629	22,018	178	16,994	288	-	-
FEB		30,858	1,850	18,425	1,565	4,271	81	8,162	204	-	-
MAR		51,194	2,091	17,909	1,626	18,886	183	14,399	282	-	-
APR		31,078	1,852	18,601	1,569	4,497	81	7,980	202	-	-
MAY		56,800	2,086	20,249	1,619	20,193	184	16,358	283	-	-
JUN		34,709	1,856	21,793	1,577	4,777	79	8,139	200	-	-
JUL		77,751	2,102	33,390	1,633	25,015	186	19,346	283	-	-
AUG		51,027	1,858	36,134	1,578	5,394	81	9,499	199	-	-
SEP		87,053	2,096	43,023	1,622	24,191	185	19,839	289	-	-
OCT		47,687	1,869	32,689	1,581	5,244	79	9,754	209	-	-
NOV		58,369	2,099	21,907	1,634	20,030	183	16,432	282	-	-
DEC		33,368	1,851	20,261	1,572	4,886	81	8,221	198	-	-
<b>TOTAL</b>	<b>599,956</b>	<b>620,546</b>	<b>3,952</b>	<b>306,021</b>	<b>3,201</b>	<b>159,402</b>	<b>264</b>	<b>155,123</b>	<b>487</b>	<b>-</b>	<b>(20,590)</b>

(6) Non-Revenue = Purchased from Seattle - Total Retail Billed

		(1) Total Retail Billed Consumption		(2) Single Family Residential		(3) Multi-Family Residential		(4) Commercial/Industrial		(5) Wholesale	(6) Non-revenue
	Purchased From Seattle	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	in ccf
<b>2007</b>											
JAN		56,780	2,114	19,908	1,621	21,369	183	15,503	310	-	-
FEB		29,761	1,850	17,685	1,546	4,313	75	7,763	229	-	-
MAR		58,078	2,114	19,904	1,619	20,927	184	17,247	311	-	-
APR		29,832	1,851	17,251	1,552	4,475	75	8,106	224	-	-
MAY		55,659	2,135	19,391	1,640	20,763	185	15,505	310	-	-
JUN		36,264	1,873	22,649	1,565	4,925	80	8,690	228	-	-
JUL		73,595	2,142	28,775	1,652	23,236	183	21,584	307	-	-
AUG		46,872	1,872	31,349	1,564	5,376	77	10,147	231	-	-
SEP		82,388	2,139	33,075	1,647	24,807	184	24,506	308	-	-
OCT		42,082	1,883	25,844	1,560	4,818	77	11,420	246	-	-
NOV		59,588	2,152	20,151	1,662	21,419	187	18,018	303	-	-
DEC		31,673	1,866	18,327	1,559	5,378	77	7,968	230	-	-
<b>TOTAL</b>	<b>636,898</b>	<b>602,572</b>	<b>3,999</b>	<b>274,309</b>	<b>3,198</b>	<b>161,806</b>	<b>261</b>	<b>166,457</b>	<b>540</b>	<b>-</b>	<b>34,326</b>

(6) Non-Revenue = Purchased from Seattle - Total Retail Billed

**TABLE E.1 (CONTINUED)**  
**KING COUNTY WATER DISTRICT NO. 49**  
**BILLED CONSUMPTION BY MONTH & CLASS**

**Note: The District changed its billing system in Fall 2012, so no monthly detail of water usage is available for years 2008-2012.**

	Purchased From Seattle	(1) Total Retail Billed Consumption		(2) Single Family Residential		(3) Multi-Family Residential		(4) Commercial/ Industrial/ Irrigation Non-Residential		(5) Wholesale	(6) Non-revenue
		Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	in ccf
<b>2013</b>											
JAN		39,367	3,975	16,251	3,140	12,774	314	10,342	521	-	-
FEB		38,165	3,976	15,851	3,139	11,994	315	10,320	522	-	-
MAR		36,955	3,975	15,167	3,141	11,440	313	10,348	521	-	-
APR		37,951	4,013	15,400	3,152	12,066	342	10,485	519	-	-
MAY		40,810	4,011	17,207	3,151	12,472	343	11,131	517	-	-
JUN		46,224	4,030	20,088	3,149	13,769	361	12,367	520	-	-
JUL		53,762	4,040	25,505	3,153	14,422	364	13,835	523	-	-
AUG		60,904	4,042	29,479	3,155	15,535	363	15,890	524	-	-
SEP		56,757	4,040	26,234	3,156	15,056	360	15,467	524	-	-
OCT		45,872	4,028	19,860	3,147	13,374	360	12,638	521	-	-
NOV		40,734	4,028	16,422	3,149	13,122	360	11,190	519	-	-
DEC		39,666	4,030	16,032	3,147	12,910	362	10,724	521	-	-
<b>TOTAL</b>	<b>562,840</b>	<b>537,167</b>	<b>4,015</b>	<b>233,496</b>	<b>3,148</b>	<b>158,934</b>	<b>346</b>	<b>144,737</b>	<b>521</b>	<b>-</b>	<b>25,722</b>

(6) Non-Revenue = Purchased from Seattle - Total Retail Billed. Discrepancy with WUE DSL due to authorized non-metered consumption not removed from this calculation.

	Purchased From Seattle	(1) Total Retail Billed Consumption		(2) Single Family Residential		(3) Multi-Family Residential		(4) Commercial/ Industrial/ Irrigation Non-		Wholesale Sales	(6) Non-revenue
		Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	in ccf
<b>2014</b>											
JAN		51,486	2,185	16,816	1,635	20,291	250	14,250	269	-	-
FEB		28,393	1,841	15,833	1,509	5,768	112	6,787	195	-	-
MAR		49,769	2,187	16,144	1,638	19,037	248	14,570	271	-	-
APR		26,393	1,845	14,113	1,511	5,231	113	7,041	196	-	-
MAY		51,093	2,377	16,189	1,778	20,223	268	14,604	301	-	-
JUN		31,949	1,847	17,640	1,509	5,991	114	8,018	198	-	-
JUL		64,673	2,191	23,232	1,641	22,569	248	15,671	270	-	-
AUG		46,869	1,844	29,350	1,506	7,005	114	8,450	198	-	-
SEP		77,635	2,188	29,644	1,639	25,956	248	16,777	269	-	-
OCT		40,523	1,850	24,213	1,510	6,885	116	8,030	198	-	-
NOV		60,929	2,197	19,736	1,642	23,059	248	16,406	274	-	-
DEC		28,479	1,851	15,412	1,506	5,945	114	6,841	203	-	-
0		-	2,038	-	1,588	-	183	-	238	-	-
<b>TOTAL</b>	<b>606,746</b>	<b>558,191</b>	<b>26,441</b>	<b>238,322</b>	<b>20,612</b>	<b>167,960</b>	<b>2,376</b>	<b>137,445</b>	<b>3,080</b>	<b>-</b>	<b>48,555</b>

(6) Non-Revenue = Purchased from Seattle - Total Retail Billed. Discrepancies may occur with WUE information as this table includes all forms of authorized non-revenue consumption, not just system leakage

	Purchased From Seattle	(1) Total Retail Billed Consumption		(2) Single Family Residential		(3) Multi-Family Residential		(4) Commercial/ Industrial/ Irrigation Non-		(5) Wholesale	(6) Non-revenue
		Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	in ccf
<b>2015</b>											
JAN		52,242	2,326	16,721	1,643	20,711	249	14,775	272	-	-
FEB		29,155	1,848	15,447	1,507	6,116	114	7,570	202	-	-
MAR		50,036	2,207	15,115	1,652	19,993	251	14,924	273	-	-
APR		26,709	1,834	14,053	1,508	5,518	115	7,111	201	-	-
MAY		53,644	2,213	17,196	1,658	20,146	250	16,187	272	-	-
JUN		32,033	1,850	17,975	1,502	5,876	116	7,624	206	-	-
JUL		72,480	2,241	27,960	1,682	22,788	250	17,320	273	-	-
AUG		56,909	1,862	35,426	1,514	8,311	121	10,018	201	-	-
SEP		77,884	2,210	30,140	1,656	24,869	249	17,717	272	-	-
OCT		37,714	1,851	20,754	1,504	6,510	116	8,589	205	-	-
NOV		55,916	2,216	17,184	1,659	20,291	250	16,825	273	-	-
DEC		27,925	1,856	14,750	1,510	5,780	117	7,124	203	-	-
0		-	2,034	-	1,585	-	184	-	238	-	-
<b>TOTAL</b>	<b>625,497</b>	<b>572,647</b>	<b>26,548</b>	<b>242,721</b>	<b>20,580</b>	<b>166,909</b>	<b>2,382</b>	<b>145,784</b>	<b>3,091</b>	<b>-</b>	<b>52,850</b>

(6) Non-Revenue = Purchased from Seattle - Total Retail Billed. Discrepancies may occur with WUE information as this table includes all forms of authorized non-revenue consumption, not just system leakage



**TABLE E.1 (CONTINUED)**  
**KING COUNTY WATER DISTRICT NO. 49**  
**BILLED CONSUMPTION BY MONTH & CLASS**

		(1) Total Retail Billed Consumption		(2) Single Family Residential		(3) Multi-Family Residential		(4) Commercial/ Industrial/ Irrigation Non-		(5) Wholesale	(6) Non-revenue
	Purchased From Seattle	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	in ccf
<b>2016</b>											
JAN		52,768	2,227	17,189	1,667	20,157	252	15,372	274	-	-
FEB		28,724	1,855	15,636	1,509	5,820	117	7,262	203	-	-
MAR		49,489	2,230	15,584	1,670	18,804	251	15,058	274	-	-
APR		27,690	1,854	14,634	1,507	5,690	118	7,348	202	-	-
MAY		53,608	2,254	17,642	1,692	19,307	252	16,099	273	-	-
JUN		33,521	1,867	18,989	1,518	6,076	118	7,977	204	-	-
JUL		70,441	2,259	24,955	1,698	22,534	252	17,320	272	-	-
AUG		46,281	1,873	28,002	1,519	6,998	121	9,330	206	-	-
SEP		74,363	2,252	28,407	1,693	24,156	251	16,880	273	-	-
OCT		41,242	1,865	23,525	1,513	6,588	118	8,972	207	-	-
NOV		61,085	2,248	22,716	1,690	20,728	252	16,360	271	-	-
DEC		28,384	1,859	14,688	1,511	5,563	117	7,992	203	-	-
0		-	2,056	-	1,601	-	185	-	239	-	-
<b>TOTAL</b>	<b>631,025</b>	<b>567,597</b>	<b>26,699</b>	<b>241,967</b>	<b>20,788</b>	<b>162,419</b>	<b>2,404</b>	<b>145,970</b>	<b>3,101</b>	<b>-</b>	<b>63,428</b>

(6) Non-Revenue = Purchased from Seattle - Total Retail Billed. Discrepancies may occur with WUE information as this table includes all forms of authorized non-revenue consumption, not just system leakage

		(1) Total Retail Billed Consumption		(2) Single Family Residential		(3) Multi-Family Residential		(4) Commercial/ Industrial/ Irrigation Non-		(5) Wholesale	(6) Non-revenue
	Purchased From Seattle	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	Billed consumption in ccf	Number of accounts	in ccf	in ccf
<b>2017</b>											
JAN		54,537	2,249	18,007	1,687	19,228	254	17,300	273	-	-
FEB		29,382	1,870	14,956	1,513	6,638	121	7,769	206	-	-
MAR		49,682	2,247	15,198	1,685	19,138	254	15,345	273	-	-
APR		27,562	1,876	13,347	1,521	5,714	117	8,469	207	-	-
MAY		49,954	2,266	16,056	1,700	19,026	256	14,695	275	-	-
JUN		31,480	1,871	15,878	1,519	5,403	116	9,808	205	-	-
JUL		66,813	2,252	25,238	1,690	22,341	254	16,403	273	-	-
AUG		49,083	1,875	29,848	1,524	6,882	116	10,478	204	-	-
SEP		78,321	2,259	32,042	1,697	24,083	254	16,822	272	-	-
OCT		44,896	1,871	25,003	1,518	6,397	119	11,046	202	-	-
NOV		54,970	2,257	18,531	1,690	19,747	256	15,318	275	-	-
DEC		29,525	1,866	14,654	1,514	5,457	120	8,769	200	-	-
0		-	2,064	-	1,606	-	186	-	239	-	-
<b>TOTAL</b>	<b>602,751</b>	<b>566,205</b>	<b>26,823</b>	<b>238,758</b>	<b>20,864</b>	<b>160,054</b>	<b>2,423</b>	<b>152,222</b>	<b>3,104</b>	<b>-</b>	<b>36,546</b>

(6) Non-Revenue = Purchased from Seattle - Total Retail Billed. Discrepancies may occur with WUE information as this table includes all forms of authorized non-revenue consumption, not just system leakage

**TABLE E.2  
KING COUNTY WATER DISTRICT NO. 49  
ANNUAL HISTORIC WATER DEMAND BY CUSTOMER CLASS**

	Water District 49						
	Total Purchased from SPU	Purchased from Others	Single Family Retail	Multi-Family Retail	Commercial Retail	Total Retail Use	Non-Revenue <sup>1</sup>
1993							
Average Number of Conn.			3,222	256	450	3,928	
Total Use (CCF/year)	639,973	0	313,084	166,098	189,565	668,747	(28,774)
Average Day Use (gal/day)			641,608	340,387	388,478	1,370,473	
Average Use (gal/day/conn)			199				
Estimated ERU's			3,222	1,710	1,952	6,884	
1994							
Average Number of Conn.			3,242	270	450	3,962	
Total Use (CCF/year)	700,404	14,073	352,533	182,075	188,353	722,961	(8,484)
Average Day Use (gal/day)			722,451	373,129	385,995	1,481,575	
Average Use (gal/day/conn)			223				
Estimated ERU's			3,242	1,673	1,731	6,646	
1995							
Average Number of Conn.			3,243	257	451	3,951	
Total Use (CCF/year)	712,027	14,482	372,614	168,615	185,718	726,947	(438)
Average Day Use (gal/day)			763,603	345,545	380,595	1,489,743	
Average Use (gal/day/conn)			235				
Estimated ERU's			3,243	1,470	1,620	6,333	
1996							
Average Number of Conn.			3,245	263	454	3,962	
Total Use (CCF/year)	762,238	14,258	338,307	173,262	173,661	685,230	91,266
Average Day Use (gal/day)			693,298	355,068	355,886	1,404,252	
Average Use (gal/day/conn)			214				
Estimated ERU's			3,245	1,659	1,663	6,567	
1997							
Average Number of Conn.			3,271	265	459	3,995	
Total Use (CCF/year)	689,335	9,395	331,853	174,543	183,037	689,433	9,297
Average Day Use (gal/day)			680,071	357,694	375,100	1,412,865	
Average Use (gal/day/conn)			208				
Estimated ERU's			3,271	1,720	1,803	6,794	
1998							
Average Number of Conn.			3,262	269	449	3,980	
Total Use (CCF/year)	689,310	8,953	330,671	176,486	153,755	660,912	37,351
Average Day Use (gal/day)			677,649	361,675	315,092	1,354,416	
Average Use (gal/day/conn)			208				
Estimated ERU's			3,262	1,739	1,515	6,516	
1999							
Average Number of Conn.			3,265	271	453	3,989	
Total Use (CCF/year)	685,368	6,790	321,759	176,621	170,082	668,462	23,696
Average Day Use (gal/day)			659,386	361,952	348,552	1,369,890	
Average Use (gal/day/conn)			202				
Estimated ERU's			3,265	1,792	1,726	6,783	
2000							
Average Number of Conn.			3,210	267	472	3,949	
Total Use (CCF/year)	673,791	2,108	304,214	176,616	174,678	655,508	20,391
Average Day Use (gal/day)			623,430	361,941	357,970	1,343,341	
Average Use (gal/day/conn)			194				
Estimated ERU's			3,210	1,866	1,845	6,921	
2001							
Average Number of Conn.			3,150	260	480	3,890	
Total Use (CCF/year)	616,644	0	271,020	168,237	173,612	612,869	3,775
Average Day Use (gal/day)			555,405	344,771	355,786	1,255,962	
Average Use (gal/day/conn)			176				
Estimated ERU's			3,150	1,959	2,022	7,131	

<sup>1</sup>Non-Revenue = Total Purchased from SPU + Purchased from Others-Total Retail Use

**TABLE E.2  
KING COUNTY WATER DISTRICT NO. 49  
ANNUAL HISTORIC WATER DEMAND BY CUSTOMER CLASS**

	Water District 49						
	Total Purchased from SPU	Purchased from Others	Single Family Retail	Multi-Family Retail	Commercial Retail	Total Retail Use	Non-Revenue <sup>1</sup>
2002							
Average Number of Conn.			3,143	260	488	3,891	
Total Use (CCF/year)	625,111	0	289,813	161,997	162,413	614,223	10,888
Average Day Use (gal/day)			593,918	331,983	332,835	1,258,736	
Average Use (gal/day/conn)			189				
Estimated ERU's			3,143	1,757	1,761	6,661	
2003							
Average Number of Conn.			3,143	260	488	3,891	
Total Use (CCF/year)	611,986	(10)	305,335	163,512	176,169	645,016	(33,040)
Average Day Use (gal/day)			625,728	335,088	361,026	1,321,842	
Average Use (gal/day/conn)			199				
Estimated ERU's			3,143	1,684	1,814	6,641	
2004							
Average Number of Conn.			3,047	260	499	3,806	
Total Use (CCF/year)	640,512	0	283,137	158,388	169,320	610,845	29,667
Average Day Use (gal/day)			580,237	324,587	346,990	1,251,814	
Average Use (gal/day/conn)			190				
Estimated ERU's			3,047	1,708	1,826	6,581	
2005							
Average Number of Conn.			3,150	264	523	3,937	
Total Use (CCF/year)	587,490	0	272,309	157,620	175,991	605,920	(18,430)
Average Day Use (gal/day)			558,047	323,013	360,661	1,241,721	
Average Use (gal/day/conn)			177				
Estimated ERU's			3,150	1,825	2,038	7,013	
2006							
Average Number of Conn.			3,201	264	487	3,952	
Total Use (CCF/year)	599,956	0	306,021	159,402	155,123	620,546	(20,590)
Average Day Use (gal/day)			627,133	326,665	317,896	1,271,694	
Average Use (gal/day/conn)			196				
Estimated ERU's			3,201	1,667	1,622	6,490	
2007							
Average Number of Conn.			3,198	261	540	3,999	
Total Use (CCF/year)	636,898	0	274,309	161,806	166,457	602,572	34,326
Average Day Use (gal/day)			562,146	331,591	341,123	1,234,860	
Average Use (gal/day/conn)			176				
Estimated ERU's			3,198	1,884	1,938	7,020	
2008							
Average Number of Conn.			3,274	262	476	4,012	
Total Use (CCF/year)	585,791	0	257,233	161,031	147,699	565,963	19,828
Average Day Use (gal/day)			527,151	330,003	302,682	1,159,836	
Average Use (gal/day/conn)			161				
Estimated ERU's			3,274	2,050	1,880	7,204	
2009							
Average Number of Conn.			3,279	260	500	4,039	
Total Use (CCF/year)	589,113	0	273,164	158,028	142,698	573,890	15,223
Average Day Use (gal/day)			559,799	323,849	292,433	1,176,081	
Average Use (gal/day/conn)			171				
Estimated ERU's			3,279	1,894	1,710	6,883	
2010							
Average Number of Conn.			3,263	264	470	3,997	
Total Use (CCF/year)	556,683	130	248,782	152,202	136,462	537,446	19,367
Average Day Use (gal/day)			509,833	311,910	279,654	1,101,397	
Average Use (gal/day/conn)			156				
Estimated ERU's			3,263	1,999	1,793	7,055	

<sup>1</sup>Non-Revenue = Total Purchased from SPU + Purchased from Others-Total Retail Use

**TABLE E.2  
KING COUNTY WATER DISTRICT NO. 49  
ANNUAL HISTORIC WATER DEMAND BY CUSTOMER CLASS**

	Water District 49						
	Total Purchased from SPU	Purchased from Others	Single Family Retail	Multi- Family Retail	Commercial Retail	Total Retail Use	Non- Revenue <sup>1</sup>
2011							
Average Number of Conn.			3,209	311	474	3,994	
Total Use (CCF/year)	638,260	0	240,719	158,949	136,811	536,479	101,781
Average Day Use (gal/day)			493,309	325,737	280,369	1,099,415	
Average Use (gal/day/conn)			154				
Estimated ERU's			3,209	2,115	1,821	7,145	
2012							
Average Number of Conn.			3,148	312	464	3,924	
Total Use (CCF/year)	610,235	37	240,818	159,257	137,736	537,811	72,461
Average Day Use (gal/day)			493,512	326,368	282,264	1,102,144	
Average Use (gal/day/conn)			157				
Estimated ERU's			3,148	2,079	1,798	7,025	
2013							
Average Number of Conn.			3,147	346	521	4,014	
Total Use (CCF/year)	562,840	49	233,496	158,934	144,737	537,167	25,722
Average Day Use (gal/day)			478,507	325,706	296,612	1,100,825	52,712
Average Use (gal/day/conn)			152				
Estimated ERU's			3,147	2,143	1,951	7,241	
2013 Adjusted							
Average Number of Conn.			3,147	346	521	4,014	
Total Use (CCF/year)	562,840	49	233,496	158,934	144,737	537,167	25,722
Average Day Use (gal/day)			478,507	325,706	296,612	1,100,825	52,712
Average Use (gal/day/conn)			165				
Estimated ERU's			3,147	1,974	1,798	6,919	
2014							
Average Number of Conn.			3,171	366	531	4,068	
Total Use (CCF/year)	638,260	0	238,322	167,960	151,909	558,191	80,069
Average Day Use (gal/day)			488,397	344,203	311,309	1,143,909	
Average Use (gal/day/conn)			154				
Estimated ERU's			3,171	2,235	2,021	7,427	
2015							
Average Number of Conn.			3,166	366	551	4,083	
Total Use (CCF/year)	610,235	37	242,721	166,909	163,016	572,646	37,626
Average Day Use (gal/day)			497,412	342,049	334,071	1,173,532	
Average Use (gal/day/conn)			157				
Estimated ERU's			3,166	2,179	2,128	7,473	
2016							
Average Number of Conn.			3,198	370	540	4,108	
Total Use (CCF/year)	562,840	49	241,967	162,419	145,970	550,356	12,533
Average Day Use (gal/day)			495,867	332,847	299,140	1,127,854	25,683
Average Use (gal/day/conn)			155				
Estimated ERU's			3,198	2,147	1,930	7,275	
2017							
Average Number of Conn.			3,210	373	545	4,128	
Total Use (CCF/year)	562,840	49	238,758	160,054	167,393	566,205	(3,316)
Average Day Use (gal/day)			489,290	328,001	343,041	1,160,332	-6,796
Average Use (gal/day/conn)			165				
Estimated ERU's			3,210	1,988	2,079	7,277	

<sup>1</sup>Non-Revenue = Total Purchased SPU - Others Wholesale Consumption-Total Sales  
(-) = sold to others

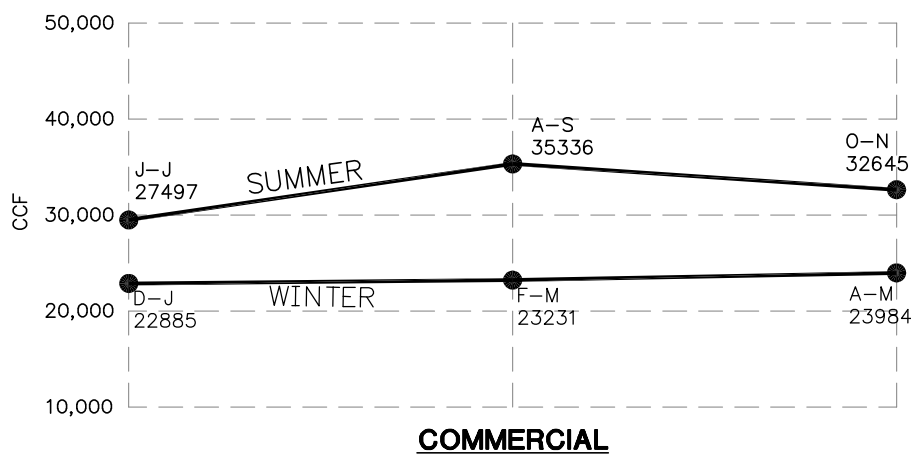
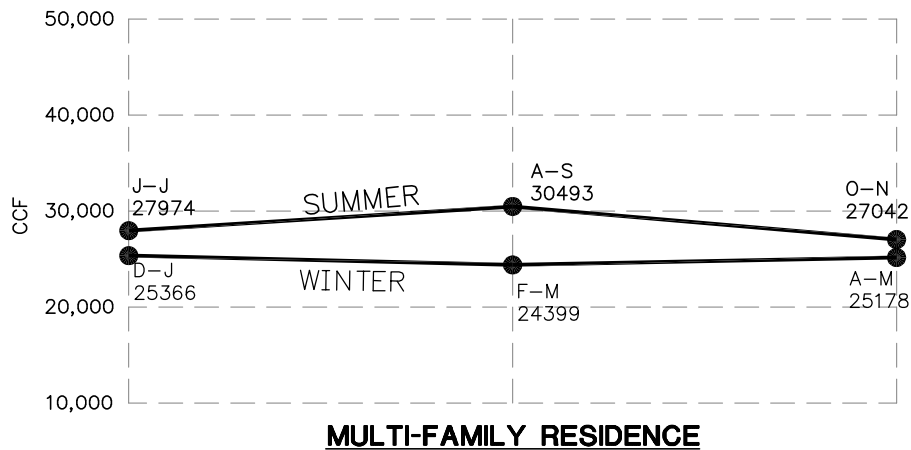
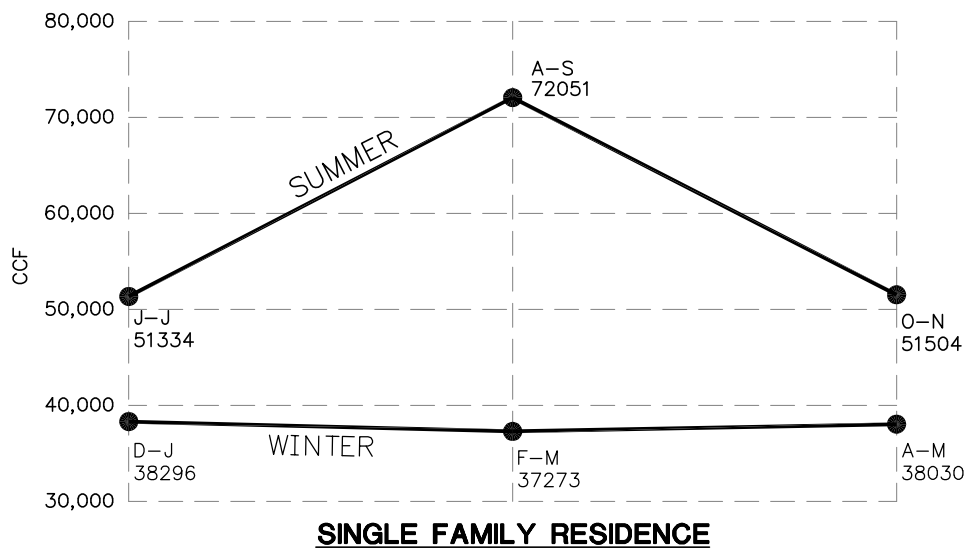
**TABLE E.3**  
**KING COUNTY WATER DISTRICT NO. 49**  
**MONTHLY WATER USAGE SUMMARY**  
**SINGLE FAMILY RESIDENTIAL**

**Winter water use** is for the months of October through March which is billed in December through May  
All water volumes in hundred cubic feet (ccf)

Month	2007	2006	2005	2004	2003	2002	Six Year Total	Two month Average
December	18,327	20,261	18,372	17,915	18,210	19,526	112,611	
January	19,908	21,640	20,872	14,621	20,082	20,041	117,164	38,296
February	17,685	18,425	19,167	19,594	18,864	18,624	112,359	
March	19,904	17,909	18,296	16,727	19,076	19,367	111,279	37,273
April	17,251	18,601	17,682	17,679	17,035	18,060	106,308	
May	19,391	20,249	19,192	22,629	20,308	20,101	121,870	38,030

**Summer water use is** for the months of April through September which is billed in June through November  
All water volumes in hundred cubic feet (ccf)

Month	2007	2006	2005	2004	2003	2002	Six Year Total	Two month Average
June	22,649	21,793	19,575	24,262	21,784	21,094	131,157	
July	28,775	33,390	24,950	29,339	32,836	27,555	176,845	51,334
August	31,349	36,134	28,989	38,208	40,913	32,301	207,894	
September	33,075	43,023	33,340	36,076	41,212	37,687	224,413	72,051
October	25,844	32,689	30,184	24,908	30,686	31,031	175,342	
November	20,151	21,907	21,690	21,179	24,329	24,426	133,682	51,504



**KING COUNTY  
WATER DISTRICT NO. 49  
2019 WATER SYSTEM PLAN**

**FIGURE E-1  
WINTER/SUMMER WATER USAGE  
BY CUSTOMER CLASS**

Table E.4  
Annual ERU and Water Demand Projections  
Average Day, Maximum Day, Peak Hour - 2013-2038  
(Without Conservation)

Type	Growth Rates	2013 Baseline			2014			2015			2016			2017			2018		
		SFR Growth ADD/ERU	ERU	Volume	SFR Growth ADD/ERU	ERU	Volume	SFR Growth ADD/ERU	ERU	Volume	SFR Growth ADD/ERU	ERU	Volume	SFR Growth ADD/ERU	ERU	Volume	SFR Growth ADD/ERU	ERU	Volume
Single Family Residential	1.285%	3,147	519,255	3,187	525,855	3,228	532,620	3,269	539,385	3,311	546,315	3,354	553,410						
Multi Family Residential	3.50%	1,974	325,710	2,009	331,485	2,044	337,260	2,116	349,140	2,190	361,350	2,267	374,055						
Commercial	1.75%	1,798	296,670	1,832	302,280	1,867	308,055	1,902	313,830	1,938	319,770	1,975	325,875						
	1.90%																		
Total Metered (gpd)		6,919	1,141,635	7,028	1,159,620	7,139	1,177,935	7,287	1,202,355	7,439	1,227,435	7,596	1,253,340						
DSL (gpd)	6%		52,612		69,577		70,676		72,141		73,646		75,200						
ADD (gpd)			1,194,247		1,229,197		1,248,611		1,274,496		1,301,081		1,328,540						
ADD (mgd)			1.19		1.23		1.25		1.27		1.30		1.33						
MDD (gpm) (mgd)	2.00	1,622	2.34	1,659	2.39	1,685	2.43	1,720	2.48	1,756	2.53	1,793	2.58						
PHD (gpm) (mgd)		2,666	3.84	2,725	3.92	2,767	3.98	2,823	4.07	2,881	4.15	2,940	4.23						

**Table E.4**  
**Annual ERU and Water Demand Projections**  
**Average Day, Maximum Day, Peak Hour - 2013-2038**  
**(Without Conservation)**

Type	2019			2020			2021			2022			2023		
	SFR Growth	1.29%	165	SFR Growth	1.29%	165	SFR Growth	1.29%	165	SFR Growth	1.29%	165	SFR Growth	1.29%	165
	ADD/ERU	Volume	Volume	ADD/ERU	Volume	Volume	ADD/ERU	Volume	Volume	ADD/ERU	Volume	Volume	ADD/ERU	Volume	Volume
Single Family Residential	3,397	560,505	3,441	567,765	3,485	575,025	3,530	582,450	3,575	589,875					
Multi Family Residential	2,307	380,655	2,347	387,255	2,388	394,020	2,430	400,950	2,473	408,045					
Commercial	2,013	332,145	2,051	338,415	2,090	344,850	2,130	351,450	2,170	358,050					
Total Metered (gpd)	7,717	1,273,305	7,839	1,293,435	7,963	1,313,895	8,090	1,334,850	8,218	1,355,970					
DSL (gpd)		76,398		77,606		78,834		80,091		81,358					
ADD (gpd)		1,349,703		1,371,041		1,392,729		1,414,941		1,437,328					
ADD (mgd)		1.35		1.37		1.39		1.41		1.44					
MDD (gpm) (mgd)	1,822	2.62	1,850	2.66	1,880	2.71	1,910	2.75	1,940	2.79					
PHD (gpm) (mgd)	2,986	4.30	3,032	4.37	3,078	4.43	3,126	4.50	3,175	4.57					



**Table E.4**  
**Annual ERU and Water Demand Projections**  
**Average Day, Maximum Day, Peak Hour - 2013-2038**  
**(Without Conservation)**

Type	2024			2025			2026			2027			2028		
	SFR Growth	1.29%	165	SFR Growth	1.29%	165	SFR Growth	1.29%	165	SFR Growth	1.29%	165	SFR Growth	1.29%	165
	ADD/ERU	Volume	Volume	ADD/ERU	Volume	Volume	ADD/ERU	Volume	Volume	ADD/ERU	Volume	Volume	ADD/ERU	Volume	Volume
Single Family Residential	3,621	597,465	3,668	605,220	3,715	612,975	3,763	620,895	3,811	628,815	3,859	636,735	3,907	644,655	628,815
Multi Family Residential	2,516	415,140	2,560	422,400	2,605	429,825	2,651	437,415	2,697	445,005	2,743	452,595	2,789	460,185	445,005
Commercial	2,211	364,815	2,253	371,745	2,296	378,840	2,340	386,100	2,384	393,360	2,428	400,620	2,472	407,880	393,360
<b>Total Metered (gpd)</b>	<b>8,348</b>	<b>1,377,420</b>	<b>8,481</b>	<b>1,399,365</b>	<b>8,616</b>	<b>1,421,640</b>	<b>8,754</b>	<b>1,444,410</b>	<b>8,892</b>	<b>1,467,180</b>	<b>9,030</b>	<b>1,490,000</b>	<b>9,168</b>	<b>1,512,810</b>	<b>1,467,180</b>
<b>DSL (gpd)</b>		<b>82,645</b>		<b>83,962</b>		<b>85,298</b>		<b>86,665</b>		<b>88,031</b>		<b>89,400</b>		<b>90,765</b>	<b>88,031</b>
<b>ADD (gpd)</b>		<b>1,460,065</b>		<b>1,483,327</b>		<b>1,506,938</b>		<b>1,531,075</b>		<b>1,555,211</b>		<b>1,579,350</b>		<b>1,603,485</b>	<b>1,555,211</b>
<b>ADD (mgd)</b>		<b>1.46</b>		<b>1.48</b>		<b>1.51</b>		<b>1.53</b>		<b>1.56</b>		<b>1.58</b>		<b>1.61</b>	<b>1.56</b>
<b>MDD (gpm) (mgd)</b>	<b>1,970</b>	<b>2.84</b>	<b>2,002</b>	<b>2.88</b>	<b>2,034</b>	<b>2.93</b>	<b>2,066</b>	<b>3.00</b>	<b>2,099</b>	<b>3.06</b>	<b>3.12</b>	<b>3.18</b>	<b>3.24</b>	<b>3.30</b>	<b>3.02</b>
<b>PHD (gpm) (mgd)</b>	<b>3,224</b>	<b>4.64</b>	<b>3,274</b>	<b>4.71</b>	<b>3,325</b>	<b>4.79</b>	<b>3,377</b>	<b>4.86</b>	<b>3,429</b>	<b>4.94</b>	<b>5.01</b>	<b>5.08</b>	<b>5.15</b>	<b>5.22</b>	<b>4.94</b>

**Table E.4**  
**Annual ERU and Water Demand Projections**  
**Average Day, Maximum Day, Peak Hour - 2013-2038**  
**(Without Conservation)**

Type	2029			2030			2031			2032			2033		
	SFR Growth ADD/ERU	1.29% 165	Volume	SFR Growth ADD/ERU	1.29% 165	Volume	SFR Growth ADD/ERU	1.29% 165	Volume	SFR Growth ADD/ERU	1.29% 165	Volume	SFR Growth ADD/ERU	1.29% 165	Volume
Single Family Residential	3,860	636,900	3,910	645,150	3,960	653,400	4,011	661,815	4,063	670,395					
Multi Family Residential	2,744	452,760	2,792	460,680	2,841	468,765	2,891	477,015	2,942	485,430					
Commercial	2,429	400,785	2,475	408,375	2,522	416,130	2,570	424,050	2,619	432,135					
Total Metered (gpd)	9,033	1,490,445	9,177	1,514,205	9,323	1,538,295	9,472	1,562,880	9,624	1,587,960					
DSL (gpd)		89,427		90,852		92,298		93,773		95,278					
ADD (gpd)		1,579,872		1,605,057		1,630,593		1,656,653		1,683,238					
ADD (mgd)		1.58		1.61		1.63		1.66		1.68					
MDD (gpm) (mgd)	2,132	3.07		3.12	2,201	3.17	2,236	3.22	2,272	3.27					
PHD (gpm) (mgd)	3,483	5.01		5.09	3,592	5.17	3,648	5.25	3,706	5.34					

Table E.4  
Annual ERU and Water Demand Projections  
Average Day, Maximum Day, Peak Hour - 2013-2038  
(Without Conservation)

Type	2034			2035			2036			2037			2038		
	SFR Growth ADD/ERU	1.29% 165	Volume	SFR Growth ADD/ERU	1.29% 165	Volume	SFR Growth ADD/ERU	1.29% 165	Volume	SFR Growth ADD/ERU	1.29% 165	Volume	SFR Growth ADD/ERU	1.29% 165	Volume
Single Family Residential	4,115	678,975	4,168	687,720	4,222	696,630	4,276	705,540	4,331	714,615					
Multi Family Residential	2,993	493,845	3,045	502,425	3,098	511,170	3,152	520,080	3,207	529,155					
Commercial	2,669	440,385	2,720	448,800	2,772	457,380	2,825	466,125	2,879	475,035					
Total Metered (gpd)	9,777	1,613,205	9,933	1,638,945	10,092	1,665,180	10,253	1,691,745	10,417	1,718,805					
DSL (gpd)		96,792		98,337		99,911		101,505		103,128					
ADD (gpd)		1,709,997		1,737,282		1,765,091		1,793,250		1,821,933					
ADD (mgd)		1.71		1.74		1.77		1.79		1.82					
MDD (gpm) (mgd)	2,308	3.32	2,345	3.38	2,382	3.43	2,420	3.48	2,459	3.54					
PHD (gpm) (mgd)	3,764	5.42	3,822	5.50	3,883	5.59	3,943	5.68	4,005	5.77					

**Table E.5**  
**Annual ERU and Water Demand Projections**  
**Average Day, Maximum Day, Peak Hour - 2013-2038**  
**(With Conservation)**

Type	Growth Rates	2013 Baseline			2014			2015			2016			2017			2018		
		SFR Growth		Volume	SFR Growth		Volume	SFR Growth		Volume	SFR Growth		Volume	SFR Growth		Volume	SFR Growth		Volume
		ADD/ERU	ERU		ADD/ERU	ERU		ADD/ERU	ERU		ADD/ERU	ERU		ADD/ERU	ERU		ADD/ERU	ERU	
Single Family Residential	1.285%	3,147	519,255	3,187	522,031	3,228	524,873	3,269	527,617	3,311	530,422	3,354	533,286						
Multi Family Residential	3.50%	1,974	325,710	2,009	329,074	2,044	332,354	2,116	341,522	2,190	350,838	2,267	360,453						
Commercial	1.75%	1,798	296,670	1,832	300,082	1,867	303,574	1,902	306,983	1,938	310,468	1,975	314,025						
	1.90%																		
<b>Total Metered (gpd)</b>																			
DSL (gpd)	6%	6,919	1,141,635	7,028	1,151,186	7,139	1,160,801	7,287	1,176,122	7,439	1,191,728	7,596	1,207,764						
ADD (gpd)			52,612		69,071		69,648		70,567		71,504		72,466						
			1,194,247		1,220,258		1,230,449		1,246,689		1,263,231		1,280,230						
<b>ADD (mgd)</b>																			
MDD (gpm) (mgd)	2.00	1,622	1.19	1,647	1.22	1,661	1.23	1,683	1.25	1,705	1.26	1,728	1.28						
PHD (gpm) (mgd)		2,666	2.34	2,706	2.37	2,727	2.39	2,762	2.42	2,797	2.45	2,834	2.49						
			3.84		3.90		3.93		3.98		4.03		4.08						

Table E.5  
Annual ERU and Water Demand Projections  
Average Day, Maximum Day, Peak Hour - 2013-2038  
(With Conservation)

Type	2019			2020			2021			2022			2023		
	SFR Growth ADD/ERU	1.29% Volume	ERU	SFR Growth ADD/ERU	1.29% Volume	ERU	SFR Growth ADD/ERU	1.29% Volume	ERU	SFR Growth ADD/ERU	1.29% Volume	ERU	SFR Growth ADD/ERU	1.29% Volume	ERU
Single Family Residential	3,397	538,764	3,441	544,366	3,485	549,933	3,530	555,622	3,575	562,705					
Multi Family Residential	2,307	365,890	2,347	371,295	2,388	376,826	2,430	382,482	2,473	389,250					
Commercial	2,013	319,262	2,051	324,468	2,090	329,802	2,130	335,262	2,170	341,558					
Total Metered (gpd)	7,717	1,223,916	7,839	1,240,130	7,963	1,256,561	8,090	1,273,366	8,218	1,293,513					
DSL (gpd)		73,435		74,408		75,394		76,402		77,611					
ADD (gpd)		1,297,351		1,314,538		1,331,955		1,349,768		1,371,124					
ADD (mgd)		1.30		1.31		1.33		1.35		1.37					
MDD (gpm) (mgd)	1,751	2.52	1,774	2.55	1,798	2.59	1,822	2.62	1,850	2.66					
PHD (gpm) (mgd)	2,870	4.13	2,907	4.19	2,945	4.24	2,983	4.30	3,029	4.36					

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Annual ERU and Water Demand Projections  
Average Day, Maximum Day, Peak Hour - 2013-2038  
(With Conservation)

Type	2024			2025			2026			2027			2028		
	SFR Growth	1.29%	ADD/ERU	SFR Growth	1.29%	ADD/ERU	SFR Growth	1.29%	ADD/ERU	SFR Growth	1.29%	ADD/ERU	SFR Growth	1.29%	ADD/ERU
	ERU	Volume		ERU	Volume		ERU	Volume		ERU	Volume		ERU	Volume	
Single Family Residential	3,621	569,945		3,668	577,343		3,715	584,741		3,763	592,296		3,811	599,851	
Multi Family Residential	2,516	396,018		2,560	402,944		2,605	410,027		2,651	417,267		2,697	424,508	
Commercial	2,211	348,011		2,253	354,622		2,296	361,390		2,340	368,316		2,384	375,242	
Total Metered (gpd)	8,348	1,313,975		8,481	1,334,909		8,616	1,356,158		8,754	1,377,880		8,892	1,399,601	
DSL (gpd)		78,839			80,095			81,370			82,673			83,976	
ADD (gpd)		1,392,814			1,415,004			1,437,528			1,460,552			1,483,577	
ADD (mgd)		1.39			1.42			1.44			1.46			1.48	
MDD (gpm) (mgd)	1,880	2.71		1,910	2.75		1,940	2.79		1,971	2.84		2,002	2.88	
PHD (gpm) (mgd)	3,076	4.43		3,124	4.50		3,173	4.57		3,222	4.64		3,272	4.71	

Table E.5  
Annual ERU and Water Demand Projections  
Average Day, Maximum Day, Peak Hour - 2013-2038  
(With Conservation)

Type	2029			2030			2031			2032			2033		
	SFR Growth ADD/ERU	1.29% 157.4	Volume	SFR Growth ADD/ERU	1.29% 157.4	Volume	SFR Growth ADD/ERU	1.29% 157.4	Volume	SFR Growth ADD/ERU	1.29% 157.4	Volume	SFR Growth ADD/ERU	1.29% 157.4	Volume
Single Family Residential	3,860	607,564	3,910	615,434	3,960	623,304	4,011	631,331	4,063	639,516					
Multi Family Residential	2,744	431,906	2,792	439,461	2,841	447,173	2,891	455,043	2,942	463,071					
Commercial	2,429	382,325	2,475	389,565	2,522	396,963	2,570	404,518	2,619	412,231					
Total Metered (gpd)	9,033	1,421,794	9,177	1,444,460	9,323	1,467,440	9,472	1,490,893	9,624	1,514,818					
DSL (gpd)		85,308		86,668		88,046		89,454		90,889					
ADD (gpd)		1,507,102		1,531,127		1,555,487		1,580,346		1,605,707					
ADD (mgd)		1.51		1.53		1.56		1.58		1.61					
MDD (gpm) (mgd)	2,034	2.93	2,066	2.98	2,099	3.02	2,133	3.07	2,167	3.12					
PHD (gpm) (mgd)	3,323	4.79	3,375	4.86	3,427	4.94	3,481	5.01	3,536	5.09					

Table E.5  
Annual ERU and Water Demand Projections  
Average Day, Maximum Day, Peak Hour - 2013-2038  
(With Conservation)

Type	2034			2035			2036			2037			2038		
	SFR Growth ADD/ERU	1.29% 157.4	Volume	SFR Growth ADD/ERU	1.29% 157.4	Volume	SFR Growth ADD/ERU	1.29% 157.4	Volume	SFR Growth ADD/ERU	1.29% 157.4	Volume	SFR Growth ADD/ERU	1.29% 157.4	Volume
Single Family Residential	4,115	647,701	4,168	656,043	4,222	664,543	4,276	673,042	4,331	681,699					
Multi Family Residential	2,993	471,098	3,045	479,283	3,098	487,625	3,152	496,125	3,207	504,782					
Commercial	2,669	420,101	2,720	428,128	2,772	436,313	2,825	444,655	2,879	453,155					
Total Metered (gpd)	9,777	1,538,900	9,933	1,563,454	10,092	1,588,481	10,253	1,613,822	10,417	1,639,636					
DSL (gpd)		92,334		93,807		95,309		96,829		98,378					
ADD (gpd)		1,631,234		1,657,261		1,683,790		1,710,652		1,738,014					
ADD (mgd)		1.63		1.66		1.68		1.71		1.74					
MDD (gpm) (mgd)	2,201	3.17	2,237	3.22	2,272	3.27	2,309	3.32	2,346	3.38					
PHD (gpm) (mgd)	3,591	5.17	3,647	5.25	3,705	5.33	3,763	5.42	3,822	5.50					





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# ***Annual Water Quality Report***

April 2016

## ***What Do You Know About Your Drinking Water?***

King County Water District No. 49 is pleased to provide you with this information about your drinking water. The purpose of this report is to inform our customers about the high quality of drinking water in Water District No. 49's water system. We would like you to know where your water comes from, what it contains and how it compares to stringent Federal water quality standards. This report summarizes the 2015 water quality testing results for your water.

The water you drink is supplied from the Cedar River Watershed. The Cedar River Watershed is located in a remote, uninhabited area of the Cascade Mountains and is managed by the City of Seattle. The city also maintains large transmission pipelines which convey the water from the watershed to our area. The District's distribution system is connected to these pipelines by four separate taps on large transmission mains.

The City of Seattle safeguards the quality of drinking water by enforcing an aggressive protection plan for the watershed. If you have any questions regarding this report, please call Ms. Holly Inkpen, Office Manager, at 206.242.8535.

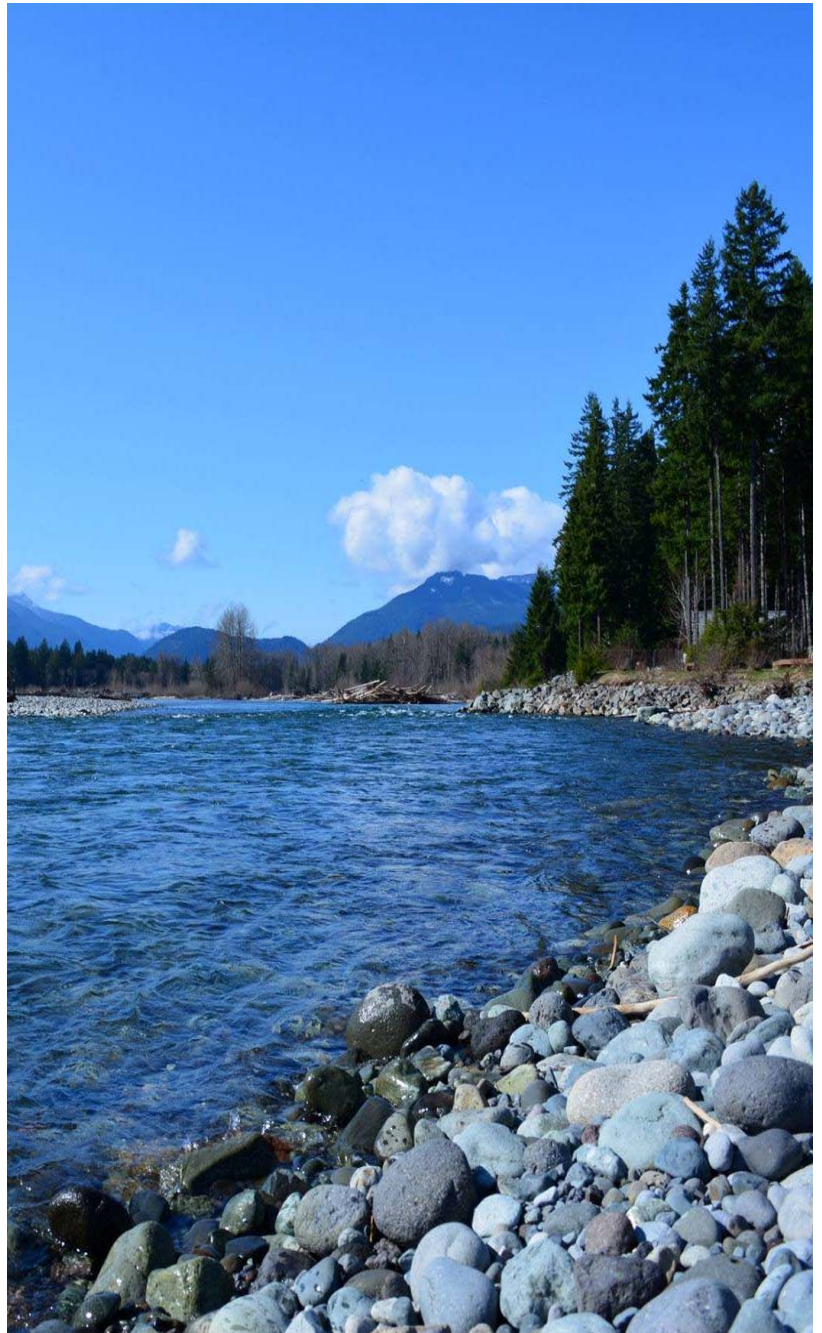


Photo by Bob Gulling

King County Water District No. 49 holds its Board meetings the second and fourth Wednesday of each month. Meetings are held at the District office located at 415 SW 153<sup>rd</sup> St, Burien, WA 98166-2214. You can contact the District at 206.242.8535 for more information.

## *Residential Tap Monitoring for Lead Copper*

Our Source waters *do not contain lead or copper*. However, lead and copper can leach into residential water from building plumbing systems. Lead and copper monitoring is conducted at homes

categorized as high risk, most recently in 2015. Compliance is determined on a regional basis. As shown in the table below, our 90<sup>th</sup> percentile lead concentration is below the Action Level.

### Lead and Copper Monitoring Results (Cedar WSA)

Parameter and Units	MCLG	Action Level+	2015 Results*	Homes Exceeding Action Level	Source
Lead, ppb	0	15	4.0	0 of 50	Corrosion of household plumbing systems
Copper, ppm	1.3	1.3	0.161	0 of 50	

\* 90th Percentile: i.e. 90 percent of the samples were less than the values shown

+ The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. King County Water District No. 49 is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at <http://www.epa.gov/safewater/lead>

## *Information Provided by the U.S. EPA*

### Do I need to take special precautions?

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Water Drinking Hotline (800-426-4791).

### Why are there contaminants in my drinking water?

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's (EPA) Safe Drinking Water Hotline (800-426-4791).

## *Cryptosporidium Parvum*

*Cryptosporidium Parvum* are microscopic organisms that, when ingested, can result in diarrhea, fever and other gastrointestinal symptoms. These organisms are in all of Washington's rivers and

streams and are a product of animal activity in the watershed. The District regularly tests for *Cryptosporidium*.



Photo by Bob Gulling

## 2015 Water Quality Monitoring Results

In February of this year the results of the 2015 regional water quality testing were provided to the District by the Seattle Public Utilities Water Quality Laboratory. This testing information has been summarized in the table below.

The first column lists each compound tested and the units of measurement used for the test. The second column indicates the highest levels the U.S. EPA allows for each compound.

The third column illustrates the levels found in the Cedar River supply and if these levels meet compliance levels. The last column shows the typical source for the compounds.

All of the compounds found in the Cedar River supply were found to be at *lower levels* than the EPA allows. For more information about water quality testing you can contact the EPA at 800-426-4791.

		EPA's		Levels in		Levels in		
		Allowable Limits		Cedar Water		Well Water <sup>#</sup>		
Detected Compounds	Units	MCLG	MCL	Average	Range	Average	Range	Typical Sources
Raw Water								
Total Organic Carbon	ppm	NA	TT	0.7	0.5 to 1.5	NA	NA	Naturally present in the environment
Cryptosporidium**	#/100L	NA	NA	1	ND to 8	NA	NA	Naturally present in the environment
Finished Water								
Turbidity	NTU	NA	TT	0.4	0.1 to 1.2	0.2	0.1 to 0.3	Soil runoff
Arsenic	ppb	0	10	0.5	0.4 to 0.7	3.9	1.7 to 7.9	Erosion of natural deposits
Chromium	ppb	100	100	0.27	.025 to 0.33	0.7	0.3 to 1.3	Erosion of natural deposits
Nitrate	ppm	10	10	0.01	(one sample)	ND	ND	Erosion of natural deposits
Fluoride	ppm	4	4	0.8	0.7 to 0.9	0.7	0.5 to 1.0	Water additive, which promotes strong teeth
Barium	ppb	2000	2000	1.6	(one sample)	3.0	2.2 to 4.6	Erosion of natural deposits
Total Trihalomethanes	ppb	NA	80	W.D. 49 Monitoring Site*				By-products of drinking water chlorination
				31	28-35			
Haloacetic Acids (5)	ppb	NA	60	W.D. 49 Monitoring Site*				By-products of drinking water chlorination
				30	29-34			
Chlorine	ppm	MRDLG=4	MRDL=4	W.D. 49 Monitoring Site*				Water additive used to control microbes
				Average = .86 Range = .69-1				
Bromate	ppb	0	10	ND	ND	NA	NA	By-products of drinking water disinfection

\*Tested in 2015

\*\*Cryptosporidium was detected in 2 of 9 samples from the Cedar supply. This monitoring is not required for wells.

#Values presented represent 100% well water. All well water was blended with Cedar supply water before delivery to customers. The wells operated from July to November 2015.

## Definitions

**Maximum Contaminant Level Goal (MCLG)** – The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLG's allow for a margin of safety.

**Maximum Contaminant Level (MCL)** – The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

**Maximum Residual Disinfectant Level (MRDL)** – The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

**Maximum Residual Disinfectant Level Goal (MRDLG)** – The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

**NA** – Not Applicable

**ND** – Not Detected

**Nephelometric Turbidity Unit (NTU)** – Turbidity is a measure of how clear the water looks. The turbidity MCL that applied to the Cedar supply in 2015 is 5 NTU.

**ppm** – 1 part per million = 1mg/L = 1 milligram per liter

**ppb** – 1 part per billion = 1ug/L = 1 microgram per liter

**Treatment Technique (TT)** – A required process intended to reduce the level of a contaminant in drinking water.

**1 ppm** – 1,000 ppb



# 4 Water Conservation

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## *Water Efficiency*

King County Water District No. 49's commitment to water conservation began in the early 1990's. Programs were designed to meet the Washington State Department of Health Conservation (DOH) Planning Guidelines and to slow the increase of average and peak seasonal water use demand. The DOH revised its requirements for water conservation planning as a result of the 2003 Municipal Water Law. As part of this law, the District adopted water use efficiency goals in a public process December 2007. The District, Seattle and 16 other water utilities formed the Saving Water Partnership (SWP). The SWP consist of the Wholesale Water Customers, excluding municipalities and special purpose districts that belong to Cascade Water Alliance.

For 2015, King County Water District No. 49 purchased 4.68 million gallons of water and had a distribution system leakage rate of 1.8%. District customers used rebates and replaced 1 toilet in a single family dwelling. District customers used 1 of the Water Smart Technology incentives. The District replaced over 200 water meters and replaced 9 hydrants.

The District's Water Use Efficiency goals are shown below in the italics and the progress towards meeting those goals will be reported annually.

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The Saving Water Partnership (SWP) — which is made up of King County Water District 49 and its 18 water utility partners — has set a six-year conservation goal: reduce per capita use from current levels so that the SWP's total average annual retail water use is less than 105 mgd from 2013 through 2018 despite forecasted population growth. For 2015, the Saving Water Partnership met the goal, using 93.8 mgd.

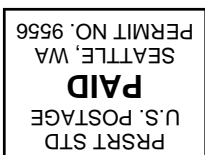
Thank you for all you are doing to conserve water. It makes a difference! Conserving water year-round keeps your water bill as low as possible, and saves water for future generations and conservation is good for salmon too.

***King County Water District No. 49 will continue to have less than 10 percent annual water leakage for the entire system.***

The District has averaged less than 6% water leakage for the past 18 years with high water losses of 13.3 percent in 1996. The leakage rate for 2015 was 1.8%. The District will continue to tighten the water system by completing more water main replacement projects in the future.



King County Water District No. 49  
415 SW 153rd St  
Burien, WA 98166-2214



# ***Annual Water Quality Report***

April 2017

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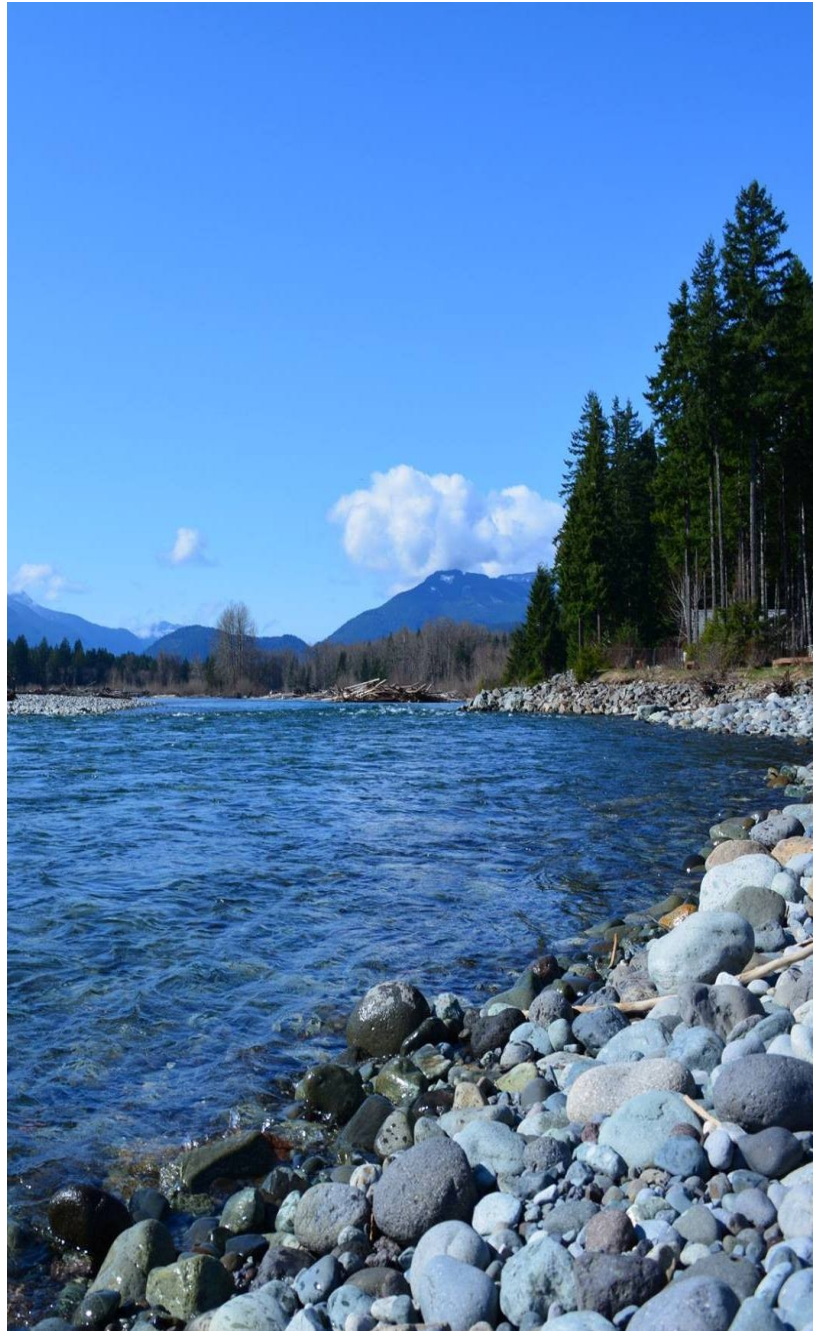


Photo by Bob Gulling

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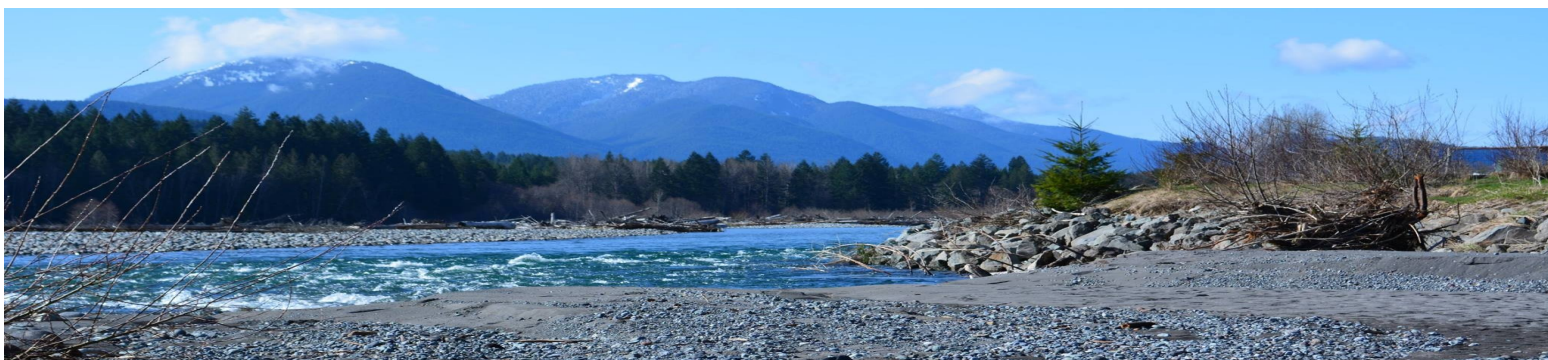


Photo by Bob Gulling



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In February of this year the results of the 2015 regional water quality testing were provided to the District by the Seattle Public Utilities Water Quality Laboratory. This testing information has been summarized in the table below.

The first column lists each compound tested and the units of measurement used for the test. The second column indicates the highest levels the U.S. EPA allows for each compound.

The third column illustrates the levels found in the Cedar River supply and if these levels meet compliance levels. The last column shows the typical source for the compounds.

All of the compounds found in the Cedar River supply were found to be at *lower levels* than the EPA allows. For more information about water quality testing you can contact the EPA at 800-426-4791.

		EPA's		Levels in		
		Allowable Limits		Cedar Water		
Detected Compounds	Units	MCLG	MCL	Average	Range	Typical Sources
Raw Water						
Total Organic Carbon	ppm	NA	TT	0.8	3 to 2.1	Naturally present in the environment
Cryptosporidium**	#/100L	NA	NA	0.3	ND to 2	Naturally present in the environment
Finished Water						
Turbidity	NTU	NA	TT	0.3	0.2 to 2.3	Soil runoff
Arsenic	ppb	0	10	0.5	0.4 to 0.6	Erosion of natural deposits
Chromium	ppb	100	100	0.27	.025 to 0.33	Erosion of natural deposits
Nitrate	ppm	10	10	0.01	(one sample)	Erosion of natural deposits
Fluoride	ppm	4	4	0.5	0.6 to 0.9	Water additive, which promotes strong teeth
Barium	ppb	2000	2000	1.6	(one sample)	Erosion of natural deposits
Total Trihalomethanes	ppb	NA	80	W.D. 49 Monitoring Site*		By-products of drinking water chlorination
				31	28-35	
Haloacetic Acids (5)	ppb	NA	60	W.D. 49 Monitoring Site*		By-products of drinking water chlorination
				30	29-34	
Chlorine	ppm	MRDLG=4	MRDL=4	W.D. 49 Monitoring Site*		Water additive used to control microbes
				Average = .86 Range = .69		
Bromate	ppb	0	10	ND	ND	By-products of drinking water disinfection

\*\*Cryptosporidium was detected in 2 of 12 samples from the Cedar supply.

## Definitions

**Maximum Contaminant Level Goal (MCLG)** – The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLG's allow for a margin of safety.

**Maximum Contaminant Level (MCL)** – The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

**Maximum Residual Disinfectant Level (MRDL)** – The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

**Maximum Residual Disinfectant Level Goal (MRDLG)** – The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

**NA** – Not Applicable

**ND** – Not Detected

**Nephelometric Turbidity Unit (NTU)** – Turbidity is a measure of how clear the water looks. The turbidity MCL that applied to the Cedar supply in 2015 is 5 NTU.

**ppm** – 1 part per million = 1mg/L = 1 milligram per liter

**ppb** – 1 part per billion = 1ug/L = 1 microgram per liter

**Treatment Technique (TT)** – A required process intended to reduce the level of a contaminant in drinking water.

**1 ppm** – 1,000 ppb

## *Water Efficiency*

King County Water District No. 49's commitment to water conservation began in the early 1990's. Programs were designed to meet the Washington State Department of Health Conservation (DOH) Planning Guidelines and to slow the increase of average and peak seasonal water use demand. The DOH revised its requirements for water conservation planning as a result of the 2003 Municipal Water Law. As part of this law, the District adopted water use efficiency goals in a public process December 2007. The District, Seattle and 19 other water utilities formed the Saving Water Partnership (SWP). The SWP consist of the Wholesale Water Customers, excluding municipalities and special purpose districts that belong to Cascade Water Alliance.

For 2016, King County Water District No. 49 purchased 4.72 million gallons of water and had a distribution system leakage rate of 1.4%. District customers used rebates and replaced 2 toilet in a single family dwelling, 1 irrigation timer and 146 toilets in a multifamily complex. District customers used 1 of the Water Smart Technology incentives. The District replaced over 160 water meters and replaced 8 hydrants.

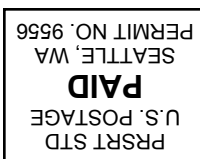
The District's Water Use Efficiency goals are shown below in the italics and the progress towards meeting those goals will be reported annually.

The Saving Water Partnership (SWP) — which is made up of King County Water District 49 and its 18 water utility partners — has set a six-year conservation goal: reduce per capita use from current levels so that the SWP's total average annual retail water use is less than 105 mgd from 2013 through 2018 despite forecasted population growth. For 2016, the Saving Water Partnership met the goal, using 94.4 mgd.

Thank you for all you are doing to conserve water. It makes a difference! Conserving water year-round keeps your water bill as low as possible, and saves water for future generations and conservation is good for salmon too.

***King County Water District No. 49 will continue to have less than 10 percent annual water leakage for the entire system.***

The District has averaged less than 6% water leakage for the past 18 years with high water losses of 13.3 percent in 1996. The leakage rate for 2016 was 1.8%. The District will continue to tighten the water system by completing more water main replacement projects in the future.



King County Water District No. 49  
415 SW 153rd St  
Burien, WA 98166-2214



# **Annual Water Quality Report**

June 2018

## ***What Do You Know About Your Drinking Water?***

King County Water District No. 49 is pleased to provide you with this information about your drinking water. The purpose of this report is to inform our customers about the high quality of drinking water in Water District No. 49's water system. We would like you to know where your water comes from, what it contains and how it compares to stringent Federal water quality standards. This report summarizes the 2017 water quality testing results for your water.

The water you drink is supplied from the Cedar River Watershed. The Cedar River Watershed is located in a remote, uninhabited area of the Cascade Mountains and is managed by the City of Seattle. The city also maintains large transmission pipelines which convey the water from the watershed to our area. The District's distribution system is connected to these pipelines by four separate taps on large transmission mains.

The City of Seattle safeguards the quality of drinking water by enforcing an aggressive protection plan for the watershed. If you have any questions regarding this report, please call Ms. Holly Inkpen, Office Manager, at 206.242.8535.

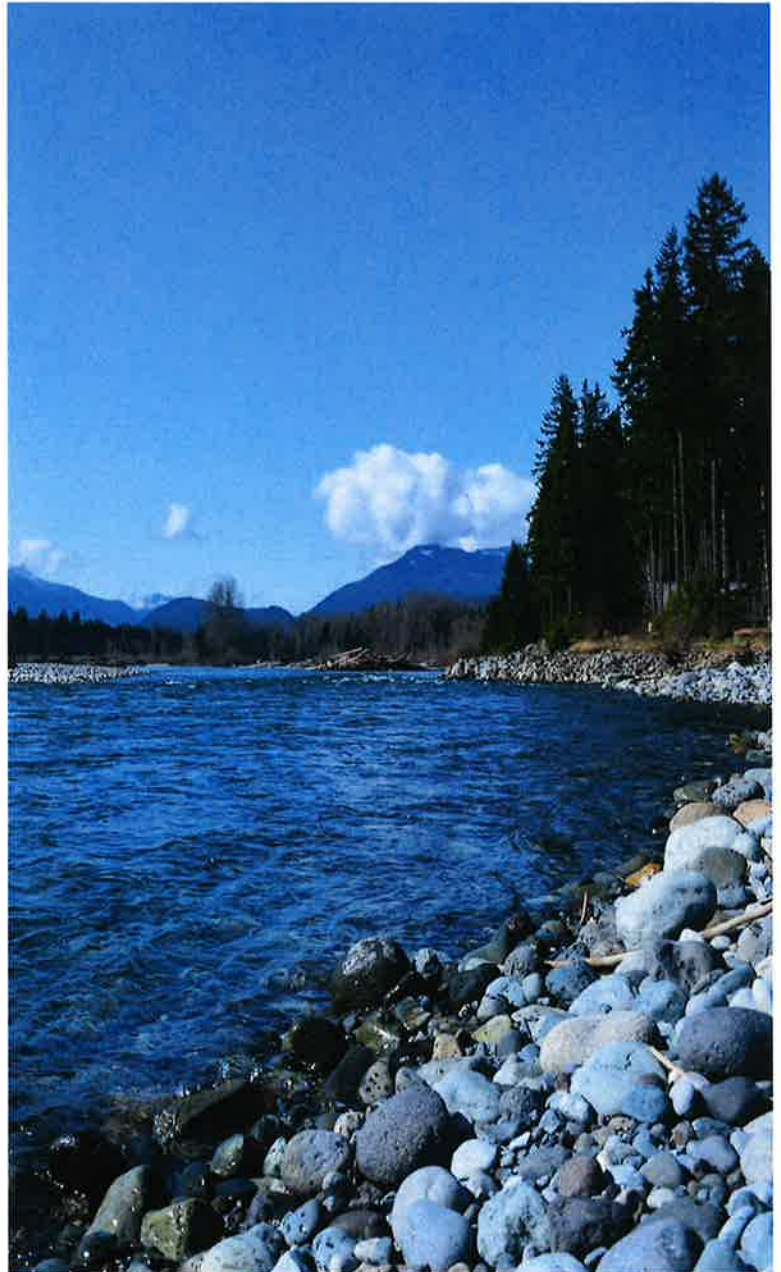


Photo by Bob Gulling

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King County Water District No. 49 holds its Board meetings the second and fourth Wednesday of each month. Meetings are held at the District office located at 415 SW 153<sup>rd</sup> St, Burien, WA 98166-2214. You can contact the District at 206.242.8535 for more information.



## *Residential Tap Monitoring for Lead Copper*

Our source waters *do not contain lead or copper*. However, lead and copper can leach into residential water from building plumbing systems. Lead and copper monitoring is conducted at homes

categorized as high risk, most recently in 2015. Compliance is determined on a regional basis. As shown in the table below, our 90<sup>th</sup> percentile lead concentration is below the Action Level.

### Lead and Copper Monitoring Results (Cedar WSA)

Parameter and Units	MCLG	Action Level+	2015 Results*	Homes Exceeding Action Level	Source
Lead, ppb	0	15	4.0	0 of 50	Corrosion of household plumbing systems
Copper, ppm	1.3	1.3	0.161	0 of 50	

\* 90th Percentile: i.e. 90 percent of the samples were less than the values shown

+ The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. King County Water District No. 49 is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at <http://www.epa.gov/safewater/lead>

## *Information Provided by the U.S. EPA*

### Do I need to take special precautions?

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Water Drinking Hotline (800-426-4791).

### Why are there contaminants in my drinking water?

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's (EPA) Safe Drinking Water Hotline (800-426-4791).

## *Cryptosporidium Parvum*

Cryptosporidium Parvum are microscopic organisms that, when ingested, can result in diarrhea, fever and other gastrointestinal symptoms. These organisms are in all of Washington's rivers and

streams and are a product of animal activity in the watershed. The District regularly tests for Cryptosporidium.



Photo by Bob Gulling

## 2017 Water Quality Monitoring Results

In February of this year the results of the 2017 regional water quality testing were provided to the District by the Seattle Public Utilities Water Quality Laboratory. This testing information has been summarized in the table below.

The first column lists each compound tested and the units of measurement used for the test. The second column indicates the highest levels the U.S. EPA allows for each compound.

The third column illustrates the levels found in the Cedar River supply and if these levels meet compliance levels. The last column shows the typical source for the compounds.

All of the compounds found in the Cedar River supply were found to be at *lower levels* than the EPA allows. For more information about water quality testing you can contact the EPA at 800-426-4791.

		EPA's		Levels in Cedar Water		
		Allowable Limits				
Detected Compounds	Units	MCLG	MCL	Average	Range	Typical Sources
Raw Water						
Total Organic Carbon	ppm	NA	TT	0.8	0.3 to 1.5	Naturally present in the environment
Finished Water						
Turbidity	NTU	NA	TT	0.3	0.2 to 2.5	Soil runoff
Arsenic	ppb	0	10	0.5	0.4 to 0.6	Erosion of natural deposits
Barium	ppb	2000	2000	1.7	1.4 to 1.9	Erosion of natural deposits
Bromate	ppb	0	10	0.04	ND -1	By-product of drinking water disinfection
Chromium	ppb	100	100	0.27	0.25 to 0.33	Erosion of natural deposits
Fluoride	ppm	4	4	0.7	0.3 to 0.9	Water additive, which promotes strong teeth
Coliform, Total	%	0	5%	ND	ND	Naturally present in the environment
Total Trihalomethanes	ppb	NA	80	35	20 to 46	By-products of drinking water chlorination
Haloacetic Acids (5)	ppb	NA	60	44	16 to 85	By-products of drinking water chlorination
Chlorine	ppm	MRDLG=4	MRDL=4			Water additive used to control microbes

\*\*Cryptosporidium was not detected in any samples from the Cedar supply.

## Definitions

**(MCLG) Maximum Contaminant Level Goal** – The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLG's allow for a margin of safety.

**(MCL) Maximum Contaminant Level** – The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

**(MRDL) Maximum Residual Disinfectant Level** – The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

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**NA – Not Applicable**

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**(NTU) Nephelometric Turbidity Unit** – Turbidity is a measure of how clear the water looks. The turbidity MCL that applied to the Cedar supply in 2017 is 5 NTU.

**ppm – 1 part per million** = 1mg/L = 1 milligram per liter

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**(TT) Treatment Technique** – A required process intended to reduce the level of a contaminant in drinking water.

**1 ppm – 1,000 ppb**

## *Water Efficiency*

King County Water District No. 49's commitment to water conservation began in the early 1990's. Programs were designed to meet the Washington State Department of Health Conservation (DOH) Planning Guidelines and to slow the increase of average and peak seasonal water use demand. The DOH revised its requirements for water conservation planning as a result of the 2003 Municipal Water Law. As part of this law, the District adopted water use efficiency goals in a public process December 2007. The District, Seattle and 18 other water utilities formed the Saving Water Partnership (SWP). The SWP consist of the Wholesale Water Customers, excluding municipalities and special purpose districts that belong to Cascade Water Alliance.

The Saving Water Partnership (SWP) has set a six-year conservation goal: reduce per capita use from current levels so that the SWP's total average annual retail water use is less than 105 mgd from 2013 through 2017 despite forecasted population growth. For 2017, the Saving Water Partnership met the goal, using 96.6 mgd.

Thank you for all you are doing to conserve water. It makes a difference! Conserving water year-round keeps your water bill as low as possible, and saves water for future generations and conservation is good for salmon too.

For 2017, King County Water District No. 49 purchased 4.50 million gallons of water and had a distribution system leakage rate of 3%. District customers used rebates and replaced 2 toilets in a single family dwelling and 63 toilets in a multi-family complex. The District replaced over 100 water meters and replaced 5 hydrants.

***King County Water District No. 49 will continue to have less than 10 percent annual water leakage for the entire system.***

The District has averaged less than 6% water leakage for the past 18 years. The District will continue to tighten the water system by completing more water main replacement projects in the future.

### WAYS YOU CAN CONSERVE WATER

- Fix leaky faucets right away.
- Check your toilet for leaks annually.
- Run your washer and dishwasher with full loads.
- Keep showers to a reasonable time.
- Use a broom to sweep outdoors instead of a hose.
- Mulch your garden beds to retain moisture longer.

### LET US KNOW WHAT YOU THINK!

Go to [www.savingwater.org](http://www.savingwater.org) and take our survey and enter to win a free home water and energy saving kit!

### KEEPING YOUR WATER SAFE

For additional information, the following resources are available for assistance:

**Washington State Department of Health**  
(360) 236-3100

**Washington State Department of Ecology**  
(425) 649-7000

**Washington State Office of Drinking Water**  
(253) 395-6750

**Environmental protection Agency (EPA)**  
(800) 426-4791

**Seattle Public Utilities—Customer Service**  
(206) 684-3000

**Seattle Public Utilities—Water Quality**  
(206) 615-0827



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## APPENDIX B

# FIRE-FLOW REQUIREMENTS FOR BUILDINGS

*The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.*

### SECTION B101 GENERAL

**B101.1 Scope.** The procedure for determining fire-flow requirements for buildings or portions of buildings hereafter constructed shall be in accordance with this appendix. This appendix does not apply to structures other than buildings.

### SECTION B102 DEFINITIONS

**B102.1 Definitions.** For the purpose of this appendix, certain terms are defined as follows:

**FIRE-FLOW.** The flow rate of a water supply, measured at 20 pounds per square inch (psi) (138 kPa) residual pressure, that is available for fire fighting.

**FIRE-FLOW CALCULATION AREA.** The floor area, in square feet (m<sup>2</sup>), used to determine the required fire flow.

### SECTION B103 MODIFICATIONS

**B103.1 Decreases.** The fire chief is authorized to reduce the fire-flow requirements for isolated buildings or a group of buildings in rural areas or small communities where the development of full fire-flow requirements is impractical.

**B103.2 Increases.** The fire chief is authorized to increase the fire-flow requirements where conditions indicate an unusual susceptibility to group fires or conflagrations. An increase shall not be more than twice that required for the building under consideration.

**B103.3 Areas without water supply systems.** For information regarding water supplies for fire-fighting purposes in rural and suburban areas in which adequate and reliable water supply systems do not exist, the *fire code official* is authorized to utilize NFPA 1142 or the *International Wildland-Urban Interface Code*.

### SECTION B104 FIRE-FLOW CALCULATION AREA

**B104.1 General.** The fire-flow calculation area shall be the total floor area of all floor levels within the *exterior walls*, and under the horizontal projections of the roof of a building, except as modified in Section B104.3.

**B104.2 Area separation.** Portions of buildings which are separated by *fire walls* without openings, constructed in accordance with the *International Building Code*, are allowed to be considered as separate fire-flow calculation areas.

**B104.3 Type IA and Type IB construction.** The fire-flow calculation area of buildings constructed of Type IA and Type IB construction shall be the area of the three largest successive floors.

**Exception:** Fire-flow calculation area for open parking garages shall be determined by the area of the largest floor.

### SECTION B105 FIRE-FLOW REQUIREMENTS FOR BUILDINGS

**B105.1 One- and two-family dwellings, Group R-3 and R-4 buildings and townhouses.** The minimum fire-flow and flow duration requirements for one- and two-family *dwellings*, Group R-3 and R-4 buildings and townhouses shall be as specified in Tables B105.1(1) and B105.1(2).

**B105.2 Buildings other than one- and two-family dwellings, Group R-3 and R-4 buildings and townhouses.** The minimum fire-flow and flow duration for buildings other than one- and two-family *dwellings*, Group R-3 and R-4 buildings and townhouses shall be as specified in Tables B105.2 and B105.1(2).

TABLE B105.1(1)  
REQUIRED FIRE-FLOW FOR ONE- AND TWO-FAMILY DWELLINGS, GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES

FIRE-FLOW CALCULATION AREA (square feet)	AUTOMATIC SPRINKLER SYSTEM (Design Standard)	MINIMUM FIRE-FLOW (gallons per minute)	FLOW DURATION (hours)
0-3,600	No automatic sprinkler system	1,000	1
3,601 and greater	No automatic sprinkler system	Value in Table B105.1(2)	Duration in Table B105.1(2) at the required fire-flow rate
0-3,600	Section 903.3.1.3 of the <i>International Fire Code</i> or Section P2904 of the <i>International Residential Code</i>	500	1/2
3,601 and greater	Section 903.3.1.3 of the <i>International Fire Code</i> or Section P2904 of the <i>International Residential Code</i>	1/2 value in Table B105.1(2)	1

For SI: 1 square foot = 0.0929 m<sup>2</sup>, 1 gallon per minute = 3.785 L/m.

**TABLE B105.1(2)**  
**REFERENCE TABLE FOR TABLES B105.1(1) AND B105.2**

FIRE-FLOW CALCULATION AREA (square feet)					FIRE-FLOW (gallons per minute) <sup>b</sup>	FLOW DURATION (hours)
Type IA and IB <sup>a</sup>	Type IIA and IIIA <sup>a</sup>	Type IV and V-A <sup>a</sup>	Type IIB and IIIB <sup>a</sup>	Type V-B <sup>a</sup>		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	4
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	
203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5,000	
225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5,250	
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500	
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750	
295,901-Greater	166,501-Greater	106,501-115,800	77,001-83,700	47,401-51,500	6,000	
—	—	115,801-125,500	83,701-90,600	51,501-55,700	6,250	
—	—	125,501-135,500	90,601-97,900	55,701-60,200	6,500	
—	—	135,501-145,800	97,901-106,800	60,201-64,800	6,750	
—	—	145,801-156,700	106,801-113,200	64,801-69,600	7,000	
—	—	156,701-167,900	113,201-121,300	69,601-74,600	7,250	
—	—	167,901-179,400	121,301-129,600	74,601-79,800	7,500	
—	—	179,401-191,400	129,601-138,300	79,801-85,100	7,750	
—	—	191,401-Greater	138,301-Greater	85,101-Greater	8,000	

For SI: 1 square foot = 0.0929 m<sup>2</sup>, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

a. Types of construction are based on the *International Building Code*.

b. Measured at 20 psi residual pressure.

**TABLE B105.2**  
**REQUIRED FIRE-FLOW FOR BUILDINGS OTHER THAN ONE- AND TWO-FAMILY DWELLINGS, GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES**

AUTOMATIC SPRINKLER SYSTEM (Design Standard)	MINIMUM FIRE-FLOW (gallons per minute)	FLOW DURATION (hours)
No automatic sprinkler system	Value in Table B105.1(2)	Duration in Table B105.1(2)
Section 903.3.1.1 of the <i>International Fire Code</i>	25% of the value in Table B105.1(2) <sup>a</sup>	Duration in Table B105.1(2) at the reduced flow rate
Section 903.3.1.2 of the <i>International Fire Code</i>	25% of the value in Table B105.1(2) <sup>b</sup>	Duration in Table B105.1(2) at the reduced flow rate

For SI: 1 gallon per minute = 3.785 L/m.

a. The reduced fire-flow shall be not less than 1,000 gallons per minute.

b. The reduced fire-flow shall be not less than 1,500 gallons per minute.

**B105.3 Water supply for buildings equipped with an automatic sprinkler system.** For buildings equipped with an approved *automatic sprinkler system*, the water supply shall be capable of providing the greater of:

1. The *automatic sprinkler system* demand, including hose stream allowance.
2. The required fire-flow.

#### SECTION B106 REFERENCED STANDARDS

ICC	IBC—15	International Building Code	B104.2,
			Tables
ICC	IFC—15	International Fire Code	B105.1(1) and
			B105.2
ICC	IWUIC—15	International Wildland-Urban Interface Code	B103.3
ICC	IRC—15	International Residential Code	Table
			B105.1(1)
NFPA	1142—12	Standard on Water Supplies for Suburban and Rural Fire Fighting	B103.3

## APPENDIX C

# FIRE HYDRANT LOCATIONS AND DISTRIBUTION

*The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.*

### SECTION C101 GENERAL

**C101.1 Scope.** In addition to the requirements of Section 507.5.1 of the *International Fire Code*, fire hydrants shall be provided in accordance with this appendix for the protection of buildings, or portions of buildings, hereafter constructed or moved into the jurisdiction.

### SECTION C102 NUMBER OF FIRE HYDRANTS

**C102.1 Minimum number of fire hydrants for a building.** The number of fire hydrants available to a building shall be not less than the minimum specified in Table C102.1.

### SECTION C103 FIRE HYDRANT SPACING

**C103.1 Hydrant spacing.** Fire apparatus access roads and public streets providing required access to buildings in accordance with Section 503 of the *International Fire Code* shall be provided with one or more fire hydrants, as determined by Section C102.1. Where more than one fire hydrant is

required, the distance between required fire hydrants shall be in accordance with Sections C103.2 and C103.3.

**C103.2 Average spacing.** The average spacing between fire hydrants shall be in accordance with Table C102.1.

**Exception:** The average spacing shall be permitted to be increased by 10 percent where existing fire hydrants provide all or a portion of the required number of fire hydrants.

**C103.3 Maximum spacing.** The maximum spacing between fire hydrants shall be in accordance with Table C102.1.

### SECTION C104 CONSIDERATION OF EXISTING FIRE HYDRANTS

**C104.1 Existing fire hydrants.** Existing fire hydrants on public streets are allowed to be considered as available to meet the requirements of Sections C102 and C103. Existing fire hydrants on adjacent properties are allowed to be considered as available to meet the requirements of Sections C102 and C103 provided that a fire apparatus access road extends between properties and that an easement is established to prevent obstruction of such roads.

TABLE C102.1  
REQUIRED NUMBER AND SPACING OF FIRE HYDRANTS

FIRE-FLOW REQUIREMENT (gpm)	MINIMUM NUMBER OF HYDRANTS	AVERAGE SPACING BETWEEN HYDRANTS <sup>a, b, c, d, e</sup> (feet)	MAXIMUM DISTANCE FROM ANY POINT ON STREET OR ROAD FRONTAGE TO A HYDRANT <sup>a, f, g</sup>
1,750 or less	1	500	250
2,000-2,250	2	450	225
2,500	3	450	225
3,000	3	400	225
3,500-4,000	4	350	210
4,500-5,000	5	300	180
5,500	6	300	180
6,000	6	250	150
6,500-7,000	7	250	150
7,500 or more	8 or more <sup>c</sup>	200	120

For SI: 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m.

- Reduce by 100 feet for dead-end streets or roads.
- Where streets are provided with median dividers that cannot be crossed by fire fighters pulling hose lines, or where arterial streets are provided with four or more traffic lanes and have a traffic count of more than 30,000 vehicles per day, hydrant spacing shall average 500 feet on each side of the street and be arranged on an alternating basis.
- Where new water mains are extended along streets where hydrants are not needed for protection of structures or similar fire problems, fire hydrants shall be provided at spacing not to exceed 1,000 feet to provide for transportation hazards.
- Reduce by 50 feet for dead-end streets or roads.
- One hydrant for each 1,000 gallons per minute or fraction thereof.
- A 50-percent spacing increase shall be permitted where the building is equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Fire Code*.
- A 25-percent spacing increase shall be permitted where the building is equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.2 or 903.3.1.3 of the *International Fire Code* or Section P2904 of the *International Residential Code*.

## APPENDIX C

### SECTION C105 REFERENCED STANDARDS

ICC	IFC—15	International Fire Code	C101.1, C103.1, Table C102.1
ICC	IRC—15	International Residential Code	Table C102.1

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## **APPENDIX H – SEPA DNS, CHECKLIST AND MAILING LIST**

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**DETERMINATION OF NON-SIGNIFICANCE  
WAC 197-11-970**

Description of Proposal: Adoption of the 2019 Water System Plan for and by King County Water District No. 49 per the requirements of the State Department of Health. The plan updates the 2017 Water System Plan.

Proponent: King County Water District No. 49

Location of Proposal, including Street Address, if any: The Water service area of King County Water District No. 49 includes all or portions of Sections 24 and 25 in Township 23 North, Range 3 East and Sections 19, 20, 29, 30 and 32 in Township 23 North, Range 4 East, W.M. in King County, Washington.

Lead Agency: King County Water District No. 49

The lead agency for this proposal has determined that it does not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request.

☐ There is no comment period for this DNS.

☐ This DNS is issued after using the optional DNS process in WAC 197-11-355. There is no further comment period on the DNS.

☒ This DNS is issued under 197-11-340(2); the lead agency will not act on this proposal for 14 days from the date below. Comments must be submitted by February 20, 2019.

Responsible Official: Bryan Koehmstedt

Position/Title: Superintendent Phone: 206-242-8535

Address: King County Water District No. 49  
415 SW 153<sup>rd</sup> Street  
Burien, Washington 98166

Date: February 1, 2019

Signature: \_\_\_\_\_





February 1, 2019

To: Attached Distribution List

**RE: DNS and SEPA Checklist  
2019 Water System Plan - King County Water District No. 49**

Dear Interested Party:

Please find enclosed the SEPA Determination of Non-significance and the Environmental Checklist for the planned adoption of the King County Water District No. 49 2019 Water System Plan.

The District's 2017 Water System Plan has been updated in response to agency review comments and additional studies by the District. After completion of the Environmental Checklist, King County Water District No. 49 (as lead agency) has determined that this proposal does not have a probable significant adverse impact on the environment.

If you have any questions regarding this Determination, please contact me at 206-242-8535

Sincerely,  
**King County Water District No. 49**

A handwritten signature in blue ink, appearing to read "Bryan Koehmstedt", written over a blue circular stamp or seal.

Bryan Koehmstedt  
Superintendent

Enclosures: Determination of Non-significance  
Environmental Checklist  
Distribution list

**KING COUNTY WATER DISTRICT NO. 49  
2019 WATER SYSTEM PLAN**

**DETERMINATION OF NON-SIGNIFICANCE  
AND SEPA CHECKLIST DISTRIBUTION LIST**

Department of Ecology  
Environmental Review  
SEPA Unit  
P.O. Box 47703  
Olympia, WA 98504-7703  
(360) 407-6922  
[separegister@ecy.wa.gov](mailto:separegister@ecy.wa.gov)\*  
\*transmit via email only

Department of Ecology  
Northwest Regional Office  
Water Resources Department  
3190 – 160<sup>th</sup> Avenue SE  
Bellevue, WA 98008-5452  
(425) 649-7000  
[nwroerts@ecy.wa.gov](mailto:nwroerts@ecy.wa.gov)

Department of Fish and Wildlife  
SEPA Desk  
P.O. Box 43200  
Olympia, WA 98504-3155  
(360) 902-2946  
[SEPAdesk@dfw.wa.gov](mailto:SEPAdesk@dfw.wa.gov)

Department of Health  
Northwest Regional Office  
Richard Rodriguez, Regional Planner  
20425 72<sup>nd</sup> Avenue South  
Building 2, Suite 310  
Kent, WA 98032-2358  
(253) 395-6771  
[richard.rodriguez@doh.wa.gov](mailto:richard.rodriguez@doh.wa.gov)

King County  
Department of Natural Resources and  
Parks  
Paige Myers, Executive Assistant  
201 S Jackson Street, Room 700  
Seattle, WA 98104-3855  
(206) 477-4538  
[Paige.Myers@kingcounty.gov](mailto:Paige.Myers@kingcounty.gov)

King County  
Department of Natural Resources and  
Parks  
Steve Hirschey, UTRC Chair  
King Street Center  
201 S Jackson Street, MS: KSC-NR-  
0512  
Seattle, WA 98104  
(206) 477-5387  
[steve.hirschey@kingcounty.gov](mailto:steve.hirschey@kingcounty.gov)

King County  
Department of Permitting and  
Environmental Review  
Steve Bottheim  
35030 SE Douglas Street, Suite 210  
Snoqualmie, WA 98056-9266  
(206) 477-0732  
[steve.bottheim@kingcounty.gov](mailto:steve.bottheim@kingcounty.gov)

King County  
Department of Public Health  
Chinook Building  
Patty Hayes, Director  
401 5<sup>th</sup> Avenue, Suite 1300  
Seattle, WA 98104  
(206) 296-4600  
[patty.hayes@kingcounty.gov](mailto:patty.hayes@kingcounty.gov)

Metropolitan King County Council  
Melani Pedroza, Clerk of the Council  
516 Third Avenue, Room 1200  
Seattle, WA 98104  
(206) 477-1020  
[melani.pedroza@kingcounty.gov](mailto:melani.pedroza@kingcounty.gov)

Port of Seattle Headquarters  
Arlyn Purcell, Director, Aviation  
Environment and Sustainability  
P.O. Box 1209  
Seattle, WA 98111-1209  
(206) 787-3000  
[purcell.arlyn@portseattle.org](mailto:purcell.arlyn@portseattle.org)

City of Burien  
Community Development Department  
Chip Davis, Community Development  
Director  
400 SW 152<sup>nd</sup> Street, Suite 300  
Burien, WA 98166  
(206) 248-5501  
[chipd@burienwa.gov](mailto:chipd@burienwa.gov)

City of Normandy Park  
Community Development Department  
Ryan Harriman, Community  
Development Director  
801 SW 174<sup>th</sup> Street  
Normandy Park, WA 98166  
(206) 248-8253  
[rharriman@normandyparkwa.gov](mailto:rharriman@normandyparkwa.gov)

City of SeaTac  
Community and Economic Development  
Department  
Steve Pilcher, Director Department of  
Community Economic Development  
4800 South 188<sup>th</sup> Street  
SeaTac, WA 98188-8605  
(206) 973-4832  
[spilcher@ci.seatac.wa.us](mailto:spilcher@ci.seatac.wa.us)

Seattle Public Utilities  
Kathy Curry, Interim Wholesale  
Contracts Manager  
P.O. Box 34018  
700 5<sup>th</sup> Avenue, Suite 4900  
Seattle, WA 98124-4018  
(206) 684-7975  
[kathy.curry@seattle.gov](mailto:kathy.curry@seattle.gov)

King County Water District No. 20  
Michael Martin, General Manager  
12606 1<sup>st</sup> Avenue South  
Burien, WA 98168-2617  
(206) 243-3990  
[mmartin@kcwd20.com](mailto:mmartin@kcwd20.com)

King County Water District No. 125  
Shane Young, Office Manager  
3460 S 148<sup>th</sup> Street, Suite 110  
Tukwila, WA 98168  
(206) 242-9547  
[shaneyoung@waterdistrict125.com](mailto:shaneyoung@waterdistrict125.com)

Highline Water District  
Matt Everett, General Manager  
23828 30<sup>th</sup> Avenue S  
Kent, WA 98032  
(206) 592-8902  
[meverett@highlinewater.org](mailto:meverett@highlinewater.org)

King County Fire District No. 2  
Burien-Normandy Park Fire Department  
Ray Pettigrew, Fire Marshal  
900 SW 146<sup>th</sup> St PO Box 66029  
Burien, WA 98166  
(206) 242-2040  
[raypettigrew@burienfire.org](mailto:raypettigrew@burienfire.org)

Southwest Suburban Sewer District  
Ron Hall, General Manager  
17840 Des Moines Memorial Drive  
South  
Burien, WA 98148  
(206) 244-9575  
[ron.hall@swssd.com](mailto:ron.hall@swssd.com)

## ENVIRONMENTAL CHECKLIST

### A. BACKGROUND

**1. Name of proposed project (if applicable):**

King County Water District No. 49 2019 Water System Plan

**2. Name of Applicant:**

King County Water District No. 49

**3. Address and phone number of applicant and contact person:**

415 SW 153<sup>rd</sup> Street  
Burien, Washington 98166  
Bryan Koehmstedt, Superintendent  
206-242-8535

**4. Date checklist prepared:**

January 2019

**5. Agency requesting checklist:**

King County Water District No. 49

**6. Proposed timing or schedule (including phasing, if applicable):**

Adoption of 2019 Water System Plan – Spring 2019

**7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.**

King County Water District No. 49 will implement the water system plan according to the construction schedule outlined in Chapter 8 of the plan.

**8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.**

None known to date.

- 9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.**

None known.

- 10. List any government approvals or permits that will be needed for your proposal, if known.**

City of Burien  
City of Normandy Park  
City of SeaTac  
City of Seattle  
King County  
Washington State Department of Health

- 11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description).**

The Water System Plan discusses the existing and proposed service area characteristics; population and land use and projects the growth within the District's service boundary. The plan discusses design criteria, water demand, the existing system and proposed system expansion and improvements.

- 12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.**

The King County Water District No. 49 water service area is located in King County Washington in Township 23 North, Ranges 3 and 4 East. The service area is generally bounded by South/SW 144<sup>th</sup> Street and South/SW 178<sup>th</sup> Street between 27<sup>th</sup> Avenue SW and 12<sup>th</sup> Avenue South.

## **B. ENVIRONMENTAL ELEMENTS**

### **1. Earth**

- a. General description of the site (circle one):** Flat, rolling, hilly, steep slopes, mountainous, other \_\_\_\_\_.

The District is generally a rolling plateau with some areas of steep slopes.

- b. What is the steepest slope on the site (approximate percent slope)?**

The topography in the District ranges from rolling hills (0-1% slope) to hilly (15-25% slope) topography.

- c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck): If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils.**

There are two primary soil types identified in the Soil Survey for King County Area, Washington, U.S.D.A., November 1973: Alderwood and Everett. There are small pockets of Greenwood Peat, Kitsap, Norma, Seattle Muck and Tukwila throughout the District. Rough broken and stony land line the edge of Puget Sound.

- d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.**

Some erosion activity is evident along the western boundary along the Puget Sound. No other unstable soils are known in the District's service area.

- e. Describe the purpose, type, total area, and approximate quantities of any filling, excavation, and grading proposed. Indicate source of fill.**

No excavation or fill will occur other than trench excavation and backfill with native material as much as possible. Ground contours will not be changed. Bedding and backfill will come from local suppliers.

- f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.**

Erosion could occur during and immediately after construction until the ground cover re-establishes itself. Construction will typically take place in the public right-of-way, minimizing or eliminating the need for additional clearing.



- g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?**

No plan to cover water lines with impervious surfaces other than those existing in the right-of-way. These include asphalt and concrete road surfaces. Addition of impervious surfaces would be necessary with reservoir construction.

- h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:**

During construction, the Contractor will be required to utilize temporary erosion and sediment control measures to prevent erosion. Restoration of disturbed areas will control erosion after construction.

## **2. Air**

- a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known.**

Construction equipment will produce emissions temporarily during construction. The finished project will produce no additional air emissions.

- b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.**

None.

- c. Proposed measures to reduce or control emissions or other impacts to air, if any:**

Construction equipment should be maintained in an efficient and clean working order. The Contractor will be required to control dust during construction via sweeping, watering, and washing.

## **3. Water**

- a. Surface Water:**

- 1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.**



Lake Burien is located in the northern part of the District. Arbor Lake is located in the central portion of the District. Several creeks, including Miller Creek originate or flow through the District.

- 2) Will the project require any work over, in or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.**

No.

- 3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.**

Generally, all areas impacted by construction will be restored to original contours. Construction will consist of excavation of water main trench (average 4' deep, 1-2/3 cubic yards per foot of trench) and installation of pipe and backfill with native materials. If required by any City due to poor materials and close proximity to or located within the roadway, backfill gravel will replace native material in about 2/3 of the trench cross section. Backfill gravel would come from local materials yards.

- 4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.**

No.

- 5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.**

No.

- 6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.**

No.

**b. Ground Water:**

- 1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.**

No.

- 2) **Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals...; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.**

None.

**c. Water Runoff (including stormwater):**

- 1) **Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.**

Normal stormwater runoff is expected during construction. Sedimentation control measures during construction will be used to intercept the water prior to discharge to the existing storm systems including pipes, culverts and ditches.

- 2) **Could waste materials enter ground or surface waters? If so, generally describe.**

During construction, silt or construction waste could enter the surface water collection systems.

- 3) **Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.**

No.

**d. Proposed measures to reduce or control surface, ground and runoff water, and drainage pattern impacts, if any:**

Erosion control facilities during construction will be used to reduce or eliminate water impacts. Runoff controls for the new reservoir would be in accordance with local development regulations.

**4. Plants**

**a. Check the types of vegetation found on the site:**

<u>  X  </u>	deciduous tree: alder, maple, aspen, other
<u>  X  </u>	evergreen tree: fir, cedar, pine, other
<u>  X  </u>	shrubs
<u>  X  </u>	grass
<u>      </u>	pasture
<u>      </u>	crop or grain
<u>      </u>	Orchards, vineyards or other permanent crops.
<u>      </u>	wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
<u>      </u>	water plants: water lily, eelgrass, milfoil, other
<u>      </u>	other types of vegetation

**b. What kind and amount of vegetation will be removed or altered?**

Usually no vegetation is affected because the water mains are installed in the established roadway pavement or shoulder areas with low growing vegetation such as grasses, forbes and small shrubs.

**c. List threatened and endangered species known to be on or near the site.**

None known

**d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:**

None

**e. List all noxious weeds and invasive species known to be on or near the site.**

Not applicable.

**5. Animals**

**a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site. Examples include:**

birds: hawk, heron, eagle, songbirds, other:  
mammals: deer, bear, elk, beaver, other: small mammals and rodents  
fish: bass, salmon, trout, herring, shellfish, other: various fish

**b. List any threatened and endangered species known to be on or near the site.**

None known

- c. Is the site part of a migration route? If so, explain.**

The Pacific Flyway is a significant flyway for migratory birds along the west coast of the United States.

- d. Proposed measures to preserve or enhance wildlife, if any:**

None

- f. List any invasive animal species known to be on or near the site.**

None known.

## **6. Energy and Natural Resources**

- a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.**

Fuel will be required for construction equipment temporarily during construction. The completed project will have no permanent effect on energy resources.

- b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.**

No.

- c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:**

Construction equipment should be maintained to operate in a fuel-efficient manner.

## **7. Environmental Health**

- a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.**

Accidental spills of fuel could occur during construction.

- 1) Describe any known or possible contamination at the site from present or past uses.**

Not applicable.

- 2) **Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.**

None known

- 3) **Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.**

Not applicable.

- 4) **Describe special emergency services that might be required.**

Spill cleanup or medical services may be required in the event of an accidental spill.

- 5) **Proposed measures to reduce or control environmental health hazards, if any:**

Care should be exercised during construction to avoid accidental spills. Contractors are required to have periodic safety meetings and comply with W.I.S.H.A.

**b. Noise**

- 1) **What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?**

None.

- 2) **What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.**

During construction, equipment will produce construction-related noise. There will be no permanent increase in noise following construction.

- 3) **Proposed measures to reduce or control noise impacts, if any:**

Construction equipment will be equipped with mufflers.

**8. Land and Shoreline Use**

- a. **What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe.**

The majority of the area is primarily residential with a supporting amount of business and commercial. The Plan is intended to accommodate current and planned land use.

- b. **Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use?**

Not known

- 1) **Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, or harvesting? If so, how:**

No.

- c. **Describe any structures on the site.**

Typically the "site" is within public right-of-way, free of structures. Existing District structures include the reservoir and District Office/Maintenance Buildings.

- d. **Will any structures be demolished? If so, what?**

No

- e. **What is the current zoning classification of the site?**

Single Family Residential, Airport, and some Commercial

- f. **What is the current comprehensive plan designation of the site?**

Residential, Airport Use and Commercial

- g. **If applicable, what is the current shoreline master program designation of the site?**

Not applicable.

- h. Has any part of the site been classified as a critical area by the city or county? If so, specify.**

No

- i. Approximately how many people would reside or work in the completed project?**

Not applicable.

- j. Approximately how many people would the completed project displace?**

None

- k. Proposed measures to avoid or reduce displacement impacts, if any:**

None

- l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:**

None

- m. Proposed measures to ensure the proposal is compatible with nearby agricultural and forest lands of long-term commercial significance, if any:**

Not applicable.

## **9. Housing**

- a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.**

Not applicable.

- b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.**

None

- c. Proposed measures to reduce or control housing impacts, if any:**

None

## **10. Aesthetics**

- a. **What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?**

To be determined for specific projects.

- b. **What views in the immediate vicinity would be altered or obstructed?**

To be determined for specific projects.

- c. **Proposed measures to reduce or control aesthetic impacts, if any:**

To be determined for specific projects.

## **11. Light and Glare**

- a. **What type of light or glare will the proposal produce? What time of day would it mainly occur?**

None

- b. **Could light or glare from the finished project be a safety hazard or interfere with views?**

No

- c. **What existing off-site sources of light or glare may affect your proposal?**

None

- d. **Proposed measures to reduce or control light and glare impacts, if any:**

None

## **12. Recreation**

- a. **What designated and informal recreational opportunities are in the immediate vicinity?**

Recreational facilities exist throughout the District.

- b. **Would the proposed project displace any existing recreational uses? If so, describe.**

No



- c. **Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:**

None. No effect is expected on recreational activity during or after construction.

**13. Historic and Cultural Preservation**

- a. **Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers located on or near the site? If so, specifically describe.**

None known

- b. **Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources.**

None known

- c. **Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc.**

None

- d. **Proposed measures to avoid, minimize, or compensate for loss, change to, and disturbance to resources. Please include plans for the above and any permits that may be required.**

Not applicable

**14. Transportation**

- a. **Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.**

City roads, State highways and Interstate Freeways provide public access to and through the District service area.

- b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop?**

Yes. King County Transit local and express services are provided service throughout the District.

- c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate?**

None

- d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private).**

None

- e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.**

Parts of some projects are near SeaTac Airport but are not within the Airport proper.

- f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates?**

None additional.

- g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe.**

No.

- h. Proposed measures to reduce or control transportation impacts, if any:**

During construction, signage and flaggers will be required to control traffic.

## **15. Public Services**

- a. **Would the project result in an increased need of public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.**

No. It will improve the fire flows and pressures for the served area.

- b. **Proposed measures to reduce or control direct impacts on public services, if any.**

None

**16. Utilities**

- a. **Circle utilities currently available at the site:** electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other:

All services are available.

- b. **Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.**

Future construction activities will consist of trenching for replacement of existing water mains, installation of new PRVs and a reservoir/booster pump station. Future construction activities will be addressed under separate SEPA review, if required for the specific project or activity. King County Water District No. 49 will operate and maintain the completed system.

**C. SIGNATURE**

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature .

Name of signee Rodney Langer, P.E.

Position and Agency/Organization Project Manager, CHS Engineers, LLC

Date Submitted: January 21, 2019

## **D. SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS**

**(IT IS NOT NECESSARY to use this sheet for project actions)**

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

**1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?**

No immediate impacts upon adoption of this Plan. Temporary effects are possible during construction. As the population increases in the area, more water demand will occur requiring an increase in supply and storage facilities and upgrading of the distribution system.

**Proposed measures to avoid or reduce such increases are:**

During construction, measures will be used to prevent or reduce siltation, noise, air emissions and accidental spills following local and state regulations.

**2. How would the proposal be likely to affect plants, animals, fish, or marine life?**

The potential impacts are primarily associated with the surface disruption during construction of water facilities.

**Proposed measures to protect or conserve plants, animals, fish, or marine life are:**

Utilizing a comprehensive plan reduces the overall amount of construction activity and minimizes the effects of development. During construction, temporary measures will be implemented to control erosion and sedimentation.

**3. How would the proposal be likely to deplete energy or natural resources?**

Installation of materials, use of electricity, diesel oil and fuel.

**Proposed measures to protect or conserve energy and natural resources are:**

Use of fuel-efficient construction equipment.

4. **How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?**

Most of the proposed facilities will be installed along existing transportation and utility corridors. Each project will be permitted and constructed in accordance with the appropriate regulations.

**Proposed measures to protect such resources or to avoid or reduce impacts are:**

None. No significant impacts are anticipated.

5. **How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?**

Water mains replace existing old, undersized mains. The proposals would provide new facilities and improve existing facilities keeping in compliance with existing land and shoreline use plans.

**Proposed measures to avoid or reduce shoreline and land use impacts are:**

None. No significant impacts are anticipated.

6. **How would the proposal be likely to increase demands on transportation or public services and utilities?**

No effect on services except water service. Larger mains will provide water in a more efficient system.

**Proposed measures to reduce or respond to such demand(s) are:**

None.

7. **Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.**

The projects should be compatible with all regulations and laws.



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March 8, 2019

Brietta Carter, P.E., Regional Engineer  
Richard Rodriguez, Regional Planner  
State of Washington Department of Health  
Northwest Drinking Water Regional Operations  
20425 72<sup>nd</sup> Avenue South, Suite 310,  
Kent, WA 98032-2388

**Subject: February 2019 Water System Plan – Submittal #17-0403  
King County Water District No. 49 ID#39800**

Dear Ms. Carter and Mr. Rodriguez:

On behalf of King County Water District No. 49 we are submitting their February 2019 Water System Plan for review and approval.

The February 2019 Plan is an updated version of the February 2017. The District Board of Commissioners has reviewed this update, but adoption has been deferred pending review of the updated plan by the approving agencies.

A summary of all changes in this update is presented in Appendix N.

Thank you for your review letter to the District dated July 10, 2017. We have addressed your comments as follows in the updated Plan:

Comment No. & Topic	Response	WSP Location
1. Consistency Checklist	These were included in Appendix I. Updates for the 2019 Plan have recently been requested as documented in Appendix I. The revised plan did not change the foundational evaluation of land use and growth. The population and demand forecasts were extended through 2038 at rates consistent with PSRC values for that period.	Appendix I updated
2. King County Comments	King County comments have been addressed and documented in a response letter.	Appendix I updated

3. SPU – Forecast, HGL	The District can't speak for SPU. However, the SPU/District Full Requirements Contract includes Exhibit II addressing minimum HGL and maximum flow. Exhibit II was the subject of clarification in December 2014, as confirmed by letter from SPU. The 2019 WSP relies on the values stated in the Contract and year 2038 forecast MDD is less than the current maximum flow per Exhibit II.	Appendix D and Chapter 3 (no revisions)
4. Port of Seattle	The Port of Seattle operates buildings/facilities west of the Sea-Tac Third Runway. The District's facilities serve those buildings with potable and fire suppression service as a retail customer of the District.	Section 2.1.2 clarified (p 2-3)
5. 2014, 2015, & 2016 Supply & Sales Data	Supply and sales data for years 2014 through 2017 have been added. 2018 data was still being compiled at the time the WSP was completed.	Table 2.4 revised (p 2-5)
6. WSP vs WUE volumes	Table 2.4 values have been revised to be consistent with corresponding WUE reports. The District has been advised to report volumes in gallons for the WUE reports.	Table 2.4 revised (p 2-5)
7. Meter Accuracy, Replacement Schedule	SPU is responsible for the accuracy of its water supply meters. The District Superintendent confirms that the present policy of service meter replacement on a 20-year life cycle, as a general policy, is adequate and has served the system well.	Section 2.1.3 (no revisions)
8. Intertie Purchases	The events were not related to fire or main breaks. The use was attributed to coordinated system maintenance efforts in the vicinity of the interties (one agency relied on other) and to an imbalance of the settings of the pressure reducing valves at select interties (open during local flushing efforts). The valve settings have been adjusted to avoid such uses.	Table 2.4 clarified in footnote (p 2-5)

9. Disinfection Residual	Tables 3.3 and 3.4 have been updated to reflect daily chlorine residual monitoring. More detail has been added at the end of Section 3.3.3. and in Section 6.3.	Tables 3.3 and 3.4, Section 3.3.3 ( p 3-12, 3-13, 3-18), Section 6.3 (p 6-4) all revised
10. Hydraulic Model Results	Hydraulic model results are added as a new Appendix O. Fire flow analysis results are listed including report of the node with lowest pressure for fire flow at a given node, and that lowest pressure. For that node test, all other node pressures are higher than the lowest node listed.	Appendix O added
11. CCC – Table 9 Hazards	The WSP has been revised to note that 34 Table 9 hazards exist within the District. Each hazard has an appropriate backflow prevention assembly and has been tested within the past year.	Section 6.6 revised (p 6-6)
12. Backflow Incident Response form	DOH Form 331-457-F is now included at the end of the CCC Program – it will be incorporated officially concurrently with adoption of the 2019 WSP.	Section 6.6 (p 6-6) and Appendix B revised
13. Reservoir Inspection Frequency	The reservoir hatch and vent are inspected annually, at a minimum	Section 6.7.2 revised (p6-7)
14. Sanitary Survey Items	A tap was added for sample collection at the reservoir outlet. Continuous chlorine residual monitoring equipment has been installed at the reservoir outlet. The District has not added specific equipment for additional disinfection. They would utilize the reservoir itself for additional disinfection.	Section 6.11 revised (p 6-11)
15. Construction Completion Reports	Completion reports are prepared and filed with the respective project files.	Section 6.10 revised (p 6-11)

16. Coliform Monitoring Plan	The CMP has been revised in its entirety, including updates with respect to RTCR, <i>E. coli</i> MCL violation, Level 1 and Level 2 Assessments and forms, Tier 1, 2 and 3 violations, public notice and public notice certification forms, and a revised sample site map. The sample sites info has been audited and updated. The routine and repeat upstream address for Site 49-9 are the same due to local conditions. That site is located at a dead end street and the sample site is at the address of the last house. The service for that same address is the next service in that direction. The District has been advised to consider further plans for customer assistance under a boil water advisory. Their primary customer of concern is Highline Hospital. The other facilities referenced are very dynamic as to their operations, ownership and locations, in the District's experience.	Appendix J revised
17. Design & Construction Standards	The Standard Details have been modified to remove the drain hole from the A&V Relief Valve Detail (15) and new details have been added for pressure reducing valve assemblies and reduced pressure backflow assemblies. The DE Manual already includes standard details for a variety of double check valve assemblies.	DE Manual updated
18. Asset Management Techniques	The District's current asset management measures are described in Section 6.7.3 and 6.7.4. The District does not have a formalized asset management program. However, the CIP presented in Chapter 8 presents a 20-year plan to remove and replace the oldest and undersized remaining elements of the distribution system, including valves, hydrants and services.	Chapter 6 (no revisions)

19. Balanced Financial Plan	Table 9.2 presents a forecast budget for the period 2019-2028.	Table 9.2 revised (p 9-4)
20. Reserve Levels	A paragraph has been added to Section 9.3 discussing operation and capital reserves.	Section 9.3, added last paragraph (p 9-7)
21. Governor's Directive 16-06	The District Superintendent has worked for the District for 25 years and reports he has never observed an existing lead service line or lead components. They do have some galvanized lines but no lead goosenecks. Over that time the District has completed many water main replacement project and each project includes replacement of the service lines and appurtenances.	Discussion added at end of Section 3.3.5 (p 3-26)
22. Consumer Meeting	District Resolution 17-1270 documents the public meeting and subsequent plan adoption for the 2017 Plan. A public hearing was held on February 27, 2019 as documented in Chapter 10. Adoption has been deferred pending agency review of this update.	Section 10.1 (p 10-1), Appendix N
23. District Approval	The District adopted the 2017 WSP via Resolution 17-1270. Adoption of this plan has been deferred pending agency review of this update.	Appendix N
24. Plan Comments	Plan comments and responses are included in Appendix I. The only comments received regarding the 2017 Plan were from DOH, SPU and King County.	Appendix I
25. WAWARN	The District is a member of WAWARN.	Section 6.4 revised 9p 6-5)

Additional revisions have been made based on District actions since completion of the 2017 Plan. Additional revisions have been made in response to comments received from the King County UTRC and Seattle Public Utilities. Comments and responses are included in Appendix I.

Two print editions and one electronic copy of the 2019 Plan are enclosed. Also enclosed for your review in support of the submittal exception is one copy of the District's recently updated and adopted Developer Extension Manual.

Please contact me if you require additional information to proceed with your review.

Sincerely,  
**CHS Engineers, LLC**



Rodney Langer, P.E.  
Project Manager

Enclosure

cc: Bryan Koehmstedt, King County Water District No. 49



## Water System Plan Submittal Form

This form must be completed and submitted along with the Water System Plan (WSP). It will expedite review and approval of your WSP. All water systems should contact their regional planner before developing any planning document for submittal.

1. Water System Name King County Water District No. 49	PWS ID# or Owner ID# 39800P	Water Systems Owner's Name King County Water District No. 49
Contact Name for Utility Bryan Koehmstedt	Phone Number 206-242-8535	Title Superintendent
Contact Address 415 SW 153 <sup>rd</sup> St	City Burien	State WA 98166
2. Project Engineer Rodney Langer, P.E. CHS Engineers, LLC	Phone Number 425-637-3693	Title Project Manager
Project Engineer Address 12507 Bel-Red Rd, Suite 101	City Bellevue	State WA 98005
3. Billing Contact Name (required if not the same as #1) Same as above for District	Billing Phone Number	Billing Fax Number 206-244-5211
Billing Address	City	State Zip

4. How many services are presently connected to your system? 4,209 connections  
12/31/18, estimated  
7,596 ERUs

5. Is your system expanding (seeking to extend service area or increase number of approved connections)? ☒ Yes ☐ No

6. If the number of services is expected to increase, how many *new* connections are proposed in the next six years? 752 ERUs by 2024,  
1,175 by 2028

7. If your system is private-for-profit, is it regulated by the State Utilities and Transportation Commission? ☐ Yes ☐ No

8. Is the system located in a Critical Water Supply Service Area (i.e., have a Coordinated Water System Plan)? ☒ Yes ☐ No

9. Is your system a customer of a wholesale water system? ☒ Yes ☐ No

10. Will your system be pursuing additional water rights from the Department of Ecology in the next 20 years? ☐ Yes ☒ No

11. Is your system proposing a new intertie? ☐ Yes ☒ No

12. Do you have projects currently under review by us? ☐ Yes ☒ No

13. Are you requesting distribution main project report and construction document submittal exception and if so, does the WSP contain standard construction specifications for distribution mains? ☒ Yes ☐ No

14. The water system is responsible for sending a copy of the WSP to adjacent utilities for review or a letter notifying them that a copy of the WSP is available for their review and where the review copy is located. Has this been completed? ☒ Yes ☐ No

15. The purveyor is responsible for sending a copy of the WSP to all local governments within the service area (county and city planning departments, etc.). Has this been completed? ☒ Yes ☐ No

16. Are you proposing a change in the place of use of your water right? ☐ Yes ☒ No

If answer to questions 7, 8, 11, 14 and/or 15 is "yes," list who you sent the WSP to: See Page 1-6 in Plan for full list

Is this plan: ☐ an Initial Submittal ☒ a Revised Submittal

Please enclose the following number of copies of the WSP:

3 copies for Northwest and Southwest Regional Offices OR 2 copies for Eastern Regional Office (We will send one copy to Ecology)

1 additional copy if you answered "yes" to question 7.

3 Total copies attached

Please return completed form to the Office of Drinking Water regional office checked below.

☒ Northwest Drinking Water Operations  
Department of Health  
20425 72<sup>nd</sup> Avenue South, Suite 310  
Kent, WA 98032-2358  
253-395-6750

☐ Southwest Drinking Water Operations  
Department of Health  
PO Box 47823  
Olympia, WA 98504-7823  
360-236-3030

☐ Eastern Drinking Water Operations  
Department of Health  
16201 East Indiana Avenue Suite 1500  
Spokane Valley, WA 99216  
509-329-2100

For people with disabilities, this document is available on request in other formats. To submit a request, please call 1-800-525-0127 (TDD/TTY call 711).



STATE OF WASHINGTON  
DEPARTMENT OF HEALTH  
NORTHWEST DRINKING WATER REGIONAL OPERATIONS  
20425 72nd Avenue South, Suite 310, Kent Washington 98032-2388

July 10, 2017

BRYAN KOEHMSTEDT  
KING COUNTY WATER DISTRICT 49  
415 SW 153RD STREET  
BURIEN WA 98166

RE: King County Water District 49 ID#39800  
King County  
**Water System Plan - 2017**  
Submittal #17-0403

Dear Mr. Koehmstedt:

Thank you for submitting the Water System Plan (WSP) for King County Water District #49 (the District) received in this office on April 7, 2017. We have reviewed the plan and offer the following comments. These comments must be adequately addressed prior to approval of the WSP.

**Description of Water System**

1. Please provide determinations of local government consistency from the Cities of Burien, SeaTac, and Normandy Park.
2. King County provided comments on your WSP on May 3, 2017. Please respond to their issues. Adequate responses to their issues should be included in your final WSP submittal in order to receive a WSP Adoption Ordinance from King County.
3. Is Seattle Public Utilities (SPU) in agreement with your forecasted water quantity needs, and hydraulic grade line assumptions at the supply meters?

**Basic Planning Data**

4. Section 2.1.2 refers to a 10-inch service for the Port of Seattle. Our records do not include the District as a source of supply for the Port of Seattle. Please explain.
5. Table 2.4 *Historical Water Supply and Sales* report data through 2013. Why are 2014, 2015, 2016 data not included?
6. Regarding Table 2.4, some of the total purchased, total revenue and total non-revenue volumes do not reflect the values in the water use efficiency reports. Please explain.





If the volumes reported in Table 2.4 are inaccurate, how does that change the evaluation of average day demand and maximum day demand for one equivalent residential unit? In the future, please report volumes in gallons for the water use efficiency report.

7. Section 2.1.3 refers to inaccuracies of the SPU water meters to account for negative non-revenue volumes. What confidence does the District have in service meter accuracy? Is the 20-year service meter replacement mentioned in chapter 6 adequate?
8. The plan identifies Highline Water District and King County Water District #20 interties as emergency. Table 2.4 reports purchase from these emergency sources in 2010, 2012, and 2013. Please describe the events (fire, main break) that led to the use of these sources.

### **System Analysis**

9. Table 3.3, *Summary of Applicable Regulations and Compliance Status*. Please include the District's monitoring and reporting requirement of the distribution disinfection residual. In addition, please update Table 3.4 and the text in section 6.3.
10. Thank you for presenting the potential fire flow deficient nodes in Table 3.11. Please include in the appendices the hydraulic model results that show the resulting pressure at each node for each scenario.

### **Water Use Efficiency/ Water Rights**

No issues

### **Source Protection**

No issues

### **Operations & Maintenance**

11. Section 6.6, Cross-Connection Control Program. How many Table 9 hazards does the District have? Do they all have the required backflow prevention assemblies? Have they all been tested within the last year?
12. Appendix B, Section 3: Backflow Incident Response Plan, Exhibit D, Backflow Incident Report Form. Please update the District Backflow Incident Report Form with DOH publication 331-457-F available on-line.
13. Section 6.7.2 refers to the routine inspections of the reservoir. How often does staff check integrity of reservoir seals and screens? We recommend inspecting the integrity of the hatch seal, vent, overflow screen and any other penetrations at least once or twice a year.
14. Please respond to the observations and recommendations from the most recent routine sanitary survey conducted on March 18, 2015. Were the following items completed or added? Please comment.

- a. Adding a tap suitable for coliform bacteria sample collection on outlet of reservoir.

- b. Adding chlorine residual monitoring on inlet and outlet of reservoir.
  - c. Adding appurtenances to provide additional disinfection to the system in an emergency.
15. Under Recordkeeping and Reporting add: Construction Completion Reports for all distribution main replacements and extensions.
16. Appendix J – Coliform Monitoring Plan.
- a. Page 5. 49-9 routine sample site address is the same as repeat upstream address. Please clarify.
  - b. Page 6, Maximum Contaminant Level (MCL). With the revised total coliform rule (RTCR), there are now newly defined MCLs and violations for coliform bacteria and *E. coli* bacteria. Please see attached fact sheet entitled: *Revised Total Coliform Rule: Treatment technique triggers, violations, and public notification requirements* (DOH publication 331-206) to update language in the plan to reflect the RTCR.
  - c. Page 7. Acute MCL – please update language to reflect the RTCR. Non-Acute MCL: Tier 2 violation – RTCR eliminated this violation. See DOH publication 331-206 for discussion of newly defined violations.
  - d. Page 8, Paragraph C. The month after an unsatisfactory routine coliform sample, you must collect your usual number of routine samples from the distribution system, that is, eight samples (and not five samples as written in the plan).
  - e. Page 1-1. District staff might make further plans (in an *E. coli* MCL response scenario) to assist customers who are unable to boil water. We recommend that you identify contact persons at day cares, schools, medical facilities, and other customers who serve vulnerable populations. Other King County water systems (King County Water District #54 and City of Mercer Island, for example) had challenges under a boil water advisory.
  - f. The public notification template (DOH Form 331-263) and public notice certification (DOH Form 331-264) are outdated. Note that the “*E. coli* MCL violation” replaced the “Acute Coliform MCL.” Please replace with current versions of these publications.

**Distribution Facilities Design and Construction Standards**

17. We understand the District would like approval for the document submittal exception process.
- a. Please remove the drain hole from the standard 1” Air & Vacuum Relief Valve design, sheet 15.

- b. Please include standard design sheet for 1) pressure reducing station, 2) reduced pressure backflow assembly, 3) any other backflow prevention assembly allowed by the District.

### **Improvement Program**

18. What is the District doing in regards to implementing asset management techniques in your water utility?

### **Financial Planning**

19. WAC 246-290-100 (j) (ii); states 'a WSP must include a balanced financial plan for the plan approval period'. Is the District only requesting a three-year approval period for its WSP?
20. Please discuss the District's reserve levels for facility replacement.
21. Consider adding discussion of how the water system plans to incorporate the goals presented in the Governor's Directive 16-06 (see attached). The Governor directed water utilities to locate lead service lines and lead components in the distribution system over the course of the next two years, and replace in the next 15 years. How does this change the capital improvement plan and financial plan?

### **Miscellaneous**

22. The water system must meet the consumer input process outlined in WAC 246-290-100(8). Please include documentation of a consumer meeting discussing the WSP, prior to DOH approval of the WSP.
23. Prior to DOH approval, the District's elected governing body must approve and adopt the WSP.
24. Please provide copies of any comments made by adjacent purveyors or other interested parties, along with the District's response to those comments.
25. Is the District a member of WAWARN?

We hope that you have found these comments to be clear, constructive and helpful in the development of your final draft WSP. We ask that you submit the revised WSP on or before **October 7, 2017**. In order to expedite the review of your revised submittal, please include a cover letter summarizing how each of the above comments was addressed in the revised WSP and where each response is located (i.e., page numbers, Appendices, etc.)

Regulations establishing a schedule for fees for review of planning, engineering and construction documents have been adopted (WAC 246-290-990). Please note that we have included an invoice in the amount of **\$3705.00** for the review of the Water System Plan. This fee covers our cost for review of the initial submittal, plus the review of one revised document. Please remit your complete payment in the form of a check or money order within thirty days of the date of this letter in the enclosed envelope to: **DOH, Revenue Section, and P.O. Box 1099, Olympia, WA 98507-1099.**

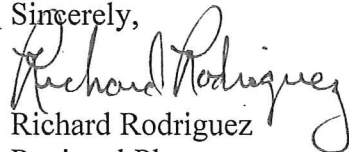
King County Water District 49 ID#39800

July 10, 2017

Page 5

Thank you again for submitting your draft Water System Plan for our review. If you have any comments or questions concerning our review, please contact either of us.

Sincerely,



Richard Rodriguez

Regional Planner

(253) 395-6771



Brietta Carter, PE

Regional Engineer

(253) 395-6770

Enclosure (invoice, DOH publication 331-206, Governor's Directive 16-06)

Cc:

Steve Hirschey, King County UTRC

Rodney Langer, PE, CHS Engineers

March 8, 2019

Joan Kersnar, P.E.  
Drinking Water Planning Manager  
Seattle Public Utilities  
700 Fifth Avenue, 59<sup>th</sup> Floor  
PO Box 34018  
Seattle, WA 98124

**Subject: February 2019 Water System Plan Submittal  
King County Water District No. 49**

Dear Ms. Kersnar:

On behalf of King County Water District No. 49 we are submitting their February 2019 Water System Plan for review and approval.

The February 2019 Plan is an updated version of the February 2017 version. The District Board has deferred adoption of the updated plan pending agency review.

A summary of all changes in this update is presented in Appendix N.

Thank you for your review letter to the District dated June 13, 2017. We have addressed your comments as follows in the updated Plan:

- 1) *General Facilities Charge*: Section 1.11.3.D has been revised per comment to reflect the nature of SPU charges and that the District passes through the SPU charges to new District connections
- 2) *Water Quality*
  - a. *Table 3.3*: revised per comments, with note that District is in compliance with chlorine residual monitoring.
  - b. *Table 3.4*: revised per comment
  - c. *Section 3.3.3 treatment*: revised per comment
  - d. *Section 3.3.3 samples*: revised per comment
  - e. *Section 3.3.3 positive sample*: revised per comment
- 3) *Source of Supply*
  - a. *Section 3*: revised per comment
  - b. *Wells*: revised per comment
  - c. *Firm yield*: revised per comment, but updated to reflect figures from 2019 SPU WSP
  - d. *Demand forecast*: revised per comment but updated to reflect figures from 2019 SPU WSP
  - e. *Tables 4.3 and 4.4*: deleted reference to Table 4.4 and added Table 4.3
- 4) *Water Use Efficiency*

- a. *Table 4.1*: retained Table 4.1 as historical information but added text per comment following the table.
  - b. *WUE Program*: revised per comment
  - c. *Water Use Efficiency Goals*: revised per comment to address performance through 2017 and revised WUE goals for consistency with the SWP 2019-2028 program and goals.
  - d. *Water Use Efficiency Measure Implementation Schedule*: revised per comment and revised WUE program for consistency with the SWP 2019-2028 program.
  - e. *Water Rate Structure Evaluation*: revised to reflect a study completed in 2017.
- 5) *Water Shortage Contingency Plan*: revised section 6.5 and 6.11 to include the recommendation to review and update the District's 2017 Water Shortage Response Plan for consistency with the recently adopted SPU Water Shortage Contingency Plan.

Additional revisions have been made in response to comments received from the King County UTRC and the State Department of Health. Comments and responses are included in Appendix I.

One electronic copy of the 2019 Plan is enclosed.

Please contact me if you require additional information to proceed with your review.

Sincerely,  
**CHS Engineers, LLC**



Rodney Langer, P.E.  
Project Manager

Enclosure

cc: Bryan Koehmstedt, King County Water District No. 49



**City of Seattle**  
Seattle Public Utilities

June 13, 2017

Rodney Langer  
CHS Engineers  
12507 Bel-Red Road, Suite 101  
Bellevue, WA 98005

Subject: Comments to King County Water District No. 49, 2017 Water System Plan

Dear Mr. Langer:

Thank you for the opportunity to review and comment on the 2017 Water System Plan (WSP) for King County Water District No. 49 (District). Our comments below include general comments and more specific comments on data gaps and corrections to the information presented in the WSP, particularly as related to Seattle Public Utilities (SPU) and its services to the District.

1) General Facilities Charge

- a) The description on page 1-13 of the Facilities Charge paid to SPU is not accurate. The wholesale contract with SPU has provisions to allocate and recover asset costs for projects that add supply capacity, such as conservation, using either what is defined in the contracts as "Facilities Charges" or through wholesale water rates. The Seattle Regional Water Supply System Operating Board has elected to recover these costs through "Facilities Charges" based on number of ERU's added, and each water utility may recover those costs from its customers as it chooses. SPU's contract does not require that these costs be collected by new utility customers at the time of connection to the system.

2) Water Quality

- a) Please make the following changes/clarifications to Table 3.3:
  - i) Surface Water Treatment Rule/Interim Enhanced Surface Water Treatment Rule – For the District Status column, change text to simply state "SPU monitors".
  - ii) Total Coliform Rule – For the District Status column, please include/clarify that SPU collects routine TCR samples and District staff is responsible for collecting repeat TCR samples within the distribution system.
  - iii) Add a row for Chlorine Residual including written report/monitoring in the Requirements column, District collects samples in the District Status column and TBD in the Compliance column.
- b) Please make the following changes/clarifications to Table 3.4:
  - i) Inorganic Compounds – the frequency column should read once every 9 years under a waiver from the Washington State Department of Health. Nitrate should stay the same as it required to be collected annually.
  - ii) Organic Compounds, SPU collects samples once every 3 to 9 years, depending on

Mami Hara, General Manager/CEO  
Seattle Public Utilities  
PO Box 34018  
Seattle, WA 98124-4018

Tel (206) 684-5851  
Fax (206) 684-4631  
TDD (206) 233-7241  
<http://www.seattle.gov/util>

- the parameter.
- iii) The parameter "Secondary Contaminants" should be listed as "Secondary Inorganic Compounds". And SPU collects samples for secondary IOCs once every 9 years under a waiver from the Washington State Department of Health.
  - iv) For chlorine residual, the District is responsible for sampling for chlorine residual in the distribution system daily. Please change the table frequency accordingly.
  - v) Radionuclides are not collected in the distribution system. Please change the location column to "point of entry into SPU's distribution system".
  - c) In Section 3.3.3, please include a description of the treatment provided by SPU and/or provide a reference to the District's Annual Water Quality Report where it is explained. Also, clarify that the District does not provide any treatment of water within their distribution system.
  - d) Update Section 3.3.3 to reflect current conditions. SPU collects samples at eight sample stands for routine coliform, temperature and chlorine. The District has four additional sample stands in the system used for DBP sampling (and maybe other parameters are collected/analyzed here). Please update/reconcile this portion of the plan with information found in Section 6.11.
  - e) Please be more specific in the last sentence of Section 3.3.3, paragraph 2. SPU will contact the District if a routine coliform sample is positive, so that District staff can collect the required repeat coliform samples within the distribution system within 24 hours, per the WAC. If other water quality problems exist in the distribution system (i.e., contamination), it is the responsibility of the District staff to be aware of it and take appropriate action.
- 3) Source of Supply
- a) In Section 3 (and in the greater report as applicable), please be consistent with how you are describing the supply from SPU's regional system. Terms used are gravity and pumped supply. Please be clear that these are descriptors developed by District staff and do not necessarily reflect how SPU would refer to these facilities.
  - b) On page 3-14, 2nd paragraph, please note that the wells are operated under a temporary water rights permit. Also, delete reference to the duration, since the wells could be used at any time and duration.
  - c) On page 3-14, the firm yield indicated in the 2013 SPU Water System Plan was 172 mgd, not 170 mgd.
  - d) SPU's demand forecast was revised in July 2013 to reflect an amendment to the contract with Cascade Water Alliance. The revised forecast shows total demand increasing gradually to 142 mgd by 2039 and then declining to stay relatively flat at about 137 mgd through 2060. The text on page 3-14 should be changed accordingly.
  - e) The water rights self-assessment forms (Tables 4.3 and 4.4) referenced on page 4-8 were not included in the version of the WSP we received, although the characterization of SPU's water rights in the WSP is acceptable.
- 4) Water Use Efficiency
- a) In Table 4.1, consider using the text below to describe WUE Program Measures:  
*WD 49 is an active participant in the Saving Water Partnership's regional water conservation program. The program offers a comprehensive set of services that helps residents and businesses use water wisely. The services include education, technical assistance, and financial incentives, as shown below:*

*Customer financial incentives:*

- *Toilet rebates for single family, multifamily, and commercial customers*



- *Irrigation system rebates for single family, multifamily and commercial customers*
- *Urinal rebates for commercial customers*
- *Dishwasher rebates for commercial customers*
- *Ice machine rebates for commercial customers*
- *Food steamer rebates for commercial customers*
- *Coin-operated clotheswasher rebates for multifamily and commercial customers*
- *Cooling tower improvement rebates for commercial customers*
- *Water Smart Technology program for commercial customers that provides rebates up to 50% of installed cost for water related equipment*

*Customer education and technical assistance:*

- *Classroom presentations for K-12 grade students*
- *Community festivals and events*
- *Water efficient gardening classes for residents*
- *Garden hotline to answer questions about water-efficient gardening and other topics*
- *Landscape professionals training*
- *Gardening brochures and fact sheets*
- *Technical assistance to residential and commercial customers on irrigation efficiency issues*
- *Technical assistance to commercial customers on indoor efficiency issues*
- *Regional website full of comprehensive information, tips, rebate information, etc (www.savingwater.org)*
- *Regional conservation hotline 206-684-SAVE*

- b) In 4.1.1 Current WUE Program, change the text to indicate that the SWP was formed in 2000, not 2007. Suggest updating measures as indicated below, and delete “and SPU” in paragraphs that say “As part of the regional program, the District and SPU...”

*Toilet Rebates*

*The District has offered toilet rebates since 2000 as part of the SWP. Toilets that ~~were installed prior to 1994 and flush at 3.5 gallons/flush or greater are eligible. By buying the toilets in bulk, all the members of the SWP can obtain a reduced price while ensuring the toilet is acceptable.~~*

*ET Controller Rebates*

*As part of the regional program, the District ~~and SPU provides~~ rebates for Evapotranspiration- (ET) based, WaterSense-labeled controllers which automatically adjust irrigation systems to ~~historic or~~ real time weather data. Rebates ~~are also~~ given to customers ~~who replace outdated controllers,~~ regardless of customer class.*

*Rain Sensor Rebates*

*As part of the regional program, the District ~~and SPU provided~~ rebates for rain sensors which turn off automatic irrigation systems when it is raining. Rebates ~~are were~~ given to all customers with in-ground irrigation systems, regardless of customer class.*

*Irrigation System Audits*

*As part of the regional program, the District ~~and SPU offers~~ free irrigation audits to customers with more than one acre of irrigated area and high outdoor water usage to improve the efficiency of their irrigation system.*

*Water Conservation Messages on Billing Notes*

*The District also provides customers with their consumption history on each water bill. Consumption for the previous 12 months is shown on the bill to inform the customer of his usage over the past year. ~~Brochures provided by SPU regarding conservation are also included with the bills.~~ [SWP has not provided bill stuffers in recent years.] Messages are included on the bills to encourage water conservation.*

*Youth Education*

*As part of the regional program, the SPU District provides in-classroom education programs and a range of youth-oriented educational materials aimed at conservation.*

*Fairs*

*As part of the regional program, ~~SPU~~ the District sponsors a wide variety of events that residents of the District have an opportunity to participate in.*

- c) In 4.1.2 Water Use Efficiency Goals, we suggest deleting the text about the two older conservation goals and keep the current 2013-18 WUE Goal. Also, consider adding that the SWP met the goal in 2015, using 96.9 mgd and 2016, using 94.4 mgd. We also suggest adding "The District plans to adopt the next Saving Water Partnership regional WUE goal and participate in the next regional program, which will cover 2019-2028."
  - d) Under 4.1.4 Water Use Efficiency Measure Implementation Schedule: This section covers the current conservation goal/program that runs through 2018, as well as the new goal and program for 2019-2028 that are under development. Therefore, it would be useful to clarify that the content through 2018 is firm, while the 2019 and beyond content is subject to finalization of the new program. Also, please delete "Rain Sensor Rebates" from the table since that is no longer part of the regional program.
  - e) In 4.1.9 Water Rate Structure Evaluation, the 4th and 5th sentences seem outdated since they refer to 2009 as the future and a 2008 rate study update as the most recent update.
- 5) Water Shortage Contingency Plan
- a) The District's WSCP was updated in 2017, and while generally consistent with SPU's 2006 WSCP, we recommend that the plan eventually be updated to reflect changes in SPU's WSCP, which will be finalized this year and adopted by Seattle City Council next year.

If you have any questions on our comments or need additional information, please contact me at 206-684-0839, or [joan.kersnar@seattle.gov](mailto:joan.kersnar@seattle.gov).

Sincerely,



Joan M. Kersnar, P.E.  
Drinking Water Planning Manager

cc: Terri Gregg, Wholesale Contracts Manager, Seattle Public Utilities  
Bryan Koehmstedt, King County Water District No. 49



March 8, 2019

Mr. Steve Hirschey  
King County UTRC  
Department of Natural Resources  
201 S Jackson, Suite 500, KCS-NR-0512  
Seattle, WA 98104-3855

**Subject: February 2019 Water System Plan Submittal  
King County Water District No. 49**

Dear Mr. Hirschey:

On behalf of King County Water District No. 49 we are submitting their February 2019 Water System Plan for review and approval per RCW 57 and King County Code.

The February 2019 Plan is an updated version of the February 2017 version. The updated plan has been reviewed by the Board but adoption has been deferred pending review of the updated plan by the approving agencies.

A summary of all changes in this update is presented in Appendix N.

Thank you for your review letter to the District dated May 3, 2017. We have addressed your comments as follows in the updated Plan, where applicable:

- *Service to Group B system in District Service area:* The map provided along with the comment letter identifies "Good N Plenty Well #2" as a Group B system within the District's service boundary. DOH's Water Facilities Inventory for Good N Plenty #2 lists the source location as Section 25, Township 23N, Range 03E. However, the Good N Plenty #2 Well is part of the Huckleberry Hill Water System, which is located on Vashon Island, Section 25, Township 23N, Range 02E. It appears this system is incorrectly located in the County's records. No plan revisions are made to address the Group B comment.
- *City Consistency Statements:* Consistency statements were previously and are included in Appendix I. We have requested updated statements as documented in the correspondence added to Appendix I.
- *Title of Plan by SEPA Reference:* SEPA review and hearing was completed in May 2016 for the plan that was adopted in February 2017. An updated SEPA checklist, review and notice were prepared for the February 2019 plan. Appendix H includes documentation of the SEPA process for the 2019 plan.
- *Adopting Resolution:* The resolution adopting the February 2017 version of the WSP is included in Appendix N. The resolution adopting the February 2019 version will also eventually be included in Appendix N.

Additional revisions have been made in response to comments received from Seattle Public Utilities and the State Department of Health. Comments and responses are included in Appendix I.

Two print copies and one electronic copy of the 2019 Plan are enclosed.

Please contact me if you require additional information to proceed with your review.

Sincerely,  
**CHS Engineers, LLC**



Rodney Langer, P.E.  
Project Manager

Enclosure

cc: Bryan Koehmstedt, King County Water District No. 49



## King County

### Utilities Technical Review Committee

Department of Natural Resources and Parks

King Street Center

201 South Jackson Street, Suite 512

Seattle, WA 98104-3855

[www.kingcounty.gov](http://www.kingcounty.gov)

May 3, 2017

Mr. Bryan Koehmstedt, Superintendent  
King County Water District 49  
415 SW 153<sup>rd</sup> Street  
Burien, WA 98166

Dear Mr. Koehmstedt:

Thank you for submitting the King County Water District 49 Water System Plan, February 2017 (Plan) for King County approval. The Plan was received on April 7, 2017, from Mr. Rodney Langer, P.E., with CHS Engineers. In accordance with the statutes, chapter 57.16 Revised Code of Washington and King County Code 13.24, the King County's Utilities Technical Review Committee (UTRC) has reviewed the Plan for consistency with the King County Comprehensive Plan and the King County Code.

In reviewing the Plan, the UTRC found that the Plan is largely consistent with the County's comprehensive plan and code. However, four additions or clarifications are necessary before we can make a recommendation to the King County Council for approval of the City's final Plan. The items are:

- Attached is a map of the one Group B system that is within the District's service area. Please describe how the District's service area policies will apply to such a systems in the event they go out of business or choose to become part of your customer base;
- Please include consistency statements from the cities that you provide water service to affirming the Plan is consistent with their respective planning efforts;
- Ensure the title for this plan matches the plan title used for the State Environmental Policy Act environmental checklist and signed SEPA threshold decision for this action; and
- Include the resolution or ordinance from the district commissioners approving the final water plan.

We look forward to seeing the final Plan and working with you to secure the King County Council's approval. The Council's action will represent King County's final action on the Plan.

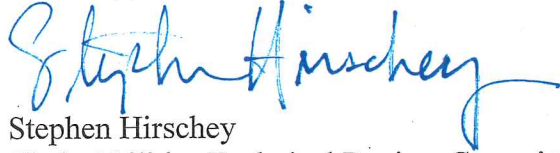
Mr. Bryan Koehmstedt

May 3, 2017

Page 2 of 2

If you have any questions or concerns about any of the information in the letter, please do not hesitate to call me at 206-477-5387.

Sincerely,



Stephen Hirschey

Chair, Utilities Technical Review Committee

cc: Richard Rodriguez, Regional Planner, Washington State Department of Health  
Mr. Rodney Langer, P.E., CHS Engineers

Enclosure







March 8, 2019

Mr. Chip Davis  
City of Burien Community Development Department  
400 SW 152<sup>nd</sup> Street, Suite 300  
Burien, WA 98166

**Subject: Water System Plan Submittal  
King County Water District No. 49**

Dear Mr. Davis

On behalf of King County Water District No. 49 we are submitting their February 2019 Water System Plan for review and approval per RCW 57. The February 2019 Plan is an updated version of the February 2017 version.

A summary of all changes in this update is presented in Appendix N. The updated plan has been reviewed by the Board, but adoption has been deferred pending review of the updated plan by the approving agencies.

We are concurrently submitting the Plan to the Cities of SeaTac and Normandy Park for review and approval per RCW 57 and to the King County UTRC per King County Code. The Plan is also concurrently submitted to DOH for approval and adjacent water systems for their information and review. See Table 1.1 starting on page 1-7 of the Plan for a full list of submittals.

One electronic copy of the Plan is enclosed.

Please contact me if you require additional information to proceed with your review.

Sincerely,  
**CHS Engineers, LLC**

A handwritten signature in cursive script, appearing to read "Rodney Langer".

Rodney Langer, P.E.  
Project Manager

Enclosure

cc: Bryan Koehmstedt, King County Water District No. 49





March 8, 2019

Mr. Matt Everett  
Highline Water District  
23828 30th Ave. S.  
Kent, WA 98032

**Subject: Water System Plan Submittal  
King County Water District No. 49**

Dear Mr. Everett:

On behalf of King County Water District No. 49 we are submitting their February 2019 Water System Plan for review and approval per RCW 57. The February 2019 Plan is an updated version of the February 2017 version.

A summary of all changes in this update is presented in Appendix N. The updated plan has been reviewed by the Board, but adoption has been deferred pending review of the updated plan by the approving agencies.

We are concurrently submitting the Plan to the Cities of Burien, SeaTac and Normandy Park for review and approval per RCW 57 and to the King County UTRC per King County Code. The Plan is also concurrently submitted to DOH for approval and adjacent water systems for their information and review. See Table 1.1 starting on page 1-7 of the Plan for a full list of submittals.

One electronic copy of the Plan is enclosed.

Please contact me if you require additional information to proceed with your review.

Sincerely,  
**CHS Engineers, LLC**

A handwritten signature in cursive script that reads "Rodney Langer".

Rodney Langer, P.E.  
Project Manager

Enclosure

cc: Bryan Koehmstedt, King County Water District No. 49



March 8, 2019

King County Department of Health  
Eastgate Environmental Health  
14350 SE Eastgate Way  
Bellevue, WA 98007

**Subject: Water System Plan Submittal  
King County Water District No. 49**

Ladies and Gentlemen:

On behalf of King County Water District No. 49 we are submitting their February 2019 Water System Plan for review and approval per RCW 57. The February 2019 Plan is an updated version of the February 2017 version.

A summary of all changes in this update is presented in Appendix N. The updated plan has been reviewed by the Board, but adoption has been deferred pending review of the updated plan by the approving agencies.

We are concurrently submitting the Plan to the Cities of Burien, SeaTac and Normandy Park for review and approval per RCW 57 and to the King County UTRC per King County Code. The Plan is also concurrently submitted to DOH for approval and adjacent water systems for their information and review. See Table 1.1 starting on page 1-7 of the Plan for a full list of submittals.

One electronic copy of the Plan is enclosed.

Please contact me if you require additional information to proceed with your review.

Sincerely,  
**CHS Engineers, LLC**

A handwritten signature in cursive script that reads "Rodney Langer".

Rodney Langer, P.E.  
Project Manager

Enclosure

cc: Bryan Koehmstedt, King County Water District No. 49  
King County UTRC



March 8, 2019

Fire Marshal Ray Pettigrew  
King County Fire District No. 2  
900 SW 146th St.  
PO Box 66029  
Burien, WA 98166

**Subject: Water System Plan Submittal  
King County Water District No. 49**

Dear Marshal Pettigrew:

On behalf of King County Water District No. 49 we are submitting their February 2019 Water System Plan for review and approval per RCW 57. The February 2019 Plan is an updated version of the February 2017 version.

A summary of all changes in this update is presented in Appendix N. The updated plan has been reviewed by the Board, but adoption has been deferred pending review of the updated plan by the approving agencies.

We are concurrently submitting the Plan to the Cities of Burien, SeaTac and Normandy Park for review and approval per RCW 57 and to the King County UTRC per King County Code. The Plan is also concurrently submitted to DOH for approval and adjacent water systems for their information and review. See Table 1.1 starting on page 1-7 of the Plan for a full list of submittals.

One electronic copy of the Plan is enclosed.

Please contact me if you require additional information to proceed with your review.

Sincerely,  
**CHS Engineers, LLC**

A handwritten signature in cursive script that reads "Rodney Langer".

Rodney Langer, P.E.  
Project Manager

Enclosure

cc: Bryan Koehmstedt, King County Water District No. 49



March 8, 2019

Ryan Harriman  
City of Normandy Park Community Development Department  
801 SW 174<sup>th</sup> Street  
Normandy Park, WA 98166

**Subject: Water System Plan Submittal  
King County Water District No. 49**

Dear Mr. Harriman:

On behalf of King County Water District No. 49 we are submitting their February 2019 Water System Plan for review and approval per RCW 57. The February 2019 Plan is an updated version of the February 2017 version.


A summary of all changes in this update is presented in Appendix N. The updated plan has been reviewed by the Board, but adoption has been deferred pending review of the updated plan by the approving agencies.

We are concurrently submitting the Plan to the Cities of SeaTac and Burien for review and approval per RCW 57 and to the King County UTRC per King County Code. The Plan is also concurrently submitted to DOH for approval and adjacent water systems for their information and review. See Table 1.1 starting on page 1-7 of the Plan for a full list of submittals.

One electronic copy of the Plan is enclosed.

Please contact me if you require additional information to proceed with your review.

Sincerely,  
**CHS Engineers, LLC**

  
Rodney Langer, P.E.  
Project Manager

Enclosure

cc: Bryan Koehmstedt, King County Water District No. 49



March 8, 2019

Mr. Steve Pilcher  
City of SeaTac Planning Division  
4800 South 188<sup>th</sup> Street  
SeaTac, WA 98188

**Subject: Water System Plan Submittal  
King County Water District No. 49**

Dear Mr. Pilcher:

On behalf of King County Water District No. 49 we are submitting their February 2019 Water System Plan for review and approval per RCW 57. The February 2019 Plan is an updated version of the February 2017 version.

A summary of all changes in this update is presented in Appendix N. The updated plan has been reviewed by the Board, but adoption has been deferred pending review of the updated plan by the approving agencies.

We are concurrently submitting the Plan to the Cities of Burien and Normandy Park for review and approval per RCW 57 and to the King County UTRC per King County Code. The Plan is also concurrently submitted to DOH for approval and adjacent water systems for their information and review. See Table 1.1 starting on page 1-7 of the Plan for a full list of submittals.

One electronic copy of the Plan is enclosed.

Please contact me if you require additional information to proceed with your review.

Sincerely,  
**CHS Engineers, LLC**

A handwritten signature in cursive script that reads "Rodney Langer".

Rodney Langer, P.E.  
Project Manager

Enclosure

cc: Bryan Koehmstedt, King County Water District No. 49



March 8, 2019

Mr. Michael Martin  
General Manager  
King County Water District No. 20  
12606 First Avenue South  
Burien, WA 98168

**Subject: Water System Plan Submittal  
King County Water District No. 49**

Dear Mr. Martin:

On behalf of King County Water District No. 49 we are submitting their February 2019 Water System Plan for review and approval per RCW 57. The February 2019 Plan is an updated version of the February 2017 version.

A summary of all changes in this update is presented in Appendix N. The updated plan has been reviewed by the Board, but adoption has been deferred pending review of the updated plan by the approving agencies.

We are concurrently submitting the Plan to the Cities of Burien, SeaTac and Normandy Park for review and approval per RCW 57 and to the King County UTRC per King County Code. The Plan is also concurrently submitted to DOH for approval and adjacent water systems for their information and review. See Table 1.1 starting on page 1-7 of the Plan for a full list of submittals.

One electronic copy of the Plan is enclosed.

Please contact me if you require additional information to proceed with your review.

Sincerely,  
**CHS Engineers, LLC**

A handwritten signature in cursive script that reads "Rodney Langer".

Rodney Langer, P.E.  
Project Manager

Enclosure

cc: Bryan Koehmstedt, King County Water District No. 49



March 8, 2019

Mr. Shane Young  
General Manager  
King County Water District No. 125  
3460 S. 148<sup>th</sup> St, Suite 110  
Tukwila, WA 98168

**Subject: Water System Plan Submittal  
King County Water District No. 49**

Dear Mr. Young:

On behalf of King County Water District No. 49 we are submitting their February 2019 Water System Plan for review and approval per RCW 57. The February 2019 Plan is an updated version of the February 2017 version.

A summary of all changes in this update is presented in Appendix N. The updated plan has been reviewed by the Board, but adoption has been deferred pending review of the updated plan by the approving agencies.

We are concurrently submitting the Plan to the Cities of Burien, SeaTac and Normandy Park for review and approval per RCW 57 and to the King County UTRC per King County Code. The Plan is also concurrently submitted to DOH for approval and adjacent water systems for their information and review. See Table 1.1 starting on page 1-7 of the Plan for a full list of submittals.

One electronic copy of the Plan is enclosed.

Please contact me if you require additional information to proceed with your review.

Sincerely,  
**CHS Engineers, LLC**

A handwritten signature in cursive script, appearing to read "Rodney Langer".

Rodney Langer, P.E.  
Project Manager

Enclosure

cc: Bryan Koehmstedt, King County Water District No. 49



January 31, 2019

Ms. Amanda Leon  
City of Normandy Park Community Development Department  
801 SW 174<sup>th</sup> Street  
Normandy Park, WA 98166

**Subject: King County Water District No. 49 2019 Comprehensive Water Plan  
Request for Local Government Consistency Review**

Dear Ms. Leon:

We are writing on behalf of King County Water District No. 49. We are in the process of updating their 2017 Water System Plan, per comments from SPU, DOH and King County, and have completed the basic planning and forecasting portion of the plan. The forecast has been extended out to 2038, and no changes in the forecast growth are noted for the period through 2036, as previously presented.

We are requesting completion of review of the current draft plan to the extent necessary (Chapters 1 and 2, Appendix N) to favorably complete the attached Local Government Consistency Review Checklist, as required by WAC 246-290-108. We have partially completed the form to facilitate your efficient review.

The District is preparing to complete the full plan in February, 2019. We anticipate submitting the full plan for your review in early March.

Please call if you have any questions.

Sincerely,  
**CHS Engineers, LLC**

A handwritten signature in blue ink that reads "Rodney Langer".

Rodney Langer, P.E.  
Principal

Enclosure  
cc: Bryan Koehmstedt, King County Water District No. 49



## Local Government Consistency Determination Form

Water System Name: King County Water District #49 PWS ID: 39800P

Planning/Engineering Document Title: Comprehensive Water System Plan Plan Date: February 2019

Local Government with Jurisdiction Conducting Review: City of Normandy Park

Before the Department of Health (DOH) approves a planning or engineering submittal under Section 100 or Section 110, the local government must review the documentation the municipal water supplier provides to prove the submittal is consistent with **local comprehensive plans, land use plans and development regulations** (WAC 246-290-108). Submittals under Section 105 require a local consistency determination if the municipal water supplier requests a water right place-of-use expansion. The review must address the elements identified below as they relate to water service.

By signing this form, the local government reviewer confirms the document under review is consistent with applicable local plans and regulations. If the local government reviewer identifies an inconsistency, he or she should include the citation from the applicable comprehensive plan or development regulation and explain how to resolve the inconsistency, or confirm that the inconsistency is not applicable by marking N/A. See more instructions on reverse.

Local Government Consistency Statement	For use by water system	For use by local government
	Identify the page(s) in submittal	Yes or Not Applicable
a) The water system service area is consistent with the adopted <u>land use and zoning</u> within the service area.	2-1, Figure 2-1	
b) The <u>growth projection</u> used to forecast water demand is consistent with the adopted city or county's population growth projections. If a different growth projection is used, provide an explanation of the alternative growth projection and methodology.	2-11, Table 2.7 and 2.8	
c) For <u>cities and towns that provide water service</u> : All water service area policies of the city or town described in the plan conform to all relevant <u>utility service extension ordinances</u> .	N/A	
d) <u>Service area policies</u> for new service connections conform to the adopted local plans and adopted development regulations of all cities and counties with jurisdiction over the service area.	1-8 through 1-15	
e) <u>Other relevant elements</u> related to water supply are addressed in the water system plan, if applicable. This may include Coordinated Water System Plans, Regional Wastewater Plans, Reclaimed Water Plans, Groundwater Management Area Plans, and the Capital Facilities Element of local comprehensive plans.		

I certify that the above statements are true to the best of my knowledge and that these specific elements are consistent with adopted local plans and development regulations.

Signature \_\_\_\_\_

Date \_\_\_\_\_



January 31, 2019

Mr. Chip Davis  
City of Burien Community Development Department  
400 SW 152<sup>nd</sup> Street, Suite 300  
Burien, WA 98166

**Subject: King County Water District No. 49 2019 Comprehensive Water Plan  
Request for Local Government Consistency Review**

Dear Mr. Davis:

We are writing on behalf of King County Water District No. 49. We are in the process of updating their 2017 Water System Plan, per comments from SPU, DOH and King County, and have completed the basic planning and forecasting portion of the plan. The forecast has been extended out to 2038, and no changes in the forecast growth are noted for the period through 2036, as previously presented.

We are requesting completion of review of the current draft plan to the extent necessary (Chapters 1 and 2, Appendix N) to favorably complete the attached Local Government Consistency Review Checklist, as required by WAC 246-290-108. We have partially completed the form to facilitate your efficient review.

The District is preparing to complete the full plan in February, 2019. We anticipate submitting the full plan for your review in early March.

Please call if you have any questions.

Sincerely,  
**CHS Engineers, LLC**

A handwritten signature in blue ink that reads "Rodney Langer".

Rodney Langer, P.E.  
Principal

Enclosure

cc: Bryan Koehmstedt, King County Water District No. 49

# Local Government Consistency Determination Form

Water System Name: King County Water District #49 PWS ID: 39800P

Planning/Engineering Document Title: Comprehensive Water System Plan Plan Date: February 2019

Local Government with Jurisdiction Conducting Review: City of Burien

Before the Department of Health (DOH) approves a planning or engineering submittal under Section 100 or Section 110, the local government must review the documentation the municipal water supplier provides to prove the submittal is consistent with **local comprehensive plans, land use plans and development regulations** (WAC 246-290-108). Submittals under Section 105 require a local consistency determination if the municipal water supplier requests a water right place-of-use expansion. The review must address the elements identified below as they relate to water service.

By signing this form, the local government reviewer confirms the document under review is consistent with applicable local plans and regulations. If the local government reviewer identifies an inconsistency, he or she should include the citation from the applicable comprehensive plan or development regulation and explain how to resolve the inconsistency, or confirm that the inconsistency is not applicable by marking N/A. See more instructions on reverse.

Local Government Consistency Statement	For use by water system	For use by local government
	Identify the page(s) in submittal	Yes or Not Applicable
a) The water system service area is consistent with the adopted <u>land use and zoning</u> within the service area.	2-1, Figure 2-1	
b) The <u>growth projection</u> used to forecast water demand is consistent with the adopted city or county's population growth projections. If a different growth projection is used, provide an explanation of the alternative growth projection and methodology.	2-11, Table 2.7 and 2.8	
c) For <u>cities and towns that provide water service</u> : All water service area policies of the city or town described in the plan conform to all relevant <u>utility service extension ordinances</u> .	N/A	
d) <u>Service area policies</u> for new service connections conform to the adopted local plans and adopted development regulations of all cities and counties with jurisdiction over the service area.	1-8 through 1-15	
e) <u>Other relevant elements</u> related to water supply are addressed in the water system plan, if applicable. This may include Coordinated Water System Plans, Regional Wastewater Plans, Reclaimed Water Plans, Groundwater Management Area Plans, and the Capital Facilities Element of local comprehensive plans.		

I certify that the above statements are true to the best of my knowledge and that these specific elements are consistent with adopted local plans and development regulations.

Signature \_\_\_\_\_

Date \_\_\_\_\_





January 31, 2019

Mr. Steve Pilcher  
City of SeaTac Planning Department  
4800 South 188<sup>th</sup> Street  
SeaTac, WA 98188

**Subject: King County Water District No. 49 2019 Comprehensive Water Plan  
Request for Local Government Consistency Review**

Dear Mr. Pilcher:

We are writing on behalf of King County Water District No. 49. We are in the process of updating their 2017 Water System Plan, per comments from SPU, DOH and King County, and have completed the basic planning and forecasting portion of the plan. The forecast has been extended out to 2038, and no changes in the forecast growth are noted for the period through 2036, as previously presented.

We are requesting completion of review of the current draft plan to the extent necessary (Chapters 1 and 2, Appendix N) to favorably complete the attached Local Government Consistency Review Checklist, as required by WAC 246-290-108. We have partially completed the form to facilitate your efficient review.

The District is preparing to complete the full plan in February, 2019. We anticipate submitting the full plan for your review in early March.

Please call if you have any questions.

Sincerely,  
**CHS Engineers, LLC**

A handwritten signature in blue ink that reads "Rodney Langer".

Rodney Langer, P.E.  
Principal

Enclosure  
cc: Bryan Koehmstedt, King County Water District No. 49

## Local Government Consistency Determination Form

Water System Name: King County Water District #49 PWS ID: 39800P

Planning/Engineering Document Title: Comprehensive Water System Plan Plan Date: February 2019

Local Government with Jurisdiction Conducting Review: City of SeaTac

Before the Department of Health (DOH) approves a planning or engineering submittal under Section 100 or Section 110, the local government must review the documentation the municipal water supplier provides to prove the submittal is consistent with **local comprehensive plans, land use plans and development regulations** (WAC 246-290-108). Submittals under Section 105 require a local consistency determination if the municipal water supplier requests a water right place-of-use expansion. The review must address the elements identified below as they relate to water service.

By signing this form, the local government reviewer confirms the document under review is consistent with applicable local plans and regulations. If the local government reviewer identifies an inconsistency, he or she should include the citation from the applicable comprehensive plan or development regulation and explain how to resolve the inconsistency, or confirm that the inconsistency is not applicable by marking N/A. See more instructions on reverse.

Local Government Consistency Statement	For use by water system	For use by local government
	Identify the page(s) in submittal	Yes or Not Applicable
a) The water system service area is consistent with the adopted <u>land use and zoning</u> within the service area.	2-1, Figure 2-1	
b) The <u>growth projection</u> used to forecast water demand is consistent with the adopted city or county's population growth projections. If a different growth projection is used, provide an explanation of the alternative growth projection and methodology.	2-11, Table 2.7 and 2.8	
c) For <u>cities and towns that provide water service</u> : All water service area policies of the city or town described in the plan conform to all relevant <u>utility service extension ordinances</u> .	N/A	
d) <u>Service area policies</u> for new service connections conform to the adopted local plans and adopted development regulations of all cities and counties with jurisdiction over the service area.	1-8 through 1-15	
e) <u>Other relevant elements</u> related to water supply are addressed in the water system plan, if applicable. This may include Coordinated Water System Plans, Regional Wastewater Plans, Reclaimed Water Plans, Groundwater Management Area Plans, and the Capital Facilities Element of local comprehensive plans.		

I certify that the above statements are true to the best of my knowledge and that these specific elements are consistent with adopted local plans and development regulations.

Signature \_\_\_\_\_

Date \_\_\_\_\_



## Local Government Consistency Review Checklist

Water System Name: King County Water District No. 49 PWS ID: 39800P

Planning/Engineering Document Title: Water System Plan Plan Date: 10/15(draft)

Local Government with Jurisdiction: City of Normandy Park

### WAC 246-290-108 Consistency with local plans and regulations:

Consistency with local plans and regulations applies to planning and engineering documents under WAC 246-290-106, 246-290-107, and 246-290-110(4)(b) (ii).

1) Municipal water suppliers must include a consistency review and supporting documentation in its planning or engineering document describing how it has addressed consistency with **local plans and regulations**. This review must include specific elements of local plans and regulations, as they reasonably relate to water service as determined by Department of Health (DOH). Complete the table below and see instructions on back.

Local Government Consistency Statement	Page(s) in Planning Document	Yes – No – Not Applicable
a) The water system service area is consistent with the adopted <u>land use and zoning</u> within the applicable service area.	2-9 and Figure 2-1	yes
b) The <u>six-year growth projection</u> used to forecast water demand is consistent with the adopted city/county's population growth projections. If a different growth projection is used, provide an explanation of the alternative growth projection and methodology.	2-1 thru 2-3 (historical) and 2-9 thru 2-11	yes
c) Applies to <u>cities and towns that provide water service</u> : All water service area policies of the city or town are consistent with the <u>utility service extension ordinances</u> of the city or town.	N/A	
d) <u>Service area policies</u> for new service connections are consistent with the adopted local plans and adopted development regulations of all jurisdictions with authority over the service area [City(ies), County(ies)].	1-8 thru 1-14	yes
e) <u>Other relevant elements</u> related to water supply are addressed in the water system plan, if applicable; Coordinated Water System plans, Regional Wastewater plans, Reclaimed Water plans, Groundwater Area Management plans, and Capital Facilities Element of Comprehensive plans.		

I certify that the above statements are true to the best of my knowledge and that these specific elements are consistent with adopted local plans and development regulations.

Signature

Printed Name, Title, & Jurisdiction

Date

## Local Government Consistency Review Checklist

Water System Name: King County Water District No. 49 PWS ID: 39800P

Planning/Engineering Document Title: Water System Plan Plan Date: 10/15 (draft)

Local Government with Jurisdiction: City of Burien

### WAC 246-290-108 Consistency with local plans and regulations:

Consistency with local plans and regulations applies to planning and engineering documents under WAC 246-290-106, 246-290-107, and 246-290-110(4)(b) (ii).

1) Municipal water suppliers must include a consistency review and supporting documentation in its planning or engineering document describing how it has addressed consistency with **local plans and regulations**. This review must include specific elements of local plans and regulations, as they reasonably relate to water service as determined by Department of Health (DOH). Complete the table below and see instructions on back.

Local Government Consistency Statement	Page(s) in Planning Document	Yes – No – Not Applicable
a) The water system service area is consistent with the adopted <u>land use and zoning</u> within the applicable service area.	2-9 and Figure 2-1	YES
b) The <u>six-year growth projection</u> used to forecast water demand is consistent with the adopted city/county's population growth projections. If a different growth projection is used, provide an explanation of the alternative growth projection and methodology.	2-1 thru 2-3 (historical) and 2-9 thru 2-11	YES
c) Applies to <u>cities and towns that provide water service</u> : All water service area policies of the city or town are consistent with the <u>utility service extension ordinances</u> of the city or town.	N/A	
d) <u>Service area policies</u> for new service connections are consistent with the adopted local plans and adopted development regulations of all jurisdictions with authority over the service area [City(ies), County(ies)].	1-8 thru 1-14	YES
e) <u>Other relevant elements</u> related to water supply are addressed in the water system plan, if applicable; Coordinated Water System plans, Regional Wastewater plans, Reclaimed Water plans, Groundwater Area Management plans, and Capital Facilities Element of Comprehensive plans.		

I certify that the above statements are true to the best of my knowledge and that these specific elements are consistent with adopted local plans and development regulations.

Signature: DAVID JOHANSON Date: 11/18/15

Printed Name, Title, & Jurisdiction: DAVID JOHANSON, SENIOR PLANNER CITY OF BURIEN



## Local Government Consistency Review Checklist

Water System Name: King County Water District No. 49 PWS ID: 39800P

Planning/Engineering Document Title: Water System Plan Plan Date: 10/15(draft)

Local Government with Jurisdiction: City of Seattle

### WAC 246-290-108 Consistency with local plans and regulations:

Consistency with local plans and regulations applies to planning and engineering documents under WAC 246-290-106, 246-290-107, and 246-290-110(4)(b)(ii).

1) Municipal water suppliers must include a consistency review and supporting documentation in its planning or engineering document describing how it has addressed consistency with **local plans and regulations**. This review must include specific elements of local plans and regulations, as they reasonably relate to water service as determined by Department of Health (DOH). Complete the table below and see instructions on back.

Local Government Consistency Statement	Page(s) in Planning Document	Yes – No – Not Applicable
a) The water system service area is consistent with the adopted <u>land use and zoning</u> within the applicable service area.	2-9 and Figure 2.1	yes
b) The <u>six-year growth projection</u> used to forecast water demand is consistent with the adopted city/county's population growth projections. If a different growth projection is used, provide an explanation of the alternative growth projection and methodology.	2-1 thru 2-3 (historical) and 2-9 thru 2-11	yes
c) Applies to <u>cities and towns that provide water service</u> : All water service area policies of the city or town are consistent with the <u>utility service extension ordinances</u> of the city or town.	N/A	yes
d) <u>Service area policies</u> for new service connections are consistent with the adopted local plans and adopted development regulations of all jurisdictions with authority over the service area [City(ies), County(ies)].	1-8 thru 1-14	yes
e) <u>Other relevant elements</u> related to water supply are addressed in the water system plan, if applicable; Coordinated Water System plans, Regional Wastewater plans, Reclaimed Water plans, Groundwater Area Management plans, and Capital Facilities Element of Comprehensive plans.	capital facilities Utilities Elements of Comp. Plan	yes

I certify that the above statements are true to the best of my knowledge and that these specific elements are consistent with adopted local plans and development regulations.

Signature: Michael Scarey Date: 11/12/15  
Michael Scarey, Senior Planner, City of Seattle  
 Printed Name, Title, & Jurisdiction





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**Coliform Monitoring Plan  
and  
E. Coli Response Plan**

**February, 2019**



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## KING COUNTY WATER DISTRICT NO. 49

### COLIFORM MONITORING PLAN

#### Background

In 1974, the US Congress enacted the Safe Drinking Water Act (SDWA), which established national drinking water standards. The SDWA set maximum levels for particular contaminants and established monitoring requirements. In 1986, Congress expanded the SDWA to include the regulation of coliforms, resulting in promulgation of the Total Coliform Rule (TCR) in 1989. State regulations were then revised to incorporate the TCR (WAC 246-290, Part 4). The federal Revised Total Coliform Rule went into effect in 2016 at the federal and state level.

Coliform testing is performed on a monthly basis with the required number of samples based on the population served. State regulations allow for reduced coliform monitoring for regional programs where utilities purchase water from a wholesale water supplier. The wholesale water supplier must have a Department of Health (DOH) approved regional monitoring program. The Seattle regional supply system has operated under a regional, reduced monitoring program since the 1970s, before the issuance of the TCR [Seattle Public Utilities (SPU) 2013 Regional Coliform Monitoring Program Plan]. As one of several local purchasing purveyors, King County Water District No. 49 (District) also has its own Coliform Monitoring Plan.

SPU, or the District, collects water quality samples to test for the presence or absence of coliform bacteria as well as chlorine residual. Coliform bacteria found in drinking water may indicate the presence of potentially harmful bacteria. Many coliform bacteria may not cause diseases, but they tend to accompany disease-causing organisms in drinking water.

In February 2013, EPA published revisions to the TCR. These revisions became effective April 1, 2016. The new rule set an MCL and MCLG for *E. coli* and eliminated the MCL and MCLG for total coliforms, although total coliforms will still serve as an indicator of contamination and can trigger a system assessment. This plan was prepared in conformance with Department of Health (DOH) *Publication #331-036 (Revised) Preparing a Coliform Monitoring Plan for Large or Multiple-Source Systems, April 2013, Revised April 2016*, and updates the previous Coliform Plan, most recently updated in February 2017.

DOH has determined that the District shall be subject to the full number of required monthly samples per Table 1 of WAC 246-290-300, effective beginning in 2015.

**SYSTEM INFORMATION:**

King County Water District No. 49  
DOH ID #39800P  
King County the

**SOURCES:**

<u>DOH Source Number</u>	<u>Source Name</u>
#S01	Seattle Public Utilities (SPU)
#S02, S04	Stations 25, 139, 140, 142 and 143
#S03	WD 49/ WD 20 Interties (5)
	WD 49/ Highline Water District Interties (2)

**STORAGE:**

1 - 500,000 gallon reservoir. Base Elevation 264', Overflow Elevation 289'

**TREATMENT:**

Source water is supplied by SPU and is assumed to come from the Cedar River or SPU's deep wells. Water from Cedar River is treated with chlorine and fluoride at Landsburg then discharged to Lake Youngs. Prior to entering the distribution system, water from Lake Youngs is treated with ozone, ultraviolet light, and chlorine (for disinfection) and lime (for corrosion control). Water can also come from the Riverton Heights and Boulevard Park wells where it is treated with hypochlorite (for disinfection), fluoride, and sodium hydroxide (for corrosion control). All water treatment is done by SPU. No additional treatment is done by the District.

**SOURCE AND TRANSMISSION:**

Water is purchased from SPU at five points of delivery through master meters owned, operated and maintained by SPU. One master meter (Station 143) is used exclusively as an emergency supply to provide fire flows to a large apartment complex and the south end of the District.

Water is supplied directly into the District's distribution system. Station 139 and 142 each have a pressure reducing station and flow control installed on the primary feed and a pressure reducing station installed on the secondary parallel feed. Station 143 only has a primary feed and has one pressure reducing station installed. The supply points at Stations 25 and 140 do not have pressure reducing valves installed; therefore, the hydraulic gradient provided by the SPU system also establishes the District's pressure zones gradients at these stations. All of the pressure reducing stations noted above belong to the District and are downstream of the SPU supply meters.

Location and size of the master meters are shown in Table 1.1 below. The minimum hydraulic gradient (head) that SPU provides at each location is also shown.

**TABLE 1.1  
SEATTLE MASTER METERS**

METER			Meter No.	Min. Head Ft.	Elevation	PSI
Location	Seattle Station Number	Size of Meter (In)				
<i>575 (Main) Pressure Zone</i>						
SW 149 <sup>th</sup> St. & 10 <sup>th</sup> Ave SW	139	10	70025553	540	369	74
SW 146 <sup>th</sup> St. & 8 <sup>th</sup> Ave SW	142	8	70069777	550	385	72
<i>425 Pressure Zone</i>						
S. 168 <sup>th</sup> St. & Des Moines	25	8	70081077	420	241	78
S. 160 <sup>th</sup> St. & Des Moines	140	12	14482003	430	271	69
Ambaum Bl. & Des Moines	143	10	5149253	395	253	62

## **PRESSURE ZONES AND POPULATION BY ZONE**

The District system consists of six pressure zones, distinguished by their maximum (nominal) hydraulic grade line elevation (see Figure 1). Estimated population served by the District is reported annually by the District to SPU and is based on the District's current *Water Facilities Inventory* (WFI). The population reported on the 2016 WFI was 16,065. The area each zone and allocation of this population is approximately as follows:

<b>Zone</b>	<b>Share of Service Area</b>	<b>Estimated Population</b>
575	56.0%	8,997
497	0.2%	32
483	2.6%	418
425	37.1%	5,960
380	2.2%	353
336	1.9%	305
<b>Total</b>	<b>100%</b>	<b>16,065</b>

## **ROUTINE SAMPLES AND SAMPLE SITES**

The District is required to collect 15 samples per month. Routine samples are collected from eight permanent sample stations located at representative points throughout the system (see Figure 1).

## BOOSTER STATION:

One booster station (located at the reservoir) is utilized to transfer water from the 425 pressure zone to the 575 pressure zone, when needed to offset the peak hour demands on SPU's regional system.

## A. ROUTINE AND REPEAT SAMPLING SITE LOCATIONS:

There are eight (8) routine and four (4) Disinfection Byproduct (DBP) sampling sites located throughout the distribution system as shown in Figure 1 and detailed in Table 1.2. These are located at representative points throughout the distribution system. In the event of a positive sample, repeat sampling is done by District personnel at both the routine and repeat sampling locations. Repeat sampling sites are available upstream and downstream of all routine sample sites. All sources (connections to the regional system) can be sampled directly as necessary. The storage reservoir can also be sampled as necessary.

**TABLE 1.2  
SAMPLE SITES**

Site Code	Type of Site	Address	Collection Point
49-1	Routine Sample Site	919 SW 150 <sup>th</sup> St (SW 150th St between Ambaum Blvd and 10 <sup>th</sup> Ave SW)	Sample Tap
	Repeat Upstream	SW 150th St and 10 <sup>th</sup> Ave SW	Fire Hydrant
	Repeat Downstream	Kirkhouse Apartments 15015 10 <sup>th</sup> Ave SW	Hose Bibb
49-2	Routine Sample Site	16783 Ambaum Blvd S (S 168 <sup>th</sup> St. at Ambaum Blvd. S)	Sample Tap
	Repeat Upstream	Residential Home, 16725 Ambaum Blvd S	Hose Bibb
	Repeat Downstream	Residential Home, 16810 Ambaum Blvd S	Hose Bibb
49-3	Routine Sample Site	17198 Sylvester Rd SW (Sylvester Road SW and SW 172 <sup>nd</sup> St)	Sample Tap
	Repeat Upstream	Residential Home, 17058 Sylvester Road	Hose Bibb
	Repeat Downstream	Residential Home, 17204 Sylvester Road	Hose Bibb
49-4	Routine Sample Site	16032 16 <sup>th</sup> Ave SW	Sample Tap
	Repeat Upstream	Residential Home, 16026 16 <sup>th</sup> Ave SW	Hose Bibb
	Repeat Downstream	Residential Home, 16038 16 <sup>th</sup> Ave SW	Hose Bibb



<b>49-5</b>	DBP Sample Site	1528 SW 166th St	Hose Bibb
<b>49-6</b>	DBP Sample Site	17751 10th Ave S	Hose Bibb
<b>49-7</b>	DBP Sample Site	16200 25th Ave SW	Fire Hydrant
<b>49-8</b>	DBP Sample Site	2233 SW 154th St	Fire Hydrant
<b>49-9</b>	Routine Sample Site	305 S 150th St	Sample Tap
	Repeat Upstream	305 S 150th St	Hose Bibb
	Repeat Downstream	313 S 150th St	Hose Bibb
<b>49-10</b>	Routine Sample Site	15402 22nd Ave SW	Sample Tap
	Repeat Upstream	15402 22nd Ave SW	Hose Bibb
	Repeat Downstream	2166 SW 154th St	Hose Bibb
<b>49-11</b>	Routine Sample Site	2640 SW 164th Pl	Sample Tap
	Repeat Upstream	2633 SW 164th Pl	Hose Bibb
	Repeat Downstream	2655 SW 164th Pl	Hose Bibb
<b>49-12</b>	Routine Sample Site	843 S 177th Pl	Sample Tap
	Repeat Upstream	819 S 177th Pl	Hose Bibb
	Repeat Downstream	825 S 177th Pl	Hose Bibb

## B. ROUTINE SAMPLING ROTATION SCHEDULE

SPU performs all routine sampling within the District boundary on a monthly basis. Sampling, testing and reporting are done by SPU on behalf of the District. WAC 246-290-300 requires fifteen (15) routine samples per month based on the District population most recently reported on the WFI. SPU determines the days, rotation and sequencing of sampling among the District's available sample sites. The District complies with the SPU Regional Coliform Monitoring Program Plan by annually submitting the "Continuation Request for Regional Reduced Coliform Monitoring" to SPU.

The SPU Water Quality Laboratory is responsible for the analyzing the coliform and chlorine residual tests. The laboratory is certified by the State Department of Health to provide this service. All routine and repeat coliform and associated chlorine residual tests are done at the SPU laboratory.

A volume of water equal to 100 ml shall be collected at each sampling site. Sampling instructions are included with each bottle furnished by the SPU and should be read carefully prior to collecting any samples. Care shall be taken to fill the bottle properly and to obtain the correct amount. Samples shall be taken immediately to the SPU laboratory for analysis. Samples shall always be kept cool, but never frozen. Chlorine residual measurements shall be done on each routine and repeat coliform sample.

### **REPEAT AND FOLLOW-UP WATER SAMPLES:**

All water systems must have at least 60 routine samples taken per year in an effective coliform monitoring program. Repeat and follow up sampling is done in response to a single positive coliform sample. In the event of a positive sample, repeat sampling is done by District personnel. District personnel collect the samples and present them to the SPU Laboratory for testing. For a repeat or follow up test, three samples must be retaken within 24 hours of being notified by the SPU Laboratory of a positive sample: at the site of the original positive coliform sample, one site upstream and one site downstream of the sample location, both within five service connections of the routine sample site, as identified in WAC 246-290-320.

### **Treatment Technique Triggers:**

#### **Level 1 Assessment Triggers:**

- a. For a water system that collects less than 40 routine samples per month (such as the District): if the District has two or more samples with positive coliform bacteria in the same month, it will trigger a Level 1 Assessment. This assessment may be done by an owner, manager, or other knowledgeable person.
- b. For a water system that collects 40 or more routine samples per month: coliform detected in more than five percent of all routine and repeat samples.
- c. Any water system that fails to collect three repeat samples for every total coliform-present routine sample.

If the above conditions are met, a basic system assessment and correction of the defect will be required within 30 days of learning of the defect. If the assessment is not completed within 30 days or any sanitary defect noted from the assessment is not mitigated within 30 days of the trigger, public notification will need to be made within the next 30 days.

### Level 2 Assessment Triggers:

A Level 2 Assessment is required when a water system experiences:

- a. An *E. coli* MCL violation
- b. A second Level 1 treatment technique trigger within a rolling 12-month period.

The Level 2 Assessment is a more complex system evaluation to be performed by a person with state-required qualifications and must be completed in response to an *E. coli* MCL violation. An *E. coli* MCL violation can occur as one or more of the following:

1. A total coliform-present repeat sample follows an *E. coli*-present routine sample.
2. An *E. coli*-present repeat sample follows a total coliform-present routine sample.
3. The lab fails to test a total coliform-present repeat sample for *E. coli*.
4. The system fails to take three repeat samples following an *E. coli*-present routine sample.

If the above conditions are met, a Tier 1 public notification for the *E. coli* MCL will need to be made within 24 hours. The system must also perform a Level 2 assessment (see summary below). The DOH forms for each template are included following the *E. coli* present Response Plan.

## Level 1 vs. Level 2 Assessments

Level 1	Level 2
Confirmed TC contamination. OR Failure to collect all required repeat samples.	An <i>E. coli</i> MCL violation. OR Triggered by a second Level 1 Assessment in 12 months.
Performed by water system—basic inspection.	Performed by PE, WDM2, DOH, or LHJ staff (special— <i>E. coli</i> triggered assessment)—comprehensive inspection.
	More in-depth than Level 1 Assessment.
State provides template/guide for conducting assessment.	State provides template/guide for conducting assessment.
Submit assessment to state within 30 days of trigger.	Submit assessment to state within 30 days of trigger.
Look for sanitary defects or concerns with operations and maintenance.	Look for sanitary defects or issues in operations and maintenance.
<b>Take corrective action!</b>	<b>Take corrective action!</b>

## **DOH AND PUBLIC NOTIFICATION:**

### **Tier 1 violation**

The District will notify DOH NW Regional Office (253-395-6750) as soon as being told of a positive fecal coliform or *E. coli* sample. When an *E. coli* MCL violation occurs, the District must provide public notice as soon as possible but within 24 hours, to the customers served. The District shall use one or more of the following methods to deliver notice to the customers:

1. Radio
2. Television
3. Hand or direct delivery
4. Post notice in conspicuous location

A copy of this notice and certification that all public requirements have been met shall be sent to DOH NW Drinking Water Office within 10 days from the time the notice was issued.

### **Tier 2 violation**

A Tier 2 violation occurs when one or more of the following occurs:

1. System fails to complete a required Level 1 or Level 2 Assessment within 30 days of the trigger
2. System fails to correct any sanitary defect by taking required corrective action within the required timeframe

The District shall notify DOH by the end of the next business day and notify the District's customers as soon as practical but within 30 days after the initial 30 days allowed for evaluation of the system and mitigation of the defect. The District shall mail the violation notice as a separate notice or include it with a water bill. A copy of each notice along with a certification that all public notice requirements have been met shall be sent to DOH NW Drinking Water Office.

### **Tier 3 violation**

A Tier 3 violation occurs when one or more of the following occurs:

1. A system fails to collect all routine samples
2. A system fails to have each total coliform-present routine samples analyzed for *E. coli*
3. A system fails to submit a monitoring report or completed assessment form to DOH in a timely manner
4. A system fails to notify DOH of an *E. coli* present sample in a timely manner

## **C. MONTH FOLLOWING UNSATISFACTORY SAMPLES**

The month after a sample with a coliform presence is detected, the District is responsible for collecting three follow up samples within 30 days at the routine sample locations following the procedures identified above.

## D. PLAN PREPARATION INFORMATION

Prepared by: Rodney Langer, P.E.  
CHS Engineers, LLC  
Bellevue, WA 98005  
425-637-3693

Revision 4 prepared: February 2019

### Attachments:

- *E. coli* Present Response Plan
- Form – Level 1 Assessment
- Form – Level 2 Assessment
- Form - Drinking Water Warning – *E. coli* MCL Violation
- Form – Public Notice Certification - *E. coli* MCL Violation
- Figure 1 – Coliform Monitoring Plan Sample Sites

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# KING COUNTY WATER DISTRICT NO. 49

## E. COLI PRESENT RESPONSE PLAN

Distribution System <i>E. coli</i> Response Checklist				
Background Information	Yes	No	N/A	To Do List
We inform staff members about activities within the distribution system that could affect water quality.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We document all water main breaks, construction & repair activities, and low pressure and outage incidents.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We can easily access and review documentation on water main breaks, construction & repair activities, low pressure and outage incidents.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our Cross-Connection Control Program is up-to-date.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We test all cross-connection control devices annually as required, with easy access to the proper documentation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We routinely inspect all treatment facilities for proper operation.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
We have procedures in place for disinfecting and flushing the water system if it becomes necessary.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We can activate an emergency intertie with an adjacent water system in an emergency.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have a map of our service area boundaries.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have consumers who may not have access to bottled or boiled water.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There is a sufficient supply of bottled water immediately available to our customers who are unable to boil their water.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have identified the contact person at each day care, school, medical facility, food service, and other customers who may have difficulty responding to a Health Advisory.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have messages prepared and translated into different languages to ensure our consumers will understand them.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have the capacity to print and distribute the required number of notices in a short time period.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Policy Direction	Yes	No	N/A	To Do List
We have discussed the issue of <i>E. coli</i> -present sample results with our policy makers.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If we find <i>E. coli</i> in a routine distribution sample, the policy makers want to wait until repeat test results are available before issuing advice to water system customers.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(Cont.)				

Distribution System <i>E. coli</i> Response Checklist				
Potential Public Notice Delivery Methods	Yes	No	N/A	To Do List
It is feasible to deliver a notice going door-to-door.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have a list of all of our customers' addresses.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have a list of customer telephone numbers or access to a Reverse 9-1-1 system.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have a list of customer email addresses.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We encourage our customers to remain in contact with us using social media.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We have an active website we can quickly update to include important messages.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Our customers drive by a single location where we could post an advisory and expect everyone to see it.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
We need a news release to supplement our public notification process.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### ***E. coli* Present Response Plan**

Distribution System <i>E. coli</i> Response Plan
<p><b>If we receive notification of an unsatisfactory sample result in our distribution system we will immediately:</b></p> <ol style="list-style-type: none"> <li>1. Call DOH at 253-395-6750.</li> <li>2. Call SPU within 24 hours of being notified of the total coliform-positive sample.</li> <li>3. Analyze the total coliform positive sample for fecal coliform or <i>E. coli</i>. Collect repeat samples per Part D. Collect additional investigative samples as necessary.</li> <li>4. Inspect water system facilities.</li> <li>5. Interview staff to determine whether anything unusual was happening in the water system service area, especially since the previous month's samples.</li> <li>6. Review new construction activities, water main breaks and pressure outages that may have occurred during the previous month.</li> <li>7. Review Cross-Connection Control Program status.</li> <li>8. Discuss with DOH whether to issue a Health Advisory based on the findings of steps 3-6. If necessary, issue Health Advisory (HA).</li> <li>9. Wait for repeat sample results.</li> <li>10. Flush affected portions of the distribution system.</li> <li>11. Prepare draft HA (if not already issued) and other public notification materials.</li> <li>12. Respond appropriately to repeat results: <ul style="list-style-type: none"> <li>• If repeats are all satisfactory, lift HA if one was issued.</li> <li>• If any repeat is unsatisfactory, issue HA if not already issued. Host DOH for an inspection and respond accordingly to inspection findings.</li> </ul> </li> </ol>





# Level 1 Assessment Guidance Template

331-569, October 2017

Send your assessment to:

<b>Northwest Region</b>	20425 72nd Ave. South, Suite 310 Kent, WA 98032-2358	Phone: (253) 395-6750 Fax: (253) 395-6760 Email: <a href="mailto:carol.stuckey@doh.wa.gov">carol.stuckey@doh.wa.gov</a> <a href="mailto:ingrid.salmon@doh.wa.gov">ingrid.salmon@doh.wa.gov</a>
<b>Southwest Region</b>	PO Box 47823 Olympia WA 98504-7823	Phone: (360) 236-3030 Fax: (360) 664-8058 Email: <a href="mailto:swro.coli@doh.wa.gov">swro.coli@doh.wa.gov</a>
<b>Eastern Region</b>	16201 Indiana Ave Suite 1500 Spokane Valley WA 99216	Phone: (509) 329-2100 Fax: (509) 329-2104 Email: <a href="mailto:ero.waterquality@doh.wa.gov">ero.waterquality@doh.wa.gov</a>

<b>Water System Name:</b> King County Water District No. 49	County: King	<b>Water System ID #:</b> 39800P
Assessor Name:	Email Address:	
Assessor Address, City, State, Zip:		ODW Only, Date Received:
Date(s) Assessment Completed:	<b>Month and Year of TTT:</b>	

**Within 30 days of learning of the Treatment Technique Trigger (TTT), submit a completed assessment to [your regional office](#). Keep a copy in your water system files.**

Use this *Level 1 Assessment Guidance Template* as a guide for a system with only a groundwater source(s).

## Part A: The Assessment

- Review the most recent sanitary survey report.
- Assess the status of the system's significant deficiencies and findings, observations, and recommendations.
- Respond to all parts of this template that are applicable to the water system.
- Use additional pages if you need more space.

## Part B: The Summary and Corrective Actions

- Summarize assessment findings. For corrective actions:
- Completed: include photos, work receipts, or reports.
- Not yet completed: include an action plan with timetable with dates.

Part A: Assessment	Corrective action needed?	Description, Comments, and Recommendations
<b>1. Site and Sampling Protocol</b>		
a. Is there a written coliform monitoring plan & sampling procedure that represents the distribution system? <b>If yes, does the system follow the coliform monitoring plan?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> Yes <input type="checkbox"/> No
b. Have there been changes in sampling conditions or procedures? Describe:	<input type="checkbox"/> Yes <input type="checkbox"/> No	
c. Inspect sampling sites where unsatisfactory samples have been collected. Are the sampling taps and locations: i. Free of potential sources of contamination? ii. In good condition?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No
d. Do the coliform sample results from the last 90 days suggest ongoing water quality issues?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
e. Is this assessment required due to failure to collect all repeat samples? <b>If yes, what were the procedures taken to ensure repeat samples will be collected in the future?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Part A: Assessment		Corrective action needed?		Description, Comments, and Recommendations
<b>2. Distribution</b>				
a. Are procedures in place to: <ul style="list-style-type: none"> <li>i. Replace and repair system parts?</li> <li>ii. Regularly flush?</li> <li>iii. Routinely inspect vault(s)?</li> <li>iv. Implement a cross connection control program?</li> <li>v. Maintain positive pressure?</li> </ul>		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	
b. Have there been: <ul style="list-style-type: none"> <li>i. Recent reports of low pressure (less than 20 PSI) or complete loss of pressure?</li> <li>ii. Changes in condition or operation?</li> </ul>		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	
c. Inspect the distribution system. Are there any: <ul style="list-style-type: none"> <li>i. Visible line breaks or leaks?</li> <li>ii. Observed unprotected cross connections?</li> <li>iii. Waterlogged pressure tanks?</li> <li>iv. Evidence of vandalism or other security breaches?</li> <li>v. Other:</li> </ul>		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>3. Storage Facilities</b> - Is there a water storage tank? If no, skip to Section 4. Note: Pressure and hydropneumatic tanks are <b>not</b> storage tanks				
a. Are there: <ul style="list-style-type: none"> <li>i. Procedures for periodic inspection and upkeep of the facility?</li> <li>ii. Any changes in storage condition or operations?</li> </ul>		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	
b. Inspect each storage tank. Are there: <ul style="list-style-type: none"> <li>i. Overflow lines constructed to prevent contaminants?</li> <li>ii. Cracks or unprotected openings in the tank walls?</li> <li>iii. Reservoir roof cracks?</li> <li>iv. Unprotected roof openings?</li> <li>v. Improperly constructed access hatch or seal?</li> <li>vi. Evidence of vandalism or other security breaches?</li> </ul>		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	
c. If there is an air vent or opening for a water-level gauge, is it constructed to prevent entry of contaminants?		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
d. If the overflow line discharges to a storm drain, to surface water, or directly into a sanitary sewer, is it protected by a proper air gap?		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>4. Treatment - Is treatment in use for any source? If no, skip to Section 5.</b>				
a. If treatment includes disinfection, were chlorine residuals normal during the month the TTT occurred?		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Part A: Assessment		Corrective action needed?	Description, Comments, and Recommendations
b. Inspect the treatment facility. Are there: i. Procedures in place for proper operation and maintenance? 1. Is the treatment system operating properly? ii. Changes in equipment or process? Describe. iii. Evidence of vandalism or other security breaches?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>5. Source</b>			
a. Are there procedures in place for periodic inspection and maintenance of the source facilities?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
b. Does each source have a raw water sample tap properly located? <a href="http://www.doh.wa.gov/portals/1/Documents/pubs/331-436.pdf">http://www.doh.wa.gov/portals/1/Documents/pubs/331-436.pdf</a>		<input type="checkbox"/> Yes <input type="checkbox"/> No	
c. Inspect the source facilities. Is the:			
i. Sanitary control area free of all potential sources of contamination?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
ii. Wellhead or spring box above grade with no potential for flooding?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
iii. Well cap sealed and watertight?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
iv. Well casing free of unprotected openings?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
v. Pressure tank waterlogged?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
vi. Spring box (structure, hatch, and overflow) free of any unprotected openings?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
vii. Other:		<input type="checkbox"/> Yes <input type="checkbox"/> No	
d. Have there been any changes in condition or operation?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>6. Other assessment activities. Describe:</b>			

Part B: Assessment Summary and Corrective Action Plan with Timetable			
1. Actions Completed	Assessor: Summarize the issues found where corrective actions have been completed. Include photos, work receipts, or reports to depict assessment findings.		
Describe issue found	Describe corrective action taken		Date Completed
2. Actions To be Taken	Assessor: Describe the issues found where corrective actions will be completed later.		Provide a timetable
Describe issue found	Describe planned corrective action		Expected Completion Date

Assessor has discussed the Assessment findings with the Water System Owner:    ☐ Yes    ☐ No

If no, note the date when the discussion will occur: \_\_\_\_\_

Signature of Assessor: \_\_\_\_\_ Date: \_\_\_\_\_

Office of Drinking Water staff will review this assessment and determine if any of the issues identified are Sanitary Defects - a defect that could provide a pathway of entry for microbial contamination into the distribution system, or a defect that is indicative of a failure or imminent failure in a barrier that is already in place.

**OFFICE OF DRINKING WATER USE ONLY**

Regional Office Reviewer: _____	Date of Review: _____	Assessment sufficient?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Likely Cause Determined? <input type="checkbox"/> Yes <input type="checkbox"/> No	Sanitary Defects Identified? <input type="checkbox"/> Yes <input type="checkbox"/> No	Corrective Actions Complete?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Corrective Action Plan Included? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Corrective Action Plan approved? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
Comments: _____			



# Level 2 Assessment Guidance Template

331-570, 2017

Send your  
assessment to:

**Northwest  
Region**

20425 72nd Ave. South, Suite 310  
Kent, WA 98032-2358

Phone: (253) 395-6750  
Fax: (253) 395-6760  
Email: [carol.stuckey@doh.wa.gov](mailto:carol.stuckey@doh.wa.gov)  
[ingrid.salmon@doh.wa.gov](mailto:ingrid.salmon@doh.wa.gov)

**Southwest  
Region**

PO Box 47823  
Olympia WA 98504-7823

Phone: (360) 236-3030  
Fax: (360) 664-8058  
Email: [swro.coli@doh.wa.gov](mailto:swro.coli@doh.wa.gov)

**Eastern  
Region**

16201 Indiana Ave Suite 1500  
Spokane Valley WA 99216

Phone: (509) 329-2100  
Fax: (509) 329-2104  
Email: [joseph.perkins@doh.wa.gov](mailto:joseph.perkins@doh.wa.gov)

<b>Water System Name:</b> King County Water District No. 49		<b>County:</b> King	<b>Water System ID #:</b> 39800P
Assessor Name: <a href="#">Click here to enter text</a>		Email Address: <a href="#">Click here to enter text</a>	
Assessor is: WDM 2, 3, or 4 <input type="checkbox"/> OR PE <input type="checkbox"/> OR LHJ <input type="checkbox"/> (check one)		ODW Only, Date Received: <a href="#">Click here to enter text</a>	
Assessor Address, City, State, Zip: <a href="#">Click here to enter text</a>			
Date(s) Assessment Completed: <a href="#">Click here to enter text</a>		<b>Month and Year of TTT:</b> Enter date	

**This assessment is required due to the repeated occurrence of total coliform bacteria, or the confirmation of *E. coli* bacteria in the distribution system. Conduct a thorough assessment of the water system per this guidance and within 30 days submit the assessment to your regional office. If this is the water system's second level 2 assessment and the cause for the contamination cannot be found and fixed, the system will be required to add the barrier of continuous disinfection treatment.**

Use this *Level 2 Assessment Guidance Template* for a system with only a groundwater source(s).

## Part A: The Assessment

- Review the most recent sanitary survey report.
  - Assess the status of the system's significant deficiencies and findings, observations, and recommendations.
- Respond to all parts of this template that are applicable to the water system.
- Use additional pages if you need more space.

## Part B: The Summary and Corrective Actions

- Summarize assessment findings. For corrective actions:
  - Completed: include photos, work receipts, or reports.
  - Not yet completed: include an action plan with dates for completion of each item.

Part A: Assessment	Corrective Action Needed?	Description, Comments, and Recommendations
<b>1. Site and Sampling Protocol</b>		
a. Is there a written <a href="#">coliform monitoring plan</a> & <a href="#">sampling procedure</a> that ensures each sample represents the distribution system?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
b. Is there a program to ensure that all sample collectors are trained before being allowed to collect compliance samples?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
c. Are routine and repeat sample sites regularly monitored to ensure that no site will contaminate the sample?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
d. Do the coliform sample results from the last 24 months suggest ongoing or reoccurring water quality issues?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
e. Relative to the Unsatisfactory samples associated with the TTT: <ul style="list-style-type: none"><li>i. Did a trained sample collector collect each sample?</li><li>ii. Were the monitoring plan and sampling procedure followed?</li><li>iii. Were there any changes in sampling conditions or procedures that may have contributed to the TTT?</li></ul>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No

Part A: Assessment		Corrective Action Needed?	Description, Comments, and Recommendations
f. Inspect the Unsatisfactory samples' sites: i. Are the sampling locations free of potential sources of contamination? ii. Are the sampling taps in good condition? iii. Other:		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
g. Was this TTT due to failure to collect all repeat samples? If yes, describe steps being taken to ensure all required repeat samples will be collected in the future.		<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>2. Distribution System</b>			
a. Are there standard procedures for proper maintenance including: i. Pipe replacement and repair? ii. Other distribution system components replacement and repair? iii. Regular flushing? iv. Routine vault inspections? v. Maintain positive pressure throughout?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> N/A <input type="checkbox"/> Yes <input type="checkbox"/> No	
b. Is there a fully implemented cross connection control program?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
c. Is each air-vacuum-relief-valve vented above-grade?		<input type="checkbox"/> Yes <input type="checkbox"/> N/A	
d. Following work done in distribution system or any pressure loss event, are investigative coliform samples collected?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
e. Have there been any: i. Recent reports of low pressure (less than 20 psi) or complete loss of pressure? ii. Recent repairs or new construction? iii. Pipe leaks that are not yet repaired? iv. Recent use of fire hydrants such as hydrant maintenance or flushing by utility or fire department? v. Recent reports of a cross-connection incident? vi. Off-normal events such as discolored water, odd taste, or smell? vii. Other changes in distribution conditions or operations that may have contributed to the TTT?		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> N/A <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	
f. Inspect the distribution system. Are there any: i. Visible line breaks or leaks? ii. Observed cross connections? iii. Waterlogged pressure tanks? iv. Indications of vandalism or other security breach? v. Other:		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> N/A <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
<b>3. Storage Facilities – Is there storage? If no, skip to Section 4.</b>			
a. Are there standard procedures for periodic inspection of the exterior of each storage facility including vents, hatches, fittings for level gage/controls, and overflows?		<input type="checkbox"/> Yes <input type="checkbox"/> No	



Part A: Assessment		Corrective Action Needed?	Description, Comments, and Recommendations
c. Have there been any:			
i. Changes in treatment equipment or processes?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
ii. Recent interruptions in any treatment process?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
iii. Recent maintenance performed on any treatment component?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
d. Inspect the treatment facilities:			
i. Is the treatment system operating properly?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
ii. Is there any evidence of vandalism or other security breach?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
iii. Other:	<input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>5. Source (if more than one source, note source number as needed)</b>			
a. Does each source comply with the Sanitary Control Area requirements (WAC 246-290-135(2))?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
b. Are all sources protected from fecal contamination by appropriate placement and construction?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
c. Are there standard procedures for periodic inspection and maintenance of the source facilities?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
d. Are the source facilities secured from unauthorized entry and vandalism?		<input type="checkbox"/> Yes <input type="checkbox"/> No	
e. Has there been any:			
i. Recent use of an unapproved source?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
ii. Recent land use changes?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
iii. Standing water, heavy precipitation, or flooding around a source in the last month?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
iv. Recent failure of a source pump?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
v. Recent maintenance on a source pump or other source component?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
vi. Other changes in source conditions or operations?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
f. Inspect the source facilities. Is:			
i. Sanitary control area free of all potential sources of contamination?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
ii. Top of well casing or spring box at risk of submergence?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
iii. Well cap sealed and watertight?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
iv. Well casing or spring box free of unprotected openings?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
v. Pressure tank water logged or off-line?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
vi. There any evidence of vandalism or other security breach?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	
vii. Other:	<input type="checkbox"/> N/A	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>6. Other assessment activities.</b>			
a. Is it time for the additional barrier of continuous disinfection to be installed at this system? If no, why not? Explain:		<input type="checkbox"/> Yes <input type="checkbox"/> No	
b. Other activities:			



Part B: Assessment Summary and Corrective Action Plan with Timetable			
1. Actions Completed		Assessor: Summarize the issues found where corrective actions have been completed. Include photos, work receipts, and/or reports to depict assessment findings.	
Describe issue found	Describe corrective action taken		Date Completed
Click here to enter text	Click here to enter text		
Click here to enter text	Click here to enter text		
Click here to enter text	Click here to enter text		
2. Actions To be Taken		Assessor: Describe the issues found where corrective actions will be completed later.	
Describe issue found	Describe planned corrective action		Provide a timetable Expected Completion Date
Click here to enter text	Click here to enter text		
Click here to enter text	Click here to enter text		
Click here to enter text	Click here to enter text		

Assessor has discussed the Assessment findings with the Water System Owner:    ☐ Yes    ☐ No

If no, note the date when the discussion will occur: [Click here to enter text](#)

Signature of Assessor: \_\_\_\_\_ Date: [Click here to enter text](#)

Office of Drinking Water staff will review this assessment and determine if any of the issues identified are Sanitary Defects - a defect that could provide a pathway of entry for microbial contamination into the distribution system, or a defect that is indicative of a failure or imminent failure in a barrier that is already in place.

OFFICE OF DRINKING WATER USE ONLY

Regional Office Reviewer: <a href="#">Click here to enter text</a>	Date of Review: <a href="#">Click here to enter text</a>	Assessment sufficient?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Likely Cause Determined? <input type="checkbox"/> Yes <input type="checkbox"/> No	Sanitary Defects Identified? <input type="checkbox"/> Yes <input type="checkbox"/> No	Corrective Actions Complete?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Corrective Action Plan Included? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Corrective Action Plan approved? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
Comments: <a href="#">Click here to enter text</a>			

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## DRINKING WATER WARNING

### *E. coli* MCL Violation

The \_\_\_\_\_ Water System, ID \_\_\_\_\_, located in \_\_\_\_\_ County is  
contaminated with *E. coli* bacteria.

*E. coli* bacteria were detected in the water supply on \_\_\_\_\_. These bacteria can make you sick and are a particular concern for people with compromised immune systems. Boiled or purchased bottled water should be used for drinking, making ice, brushing teeth, washing dishes, and food preparation until further notice. Boiling kills bacteria and other organisms in the water.

What should you do? **DO NOT DRINK THE WATER WITHOUT BOILING IT FIRST.** Bring all water to a rolling boil, for 1 minute, and let it cool before using. Boiling kills bacteria and other organisms in the water.

*E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a greater health risk for infants, young children, the elderly, and people with severely compromised immune systems.*

The symptoms above are not caused only by organisms in drinking water. If you experience any of these symptoms and they persist, you may want to seek medical advice. People at increased risk should seek advice about drinking water from their health care provider.

What happened? What is the suspected or known source of contamination?

The following is being done to correct the problem:

We will consult with the State Department of Health about this incident. We will provide you notification when you no longer need to boil the water. We anticipate resolving the problem by \_\_\_\_\_.

For more information please contact: \_\_\_\_\_  
(owner/operator) (phone #) (address) (email)

*Please share this notice with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.*

This notice is sent to you by \_\_\_\_\_ Water System on \_\_\_\_/\_\_\_\_/\_\_\_\_



## PUBLIC NOTICE CERTIFICATION

### *E. coli*-MCL Violation

Within 10 days after notifying your customers about an *E. coli*-MCL violation, you must complete this form and send it to our regional office along with a copy of each type of notice you distributed to your customers (hand-delivered notices, news releases, newspaper articles, and so on).

By completing this form, you certify that:

- You met all of the public notification requirements.
- You will meet future requirements for notifying new billing units of the violation or situation.

If the boil water advisory remains in effect more than three months, you must re-notify your water users and send another completed copy of this *Public Notice Certification* to us.

**Complete the following items, sign the form and mail it to the nearest regional office, addresses below:**

Water System: _____ ID # _____ County: _____		
Violation Date: ____ / ____ / ____ Violation Type _____		
<b>This public water system certifies that it gave this public notice to water users, following state and federal requirements for delivery, content, and deadlines.</b>		<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>Distribution was completed</b> Yes <input type="checkbox"/> No <input type="checkbox"/> on ____ / ____ / _____.		
<b>Check all that apply:</b>		
<input type="checkbox"/> Hand delivery,		
<input type="checkbox"/> News release (TV, radio, newspaper)		
<input type="checkbox"/> Posting at _____ (by DOH approval only),		
<input type="checkbox"/> Other _____ (by DOH approval only).		
<b>Were the water users notified within 24 hours?</b> Yes <input type="checkbox"/> No <input type="checkbox"/>		
_____ Signature of owner or operator	_____ Position	_____ Date

If you need this publication in an alternative format, call 800.525.0127 (TDD/TTY call 711). This and other publications are available at [www.doh.wa.gov/drinkingwater](http://www.doh.wa.gov/drinkingwater).

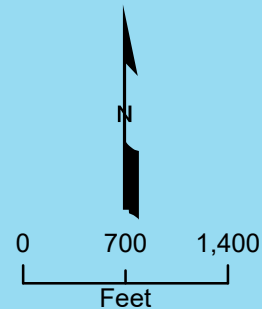
**Northwest Regional Office:**  
 20425 72nd Ave S Suite 310  
 Kent WA 98032  
 (253) 395-6775  
 Fax: (253) 395-6760  
 Email: [dw.nwro@doh.wa.gov](mailto:dw.nwro@doh.wa.gov)

**Southwest Regional Office:**  
 PO Box 47823  
 Olympia WA 98504-7823  
 (360) 236-3030  
 Fax (360) 664-8058  
 Email: [swro.coli@doh.wa.gov](mailto:swro.coli@doh.wa.gov)

**Eastern Regional Office:**  
 16201 E Indiana Ave Suite 1500  
 Spokane Valley WA 99216  
 (509) 329-2100  
 Fax: (509) 329-2104  
 Email: [mark.steward@doh.wa.gov](mailto:mark.steward@doh.wa.gov)

**Legend**

- Sample Stations
- PRVs
- SPU Meters
- DBP Stations
- Repeat Sample Stations
  - Down
  - Left
  - Right
  - Up
- WD49 Reservoir
- WD49 District Boundary
- Pressure Zones (HGL)**
  - ZONE-336
  - ZONE-380
  - ZONE-425
  - ZONE-483
  - ZONE-497
  - ZONE-575



PUGET SOUND

LAKE BURIEN

ZONE 6  
483

ZONE 1  
575

ZONE 2  
425

ZONE 3  
380

ZONE 4  
336

ZONE 5  
497

49-3

49-5

49-4

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# KING COUNTY WATER DISTRICT 49

## EMERGENCY MANAGEMENT PLAN

The Emergency Management Plan for King County Water District 49 provides for the coordination of emergency management operations during a major emergency. This plan, including the appendices and checklists, along with Mutual Aid Agreements and Letters of Understanding will direct District personnel in the recovery effort. This plan has been prepared so it will be compatible with the King County Emergency Operation Plan.



# KING COUNTY WATER DISTRICT 49 EMERGENCY MANAGEMENT PLAN

## I. PURPOSE

This plan predetermines what actions will be taken by the District to prevent, reduce the risk of, and to respond to, and recover from an emergency.

### A. MISSION

- 1) It is the policy of King County Water District 49 that in order to preserve public health, provide essential services, and to protect property and the environment, will in cooperation with other elements of the community endeavor to mitigate, prepare for, and respond to and recover from all natural and man made emergencies and disasters.

Because of the nature of disasters, the customers of Water District 49 are encouraged to be self sufficient for a period of at least 72 hours. In order for the District to deliver it's services, all employees are expected to be available for assignments.

- 2) King County Water District 49's Emergency Management goals are as follows:
  - a) Have a plan which will guide operational behavior in an emergency or disaster situation.
  - b) Create an atmosphere of self sufficiency, and self reliance through preparation, cross training and evaluation.
  - c) Create and maintain interagency cooperation and assistance.
  - d) Develop procedures for employees to assure the welfare of their family members following a disaster.
- 3) The term EMERGENCY as used in this plan means an occurrence which demands immediate action to preserve public health, essential services or protect property. The term DISASTER means the situation is beyond the capabilities of the District to immediately handle and outside assistance is needed.
- 4) The District's Emergency Management Plan provides guidance for the following:
  - a) Mitigation, preparedness, response and recovery policy and procedures.
  - b) Disaster and Emergency responsibilities.
  - c) Training, education and evaluation of employees.

## I. PURPOSE

### B. AUTHORITY

The Emergency Management Plan of King County Water District 49 is developed and authorized under Resolution # \_\_\_\_\_ adopted by the Board of Commissioners.

Additionally there are a number of statutes and regulations adopted under the Washington Administrative Code, The Revised Code of Washington and Federal law which govern portions of activities in a declared emergency. Washington State law sites RCW 38.52.070 and WAC 118.30, deal with emergency management and planning. The codes define a political subdivision as "county or incorporated city or town". Since the District has a responsibility to provide water service even in an emergency or disaster situations, emergency management and planning are necessary and desirable processes. Additionally WAC 296-24-040 and 296-24-567 deal with accident prevention and employee emergency plans and the employees right to know about safety in the work place.

Federal law is included under Public Law 93-288, "Disaster Relief Act of 1974;" The Federal Civil Defense Act of 1950; Public Law 96-342, "Improved Civil Defense;" and Title III Superfund Amendments and Reauthorization Act of 1986. Title III is also known as Emergency Planning and community right to know. Again the employees right to know is addressed under Federal Regulation 29 CFR 1910.38. Simply stated you must warn your employees, and the general public of any potential hazard in the work place and the consequences of any accident. By having this plan in place the Districts liability both civil and criminal is reduced.

The Board of Commissioners of Water District 49 and it's manager are to be commended for their commitment to the community in developing and implementing an emergency plan.

## I. PURPOSE

### C. LIMITATIONS

It is the policy of Water District 49 that no guarantee is implied by this plan as to a perfect response system. As District assets and personnel may be overwhelmed, we can only make every reasonable effort to respond, based on the situation, information, and resources available.

The District policy is that no service will be denied on the basis of race, color, national origin, religion, sex, age, or disability, and no special treatment will be extended to any person or group in an emergency or disaster over and above what normally would be expected in the way of services.

## 1. PURPOSE

### D. SITUATION

Disasters, emergencies and incidents have occurred and will do so again. The hazard vulnerability analysis provides information on potential areas of concern that threaten the District.

The definition of a disaster is a situation that is beyond the capabilities of the district and King County to handle and that outside assistance is called for. An emergency means that immediate action is required to preserve public health, maintain essential services or to protect property. An incident is a routine occurrence or event that requires action to prevent or minimize damage and to maintain public health and essential services, and is not wide spread.

Types of situations that could range from incident to disaster include the following:

#### NATURAL HAZARDS

- Earthquake
- Windstorm
- Snowstorm
- Drought
- Severe Cold
- Landslide
- Flood
- Wild Fire
- Volcanic Activity
- Disease

#### MAN-MADE HAZARDS

- Fire
- Civil Disorder
- Energy shortage
- Power outage
- Communications failure
- Mechanical failure
- Water sample failure
- Hazardous Material Spill
- Broken Mainlines
- Confined Space accident

## HAZARD VULNERABILITY ANALYSIS

The purpose of the Hazard Vulnerability Analysis is to identify how people and property will be damaged when a hazardous situation occurs. It is divided into two sections, natural hazards, and man made hazards. It is unlikely that every possible hazard has been covered, therefore this analysis is prepared to be readily updated as additional information becomes available. The information in this report has been taken from several sources. It is not presented as a detailed study, but rather as an overview of potential situations that could affect the District.

### DISASTER PROBABILITY AND SEVERITY

Type of Disaster	Probability	Severity
<u>NATURAL</u>		
Earthquake	4	5
Windstorm	5	3
Snowstorm	4	3
Drought	3	2
Severe Cold	2	2
Landslide	3	2
Flood	2	1
Volcanic Activity	3	4
Disease	2	4
<u>MAN MADE</u>		
Fire	2	3
Civil Disorder	2	5
Energy Shortage	3	3
Power Disruption	4	4
Communications Failure	3	2
Mechanical Failure	3	2
Water Supply Failure	3	4
Broken Main Lines	4	3
Hazardous Material Spill	2	3
Confined Space Accident	1	3

Based on a scale of 1 to 5, with 5 being the most destructive to the system.

## I. PURPOSE

### E. ASSUMPTION

King County Water District 49 is responsible for emergency response and recovery from any and all damage to the potable water supply and distribution system. The District will commit all available resources to minimize damage and to maintain services.

While it is likely that outside assistance would be available in most large scale disaster situations, it is necessary for the District to plan for and to be prepared to carry out emergency response and short term recovery operations on our own.

## II. ORGANIZATION

### A. ORGANIZATION

#### 1. DISTRICT MANAGEMENT TEAM

The District Emergency Management Team is comprised of all District officials, management, and a representative from KCM Engineering, and are charged with the carrying out of this plan during an emergency.

#### 2. COUNTY GOVERNMENT

King County Office of Emergency Management is to be the coordination point for inter-agency needs and resources in the event of a disaster. It must be stressed that it is not the purpose of the King County Emergency Management Office to direct an agency in its normal operations, but to relieve the agency of the additional work load of obtaining assistance to support that agency's primary function.

#### 3. STATE GOVERNMENT

The Governor is legally and ultimately responsible for the direction and control of all State Emergency Management activities. The Washington State Emergency Management Division is the agency that fills the function of coordinator at the State level.

#### 4. FEDERAL GOVERNMENT

The Federal Emergency Management Agency (FEMA) was established in 1979 and combined Federal programs involved with preparedness, mitigation, and response to national emergencies. FEMA responsibilities are administered through ten regional offices. The Pacific Northwest has been designated as Region Ten. In the event a disaster becomes unmanageable for the State to handle than FEMA takes over the coordinating of resources.

### B. RESPONSIBILITY

#### 1. DISTRICT MANAGEMENT TEAM

The District Emergency Management Team may enlist the aid of any group, organization persons or volunteers, whom by agreement or law, may help in the protection and recovery

## II. ORGANIZATION continued

### 1. DISTRICT MANAGEMENT TEAM CONTINUED

of District property and services.

### 2. COUNTY GOVERNMENT

The King County Office of Emergency Management is responsible for the coordination of appropriate plans and programs to ensure proper functioning of various agencies, the most effective utilization of available resources in an emergency, and the most expeditious recover of the County.

### 3. STATE GOVERNMENT

The Washington Emergency Management Division is responsible for ensuring the State and County agencies comply with Federal plans and programs to ensure adequate measures are taken to protect lives and property, maintain or restore essential services, and manage and mobilize necessary resources. In addition they are responsible for coordinating the operations of all State emergency organizations during declared emergencies and to ensure that all State and County agency plans are carried out as required by law.

### 4. FEDERAL GOVERNMENT

FEMA is responsible for the coordination of appropriate emergency plans and programs to ensure proper functioning of various governments, most effective utilization of resources in an emergency, and the most expeditious recovery of the nation.



### III. CONCEPT OF OPERATIONS

#### A. CONCEPT:

Emergency operations shall remain under normal control if possible, however overall emergency response efforts shall be coordinated from the District's Emergency Operation Center, under control of the Manager or designee.

The District Emergency Management Team provides for the preparation and carrying out of plans for the protection of lives and property within the District in the event of an emergency or disaster, and provides for the coordination of the emergency services and disaster functions of this District with all public agencies, and affected customers. This Emergency Management Team shall report to the Board of Commissioners, make recommendations regarding emergency operations, and ensure the effective operations of the District Emergency Operations Center.

#### B. OPERATIONS BY TIME PHASE:

##### 1. Mitigation and Preparedness:

The District's Emergency Management Team shall develop and maintain plans, establish procedures, train personnel, and maintain resource lists in order to meet emergency or disaster conditions as safely and efficiently as possible. This preparedness shall include establishment of an EOC and alternate sites for coordinated management of the District's emergency response and recovery efforts.

##### 2. Response:

- a) Increased Readiness: During this phase, the Emergency Management Team will contact the City of Burien, schools, fire departments, other utilities, etc. so a coordination of emergency action and planning may begin.
- b) Emergency Warning Phase: During this phase all District employees along with any outside help, either volunteer or contracted, shall be notified of the emergency and instructed on what actions to take.
- c) Emergency Phase: During this phase, the emergency is occurring, and the District is responding to protect the system from damage and restore normal services.

##### 3. Recovery:

Damage assessment and repair prioritization are integral parts of any restoration plan. The District shall utilize every resource to repair damage and restore normal operations. Every effort shall be made to ensure safe work conditions prior to beginning work.

#### IV. ADMINISTRATION AND LOGISTICS

##### A. ADMINISTRATION:

1. Each department expending resources in response to a declared emergency shall maintain detailed records of these expenditures.
  - a) The Emergency Coordinator shall establish a means of recording the emergency purchases authorized by the Manager, or the Board of Commissioners.
  - b) When the Districts resources are exhausted, and a disaster is proclaimed by the Board of Commissioners, assistance may be requested from King County, the State and Federal agencies.
2. All Personnel assigned to emergency management responsibilities shall:
  - a) Record all resources used and time expended in carrying out emergency work.
  - b) Be subject to all requirements set forth in RCW 38.52 and all WAC's as pertaining to emergency workers by the State Department of Emergency Management.

##### B. LOGISTICS:

The Districts Emergency Management Coordinator shall maintain lists of resources, government and private, that may be available for use by the District in times of emergency or disaster.

## V. DIRECTION AND CONTROL

### A. PROCLAMATION OF AN EMERGENCY:

1. When it is determined an emergency exists in the District that could overwhelm the local resources, the Board of Commissioners shall adopt a resolution proclaiming a District disaster and request that the County issue a similar proclamation and that assistance be granted to the District for emergency purposes.
2. When circumstances require immediate attention, the General Manager or his designee may proclaim a disaster if there is not enough time for the Board to meet. When a disaster is declared in this manner, the Board shall meet as soon as possible to either affirm or rescind the proclamation.
3. A copy of the Proclamation of Emergency shall be promptly filed with the King County Office of Emergency Management.
4. The Proclamation of Emergency shall activate the District EOC and Emergency Management Plan.

The progression of Proclamation of Emergency is as follows:

1. The Board proclaims by means of Resolution (official request for County assistance).
2. King County Executive proclaims a disaster (official request for State aid).
3. The Governor proclaims a disaster (official request of Federal Aid).
4. The President proclaims a disaster (authorizes FEMA to render financial aid).

### B. FACILITIES:

1. Emergency Operations Center: The EOC location will be at the District office.
2. Alternate sites are:

### C. EMERGENCY COMMUNICATIONS:

Communication support for the District EOC are provided by U.S. West phone system, Cellular phone, and two way radio

EXHIBIT 17



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King County

## Water Reclamation Evaluation Checklist For Systems with 1,000 or more Connections

The County and State recognize that changing conditions could initiate a need to respond in new ways to future water quality standards, wastewater discharge requirements, take advantage of advances in treatment technologies and/or allow our region to be positioned to respond to changes associated with climate change and population growth.

In 2003, Chapter 90.46 of the Revised Code of Washington (RCW) was amended to require public water systems serving 1,000 or more connections to evaluate opportunities for reclaimed water when completing their water system plans. Please use this checklist to meet King County consistency requirements in responding to this legislation.

Water System Name: \_\_\_\_\_  
Date: \_\_\_\_\_  
PWS ID# \_\_\_\_\_  
Contact: \_\_\_\_\_

*Please use this checklist, including the inventory template, to ensure that your water system plan includes sufficient information about opportunities for reclaimed water and your system's efforts to develop those opportunities. If a question is not applicable or the information is unavailable, then answer, "unknown" or "n/a." King County will consider the checklist completed if each answer is filled in with the best available information, even if the utility states that it is not aware of any reclaimed water opportunities within its service area.*

**1. Identifying Potential Future Demand for Reclaimed Water:** King County maintains a database and map of potential reclaimed water users for evaluating future projects. Please use the template below, or similar table, to provide information to assist King County in further researching these potential uses.

- **Large Utility Water Users** (choose one):

- ☐ Attached is an inventory of twenty large (above 20,000 gallons/month on average), non single-family residential, water users served by our utility that have a potential for reclaimed water use, or
- ☐ Attached is an inventory of our utility's top twenty water users, or
- ☐ The information requested is unknown or not available.

Additional Comments: \_\_\_\_\_

- **Large Self Suppliers** (choose one):

- ☐ Attached is an inventory of large, self-supplied water users within our water utility's service boundaries - especially those near wastewater treatment plants, mainlines, outfalls, and pump stations or similar reclaimed water facilities), or
- ☐ The information requested is unknown or not available.

Additional Comments: \_\_\_\_\_

- **Other** (choose one):

- ☐ Attached is an inventory of other water users (such as those that are clustered near one another and could be served by a single system) that may be likely candidates for reclaimed water use, or
- ☐ The information requested is unknown or not available.

Additional Comments: \_\_\_\_\_

2. **Environmental Commitment:** Are you a city/town, or providing water service to a city/town, that has made commitments within resource management plans, salmon recovery plans, or other environmental initiatives for which there is a potential opportunity for using reclaimed water to assist in meeting commitments? (choose one)

☐ Yes, here are plans that have potential for reclaimed water use in our service area to meet the above commitments:

---

☐ The information requested is unknown, not available.

Additional Comments: 

---

3. **Identifying Areas of Potential Use of Reclaimed Water for Environmental Benefit:**

Below are **examples** of uses of reclaimed water **that comply with State, Federal and other reclaimed water environmental, health and safety standards**. All of these uses are currently in effect somewhere in Washington State. To the best of your knowledge, are any of these potential uses for reclaimed water applicable to your area?

**River Augmentation** (choose one):

☐ Yes, our water rights are limited by instream flows. For more information, King County may contact:

---

☐ The information requested is unknown, or not available.

Additional Comments: 

---

**Groundwater Recharge** (choose one):

☐ Yes, we withdraw water from an aquifer that is in a groundwater management area, or from a declining aquifer, where water levels may need to be replenished or to maintain aquifer storage. For more information, King County may contact:

---

☐ The information requested is unknown, or not available.

Additional Comments: 

---

**Water Rights Mitigation** (choose one):

☐ Yes, our area is pursuing, or planning to pursue, new or additional water rights, and there may be an opportunity to use reclaimed water for mitigation of those new water rights. For more information, King County may contact:

---

☐ The information requested is unknown, or not available.

Additional Comments: 

---

**Potential Areas of Environmental Need** (choose one):

☐ Yes, parts of our service area include potential environmental enhancement locations, such as wetlands enhancement, aquifer recharge, stream flow augmentation, that might be candidates for reclaimed water use. For more information, King County may contact:

---

☐ The information requested is unknown, or not available.

Additional Comments: 

---

4. **Local Reclaimed Water Legislation:** If water reclamation is mandated for this water system through local government agreement, contract, local regulations, ordinances, or other mechanisms, please provide a copy of the governing mechanism (choose one).
- ☐ Yes, local legislation exists in our area in support of reclaimed water use. The following relevant legislation is attached (please list titles of documents):
- 
- 
- ☐ No water reclamation legislation exists, or is known to exist, at a local level in our service area.
5. **Coordination with Local Wastewater Utility:** Include a brief description of your interactions with any wastewater or reclaimed water utility (King County or other) adjacent to your service area to evaluate any potential opportunities to develop reclaimed water (choose one).
- ☐ Describe if applicable:
- 
- 
- ☐ None. Additional Comments:

## Template for Inventory of Water Users and Identification of Potential Reclaimed Water Users

[illegible]

<sup>1</sup> See Washington State Reclamation and Reuse Standards, September 1997, Section 1, Articles 1-5 for allowable uses of reclaimed water. <http://www.ecy.wa.gov/PROGRAMS/WQ/reclaim/standards.html>



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*Saving Water Partnership*  
Seattle and Participating Local Water Utilities

# **2019-2028 Water Conservation Program Planning Document**

**December 2018**

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# Acronyms

CEE	Consortium for Energy Efficiency
CCF	Centum Cubic Feet (100 cubic feet)
CIP	Capital Improvement Program
CPA	Conservation Potential Assessment
CTF	Conservation Technical Forum
DOH	Department of Health (Washington State)
EPA	Environmental Protection Agency (United States)
FTE	Full Time Equivalency
GPC	Gallons per Cycle
GPF	Gallons per Flush
GPH	Gallons per Hour
GPM	Gallons per Minute
HCP	Habitat Conservation Plan
MF	Multifamily
MGD	Million Gallons per Day
MIT	Muckleshoot Indian Tribe
MWL	Municipal Water Law
NR	Non-Residential
O&M	Operations and Maintenance
SF	Single Family
SPU	Seattle Public Utilities
SWP	Saving Water Partnership
WAC	Washington Administrative Code
WF	Water Factor
WSP	Water System Plan
WUE	Water Use Efficiency

# 1 Introduction

The Saving Water Partnership (SWP) is a collaboration between Seattle Public Utilities (SPU) and 18 water utility partners that purchase water from SPU. SPU staff administer a regional water conservation program on behalf of the SWP.

This introductory section explains the purpose of this document, describes the organization of the document, and provides information about the SWP including the members, the governance structure, water use characteristics, housing characteristics, and demographics.

## 1.1 Purpose

The primary purpose of this plan is to document the direction of the 2019-2028 SWP water conservation program. Additionally, this plan provides a basic primer on water conservation and some history of the SWP water conservation program.

The scope of the 2019-2028 SWP water conservation program is customer-facing, utility-sponsored programs, which is often called “programmatic conservation”. However, this plan also explains how the SWP water conservation program fits into a broader conservation context that includes rates, codes, and system efficiencies. The SWP water conservation program does not include conservation efforts by individual utilities that are above and beyond the regional program. For example, SPU’s low-income water conservation program that is only available to SPU retail customers is not included.

The 10-year period (2019-2028) for the new program matches the timeframe of SPU’s new water system plan (WSP). Because 10 years is a long time, the details of the program are more defined for earlier years and less defined for later years. Flexibility is needed for the later years due to potential changes that can occur related to conservation technologies, communication methods, demographic shifts, and other issues. The intent is to not update this document unless there are compelling reasons to do so. However, there will be an annual report each year and periodic documentation to further develop program details in future years.

## 1.2 Plan Organization

This document is organized as follows:

- **Section 1 Introduction:** This section explains the purpose of this document, describes the organization of the document, and provides information about the SWP including the members, the governance structure, water use characteristics, housing characteristics, and demographics.
- **Section 2 Water Conservation Basics:** This section provides a basic primer on water conservation including definitions, categories, regulations/commitments, and codes/standards. It is intended to provide a base level of understanding and context for the SWP water conservation program.

- **Section 3 History of the Regional Water Conservation Program:** This section provides a history of the regional water conservation program including the original reason for developing a program, conservation successes, major program milestones, and key program design criteria.
- **Section 4 2019-2028 Water Conservation Program:** This section provides details on the 2019-2028 conservation program including the development process, the current reasons for the conservation program, the conservation goal, the existing programs, intended modifications, and information on budget and staffing. **[Readers should go directly to this section if they are not interested in the background information in the other sections.]**

## 1.3 Saving Water Partnership

### 1.3.1 Member Utilities

The SWP is a collaboration between SPU and 18 water utility partners that purchase water from SPU. SPU owns and operates a regional water system that includes water sources, treatment plants, and a transmission system. Each of the individual water utilities own and operate their own distribution system and retail water to their customers. Some utilities also have their own water sources. The members of the SWP are shown in **Table 1-1**.

**Table 1-1 Saving Water Partnership Members**

1. Cedar River Water & Sewer District*	8. North City Water District	15. Water District 49
2. City of Bothell	9. Northshore Utility District	16. Water District 90*
3. City of Duval	10. Olympic View Water & Sewer District*	17. Water District 119
4. City of Mercer Island	11. Seattle Public Utilities (City of Seattle)	18. Water District 125
5. City of Renton*	12. Soos Creek Water & Sewer District	19. Woodinville Water District
6. Coal Creek Utility District	13. Water District 20	
7. Highline Water District*	14. Water District 45	

\* SPU's wholesale customers with their own water sources.

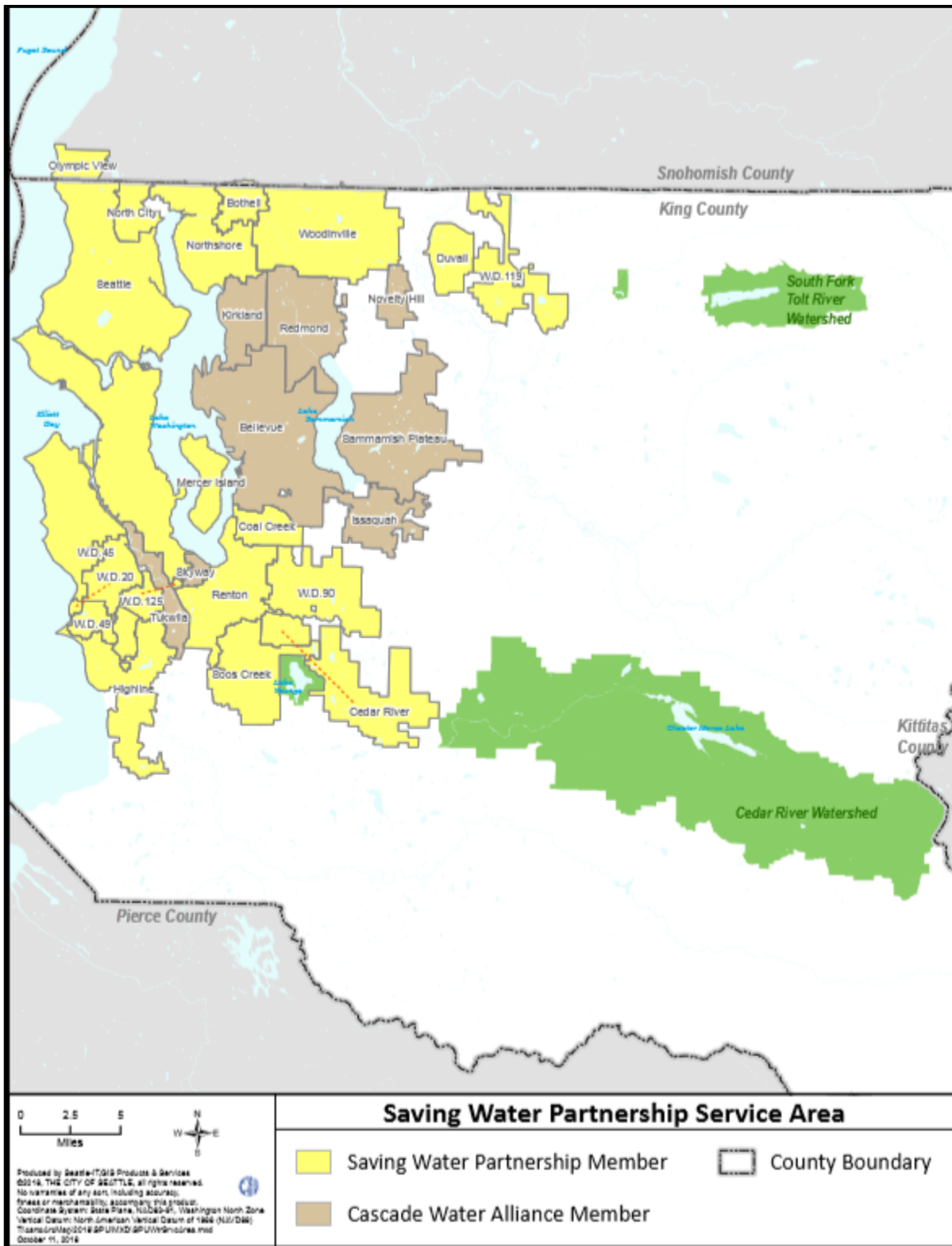
SPU also wholesales water to the Cascade Water Alliance, which is comprised of seven water utilities. The SWP does not include Cascade Water Alliance or their members; they have their own water conservation program. The members of the Cascade Water Alliance are listed in **Table 1-2**.

**Table 1-2 Cascade Water Alliance Members (Not SWP Members)**

1. City of Bellevue	4. City of Redmond	7. Skyway Water & Sewer District
2. City of Issaquah	5. City of Tukwila	
3. City of Kirkland	6. Sammamish Plateau Water	

The location of the SWP members is shown on **Figure 1-1**, which also shows, and sets apart, the Cascade Water Alliance members.

Figure 1-1 Saving Water Partnership Map





### 1.3.2 Organization and Governance Structure

A majority of the workload for planning and implementing the SWP program is done by SPU staff, under the governance and guidance of two bodies:

- **Operating Board:** The Seattle Water Supply System Operating Board (Operating Board) is comprised of management level staff from each of the 19 water utilities. It sets the strategic direction for the water conservation program, specifically the water conservation goal, the program priorities, and the budget. In short, the Operating Board determines what the water conservation program should achieve. The Operating Board also determines how conservation program costs are allocated, as authorized in the water wholesale contracts.
- **Conservation Technical Forum:** The Conservation Technical Forum (CTF) is comprised of program level staff from each of the 19 water utilities. The CTF participates in designing and implementing the SWP water conservation program, within the strategic direction parameters set by the Operating Board, by providing original ideas and providing input on ideas generated by SPU staff. In short, the CTF addresses how the SWP conservation program's goal and priorities will be achieved. Each CTF representative is also responsible for marketing the program within their retail service area.

### 1.3.3 Member Water Use Characteristics

Understanding water use characteristics of the collective SWP service area, as well as variations across the 19 members is important in designing a water conservation program that fits those characteristics. Raw data for water consumption and the number of customer accounts for each of the 19 SWP members is provided in **Table 1-3** and analysis of that raw data directly follows. The data is from the annual wholesale customer survey conducted by SPU and uses 2016 data, which was the most recent data available.

**Table 1-3 Consumption and Accounts**

Consumption & Accounts (2016; sorted alphabetically)									
Water Utility	Category	Consumption in CCF				Number of Accounts			
		Single Family	Multifamily	Non Residential	Total <sup>1</sup>	Single Family	Multifamily	Non Residential	Total
1	Bothell, City of	240,679	202,837	309,679	753,195	3,272	354	508	4,134
2	Cedar River WSD	625,446	121,071	120,966	867,483	7,391	252	367	8,010
3	Coal Creek UD	329,890	52,895	120,111	502,896	3,770	91	148	4,009
4	Duwall, City of	190,946	8,711	30,581	230,238	2,422	35	144	2,601
5	Hightline WD	1,259,538	795,035	795,709	2,850,282	15,887	1,140	1,182	18,209
6	Mercer Island, City of	694,376	105,515	130,900	930,791	7,197	89	361	7,647
7	North City WD	508,168	145,654	100,967	754,789	7,590	319	255	8,164
8	Northshore UD	1,495,863	433,977	455,119	2,384,959	19,409	1,331	1,222	21,962
9	Olympic View WSD	389,162	101,255	106,883	597,300	4,400	207	254	4,861
10	Renton, City of	1,032,098	689,152	1,218,690	2,939,940	13,819	1,546	1,827	17,192
11	Seattle Public Utilities <sup>2</sup>	10,045,938	5,647,560	10,823,633	26,517,131	162,005	13,208	13,588	188,801
12	Soos Creek WSD	1,438,363	306,490	154,981	1,899,834	17,246	467	561	18,274
13	WD 119 <sup>3</sup>	127,510	0	0	127,510	1,209	0	0	1,209
14	WD 125	238,136	176,178	156,774	571,088	2,812	207	265	3,284
15	WD 20	598,889	243,657	185,974	1,028,520	8,156	510	520	9,186
16	WD 45	57,819	34,772	12,158	104,749	895	54	37	986
17	WD 49	241,967	162,419	162,511	566,897	3,198	370	540	4,108
18	WD 90	651,862	7,975	50,093	709,930	7,787	3	155	7,945
19	Woodinville WD	1,211,365	170,523	334,839	1,716,727	12,982	282	794	14,058
	Total	21,378,015	9,405,675	15,270,568	46,054,258	301,447	20,465	22,728	344,640

1. Total billed consumption for a utility is not the same as SPU sales to that utility due to non-revenue water and, in some instances, use of other water sources.

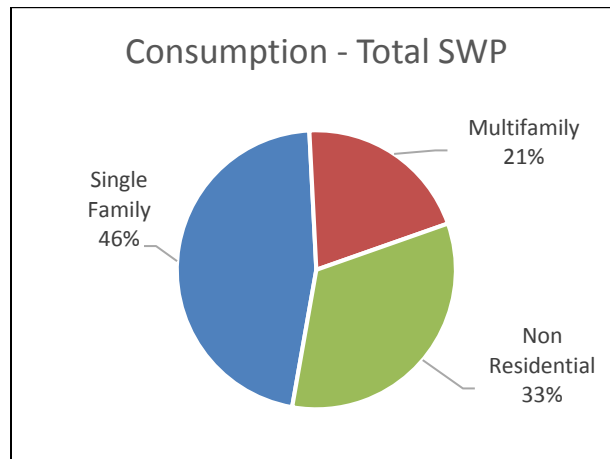
2. SPU data is from Bruce Flory, Principal Economist. It is non-weather adjusted data. The SF data backs out duplexes, which is put with MF, to better match how wholesale customers categorize SF and MF.

3. WD 119 did not submit data for 2016, therefore this data is for 2015.

Key water use characteristics are as follows:

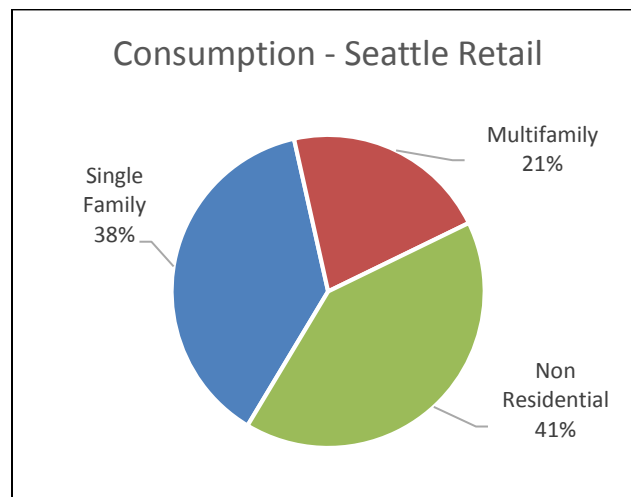
- **Sector Split for Consumption:** Water consumption for the total SWP is 46% single family (SF), 21% multifamily (MF), and 33% non-residential (NR), as shown in **Figure 1-2**. The single family sector includes residential detached homes, duplexes, and triplexes. Multifamily is defined as residential buildings with 4 units or more. The non-residential sector includes a wide variety of buildings and water use from small restaurants to large industrial complexes.

**Figure 1-2 Consumption Sector Split – Total SWP**

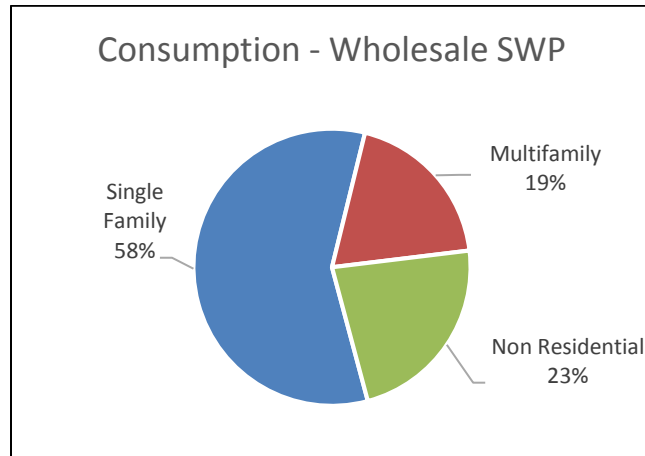


The sector split does vary between Seattle retail and wholesale SWP, with wholesale SWP having more SF and less NR consumption, as shown in **Figure 1-3** and **Figure 1-4**.

**Figure 1-3 Consumption Sector Split – Seattle Retail**

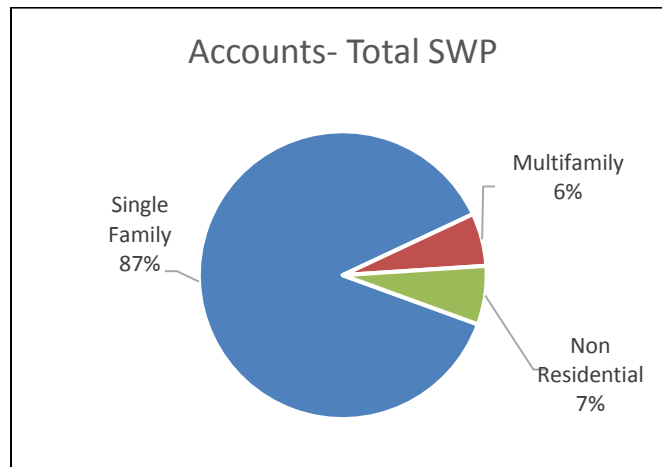


**Figure 1-4 Consumption Sector Split – Wholesale SWP**



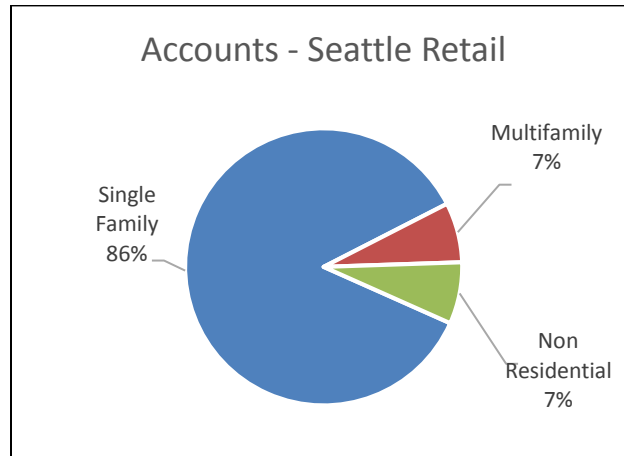
- **Sector Split for Accounts:** The number of customer accounts in each category for the total SWP it is 87% SF, 6% MF, and 7% NR, as shown in **Figure 1-5**.

**Figure 1-5 Accounts Sector Split – Total SWP**

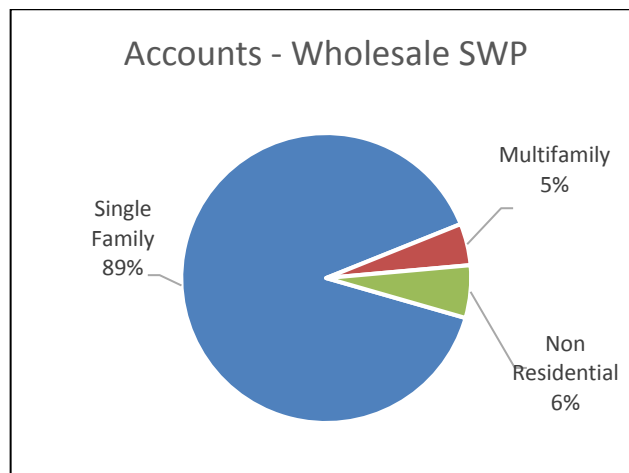


Seattle retail and wholesale SWP have a similar sector split, as shown in **Figure 1-6** and **Figure 1-7**.

**Figure 1-6 Accounts Sector Split – Seattle Retail**



**Figure 1-7 Accounts Sector Split – Wholesale SWP**



- **Single Family Sector:** Single family is a great target for the SWP water conservation program because this sector:
  - Represents the largest portion of consumption (46%) for the total SWP and thus has a large savings potential. (Note this is also true for the vast majority of individual SWP members.)
  - Represents the vast majority of accounts for the total SWP and thus provides programs for the largest number of customers. (Note this is also true for every individual SWP member.)
  - Every SWP member has an ample number of SF accounts (the minimum is approximately 900) so there are many opportunities for every individual SWP member.

- **Multifamily Sector:** Multifamily is a good target for the SWP water conservation program because this sector:
  - Represents a sizable portion of the consumption (21%) for the total SWP and thus provides a respectable savings potential. (Note this is also true for approximately half of the individual SWP members.)
  - Has a much smaller percent of accounts (6%) for the total SWP compared to the percent of consumption (21%) and thus can be cost-effective outreach. (Note this is also true for vast majority of individual SWP members.)
  - Most SWP members have a respectable number of MF accounts (13 SWP members have 200+; 5 SWP members have 500+) so there are reasonable opportunities for most SWP members.
- **Non-Residential Sector:** Non-residential is a good target for the SWP water conservation program because this sector:
  - Represents a sizable portion of the consumption (33%) for the total SWP and thus provides a respectable savings potential. (Note this is also true for approximately one-third of the individual SWP members.)
  - Has a much smaller percent of accounts (7%) for the total SWP compared to the percent of consumption (33%) and thus can be cost-effective outreach. (Note this is also true for vast majority of individual SWP members.)
  - Most SWP members have a respectable number of NR accounts (14 SWP members have 200+; 9 SWP members have 500+) so there are reasonable opportunities for most SWP members.

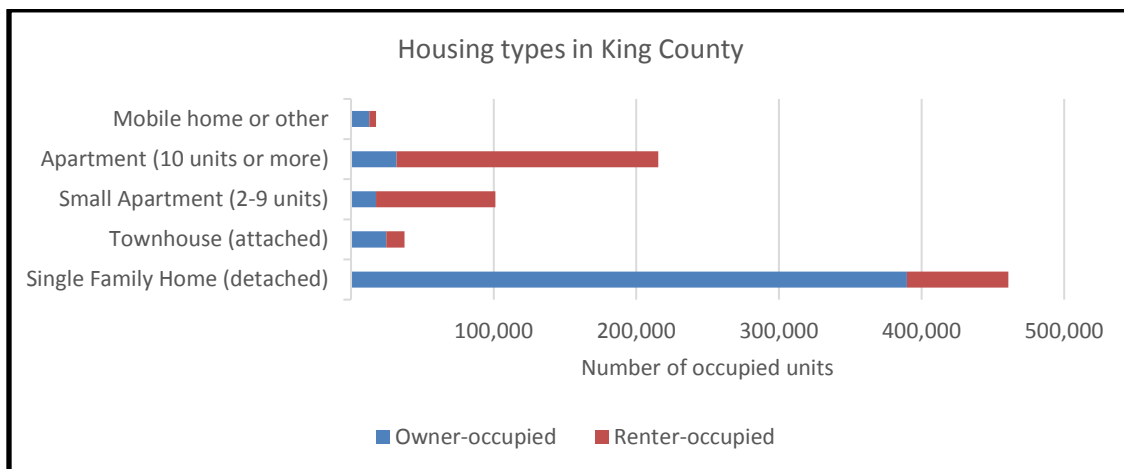
### 1.3.4 Housing Stock Characteristics

Understanding the type and age of housing in the SWP service area is important when choosing appropriate water conservation behaviors and hardware changes to promote through a water conservation program.

Information on housing type and age is provided below and is from the U.S. Census Bureau 2012-2016 American Community Survey 5-year estimates. Note that data were available only at the county level, of which approximately 75% is served by the Seattle Regional Water System and a smaller portion by the SWP service area. However, the county-level data are generally representative of the SWP service area.

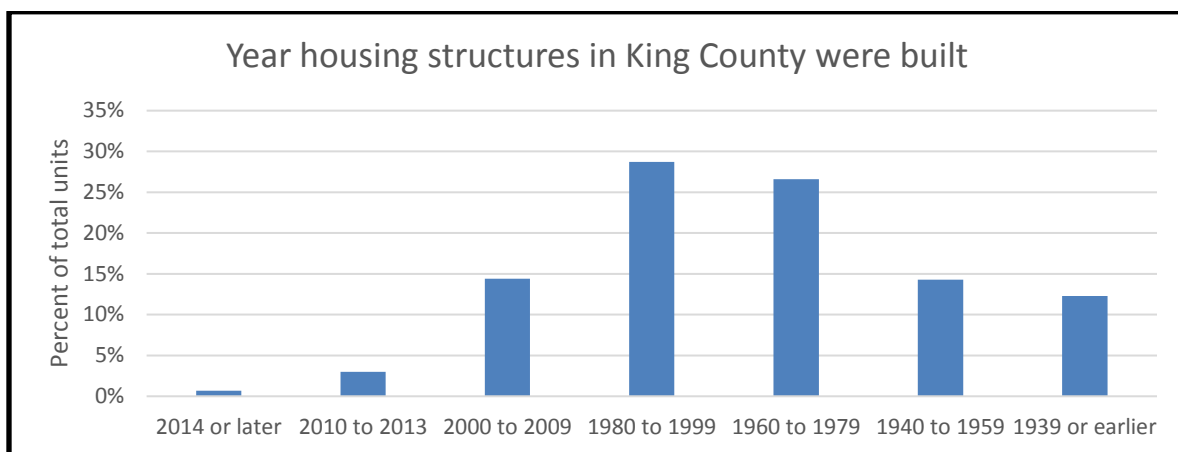
- **Housing Type:** Single family homes are the predominant housing type, followed by larger apartment buildings, and there is an approximately equal split between owner-occupied and renter-occupied units, as shown in **Figure 1-8**.

**Figure 1-8 Housing Types**



- Both single family and multifamily (i.e., apartment) sectors are good targets for the SWP water conservation program, as discussed above in Section 1.3.3 Member Water Use Characteristics
- Homeowners are more likely to have control over the hardware and fixtures installed and to pay their water bill directly. Promoting efficient hardware and behavior tips are likely successful water conservation strategies with homeowners because they have an intrinsic reason to participate.
- Renters make up approximately 50% of King County residents and are a good target for behavior tips and can help persuade building owners and managers to make changes to hardware.
- **Housing Age:** The overall housing stock is relatively old, with only approximately 20% built since 2000, as shown in **Figure 1-9**.

**Figure 1-9 Housing Age**



- Most of the existing housing stock was built before the plumbing code was updated to a higher water efficiency standard in 1994. The fixtures in some older buildings have already been updated, but many buildings still have pre-code hardware installed and are a good target for water efficiency upgrades.

### 1.3.5 Member Demographics

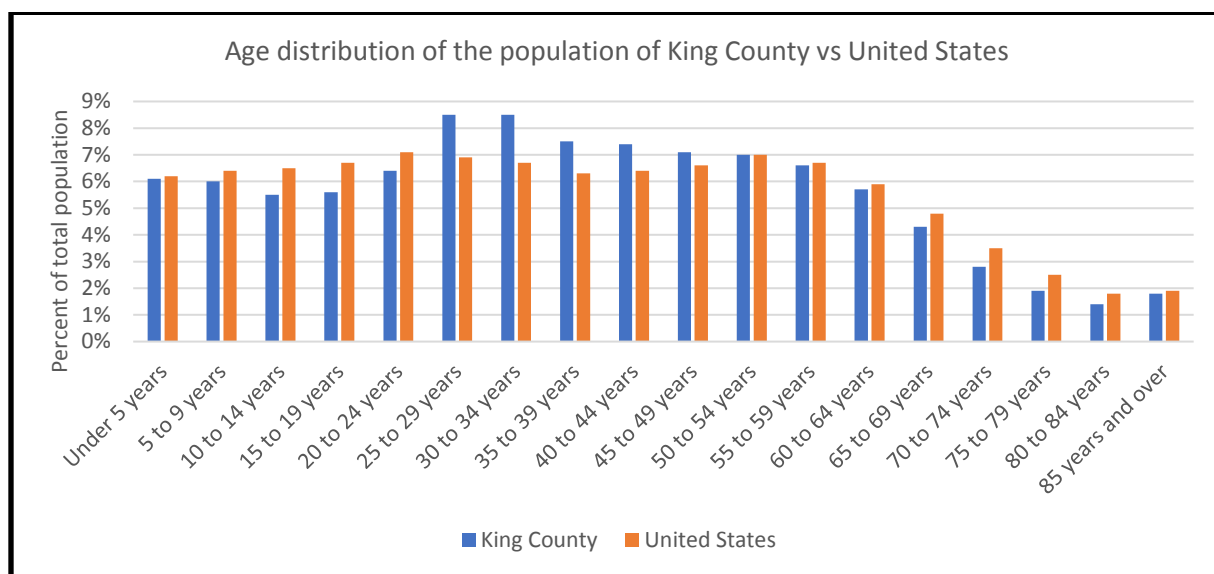
Understanding the demographics of the collective SWP service area, as well as variations across the 19 members is important to designing a water conservation program that fits those characteristics. As a region, King County is growing significantly (it's added more people since 2000 than the current combined of population of Tacoma and Everett) and its demographics are changing, especially in the suburbs.

The demographic information that follows is from the 2010 Census, American Community Surveys from 2009-2016, and the King County Office of Performance, Strategy and Budget. Note that data were available only at the county level, of which approximately 75% is served by the Seattle Regional Water System and a smaller portion by the SWP service area. However, the county-level data are generally representative of the SWP service area.

Key demographic information is as follows:

- **Age:** Compared to the United States, the population of King County skews towards middle age with a smaller proportion of both youth and seniors as shown in **Figure 1-10**.

**Figure 1-10 Age Distribution**

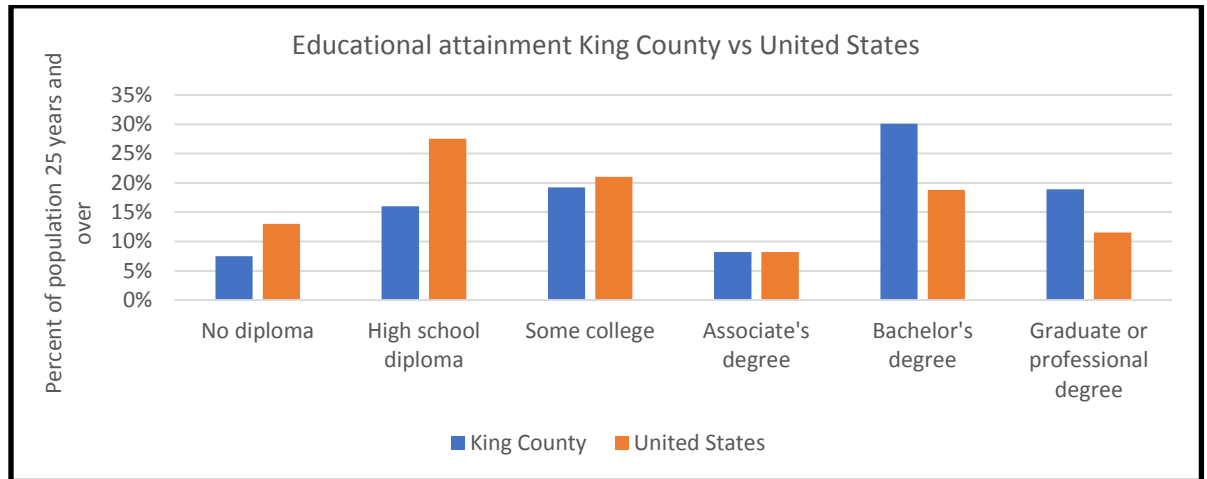


- The SWP program should have programs available for the full range of ages so that all residents can participate.
- The millennial generation (25-34 year-olds) is a good target because they represent the largest portion of residents. Millennials and their adjacent generational cohorts are characterized by their quick adoption of new technology and extensive use of the internet.



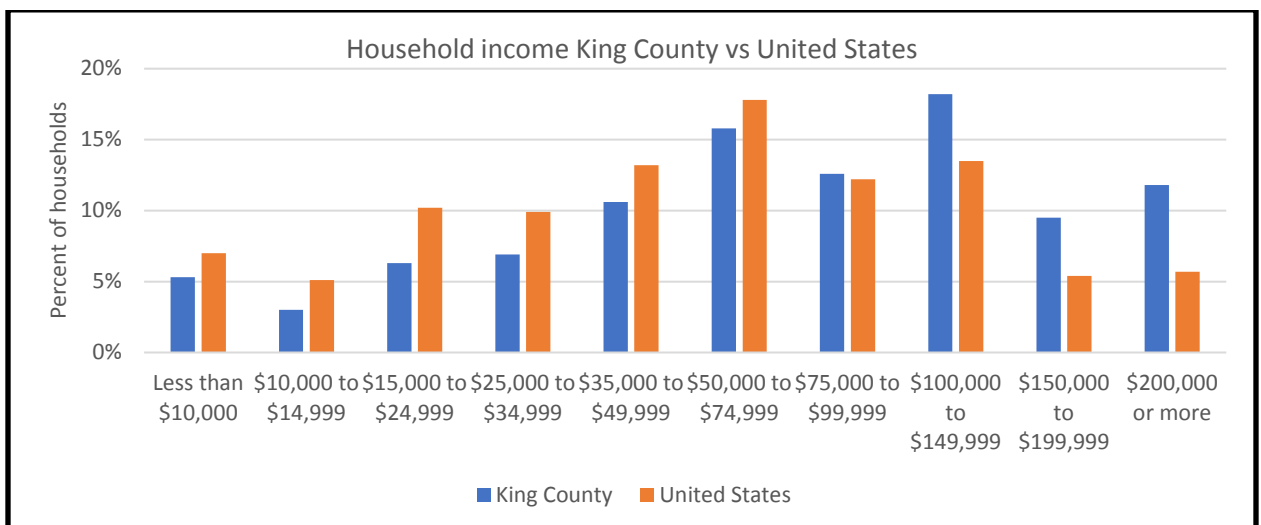
- **Educational Attainment:** King County residents have significantly higher levels of educational attainment than the United States, with almost 50% having a bachelor's degree or higher as shown in **Figure 1-11**.

**Figure 1-11 Educational Attainment**

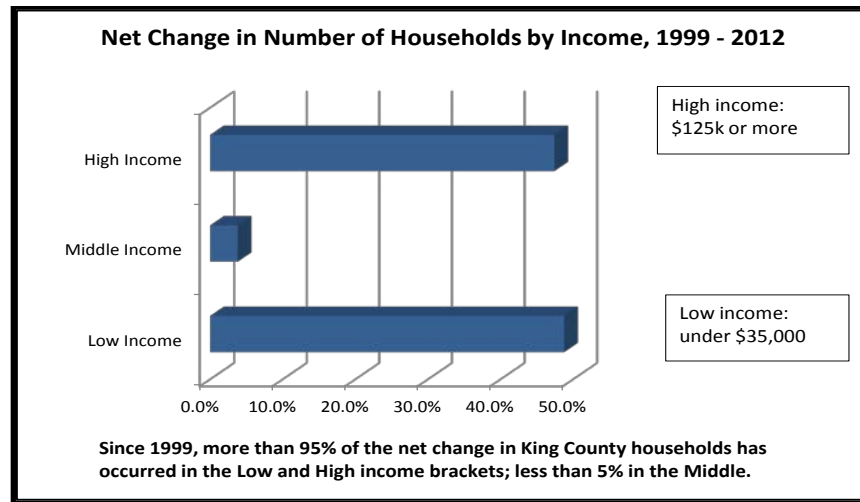


- To meet the needs of all residents, information about SWP programs should be communicated in plain language.
  - Additionally, a significant portion of the SWP customer base may desire a deeper level of information before taking action and may be skeptical about programs until detailed or technical information is provided.
- **Household Income:** The average annual household income in King County is \$106,772 compared to \$77,866 in the United States, as shown in **Figure 1-12**. While the average income in King County is high, the cost of living is also high, and the number of low-income households in the county is increasing. Regional population growth has increased the number of both low and high-income households while the number of middle income households has remained static. The number of residents below the poverty level has nearly doubled since 2000 as shown in **Figure 1-13**.

**Figure 1-12 Household Income**

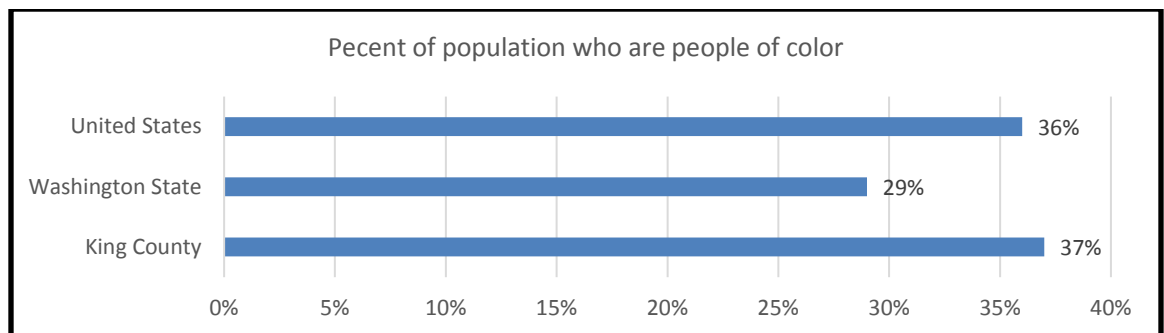


**Figure 1-13 Changes in Household by Income**



- Income plays a significant role in an individual's motivation and/or ability to participate in water conservation programming.
- The water conservation program design should take into account the unique circumstances of a growing low-income customer base, a squeezed middle class, and the growing number of high-income households that may not be as responsive to price signals. Continuing to provide both financial and technical assistance will help customers at all income levels participate in programs.
- **Race and Ethnicity:** 37% of the population in King County identify as People of Color, a higher percentage than Washington or the United States, as shown in **Figure 1-14**. Additionally, most of the net population growth in King County since 1990 has consisted of persons of color.

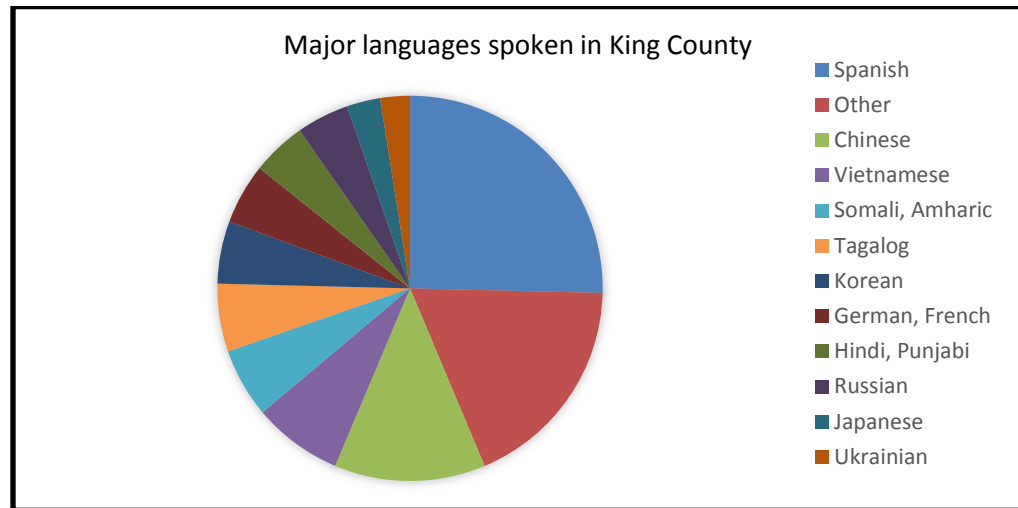
**Figure 1-14 People of Color**



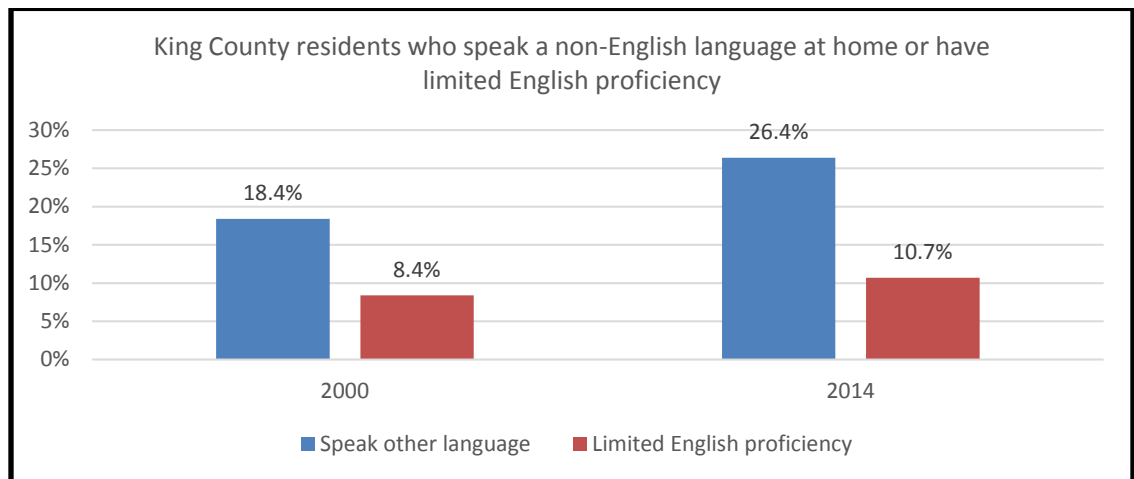
- People of color experience unique barriers accessing government and public services and are a significant and growing portion of King County residents. For SWP's water conservation programs to serve all customers, programs should be designed to meet the needs of a racially diverse region.

- **Language:** Residents of King County speak over 170 languages and more than 25% speak a language other than English at home. 10% of King County residents have limited English proficiency and the proportion of residents with limited English proficiency is growing, as shown in **Figure 1-15** and **Figure 1-16**.

**Figure 1-15 Major Languages**



**Figure 1-16 Limited English Proficiency**



- While not interchangeable, language and culture often go hand in hand—both are critical components of communication, education, and outreach.
- To serve all customers, the SWP water conservation programs should consider strategies like partnering with community-based organizations and transcreation of information to increase program accessibility to the growing proportion of limited English speakers in SWP's service area.

- **Geographic Variations:** The geographic distribution of many demographic characteristics are highly varied across the service area, as shown in **Figure 1-17**, **Figure 1-18**, **Figure 1-19** and **Figure 1-20**. The SWP water conservation program may need to be adapted to meet the needs of this varied distribution.

**Figure 1-17 Median Household Income (\$) Geographic Distribution**

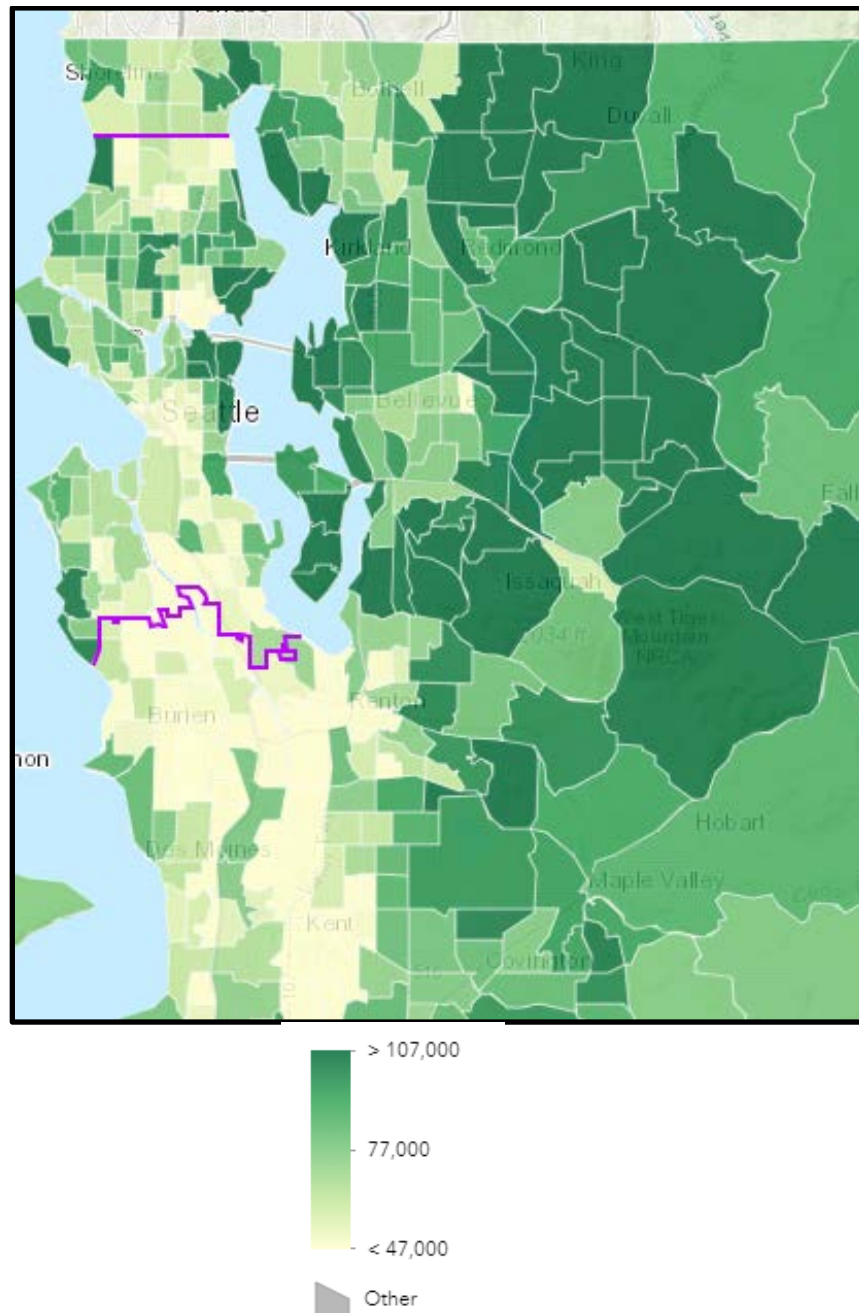


Figure 1-18 Most Common Education Attainment Geographic Distribution

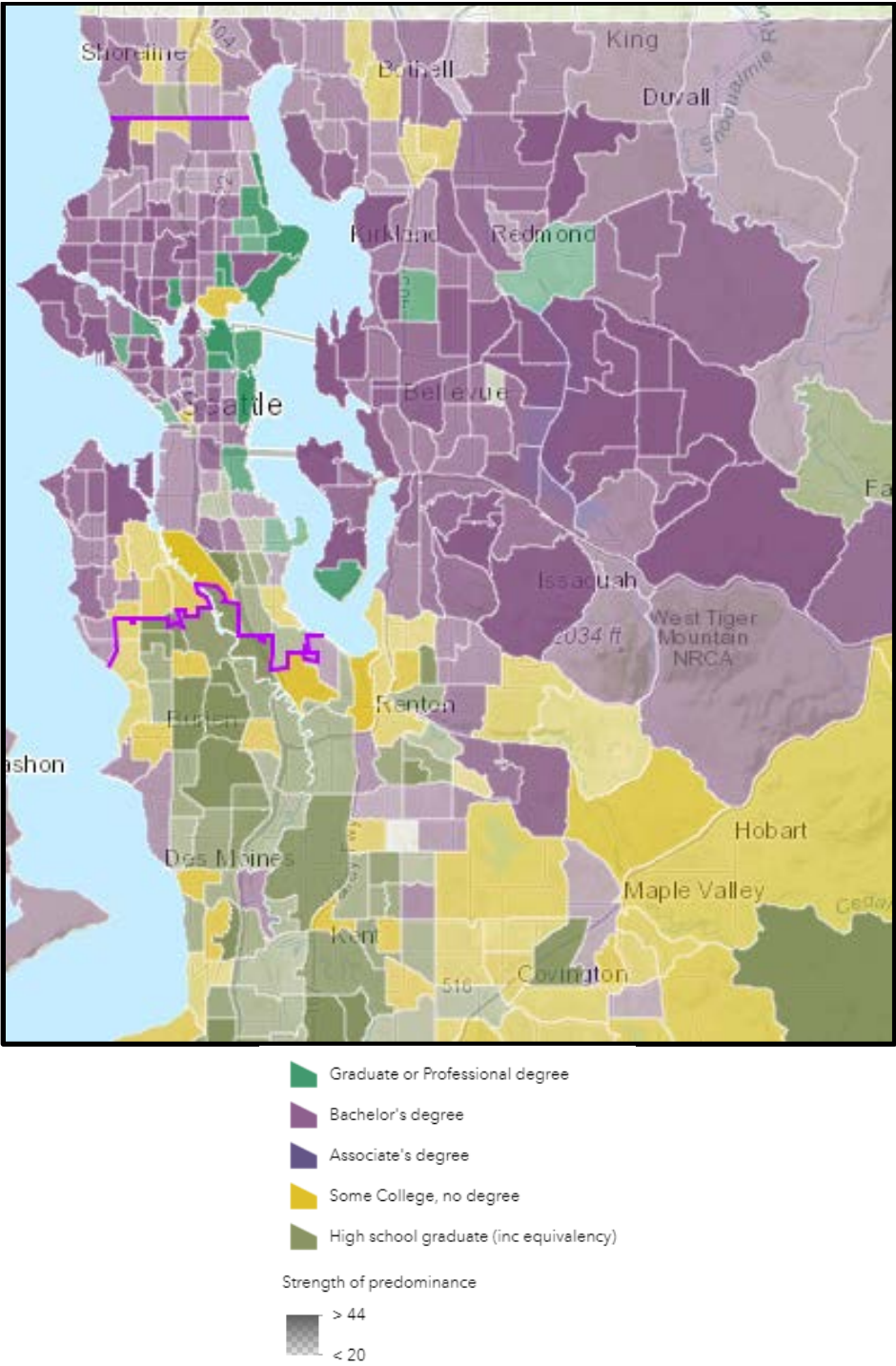


Figure 1-19 Percentage of Population Who are People of Color Geographic Distribution

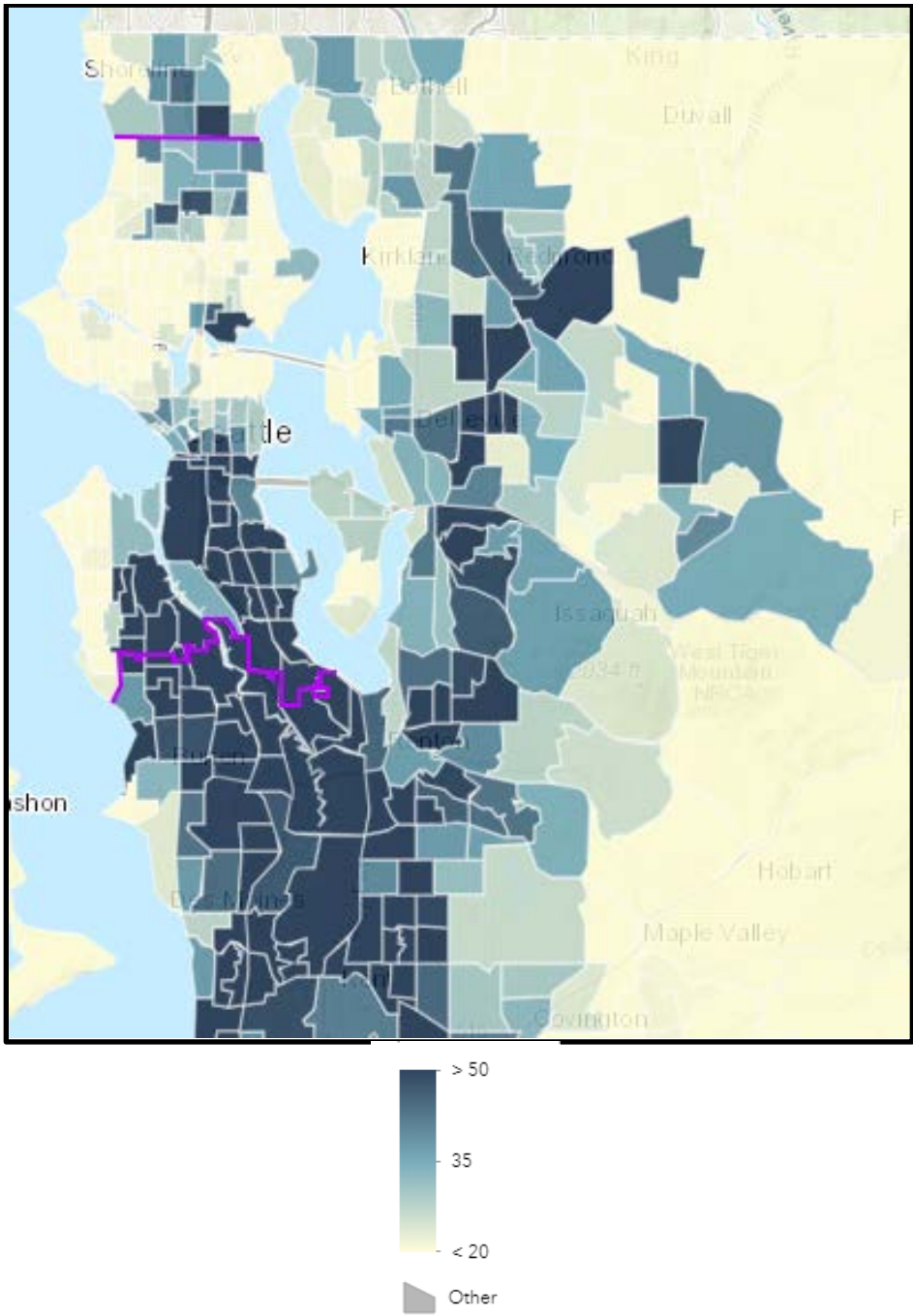
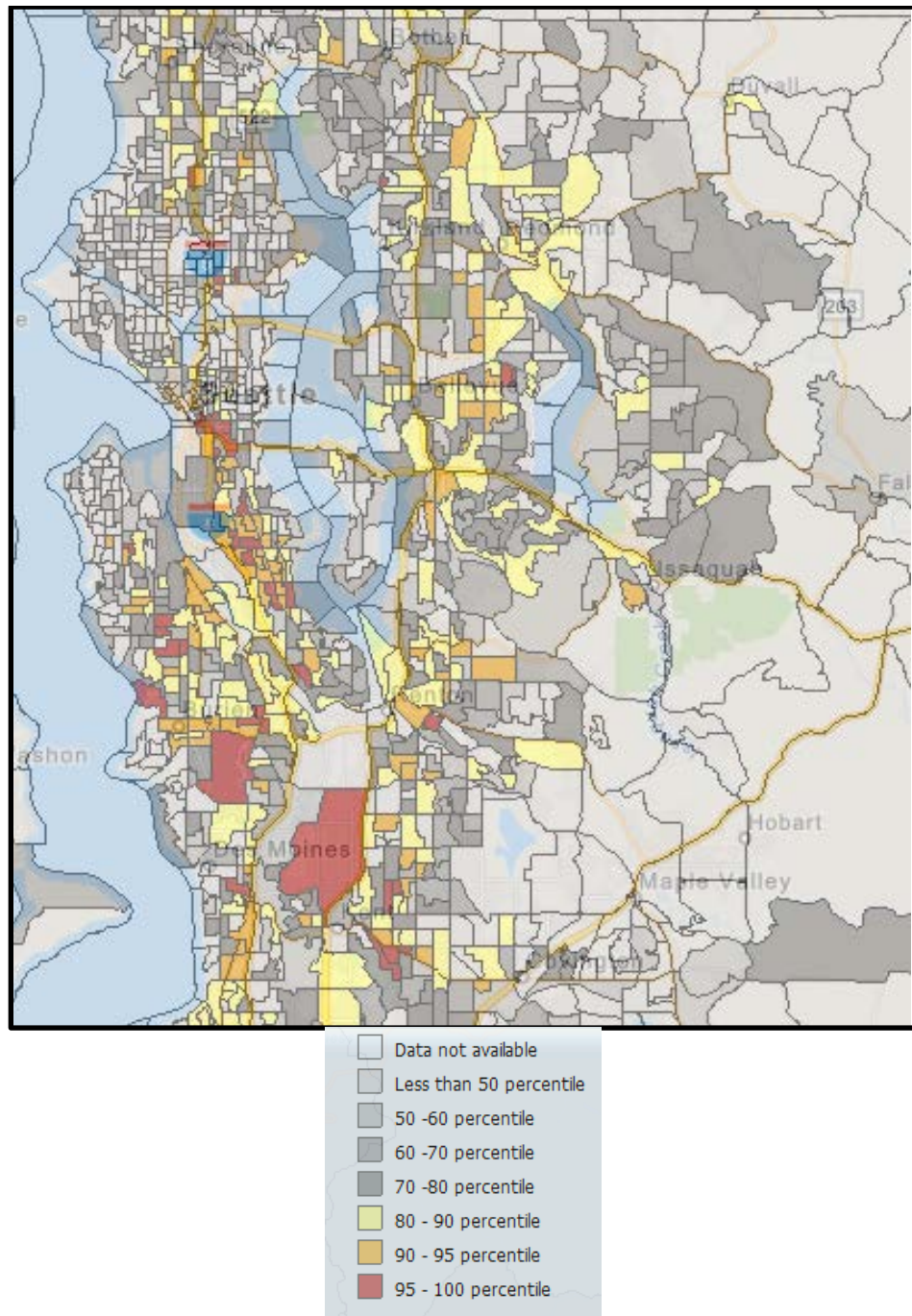




Figure 1-20 Linguistically Isolated Households Geographic Distribution



## 2 Water Conservation Basics

This section provides a basic primer on water conservation including definitions, categories, regulations/commitments, and codes/standards. This is intended to provide a base level of understanding and context for the SWP water conservation program.

### 2.1 Conservation Definition

It is important to define conservation because the word often gets confused in two ways:

- **Confusion #1 Conservation vs Curtailment:** It is important to distinguish between conservation and curtailment, as explained below.

**Conservation:** Long-term, sustainable management of water use which eliminates waste and maximizes efficiency of use. This has no loss of service or satisfaction by the customer.

**Curtailment:** Short-term response to a shortage or emergency such as a drought or system disruption. This can have a loss of service or satisfaction by the customer.

- **Confusion #2 Broad Conservation vs Narrow Conservation:** Conservation is used both in a broad sense and a narrow sense, as explained below.

**Broad Conservation:** This includes everything that reduces water use, both on the customer side (demand-side) and the utility side (supply-side). There are four main components:

- **Programmatic Conservation:** Utility-sponsored programs that help customers reduce their water use. This can include education, technical assistance, and/or financial assistance.
- **Plumbing Codes/Standards:** Savings that occur as customers replace older, less-efficient fixtures with new, more-efficient models that meet federal or state codes or standards. These savings are also achieved as new buildings are constructed using efficient code-compliant fixtures.
- **Rate/Price Impacts:** Rate structures that encourage customer conservation. Examples include seasonal rates (higher prices in the summer), inclining blocks (higher unit costs at higher levels of consumption), and irrigation rates that are higher than non-irrigation rates.
- **System Operation Improvements:** Improvements water utilities make to operate their systems with less water waste. Examples include reducing distribution system leakage and covering reservoirs which reduces the amount of water used to clean and overflow the reservoirs.

**Narrow Conservation:** This includes only the programmatic conservation.



The 2019-2028 SWP water conservation program is conservation in the narrow sense, since it is programmatic conservation only. Throughout this document, the phrase “conservation program” typically refers to conservation in the narrow sense, meaning programmatic conservation. Note that the background information provided in Sections 2 and 3 of this document includes the broader conservation.

One example of the importance of this distinction is that when the overall reduction in water use is attributed to “conservation”, many people mistakenly take that to mean just programmatic conservation, when it is really all conservation efforts.

## 2.2 Conservation Categories

Conservation can be divided into various categories, as shown and described below. The categories are based on a framework in the *Handbook of Water Use and Conservation* by Amy Vickers.

Measure (saves water)		Incentive (motivation to save water)		
Hardware	Behavior	Educational	Financial	Regulatory
More efficient equipment	More efficient behavior	Explain why & how to save water	Make saving water financially attractive	Require an action
<i>Example:</i> Install low flow toilets	<i>Example:</i> Take shorter showers	<i>Example:</i> Conservation tips brochure/website	<i>Example:</i> Inverted block rate structure	<i>Example:</i> Plumbing code

- **Measures:** Measures save water in and of themselves and can be categorized as follows:
  - **Hardware Measures:** Entails using more efficient equipment.
  - **Behavioral Measures:** Entails promoting behavior changes toward more efficient practices.
- **Incentives:** Incentives motivate customers to engage in a water-saving measure and can be categorized as follows:
  - **Educational Incentives:** Explains why and how to save water.
  - **Financial Incentives:** Makes saving water financially attractive.
  - **Regulatory Incentives:** Mandatory requirements for conservation actions.

It is important to understand these categories since the cost structure, longevity of savings, certainty of savings, and political impacts vary across the categories and there can be tradeoffs between them. A comprehensive conservation program will include a mix of these elements in order to take advantage of the benefits of some and mitigate against the downside of others.

- **Costs:** Hardware measures typically have direct costs to the customer, whereas behavioral measures typically have low or no direct costs to the customer. For example, upgrading a clotheswasher to a more efficient model requires paying for a new clotheswasher and installation, whereas washing full loads has no direct costs. For programmatic conservation,

the water utility has direct costs for both hardware and behavior measures. Incentives typically have no direct costs to customers, but can have costs to the water utility.

- **Longevity & Certainty:** Hardware measures are better on both accounts, compared to behavioral measures. For example, installing a low-flow showerhead (a hardware measure) has higher water saving certainty and longevity than taking shorter showers (a behavioral measure), since it is easier to backslide on the shorter shower than it is to change out the showerhead. For incentives, regulatory efforts have higher longevity and certainty than educational or financial efforts.
- **Political:** Program elements that are voluntary are often preferred by customers over mandatory elements. For example, voluntary programs that help customers improve the efficiency of their irrigation system (e.g., rebates on efficient irrigation controllers) are often preferred over regulations that restrict the amount of lawn that can be planted.

## 2.3 Regulations / Agreements / Commitments

There are several regulations, agreements, and commitments that set the requirements or expectations for a water conservation program for the SWP members and/or SPU.

### 2.3.1 State Municipal Water Law and Water Use Efficiency Rule

The Washington State Municipal Water Law (MWL) was a major milestone for water conservation in Washington. In 2003, the Washington State Legislature passed Engrossed Second Substitute House Bill 1338, better known as the Municipal Water Law, to address the increasing demand on our state's water resources. The law established that all municipal water suppliers must use water more efficiently in exchange for water right certainty and flexibility to help them meet future demand.

The Legislature directed the Washington State Department of Health (DOH) to adopt an enforceable Water Use Efficiency (WUE) Rule and program, which became effective on January 22, 2007. Any Group A community water system that serves at least 15 residential service connections must comply with the WUE Rule, whether publicly or privately owned.

WUE Rule requirements are found in WAC 246-290. The primary requirements in the WUE Rule are as follows:

- **Meters:** Water sources and customers must be 100% metered. (WAC 246-290-496)
- **Data Collection:** Certain types of data must be collected and reported. (WAC 246-290-100)
- **Leakage:** Distribution system leakage must be calculated and reported annually to the State and to customers and must be 10% or less. (WAC 246-290-820)
- **Conservation Goal:** Utilities must set a quantitative water conservation goal (using a public process) and report on it annually to the State and to customers. (WAC 246-290-830)
- **Conservation Program:** Utilities must implement (or evaluate) 1-12 conservation measures, depending on their size. (WAC 246-290-810)

- **Reporting:** Utilities must report their distribution system leakage and progress towards achieving their conservation goal annually to the State and customers. (WAC 246-290-840)

Importantly for the SWP, the State allows regional goals and programs, where each utility separately adopts the regional goal and reports to the State and to customers.

### 2.3.2 Cedar River Habitat Conservation Plan

SPU's 2000 Cedar River Habitat Conservation Plan (HCP) relates to the federal Endangered Species Act (ESA). Section 10 of the ESA allows landowners to conduct activities that would result in a "take" of endangered species, in exchange for other commitments. ("Take" is defined as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.") SPU's HCP was developed in anticipation of Puget Sound Chinook being listed under ESA, although the HCP is an ecosystem-based plan that covers nearly 90 species. The HCP was developed by SPU and submitted to the National Marine Fisheries Service and the United States Fish and Wildlife Service.

The HCP is a 50-year agreement (thru 2050) that provides certainty for the City of Seattle's drinking water system, while it protects and restores habitat by implementing over 80 projects in the following three areas.

- **Watershed Management:** This includes decommissioning roads, stream/riparian restoration, and reforestation.
- **Landsburg Dam Mitigation:** This includes fish passage and a sockeye hatchery.
- **Instream Flow Management:** This includes guaranteed flow regimes, diversion limits, and floodplain reconnection.

With respect to water conservation, the HCP commits SPU to educate customers about the linkage between water use and salmon habitat, as well as to implement public information programs prior to reducing instream flows to critical-year levels.

### 2.3.3 Muckleshoot Indian Tribe Settlement Agreement

The 2006 Muckleshoot Indian Tribe (MIT) Settlement Agreement is an agreement between SPU and the MIT that resulted from the MIT formally challenging the National Marine Fisheries Service's approval of the HCP and the corresponding Incidental Take Permit.

The challenge was based on the MIT's longstanding assertion that the Cedar River Project has damaged fish runs in the Cedar River/Lake Washington Basin and that the Tribe is entitled to compensation and mitigation for such damage. As discussions progressed, the parties also addressed the Tribe's exercise of its treaty rights to hunt and gather in the Cedar River Municipal Watershed, the Tribe's interest in wildlife management in the watershed, and the Tribe's interest in conducting traditional activities there.

The settlement agreement resolved the Tribe's claim against the City for damages to fish runs in the Cedar River/Lake Washington Basin and impairment of treaty rights. The primary commitments in the agreement relate to instream flow requirements, diversion limits, and the fish hatchery.

With respect to water conservation, the agreement has the following commitments:

- **Existing retail customers:** Commits SPU to continue conservation efforts with its retail customers.
- **Existing wholesale customers:** Commits SPU to encourage conservation efforts from its existing wholesale water customers.
- **New wholesale customers:** Commits SPU to require that conservation measures from any new wholesale customers be substantially similar to conservation efforts from SPU's retail.

### 2.3.4 Wholesale Water Supply Contracts

The wholesale water supply contracts SPU has with the 18 wholesale customers in the SWP requires the wholesale water customers to participate in the regional conservation program.

## 2.4 Codes and Standards

There are several codes and standards that relate to water conservation as described below.

- **Federal Code:** Federal code is federal law. The primary example of this is the 1992 Federal Energy Policy Act (effective in 1994), which included maximum water use rates for toilets, showerheads, and faucet aerators.
- **WaterSense:** WaterSense is a voluntary product labeling program for water efficiency sponsored by the EPA. WaterSense labeled products are at least 20% more efficient than the federal code. The intent is to help people save water while ensuring high performance. Products with the WaterSense label have been tested by an independent laboratory to ensure both water efficiency and performance. WaterSense is primarily applicable to cold water using fixtures, such as toilets.
- **MaP Premium Toilets:** MaP (short for Maximum Performance) Premium is an effort to help customers identify toilets with strong water efficiency and flushing performance. The MaP program tests toilets against a protocol to verify maximum water use and flushing performance. The testing protocol requires toilets to use 20% less water (1.1 gpf or less) and remove 70% more solid waste, compared to regular WaterSense toilets. MaP is a joint US and Canadian effort by Gauley Associates, Ltd. and Koeller and Company. The SWP found that the general public is not familiar with the term "MaP Premium", is confused by the term, and thus the SWP has chosen to use the term "Premium toilets" instead.
- **Energy Star:** Energy Star is a voluntary product labeling program for energy efficiency sponsored by the EPA. Energy Star labeled products are more efficient than the federal code. Energy Star is primarily applicable to hot water using fixtures, such as showerheads.
- **Consortium for Energy Efficiency (CEE):** The CEE is a US and Canadian consortium of gas and electric efficiency program administrators, which works to accelerate the development and availability of energy efficient products and services. The CEE develops tiered product specifications, which are more efficient than both the federal code and Energy Star. Many utilities use the CEE specifications as equipment qualifications for their rebate programs.

The maximum water use levels by the various codes and standards are shown in **Table 2-1**.

**Table 2-1 Fixture Maximum Water Use Levels**

Fixture	Federal Code	WaterSense	Energy Star	Consortium for Energy Efficiency (CEE)
Toilets (residential/gravity)	1.6 gpf	1.28 gpf	n/a	n/a
Toilets (commercial/flushometer)	1.6 gpf	1.28 gpf	n/a	n/a
Urinals	1.0 gpf	0.5 gpf	n/a	n/a
Showerheads	2.5 gpm	2.0 gpm	n/a	n/a
Faucets (bathroom - residential)	2.2 gpm	1.5 gpm	n/a	n/a
Faucets (bathroom - commercial)	2.2 gpm Private 0.5 gpm All Others 0.25 gpc (no flow rate)	n/a	n/a	n/a
Faucets (kitchen)	2.2 gpm	n/a	n/a	n/a
Clotheswashers (residential in unit)	8.4 WF Top-loader 4.7 WF Front loader	n/a	4.3 WF Top-loader 3.7 WF Front loader	6.0 WF Tier 1 4.5 WF Tier 2 4.0 WF Tier 3
Clotheswashers (MF common area & coin op)	8.5 WF Top-loader 5.5 WF Front loader	n/a	4.5 WF	n/a
Dishwashers (residential)	5.0 gpc Standard 3.5 gpc Compact	n/a	4.25 gpc Standard 3.5 gpc Compact	4.25 gpc Standard 3.5 gpc Compact
Dishwashers (commercial)	n/a	n/a	Numerous depending on style	n/a
Ice machines	Numerous depending on style	n/a	Numerous depending on style	Numerous depending on style
Pre-rinse spray valves	1.6 gpm	1.28 gpm	n/a	n/a
Commercial steam cooker	n/a	n/a	n/a	15 gph Tier 1A 4 gph Tier 1B
Irrigation controllers	n/a	Function based	n/a	n/a

gpf = gallons per flush; gpc = gallons per cycle; gpm = gallons per minute; gph = gallons per hour

WF = Water factor, which is the number of gallons per cycle per cubic foot. The lower the water factor, the more efficient. If a clothes washer uses 30 gallons per cycle and has a tub volume of 3.0 cubic feet, then the water factor is 10.0.

## 3 History of the Regional Water Conservation Program

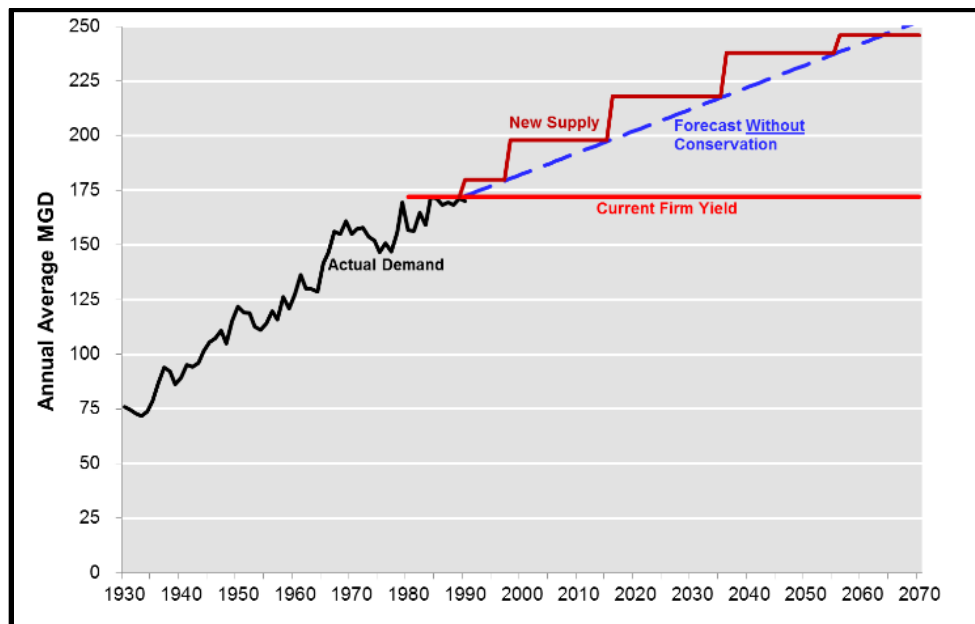
This section provides a history of the regional water conservation program including the original reason for developing a program, conservation successes, major program milestones, and key program design criteria.

### 3.1 Original Conservation Driver

The regional water conservation program began in the 1980s. The original “driver”, or reason for the program was that demand was approaching supply.

**Figure 3-1** shows how actual demand (the black line) was approaching supply or the “firm yield” (the red flat line). A demand forecast without conservation (the blue line) was developed. Options for new supply (the red stepped line) were developed to meet the demand forecast. Water conservation was one of the new supply options and was determined to be the least expensive.

**Figure 3-1 Demand Nearing Supply was Original Driver for Conservation**

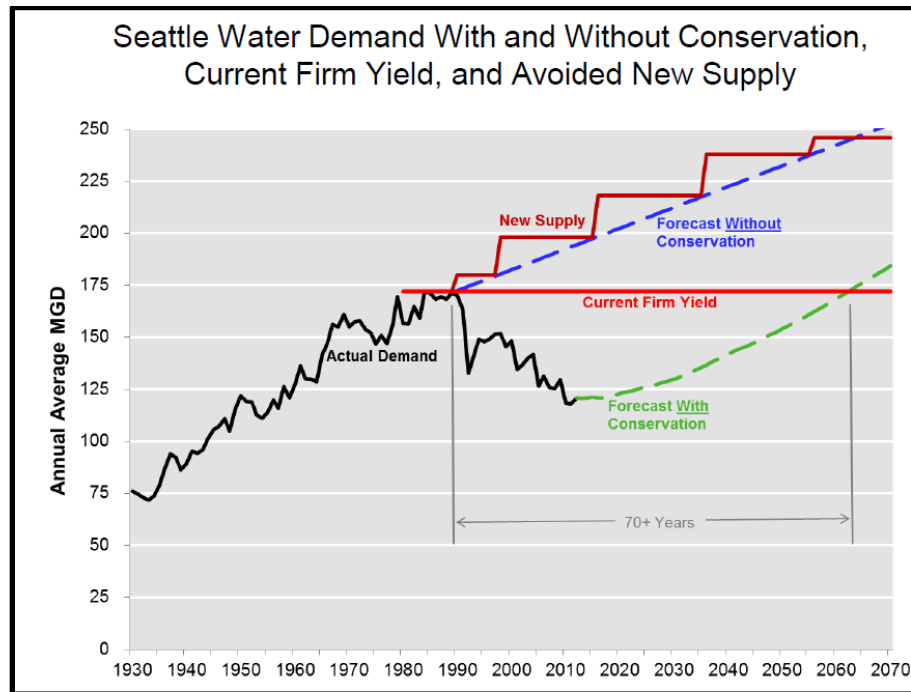


### 3.2 Conservation Success

The decision to invest in conservation was a wise one, as shown in **Figure 3-2**, which is similar to **Figure 3-1**, but with two new components. First, it shows additional years of actual demand (the black line). Second, it includes the current demand forecast with conservation (the green line) and shows that demand is anticipated to stay below supply until approximately 2065. Conservation has

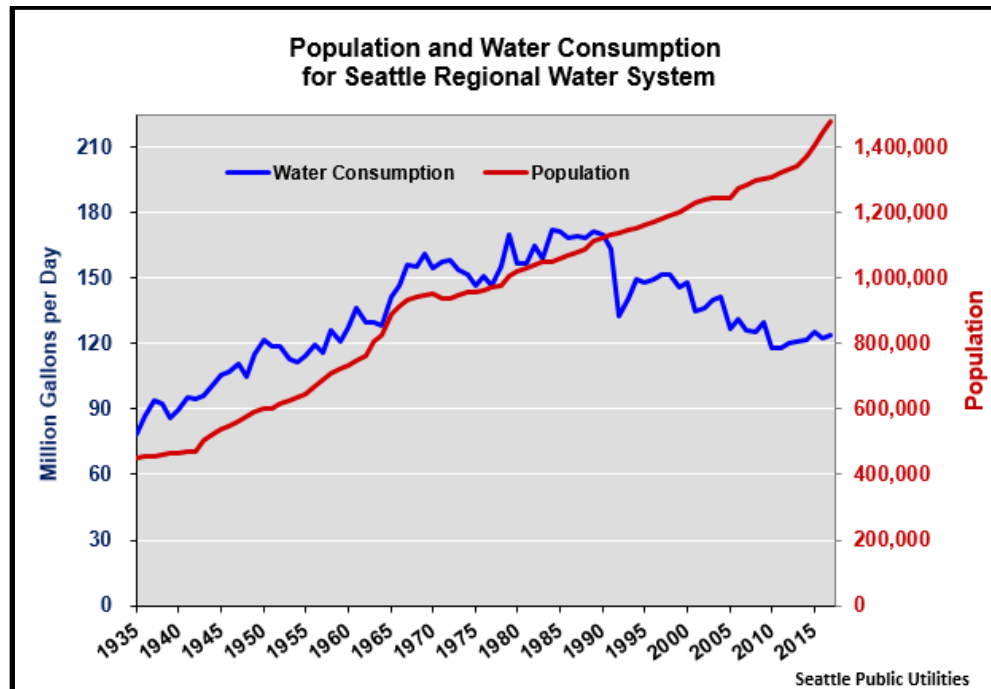
indeed been the new supply. It is important to remember this reflects conservation in the broad sense, so everything that reduces demand, not just programmatic conservation.

**Figure 3-2 Conservation Succeeds as Supply Source**



Another way of looking at this success is to compare historical water consumption and population, as shown in **Figure 3-3**. For most of Seattle's history, water consumption has increased along with its population. However, that link was broken around 1990 when consumption reached its highest levels of about 170 million gallons per day (mgd). Since then, water consumption has steadily declined due to various forms of conservation (conservation in a broad sense) despite continued population growth. Seattle and its suburban customers now use about 120 mgd. That is about as much water as Seattle and the surrounding suburbs were using in the 1950s with only half of today's population.

Figure 3-3 Population and Water Consumption Comparison



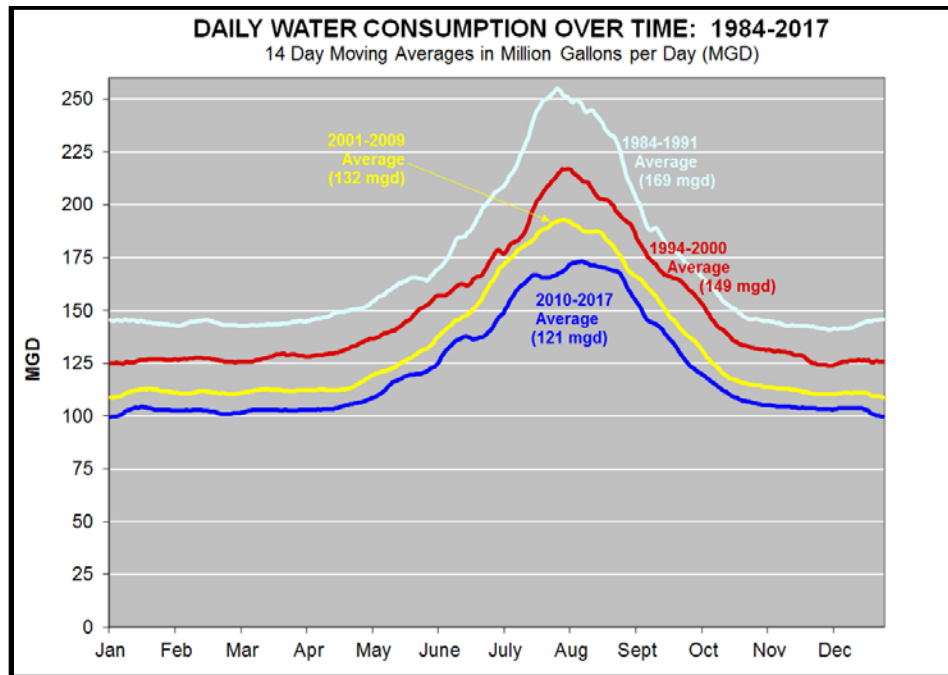
Yet another way of looking at this success is to examine changes in annual patterns of water use, as shown in **Figure 3-4**. It shows that pattern for four different time periods, with the older time periods towards the top and the more recent time periods towards the bottom. All four time periods have the classic water consumption bell curve, where water use is significantly higher in the summer months, mostly due to irrigation, although commercial use can also increase due to economic activity in the summer (e.g., tourism).

The figure shows that numerous aspects have decreased including:

- Total annual consumption
- Total summer consumption
- Summer season peaking factor (volume during summer compared to annual volume)
- Maximum day demand



Figure 3-4 Changes in Annual Patterns of Water Use



### 3.3 Major Milestones

The Seattle Regional Water System has a long history of water conservation. **Table 3-1** shows a list of key milestones of conservation efforts, most of which are efforts of the SWP, but a few are SPU-specific or national. It should be noted this is conservation in the broad sense, which includes everything, not just programmatic conservation.

**Table 3-1 Major Milestones for Regional Conservation Program**

Year	Milestone
1981	<ul style="list-style-type: none"> <li>Launched initial regional program; focus was residential education; included school programs, bill inserts, conservation kits (aerators, toilet displacement bags, leak tablets).</li> </ul>
1985	<ul style="list-style-type: none"> <li>Introduced hardware as primary tool (education as support)</li> <li>Conducted financial analysis of delaying facilities via conservation</li> </ul>
1987	<ul style="list-style-type: none"> <li>Experienced major drought with lawn watering restrictions</li> <li>Aggressive outreach (tv, newspapers, radio)</li> <li>Added engineer and technical analyst to existing education/outreach staff</li> <li>Added commercial and non-revenue water focus</li> </ul>
1989	<ul style="list-style-type: none"> <li>Implemented conservation rates (seasonal &amp; inclining block) (<i>SPU-specific</i>)</li> </ul>
1992	<ul style="list-style-type: none"> <li>Federal plumbing code set efficiency levels for toilets, showers, faucets (<i>national</i>)</li> <li>Experienced major drought; banned lawn watering; reset demand levels</li> <li>Started major supply-side efficiencies; 1980s non-revenue was 14-22%; SPU 2017 “distribution system leakage” is only 4.3%; focused on system operations, leaks, and covered open reservoirs</li> <li>Began partnering with energy utilities for showerhead &amp; aerator programs</li> <li>Began capitalizing hardware costs as part of the CIP budget</li> </ul>
1993	<ul style="list-style-type: none"> <li>Conservation officially designated as the preferred source of supply</li> <li>Introduced concept of levelized cost and 10% bonus for conservation (implement conservation up to 110% of marginal cost of supply)</li> </ul>

Year	Milestone
1994	<ul style="list-style-type: none"> <li>Launched major commercial rebate program (50% of installed cost)</li> </ul>
1995	<ul style="list-style-type: none"> <li>Launched major clotheswasher &amp; toilet rebate programs</li> </ul>
1998	<ul style="list-style-type: none"> <li>Completed first Conservation Potential Assessment (CPA) analyzing water savings &amp; costs of numerous conservation measures</li> </ul>
1999	<ul style="list-style-type: none"> <li>Residential End Use Study from Water Research Foundation published (national)</li> </ul>
2000	<ul style="list-style-type: none"> <li>Launched 1% Conservation Program; goal of saving 1% per year between 2000-2010</li> </ul>
2001	<ul style="list-style-type: none"> <li>Added Seattle-only low-income emphasis (toilets, showerheads, aerators) (SPU-specific)</li> <li>1st federal water efficiency code for clotheswashers (national)</li> </ul>
2003	<ul style="list-style-type: none"> <li>State Municipal Water Law requiring conservation programs (effective 2007) (state)</li> <li>Cascade Water Alliance formed; those members leave the SWP</li> </ul>
2006	<ul style="list-style-type: none"> <li>State Water Use Efficiency Rule detailing conservation requirements (effective 2007) (state)</li> <li>Set 1st WUE goal</li> <li>EPA launched WaterSense labeling for efficient/effective products (national)</li> <li>CPA updated</li> </ul>
2012	<ul style="list-style-type: none"> <li>Set new WUE goal &amp; program emphasis for 2013-2018</li> <li>City of Renton joins SWP</li> </ul>
2018	<ul style="list-style-type: none"> <li>Set new WUE goal &amp; program emphasis for 2019-2028</li> </ul>

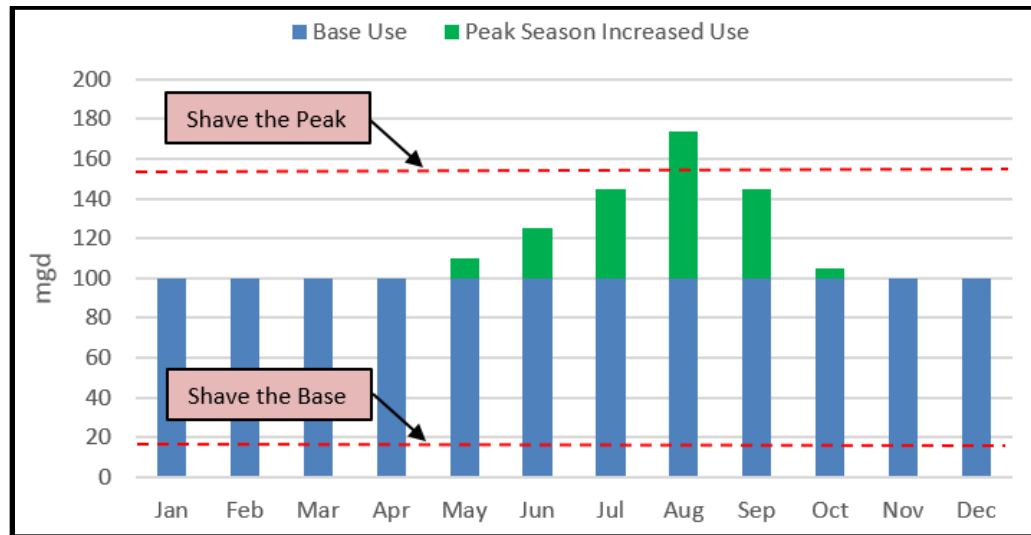
## 3.4 Program Design Criteria

There are several design criteria that have guided the regional water conservation program over time. They are described below.

- Saves Water:** Each program element should be reasonably expected to contribute to water savings, either in the near-term or in the longer-term. These expectations should be based on industry reports, program evaluations, customer research, or similar means. It is understood that some efforts are easier to document water savings (e.g., toilet rebates) than others (e.g., youth education).
- No Sacrifice:** The conservation program should maintain the lifestyle of customers and not require sacrifice.
- Voluntary & Customer Choice:** The program should be voluntary and allow for customer choice.

- **3-Prongs:** The program should include three prongs, which work in concert with each other:
  - **Education:** Educate customers on why and how to conserve water. Education is important because it forms the platform upon which the other prongs operate and many customers will take efficiency actions just based on education. Examples of education from the current program include the website and the youth education program.
  - **Technical Assistance:** Provide technical assistance to customers either in static forms (such as the website), over the phone, or in person. Technical assistance is important because some customers need it to accomplish efficiency efforts. Examples of technical assistance from the current program include videos on leak detection, on-site assessments to assess and improve irrigation system efficiency, and temporary sub-metering of water-using equipment to understanding water use and efficiency opportunities.
  - **Financial Incentives:** Financial assistance to help customers pay for efficiency improvements. Financial assistance is important because some customers will not take efficiency efforts without it. Examples of financial incentives from the current program include toilet rebates, irrigation system controller rebates, and custom rebates for other irrigation or commercial water uses.
- **Comprehensive & Well Rounded:** The program should be comprehensive and well-rounded, as follows:
  - **All Customer Classes:** The program should have offerings for all customer classes so that all customers, whether residential or non-residential, can participate.
  - **Hardware & Behavior:** The program should have offerings that target both hardware and behavior efficiencies. This is important because, as described in Section 2.2 Conservation Categories, the cost structure, longevity of savings, certainty of savings, and political impacts vary between these and it is important to obtain the benefits and mitigate for the downsides of both categories.
  - **Indoor & Outdoor:** The program should have offerings to achieve both indoor and outdoor efficiencies. Efforts that reduce indoor water use primarily impact the year-round base water use, while efforts that reduce outdoor water use target the peak season increased use. It should be noted that both indoor and outdoor efforts impact the peak season water use. **Figure 3-5** shows how the peak season water use can be impacted by either “shaving the peak” or “shaving the base”.

Figure 3-5 Shave the Peak vs Shave the Base



- Regional:** The program should be regional in scope and have applicability across the SWP service area. However, it is recognized that the customer base varies across the regional service area and therefore the program may look somewhat different in each of the 19 SWP members' areas. For example, some of the SWP members are primarily single family in nature, while others have a balance of single family, multifamily, and non-residential customers. Another example is within the single family customer base, the lot size and irrigated area vary significantly across the regional service area.
- Customer Cost Share:** For financial incentive programs, the customer should pay part of the cost. Historically, this has manifested in fixed rebate programs where the rebate amount is less than the cost of the fixture/equipment and custom rebates where the program only pays up to 50% of the installed cost of the project. (Note that the Seattle-only low-income program does not include a customer cost share.)
- Beyond-Code:** The program should move customers to efficiency levels that are more efficient than the plumbing code or what is standardly available so that the program minimizes free riders and maximizes water savings. Toilet rebates are a good example of this. The plumbing code stipulates the maximum water use of a toilet is 1.6 gallons per flush (gpf) and most toilets stocked in retailers are 1.28 gpf models. The current program offers toilet rebates only for 1.1 gpf (or less) toilets, which is more efficient than both code or most stocked models.
- Retrofits:** Financial incentive programs should focus on retrofitting existing, less-efficient fixtures/equipment, rather than on new development. The philosophy is that developers should take on the responsibility of building new development as efficiently as possible and that program dollars should be directed to upgrading existing buildings that were built with older, less efficient standards and technologies.
- Partnerships:** The program should work to leverage partnerships that help increase participation and reduce costs. Potential partners include other water utilities, energy utilities, community-based organizations, and professional organizations.
- Reach All Customers:** The SWP service area is economically, racially, culturally, and linguistically diverse. This reality should be embedded in program planning and

implementation including, but not limited to, tracking demographics (to the degree possible), partnering with community organizations, and creating culturally relevant outreach and education materials to ensure participation across different demographic groups.

## 4 2019-2028 Water Conservation Program

This section provides details on the 2019-2028 SWP water conservation program including the development process, the current reasons for the conservation program, the conservation goal, the existing programs, intended modifications, and information on budget and staffing.

### 4.1 Overview of Development Process

The 2019-2028 SWP water conservation program was developed by SPU staff, in partnership with the Operating Board and the Conservation Technical Forum.

The Operating Board involvement focused on drivers, priorities, budget, and the goal. That work occurred from March to November 2017 and is summarized below:

- **Drivers:** The Operating Board reassessed the drivers, or reasons, for the conservation program. The detailed results are provided in Section 4.2 Current Conservation Drivers.
- **Priorities:** The Operating Board decided on the strategic priorities, which were to increase the emphasis on education, outreach, and technical assistance and decrease the emphasis on financial assistance. The process to determine those priorities included a survey to understand Operating Board preferences, developing 10 packages to reflect different options, discussions regarding those packages, and several rounds of voting on the packages.
- **Budget:** The Operating Board set the budget level for the 10-year period. The overall budget is the same as the previous level, however with a shift to match the new priorities of more education, outreach, and technical assistance and less financial assistance. The budget was set as two pools, an Operations & Maintenance (O&M) pool which funds the education, outreach, and technical assistance work and a Capital Improvement Program (CIP) pool which funds the financial assistance work. SPU staff are given the flexibility to manage to the bottom line of each pool, which provides necessary program flexibility. The budget numbers for all 10 years are provided in Section 4.6 Budget.
- **Goal:** The Operating Board set the new 2019-2028 water conservation goal, which is required by the State's Water Use Efficiency Rule. The new goal is structured similarly to the previous goal in that it sets a demand level which the group, as a whole, should stay below. The numeric value of that demand level is slightly higher than the previous goal, to reflect a longer plan period (10-years rather than 6-years) and to hedge slightly against uncertainty. The results are provided in Section 4.3 Water Conservation Goal.
- **Operating Board Reports:** The conservation program will report back to the Operating Board every two years. The reporting will be a presentation to the Operating Board and will include details on the previous years' activities and plans for the upcoming years.

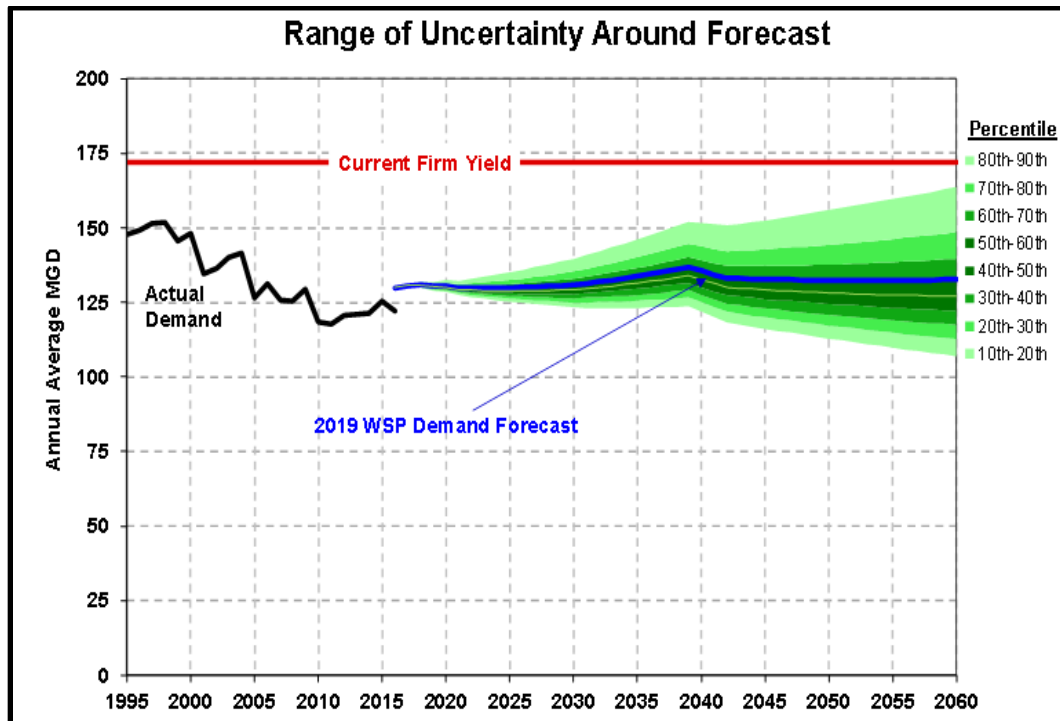
The Conservation Technical Forum was heavily involved throughout 2018 to determine how to implement the Operating Board's strategic vision, primarily increasing education, outreach, and technical assistance. That process had the following hallmarks:

- **Intensive Process:** The process was relatively intensive with monthly CTF meetings, structured to hear from all attendees, rather than the normal quarterly CTF meetings.
- **Deepened Understanding:** The process began with deepening wholesale customers' understanding of the existing programs. Wholesale customer staff's understanding of the conservation program is typically less than SPU staff, because SPU staff work on the conservation program daily, while most wholesale customer staff do not. Therefore, it was important to bring the entire CTF up to a certain level of understanding of the existing program, to make solid decisions on changes to the program.
- **Early Input:** SPU staff solicited early input from wholesale customers on their ideas to modify the existing program. SPU staff also shared their initial modification ideas and asked for wholesale customers' reactions.
- **Researched Ideas:** SPU staff researched and fleshed out the initial modification ideas, as well as added additional ideas. The more developed ideas were discussed at the monthly CTF meetings.
- **Consensus on Idea Prioritization:** The group went through a formal process to prioritize the various program modification options. Prioritization was necessary given available staff time and budget. A total of 29 modification options were generated for the education, outreach, and technical assistance program and 6 modification options were developed for the financial incentive programs. Some of the modifications were improvements to existing efforts, while others were new. Each SWP member was tasked with designating the options as either "highest", "medium", or "lowest" priority and doing so by creating three equal prioritization groups. All 19 SWP members completed this prioritization exercise. The CTF representative was responsible for submitting their utilities' prioritization and they were asked to discuss the exercise with their management so that their responses reflected the views of the utility. The responses from all the members were tallied and scored to develop a group-prioritization. The results are provided in Section 4.5 Program Modifications.

## 4.2 Current Conservation Drivers

It is important to understand the drivers, or reasons, for the conservation program since they set the foundation for the program. As described in Section 3.1 Original Conservation Driver, the original driver for the conservation program was as a near-term supply source, since demand was nearing supply. However, as shown in **Figure 4-1**, that is no longer the case and there is an adequate cushion between demand and supply.

**Figure 4-1 Demand Forecast**



\* The ranges reflect uncertainty in projected household, employment, price, and income growth; price and income elasticities; and conservation. Weather variability and climate change uncertainties are not included. Percentiles represent the probability that demand is less than the value shown. Note that the official forecast is at approximately the 60<sup>th</sup> percentile.

The current conservation drivers, as decided by the Operating Board, are as follows:

- Maintain a cushion between demand and supply
- Ensure conservation capacity (staff expertise and industry partnerships) is available to deliver conservation services, as well as to respond to droughts and supply disruptions
- Help customers use water wisely and manage their bills
- Preserve the customer water conservation ethic
- Be good stewards of our water resources and environment
- Meet regulatory, contractual, and stakeholder requirements and expectations



## 4.3 Water Conservation Goal

The new and previous water conservation goals, as decided by the Operating Board, are provided below.

- **Previous 2013-2018 Goal:**

“Reduce per capita water use from current levels so that the total average annual retail water use of the members of the Saving Water Partnership is less than 105 million gallons a day (mgd) from 2013 through 2018, despite forecasted population growth.”

- **New 2019-2028 Goal:**

“Keep the total average annual retail water use of SWP members under 110 mgd through 2028, despite forecasted population growth, by reducing per capita water use.”

Each SWP member adopts the goal individually. SPU included the new 2019-2028 goal in its 2019 Water System Plan (WSP), which was approved by the Seattle City Council in October 2018 and is expected to be approved by DOH by April 2019. Each wholesale customer should adopt the new 2019-2028 goal as soon as possible after DOH adoption, but no later than the July 1, 2020 WUE report (which reports on calendar year 2019).

Every SWP member needs to include the water conservation goal in their WSP. The timeframe of the goal matches the timeframe of SPU’s WSP, but will likely not match that of every wholesale customer’s WSP. For wholesale customers that are on a different WSP cycle than SPU, they will include the regional goal that is current at the time in their WSPs, plus a statement that they have a long-term commitment to conservation and that they plan to adopt the next regional goal once it is determined. This coordination is illustrated, using an example where a wholesale customers’ WSP cycle is two years off from SPU’s, in **Table 4-1**.

**Table 4-1 Coordination of Timeframes for Conservation Goal and Water System Plans**

Year #	Year Date	SPU & Wholesale Customers on Same WSP Cycle	Wholesale Customers on Different WSP Cycle (e.g., 2 years different)
1	2019	SWP "2019-2028" goal	Adopt the "2019-2028" goal outside of their WSP
2	2020		SWP "2019-2028" goal  +  Statement that utility has a long-term commitment to conservation and will adopt the "next" SWP goal once it is determined
3	2021		
4	2022		
5	2023		
6	2024		
7	2025		
8	2026		
9	2027		
10	2028		
11	2029	SWP "next" goal	Etc.
12	2030		
13	2031		
14	2032		
15	2033		
16	2034		
17	2035		
18	2036		
19	2037		
20	2038		

## 4.4 Existing Programs

The SWP offers a comprehensive set of programs that helps residents and businesses use water wisely. The programs include education, technical assistance, and financial incentives and are described below.

### 4.4.1 Education, Outreach & Technical Assistance

- **Youth Education**
  - **Youth Education:** 50-minute, in-classroom school programs for K-12 students. 16 different programs that support two key themes. Key Theme #1: Importance of water conservation and specific water conservation strategies. Key Theme #2: Water is an important shared resource and we are all responsible for making smart choices in managing it (including water conservation). Implemented by local non-profit Nature Vision.

- **General**

- **SWP Website:** Comprehensive website that serves as the main customer clearinghouse of information regarding the regional water conservation program. Six main topic areas: 1) home, 2) lawn/garden, 3) indoors, 4) businesses, 5) students/teachers, 6) rebates. [www.savingwater.org](http://www.savingwater.org)
- **Phone Hotline:** Recorded phone tree message giving customers a little information about the program and the ability to be connected to the appropriate program manager. Three main trunks: 1) landscape/gardening, 2) single family and multifamily indoor, and 3) business indoor. 206-684-SAVE (7283).
- **How-to-Videos (Leaks):** Short 2-minute videos to help customers identify, fix, and prevent leaks. Five topics: 1) how to fix a leaky toilet, 2) how to fix a leaky indoor faucet, 3) how to fix a leaky outdoor faucet, 4) how to use your meter to find a leak, and 5) how to protect outdoor spigots from freezing.
- **Table Top Display:** 3-panel, table-top display board with interchangeable panels on various topics that can be used in SWP member lobbies, at events, etc.
- **Community Festivals/Events:** Providing materials and/or staff for a booth at community events/festivals to promote the water conservation program. Some events are utility-specific (e.g., WD 90 customer appreciation event, Celebrate Mercer Island) while others are more regional (e.g., International District Dragon Fest in Seattle).
- **Giveaways:** Various items to give away to customers at customer service desks, events, or via other methods. Items include toilet leak detection dye strips, toilet leak detection kit (dye strip in small brochure; customized w/ SWP member name), flow-rate bags (to estimate efficiency of showerheads and faucets), hose washers (to fix/prevent leaky hose), Shared Waters kids activity book, rulers for kids (conservation tips, leak volume estimates, water use by fixture pie chart), faucet aerators (1.0 gpm), and showerheads (2.0 gpm).
- **Language Line:** On-demand, over-the-phone interpretation for customers who are not proficient in English. 200+ languages available. The service is free to customers.
- **Messaging “Media Kit”:** Provide text and image content for use on various print, electronic, and social media communications to help SWP members easily promote conservation messages/programs to their retail customers. Content is appropriate for websites, bill inserts, newsletters, bill messages, Facebook, Twitter and NextDoor. Message content is coordinated with the SWP website homepage content.
- **Image Bank:** Electronic site where conservation-related images (mostly pictures) are stored to help SWP members have easy access to high-quality images for marketing, reporting, etc. There are eleven folders: 1) commercial, 2) indoor, 3) landscape, 4) logos, 5) marketing kits, 6) SWP events and outreach, 7) water and nature, 8) water and people, 9) water system, 10) youth education, and 11) miscellaneous.
- **Water System Map:** Currently two versions. Version #1 is a basic graphic on the website showing the location of each of the 19 SWP members. Version #2 is a poster (approx. 2’ x 3’) showing the Seattle Regional Water System and has been used in school programs and at utilities’ offices. The original version of the poster had cartoonish graphics and the current version is less-cartoonish.

- **Non-Residential**

- **Equipment Submetering:** SPU staff (or consultant) puts a temporary meter on a piece of equipment to determine its water use and potential water savings if modified or replaced. This service is often used in conjunction with the custom and fixed rebate programs.

- **Landscaping**

- **Garden Hotline:** A phone hotline and website where the general public and landscape professionals can ask landscaping and gardening questions. Topics include irrigation, soils, compost, mulch, plants, pests of all kinds, and fertilizers. The website is a repository of information, including videos. This is managed by Tilth Alliance and funded by SPU, SWP, Cascade Water Alliance, Seattle and King County's Rainwise Program, and the Local Hazardous Waste Management Program (LHWMP) in King County. 206-633-0224 Mon–Sat 9am-5pm; [www.gardenhotline.org](http://www.gardenhotline.org); [help@gardenhotline.org](mailto:help@gardenhotline.org).
- **Natural Yard Care Publications:** Publications (brochures or flyers) to help customers create a healthy landscape naturally, including water-efficient strategies. The brochures are: 1) *Natural Yard Care Guide (English & Spanish versions)*; 2) *Smart Watering Guide*; 3) *Growing Healthy Soil Guide*; 4) *Composting At Home Guide*; 5) *Choosing The Right Plants Guide*; 6) *Natural Pest, Weed, & Disease Control Guide*; 7) *Natural Lawn Care Guide*; 8) *Growing Food In The City Guide*; 9) *How To Water New Plants*; 10) *Right Plant, Right Place*.
- **How-to-Videos (Landscaping):** Short 3-5 minute videos to help customers and landscape professionals with water-efficient landscaping practices. Four topics: 1) using mulch, 2) installing soaker hoses, 3) natural lawn care, and 4) how to plant in the fall.
- **Savvy Gardener Classes:** Classes to help customers with water-efficient landscaping practices, taught by local landscape professionals. SPU staff provides a turnkey program administration kit (list of classes, PR materials, class evaluation forms, etc.). Individual SWP members are responsible for contacting the instructor and implementation.
- **Training for Landscape Professionals:** Trainings for landscape professionals related to water-efficient landscaping practices. Topics include irrigation timer settings, design, maintenance, etc. Trainings are typically all-day events.
- **On-Site Irrigation System Assessments:** Comprehensive on-site assessments to identify where water is being wasted in the landscape. Assessments include evaluating each irrigation zone for water efficiency, looking for leaks at the meter, inspecting controller settings, and examining root depth and soil texture.

#### 4.4.2 Financial Incentives

- **Residential**
  - **Single Family Toilet Rebates:** Rebates to replace older, less-efficient toilets with Premium 1.1 gpf (or less) models, which are more efficient than both the plumbing code (1.6 gpf) and WaterSense (1.28 gpf).
  - **Multifamily Toilet Rebates:** Rebates to replace older, less-efficient toilets with Premium 1.1 gpf (or less) models, which are more efficient than both the plumbing code (1.6 gpf) and WaterSense (1.28 gpf).
- **Non-Residential**
  - **Non-Residential Fixed Rebates:** Rebates to replace older, less-efficient water using fixtures and equipment with more efficient models. Eligible fixtures/equipment include toilets, urinals, coin-operated clotheswashers, ice machines, commercial dishwashers, and food steamers.
  - **Non-Residential Custom Rebates:** Rebates where the dollar amount is based on the estimated water savings of replacing/upgrading existing water-using equipment with more efficient equipment. Types of projects have included converting single pass water use to recirculating systems, refrigeration equipment, compressors, and more.
- **Landscaping**
  - **Irrigation Timer Rebates:** Rebates to upgrade older, less-efficient sprinkler timers (a.k.a., irrigation controllers) with more water-efficient (WaterSense) models. WaterSense labeled sprinkler timers modify the sprinkler runtimes from day to day based on weather data collected either from the internet via wi-fi connection or from a small onsite weather station. Almost exclusively single family customers.
  - **Custom Irrigation Rebates:** Rebates where the dollar amount is based on the estimated water savings of retrofitting an existing irrigation system with more efficient components. Potential retrofits include sprinkler nozzles, pressure reducers, WaterSense controllers, replacing overhead irrigation with drip irrigation, and check valves.

### 4.5 Program Modifications

#### 4.5.1 Options

As described in Section 4.1 Development Process, modifications to the existing program were identified. The potential modifications include both strengthening existing program offerings and adding new program offerings. A summary of the 29 modification options to the education, outreach, and technical assistance programs and the 6 modification options to the financial assistance programs are provided in **Table 4-2** and **Table 4-3**, respectively. More detailed descriptions of each program modification option are provided in Appendix A.

**Table 4-2 Education, Outreach & Technical Assistance Modifications**

#	Program Element
1	Improve the SWP website text and reach
2	Refresh the SWP brand identity
3	Improve the regional map
4	Add water utility lookup tool to website
5	Add water audit calculator to website
6	Improve use of Garden Hotline
7	Improve/expand videos
8	Improve leak videos
9	Add “foundational” video
10	Add “conservation 101” brochure
11	Simplify landscape brochure offerings
12	Add commercial brochure
13	Add leak publication(s)
14	Improve youth education
15	Improve/expand landscape classes for public
16	Add leaks class
17	Improve/expand trainings for landscape professionals
18	Add trainings for commercial indoor professionals
19	Improve display board
20	Improve/expand community events
21	Improve giveaways
22	Add interpretive signage
23	Strengthen Fix-a-Leak Week connection
24	Strengthen commercial indoor strategic partnerships
25	Strengthen landscape strategic partnerships
26	Expand commercial indoor audits
27	Expand landscape audits
28	Improve marketing for individual SWP members
29	Improve image bank

**Table 4-3 Financial Assistance Modifications**

#	Program Element
1	Improve residential toilet rebates
2	Add new residential indoor rebates
3	Improve commercial indoor fixed rebates
4	Improve commercial indoor custom rebates
5	Improve landscape fixed rebates
6	Improve landscape custom rebates

#### 4.5.2 Modification Prioritization Results

The results from the modification prioritization process described in Section 4.1 Development Process are shown in **Table 4-4** and **Table 4-5**. The tables show the prioritization counts and the scores for each modification option. The tables are sorted by the total score (2<sup>nd</sup> column from the right; highlighted in blue) from highest to lowest. The “#” (the 1<sup>st</sup> column) refers to the number in previous tables so the tables can be cross referenced.

Table 4-4 Education, Outreach & Technical Assistance Modifications – Sorted by Score

#	Education, Outreach & Technical Assistance Modifications	Collective SWP - Counts					Collective SWP - Scores					Group Priority
		Priority			Optional Designation		Priority					
		Highest	Medium	Lowest	Critical	No Interest	Highest	Medium	Lowest	Total		
											3	
3	Improve the regional map	13	5	1	6	0	39	10	1	50	Highest	
8	Improve leak videos	13	5	1	3	0	39	10	1	50	Highest	
14	Improve youth education	14	3	2	4	1	42	6	2	50	Highest	
13	Add leak publication(s)	13	4	2	4	0	39	8	2	49	Highest	
1	Improve the SWP website text and reach	13	3	3	6	0	39	6	3	48	Highest	
10	Add “conservation 101” brochure	11	6	2	4	0	33	12	2	47	Highest	
5	Add water audit calculator to website	10	7	2	4	0	30	14	2	46	Highest	
21	Improve giveaways	8	11	0	2	0	24	22	0	46	Highest	
28	Improve marketing for individual SWP members	11	5	3	2	1	33	10	3	46	Highest	
29	Improve image bank	11	3	5	1	0	33	6	5	44	Highest	
7	Improve/expand videos	6	10	3	0	0	18	20	3	41	Medium	
16	Add leaks class	9	4	6	2	1	27	8	6	41	Medium	
20	Improve/expand community events	6	9	4	1	1	18	18	4	40	Medium	
9	Add “foundational” video	3	13	3	0	1	9	26	3	38	Medium	
11	Simplify landscape brochure offerings	7	4	8	1	1	21	8	8	37	Medium	
4	Add water utility lookup tool to website	7	3	9	1	1	21	6	9	36	Medium	
27	Expand landscape audits	4	9	6	2	0	12	18	6	36	Medium	
23	Strengthen Fix-a-Leak Week connection	6	4	9	1	2	18	8	9	35	Medium	
24	Strengthen commercial indoor strategic partnerships	3	8	8	0	2	9	16	8	33	Medium	
25	Strengthen landscape strategic partnerships	2	10	7	0	0	6	20	7	33	Medium	
2	Refresh the SWP brand identity	4	5	10	0	1	12	10	10	32	Lowest	
17	Improve/expand trainings for landscape professionals	2	9	8	0	1	6	18	8	32	Lowest	
12	Add commercial brochure	2	8	9	0	1	6	16	9	31	Lowest	
15	Improve/expand landscape classes for public	2	8	9	1	1	6	16	9	31	Lowest	
26	Expand commercial indoor audits	1	10	8	0	2	3	20	8	31	Lowest	
6	Improve use of Garden Hotline	2	6	11	0	1	6	12	11	29	Lowest	
19	Improve display board	2	6	11	2	0	6	12	11	29	Lowest	
22	Add interpretive signage	1	4	14	0	2	3	8	14	25	Lowest	
18	Add trainings for commercial indoor professionals	0	5	14	0	3	0	10	14	24	Lowest	

**Table 4-5 Financial Assistance Modifications – Sorted by Score**

#	Financial Assistance Modifications	Collective SWP - Counts					Collective SWP - Scores					Group Priority
		Priority			Optional Designation		Priority					
		Highest	Medium	Lowest	Critical	No Interest	Highest	Medium	Lowest	Total		
1	Improve residential toilet rebates	15	3	1	3	0	45	6	1	52	Highest	
2	Add new residential indoor rebates	13	3	3	3	0	39	6	3	48	Highest	
3	Improve commercial indoor fixed rebates	2	14	3	0	1	6	28	3	37	Medium	
5	Improve landscape fixed rebates	4	9	6	1	0	12	18	6	36	Medium	
6	Improve landscape custom rebates	4	4	11	0	1	12	8	11	31	Lowest	
4	Improve commercial indoor custom rebates	0	5	14	0	2	0	10	14	24	Lowest	



The program modification priorities are as follows:

- **Highest:** The top third are the “highest” priority and where SPU staff will spend the majority of their time and budget in the near term (in addition to continue running the existing program).
- **Middle:** The middle third are the “medium” priority. Time and budget might be expended for a few of these in the near term, if it does not distract significantly from delivering the “highest” priorities.
- **Lowest:** The bottom third are the “lowest” priority. Time and budget might be expended for a few of these in the near term, if it does not distract significantly from delivering the “highest” priorities.

The “highest” priorities for modifying the education, outreach, and technical assistance programs were grouped into five themes, as shown in **Table 4-6**, which is a helpful framework.

**Table 4-6 Themes for Highest Priority Education, Outreach & Technical Assistance Modifications**

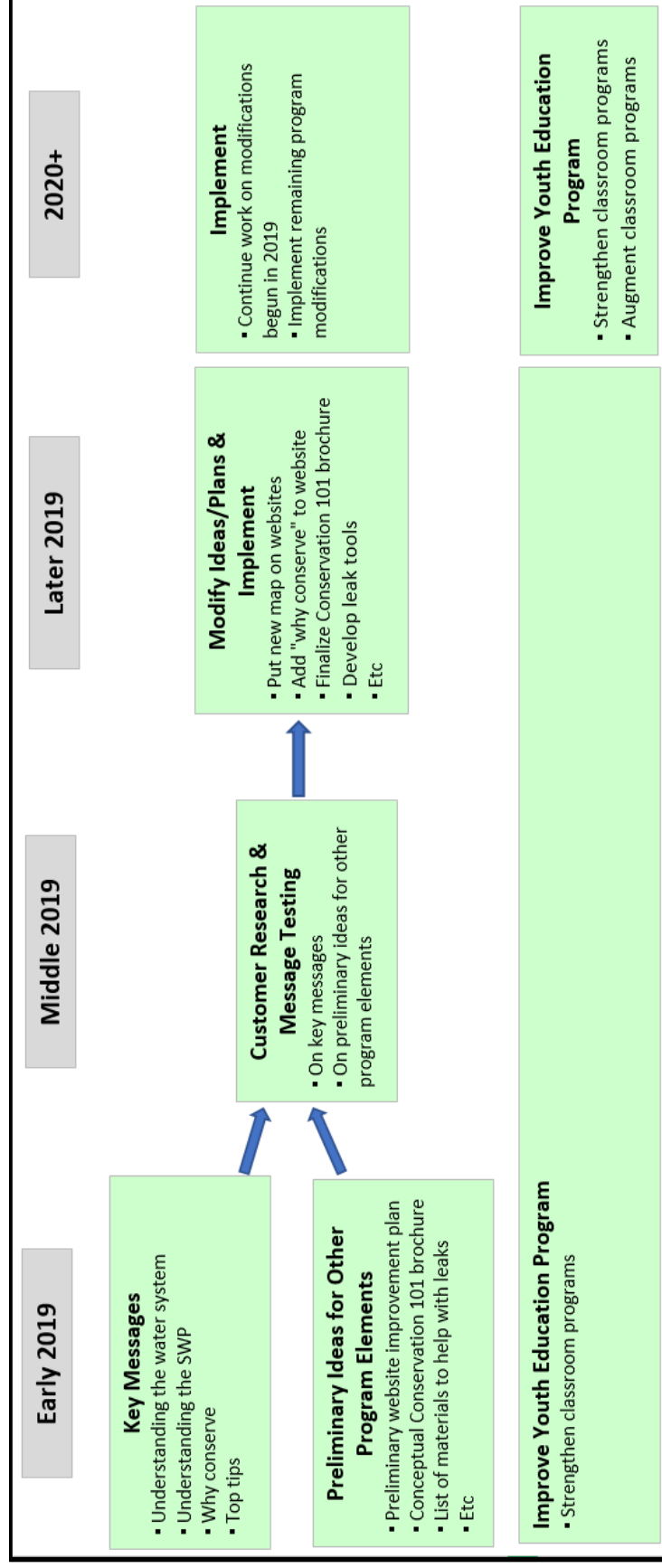
#	Theme	Program Elements	Effort
1	The Future	▪ Youth education (improve)	Significant
2	Fundamental Tools to Help Customers Conserve	▪ Website (improve) ▪ Conservation 101 brochure (add) ▪ Regional map (improve) ▪ Image bank (improve) ▪ Water audit/calculator (add)	Significant
3	Baseline Efficiency	▪ Leak publications (add) ▪ Leak videos (improve)	Moderate
4	Conservation Marketing Tools for SWP Members	▪ Marketing kit (improve) ▪ Image bank (repeat) (improve)	Minor
5	Quick Wins/Tools	▪ Giveaways (improve)	Minor

#### 4.5.3 Implementation Schedule

Implementing the program modifications will occur over time. In the near term, the focus will be on administering the existing program elements and beginning to implement the “highest” priority program modifications. Existing programs will remain as-is, unless or until, the program modifications impact them. The wholesale customers will stay actively involved in implementation of the program through the CTF, which will meet every other month in the near term.

**Figure 4-2** provides an overview of the implementation schedule for the program modifications, with an emphasis on 2019. Early 2019 will focus on developing key messages and preliminary ideas for other “highest” priority modifications. The middle of 2019 will focus on conducting customer research and message testing regarding the key messages and the preliminary modification ideas, as well as assessing general water conservation awareness, attitudes, and behaviors. It is possible that the customer research could result in adjusting modification priorities. Late 2019 will focus on modifying the key messages and preliminary modification ideas, as appropriate based on the customer research, and implementing them. The years 2020 and beyond will focus on continuing any modifications begun, but not completed in 2019, as well as implementing the remaining program modifications.

Figure 4-2 Implementation Schedule for Program Modifications



## 4.6 Budget

The annual budgets for the 10-year program are shown in **Table 4-7** and incorporate a 2.5% annual inflation rate.

The budget is divided into two categories: CIP and O&M. The CIP budget pays for the rebate programs and is funded by facility charges. The O&M budget pays for education, outreach, and technical assistance programs and is funded by wholesale rates.

As noted in Section 4.1 Overview of Development Process, the budget was shifted from previous years to match the new priorities of more education, outreach, and technical assistance and less financial assistance. The CIP budget was decreased from \$1.4M in 2018 to \$1.1M in 2019. The O&M budget was increased from \$540,000 in 2018 to \$871,000 in 2019.

The budget is all-inclusive and pays for SPU staff time, rebates to customers, contractors (e.g., Nature Vision for the youth education program), marketing, and all other expenses.

**Table 4-7 Budget for 2019-2028 Water Conservation Program**

Year	CIP (rebates)	O&M (education, outreach, and technical assistance)	Total
2019	\$1,098,000	\$871,000	\$1,969,000
2020	\$1,126,000	\$893,000	\$2,019,000
2021	\$1,154,000	\$915,000	\$2,069,000
2022	\$1,183,000	\$938,000	\$2,121,000
2023	\$1,212,000	\$961,000	\$2,173,000
2024	\$1,243,000	\$985,000	\$2,228,000
2025	\$1,274,000	\$1,010,000	\$2,284,000
2026	\$1,306,000	\$1,035,000	\$2,341,000
2027	\$1,338,000	\$1,061,000	\$2,399,000
2028	\$1,372,000	\$1,088,000	\$2,460,000

## 4.7 Staffing

SPU employees implement the SWP water conservation program on behalf of wholesale customers. SPU has six staff assigned to the program. Those six staff translate to slightly less than five Full Time Equivalents (FTEs) because two staff are part time and also work on SPU's Seattle-only low-income water conservation program, which is operated and funded separately from the SWP program. The SPU staff positions are shown in **Table 4-8**.

**Table 4-8 SPU Conservation Staff Positions**

#	Title	Person
1	Water Conservation Manager	Kelly O'Rourke
2	Community Outreach Program Manager	Anna Dyer
3	Residential Program Manager	Melissa Levo (part-time)
4	Commercial Program Manager	Arece Hampton
5	Landscape Program Manager	Mark Guthrie
6	Evaluation, Reporting, CTF Liaison Program Manager	Mialee Jose (part-time)

## Appendix A – Detailed Descriptions of Program Modification Options

#	Education, Outreach & Technical Assistance Program Elements
1	<p><b>IMPROVE SWP WEBSITE TEXT &amp; REACH</b></p> <p>Examples include:</p> <ul style="list-style-type: none"> <li>▪ Simplify &amp; condense existing content to make more user/mobile friendly</li> <li>▪ Have top tips for every sector</li> <li>▪ Expand content on regional water system</li> <li>▪ Add "why conserve" content</li> <li>▪ Add participant of the month to the homepage to make it less static</li> <li>▪ Improve referrals from individual SWP members' websites</li> <li>▪ Additional SWP online presence (e.g. social media, E-news, online ads)</li> </ul> <p><i>Cost: Main cost SPU staff time; other costs (e.g. graphic design) tbd</i></p>
2	<p><b>REFRESH THE SWP BRAND IDENTITY</b></p> <p>Examples include:</p> <ul style="list-style-type: none"> <li>▪ Update the logo</li> <li>▪ Add a tag line</li> <li>▪ Develop key messages</li> <li>▪ Reassess co-branding standards</li> </ul> <p><i>Cost: tbd</i></p>
3	<p><b>IMPROVE THE REGIONAL MAP</b></p> <p>Examples include:</p> <ul style="list-style-type: none"> <li>▪ Create a new static map (for website, publications, videos, display board, etc). Likely will have 20 versions so each SWP member has a version (if only title and explanation text) that leads with their utility name, plus a full SWP version.</li> <li>▪ Create a new interactive map (for website). When user scrolls over each SWP member certain stats (e.g., population served) show up, similar to <a href="http://waswdmap.org">http://waswdmap.org</a>. Could also have stats on the physical elements (e.g., watershed, treatment, storage).</li> <li>▪ Create a new fun poster-sized map (for wall display)</li> <li>▪ Create new 3D model (for community events)</li> </ul> <p><i>Cost: tbd</i></p>
4	<p><b>ADD WATER UTILITY LOOKUP TOOL TO WEBSITE</b></p> <ul style="list-style-type: none"> <li>▪ Develop a lookup tool for the SWP website that allows customers to identify their water utility by providing their address</li> </ul> <p><i>Cost: Likely no cost beyond SPU staff time</i></p>
5	<p><b>ADD WATER AUDIT/CALCULATOR TO WEBSITE</b></p> <p>Develop a water audit/calculator for the SWP website that allows customers to:</p> <ul style="list-style-type: none"> <li>▪ Understand how much water various fixtures use</li> <li>▪ Understand how much water can be saved by switching from inefficient to efficient fixtures</li> <li>▪ Connect to SWP conservation programs</li> <li>▪ Understand how much water their household uses compared to an average SWP household</li> </ul> <p><i>Cost: tbd</i></p>

#	Education, Outreach & Technical Assistance Program Elements
6	<b>IMPROVE USE OF GARDEN HOTLINE</b> <ul style="list-style-type: none"> <li>▪ Work to "right size" how we utilize the Garden Hotline website and phone number, compared to landscape info on the SWP website and assistance provided by the SPU Landscape Water Conservation Program Manager.</li> </ul> <i>Cost: SWP currently contributes \$20,000 annually</i>
7	<b>IMPROVE/EXPAND VIDEOS</b> <p>Examples include:</p> <ul style="list-style-type: none"> <li>▪ Cover common efficiency strategies for fixture/behavior, indoor/outdoor, all sectors.</li> <li>▪ Update case study videos highlighting conservation projects</li> <li>▪ Likely include special focus on leaks</li> <li>▪ Test using marketing &amp; promotion dollars to improve utilization of video</li> </ul> <i>Cost: tbd</i>
8	<b>IMPROVE LEAK VIDEOS</b> <ul style="list-style-type: none"> <li>▪ Update video on using meters to detect leaks (more types of meters including AMI, expand language from "high water use" to "continuous use"; include a "Meter 101")</li> <li>▪ Update toilet leak video to reflect newer technology (e.g. siphon-valves)</li> </ul> <i>Cost: tbd</i>
9	<b>ADD "FOUNDATIONAL" VIDEO</b> <ul style="list-style-type: none"> <li>▪ Develop a video highlighting the regional water system, who is the SWP, why conservation is important in our area, and overview of services available (ed, tech asst, rebates)</li> </ul> <i>Cost: tbd</i>
10	<b>ADD "CONSERVATION 101" BROCHURE</b> <ul style="list-style-type: none"> <li>▪ Develop a "conservation 101" brochure highlighting the regional water system, who is the SWP, why conservation is important in our area, top indoor/outdoor tips, and overview of services available (ed, tech asst, rebates).</li> </ul> <i>Cost: tbd</i>
11	<b>SIMPLIFY LANDSCAPE BROCHURE OFFERINGS</b> <ul style="list-style-type: none"> <li>▪ Simplify/streamline the existing 7 brochures into 1 entry/mid-level landscaping publication</li> </ul> <i>Cost: tbd</i>
12	<b>ADD COMMERCIAL BROCHURE</b> <ul style="list-style-type: none"> <li>▪ Develop an overview brochure for businesses highlighting the reasons to conserve and overview of our commercial conservation services available (ed, tech asst, rebates).</li> </ul> <i>Cost: tbd</i>
13	<b>ADD LEAKS PUBLICATION(S)</b> <ul style="list-style-type: none"> <li>▪ Develop leak detection and repair materials that SWP members can use with their customers. Examples include: <ul style="list-style-type: none"> <li>▫ Stand-alone brochure on high consumption/leaks</li> <li>▫ Materials to help MF owners/mgr work with their tenants to check for, and report, leaks.</li> <li>▫ Info on tenants' rights &amp; responsibilities regarding leaks.</li> <li>▫ Door hanger</li> </ul> </li> <li>▪ Include leak content in "conservation 101" brochure (if that brochure moves forward)</li> </ul> <i>Cost: tbd</i>

#	Education, Outreach & Technical Assistance Program Elements
14	<p><b>IMPROVE YOUTH EDUCATION</b></p> <ul style="list-style-type: none"> <li>▪ Classroom Programs - Phase I <ul style="list-style-type: none"> <li>▫ Strengthen conservation connection in each program</li> <li>▫ Reduce program topics to improve relevancy</li> <li>▫ Potentially add new program topics</li> </ul> </li> <li>▪ Classroom Programs - Phase II <ul style="list-style-type: none"> <li>▫ Scale number of programs delivered, based on outcome of Phase I</li> </ul> </li> <li>▪ Non-Classroom Programs <ul style="list-style-type: none"> <li>▫ Pilot new school-based area (e.g. science fair, green teams, water festivals, field trips, teacher trainings, explore getting conservation into district curriculum)</li> <li>▫ Pilot non school-based area (e.g. summer camp, scouts, after-school program, community center)</li> </ul> </li> </ul> <p><i>Cost: Current Nature Vision contract is approx. \$85,000 yr. for 500 programs; future costs tbd</i></p>
15	<p><b>IMPROVE/EXPAND LANDSCAPE CLASSES FOR PUBLIC</b></p> <p>Examples include:</p> <ul style="list-style-type: none"> <li>▪ Help SWP members advertise classes better</li> <li>▪ Target market to presumed inefficient irrigators</li> <li>▪ Use the new "conservation 101" video (assuming that is created)</li> <li>▪ Use the new "conservation 101" brochure (assuming that is created)</li> </ul> <p><i>Cost: Presenters are currently paid \$250-\$650</i></p>
16	<p><b>ADD LEAKS CLASS</b></p> <ul style="list-style-type: none"> <li>▪ Add a leak detection and repair class for homeowners</li> </ul> <p><i>Cost: tbd</i></p>
17	<p><b>IMPROVE/EXPAND TRAININGS FOR LANDSCAPE PROFESSIONALS</b></p> <p>Examples include:</p> <ul style="list-style-type: none"> <li>▪ Seek opportunities to offer more training.</li> <li>▪ Coordinate with SWP backflow staff and backflow testing companies</li> </ul> <p><i>Cost: SWP typically pays \$5,000 per training</i></p>
18	<p><b>ADD TRAININGS FOR COMMERCIAL INDOOR PROFESSIONALS</b></p> <ul style="list-style-type: none"> <li>▪ Develop efficient trainings for key commercial water uses (e.g. cooling towers)</li> </ul> <p><i>Cost: tbd</i></p>
19	<p><b>IMPROVE DISPLAY BOARD</b></p> <p>Examples include:</p> <ul style="list-style-type: none"> <li>▪ Improve existing display content, including making it more interactive</li> <li>▪ Add new display content, including regional map</li> <li>▪ Improve display board so it doesn't tip over</li> <li>▪ Develop display board that uses less space</li> </ul> <p><i>Cost: tbd</i></p>
20	<p><b>IMPROVE/EXPAND COMMUNITY EVENTS</b></p> <p>Examples include:</p> <ul style="list-style-type: none"> <li>▪ Develop an engaging booth "hook" to draw in attendees and communicate the conservation message</li> <li>▪ Determine what materials to provide to the public (giveaways, brochures)</li> <li>▪ Determine balance of support by individual member staff and SPU staff</li> </ul> <p><i>Cost: tbd</i></p>

#	Education, Outreach & Technical Assistance Program Elements
21	<p><b>IMPROVE GIVEAWAYS</b></p> <p>Examples include:</p> <ul style="list-style-type: none"> <li>▪ Update suite of giveaways based on appropriate criteria (e.g. useful, cost-effective)</li> <li>▪ Develop companion piece that: 1) explains how to use &amp; appropriateness for them (e.g. only if have less efficient fixture), 2) provides context (why we have a conservation program), 3) markets other program elements.</li> <li>▪ Promote availability of items on SWP website</li> <li>▪ Ask for a commitment to receive the giveaway</li> <li>▪ Determine whether to provide individual items or kit(s)</li> <li>▪ Develop videos on how to use the items</li> </ul> <p><i>Cost: tbd</i></p>
22	<p><b>ADD INTERPRETIVE SIGNAGE</b></p> <ul style="list-style-type: none"> <li>▪ Add permanent interpretive signage at regional/local water system infrastructure (e.g. reservoirs)</li> </ul> <p><i>Cost: tbd</i></p>
23	<p><b>STRENGTHEN FIX-A-LEAK WEEK CONNECTION</b></p> <p>Develop stronger connections to EPA's Fix-A-Leak Week. Examples include:</p> <ul style="list-style-type: none"> <li>▪ Stronger presence on SWP &amp; SWP members' websites</li> <li>▪ Promotion by SWP members in their bill inserts, newsletters, etc</li> <li>▪ Annual mailing of toilet leak detection dye strips</li> </ul> <p><i>Cost: tbd</i></p>
24	<p><b>STRENGTHEN COMMERCIAL INDOOR STRATEGIC PARTNERSHIPS</b></p> <ul style="list-style-type: none"> <li>▪ Strengthen existing relationships with key commercial professional organizations (e.g. WA Hospitality Assoc. &amp; chambers of commerce) to leverage their help in marketing our commercial programs</li> <li>▪ Build new relationships with other key commercial professional organizations</li> </ul> <p><i>Cost: Membership fees for some</i></p>
25	<p><b>STRENGTHEN LANDSCAPE STRATEGIC PARTNERSHIPS</b></p> <ul style="list-style-type: none"> <li>▪ Strengthen existing relationships with key landscape professional organizations (e.g. WA Assoc. of Landscape Professionals; WA State Nursery &amp; Landscape Assoc.) to leverage their help in marketing our landscape programs. This could include more aggressively promoting Smart Watering Month (July).</li> </ul> <p><i>Cost: Membership fees for some</i></p>
26	<p><b>EXPAND COMMERCIAL INDOOR AUDITS</b></p> <ul style="list-style-type: none"> <li>▪ Improve and then expand the use of facility water use audits to help commercial customers understand and implement water efficiency fixture and behavior strategies.</li> </ul> <p><i>Cost: tbd</i></p>
27	<p><b>EXPAND LANDSCAPE AUDITS</b></p> <p>Examples include:</p> <ul style="list-style-type: none"> <li>▪ Loosen restriction of having 1+ acre irrigated area</li> <li>▪ Include ability to adjust timer at end of audit</li> <li>▪ Target presumed inefficient irrigators</li> <li>▪ Add performing via Skype</li> <li>▪ Develop how-to video for self-assessments</li> </ul> <p><i>Cost: Likely no cost beyond SPU staff time</i></p>

#	Education, Outreach & Technical Assistance Program Elements
28	<p><b>IMPROVE MARKETING FOR INDIVIDUAL SWP MEMBERS</b></p> <p>Examples include:</p> <ul style="list-style-type: none"> <li>▪ Create suite of "evergreen" content that SWP members can use in their own marketing channels (e.g. bill inserts, newsletters, website, social media) to marketing efficient fixtures/behaviors and the SWP programs.</li> <li>▪ Store on the Image Bank for ongoing access</li> <li>▪ Also add section for content that SWP members have written that could be used by others.</li> <li>▪ Provide training to SWP member staff on Next Door and other social media tools</li> <li>▪ Create and share an annual editorial calendar with SWP members so they can plan ahead for tie-ins with their own marketing (utility websites, bill inserts, etc)</li> </ul> <p><i>Cost: Likely no cost beyond SPU staff time</i></p>
29	<p><b>IMPROVE IMAGE BANK</b></p> <ul style="list-style-type: none"> <li>▪ Add new high quality photos and other images for all program areas</li> <li>▪ Add captions and labeling for all images</li> </ul> <p><i>Cost: tbd</i></p>

#	Financial Assistance Program Elements
1	<p><b>IMPROVE RESIDENTIAL TOILET REBATES</b></p> <p>Examples include:</p> <ul style="list-style-type: none"> <li>▪ Target market to older homes</li> <li>▪ Improve ID of eligible toilets (e.g. filterable/searchable toilet list)</li> <li>▪ Improve application submittal process (e.g. apply online)</li> <li>▪ Improve recycling options</li> <li>▪ Investigate how to offer more assistance to low-income</li> <li>▪ Continue to reduce or phase out over time</li> </ul> <p><i>Cost: Currently \$100 per toilet rebate</i></p>
2	<p><b>ADD NEW RESIDENTIAL INDOOR REBATES</b></p> <ul style="list-style-type: none"> <li>▪ Investigate opportunities to offer rebates for other indoor water uses such as water use monitoring technology or building system controls for multifamily.</li> </ul> <p><i>Cost: tbd</i></p>
3	<p><b>IMPROVE COMMERCIAL INDOOR FIXED REBATES</b></p> <p>Examples include:</p> <ul style="list-style-type: none"> <li>▪ Improve marketing to increase overall cost-effectiveness</li> </ul> <p><i>Cost: Currently ranges \$100-\$1,500 per fixture</i></p>
4	<p><b>IMPROVE COMMERCIAL INDOOR CUSTOM REBATES</b></p> <p>Examples include:</p> <ul style="list-style-type: none"> <li>▪ Improve marketing to increase overall cost-effectiveness</li> </ul> <p><i>Cost: Currently up to 50% of installed cost</i></p>
5	<p><b>IMPROVE LANDSCAPE FIXED REBATES</b></p> <p>Examples include:</p> <ul style="list-style-type: none"> <li>▪ Only allow when analysis shows would reduce water use</li> <li>▪ Investigate methods to reduce free riders</li> <li>▪ Add education materials to enhance savings</li> </ul> <p><i>Cost: Currently \$100 per timer</i></p>



#	Financial Assistance Program Elements
6	<p><b>IMPROVE LANDSCAPE CUSTOM REBATES</b></p> <p>Examples include:</p> <ul style="list-style-type: none"> <li>▪ Loosen requirement to have 1+ acre irrigated area</li> </ul> <p><i>Cost: Currently up to 50% of installed cost; indiv. rebates ranged \$500-\$40,000 last 3 yrs.</i></p>

# 2017 Annual Report

APRIL 2018



SEATTLE WATER  
SUPPLY SYSTEM  
REGIONAL  
WATER  
CONSERVATION  
PROGRAM



## Program Overview

The Saving Water Partnership (SWP) is a collaboration of Seattle Public Utilities (SPU) and 18 water utility partners that purchase water from Seattle. The SWP's conservation program emphasizes long-term water use efficiency for residential and commercial customers.

In 2017, the SWP maintained emphasis on community and youth education, and promoted popular rebate programs for Premium 1.1 gallons per flush (or less) toilets and irrigation timers. The program continues to include educational campaigns for efficient water use in the landscape. The program also continues to include cost-sharing with customers who retrofit old water-using equipment with new equipment that is more efficient than required by national and state appliance and fixture codes.

Collectively, the SWP is working to achieve the region's adopted Water Use Efficiency Goal in compliance with the State of Washington Municipal Water Law (RCW 70.119A.180) and the resulting Water Use Efficiency Rule (Chapter 246-290-800 WAC). The SWP regional goal is set by the Seattle Regional Water Supply System Operating Board and adopted by each SWP member utility.

**Conservation**  
prepares the region  
for potential water  
supply challenges,  
helps customers  
use water wisely,  
and preserves the  
ethic of stewarding  
natural resources.

**Saving water benefits people, salmon, and wildlife**

## REGIONAL WATER USE EFFICIENCY GOAL AND 2017 RESULTS

The Saving Water Partnership has adopted a six-year regional Water Use Efficiency Goal: reduce per capita use from current levels so that the Saving Water Partnership's total average annual retail water use is less than 105 million gallons per day (mgd) from 2013 through 2018, despite forecasted population growth.

In 2017, the Saving Water Partnership, with the support of residential and commercial customers, met the goal, using 96.6 mgd. The cost of implementing the SWP program in 2017 was \$1.8 million.

Achievement of the goal is accomplished by customers who change their behavior and/or install efficient equipment. Customers engage in these efficiency measures for a variety of reasons including concern for the environment, desire to save money, and choosing new fixtures and appliances that meet higher efficiency codes and standards. Water savings fall into three categories:

### ■ CONSERVATION PROGRAM:

Savings that result from the SWP program. With respect to equipment, the SWP program promotes equipment more efficient than federal or state codes or standards, as well as equipment not covered by codes or standards.

### ■ CODES AND STANDARDS:

Savings that occur as customers replace older, less-efficient fixtures with new, more-efficient models that meet federal or state codes or standards. These savings are also achieved as new buildings are built using efficient code-compliant equipment.

### ■ INDEPENDENT: Savings that result from customers who make efficient choices, independent of the SWP program or codes and standards.

## 2017 Program Highlights

### Education

- The youth education program maintained its gains from last year, conducting nearly 500 in-classroom presentations for nearly 12,000 K-12 grade students. Topics included water efficiency, the water cycle, the salmon life cycle, waterwise gardening, "Fix That Leak!", and the water supply system.



*The youth education program continued its brisk pace, conducting 500 classes in 96 schools.*

- The Savvy Gardener program presented 13 gardening classes to 365 residential customers in spring and fall, hosted by North City Water District, Northshore Utility District, Water District 90, and Woodinville Water District. 155 attendees were new to the Savvy Gardener classes. The classes were designed to inspire, create, and maintain healthy, sustainable, water-efficient landscapes.
- The SWP educated landscape professionals on irrigation topics by co-sponsoring a training with the UW Center for Urban Horticulture that attracted 106 attendees.

### Community Outreach and Engagement



*Water District 90 Commissioner Byron Murgatroyd staffed the new SWP display at their Customer Appreciation and 65th Anniversary event.*

- The SWP increased community outreach, providing materials for a total of 24 community festivals in Bothell, Duvall, Mercer Island, North City, Renton, Seattle, Soos Creek, Water District 90, Water District 125, and Woodinville, attended by approximately 6,000 customers.
- The regional website, [www.savingwater.org](http://www.savingwater.org), continued to be a key resource for customers to learn ways to reduce their water use. The SWP developed a new mobile-friendly website to launch in early 2018.
- The SWP continued the annual online survey to assess customer attitudes toward conservation. Promoting the survey on Nextdoor.com boosted responses from nearly 200 in prior years to 1,600 in 2017. Similar to the previous years, in 2017 95% of respondents said that using water wisely is important. 96% said they take steps to use water wisely at home, for three main reasons: protecting the environment, saving money, and wasting less.

### Rebates

- The SWP irrigation timer rebate program upgraded nearly 220 inefficient timers to WaterSense-labeled timers, with significant participation by wholesale customers. The program conducted a targeted mailing to SPU high summer water users and Woodinville Water District irrigation customers in July. The program conducted a customer survey, and found 90% of respondents felt somewhat or very satisfied with the program.
- The SWP continued to promote and support the availability of 1.1 gallons per flush (gpf) Premium toilets for residential and commercial customers. These toilets use at least 20% less water than WaterSense toilets. Program participation for single family customers declined compared to 2016, but was higher than 2015, with nearly 700 toilets upgraded.
- The multifamily program maintained a high level of participation even though its focus narrowed to Premium toilets that use 1.1 gpf or less, in alignment with the single family program. 45 apartment and condominium buildings upgraded nearly 3,200 toilets to Premium models. Large apartment complexes in the Cedar River Water and Sewer District, City of Renton, and Soos Creek Water and Sewer District participated, contributing to the high number of fixtures replaced this year.

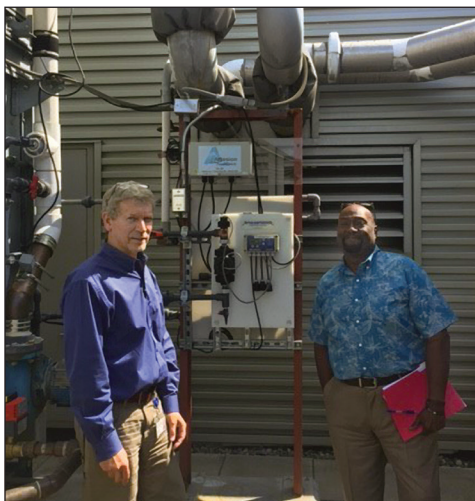




*The Four Seasons Apartments in Highline Water District upgraded 80 toilets.*

## Business Outreach

- Water efficiency projects were completed at 17 businesses. Workshops and discussions with breweries and distilleries have resulted in a checklist of strategies for these industries to improve water and energy efficiency, and two applications for significant rebate projects. Targeting these industries will continue in 2018.
- The new EnviroStars Green Business Program, which helps market commercial conservation programs, launched in fall 2017. SWP leveraged resources from Energy, Solid Waste, Drainage, and Wastewater utilities across King and Snohomish Counties to create a coordinated green business resource for business customers. The program uses the EnviroStars brand and features a single web portal for businesses to find partners' programs. The program is a partnership between eight regional partners.



*Jim Walker of Fred Hutchinson Cancer Research Center and Arece Hampton of SPU inspect a cooling tower that received efficiency upgrades.*

## 2017 Program Activities

PROGRAM	ACTIVITY LEVEL
<b>Youth Education</b>	
Classroom Presentations	496 presentations / 11,932 students
<b>Community Outreach</b>	
Festivals and Events	24 festivals / 6,000 festival attendees
<b>Residential Landscape Education</b>	
Savvy Gardener Classes	13 classes / 365 attendees
Garden Hotline	855 water efficiency questions 12,450 soil, lawn and plant questions (many relevant to water efficiency)
Natural Yard Care Guides and Fact Sheets	25,700 brochures distributed
<b>Residential Toilets</b>	
Multifamily Premium Toilets	45 buildings / 3,188 toilets
Single Family Premium Toilets	558 homes / 699 toilets
<b>Commercial Equipment Rebates</b>	
Kitchen Measures	5 projects
Restroom Measures	7 projects / 264 fixtures
Cooling Tower Measures	4 projects
Coin-Operated Laundry	1 project / 2 machines
<b>Irrigation Projects</b>	
WaterSense Timers	219 timers
Landscape Irrigation	4 projects
<b>Landscape Professionals Trainings</b>	
Irrigation Training	1 training / 106 attendees

## SUPPORTING ELEMENTS

### For Customers

- Technical assistance to residential and commercial customers on irrigation efficiency issues.
- Technical assistance to commercial customers on indoor efficiency issues.
- Regional website [www.savingwater.org](http://www.savingwater.org).
- Regional hotline 206-684-SAVE.
- Regional Language Line, offering language interpretation by phone.
- Take-home items including toilet leak detection kits and hose washers.

### For Partner Utilities

- Bi-monthly marketing kits with social media and print messages for use in utility newsletters and other communications.
- Online Image Bank repository of photos for use in utility newsletters and other communications.
- Support for Water Use Efficiency Rule reporting.
- Saving Water Partnership annual report.
- Messaging on water conservation benefits for salmon, in fulfillment of resource agency and tribal agreements.

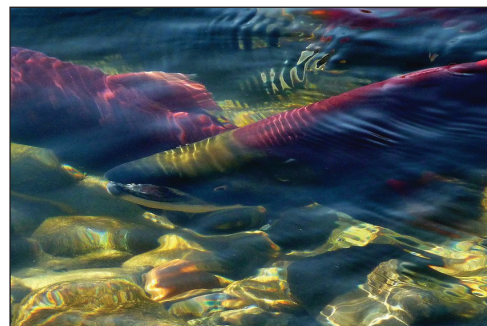


The bean bag toss game was a hit at North City's booth at the Lake Forest Park Picnic.



Megan Stats, Joe Andres, and Paula Parvin, staff at The Carriages at Fairwood Downs Apartments in Soos Creek Water and Sewer District, installed more than 700 Premium toilets. Marci Oda of Soos Creek inspected the project.

Marketing kits with social media posts were sent to SWP members for use in customer communication. "Saving water helps salmon" was a key message in the fall.



Long-time Chair of the Conservation Technical Forum, Debbie Rannfeldt of Woodinville Water District, (l) retired in August after 30 years of dedicated service. Her work with celebrity gardener Ciscoe Morris and Liz Fikejs of SPU helped customers save water and keep a beautiful yard.



This postcard was mailed to nearly 10,000 SPU and Woodinville Water District customers to promote the irrigation timer rebate.

## Seattle Regional Water Conservation Service Area



### Saving Water Partnership:

Cedar River Water & Sewer District  
City of Bothell  
City of Duvall  
City of Mercer Island  
City of Renton  
Coal Creek Utility District  
Highline Water District  
North City Water District  
Northshore Utility District  
Olympic View Water & Sewer District  
Seattle Public Utilities  
Soos Creek Water & Sewer District  
Water District Number 20  
Water District Number 45  
Water District Number 49  
Water District Number 90  
Water District Number 119  
Water District Number 125  
Woodinville Water District

### Saving Water Partnership Administered by Seattle Public Utilities

For more information contact:  
Seattle Public Utilities  
Seattle Municipal Tower  
700 5th Avenue  
P.O. Box 34018  
Seattle, WA 98124-4018  
Email: [Mialee.jose@seattle.gov](mailto:Mialee.jose@seattle.gov)  
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Cover art:  
"Salmon Spawning"  
by Maynard Johny, Jr.; 2008, Limited Edition Serigraph, hand-pulled, 15.5" x 15"





# 2016 ANNUAL REPORT

Seattle Water Supply System Regional Water Conservation Program

May 2017



*Conservation prepares the region for potential water supply challenges, helps customers use water wisely, and preserves the ethic of stewarding natural resources.*

## SAVING WATER BENEFITS PEOPLE, SALMON, AND WILDLIFE

### PROGRAM OVERVIEW

The Saving Water Partnership (SWP) is a collaboration of Seattle Public Utilities (SPU) and 18 water utility partners that purchase water from Seattle. The SWP's conservation program emphasizes long-term water use efficiency for residential and commercial customers.

In 2016, the SWP expanded emphasis on community and youth education, and improved customers' access to Premium 1.1 gallons per flush (or less) toilets. The program continues to include educational campaigns for efficient water use in the landscape. The program also continues to include cost-sharing with customers who retrofit old water-using equipment with new equipment that is more efficient than required by national and state appliance and fixture codes.

Collectively, the SWP is working to achieve the region's adopted Water Use Efficiency Goal in compliance with the State of Washington Municipal Water Law (RCW 70.119A.180) and the resulting Water Use Efficiency Rule (Chapter 246-290-800 WAC). The SWP regional goal is set by the Seattle Regional Water Supply System Operating Board and adopted by each SWP member utility.



**Saving Water Partnership**  
Seattle and Participating Local Water Utilities

## Regional Water Use Efficiency Goal and 2016 Results

The Saving Water Partnership has adopted a six-year regional Water Use Efficiency Goal: reduce per capita use from current levels so that the Saving Water Partnership's total average annual retail water use is less than 105 million gallons per day (mgd) from 2013 through 2018, despite forecasted population growth.

In 2016, the Saving Water Partnership, with the support of residential and commercial customers, met the goal, using 94.4 mgd. The cost of implementing the SWP program in 2016 was \$2 million.

Achievement of the goal is accomplished by customers who change their behavior and/or install efficient equipment. Customers engage in these efficiency measures for a variety of reasons including concern for the environment, desire to save money, and choosing new fixtures and appliances that meet higher efficiency codes and standards. Water savings fall into three categories:

- **Conservation Program:** Savings that result from the SWP program. With respect to equipment, the SWP program promotes equipment more efficient than federal or state codes or standards, as well as equipment not covered by codes or standards.
- **Codes and Standards:** Savings that occur as customers replace older, less-efficient fixtures with new, more-efficient models that meet federal or state codes or standards. These savings are also achieved as new buildings are built using efficient code-compliant equipment.
- **Independent:** Savings that result from customers who make efficient choices, independent of the SWP program or codes and standards.

## 2016 PROGRAM HIGHLIGHTS

### EDUCATION

- The youth education program expanded by 140 programs, conducting nearly 500 in-classroom presentations for nearly 12,000 K-12 grade students. Topics included water efficiency, the water cycle, the salmon life cycle, waterwise gardening, the water supply system, and "Fix That Leak!".



*Kids and teachers both appreciate the hands-on learning opportunities offered by the SWP youth education program.*

- The Savvy Gardener program presented 16 gardening classes hosted by North City, Northshore, Water District 90, and Woodinville, in spring and fall to 400 residential customers. Nearly 150 attendees were new to the Savvy Gardener classes. The classes were designed to inspire, create, and maintain healthy, sustainable, water-efficient landscapes.
- The SWP educated landscape professionals on water efficiency topics by co-sponsoring a Green Gardening Workshop that attracted 300 attendees.

### COMMUNITY OUTREACH AND ENGAGEMENT

- Seven community festivals rolled out the Water Refilling Station, where customers refilled their water bottles and talked with utility staff about water quality, water conservation, and other utility topics of interest.
- The SWP provided materials for a total of 18 community festivals in Bothell, Duvall, Mercer Island, North City, Seattle, Water District 90, Water District 125, and Woodinville, attended by approximately 9,200 customers.



*North City Water District staffed a booth at the Celebrate Shoreline Festival to meet customers and talk about water quality and conservation.*

- Site traffic on the regional website, [www.savingwater.org](http://www.savingwater.org), grew in 2016 compared to 2015, even while 2015 had higher than normal traffic due to the drought that took place that year.
- The SWP continued the annual online survey to assess customer attitudes toward conservation. Similar to the previous year, in 2016 95% of respondents said that using water wisely is important. 96% said they take steps to use water wisely at home, for three main reasons: protecting the environment; saving money; and wasting less.



*City of Duvall's Boyd Benson (right) captures education in action at their Earth Day and Arbor Day Festival.*

### REBATES

- The SWP launched a new irrigation timer rebate to serve customers with less than one acre of irrigated area. The program upgraded 190 inefficient timers to WaterSense-labeled timers, with significant participation by wholesale customers.
- The SWP made considerable strides in increasing the availability of 1.1 gallons per flush (gpf) Premium toilets for residential and commercial customers. These toilets use at least 20% less water than WaterSense toilets. The SWP partnered with toilet manufacturer Niagara Conservation and Home Depot to hold Toilet Rebate Events at two Home Depot locations in Seattle. Nearly 100 customers took advantage of the events to upgrade their water-wasting toilets. More importantly,



Home Depot expanded their stock of Premium toilets. Program participation for single family customers more than doubled compared to 2015, with 1,050 toilets upgraded.

- Participation increased in the multifamily program as well: 61 apartment and condominium buildings upgraded nearly 1,960 toilets to 1.1 gpf Premium models and 380 toilets to 1.28 gpf WaterSense models.



Customers near the Bitter Lake and West Seattle Home Depot stores received this post card inviting them to the rebate events.

## BUSINESS OUTREACH

- Significant progress was made on developing the new EnviroStars Green Business Program, which will help market commercial conservation programs. SWP is leveraging resources from Energy, Solid Waste, Drainage, and Wastewater utilities across King and Snohomish Counties to create a coordinated green business resource for business customers. The program will use the EnviroStars brand and feature a single web portal for businesses to find partners' programs. The program is a partnership between eight regional partners and will launch in 2017.
- Water efficiency projects were completed at 31 businesses. Real progress is being made in transforming the market from WaterSense toilet models to Premium 1.1 gpf models, with 12 area hotels making the switch. A special effort was conducted to reach out to smaller ethnically-owned hotels.

Unshik Che, Owner of the Sleep Inn Sea-Tac in Highline Water District, upgraded 109 toilets to Premium models. The SWP continues to benefit from belonging to the Korean Hotel Association.



## 2016 PROGRAM ACTIVITIES

PROGRAM	ACTIVITY LEVEL
<b>Youth Education</b>	
Classroom Presentations	493 presentations / 11,935 students
<b>Community Outreach</b>	
Festivals and Events	18 festivals / 9,200 festival attendees
<b>Residential Landscape Education</b>	
Savvy Gardener Classes	16 classes / 398 attendees
Garden Hotline	1,010 water efficiency questions 21,520 soil, lawn and plant questions (many relevant to water efficiency)
Natural Yard Care Guides and Fact Sheets	15,000 brochures distributed
<b>Residential Toilets</b>	
Multifamily WaterSense Toilets	7 buildings / 380 toilets
Multifamily Premium Toilets	54 buildings / 1,959 toilets
Single Family Premium Toilets	800 homes / 1,051 toilets
<b>Commercial Equipment Rebates</b>	
Kitchen Measures	5 projects
Restroom Measures	21 projects / 1,223 fixtures
Custom Projects	3 projects
Cooling / Refrigeration / Ice	1 project
Laundry System	1 project
<b>Irrigation Projects</b>	
WaterSense Timer	190 timers
Landscape Irrigation	2 projects
<b>Landscape Professionals Trainings</b>	
Regional Collaboration (Local Hazardous Waste Management Green Gardening Program)	1 training / 300 attendees

## SUPPORTING ELEMENTS

### For Customers

- Technical assistance to residential and commercial customers on irrigation efficiency issues.
- Technical assistance to commercial customers on indoor efficiency issues.
- Regional website [www.savingwater.org](http://www.savingwater.org).
- Regional hotline 206-684-SAVE.
- Regional Language Line, offering language interpretation by phone.
- Take-home items including toilet leak detection kits and hose washers.

### For Partner Utilities

- Bi-monthly marketing kits with social media and print messages for use in utility newsletters and other communications.
- Online Image Bank repository of photos for use in utility newsletters and other communications.
- Support for Water Use Efficiency Rule reporting.
- Saving Water Partnership annual report.
- Messaging on water conservation benefits for salmon, in fulfillment of resource agency and tribal agreements.





Nearly 100 customers took advantage of the events to get questions answered, turn in rebate applications, and head home with new Premium 1.1 gpf toilets.



This ad was used to introduce the timer rebate on social media and trade magazines.



Marketing kits with social media and print messages were sent to SWP members for use in customer communication.



Rochelle Bauer, Property Manager, is glad she participated in the Multifamily Toilet Program. "I have very happy tenants since they have new water-efficient toilets. Our company is excited about the reduction in our utility bill."



Blake Sommerville of Metropolitan Management upgraded 470 toilets in 26 multifamily buildings.



Water District 90 staff helped kids understand the watershed at the local Science Fair.



The bean bag toss game was a hit at North City's booth at the Celebrate Shoreline Festival.

## SEATTLE REGIONAL WATER CONSERVATION SERVICE AREA



### Saving Water Partnership:

Cedar River Water & Sewer District  
City of Bothell  
City of Duvall  
City of Mercer Island  
City of Renton  
Coal Creek Utility District  
Highline Water District  
North City Water District  
Northshore Utility District  
Olympic View Water & Sewer District  
Seattle Public Utilities  
Soos Creek Water & Sewer District  
Water District Number 20  
Water District Number 45  
Water District Number 49  
Water District Number 90  
Water District Number 119  
Water District Number 125  
Woodinville Water District

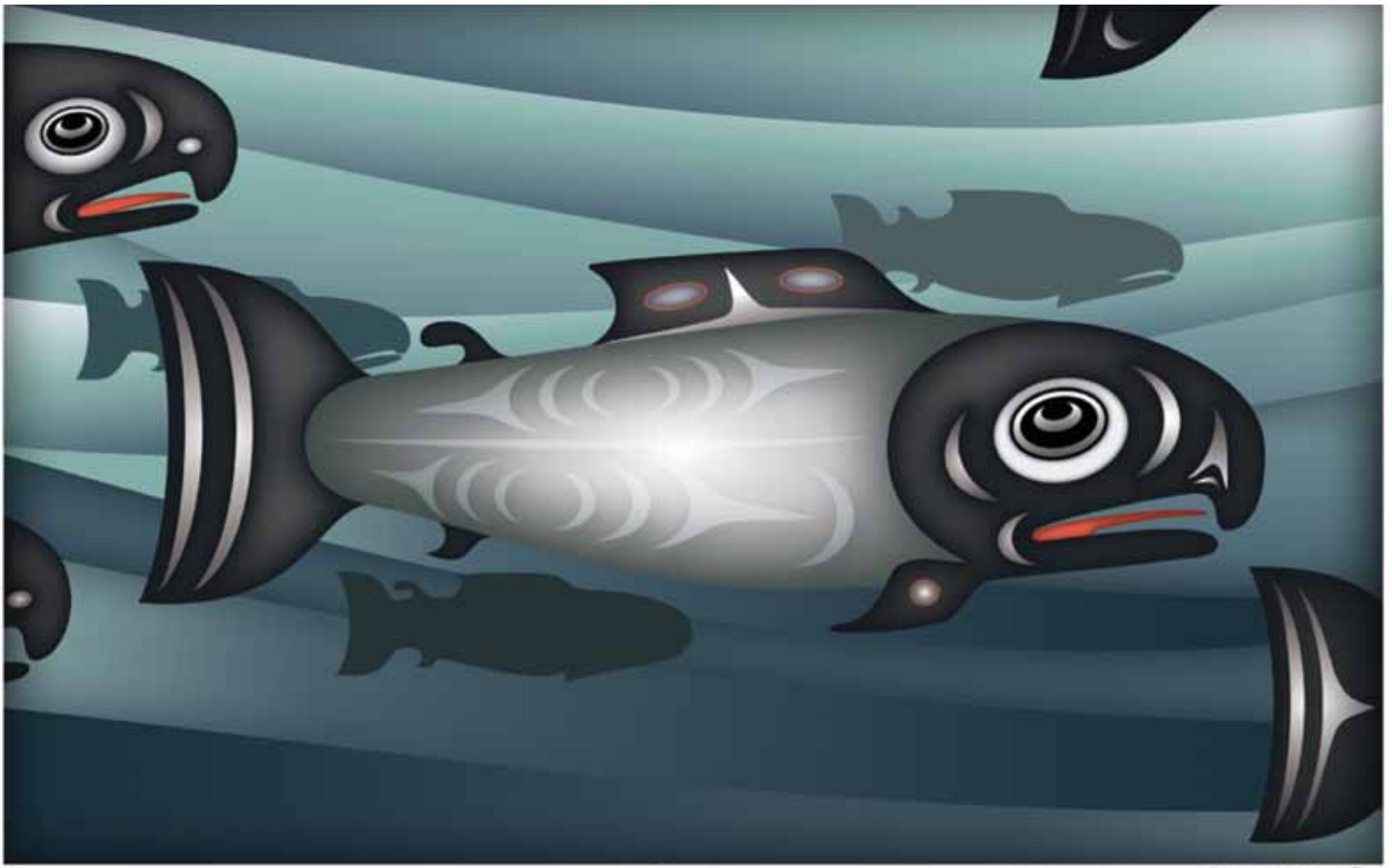
Saving Water Partnership  
Administered by  
Seattle Public Utilities Resource  
Conservation Office

For more information contact:  
Seattle Public Utilities  
Seattle Municipal Tower  
700 5th Avenue  
P.O. Box 34018  
Seattle, WA 98124-4018  
Email: [Mialee.jose@seattle.gov](mailto:Mialee.jose@seattle.gov)  
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Cover art: "Discovery" by Susan Point; 2005, Limited Edition Serigraph, hand-pulled, 33"x 20"





# 2015 ANNUAL REPORT

SEATTLE WATER SUPPLY SYSTEM REGIONAL WATER CONSERVATION PROGRAM

JUNE 2016

## Program Overview

### ***Saving water benefits people, salmon, and wildlife***

The Saving Water Partnership (SWP) is a collaboration of Seattle Public Utilities (SPU) and 18 water utility partners that purchase water from Seattle. The SWP's conservation program emphasizes long-term water use efficiency for residential and commercial customers.

2015 was a unique year for the SWP program. A major summer drought took place, the first in 10 years, and the SWP program provided key expertise to support the regional response. In addition to the special emphasis on drought response, the regular SWP program continued to serve customers. The SWP expanded its community and youth education services. Educational campaigns for efficient water use in the landscape continued. The SWP continued to cost-share customer replacement of old water-using equipment with new equipment that is more efficient than national and state appliance and fixture codes require.

Collectively, the SWP is working to achieve the region's adopted Water Use Efficiency Goal in compliance with the State of Washington Municipal Water Law (RCW 70.119A.180) and the resulting Water Use Efficiency Rule (Chapter 246-290-800 WAC). The SWP regional goal is set by the Seattle Regional Water Supply System Operating Board and adopted by each SWP member utility.

***Conservation prepares the region for potential water supply challenges, helps customers use water wisely, and preserves the ethic of stewarding natural resources.***



***Saving Water Partnership***  
Seattle and Participating Local Water Utilities



# Regional Water Use Efficiency Goal and 2015 Results

**The Saving Water Partnership has adopted a six-year regional Water Use Efficiency Goal:** reduce per capita use from current levels so that the Saving Water Partnership's total average annual retail water use is less than 105 million gallons per day (mgd) from 2013 through 2018, despite forecasted population growth.

In 2015, the Saving Water Partnership, with the support of residential and commercial customers, met the goal, using 96.9 mgd. The cost of implementing the SWP program in 2015 was \$1.6 million.

Achievement of the goal is accomplished by customers who change their behavior and/or install efficient equipment. Customers engage in these efficiency measures for a variety of reasons including concern for the environment, desire to save money, and codes and standards that require higher efficiency in new fixtures and appliances. Water savings fall into three categories:

- **Conservation Program:** Savings that result from the SWP program. With respect to equipment, the SWP program promotes equipment more efficient than federal and state codes and standards, as well as equipment not covered by codes or standards.
- **Codes and Standards:** Savings that occur as customers replace older, less-efficient fixtures with new, more-efficient models that meet federal and state codes and standards. These savings are also achieved as new buildings are built using efficient code-compliant equipment.
- **Independent:** Savings that result from customers who make efficient choices, independent of the SWP program or codes and standards.

## 2015 PROGRAM HIGHLIGHTS

- In July, Seattle, Tacoma, and Everett jointly activated their Water Shortage Response Plans, and in August asked customers to voluntarily reduce water use by 10 percent. The SWP conservation program supported the drought response until conditions returned to normal in November by:
  - Providing knowledgeable staff
  - Leveraging relationships with the landscape industry, major water users, and the media
  - Leveraging the SWP website into a regional hub used by customers and the media
  - Emphasizing the SWP programs as ways for customers to reduce their water use.



*Kids make terrariums at Northshore Utility District's booth at Kenmore Music in the Park.*

- The youth education program that launched in 2013 was expanded by nearly 100 programs, conducting 360 in-classroom presentations for nearly 9,200 K-12 grade students. Topics included water efficiency, the water cycle, the salmon life cycle, waterwise gardening, and the water supply system. A new class, "Fix That Leak!" was developed this year.
- Nine community festivals rolled out the Water Refilling Station, where customers refilled their water bottles and talked with utility staff about water quality, water conservation, and other utility topics of interest.
- The SWP provided materials for 12 community festivals in all, in Bothell, Duvall, Renton, Seattle, Water District 90, and Woodinville, attended by approximately 5,150 customers.



*SWP sponsored Savvy Gardener classes by four utilities, including this one by Ladd Smith on resilient gardening.*

- The Savvy Gardener program presented 15 gardening classes by four partner utilities in spring and fall to 385 residential customers. The classes were designed to inspire, create, and maintain healthy, sustainable, water-efficient landscapes.
- The SWP educated landscape professionals on water efficiency topics by co-sponsoring two Green Gardening Workshops.
- Site traffic on the regional website, [www.savingwater.org](http://www.savingwater.org), grew by nearly 40% in 2015 compared to 2014.
- The SWP launched a new annual survey to assess customer attitudes toward conservation. 94% of respondents said that using water wisely is important. 95% said they take steps to use water wisely at home, for three main reasons: protect the environment; save money, and waste less.



*Direct mail and trade paper advertising promoted the toilet rebate program.*

- The SWP continued to promote 1.1 gallons per flush (gpf) Premium toilets for residential and commercial customers. These toilets use at least 20% less water than WaterSense toilets. Lists of locally available models, and retailers that carry them, were maintained to help customers find these models.

- 53 apartment and condominium buildings upgraded 355 toilets to 1.1 gpf Premium models and nearly 680 toilets to 1.28 gpf WaterSense models. The SWP continued surveying program participants in both the Premium and WaterSense rebate programs to learn more about customer satisfaction with the toilets and the program. Survey results for both single family and multifamily customers are very positive.



*This hotel in Renton upgraded restroom fixtures and ice machines.*

- Water efficiency projects were completed at 52 businesses. Real progress is being made in transforming the market from WaterSense toilet models to Premium 1.1 gpf models, with seven area hotels making the switch. A special effort was conducted to reach out to smaller ethnically-owned hotels.
- Based on groundwork done in 2014, eight regional partners have reached an agreement to form a new regional green business program which will help market commercial conservation programs. The program will be developed in 2016, with a soft launch in late 2016 and a full launch in 2017. The program will use the EnviroStars brand and feature a single web portal for businesses to find partners' programs.



*The Landscape Working Group developed a new irrigation timer rebate that will launch in 2016.*

- A new irrigation timer rebate was developed to serve customers with less than one acre of irrigated area. The program will launch in 2016.

## 2015 PROGRAM ACTIVITIES

PROGRAM	ACTIVITY LEVEL
<b>Youth Education</b>	
Classroom Presentations	360 presentations / 9,200 students
<b>Community Outreach</b>	
Festivals and Events	12 festivals / 5,150 festival attendees
<b>Residential Landscape Education</b>	
Savvy Gardener Classes	15 classes / 385 attendees
Garden Hotline	1,500 water efficiency questions 18,700 soil, lawn and plant questions (many relevant to water efficiency)
Natural Yard Care Guides and Fact Sheets	5,430 brochures distributed
<b>Residential Toilets</b>	
Multifamily WaterSense Toilets	37 buildings / 679 toilets
Multifamily Premium Toilets	16 buildings / 355 toilets
Single Family Premium Toilets	241 homes / 325 toilets
<b>Commercial Equipment</b>	
Kitchen Measures	8 projects
Restroom Measures	30 projects / 1,285 fixtures
Custom Projects	2 projects
Cooling / Refrigeration / Ice	6 projects
Clothes Washers	1 project
Cool Tunes (Cooling Tower Incentive)	5 projects completed / 6 ongoing participants
<b>Irrigation Projects</b>	
Landscape Irrigation	2 projects
<b>Landscape Professionals Trainings</b>	
Regional Collaboration (Local Hazardous Waste Management Green Gardening Program)	13 trainings / 554 attendees

## SUPPORTING ELEMENTS

### For Customers

- Technical assistance to residential and commercial customers on irrigation efficiency issues.
- Technical assistance to commercial customers on indoor efficiency issues.
- Regional website [www.savingwater.org](http://www.savingwater.org).
- Regional hotline (206) 684-SAVE.
- Regional Language Line, offering language interpretation by phone.
- Take-home items including toilet leak detection kits and hose washers.

### For Partner Utilities

- Seasonal message repository for use in utility newsletters and other communications.
- Support for Water Use Efficiency Rule reporting.
- Saving Water Partnership annual report.
- Messaging on water conservation benefits for salmon, in fulfillment of resource agency and tribal agreements.





Everyone pitched in during the 2015 drought, when Seattle, Tacoma and Everett asked customers to curtail their water use until the fall rains returned.



Woodmoor Elementary students gathered to learn about the water cycle.



Ceradyne Inc., a 3M Company, participated in the Cooling Tower Incentive Pilot Program and in Water Smart Technology rebates.



A new water recycling system for Marmo e Granito, a natural stone product supplier and fabricator, is saving 1,800 gallons per day.



The SWP produced a PSA with the Mariners Moose that ran pre-game all season on the big screen at Safeco Field.



The SWP website, [Savingwater.org](http://Savingwater.org), was the key information resource for customers and the media during the drought.



Roxanne Heller of Water District 119 inspects the upgraded urinals at Stillwater Elementary. The school replaced 30 restroom fixtures.

## **Saving Water Partnership** Seattle and Participating Local Water Utilities (206) 684-SAVE [www.savingwater.org](http://www.savingwater.org)

### SEATTLE REGIONAL WATER CONSERVATION SERVICE AREA



#### **Saving Water Partnership:**

Cedar River Water & Sewer District  
 City of Bothell  
 City of Duval  
 City of Mercer Island  
 City of Renton  
 Coal Creek Utility District  
 Highline Water District  
 North City Water District  
 Northshore Utility District  
 Olympic View Water & Sewer District  
 Seattle Public Utilities  
 Soos Creek Water & Sewer District  
 Water District Number 20  
 Water District Number 45  
 Water District Number 49  
 Water District Number 90  
 Water District Number 119  
 Water District Number 125  
 Woodinville Water District

#### **SWP administered by:** Seattle Public Utilities Resource Conservation Office

For more information contact:  
 Seattle Public Utilities  
 Seattle Municipal Tower  
 700 5th Avenue, Suite 4900  
 P.O. Box 34018  
 Seattle, WA 98124-4018  
 email: [Mialee.jose@seattle.gov](mailto:Mialee.jose@seattle.gov)  
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 accommodate people with disabilities  
 and those who need language assistance.



Cover art: "Sillers" by Shaun Peterson;  
 2013, Limited Edition Giclee Print,  
 12.75" x 19" Photo courtesy of  
 Stonington Gallery

# 2014 ANNUAL REPORT

*Saving water benefits people, salmon, and wildlife*

## Program Overview

The Saving Water Partnership (SWP) is a collaboration of Seattle Public Utilities (SPU) and 18 water utility partners that purchase water from Seattle. The SWP's conservation program emphasizes long-term water use efficiency for residential and commercial customers.

In 2014, the SWP expanded emphasis on community and youth education. The program continues to include educational campaigns for efficient water use in the landscape. The program also continues to include cost-sharing with customers who retrofit old water-using equipment with new equipment that is more efficient than required by national and state appliance and fixture codes.

Collectively, the SWP is working to achieve the region's adopted Water Use Efficiency Goal in compliance with the State of Washington Water Use Efficiency Rule. SWP program direction and the regional Goal are set by management from member utilities.

*Conservation prepares the region for potential water supply challenges, helps customers use water wisely, and preserves the ethic of stewarding natural resources.*

JUNE 2015

SEATTLE WATER SUPPLY SYSTEM  
REGIONAL WATER CONSERVATION PROGRAM





# REGIONAL WATER USE EFFICIENCY GOAL AND 2014 RESULTS

The Saving Water Partnership has adopted a six-year regional Water Use Efficiency Goal: reduce per capita use from current levels so that the Saving Water Partnership's total average annual retail water use is less than 105 million gallons per day (mgd) from 2013 through 2018, despite forecasted population growth.

In 2014, the Saving Water Partnership, with the support of residential and commercial customers, met the goal, using 93.8 mgd. The cost of implementing the SWP program in 2014 was \$1.6 million.

The following elements contribute to achieving the regional Water Use Efficiency Goal:

- **Programmatic Savings:** Savings from customers who change their behavior or install efficient equipment as a result of SWP programs.
- **Code Savings:** Savings that occur as customers replace older, less-efficient water-using fixtures as they break or wear out with new, more-efficient models that meet federal or state codes or standards. These savings are also achieved as new buildings are built using efficient code-compliant equipment.
- **Other Savings:** Savings from customers who switch to more efficient behavior or equipment on their own. These actions are motivated by cost, concern for the environment, price signals from utility rates, and increasing availability of fixtures and appliances that are more efficient than required by code.

## 2014 Program Highlights

- The new youth education program that launched in 2013 was expanded, conducting 270 in-classroom presentations for more than 6,800 K-12 grade students. Topics included water efficiency, the water cycle, the salmon life cycle, waterwise gardening, and the water supply system. A new class on leaks was developed to replace the Fix-A-Leak Week challenge.



*The youth education program grew, conducting 270 in-classroom presentations.*

- The SWP provided materials for 12 community festivals and staff for seven festivals in Bothell, Duvall, Northshore, Seattle, and Woodinville, attended by approximately 8,600 customers.
- Six community festivals rolled out the new Water Refilling Station, where customers refilled their water bottles while engaging with utility staff about water quality, water conservation, and other utility topics of interest.



*Customers at Bothell's Sustainamania event fill up their water bottles and learn about conservation.*

- The Savvy Gardener program presented 14 gardening classes in spring and fall to 300 residential customers. The classes were designed to inspire, create, and maintain healthy, water-efficient landscapes. A new class titled "How to Program Your Irrigation Controller" was taught by SWP irrigation program staff and offered participants a \$150 rebate on installing a rain sensor. Mid-year the program transitioned to a new model in which SWP partners arrange for the classes and the SWP pays for instructor fees.
- The SWP educated landscape professionals on water efficiency topics by co-sponsoring the Green Gardening Workshop.
- Site traffic has grown by 20% since the new and improved regional website, [www.savingwater.org](http://www.savingwater.org), launched in 2013.
- The SWP continued to promote 1.06 gallons per flush (gpf) Premium WaterSense toilets for residential and commercial customers. These toilets use at least 20% less water than a regular WaterSense toilet. New lists of locally available models, and retailers that carry them, were developed to help customers find these models.

**Still Have Water Guzzling Toilets?**

GET REBATES ON NEW TOILETS & REDUCE WATER BILLS 15-25%

**LIMITED OFFER WHILE FUNDS LAST**

**\$75 REBATE** for 1.28 gallons per flush WaterSense Toilets

**\$150 REBATE** for 1.06 gallons per flush Premium WaterSense Toilets

Saving Water Partnership  
Duke and University and more cities

*This direct mail piece promoted toilet rebates to multifamily customers.*

- 62 apartment and condominium buildings upgraded nearly 780 toilets to 1.06 gpf Premium WaterSense models and nearly 330 toilets to 1.28 gpf regular WaterSense models. The SWP began surveying program participants in both the Premium WaterSense and regular WaterSense rebate programs to learn more about customer satisfaction with the toilets and the program.
- Water efficiency projects were completed at 56 businesses. Two hotel projects upgraded nearly 800 toilets. Customers are very satisfied with the toilets.

- The Water Smart Technology program researched water-saving opportunities at craft breweries and decorative fountains. The research found several measures that could significantly improve water use in both areas.



*A happy small business owner took advantage of the Water Smart Technology Program and was recognized as a green business.*

- The SWP is working with a group of utilities and cities to develop a new regional green business program, which will help market commercial conservation programs. The program will feature a unified brand, a one-stop-shop web portal for businesses to find programs, and joint marketing and recognition.
- The Water Smart Technology Program continued “Cool Tunes,” a program to upgrade equipment and monitor the efficiency of cooling towers, long a significant source of water waste. Seven customers are participating in the pilot, and four incentive projects were completed. Results to date are encouraging and will help staff develop cooling tower incentives as an ongoing program.



*North City Water District Commissioner Larry Schoonmaker (seated) discusses water conservation at the Shoreline Science, Technology, Engineering & Math Festival.*

## 2014 Program Activities

PROGRAM	ACTIVITY LEVEL
<b>Youth Education</b>	
Classroom Presentations	270 presentations / 6,800 students
<b>Community Outreach</b>	
Festivals and Events	12 festivals / 8,600 festival attendees
<b>Residential Landscape Education</b>	
Savvy Gardener Classes	14 classes / 300 attendees
Garden Hotline	1,100 water efficiency questions 13,450 soil, lawn and plant questions (many relevant to water efficiency)
Natural Yard Care Guides and Fact Sheets	9,050 brochures distributed
<b>Residential Toilets</b>	
Multifamily WaterSense Toilets	35 buildings / 329 toilets
Multifamily Premium WaterSense Toilets	27 buildings / 777 toilets
Single Family WaterSense Toilets	404 homes / 404 toilets
Single Family Premium WaterSense Toilets	87 homes / 96 toilets
<b>Commercial Equipment</b>	
Kitchen Measures	26 projects
Restroom Measures	23 projects / 765 fixtures
Custom Projects	2 projects
Cooling / Refrigeration / Ice	1 project
Cool Tunes (Cooling Tower Incentive)	4 projects completed / 7 ongoing participants
<b>Irrigation Projects</b>	
Landscape Irrigation	8 projects
<b>Landscape Professionals Trainings</b>	
Regional Collaboration (Local Hazardous Waste Management Green Gardening Program)	17 trainings / 590 attendees

## Supporting Elements

### For Customers

- Technical assistance to residential and commercial customers on irrigation efficiency issues.
- Technical assistance to commercial customers on indoor efficiency issues.
- Regional website [www.savingwater.org](http://www.savingwater.org).
- Regional hotline 206-684-SAVE.
- Regional Language Line, offering language interpretation by phone.
- Take-home items including toilet leak detection kits and hose washers.

### For Partner Utilities

- Seasonal message repository for use in utility newsletters and other communications.
- Support for Water Use Efficiency Rule reporting.
- Saving Water Partnership annual report.
- Messaging on water conservation benefits for salmon, in fulfillment of resource agency and tribal agreements.





SWP conducted an irrigation scheduling case study at a commercial property in the City of Renton. The results showed that irrigation run times could be reduced 30% and still maintain attractive, healthy landscapes.



Woodinville Water District (WWD) had great success with the new Water Refilling Station. Top photo: Debbie Rannfeldt (WWD) and Arece Hampton (SPU). Bottom photo: Customers lined up to refill water bottles.



Customers continue to give high ratings to Savvy Gardener classes like this one with Emily Bishton at North City Water District.



Research conducted on craft breweries identified cost-effective measures that can reduce water use for these customers.



## Saving Water Partnership

Seattle and Participating Local Water Utilities

(206) 684-SAVE [www.savingwater.org](http://www.savingwater.org)

### Seattle Regional Water Conservation Service Area



#### Saving Water Partnership:

Cedar River Water & Sewer District  
City of Bothell  
City of Duval  
City of Mercer Island  
City of Renton  
Coal Creek Utility District  
Highline Water District  
North City Water District  
Northshore Utility District  
Olympic View Water & Sewer District  
Seattle Public Utilities  
Soos Creek Water & Sewer District  
Water District Number 20  
Water District Number 45  
Water District Number 49  
Water District Number 90  
Water District Number 119  
Water District Number 125  
Woodinville Water District

#### SWP administered by: Seattle Public Utilities Resource Conservation Office

For more information contact:  
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700 5th Avenue, Suite 4900  
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Cover art: "Salish Sea" by Kelly Cannell, 2014, Hand pulled silkscreen print, 14" x 31"



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## **King County Water District No. 49**

### **Water Shortage Response Plan**

**Adopted 2008**

**Updated 2017**

#### **1.0 Introduction**

This Water Shortage Response Plan (WSRP) provides systematic responses to a water shortage. These potential problems could include immediate supply disruptions resulting from a major pipeline failure as well as forecasted water supply shortages related to weather. A variety of water supply emergencies may produce water shortage conditions and, depending on the severity of the problem, may require activation of this WSCP. This plan will be implemented by District personnel in the event of a water shortage event. This plan does not cover the water main breaks that can be resolved in a short period of time using the District's Emergency Response Plan. This WSRP has been prepared as an element of the water resource analysis, reliability and emergency response requirements of WAC 246-290-100(4) (f) and 246-290-420.

#### **1.1 Objective of the WSRP**

The objective of this WSRP is to establish actions and procedures for evaluating and implementing supply options and effectively managing water demand during a water shortage event. By planning ahead, the District can continue to provide essential public health and safety as well as minimizing impacts to structures.

Water shortage will not just impact the District but rather likely the entire region. The District purchases all of its water from Seattle Public Utilities (SPU) and will participate with SPU as part of the SPU Water Shortage Contingency Plan (WSCP) with respect to regional situations such as drought, transmission main breaks and inadequate source of water. SPU's updated WSCP was developed as part of the 2007 SPU Water System Plan (2013 WSP is most current) and can be found at

[http://www.seattle.gov/util/MyServices/Water/AbouttheWaterSystem/Plans/Water\\_Shortage\\_Plan/index.htm](http://www.seattle.gov/util/MyServices/Water/AbouttheWaterSystem/Plans/Water_Shortage_Plan/index.htm)

#### **1.2 Coordination with other emergency planning**

The District's Emergency Management Plan identifies non-drought related emergencies and is included in Appendix K of the 2017 Water System Plan.

#### **1.3 Relationship to other plans/other purveyor**

The District purchases all its water from Seattle Public Utilities (SPU). In the event of an immediate water supply disruption, the District will notify SPU and SPU will take the lead in coordinating the emergency response activities. As a customer of SPU, the District will depend on SPU to communicate the potential for water shortage to the District. SPU's Water Shortage Contingency Plan (dated July 2006) states that the SPU *"plan has been developed by SPU, in*

*consultation with its wholesale customers and other participants, based on the premise that an effective demand management strategy must be regionally consistent.”*

## **2.0 Drought Management Strategy**

### **2.1 Causes for water supply shortages**

Interruptions in the regional water supply conditions can occur for a variety of reasons. Weather related shortages are considered “drought” conditions. Droughts occur naturally but are unpredictable as they vary in frequency, duration and severity. The District purchases water from SPU along with multiple other purveyors. Changes in water supply will affect SPU and all the purveyors. The region has not experienced a multi-year drought but it has experienced short-term drought conditions.

The Puget Sound area receives, on average, 37 inches of annual precipitation. Approximately 5” of precipitation occurs between June and September, according to the 30 year period of information from the National Weather Service at Sea-Tac Airport. SPU operates the water supply storage reservoirs on an annual schedule of drawdown and refilling of the reservoirs dependent upon the annual precipitation. Depending upon how SPU operates the reservoirs can impact the water shortage. SPU has defined the following droughts:

- Winter/Spring drought – less than normal snow pack
- Summer/Fall drought – increased water system demands
- Fall/Early Winter drought – delay of fall rains or a dry winter

A fourth drought condition can occur with unusually warm spring weather, which can cause snowpack to melt early and require an early draw down in the reservoirs.

Coordination and timing of SPU reservoirs is also impacted by the required instream flows in the Cedar River and at Hiram Chittenden Locks. Instream flow needs are for both fish and wildlife habitat and have been agreed to by a number of different agencies. The Cedar River provides approximately one-half of the inflow to Lake Washington annually. The US Army Corps of Engineers manages Lake Washington lake levels as part of the Lake Washington Ship Canal Project, which connects Lake Washington to Puget Sound. Their management objectives include providing water flows at the Hiram Chittenden Locks for navigation, fish passage, and control of the salt water intrusion caused by operation of the Locks.

### **2.2 Strategy**

SPU has identified a strategy for the following regional drought and potential drought components:

- **Current Conditions** – SPU contracts with US Geological Survey (USGS) to provide real time streamflow monitoring and data collection services. SPU also contracts with the Natural Resources Conservation Services (NRCS) to provide real time snow monitoring and weather data collection services. Information from these sources provides the basis for SPU's reservoir management and flow release decisions.

- **Forecasting** – Through the National Oceanic and Atmospheric Administration (NOAA), SPU regularly monitors daily weather forecasts (National Centers for Environmental Prediction), 30- and 90-day and multi-season climate outlooks (Climate Prediction Center), and daily hydrometeorological forecasts (Northwest River Forecast Center in Portland, Oregon). NOAA’s web information on El Nino/La Nina provides a wealth of timely information on current and forecasted El Nino and La Nina conditions with enough lead time for water resource managers to prepare for such events.

SPU uses a number of analytical tools for forecasting hydrologic conditions as they relate to water supply and fisheries including:

- ✓ Streamflow forecasts prepared by the USGS and NRCS;
  - ✓ Weather, climate, and river forecasts from NOAA;
  - ✓ A reservoir management and streamflow forecasting computer model known as the Seattle Forecast Model, or SEAFM. This model is regularly updated with hourly meteorological and hydrological data, and it simulates the current state of the watershed (including snowpack, soil moisture, aquifer storage, streamflows and water supply system. The modeling is used to analyze and assess various future reservoir operating scenarios, both in real time and in near and long-term operational planning, based on probabilistic analysis of over 65 years of historic weather; and
  - ✓ SPU’s Conjunctive Use Evaluation (CUE) model, which is a weekly time step simulation model used for calculating and evaluating the firm yield and reliability of SPU’s water supply system and potential future water supply projects. While not a forecast tool per se, the model provides valuable insight into the hydrologic record.
- **Communications** – SPU’s water management team works closely with members of other local, state, federal and tribal resource agencies including Seattle City Light, City of Renton, King County, Washington State Department of Ecology, Washington State Department of Fish and Wildlife, US Army Corps of Engineers, US Fish and Wildlife Service, National Marine Fisheries Services, the Muckleshoot Indian Tribe, and the Tulalip Tribes.

The agencies typically schedule conference calls once per month throughout the year to discuss the variety of issues relating to the management of streamflows. These conference calls can occur more frequently, especially in a drought condition. SPU also has formal and informal agreements with resource agencies, Indian Tribes, and the US Army Corps of Engineers in how it manages the streamflow levels. These agreements affect SPU’s ability to manage the water supply between the needs of the customers and the fish when there is a potential shortage

- **Operational Rules** – Operational flexibility is critical with operating plans changing as conditions and forecast change. SPU has developed “dynamical reservoir rule curves” to operate its reservoirs in the winter season with watershed snowpack and soil moisture conditions. In low water years, it will be important for customers to curtail their water use so as to minimize the human impacts on other instream flow needs.

SPU has several alternative water supply options that can be called upon for use: Chester Morse Lake “Dead Storage”, interties with other purveyors in the region and reclaimed water. The decision to use these options will be made after other alternatives are explored (monitoring current streamflow conditions, forecasting future weather reports, communications with local, state, federal and tribal resource agencies as well as other purveyors, customers and the media, operational adjustments to regional reservoirs and possible curtailment actions).

The SPU principles include:

- a. Clear, timely and specific water supply conditions should be the first choice so that customers can voluntarily meet the targeted demand reduction levels.
- b. Each shortage situation is unique and no one plan can fit all potential scenarios.
- c. Distinguishing between ongoing long-term Conservation Program measures compared to short-term curtailment measures.
- d. Water quality monitoring, both in the streams, wells as well as in the distribution system.

### **3.0 Water Use Curtailment Action Plan**

Changes in water supply will affect SPU and all the purveyors. The District will follow the four stages of response identified in SPU WSCP. The Curtailment measures become more rigorous as shortage conditions become progressively more severe. In the “Advisory Stage”, District customers are informed as soon as meaningful data becomes available of conditions that may reduce the potential for the projected supply to a significant degree unless corrective actions are implemented. Therefore, if the projected supply worsens, the plan moves to the “Voluntary Stage” which relies on voluntary cooperation and support of customers to meet target consumption goals. “Mandatory restrictions” are implemented if the Voluntary Stage does not result in the reduction needed, or if supply conditions worsens. In extreme situations, the “Emergency Curtailment Stage” or “Rationing”, would be implemented but only if the consumption reduction goal is not reached under the Mandatory Restrictions level.

The WSRP can be initiated at any stage depending on the severity of the water shortage situation. Curtailment implemented in response to an emergency would ordinarily require implementation at the Voluntary Stage. The District Superintendent will be responsible for coordinating with SPU implementation of the District’s WSRP and SPU’s WSCP. The District Superintendent will keep the District Commissioners informed regarding all actions relating to the District’s WSRP. Prior to moving to different stages of the plan, SPU will coordinate with the key stakeholders. Communication efforts should be coordinated between the District and SPU so that the same message is being distributed to all the stakeholders.

### **3.1 Advisory Stage**

#### Objectives:

- ✓ Coordinate with SPU and water customers for a potential water shortage thereby allowing all parties adequate planning and coordination time.



- ✓ Undertake supply management actions in cooperation with SPU that forestalls or minimizes the need later for more stringent demand or supply management actions.

Triggers: there are a variety of weather and other conditions that may cause concern about water availability and a potential water shortage. Some of the primary conditions that would trigger regional implementation of the Advisory Stage by SPU, the District, and other purveyors are:

- Exceptionally low snow pack, precipitation and low storage from previous years can cause the total reservoir storage to not be projected to be at the standard operating capacity as of June 1.
- Total reservoir storage and predicted inflows are significantly below the historical average, specific to the time of year. The supply model may predict that the expected summer/fall demands may not be met if this trend continues or worsens.

Public message: “The potential exists for lower than normal water supply. Conditions may return to normal. If water supply conditions do not improve, we may need to reduce consumption at a later date. We will continue to keep you informed”.

SPU and purveyors communications:

- SPU will brief the District and other purveyors on the water shortage advisory and how the implementation of the Advisory stage will occur as part of the Regional Water Shortage Contingency Plan.
- Provide regional public information regarding supply conditions and potential for a water shortage.

District actions:

- District Superintendent will notify the Board of Commissioners.
- District Superintendent will notify District staff.
- District Superintendent to provide Advisory Stage information from SPU to District staff.
- Coordinate with SPU to provide SPU Water Supply Status Report to special interest groups and top District water use customers.
- Coordinate distribution of SPU public information materials explaining the WSCP stages and ranges of action with SPU to target customers.
- Assess current water main flushing and reservoir cleaning activities. Proposed actions should be consistent with regional decisions to either accelerate to be completed prior to the peak season or reduced activities to conserve supply.
- Assess water quality in reservoirs and distribution system to target areas that are predicted to experience severe degradation with reduction consumption.
- Initiate planning and preparation for voluntary Stage Actions.



## 3.2 Voluntary Stage

### Objectives:

- ✓ Maintain or reduce water demand to targeted demand reduction goals through voluntary actions by customers.
- ✓ Forestall or minimize need later for more stringent demand or supply management actions.
- ✓ Maintain high water quality standards throughout the water shortage.

Triggers: the “Voluntary Stage” is implemented by the District Superintendent with one or both of the following situations:

- Supply conditions identified in the Advisory Stage have not improved or have worsened.
- Demand levels have not reduced and require a more stringent response to manage the situation.

Public message: “We are relying on the support and cooperation of our water users to conserve the available water supply. Demand needs to be reduced by \_\_%. Customers are responsible for determining how they will meet that goal. If everyone cooperates, we may avoid imposing more stringent restrictions. In addition to meeting essential water needs of customers, meeting the needs of fish habitat and other environmental concerns is a priority. We will continue to keep you informed.”

### SPU and purveyors communications:

- SPU will brief the District and other purveyors on the water shortage advisory and how the implementation of the Voluntary Stage will occur as part of the Regional Water Shortage Contingency Plan. The Voluntary Stage Demand Reduction Goals, the nature and scope of the voluntary measures shall be agreed to regionally, including the timing of shared information.
- Evaluate whether targeted consumption levels and supply conditions warrant a rate surcharge to reinforce voluntary actions. SPU’s Director will make recommendations to the Mayor and Seattle City Council.
- SPU will inform purveyors of the move to the Voluntary Stage and of any surcharges.
- SPU and the purveyors will evaluate the ability to accelerate, enhance, or expand long-term conservation programs and implement those that are appropriate.

### District actions:

- District Superintendent will notify the Board of Commissioners.
- District Superintendent will notify District staff.
- Concurrent with SPU and other purveyors, the District will prepare a Declaration of Shortage Water Emergency for the Board of Commissioners to review and possibly adopt.
- Prepare and review with the Board the Mandatory Water Use Restrictions and/or surcharges for consideration and approval.

- Coordinate distribution of SPU public information materials explaining the WSCP stages and ranges of action with SPU to all customers.
- Include water quality information for the District customers so that if flushing is necessary, the customers will understand that it is essential for water quality maintenance.
- Eliminate system operation water uses that are not essential to maintain water quality.
- Request that large water users reduce the training exercises that use water.
- Request that large fleet agencies eliminate washing the fleet vehicles unless recycling car washes are used.
- Have District field staff “tag” any observed obvious water waste with notices that inform customers about the supply conditions and the need to conserve.

### **3.3 Mandatory Stage**

#### Objectives:

- ✓ Achieve targeted demand reduction goals by restricting or prohibiting defined water uses.
- ✓ Ensure adequate water supply will be available for the duration of the water shortage to protect public health and safety and to balance the need for stream flows for fish habitat.
- ✓ Minimize disruption to customer’s lives and business, to the extent practical, while meeting target demand reduction goals.
- ✓ Maintain high water quality standards throughout the water shortage.
- ✓ Promote equity amongst customers by establishing clear restriction that affects all customers.

Triggers: the “Mandatory Stage” is implemented by the Board of Commissioners in one or both of the following situations:

- Goals established in the “Voluntary Stage” have not been met, and additional action is needed.
- Supply conditions worsen despite voluntary measures.

Public message: “It is necessary to impose mandatory restrictions to reduce water demand because the voluntary approach has not resulted in the necessary savings (or water supply conditions have worsened despite the public’s water saving efforts). We are continuing to rely on the support and cooperation of the public to comply with these restrictions, but need the certainty and predictability of restricting certain water uses in order to ensure that throughout the duration of this shortage an adequate supply of water is maintained for public health and safety”

#### SPU and purveyors communications:

- SPU will brief the District and other purveyors on the water shortage advisory and how the implementation of the Mandatory Stage will occur as part of the Regional Water Shortage Contingency Plan. The Mandatory Stage, including the nature and scope of

the mandatory measures, shall be agreed to regionally including the timing of shared information.

- SPU Director recommends Mandatory Stage and water use restriction to the Seattle Mayor and Seattle City Council.
- Seattle City Council adopts legislation on mandatory restrictions and, if needed and not already in place, emergency surcharges.

District actions:

- District Superintendent will notify the Board of Commissioners.
- District Superintendent will notify District staff.
- Concurrent with SPU and other purveyors, the District will prepare a resolution declaring a Shortage Water Emergency for the Board of Commissioners to review and possibly adopt.
- Prepare and review with the Board the Emergency Curtailment Stage.
- Coordinate distribution of SPU public information materials explaining the WSCP stages and ranges of action with SPU to all customers.
- Continue with the following actions:
  - Include water quality information for the District customers so that if flushing is necessary, the customers will understand that it is essential for water quality maintenance,
  - Eliminate system operation water uses that are not essential to maintain water quality.
  - Request that large water users reduce the training exercises that use water.
  - Request that large fleet agencies eliminate washing the fleet vehicles unless recycling car washes are used.
  - Have District field staff “tag” any observed obvious water waste with notices that inform customers about the supply conditions and need to conserve.
- If appropriate, implement procedures for exemptions from restrictions and/or emergency surcharges.
- Implement Enforcement Procedures for Mandatory Water Use Restrictions, including highly visible “Water Watchers” (SPU’s guidelines).
- Increase water quality monitoring actions.
- Rescind all Hydrant Use Permits
- Prohibit washing of sidewalks, streets, decks or driveways except as necessary for public health and safety.
- Limit pressure-washing of buildings to situations that require it as part of a scheduled building rehabilitation project (e.g. paint).
- Prohibit all landscape and garden watering during the warmest hours of the day.
- Limit all landscape and garden watering to a specific number of days per week or month.
- Prohibit/ban lawn watering with other watering restrictions. Some potential exemptions from water use restrictions include: newly installed lawns, sports fields, ball fields and play fields, use of water for dust control at construction areas and other areas to comply with air quality requirements.

### 3.4 Emergency Curtailment Stage

#### Objectives:

- ✓ Achieve immediate and significant demand reduction goals to maintain adequate water supply essential for basic public health and safety.

#### Triggers: SPU, the District and other wholesale purveyors recognize that:

- A critical regional and/or local water supply emergency exists.
- Immediate and significant curtailment actions are necessary to maintain essential supplies of water for public health and safety.

Public message: To be determined based on the conditions of the emergency. A typical example of the message might be: "We are in an emergency water supply situation and need the immediate assistance of the public to achieve necessary water savings. We are imposing additional water restrictions and a rate surcharge to achieve the savings because the mandatory approach has not resulted in sufficient savings, and we need to ensure water will be available for public health and safety throughout this shortage."

#### SPU and purveyors communications:

- Continue all previous, applicable actions.
- Prepare appropriate legislation and recommends Declaration of Emergency to Seattle Mayor and City Council for consideration and approval.
- SPU will inform the District and other purveyors on the move into Emergency Curtailment, and of determined water use restrictions, prohibitions, rationing allotments, and/or further surcharges.

#### District actions:

- Continues all previous, applicable actions.
- District Superintendent will notify the Board of Commissioners.
- District Superintendent will notify District staff.
- Concurrent with SPU and other purveyors, the District will prepare a Declaration of Shortage Water Emergency for the Board of Commissioner to review and adopt.
- Coordinate distribution of SPU public information materials relating to Curtailment Water Use Restriction, Prohibitions, and Surcharge legislation then under of Board consideration and approval.
- Inform customers of the rate surcharge and how it will affect them. Provide information on an appeal process.
- Inform customers that taste and odor water quality problems may occur with system-wide reduced water consumption.
- Inform customer about possible pressure reductions and problems this may entail.

- Define and communicate exemptions for medical facilities and other public health institutions.
- Implement Enforcement Procedures for Mandatory Water Use Restrictions, including highly visible “Water Watchers” (SPU’s guidelines).
- Increase water quality monitoring actions.
- Prohibit all landscape and garden watering.

#### **4.0 Short-term Emergency Curtailment Plan**

Non-drought water emergencies are similar to drought emergencies except they lack preparation time and the immediate, potentially large demand reductions. Each emergency scenario is different, but many could require major curtailment actions by customers. Some emergencies could be localized which could require the demand reduction for a limited area. Examples of some of the potential emergencies include: major transmission pipeline break in SPU’s system, temporary treatment plant shut down, major river flooding leading to high Turbidity. SPU has experienced each of these situations and with the efforts within their agency, were able to provide water to the District uninterrupted. Coordination between SPU, the District and other impacted wholesale purveyors will occur in the event of an emergency. If need be, the District can communicate any potential impacts to its customers.



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**2019 Plan Updates of February 2017 Plan**  
2019 Water System Plan  
King County Water District No. 49

The following is a general summary of revisions to the February 2017 WSP to complete the February 2019 WSP. (Highlighted tasks are pending the review and approval process but are intended to be included in the final 2019 Plan.)

- **General** – dates on cover sheets and footers, table of contents
- **Introduction**
  - Summarize relationship of 2019 Plan to 2017 Plan
- **Chapter 1**
  - 1.4 – updated connections through 2018
  - 1.5 – updated dates of referenced planning documents
  - 1.6 – agency comment and submittals discussion updates
  - 1.11.2 – clarified Developer Extension (DE) process. Upon adoption of March 2017 DE Manual only a single DE manual is now maintained.
  - 1.11.3.D – documented 8/17 update of District GFC, clarified SPU facilities charges and conversion of tabular data to tables 1.2 and 1.3, noted SPU GFC increase effective 1/19
- **Chapter 2**
  - 2.1.2 – updated connections through 2018, clarified Port of Seattle as retail customer
  - Table 2.4 – updated water use through 2017 and clarified use through interties
  - 2.1.4 – updated historical water user per ERU
  - Table 2.5 – updated water use through 2017
  - Table 2.6 – updated data for 2018
  - Table 2.7 – updated population forecast through 2038
  - Tables 2.9 and 2.10 – updated demand forecast through 2038
- **Chapter 3**
  - Table 3.1 – Updated to show forecast from 2019-2038
  - Tables 3.3 and 3.4 – clarified SPU and District monitoring requirements, frequency and responsibilities
  - Section 3.2 – clarified references to SPU water supply system including wells available for use as necessary.
  - Section 3.3.1 – clarified that reference to SPU “pumped” or “gravity” supply lines are District terms of distinction, updated SPU estimated water supply firm yield and demand forecast through year 2060, updated SPU WSP date



- Section 3.3.3 – added summary of SPU treatment and reference to SPU water quality annual report and website, clarified SPU and District monitoring responsibilities
  - Section 3.3.4 – updated storage capacity analysis based on extended demand forecast and preliminary sizing of additional storage facility.
  - Section 3.3.5 – discussed District response to Governor’s Directive 16-06
  - (Section 3.3.10 – the hydraulic analysis was not updated for the additional/last two years of the planning period. The analysis through 2036 in the 2017 WSP did not reveal network deficiencies other than for fire flow, already addressed in the CIP.)
  - Section 3.3.4 – updated status of District activity toward purchase of property and subsequent efforts to complete a project to add storage capacity in the system
- **Chapter 4**
    - Table 4.1 – updated to include efforts through 2018
    - Section 4.1.1 – clarified SPU and District WUE program based on SPU input
    - Section 4.1.2 – updated reference to prior SPU and District WUE Program goals, updated current SWP goals and recent progress
    - Section 4.1.2 – updated SWP Goals to 2019 SWP Goals
    - Section 4.1.4 – program for 2019 and beyond updated per SWP plan
    - Table 4.2 – updated to 2019 SWP plan
    - Section 4.1.6 – updated forecast savings through 2028
    - Section 4.1.9 – revised to reflect a rate study completed in 2017 and subsequently revised rates
    - Section 4.2.2 - deleted reference to Tables 4.3 and 4.4 (not previously included)
    - Section 4.3 - updated SPU WSP date
    - Table 4.3 – added water rights self-assessment table
- **Chapter 5**
    - (no changes)
- **Chapter 6**
    - Section 6.1 and Figure 6-1 – updated name of office manager and telemetry and accounting consultants
    - Section 6.4 – added reference to District membership in WAWARN
    - Section 6.5 and 6.11 – added recommendation to review District 2017 Water Shortage Response Plan for consistency with SPU Water Shortage Contingency Plan (as updated and adopted in 2018) and consider updates to District plan
    - Section 6.6 – added discussion of “Table 9” hazards, protection and testing, added reference to updated cross connection control program form in Appendix B
    - Section 6.7 – added discussion of reservoir hatch and seal inspection

- Section 6.10 – added discussion of retention of Construction Completion forms
- Section 6.11 – added discussion of last sanitary survey action items
- **Chapter 7**
  - (no changes)
- **Chapter 8**
  - Table 8-1 – updated CIP to reflect projects completed since 2017, cost escalation and additional projects.
  - Figure 8-1 - updated CIP to reflect projects completed since 2017 and additional projects.
- **Chapter 9**
  - Full chapter updated to reflect 2017 bond sale, actual expenses through 2016, budget for 2017-2028, results of 2017 rate study, discussion of 2019 update of the 2017 rate study, discussion of reserves and forecast of revenue, expenses and financing through 2028
- **Chapter 10**
  - Section 10.1 – updated SEPA and public hearing action and results
  - Section 10.4 – updated referenced plan dates
- **Appendices A, C, D, G, K, M**
  - (no changes)
- **Appendix B**
  - Added new DOH form at end of Cross Connection Control Program for backflow incidence reporting
- **Appendix E**
  - Updated Tables E.1 and E.2 historical data to 2017
  - Updated Tables E.4 and E.5 forecasts to 2019-2038
- **Appendix F**
  - added District 2016 and 2017 CCRs
- **Appendix H**
  - added SEPA documentation for 2019 revised plan adoption
- **Appendix I**
  - added 2017 WSP agency review comments
  - added 2019 agency submittals with responses to 2017 WSP comments

- added updated consistency checklists requests
- **Appendix J**
  - Updated full coliform monitoring plan to be consistent with Revised Total Coliform Rule including forms and updated system map
- **Appendix L**
  - Added SWP 2019-2028 conservation program
  - added 2017-2015 SWP annual reports
  - deleted 2011-2013 SWP annual reports
- **Appendix N**
  - added summary of 2019 plan changes
  - added 2019 WSP resolution of adoption (*action deferred pending review*)
  - added 2017 WSP resolution of adoption
- **Appendix O**
  - added summary of hydraulic modeling results

**KING COUNTY WATER DISTRICT NO. 49  
KING COUNTY, WASHINGTON**

**RESOLUTION NO. 17-1270**

**A RESOLUTION OF THE BOARD OF COMMISSIONERS  
OF WATER DISTRICT NO. 49, KING COUNTY,  
WASHINGTON, RELATING TO THE ADOPTION OF THE  
2017 WATER SYSTEM PLAN.**

**WHEREAS**, RCW 57.08.005 authorizes King County Water District No. 49 (“District”) to provide water service to property within and outside the District's corporate boundaries and provides the District with full authority to regulate and control the use, content, distribution and price thereof; and

**WHEREAS**, pursuant to RCW 43.21A.445 the Washington State Department of Health administers the federal Safe Drinking Water Act; and

**WHEREAS**, the Washington State Department of Health Public Water Supplies Rules, WAC 246-290-100, require that the District update its comprehensive Water System Plan every six (6) years; and

**WHEREAS**, the District’s consulting engineer has reviewed and analyzed the District’s existing water system and operations and has prepared the 2017 Water System Plan dated February 2017 (the “Plan”), which Plan includes updates of the District Coliform Monitoring Plan, Water Use Efficiency Program and the Water Shortage Response Plan; and

**WHEREAS**, the Board of Commissioners held a public hearing on May 25, 2016, in order to receive public comments regarding the 2017 Water System Plan; and whereas, the District SEPA responsible official reviewed a completed SEPA checklist prepared in anticipation of adoption of the updated Water System Plan and issued a Determination of Non Significance and no comments were received in response; now therefore,

**BE IT RESOLVED** by the Board of Commissioners of Water District No. 49 as follows:

1. Adoption of Water System Plan. The 2017 Water System Plan dated February 2017 is hereby adopted as the official Water System Plan for the District. Pursuant to RCW 57.16.010, the 2017 Water System Plan shall be submitted to the Department of Health, cities served by the District, and other applicable agencies for comment and approval by such agencies;

and District staff and the District's consulting engineer, CHS Engineers, are authorized and directed to implement the 2017 Water System Plan as authorized by law and adopted District resolutions, policies, and procedures.

2. Adoption of Coliform Monitoring Plan. The Coliform Monitoring Plan that is included as a part of the 2017 Water System Plan is hereby adopted as the official Coliform Monitoring Plan for the District.

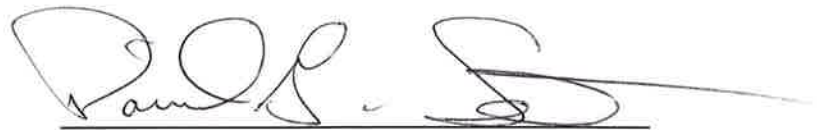
3. Adoption of Water Shortage Response Plan. The Water Shortage Response Plan that is included as a part of the 2017 Water System Plan is hereby adopted as the official Water Shortage Response Plan for the District.

4. Adoption of Water Use Efficiency Program. The Water Use Efficiency Program that is included as part of the 2017 Water System Plan is hereby adopted as the official Water Use Efficiency Program for the District.

ADOPTED by the Board of Commissioners of Water District No. 49 at a regular open public meeting held on the 22 day of ~~February~~ March, 2017.

Individual Commissioner's  
Vote on Resolution

In Favor Of: ☒  
Opposed: ☐  
Abstained: ☐  
Absent: ☐



David G. Lutz  
President and Commissioner

In Favor Of: ☒  
Opposed: ☐  
Abstained: ☐  
Absent: ☐



Raymond L. Brickell  
Vice-President and Commissioner

In Favor Of: ☒  
Opposed: ☐  
Abstained: ☐  
Absent: ☐



Thomas M. Jovanovich  
Secretary and Commissioner

**Certificate**

7D  
7D  
I, Thomas M. Jovanovich, Secretary of the Board of Commissioners of Water District No. 49, King County, Washington, do hereby certify that the foregoing resolution is a true and correct copy of Resolution No. 17-1268 of such Board, duly adopted at a regular meeting thereof held on the 22 day of ~~February~~<sup>March</sup>, 2017, signed by the members of such Board in attendance at such meeting and attested by myself in authentication of such adoption.



Thomas M. Jovanovich, Secretary  
Board of Commissioners  
Water District No. 49  
King County, Washington



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## Scenario Summary Report

### Scenario: 2016 MDD

#### Scenario Summary

ID	89
Label	2016 MDD
Notes	Created: 04/17/02 02:02:55 PM
Active Topology	23: Base-Active Topology
Physical	24: Base-Physical
Demand	27: Base-Average Daily
Initial Settings	54: Base-Initial Settings
Operational	55: Base-Operational
Age	56: Base-Age Alternative
Constituent	57: Base-Constituent
Trace	58: Base-Trace Alternative
Fire Flow	59: Base-Fire Flow
Energy Cost	68: Base-Energy Cost
Transient	1522: Base Transient
Pressure Dependent Demand	69: Base Pressure Dependent Demand
Failure History	1536: Base Failure History
SCADA	1547: Base SCADA
User Data Extensions	70: Base-User Data
Steady State/EPS Solver Calculation Options	71: 2016 MDD
Transient Solver Calculation Options	1520: Base

#### Hydraulic Summary

Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	12:00:00 AM
Trials	40	Calculation Type	Hydraulics Only

Scenario: 2016 MDD  
 Current Time Step: 0.000 h  
 FlexTable: Pipe Table

Sort Descending



ID	Label	Diameter (in)	Flow (gpm)	Velocity (ft/s)	Has Check Valve?	Has User Defined Length?	Is Closed?
1271	652	10.0	535.88	2.19	False	True	False
1272	653	10.0	535.88	2.19	True	True	False
1273	654	12.0	650.00	1.84	False	True	False
1274	655	12.0	650.00	1.84	True	True	False
1564	P-65	12.0	535.28	1.52	True	True	False
1565	P-66	12.0	535.28	1.52	True	True	False
1026	372	8.0	233.79	1.49	False	True	False
795	91	12.0	-399.26	1.13	False	False	False
834	138	12.0	363.40	1.03	False	False	False
904	227	10.0	-238.62	0.97	False	True	False
865	178	12.0	328.70	0.93	False	False	False
796	92	8.0	145.66	0.93	False	False	False
903	226	10.0	-215.31	0.88	False	False	False
832	136	12.0	306.93	0.87	False	False	False
833	137	12.0	303.92	0.86	False	False	False
1024	370	12.0	-299.79	0.85	False	True	False
914	237	12.0	-297.01	0.84	False	True	False
1012	357	8.0	-130.89	0.84	False	False	False
831	135	12.0	293.65	0.83	False	False	False
726	12	8.0	-128.40	0.82	False	False	False
732	18	8.0	125.99	0.80	False	False	False
1599	P-88	6.0	70.44	0.80	False	False	False
780	72	10.0	-186.84	0.76	False	False	False
840	146	10.0	185.21	0.76	False	False	False
1020	366	8.0	-115.64	0.74	False	False	False
1027	373	8.0	114.95	0.73	False	False	False
1084	443	8.0	114.69	0.73	False	True	False
902	224	10.0	-176.91	0.72	False	False	False
733	19	8.0	111.91	0.71	False	False	False
1374	769	8.0	111.67	0.71	False	True	False
1350	223	10.0	-169.25	0.69	False	True	False
1375	770	8.0	106.63	0.68	False	True	False
1019	365	8.0	-106.31	0.68	False	False	False
1033	380	10.0	-164.77	0.67	False	False	False
1508	375	4.0	26.32	0.67	False	False	False
915	238	6.0	-57.28	0.65	False	True	False
1612	P-96	6.0	-57.28	0.65	False	False	False
1310	708	8.0	-94.70	0.60	False	False	False
802	98	10.0	-147.61	0.60	False	False	False
1032	379	10.0	-147.57	0.60	False	False	False
1315	713	8.0	93.74	0.60	False	False	False
1316	714	8.0	93.74	0.60	False	False	False
727	13	8.0	90.87	0.58	False	False	False
1501	356	8.0	-90.60	0.58	False	False	False
969	304	8.0	90.48	0.58	False	False	False
875	189	10.0	140.97	0.58	False	False	False
964	298	8.0	-90.13	0.58	False	False	False
841	147	10.0	137.94	0.56	False	False	False
916	239	12.0	-196.12	0.56	False	False	False
850	156	8.0	87.13	0.56	False	False	False
803	99	10.0	-135.73	0.55	False	False	False
960	294	12.0	195.37	0.55	False	False	False
970	305	8.0	86.44	0.55	False	False	False
1667	P-117	10.0	134.80	0.55	False	False	False
1668	P-118	10.0	134.80	0.55	False	False	False


Scenario: 2016 MDD  
 Current Time Step: 0.000 h  
 FlexTable: Junction Table

Sort Descending



ID	Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Zone	Demand (Maximum) (gpm)
508	J-379	196.0	7.56	554.1	154.9	358.09	153: ZONE-1	7.56
473	J-344	128.0	1.01	460.2	143.7	332.22	158: ZONE-6	1.01
343	J-205	236.0	1.51	554.0	137.6	317.98	153: ZONE-1	1.51
449	J-320	246.0	1.27	554.2	133.4	308.23	153: ZONE-1	1.27
451	J-322	264.0	1.74	554.2	125.6	290.23	153: ZONE-1	1.74
293	J-146	267.2	3.47	554.5	124.3	287.32	153: ZONE-1	3.47
653	J-525	270.0	0.00	554.5	123.1	284.52	153: ZONE-1	0.00
1494	J-588	270.0	0.00	554.2	123.0	284.23	153: ZONE-1	0.00
1495	J-589	270.0	0.00	554.2	123.0	284.23	153: ZONE-1	0.00
472	J-343	177.0	3.02	460.2	122.5	283.22	158: ZONE-6	3.02
338	J-200	272.0	1.76	554.0	122.0	281.98	153: ZONE-1	1.76
452	J-323	274.0	1.27	554.2	121.2	280.23	153: ZONE-1	1.27
474	J-345	189.0	1.01	460.2	117.3	271.22	158: ZONE-6	1.01
314	J-169	284.0	9.49	554.5	117.0	270.50	153: ZONE-1	9.49
295	J-149	287.0	2.46	554.5	115.7	267.52	153: ZONE-1	2.46
389	J-258	287.0	3.03	554.2	115.6	267.24	153: ZONE-1	3.03
292	J-145	288.0	3.47	554.5	115.3	266.52	153: ZONE-1	3.47
684	J-555	290.0	0.00	554.5	114.4	264.52	153: ZONE-1	0.00
608	J-480	197.0	2.27	460.2	113.9	263.20	158: ZONE-6	2.27
514	J-385	177.0	2.77	438.9	113.3	261.92	154: ZONE-2	2.77
313	J-168	294.0	7.09	554.4	112.7	260.44	153: ZONE-1	7.09
561	J-434	295.0	1.01	554.0	112.0	258.97	153: ZONE-1	1.01
562	J-435	295.0	0.76	554.0	112.0	258.97	153: ZONE-1	0.76
296	J-150	296.0	2.48	554.5	111.8	258.52	153: ZONE-1	2.48
294	J-148	296.6	2.05	554.5	111.6	257.92	153: ZONE-1	2.05
433	J-303	205.0	1.76	460.2	110.4	255.21	158: ZONE-6	1.76
685	J-556	300.0	0.00	554.5	110.1	254.52	153: ZONE-1	0.00
392	J-261	300.0	3.78	554.2	110.0	254.24	153: ZONE-1	3.78
290	J-143	301.5	11.77	554.5	109.5	253.01	153: ZONE-1	11.77
297	J-151	302.0	2.07	554.5	109.3	252.52	153: ZONE-1	2.07
503	J-374	302.0	3.02	554.1	109.1	252.06	153: ZONE-1	3.02
515	J-386	187.0	0.00	438.9	109.0	251.90	154: ZONE-2	0.00
519	J-391	188.0	1.76	438.9	108.5	250.87	154: ZONE-2	1.76
241	J-88	305.0	1.90	554.6	108.0	249.59	153: ZONE-1	1.90
291	J-144	305.0	3.54	554.5	108.0	249.52	153: ZONE-1	3.54
298	J-152	306.0	1.55	554.5	107.5	248.52	153: ZONE-1	1.55
312	J-166	306.0	6.71	554.4	107.5	248.44	153: ZONE-1	6.71
385	J-254	306.3	2.52	554.3	107.3	248.03	153: ZONE-1	2.52
687	J-558	307.0	0.00	554.5	107.1	247.53	153: ZONE-1	0.00
1486	J-585	307.0	0.00	554.2	107.0	247.23	153: ZONE-1	0.00
265	J-116	307.5	5.65	554.5	106.9	247.03	153: ZONE-1	5.65
266	J-117	307.5	4.26	554.5	106.9	247.03	153: ZONE-1	4.26
520	J-392	192.0	5.04	438.9	106.8	246.87	154: ZONE-2	5.04
267	J-120	309.0	6.82	554.5	106.2	245.52	153: ZONE-1	6.82
306	J-160	308.9	9.44	554.4	106.2	245.45	153: ZONE-1	9.44
387	J-256	309.0	6.86	554.2	106.1	245.25	153: ZONE-1	6.86
686	J-557	310.0	0.00	554.5	105.8	244.52	153: ZONE-1	0.00
299	J-153	310.0	1.91	554.5	105.8	244.52	153: ZONE-1	1.91
310	J-164	310.0	17.30	554.5	105.8	244.47	153: ZONE-1	17.30
665	J-536	310.0	0.00	554.0	105.6	243.98	153: ZONE-1	0.00
672	J-543	195.0	0.00	438.9	105.5	243.90	154: ZONE-2	0.00
245	J-92	311.0	2.14	554.6	105.4	243.57	153: ZONE-1	2.14
240	J-87	312.0	0.93	554.6	105.0	242.59	153: ZONE-1	0.93
242	J-89	312.0	0.93	554.6	105.0	242.59	153: ZONE-1	0.93
301	J-155	312.0	0.00	554.5	104.9	242.52	153: ZONE-1	0.00
302	J-156	312.0	0.00	554.5	104.9	242.52	153: ZONE-1	0.00

**Scenario: 2016 MDD**  
**Current Time Step: 0.000 h**  
**FlexTable: Junction Table**

Sort Ascending  


ID	Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Zone	Demand (Maximum) (gpm)
641	J-513	265.0	0.00	372.3	46.4	107.34	1624: Pump Inlet	0.00
603	J-476	330.0	0.50	438.8	47.1	108.77	154: ZONE-2	0.50
659	J-531	324.0	0.00	438.8	49.7	114.77	154: ZONE-2	0.00
622	J-494	323.0	1.26	438.8	50.1	115.77	154: ZONE-2	1.26
604	J-477	323.0	1.01	438.8	50.1	115.77	154: ZONE-2	1.01
602	J-475	323.0	0.76	438.8	50.1	115.77	154: ZONE-2	0.76
565	J-438	190.0	0.50	319.5	56.0	129.48	156: ZONE-4	0.50
567	J-440	190.0	0.76	319.5	56.0	129.48	156: ZONE-4	0.76
614	J-486	190.0	0.50	319.5	56.0	129.48	156: ZONE-4	0.50
600	J-473	306.0	4.03	438.8	57.4	132.77	154: ZONE-2	4.03
601	J-474	306.0	0.00	438.8	57.4	132.77	154: ZONE-2	0.00
326	J-185	305.0	5.74	439.3	58.1	134.27	154: ZONE-2	5.74
607	J-479	305.0	5.74	439.3	58.1	134.27	154: ZONE-2	5.74
606	J-478	303.0	6.63	439.3	59.0	136.27	154: ZONE-2	6.63
563	J-436	245.0	0.76	381.7	59.2	136.73	157: ZONE-5	0.76
477	J-348	322.0	1.76	460.2	59.8	138.23	158: ZONE-6	1.76
337	J-199	300.0	4.19	439.3	60.3	139.27	154: ZONE-2	4.19
335	J-197	300.0	5.82	439.3	60.3	139.27	154: ZONE-2	5.82
1610	J-619	299.1	0.00	439.3	60.7	140.22	154: ZONE-2	0.00
336	J-198	299.0	7.09	439.3	60.7	140.29	154: ZONE-2	7.09
327	J-187	299.0	11.84	439.3	60.7	140.34	154: ZONE-2	11.84
475	J-346	318.0	1.76	460.2	61.5	142.23	158: ZONE-6	1.76
325	J-184	295.0	2.65	439.2	62.4	144.19	154: ZONE-2	2.65
422	J-292	295.0	3.28	439.4	62.5	144.38	154: ZONE-2	3.28
332	J-194	295.0	6.39	439.6	62.6	144.59	153: ZONE-1	6.39
626	J-498	294.0	3.58	439.0	62.7	144.96	154: ZONE-2	3.58
643	J-515	293.0	0.00	438.9	63.1	145.95	153: ZONE-1	0.00
342	J-204	353.0	0.50	499.3	63.3	146.32	153: ZONE-1	0.50
394	J-263	292.0	1.26	438.9	63.6	146.93	154: ZONE-2	1.26
443	J-313	406.5	5.04	554.2	63.9	147.73	153: ZONE-1	5.04
354	J-221	312.0	1.26	460.2	64.1	148.19	158: ZONE-6	1.26
644	J-516	405.0	0.00	554.1	64.5	149.13	153: ZONE-1	0.00
330	J-191	290.0	3.60	439.6	64.7	149.59	154: ZONE-2	3.60
555	J-427	404.0	3.28	554.0	64.9	149.96	153: ZONE-1	3.28
323	J-181	289.0	3.75	439.2	65.0	150.18	154: ZONE-2	3.75
324	J-183	289.0	3.75	439.2	65.0	150.19	154: ZONE-2	3.75
390	J-259	288.0	6.54	438.9	65.3	150.94	154: ZONE-2	6.54
419	J-289	288.0	6.59	439.3	65.4	151.27	154: ZONE-2	6.59
329	J-190	287.0	3.71	439.6	66.0	152.59	154: ZONE-2	3.71
328	J-189	287.0	3.22	439.6	66.0	152.60	154: ZONE-2	3.22
481	J-352	400.0	3.28	553.9	66.6	153.91	153: ZONE-1	3.28
542	J-414	400.0	2.52	553.9	66.6	153.92	153: ZONE-1	2.52
553	J-425	400.0	1.51	554.0	66.6	153.95	153: ZONE-1	1.51
331	J-193	285.0	6.39	439.6	66.9	154.59	153: ZONE-1	6.39
380	J-249	398.8	9.58	554.2	67.2	155.37	153: ZONE-1	9.58
379	J-248	397.5	7.31	554.1	67.8	156.61	153: ZONE-1	7.31
444	J-314	397.0	5.04	554.2	68.0	157.23	153: ZONE-1	5.04
509	J-380	204.5	3.02	361.8	68.1	157.35	155: ZONE-3	3.02
334	J-196	282.0	0.00	439.7	68.2	157.69	154: ZONE-2	0.00
333	J-195	282.0	1.12	439.7	68.2	157.70	154: ZONE-2	1.12
544	J-416	396.0	2.77	553.9	68.3	157.92	153: ZONE-1	2.77
202	J-44	395.0	0.00	554.7	69.1	159.73	153: ZONE-1	0.00
420	J-290	279.0	1.25	439.3	69.3	160.27	154: ZONE-2	1.25
423	J-293	279.0	2.52	439.4	69.4	160.38	154: ZONE-2	2.52
203	J-45	394.0	0.00	554.7	69.5	160.73	153: ZONE-1	0.00
173	J-15	394.0	2.02	554.9	69.6	160.90	153: ZONE-1	2.02

## Scenario Summary Report

### Scenario: 2016 MDD

Scenario Summary			
ID	89		
Label	2016 MDD		
Notes	Created: 04/17/02 02:02:55 PM		
Active Topology	23: Base-Active Topology		
Physical	24: Base-Physical		
Demand	27: Base-Average Daily		
Initial Settings	1651: 2016 SPU FCV-Inactive		
Operational	55: Base-Operational		
Age	56: Base-Age Alternative		
Constituent	57: Base-Constituent		
Trace	58: Base-Trace Alternative		
Fire Flow	59: Base-Fire Flow		
Energy Cost	68: Base-Energy Cost		
Transient	1522: Base Transient		
Pressure Dependent Demand	69: Base Pressure Dependent Demand		
Failure History	1536: Base Failure History		
SCADA	1547: Base SCADA		
User Data Extensions	70: Base-User Data		
Steady State/EPS Solver Calculation Options	71: 2016 MDD		
Transient Solver Calculation Options	1520: Base		
Hydraulic Summary			
Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	12:00:00 AM
Trials	40	Calculation Type	Hydraulics Only

**Scenario: 2016 MDD**  
**Current Time Step: 0.000 h**  
**FlexTable: Pipe Table**

ID	Label	Diameter (in)	Flow (gpm)	Velocity (ft/s)	Has Check Valve?	Has User Defined Length?	Is Closed?
1273	654	12.0	701.91	1.99	False	True	False
1274	655	12.0	701.91	1.99	True	True	False
1271	652	10.0	483.97	1.98	False	True	False
1272	653	10.0	483.97	1.98	True	True	False
1564	P-65	12.0	535.28	1.52	True	True	False
1565	P-66	12.0	535.28	1.52	True	True	False
1026	372	8.0	233.95	1.49	False	True	False
795	91	12.0	-423.24	1.20	False	False	False
796	92	8.0	166.36	1.06	False	False	False
834	138	12.0	365.75	1.04	False	False	False
904	227	10.0	-238.50	0.97	False	True	False
865	178	12.0	330.23	0.94	False	False	False
832	136	12.0	313.57	0.89	False	False	False
833	137	12.0	310.55	0.88	False	False	False
903	226	10.0	-215.19	0.88	False	False	False
831	135	12.0	304.42	0.86	False	False	False
1024	370	12.0	-299.63	0.85	False	True	False
914	237	12.0	-296.86	0.84	False	True	False
1012	357	8.0	-130.74	0.83	False	False	False
1599	P-88	6.0	71.48	0.81	False	False	False
840	146	10.0	190.01	0.78	False	False	False
732	18	8.0	117.31	0.75	False	False	False
1020	366	8.0	-115.44	0.74	False	False	False
1027	373	8.0	115.29	0.74	False	False	False
1084	443	8.0	115.04	0.73	False	True	False
902	224	10.0	-176.71	0.72	False	False	False
1374	769	8.0	112.02	0.71	False	True	False
726	12	8.0	-110.64	0.71	False	False	False
1350	223	10.0	-169.06	0.69	False	True	False
1375	770	8.0	106.98	0.68	False	True	False
1019	365	8.0	-106.12	0.68	False	False	False
780	72	10.0	-165.38	0.68	False	False	False
1033	380	10.0	-164.66	0.67	False	False	False
1508	375	4.0	26.31	0.67	False	False	False
733	19	8.0	104.76	0.67	False	False	False
1310	708	8.0	-101.92	0.65	False	False	False
915	238	6.0	-57.24	0.65	False	True	False
1612	P-96	6.0	-57.24	0.65	False	False	False
1315	713	8.0	96.10	0.61	False	False	False
1316	714	8.0	96.10	0.61	False	False	False
1032	379	10.0	-147.42	0.60	False	False	False
841	147	10.0	143.27	0.59	False	False	False
875	189	10.0	141.46	0.58	False	False	False
1501	356	8.0	-90.49	0.58	False	False	False
964	298	8.0	-89.96	0.57	False	False	False
969	304	8.0	89.91	0.57	False	False	False
802	98	10.0	-138.84	0.57	False	False	False
1238	615	6.0	49.77	0.56	False	False	False
916	239	12.0	-196.28	0.56	False	False	False
960	294	12.0	195.52	0.55	False	False	False
727	13	8.0	86.86	0.55	False	False	False
1668	P-118	10.0	134.72	0.55	False	False	False
970	305	8.0	85.87	0.55	False	False	False
850	156	8.0	85.30	0.54	False	False	False
961	295	12.0	191.74	0.54	False	False	False

**Scenario: 2016 MDD**  
**Current Time Step: 0.000 h**  
**FlexTable: Junction Table**

ID	Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Zone	Demand (Maximum) (gpm)
508	J-379	196.0	7.56	554.2	155.0	358.15	153: ZONE-1	7.56
473	J-344	128.0	1.01	460.2	143.7	332.22	158: ZONE-6	1.01
343	J-205	236.0	1.51	554.0	137.6	318.04	153: ZONE-1	1.51
449	J-320	246.0	1.27	554.3	133.4	308.29	153: ZONE-1	1.27
451	J-322	264.0	1.74	554.3	125.6	290.29	153: ZONE-1	1.74
293	J-146	267.2	3.47	554.6	124.3	287.37	153: ZONE-1	3.47
653	J-525	270.0	0.00	554.6	123.1	284.57	153: ZONE-1	0.00
1494	J-588	270.0	0.00	554.3	123.0	284.29	153: ZONE-1	0.00
1495	J-589	270.0	0.00	554.3	123.0	284.29	153: ZONE-1	0.00
472	J-343	177.0	3.02	460.2	122.5	283.22	158: ZONE-6	3.02
338	J-200	272.0	1.76	554.0	122.0	282.04	153: ZONE-1	1.76
452	J-323	274.0	1.27	554.3	121.3	280.29	153: ZONE-1	1.27
474	J-345	189.0	1.01	460.2	117.3	271.22	158: ZONE-6	1.01
314	J-169	284.0	9.49	554.6	117.1	270.56	153: ZONE-1	9.49
295	J-149	287.0	2.46	554.6	115.8	267.57	153: ZONE-1	2.46
389	J-258	287.0	3.03	554.3	115.6	267.30	153: ZONE-1	3.03
292	J-145	288.0	3.47	554.6	115.3	266.57	153: ZONE-1	3.47
684	J-555	290.0	0.00	554.6	114.5	264.57	153: ZONE-1	0.00
608	J-480	197.0	2.27	460.2	113.9	263.20	158: ZONE-6	2.27
514	J-385	177.0	2.77	438.9	113.3	261.92	154: ZONE-2	2.77
313	J-168	294.0	7.09	554.5	112.7	260.50	153: ZONE-1	7.09
561	J-434	295.0	1.01	554.0	112.1	259.03	153: ZONE-1	1.01
562	J-435	295.0	0.76	554.0	112.1	259.03	153: ZONE-1	0.76
296	J-150	296.0	2.48	554.6	111.9	258.57	153: ZONE-1	2.48
294	J-148	296.6	2.05	554.6	111.6	257.97	153: ZONE-1	2.05
433	J-303	205.0	1.76	460.2	110.4	255.21	158: ZONE-6	1.76
685	J-556	300.0	0.00	554.6	110.1	254.57	153: ZONE-1	0.00
392	J-261	300.0	3.78	554.3	110.0	254.30	153: ZONE-1	3.78
290	J-143	301.5	11.77	554.6	109.5	253.06	153: ZONE-1	11.77
297	J-151	302.0	2.07	554.6	109.3	252.57	153: ZONE-1	2.07
503	J-374	302.0	3.02	554.1	109.1	252.12	153: ZONE-1	3.02
515	J-386	187.0	0.00	438.9	109.0	251.90	154: ZONE-2	0.00
519	J-391	188.0	1.76	438.9	108.5	250.88	154: ZONE-2	1.76
241	J-88	305.0	1.90	554.6	108.0	249.64	153: ZONE-1	1.90
291	J-144	305.0	3.54	554.6	108.0	249.58	153: ZONE-1	3.54
298	J-152	306.0	1.55	554.6	107.5	248.57	153: ZONE-1	1.55
312	J-166	306.0	6.71	554.5	107.5	248.50	153: ZONE-1	6.71
385	J-254	306.3	2.52	554.4	107.3	248.09	153: ZONE-1	2.52
687	J-558	307.0	0.00	554.6	107.1	247.58	153: ZONE-1	0.00
1486	J-585	307.0	0.00	554.3	107.0	247.29	153: ZONE-1	0.00
265	J-116	307.5	5.65	554.6	106.9	247.08	153: ZONE-1	5.65
266	J-117	307.5	4.26	554.6	106.9	247.08	153: ZONE-1	4.26
520	J-392	192.0	5.04	438.9	106.8	246.88	154: ZONE-2	5.04
267	J-120	309.0	6.82	554.6	106.2	245.57	153: ZONE-1	6.82
306	J-160	308.9	9.44	554.4	106.2	245.51	153: ZONE-1	9.44
387	J-256	309.0	6.86	554.3	106.1	245.31	153: ZONE-1	6.86
686	J-557	310.0	0.00	554.6	105.8	244.58	153: ZONE-1	0.00
299	J-153	310.0	1.91	554.6	105.8	244.57	153: ZONE-1	1.91
310	J-164	310.0	17.30	554.5	105.8	244.53	153: ZONE-1	17.30
665	J-536	310.0	0.00	554.0	105.6	244.04	153: ZONE-1	0.00
672	J-543	195.0	0.00	438.9	105.5	243.90	154: ZONE-2	0.00
245	J-92	311.0	2.14	554.6	105.4	243.62	153: ZONE-1	2.14
240	J-87	312.0	0.93	554.6	105.0	242.64	153: ZONE-1	0.93
242	J-89	312.0	0.93	554.6	105.0	242.64	153: ZONE-1	0.93
301	J-155	312.0	0.00	554.6	104.9	242.57	153: ZONE-1	0.00
302	J-156	312.0	0.00	554.6	104.9	242.57	153: ZONE-1	0.00

**Scenario: 2016 MDD**  
**Current Time Step: 0.000 h**  
**FlexTable: Junction Table**

ID	Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Zone	Demand (Maximum) (gpm)
641	J-513	265.0	0.00	372.4	46.5	107.37	1624: Pump Inlet	0.00
603	J-476	330.0	0.50	438.6	47.0	108.58	154: ZONE-2	0.50
659	J-531	324.0	0.00	438.6	49.6	114.58	154: ZONE-2	0.00
622	J-494	323.0	1.26	438.6	50.0	115.58	154: ZONE-2	1.26
604	J-477	323.0	1.01	438.6	50.0	115.58	154: ZONE-2	1.01
602	J-475	323.0	0.76	438.6	50.0	115.58	154: ZONE-2	0.76
565	J-438	190.0	0.50	319.5	56.0	129.48	156: ZONE-4	0.50
567	J-440	190.0	0.76	319.5	56.0	129.48	156: ZONE-4	0.76
614	J-486	190.0	0.50	319.5	56.0	129.48	156: ZONE-4	0.50
600	J-473	306.0	4.03	438.6	57.4	132.58	154: ZONE-2	4.03
601	J-474	306.0	0.00	438.6	57.4	132.58	154: ZONE-2	0.00
326	J-185	305.0	5.74	439.3	58.1	134.27	154: ZONE-2	5.74
607	J-479	305.0	5.74	439.3	58.1	134.27	154: ZONE-2	5.74
606	J-478	303.0	6.63	439.3	59.0	136.27	154: ZONE-2	6.63
563	J-436	245.0	0.76	381.7	59.2	136.73	157: ZONE-5	0.76
477	J-348	322.0	1.76	460.2	59.8	138.23	158: ZONE-6	1.76
337	J-199	300.0	4.19	439.3	60.3	139.27	154: ZONE-2	4.19
335	J-197	300.0	5.82	439.3	60.3	139.27	154: ZONE-2	5.82
1610	J-619	299.1	0.00	439.3	60.7	140.22	154: ZONE-2	0.00
336	J-198	299.0	7.09	439.3	60.7	140.29	154: ZONE-2	7.09
327	J-187	299.0	11.84	439.3	60.7	140.34	154: ZONE-2	11.84
475	J-346	318.0	1.76	460.2	61.5	142.23	158: ZONE-6	1.76
325	J-184	295.0	2.65	439.2	62.4	144.19	154: ZONE-2	2.65
422	J-292	295.0	3.28	439.4	62.5	144.38	154: ZONE-2	3.28
332	J-194	295.0	6.39	439.6	62.6	144.59	153: ZONE-1	6.39
626	J-498	294.0	3.58	439.0	62.7	144.96	154: ZONE-2	3.58
643	J-515	293.0	0.00	438.9	63.1	145.95	153: ZONE-1	0.00
342	J-204	353.0	0.50	499.3	63.3	146.32	153: ZONE-1	0.50
394	J-263	292.0	1.26	438.9	63.6	146.93	154: ZONE-2	1.26
443	J-313	406.5	5.04	554.3	63.9	147.79	153: ZONE-1	5.04
354	J-221	312.0	1.26	460.2	64.1	148.19	158: ZONE-6	1.26
644	J-516	405.0	0.00	554.2	64.5	149.19	153: ZONE-1	0.00
330	J-191	290.0	3.60	439.6	64.7	149.59	154: ZONE-2	3.60
555	J-427	404.0	3.28	554.0	64.9	150.02	153: ZONE-1	3.28
323	J-181	289.0	3.75	439.2	65.0	150.18	154: ZONE-2	3.75
324	J-183	289.0	3.75	439.2	65.0	150.19	154: ZONE-2	3.75
390	J-259	288.0	6.54	438.9	65.3	150.94	154: ZONE-2	6.54
419	J-289	288.0	6.59	439.3	65.4	151.27	154: ZONE-2	6.59
329	J-190	287.0	3.71	439.6	66.0	152.59	154: ZONE-2	3.71
328	J-189	287.0	3.22	439.6	66.0	152.60	154: ZONE-2	3.22
481	J-352	400.0	3.28	554.0	66.6	153.97	153: ZONE-1	3.28
542	J-414	400.0	2.52	554.0	66.6	153.98	153: ZONE-1	2.52
553	J-425	400.0	1.51	554.0	66.6	154.01	153: ZONE-1	1.51
331	J-193	285.0	6.39	439.6	66.9	154.59	153: ZONE-1	6.39
380	J-249	398.8	9.58	554.2	67.2	155.43	153: ZONE-1	9.58
379	J-248	397.5	7.31	554.2	67.8	156.67	153: ZONE-1	7.31
444	J-314	397.0	5.04	554.3	68.1	157.29	153: ZONE-1	5.04
509	J-380	204.5	3.02	361.8	68.1	157.35	155: ZONE-3	3.02
334	J-196	282.0	0.00	439.7	68.2	157.69	154: ZONE-2	0.00
333	J-195	282.0	1.12	439.7	68.2	157.70	154: ZONE-2	1.12
544	J-416	396.0	2.77	554.0	68.4	157.98	153: ZONE-1	2.77
202	J-44	395.0	0.00	554.8	69.1	159.80	153: ZONE-1	0.00
420	J-290	279.0	1.25	439.3	69.3	160.27	154: ZONE-2	1.25
423	J-293	279.0	2.52	439.4	69.4	160.38	154: ZONE-2	2.52
203	J-45	394.0	0.00	554.8	69.6	160.80	153: ZONE-1	0.00
173	J-15	394.0	2.02	554.9	69.6	160.91	153: ZONE-1	2.02



## Scenario Summary Report

### Scenario: 2016 PHD

Scenario Summary	
ID	1649
Label	2016 PHD
Notes	
Active Topology	<I> 23: Base-Active Topology
Physical	<I> 24: Base-Physical
Demand	<I> 27: Base-Average Daily
Initial Settings	54: Base-Initial Settings
Operational	<I> 55: Base-Operational
Age	<I> 56: Base-Age Alternative
Constituent	<I> 57: Base-Constituent
Trace	<I> 58: Base-Trace Alternative
Fire Flow	<I> 59: Base-Fire Flow
Energy Cost	<I> 68: Base-Energy Cost
Transient	<I> 1522: Base Transient
Pressure Dependent Demand	<I> 69: Base Pressure Dependent Demand
Failure History	<I> 1536: Base Failure History
SCADA	<I> 1547: Base SCADA
User Data Extensions	<I> 70: Base-User Data
Steady State/EPS Solver Calculation Options	1642: 2016 PHD
Transient Solver Calculation Options	<I> 1520: Base

*Run fails  
w/ FCVs active*

Hydraulic Summary			
Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	12:00:00 AM
Trials	40	Calculation Type	Hydraulics Only

**Scenario: 2016 PHD**  
**Current Time Step: 0.000 h**  
**FlexTable: FCV Table**

ID	Diameter (Valve) (in)	Flow Setting (Initial) (gpm)	Flow (gpm)	Is Active?	Is Open?	Velocity (ft/s)	Hydraulic Grade (From) (ft)	Hydraulic Grade (To) (ft)
705	4.0	850.00	850.00	True	True	21.70	555.0	498.0
1563	6.0	1,000.00	984.34	True	True	11.17	440.0	3,490,346.5
706	8.0	650.00	650.00	True	True	4.15	555.0	497.6
1628	6.0	2,000.00	-16.72	True	True	0.19	3,490,342.5	3,490,342.5
1566	6.0	10.00	-15.66	True	True	0.18	420.0	420.0
1569	6.0	10.00	0.00	True	True	0.00	3,490,342.8	3,490,342.8

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## Scenario Summary Report

### Scenario: 2016 PHD

Scenario Summary			
ID	1649		
Label	2016 PHD		
Notes			
Active Topology	<I> 23: Base-Active Topology		
Physical	<I> 24: Base-Physical		
Demand	<I> 27: Base-Average Daily		
Initial Settings	<I> 1651: 2016 SPU FCV-Inactive		
Operational	<I> 55: Base-Operational		
Age	<I> 56: Base-Age Alternative		
Constituent	<I> 57: Base-Constituent		
Trace	<I> 58: Base-Trace Alternative		
Fire Flow	<I> 59: Base-Fire Flow		
Energy Cost	<I> 68: Base-Energy Cost		
Transient	<I> 1522: Base Transient		
Pressure Dependent Demand	<I> 69: Base Pressure Dependent Demand		
Failure History	<I> 1536: Base Failure History		
SCADA	<I> 1547: Base SCADA		
User Data Extensions	<I> 70: Base-User Data		
Steady State/EPS Solver Calculation Options	1642: 2016 PHD		
Transient Solver Calculation Options	<I> 1520: Base		
Hydraulic Summary			
Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	12:00:00 AM
Trials	40	Calculation Type	Hydraulics Only

**Scenario: 2016 PHD**  
**Current Time Step: 0.000 h**  
**FlexTable: Pipe Table**



ID	Label	Diameter (in)	Flow (gpm)	Velocity (ft/s)	Has Check Valve?	Has User Defined Length?	Is Closed?
1274	655	12.0	1,150.46	3.26	True	True	False
1273	654	12.0	1,150.46	3.26	False	True	False
1272	653	10.0	793.26	3.24	True	True	False
1271	652	10.0	793.26	3.24	False	True	False
1564	P-65	12.0	877.34	2.49	True	True	False
1565	P-66	12.0	877.34	2.49	True	True	False
1026	372	8.0	383.45	2.45	False	True	False
795	91	12.0	-693.71	1.97	False	False	False
796	92	8.0	272.67	1.74	False	False	False
834	138	12.0	599.49	1.70	False	False	False
904	227	10.0	-390.91	1.60	False	True	False
865	178	12.0	541.27	1.54	False	False	False
832	136	12.0	513.95	1.46	False	False	False
833	137	12.0	509.01	1.44	False	False	False
903	226	10.0	-352.70	1.44	False	False	False
831	135	12.0	498.96	1.42	False	False	False
1024	370	12.0	-491.11	1.39	False	True	False
914	237	12.0	-486.57	1.38	False	True	False
1012	357	8.0	-214.28	1.37	False	False	False
1599	P-88	6.0	117.16	1.33	False	False	False
840	146	10.0	311.44	1.27	False	False	False
732	18	8.0	192.28	1.23	False	False	False
1020	366	8.0	-189.22	1.21	False	False	False
1027	373	8.0	188.97	1.21	False	False	False
1084	443	8.0	188.56	1.20	False	True	False
902	224	10.0	-289.64	1.18	False	False	False
1374	769	8.0	183.60	1.17	False	True	False
726	12	8.0	-181.35	1.16	False	False	False
1350	223	10.0	-277.09	1.13	False	True	False
1375	770	8.0	175.34	1.12	False	True	False
1019	365	8.0	-173.93	1.11	False	False	False
780	72	10.0	-271.07	1.11	False	False	False
1033	380	10.0	-269.88	1.10	False	False	False
1508	375	4.0	43.13	1.10	False	False	False
733	19	8.0	171.71	1.10	False	False	False
1310	708	8.0	-167.06	1.07	False	False	False
915	238	6.0	-93.83	1.06	False	True	False
1612	P-96	6.0	-93.83	1.06	False	False	False
1315	713	8.0	157.52	1.01	False	False	False
1316	714	8.0	157.52	1.01	False	False	False
1032	379	10.0	-241.63	0.99	False	False	False
841	147	10.0	234.83	0.96	False	False	False
875	189	10.0	231.86	0.95	False	False	False
1501	356	8.0	-148.32	0.95	False	False	False
964	298	8.0	-147.45	0.94	False	False	False
969	304	8.0	147.37	0.94	False	False	False
802	98	10.0	-227.57	0.93	False	False	False
1238	615	6.0	81.57	0.93	False	False	False
916	239	12.0	-321.71	0.91	False	False	False
960	294	12.0	320.47	0.91	False	False	False
727	13	8.0	142.36	0.91	False	False	False
1668	P-118	10.0	220.81	0.90	False	False	False
970	305	8.0	140.75	0.90	False	False	False
850	156	8.0	139.82	0.89	False	False	False
961	295	12.0	314.27	0.89	False	False	False

**Scenario: 2016 PHD**  
**Current Time Step: 0.000 h**  
**FlexTable: Junction Table**

ID	Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Zone	Demand (Maximum) (gpm)
508	J-379	196.0	12.39	552.9	154.4	356.89	153: ZONE-1	12.39
473	J-344	128.0	1.65	460.2	143.7	332.20	158: ZONE-6	1.65
343	J-205	236.0	2.48	552.6	137.0	316.61	153: ZONE-1	2.48
449	J-320	246.0	2.08	553.2	132.9	307.22	153: ZONE-1	2.08
451	J-322	264.0	2.86	553.2	125.1	289.24	153: ZONE-1	2.86
293	J-146	267.2	5.68	553.9	124.1	286.73	153: ZONE-1	5.68
653	J-525	270.0	0.00	553.9	122.8	283.93	153: ZONE-1	0.00
1494	J-588	270.0	0.00	553.2	122.5	283.22	153: ZONE-1	0.00
1495	J-589	270.0	0.00	553.2	122.5	283.22	153: ZONE-1	0.00
472	J-343	177.0	4.96	460.2	122.5	283.20	158: ZONE-6	4.96
338	J-200	272.0	2.89	552.6	121.4	280.61	153: ZONE-1	2.89
452	J-323	274.0	2.08	553.2	120.8	279.23	153: ZONE-1	2.08
474	J-345	189.0	1.65	460.2	117.3	271.21	158: ZONE-6	1.65
314	J-169	284.0	15.56	553.9	116.8	269.89	153: ZONE-1	15.56
295	J-149	287.0	4.04	553.9	115.5	266.93	153: ZONE-1	4.04
389	J-258	287.0	4.97	553.3	115.2	266.26	153: ZONE-1	4.97
292	J-145	288.0	5.68	553.9	115.1	265.93	153: ZONE-1	5.68
684	J-555	290.0	0.00	553.9	114.2	263.93	153: ZONE-1	0.00
608	J-480	197.0	3.72	460.2	113.9	263.15	158: ZONE-6	3.72
514	J-385	177.0	4.54	437.3	112.6	260.30	154: ZONE-2	4.54
313	J-168	294.0	11.62	553.8	112.4	259.75	153: ZONE-1	11.62
296	J-150	296.0	4.07	553.9	111.6	257.93	153: ZONE-1	4.07
561	J-434	295.0	1.65	552.6	111.4	257.57	153: ZONE-1	1.65
562	J-435	295.0	1.24	552.6	111.4	257.57	153: ZONE-1	1.24
294	J-148	296.6	3.35	553.9	111.3	257.33	153: ZONE-1	3.35
433	J-303	205.0	2.89	460.2	110.4	255.18	158: ZONE-6	2.89
685	J-556	300.0	0.00	553.9	109.9	253.93	153: ZONE-1	0.00
392	J-261	300.0	6.20	553.2	109.6	253.25	153: ZONE-1	6.20
290	J-143	301.5	19.29	553.9	109.2	252.41	153: ZONE-1	19.29
297	J-151	302.0	3.39	553.9	109.0	251.93	153: ZONE-1	3.39
503	J-374	302.0	4.96	552.8	108.5	250.81	153: ZONE-1	4.96
515	J-386	187.0	0.00	437.2	108.3	250.25	154: ZONE-2	0.00
519	J-391	188.0	2.89	437.2	107.8	249.20	154: ZONE-2	2.89
241	J-88	305.0	3.11	554.1	107.8	249.10	153: ZONE-1	3.11
291	J-144	305.0	5.81	553.9	107.7	248.94	153: ZONE-1	5.81
298	J-152	306.0	2.55	553.9	107.3	247.93	153: ZONE-1	2.55
312	J-166	306.0	11.00	553.7	107.2	247.75	153: ZONE-1	11.00
385	J-254	306.3	4.14	553.5	106.9	247.17	153: ZONE-1	4.14
687	J-558	307.0	0.00	554.0	106.8	246.96	153: ZONE-1	0.00
265	J-116	307.5	9.26	554.0	106.6	246.46	153: ZONE-1	9.26
266	J-117	307.5	6.99	554.0	106.6	246.46	153: ZONE-1	6.99
1486	J-585	307.0	0.00	553.2	106.5	246.23	153: ZONE-1	0.00
520	J-392	192.0	8.26	437.2	106.1	245.19	154: ZONE-2	8.26
267	J-120	309.0	11.18	553.9	106.0	244.93	153: ZONE-1	11.18
306	J-160	308.9	15.47	553.5	105.8	244.63	153: ZONE-1	15.47
387	J-256	309.0	11.24	553.3	105.7	244.27	153: ZONE-1	11.24
686	J-557	310.0	0.00	553.9	105.5	243.94	153: ZONE-1	0.00
299	J-153	310.0	3.14	553.9	105.5	243.92	153: ZONE-1	3.14
310	J-164	310.0	28.36	553.8	105.5	243.82	153: ZONE-1	28.36
245	J-92	311.0	3.51	554.0	105.2	243.04	153: ZONE-1	3.51
665	J-536	310.0	0.00	552.6	105.0	242.61	153: ZONE-1	0.00
672	J-543	195.0	0.00	437.2	104.8	242.25	154: ZONE-2	0.00
240	J-87	312.0	1.52	554.1	104.7	242.10	153: ZONE-1	1.52
242	J-89	312.0	1.52	554.1	104.7	242.10	153: ZONE-1	1.52
301	J-155	312.0	0.00	553.9	104.7	241.92	153: ZONE-1	0.00
302	J-156	312.0	0.00	553.9	104.7	241.92	153: ZONE-1	0.00

**Scenario: 2016 PHD**  
**Current Time Step: 0.000 h**  
**FlexTable: Junction Table**

ID	Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Zone	Demand (Maximum) (gpm)
603	J-476	330.0	0.83	436.5	46.1	106.47	154: ZONE-2	0.83
641	J-513	265.0	0.00	372.0	46.3	106.99	1624: Pump Inlet	0.00
659	J-531	324.0	0.00	436.5	48.7	112.47	154: ZONE-2	0.00
622	J-494	323.0	2.07	436.5	49.1	113.47	154: ZONE-2	2.07
604	J-477	323.0	1.65	436.5	49.1	113.47	154: ZONE-2	1.65
602	J-475	323.0	1.24	436.5	49.1	113.47	154: ZONE-2	1.24
565	J-438	190.0	0.83	319.5	56.0	129.47	156: ZONE-4	0.83
614	J-486	190.0	0.83	319.5	56.0	129.48	156: ZONE-4	0.83
567	J-440	190.0	1.24	319.5	56.0	129.48	156: ZONE-4	1.24
600	J-473	306.0	6.61	436.5	56.4	130.47	154: ZONE-2	6.61
601	J-474	306.0	0.00	436.5	56.4	130.47	154: ZONE-2	0.00
326	J-185	305.0	9.41	438.2	57.6	133.18	154: ZONE-2	9.41
607	J-479	305.0	9.41	438.2	57.6	133.18	154: ZONE-2	9.41
606	J-478	303.0	10.87	438.2	58.5	135.18	154: ZONE-2	10.87
563	J-436	245.0	1.24	381.7	59.2	136.73	157: ZONE-5	1.24
337	J-199	300.0	6.86	438.2	59.8	138.18	154: ZONE-2	6.86
335	J-197	300.0	9.54	438.2	59.8	138.18	154: ZONE-2	9.54
477	J-348	322.0	2.89	460.2	59.8	138.23	158: ZONE-6	2.89
1610	J-619	299.1	0.00	438.3	60.2	139.22	154: ZONE-2	0.00
336	J-198	299.0	11.62	438.2	60.2	139.23	154: ZONE-2	11.62
327	J-187	299.0	19.41	438.3	60.3	139.34	154: ZONE-2	19.41
475	J-346	318.0	2.89	460.2	61.5	142.23	158: ZONE-6	2.89
325	J-184	295.0	4.35	438.0	61.9	142.99	154: ZONE-2	4.35
626	J-498	294.0	5.87	437.4	62.0	143.40	154: ZONE-2	5.87
422	J-292	295.0	5.37	438.4	62.1	143.45	154: ZONE-2	5.37
332	J-194	295.0	10.47	439.0	62.3	143.98	153: ZONE-1	10.47
643	J-515	293.0	0.00	437.4	62.5	144.38	153: ZONE-1	0.00
394	J-263	292.0	2.07	437.3	62.9	145.33	154: ZONE-2	2.07
342	J-204	353.0	0.83	499.3	63.3	146.32	153: ZONE-1	0.83
443	J-313	406.5	8.26	553.2	63.5	146.74	153: ZONE-1	8.26
644	J-516	405.0	0.00	553.0	64.0	147.97	153: ZONE-1	0.00
354	J-221	312.0	2.07	460.1	64.1	148.14	158: ZONE-6	2.07
555	J-427	404.0	5.37	552.5	64.3	148.55	153: ZONE-1	5.37
323	J-181	289.0	6.15	438.0	64.4	148.96	154: ZONE-2	6.15
330	J-191	290.0	5.90	439.0	64.5	148.99	154: ZONE-2	5.90
324	J-183	289.0	6.15	438.0	64.5	148.99	154: ZONE-2	6.15
390	J-259	288.0	10.72	437.4	64.6	149.35	154: ZONE-2	10.72
419	J-289	288.0	10.81	438.2	65.0	150.17	154: ZONE-2	10.81
329	J-190	287.0	6.09	439.0	65.8	151.99	154: ZONE-2	6.09
328	J-189	287.0	5.28	439.0	65.8	151.99	154: ZONE-2	5.28
481	J-352	400.0	5.37	552.4	66.0	152.44	153: ZONE-1	5.37
542	J-414	400.0	4.13	552.4	66.0	152.45	153: ZONE-1	4.13
553	J-425	400.0	2.48	552.5	66.0	152.54	153: ZONE-1	2.48
331	J-193	285.0	10.47	439.0	66.6	153.98	153: ZONE-1	10.47
380	J-249	398.8	15.70	553.1	66.7	154.28	153: ZONE-1	15.70
379	J-248	397.5	11.98	552.9	67.2	155.44	153: ZONE-1	11.98
444	J-314	397.0	8.26	553.2	67.6	156.24	153: ZONE-1	8.26
544	J-416	396.0	4.54	552.5	67.7	156.46	153: ZONE-1	4.54
334	J-196	282.0	0.00	439.2	68.0	157.21	154: ZONE-2	0.00
333	J-195	282.0	1.83	439.2	68.0	157.24	154: ZONE-2	1.83
509	J-380	204.5	4.96	361.8	68.1	157.35	155: ZONE-3	4.96
420	J-290	279.0	2.05	438.2	68.9	159.17	154: ZONE-2	2.05
423	J-293	279.0	4.13	438.4	69.0	159.45	154: ZONE-2	4.13
546	J-418	393.0	3.72	552.5	69.0	159.46	153: ZONE-1	3.72
202	J-44	395.0	0.00	554.5	69.0	159.49	153: ZONE-1	0.00
494	J-365	393.0	8.68	552.6	69.0	159.56	153: ZONE-1	8.68

**Scenario: 2016 PHD**  
**Current Time Step: 0.000 h**  
**FlexTable: FCV Table**

ID	Diameter (Valve) (in)	Flow Setting (Initial) (gpm)	Flow (gpm)	Is Active?	Is Open?	Velocity (ft/s)	Hydraulic Grade (From) (ft)	Hydraulic Grade (To) (ft)
705	4.0	850.00	793.26	True	True	20.25	555.0	555.0
1563	6.0	1,000.00	877.34	True	True	9.96	440.0	440.0
706	8.0	650.00	1,150.46	True	True	7.34	555.0	555.0
1569	6.0	10.00	0.00	True	True	0.00	436.4	436.4
1566	6.0	10.00	0.00	True	True	0.00	420.0	420.0
1628	6.0	2,000.00	0.00	True	True	0.00	436.5	436.5

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## Scenario Summary Report

### Scenario: 2016 MDD FF

Scenario Summary			
ID	1648		
Label	2016 MDD FF		
Notes			
Active Topology	<I> 23: Base-Active Topology		
Physical	<I> 24: Base-Physical		
Demand	27: Base-Average Daily		
Initial Settings	54: Base-Initial Settings		
Operational	<I> 55: Base-Operational		
Age	<I> 56: Base-Age Alternative		
Constituent	<I> 57: Base-Constituent		
Trace	<I> 58: Base-Trace Alternative		
Fire Flow	<I> 59: Base-Fire Flow		
Energy Cost	<I> 68: Base-Energy Cost		
Transient	<I> 1522: Base Transient		
Pressure Dependent Demand	<I> 69: Base Pressure Dependent Demand		
Failure History	<I> 1536: Base Failure History		
SCADA	<I> 1547: Base SCADA		
User Data Extensions	<I> 70: Base-User Data		
Steady State/EPS Solver Calculation Options	1647: 2016 MDD FF		
Transient Solver Calculation Options	<I> 1520: Base		
Hydraulic Summary			
Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	12:00:00 AM
Trials	40	Calculation Type	Fire Flow

*Run Fails w/  
FCVs active.*



**Scenario: 2016 MDD FF**  
**Current Time Step: 0.000 h**  
**FlexTable: FCV Table**

ID	Diameter (Valve) (in)	Flow Setting (Initial) (gpm)	Flow (gpm)	Is Active?	Is Open?	Velocity (ft/s)	Hydraulic Grade (From) (ft)	Hydraulic Grade (To) (ft)
705	4.0	850.00	765.06	True	True	19.53	555.0	18,924,302.0
1563	6.0	1,000.00	903.32	True	True	10.25	440.0	21,541,456.0
706	8.0	650.00	565.06	True	True	3.61	555.0	18,924,300.0
1628	6.0	2,000.00	-100.32	True	True	1.14	21,541,450.0	21,541,450.0
1566	6.0	10.00	-96.68	True	True	1.10	420.0	420.0
1569	6.0	10.00	-16.72	True	True	0.19	21,541,452.0	21,541,452.0

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## Scenario Summary Report

### Scenario: 2016 MDD FF

Scenario Summary			
ID	1648		
Label	2016 MDD FF		
Notes			
Active Topology	<I> 23: Base-Active Topology		
Physical	<I> 24: Base-Physical		
Demand	27: Base-Average Daily		
Initial Settings	1651: 2016 SPU FCV-Inactive		
Operational	<I> 55: Base-Operational		
Age	<I> 56: Base-Age Alternative		
Constituent	<I> 57: Base-Constituent		
Trace	<I> 58: Base-Trace Alternative		
Fire Flow	<I> 59: Base-Fire Flow		
Energy Cost	<I> 68: Base-Energy Cost		
Transient	<I> 1522: Base Transient		
Pressure Dependent Demand	<I> 69: Base Pressure Dependent Demand		
Failure History	<I> 1536: Base Failure History		
SCADA	<I> 1547: Base SCADA		
User Data Extensions	<I> 70: Base-User Data		
Steady State/EPS Solver Calculation Options	1647: 2016 MDD FF		
Transient Solver Calculation Options	<I> 1520: Base		
Hydraulic Summary			
Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	12:00:00 AM
Trials	40	Calculation Type	Fire Flow

Scenario: 2016 MDD FF  
Current Time Step: 0.000 h  
Fire Flow Node FlexTable: Fire Flow Report

Label	Zone	Specify Local Fire Flow Constraints?	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)	Is Fire Flow Run Balanced?
J-30	153: ZONE-1	False	False	1,000.00	894.89	20.1	62.6	332: J-194	46.4	641: J-513	True
J-121	153: ZONE-1	True	False	4,000.00	2,229.03	33.4	20.0	272: J-125	20.0	272: J-125	True
J-122	153: ZONE-1	True	False	4,000.00	1,550.34	29.5	20.0	272: J-125	20.0	272: J-125	True
J-123	153: ZONE-1	True	False	4,000.00	1,270.75	23.5	20.0	272: J-125	20.0	272: J-125	True
J-124	153: ZONE-1	True	False	4,000.00	1,243.67	20.0	22.8	272: J-125	22.8	272: J-125	True
J-125	153: ZONE-1	True	False	4,000.00	727.83	20.0	62.6	332: J-194	46.3	641: J-513	True
J-153	153: ZONE-1	True	False	4,000.00	1,410.65	20.0	62.6	332: J-194	46.2	641: J-513	True
J-172	154: ZONE-2	True	False	4,000.00	3,621.09	20.0	39.6	603: J-476	39.6	603: J-476	True
J-173	154: ZONE-2	True	False	4,000.00	3,501.18	20.0	39.8	603: J-476	39.8	603: J-476	True
J-184	154: ZONE-2	True	False	4,000.00	2,492.49	20.0	41.3	603: J-476	41.3	603: J-476	True
J-191	154: ZONE-2	True	False	4,000.00	3,731.14	20.0	40.8	329: J-190	37.3	332: J-194	True
J-199	154: ZONE-2	True	False	4,000.00	3,327.05	20.0	40.5	603: J-476	40.5	603: J-476	True
J-241	153: ZONE-1	False	False	1,000.00	795.29	20.0	62.6	332: J-194	46.2	641: J-513	True
J-263	154: ZONE-2	True	False	4,000.00	1,318.50	20.0	42.3	603: J-476	42.3	603: J-476	True
J-264	154: ZONE-2	True	False	4,000.00	3,823.94	45.9	20.0	394: J-263	20.0	394: J-263	True
J-287	154: ZONE-2	True	False	4,000.00	3,276.63	20.0	39.0	603: J-476	39.0	603: J-476	True
J-290	154: ZONE-2	True	False	4,000.00	2,556.83	20.0	41.0	603: J-476	41.0	603: J-476	True
J-324	154: ZONE-2	True	False	4,000.00	3,567.09	20.0	21.3	454: J-325	21.3	454: J-325	True
J-325	154: ZONE-2	True	False	4,000.00	3,078.69	20.0	21.7	458: J-329	21.7	458: J-329	True
J-328	154: ZONE-2	True	False	4,000.00	2,705.00	20.0	20.0	458: J-329	20.0	458: J-329	True
J-329	154: ZONE-2	True	False	4,000.00	2,678.00	20.0	22.3	457: J-328	22.3	457: J-328	True
J-363	153: ZONE-1	False	False	1,000.00	700.95	20.0	62.6	332: J-194	46.2	641: J-513	True
J-382	155: ZONE-3	False	False	1,000.00	980.34	20.1	61.0	509: J-380	46.0	641: J-513	True
J-426	153: ZONE-1	False	False	1,000.00	609.63	20.0	62.6	332: J-194	46.2	641: J-513	True
J-462	154: ZONE-2	True	False	4,000.00	3,931.58	20.0	37.4	603: J-476	37.4	603: J-476	True
J-467	154: ZONE-2	True	False	4,000.00	2,590.44	20.0	37.4	603: J-476	37.4	603: J-476	True
J-468	154: ZONE-2	True	False	4,000.00	2,810.06	20.0	37.3	603: J-476	37.3	603: J-476	True
J-473	154: ZONE-2	True	False	4,000.00	2,670.87	20.0	20.0	601: J-474	20.0	601: J-474	True
J-475	154: ZONE-2	True	False	4,000.00	2,578.80	20.0	20.0	622: J-494	20.0	622: J-494	True
J-476	154: ZONE-2	True	False	4,000.00	2,536.96	20.0	22.9	659: J-531	22.9	659: J-531	True
J-513	1624: Pump Inlet	True	False	1.00	0.00	46.5	46.5	641: J-513	47.0	603: J-476	True
J-514	1638: Pump Outlet	False	False	1,000.00	0.00	72.2	72.2	642: J-514	46.5	641: J-513	True
J-522	154: ZONE-2	True	False	4,000.00	2,531.71	20.0	37.0	622: J-494	37.0	622: J-494	True
J-531	154: ZONE-2	True	False	4,000.00	2,536.45	22.6	20.1	603: J-476	20.1	603: J-476	True
J-532	154: ZONE-2	True	False	4,000.00	3,778.85	20.0	23.5	609: J-482	23.5	609: J-482	True
J-326	154: ZONE-2	True	False	4,000.00	2,869.23	22.7	20.0	458: J-329	20.0	458: J-329	True
J-622	154: ZONE-2	True	False	4,000.00	3,516.38	20.0	37.4	603: J-476	37.4	603: J-476	True
J-1	153: ZONE-1	False	True	1,000.00	1,010.00	72.7	62.6	332: J-194	46.4	641: J-513	True
J-2	153: ZONE-1	False	True	1,000.00	1,010.00	73.2	62.6	332: J-194	46.4	641: J-513	True
J-3	153: ZONE-1	False	True	1,000.00	1,010.00	69.9	62.6	332: J-194	46.4	641: J-513	True
J-4	153: ZONE-1	False	True	1,000.00	1,010.00	75.6	62.6	332: J-194	46.4	641: J-513	True
J-5	153: ZONE-1	False	True	1,000.00	1,010.00	76.5	62.6	332: J-194	46.4	641: J-513	True
J-6	153: ZONE-1	False	True	1,000.00	1,010.00	69.9	62.6	332: J-194	46.4	641: J-513	True
J-7	153: ZONE-1	False	True	1,000.00	1,010.00	70.7	62.6	332: J-194	46.4	641: J-513	True
J-8	153: ZONE-1	True	True	4,000.00	4,010.00	52.1	56.3	169: J-11	46.1	641: J-513	True
J-10	153: ZONE-1	True	True	4,000.00	4,010.00	52.4	51.5	169: J-11	46.1	641: J-513	True
J-11	153: ZONE-1	False	True	1,000.00	1,010.00	70.2	62.6	332: J-194	46.4	641: J-513	True
J-12	153: ZONE-1	True	True	4,000.00	4,010.00	64.8	62.6	332: J-194	46.1	641: J-513	True
J-13	153: ZONE-1	True	True	4,000.00	4,010.00	67.4	62.6	332: J-194	46.2	641: J-513	True
J-14	153: ZONE-1	True	True	4,000.00	4,010.00	73.3	62.6	332: J-194	46.4	641: J-513	True
J-15	153: ZONE-1	True	True	4,000.00	4,010.00	50.5	51.9	174: J-16	46.2	641: J-513	True
J-16	153: ZONE-1	False	True	1,000.00	1,010.00	68.2	62.6	332: J-194	46.4	641: J-513	True
J-17	153: ZONE-1	False	True	1,000.00	1,010.00	78.5	62.6	332: J-194	46.4	641: J-513	True
J-18	153: ZONE-1	False	True	1,000.00	1,010.00	78.0	62.6	332: J-194	46.4	641: J-513	True
J-19	153: ZONE-1	False	True	1,000.00	1,010.00	73.1	62.6	332: J-194	46.4	641: J-513	True
J-20	153: ZONE-1	False	True	1,000.00	1,010.00	76.5	62.6	332: J-194	46.4	641: J-513	True
J-21	153: ZONE-1	False	True	1,000.00	1,010.00	73.8	62.6	332: J-194	46.4	641: J-513	True
J-24	153: ZONE-1	False	True	1,000.00	1,010.00	68.5	62.6	332: J-194	46.4	641: J-513	True
J-25	153: ZONE-1	False	True	1,000.00	1,010.00	69.8	62.6	332: J-194	46.4	641: J-513	True
J-26	153: ZONE-1	False	True	1,000.00	1,010.00	68.6	62.6	332: J-194	46.4	641: J-513	True
J-27	153: ZONE-1	True	True	4,000.00	4,010.00	67.3	62.0	443: J-313	45.7	641: J-513	True
J-28	153: ZONE-1	False	True	1,000.00	1,010.00	73.9	62.6	332: J-194	46.4	641: J-513	True
J-29	153: ZONE-1	False	True	1,000.00	1,010.00	77.5	62.6	332: J-194	46.3	641: J-513	True
J-31	153: ZONE-1	False	True	1,000.00	1,010.00	76.4	62.6	332: J-194	46.3	641: J-513	True
J-32	153: ZONE-1	False	True	1,000.00	1,010.00	79.0	62.6	332: J-194	46.3	641: J-513	True
J-33	153: ZONE-1	False	True	1,000.00	1,010.00	74.6	62.6	332: J-194	46.3	641: J-513	True
J-34	153: ZONE-1	True	True	4,000.00	4,010.00	69.7	61.9	443: J-313	45.7	641: J-513	True
J-35	153: ZONE-1	False	True	1,000.00	1,010.00	81.9	62.6	332: J-194	46.3	641: J-513	True
J-36	153: ZONE-1	False	True	1,000.00	1,010.00	81.9	62.6	332: J-194	46.3	641: J-513	True
J-37	153: ZONE-1	False	True	1,000.00	1,010.00	81.3	62.6	332: J-194	46.3	641: J-513	True
J-38	153: ZONE-1	True	True	4,000.00	4,010.00	28.1	61.9	443: J-313	45.7	641: J-513	True
J-39	153: ZONE-1	True	True	4,000.00	4,010.00	71.2	61.8	443: J-313	45.6	641: J-513	True
J-40	153: ZONE-1	False	True	1,000.00	1,010.00	79.1	62.6	332: J-194	46.3	641: J-513	True
J-41	153: ZONE-1	False	True	1,000.00	1,010.00	79.1	62.6	332: J-194	46.4	641: J-513	True
J-42	153: ZONE-1	False	True	1,000.00	1,010.00	78.3	62.6	332: J-194	46.4	641: J-513	True
J-43	153: ZONE-1	False	True	1,000.00	1,010.00	67.7	62.6	332: J-194	46.4	641: J-513	True
J-44	153: ZONE-1	False	True	1,000.00	1,010.00	66.6	62.6	332: J-194	46.4	641: J-513	True
J-45	153: ZONE-1	False	True	1,000.00	1,010.00	67.0	62.6	332: J-194	46.4	641: J-513	True
J-46	153: ZONE-1	False	True	1,000.00	1,010.00	68.5	62.6	332: J-194	46.4	641: J-513	True
J-47	153: ZONE-1	False	True	1,000.00	1,010.00	68.1	62.6	332: J-194	46.4	641: J-513	True
J-48	153: ZONE-1	False	True	1,000.00	1,010.00	76.8	62.6	332: J-194	46.4	641: J-513	True
J-49	153: ZONE-1	False	True	1,000.00	1,010.00	76.4	62.6	332: J-194	46.4	641: J-513	True
J-50	153: ZONE-1	False	True	1,000.00	1,010.00	79.4	62.6	332: J-194	46.4	641: J-513	True
J-51	153: ZONE-1	False	True	1,000.00	1,010.00	80.7	62.6	332: J-194	46.4	641: J-513	True
J-52	153: ZONE-1	False	True	1,000.00	1,010.00	78.2	62.6	332: J-194	46.4	641: J-513	True
J-53	153: ZONE-1	False	True	1,000.00	1,010.00	76.9	62.6	332: J-194	46.4	641: J-513	True
J-54	153: ZONE-1	True	True	4,000.00	4,010.00	71.1	62.6	332: J-194	46.1	641: J-513	True

Scenario: 2016 MDD FF  
 Current Time Step: 0.000 h  
 Fire Flow Node FlexTable: Fire Flow Report

Label	Zone	Velocity of Maximum Pipe (ft/s)	Specify Local Fire Flow Constraints?	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)	Is Fire Flow Run Balanced?
J-594	154: ZONE-2	40.51	True	True	4,000.00	4,010.00	39.0	37.4	603: J-476	37.4	603: J-476	True
J-196	154: ZONE-2	39.29	True	True	4,000.00	4,010.00	50.6	41.1	603: J-476	41.1	603: J-476	True
J-287	154: ZONE-2	37.23	True	False	4,000.00	3,276.63	20.0	39.0	603: J-476	39.0	603: J-476	True
J-153	153: ZONE-1	36.06	True	False	4,000.00	1,410.65	20.0	62.6	332: J-194	46.2	641: J-513	True
J-595	154: ZONE-2	33.11	True	True	4,000.00	4,010.00	47.7	37.4	603: J-476	37.4	603: J-476	True
J-596	154: ZONE-2	33.11	True	True	4,000.00	4,010.00	35.4	37.4	603: J-476	37.4	603: J-476	True
J-183	154: ZONE-2	31.71	True	True	4,000.00	4,010.00	35.7	33.1	325: J-184	33.1	325: J-184	True
J-290	154: ZONE-2	29.03	True	False	4,000.00	2,556.83	20.0	41.0	603: J-476	41.0	603: J-476	True
J-184	154: ZONE-2	28.31	True	False	4,000.00	2,492.49	20.0	41.3	603: J-476	41.3	603: J-476	True
J-457	154: ZONE-2	27.94	True	True	4,000.00	4,010.00	54.3	37.4	603: J-476	37.4	603: J-476	True
J-456	154: ZONE-2	27.84	True	True	4,000.00	4,010.00	25.2	37.4	603: J-476	37.4	603: J-476	True
J-458	154: ZONE-2	27.76	True	True	4,000.00	4,010.00	52.5	37.3	583: J-456	37.3	583: J-456	True
J-455	154: ZONE-2	27.75	True	True	4,000.00	4,010.00	54.4	37.3	583: J-456	37.3	583: J-456	True
J-524	153: ZONE-1	26.93	True	True	4,000.00	4,010.00	64.9	62.6	332: J-194	46.1	641: J-513	True
J-190	154: ZONE-2	25.72	True	True	4,000.00	4,010.00	37.7	36.4	330: J-191	34.2	332: J-194	True
J-614	153: ZONE-1	25.70	True	True	4,000.00	4,010.00	78.1	61.2	443: J-313	45.5	641: J-513	True
J-327	154: ZONE-2	25.67	True	True	4,000.00	4,010.00	29.4	37.4	603: J-476	37.4	603: J-476	True
J-331	154: ZONE-2	25.66	True	True	4,000.00	4,010.00	79.1	37.4	603: J-476	37.4	603: J-476	True
J-91	153: ZONE-1	25.64	True	True	4,000.00	4,010.00	68.2	61.5	443: J-313	45.5	641: J-513	True
J-92	153: ZONE-1	25.64	True	True	4,000.00	4,010.00	65.5	61.5	443: J-313	45.5	641: J-513	True
J-301	154: ZONE-2	25.63	True	True	4,000.00	4,010.00	39.4	36.4	471: J-342	36.4	471: J-342	True
J-621	154: ZONE-2	25.62	True	True	4,000.00	4,010.00	36.9	36.2	417: J-287	36.2	417: J-287	True
J-87	153: ZONE-1	25.62	True	True	4,000.00	4,010.00	82.1	61.6	443: J-313	45.6	641: J-513	True
J-88	153: ZONE-1	25.62	True	True	4,000.00	4,010.00	54.6	61.6	443: J-313	45.6	641: J-513	True
J-89	153: ZONE-1	25.62	True	True	4,000.00	4,010.00	70.7	61.6	443: J-313	45.6	641: J-513	True
J-149	153: ZONE-1	25.61	True	True	4,000.00	4,010.00	98.9	61.1	443: J-313	45.4	641: J-513	True
J-107	153: ZONE-1	25.61	True	True	4,000.00	4,010.00	45.2	60.6	443: J-313	45.3	641: J-513	True
J-85	153: ZONE-1	25.61	True	True	4,000.00	4,010.00	60.3	61.7	443: J-313	45.6	641: J-513	True
J-504	153: ZONE-1	25.61	True	True	4,000.00	4,010.00	45.6	61.8	443: J-313	45.7	641: J-513	True
J-280	154: ZONE-2	25.61	True	True	4,000.00	4,010.00	24.1	37.5	603: J-476	37.5	603: J-476	True
J-282	154: ZONE-2	25.60	True	True	4,000.00	4,010.00	49.1	37.6	603: J-476	37.6	603: J-476	True
J-285	154: ZONE-2	25.60	True	True	4,000.00	4,010.00	37.1	37.7	603: J-476	37.7	603: J-476	True
J-502	153: ZONE-1	25.60	True	True	4,000.00	4,010.00	47.9	60.0	629: J-501	45.7	641: J-513	True
J-255	153: ZONE-1	25.60	True	True	4,000.00	4,010.00	45.9	56.1	443: J-313	42.1	641: J-513	True
J-38	153: ZONE-1	25.60	True	True	4,000.00	4,010.00	28.1	61.9	443: J-313	45.7	641: J-513	True
J-542	154: ZONE-2	25.59	True	True	4,000.00	4,010.00	68.3	37.4	603: J-476	37.4	603: J-476	True
J-598	154: ZONE-2	25.59	True	True	4,000.00	4,010.00	37.9	37.4	603: J-476	37.4	603: J-476	True
J-569	153: ZONE-1	25.59	True	True	4,000.00	4,010.00	79.8	61.1	443: J-313	45.4	641: J-513	True
J-121	153: ZONE-1	25.42	True	False	4,000.00	2,229.03	33.4	20.0	272: J-125	20.0	272: J-125	True
J-172	154: ZONE-2	25.30	True	False	4,000.00	3,621.09	20.0	39.6	603: J-476	39.6	603: J-476	True
J-462	154: ZONE-2	25.12	True	False	4,000.00	3,931.58	20.0	37.4	603: J-476	37.4	603: J-476	True
J-382	155: ZONE-3	25.05	False	False	1,000.00	980.34	20.1	61.0	509: J-380	46.0	641: J-513	True
J-261	153: ZONE-1	24.90	True	True	4,000.00	4,010.00	66.1	54.0	443: J-313	36.2	641: J-513	True
J-597	154: ZONE-2	24.81	True	True	4,000.00	4,010.00	58.5	37.4	603: J-476	37.4	603: J-476	True
J-532	154: ZONE-2	24.12	True	False	4,000.00	3,778.85	20.0	23.5	609: J-482	23.5	609: J-482	True
J-191	154: ZONE-2	23.94	True	False	4,000.00	3,731.14	20.0	40.8	329: J-190	37.3	332: J-194	True
J-581	154: ZONE-2	23.75	True	True	4,000.00	4,010.00	26.6	38.9	603: J-476	38.9	603: J-476	True
J-523	153: ZONE-1	23.75	True	True	4,000.00	4,010.00	65.7	62.6	332: J-194	46.1	641: J-513	True
J-185	154: ZONE-2	23.70	True	True	4,000.00	4,010.00	44.1	40.5	603: J-476	40.5	603: J-476	True
J-117	153: ZONE-1	23.44	True	True	4,000.00	4,010.00	93.3	61.2	443: J-313	45.4	641: J-513	True
J-8	153: ZONE-1	23.22	True	True	4,000.00	4,010.00	52.1	56.3	169: J-11	46.1	641: J-513	True
J-148	153: ZONE-1	23.05	True	True	4,000.00	4,010.00	96.9	61.2	443: J-313	45.4	641: J-513	True
J-173	154: ZONE-2	23.00	True	False	4,000.00	3,501.18	20.0	39.8	603: J-476	39.8	603: J-476	True
J-176	154: ZONE-2	22.92	True	True	4,000.00	4,010.00	69.9	39.0	603: J-476	39.0	603: J-476	True
J-324	154: ZONE-2	22.89	True	False	4,000.00	3,587.09	20.0	21.3	454: J-325	21.3	454: J-325	True
J-30	153: ZONE-1	22.88	False	False	1,000.00	894.89	20.1	62.6	332: J-194	46.4	641: J-513	True
J-622	154: ZONE-2	22.44	True	False	4,000.00	3,516.38	20.0	37.4	603: J-476	37.4	603: J-476	True
J-275	154: ZONE-2	22.20	True	True	4,000.00	4,010.00	72.9	38.0	603: J-476	38.0	603: J-476	True
J-126	153: ZONE-1	21.97	True	True	4,000.00	4,010.00	35.1	47.9	302: J-156	45.4	641: J-513	True
J-145	153: ZONE-1	21.83	True	True	4,000.00	4,010.00	100.3	61.1	443: J-313	45.4	641: J-513	True
J-295	154: ZONE-2	21.57	True	True	4,000.00	4,010.00	60.6	37.9	603: J-476	37.9	603: J-476	True
J-199	154: ZONE-2	21.26	True	False	4,000.00	3,327.05	20.0	40.5	603: J-476	40.5	603: J-476	True
J-258	153: ZONE-1	21.13	True	True	4,000.00	4,010.00	50.0	56.8	443: J-313	22.9	641: J-513	True
J-102	153: ZONE-1	20.76	True	True	4,000.00	4,010.00	80.0	61.5	443: J-313	45.6	641: J-513	True
J-337	154: ZONE-2	20.57	True	True	4,000.00	4,010.00	65.2	37.4	603: J-476	37.4	603: J-476	True
J-592	154: ZONE-2	20.57	True	True	4,000.00	4,010.00	66.1	37.4	603: J-476	37.4	603: J-476	True
J-241	153: ZONE-1	20.37	False	False	1,000.00	795.29	20.0	62.6	332: J-194	46.2	641: J-513	True
J-10	153: ZONE-1	20.15	True	True	4,000.00	4,010.00	52.4	51.5	169: J-11	46.1	641: J-513	True
J-325	154: ZONE-2	19.77	True	False	4,000.00	3,078.69	20.0	21.7	458: J-329	21.7	458: J-329	True
J-270	154: ZONE-2	19.75	True	True	4,000.00	4,010.00	65.6	37.4	603: J-476	37.4	603: J-476	True
J-156	153: ZONE-1	19.73	True	True	4,000.00	4,010.00	39.0	45.9	273: J-126	45.4	641: J-513	True
J-65	153: ZONE-1	19.48	True	True	4,000.00	4,010.00	80.6	61.7	443: J-313	45.6	641: J-513	True
J-300	154: ZONE-2	19.46	True	True	4,000.00	4,010.00	53.2	37.4	603: J-476	37.4	603: J-476	True
J-128	153: ZONE-1	19.32	True	True	4,000.00	4,010.00	77.8	61.6	443: J-313	45.7	641: J-513	True
J-150	153: ZONE-1	19.29	True	True	4,000.00	4,010.00	73.9	61.2	443: J-313	45.4	641: J-513	True
J-144	153: ZONE-1	18.99	True	True	4,000.00	4,010.00	95.5	61.1	443: J-313	45.4	641: J-513	True
J-116	153: ZONE-1	18.86	True	True	4,000.00	4,010.00	94.5	61.2	443: J-313	45.4	641: J-513	True
J-125	153: ZONE-1	18.61	True	False	4,000.00	727.83	20.0	62.6	332: J-194	46.3	641: J-513	True
J-326	154: ZONE-2	18.43	True	False	4,000.00	2,869.23	22.7	20.0	458: J-329	20.0	458: J-329	True
J-503	153: ZONE-1	18.35	True	True	4,000.00	4,010.00	66.7	61.8	443: J-313	45.7	641: J-513	True
J-139	153: ZONE-1	18.34	True	True	4,000.00	4,010.00	54.2	60.2	443: J-313	45.0	641: J-513	True
J-152	153: ZONE-1	18.30	True	True	4,000.00	4,010.00	62.3	60.6	299: J-153	45.4	641: J-513	True
J-127	153: ZONE-1	18.29	True	True	4,000.00	4,010.00	78.5	61.7	443: J-313	45.7	641: J-513	True
J-566	153: ZONE-1	18.16	True	True	4,000.00	4,010.00	85.6	61.9	443: J-313	45.7	641: J-513	True
J-155	153: ZONE-1	18.08	True	True	4,000.00	4,010.00	42.7	47.6	302: J-156	45.4	641: J-513	True
J-363	153: ZONE-1	17.94	False	False	1,000.00	700.95	20.0	62.6	332: J-194	46.2	641: J-513	True
J-15	153: ZONE-1	17.92	True	True	4,000.00	4,010.00	50.5	51.9	174: J-16	46.2	641: J-513	True
J-540	154: ZONE-2	17.82	True	True	4,000.00	4,010.00	77.3	37.4	603: J-476	37.4	603: J-476	True
J-539	153: ZONE-1	17.80	True	True	4,000.00	4,010.00	84.7	61.5	443: J-313	45.6	641: J-513	True
J-122												

J-328	154: ZONE-2	17.38	True	False	4,000.00	2,705.00	20.0	20.0	458: J-329	20.0	458: J-329	True
J-39	153: ZONE-1	17.30	True	True	4,000.00	4,010.00	71.2	61.8	443: J-313	45.6	641: J-513	True
J-323	153: ZONE-1	17.30	True	True	4,000.00	4,010.00	84.4	53.7	443: J-313	40.5	641: J-513	True
J-329	154: ZONE-2	17.21	True	False	4,000.00	2,678.00	20.0	22.3	457: J-328	22.3	457: J-328	True
J-166	153: ZONE-1	16.99	True	True	4,000.00	4,010.00	84.7	59.4	443: J-313	44.7	641: J-513	True
J-515	153: ZONE-1	16.98	True	True	4,000.00	4,010.00	24.8	60.1	332: J-194	31.5	390: J-259	True
J-294	154: ZONE-2	16.88	True	True	4,000.00	4,010.00	64.4	38.7	603: J-476	38.7	603: J-476	True
J-501	153: ZONE-1	16.79	True	True	4,000.00	4,010.00	60.0	59.5	630: J-502	45.7	641: J-513	True
J-279	154: ZONE-2	16.78	True	True	4,000.00	4,010.00	67.1	37.5	603: J-476	37.5	603: J-476	True
J-257	153: ZONE-1	16.69	True	True	4,000.00	4,010.00	65.2	54.2	443: J-313	32.6	641: J-513	True
J-90	153: ZONE-1	16.67	True	True	4,000.00	4,010.00	91.3	61.5	443: J-313	45.5	641: J-513	True
J-154	153: ZONE-1	16.66	True	True	4,000.00	4,010.00	47.5	53.1	301: J-155	45.4	641: J-513	True
J-589	153: ZONE-1	16.46	True	True	4,000.00	4,010.00	84.7	53.6	443: J-313	40.7	641: J-513	True
J-269	154: ZONE-2	16.45	True	True	4,000.00	4,010.00	48.7	27.9	394: J-263	27.9	394: J-263	True
J-132	153: ZONE-1	16.45	True	True	4,000.00	4,010.00	64.1	59.2	443: J-313	44.8	641: J-513	True
J-620	154: ZONE-2	16.40	True	True	4,000.00	4,010.00	60.3	37.6	603: J-476	37.6	603: J-476	True
J-180	153: ZONE-1	16.40	True	True	4,000.00	4,010.00	50.2	56.1	643: J-515	40.4	603: J-476	True
J-268	154: ZONE-2	16.27	True	True	4,000.00	4,010.00	33.7	27.0	394: J-263	27.0	394: J-263	True
J-14	153: ZONE-1	16.26	True	True	4,000.00	4,010.00	73.3	62.6	332: J-194	46.4	641: J-513	True
J-267	154: ZONE-2	16.16	True	True	4,000.00	4,010.00	35.6	26.4	394: J-263	26.4	394: J-263	True
J-55	153: ZONE-1	16.08	True	True	4,000.00	4,010.00	63.5	62.6	332: J-194	46.1	641: J-513	True
J-537	154: ZONE-2	16.07	True	True	4,000.00	4,010.00	41.6	37.4	603: J-476	37.4	603: J-476	True
J-281	154: ZONE-2	15.91	True	True	4,000.00	4,010.00	61.3	37.6	603: J-476	37.6	603: J-476	True
J-266	154: ZONE-2	15.82	True	True	4,000.00	4,010.00	46.2	24.6	394: J-263	24.6	394: J-263	True
J-619	154: ZONE-2	15.65	True	True	4,000.00	4,010.00	49.0	40.6	603: J-476	40.6	603: J-476	True
J-426	153: ZONE-1	15.62	False	False	1,000.00	609.63	20.0	62.6	332: J-194	46.2	641: J-513	True
J-541	154: ZONE-2	15.40	True	True	4,000.00	4,010.00	75.1	37.4	603: J-476	37.4	603: J-476	True
J-580	153: ZONE-1	15.39	True	True	4,000.00	4,010.00	63.1	59.8	443: J-313	44.8	641: J-513	True
J-84	153: ZONE-1	15.26	True	True	4,000.00	4,010.00	79.1	61.7	443: J-313	45.6	641: J-513	True
J-254	153: ZONE-1	15.04	True	True	4,000.00	4,010.00	86.9	56.1	443: J-313	42.1	641: J-513	True
J-259	154: ZONE-2	15.03	True	True	4,000.00	4,010.00	20.2	31.5	394: J-263	30.8	643: J-515	True
J-585	153: ZONE-1	15.01	True	True	4,000.00	4,010.00	78.7	53.7	443: J-313	40.4	641: J-513	True
J-263	154: ZONE-2	14.98	True	False	4,000.00	1,318.50	20.0	42.3	603: J-476	42.3	603: J-476	True
J-467	154: ZONE-2	14.93	True	False	4,000.00	2,590.44	20.0	37.4	603: J-476	37.4	603: J-476	True
J-421	153: ZONE-1	14.82	False	True	1,000.00	1,010.00	42.6	61.3	555: J-427	46.1	641: J-513	True
J-82	153: ZONE-1	14.82	True	True	4,000.00	4,010.00	72.4	61.9	443: J-313	45.7	641: J-513	True
J-588	153: ZONE-1	14.75	True	True	4,000.00	4,010.00	82.3	53.6	443: J-313	40.6	641: J-513	True
J-579	153: ZONE-1	14.70	True	True	4,000.00	4,010.00	75.8	61.6	443: J-313	45.6	641: J-513	True
J-522	154: ZONE-2	14.63	True	False	4,000.00	2,531.71	20.0	37.0	622: J-494	37.0	622: J-494	True
J-171	154: ZONE-2	14.62	True	True	4,000.00	4,010.00	51.7	39.2	603: J-476	39.2	603: J-476	True
J-123	153: ZONE-1	14.55	True	False	4,000.00	1,270.75	23.5	20.0	272: J-125	20.0	272: J-125	True
J-617	153: ZONE-1	14.51	True	True	4,000.00	4,010.00	67.6	62.0	443: J-313	45.7	641: J-513	True
J-334	154: ZONE-2	14.50	True	True	4,000.00	4,010.00	77.3	37.4	603: J-476	37.4	603: J-476	True
J-602	153: ZONE-1	14.43	True	True	4,000.00	4,010.00	64.0	62.6	332: J-194	46.2	641: J-513	True
J-571	153: ZONE-1	14.42	True	True	4,000.00	4,010.00	85.2	61.9	443: J-313	45.7	641: J-513	True
J-86	153: ZONE-1	14.34	True	True	4,000.00	4,010.00	88.1	61.6	443: J-313	45.6	641: J-513	True
J-165	153: ZONE-1	14.33	True	True	4,000.00	4,010.00	73.5	59.3	443: J-313	44.6	641: J-513	True
J-124	153: ZONE-1	14.24	True	False	4,000.00	1,243.67	20.0	22.8	272: J-125	22.8	272: J-125	True
J-568	153: ZONE-1	14.17	True	True	4,000.00	4,010.00	86.3	61.1	443: J-313	45.4	641: J-513	True
J-284	154: ZONE-2	14.08	True	True	4,000.00	4,010.00	76.3	38.0	603: J-476	38.0	603: J-476	True
J-578	153: ZONE-1	14.08	True	True	4,000.00	4,010.00	74.4	61.6	443: J-313	45.6	641: J-513	True
J-461	154: ZONE-2	14.01	True	True	4,000.00	4,010.00	36.5	36.5	589: J-462	36.5	589: J-462	True
J-265	154: ZONE-2	13.95	True	True	4,000.00	4,010.00	26.5	24.9	390: J-259	24.9	390: J-259	True
J-274	154: ZONE-2	13.91	True	True	4,000.00	4,010.00	56.3	38.6	603: J-476	38.6	603: J-476	True
J-459	154: ZONE-2	13.85	True	True	4,000.00	4,010.00	63.0	37.4	603: J-476	37.4	603: J-476	True
J-460	154: ZONE-2	13.76	True	True	4,000.00	4,010.00	57.8	37.4	603: J-476	37.4	603: J-476	True
J-57	153: ZONE-1	13.76	True	True	4,000.00	4,010.00	70.6	62.6	332: J-194	46.1	641: J-513	True
J-264	154: ZONE-2	13.74	True	False	4,000.00	3,823.94	45.9	20.0	394: J-263	20.0	394: J-263	True
J-463	154: ZONE-2	13.71	True	True	4,000.00	4,010.00	42.2	37.4	603: J-476	37.4	603: J-476	True
J-135	153: ZONE-1	13.68	True	True	4,000.00	4,010.00	67.8	58.4	443: J-313	44.5	641: J-513	True
J-464	154: ZONE-2	13.65	True	True	4,000.00	4,010.00	35.1	37.4	603: J-476	37.4	603: J-476	True
J-320	153: ZONE-1	13.63	True	True	4,000.00	4,010.00	91.7	53.6	443: J-313	40.6	641: J-513	True
J-587	153: ZONE-1	13.63	True	True	4,000.00	4,010.00	67.9	53.6	443: J-313	40.8	641: J-513	True
J-492	154: ZONE-2	13.63	True	True	4,000.00	4,010.00	41.5	37.4	603: J-476	37.4	603: J-476	True
J-465	154: ZONE-2	13.58	True	True	4,000.00	4,010.00	63.2	37.4	603: J-476	37.4	603: J-476	True
J-317	153: ZONE-1	13.53	True	True	4,000.00	4,010.00	64.8	53.6	443: J-313	40.6	641: J-513	True
J-510	153: ZONE-1	13.52	True	True	4,000.00	4,010.00	75.5	61.4	443: J-313	45.5	641: J-513	True
J-198	154: ZONE-2	13.33	True	True	4,000.00	4,010.00	38.7	40.3	603: J-476	40.3	603: J-476	True
J-276	154: ZONE-2	13.26	True	True	4,000.00	4,010.00	72.0	37.4	603: J-476	37.4	603: J-476	True
J-565	153: ZONE-1	13.17	True	True	4,000.00	4,010.00	72.7	62.0	443: J-313	45.7	641: J-513	True
J-521	153: ZONE-1	13.00	True	True	4,000.00	4,010.00	60.6	62.6	332: J-194	46.1	641: J-513	True
J-319	153: ZONE-1	12.88	True	True	4,000.00	4,010.00	72.0	53.4	443: J-313	41.1	641: J-513	True
J-498	154: ZONE-2	12.81	True	True	4,000.00	4,010.00	38.4	39.2	603: J-476	39.2	603: J-476	True
J-256	153: ZONE-1	12.79	True	True	4,000.00	4,010.00	79.9	54.3	443: J-313	37.6	641: J-513	True
J-475	154: ZONE-2	12.77	True	False	4,000.00	2,578.80	20.0	20.0	622: J-494	20.0	622: J-494	True
J-476	154: ZONE-2	12.77	True	False	4,000.00	2,536.96	20.0	22.9	659: J-531	22.9	659: J-531	True
J-531	154: ZONE-2	12.77	True	False	4,000.00	2,536.45	22.6	20.1	603: J-476	20.1	603: J-476	True
J-473	154: ZONE-2	12.77	True	False	4,000.00	2,670.87	20.0	20.0	601: J-474	20.0	601: J-474	True
J-72	153: ZONE-1	12.72	True	True	4,000.00	4,010.00	80.3	62.6	332: J-194	46.4	641: J-513	True
J-466	154: ZONE-2	12.60	True	True	4,000.00	4,010.00	59.9	37.4	603: J-476	37.4	603: J-476	True
J-283	154: ZONE-2	12.48	True	True	4,000.00	4,010.00	68.9	37.7	603: J-476	37.7	603: J-476	True
J-493	154: ZONE-2	12.41	True	True	4,000.00	4,010.00	60.5	37.4	603: J-476	37.4	603: J-476	True
J-175	154: ZONE-2	12.10	True	True	4,000.00	4,010.00	57.2	38.9	603: J-476	38.9	603: J-476	True
J-13	153: ZONE-1	11.93	True	True	4,000.00	4,010.00	67.4	62.6	332: J-194	46.2	641: J-513	True
J-112	153: ZONE-1	11.76	True	True	4,000.00	4,010.00	72.9	60.8	443: J-313	45.3	641: J-513	True
J-479	154: ZONE-2	11.73	True	True	4,000.00	4,010.00	46.5	40.5	603: J-476	40.5	603: J-476	True
J-286	154: ZONE-2	11.67	True	True	4,000.00	4,010.00	65.0	37.6	603: J-476	37.6	603: J-476	True
J-292	154: ZONE-2	11.53	False	True	1,000.00	1,010.00	37.9	44.8	423: J-293	44.8	423: J-293	True
J-293	154: ZONE-2	11.53	False	True	1,000.00	1,010.00	34.1	37.9	422: J-292	37.9	422: J-292	True
J-378	153: ZONE-1	11.50	False	True	1,000.00	1,010.00	44.9	62.6	332: J-194	46.0	641: J-513	True
J-478	154: ZONE-2	11.49	True	True	4,000.00	4,010.00	41.8	40.0				

J-538	153: ZONE-1	10.79	True	True	4,000.00	4,010.00	99.0	59.5	443: J-313	44.7	641: J-513	True
J-500	153: ZONE-1	10.68	True	True	4,000.00	4,010.00	89.9	61.5	443: J-313	45.6	641: J-513	True
J-197	154: ZONE-2	10.57	True	True	4,000.00	4,010.00	65.7	61.8	443: J-313	45.7	641: J-513	True
J-273	154: ZONE-2	10.57	True	True	4,000.00	4,010.00	44.4	40.0	603: J-476	40.0	603: J-476	True
J-62	153: ZONE-1	10.51	True	True	4,000.00	4,010.00	60.6	38.2	603: J-476	38.2	603: J-476	True
J-179	154: ZONE-2	10.42	True	True	4,000.00	4,010.00	73.0	62.0	443: J-313	45.7	641: J-513	True
J-114	153: ZONE-1	10.39	True	True	4,000.00	4,010.00	68.4	40.4	603: J-476	40.4	603: J-476	True
J-34	153: ZONE-1	10.38	True	True	4,000.00	4,010.00	83.0	61.5	443: J-313	45.6	641: J-513	True
J-505	153: ZONE-1	10.34	True	True	4,000.00	4,010.00	69.7	61.9	443: J-313	45.7	641: J-513	True
J-271	154: ZONE-2	10.31	True	True	4,000.00	4,010.00	69.6	61.8	443: J-313	45.7	641: J-513	True
J-115	153: ZONE-1	10.30	True	True	4,000.00	4,010.00	79.6	37.4	603: J-476	37.4	603: J-476	True
J-61	153: ZONE-1	10.29	True	True	4,000.00	4,010.00	82.6	61.0	443: J-313	45.4	641: J-513	True
J-73	153: ZONE-1	10.20	True	True	4,000.00	4,010.00	73.9	62.0	443: J-313	45.7	641: J-513	True
J-562	153: ZONE-1	10.18	True	True	4,000.00	4,010.00	81.9	62.4	443: J-313	45.9	641: J-513	True
J-563	153: ZONE-1	10.18	True	True	4,000.00	4,010.00	72.1	61.7	443: J-313	45.6	641: J-513	True
J-333	154: ZONE-2	10.06	True	True	4,000.00	4,010.00	72.6	61.7	443: J-313	45.6	641: J-513	True
J-79	153: ZONE-1	10.05	True	True	4,000.00	4,010.00	79.5	37.4	603: J-476	37.4	603: J-476	True
J-561	153: ZONE-1	10.05	True	True	4,000.00	4,010.00	81.3	62.1	443: J-313	45.8	641: J-513	True
J-138	153: ZONE-1	10.02	True	True	4,000.00	4,010.00	83.2	61.7	443: J-313	45.6	641: J-513	True
J-289	154: ZONE-2	9.99	True	True	4,000.00	4,010.00	79.4	60.4	443: J-313	45.1	641: J-513	True
J-143	153: ZONE-1	9.95	True	True	4,000.00	4,010.00	49.5	39.9	603: J-476	39.9	603: J-476	True
J-528	154: ZONE-2	9.95	True	True	4,000.00	4,010.00	96.0	60.9	443: J-313	45.3	641: J-513	True
J-560	153: ZONE-1	9.89	True	True	4,000.00	4,010.00	66.4	40.1	603: J-476	40.1	603: J-476	True
J-573	153: ZONE-1	9.88	True	True	4,000.00	4,010.00	87.3	61.5	443: J-313	45.6	641: J-513	True
J-83	153: ZONE-1	9.87	True	True	4,000.00	4,010.00	86.1	61.7	443: J-313	45.6	641: J-513	True
J-81	153: ZONE-1	9.86	True	True	4,000.00	4,010.00	87.2	61.8	443: J-313	45.6	641: J-513	True
J-559	153: ZONE-1	9.84	True	True	4,000.00	4,010.00	88.2	61.8	443: J-313	45.7	641: J-513	True
J-141	153: ZONE-1	9.83	True	True	4,000.00	4,010.00	93.7	61.5	443: J-313	45.5	641: J-513	True
J-321	153: ZONE-1	9.78	True	True	4,000.00	4,010.00	90.6	60.5	443: J-313	45.1	641: J-513	True
J-413	154: ZONE-2	9.77	True	True	4,000.00	4,010.00	73.4	53.8	443: J-313	40.2	641: J-513	True
J-451	154: ZONE-2	9.76	False	True	1,000.00	1,010.00	58.4	37.4	603: J-476	37.4	603: J-476	True
J-452	154: ZONE-2	9.76	False	True	1,000.00	1,010.00	85.3	37.4	603: J-476	37.4	603: J-476	True
J-77	153: ZONE-1	9.74	True	True	1,000.00	1,010.00	63.4	37.4	603: J-476	37.4	603: J-476	True
J-80	153: ZONE-1	9.73	True	True	4,000.00	4,010.00	75.1	62.3	443: J-313	45.9	641: J-513	True
J-572	153: ZONE-1	9.66	True	True	4,000.00	4,010.00	86.6	61.9	443: J-313	45.7	641: J-513	True
J-105	153: ZONE-1	9.61	True	True	4,000.00	4,010.00	85.8	61.9	443: J-313	45.7	641: J-513	True
J-558	153: ZONE-1	9.60	True	True	4,000.00	4,010.00	84.0	61.4	443: J-313	45.6	641: J-513	True
J-75	153: ZONE-1	9.54	True	True	4,000.00	4,010.00	97.9	61.3	443: J-313	45.4	641: J-513	True
J-557	153: ZONE-1	9.54	True	True	4,000.00	4,010.00	74.7	62.6	332: J-194	46.1	641: J-513	True
J-556	153: ZONE-1	9.52	True	True	4,000.00	4,010.00	95.9	61.2	443: J-313	45.4	641: J-513	True
J-272	154: ZONE-2	9.51	True	True	4,000.00	4,010.00	99.5	61.2	443: J-313	45.4	641: J-513	True
J-277	154: ZONE-2	9.51	True	True	4,000.00	4,010.00	80.1	37.4	603: J-476	37.4	603: J-476	True
J-106	153: ZONE-1	9.51	True	True	4,000.00	4,010.00	76.1	37.4	603: J-476	37.4	603: J-476	True
J-555	153: ZONE-1	9.50	True	True	4,000.00	4,010.00	86.0	60.6	443: J-313	45.3	641: J-513	True
J-133	153: ZONE-1	9.49	True	True	4,000.00	4,010.00	103.0	61.1	443: J-313	45.4	641: J-513	True
J-169	153: ZONE-1	9.47	True	True	4,000.00	4,010.00	82.5	60.3	443: J-313	45.1	641: J-513	True
J-146	153: ZONE-1	9.47	True	True	4,000.00	4,010.00	102.8	60.8	443: J-313	45.3	641: J-513	True
J-525	153: ZONE-1	9.46	True	True	4,000.00	4,010.00	110.9	61.1	443: J-313	45.4	641: J-513	True
J-103	153: ZONE-1	9.43	True	True	4,000.00	4,010.00	109.2	61.1	443: J-313	45.4	641: J-513	True
J-288	154: ZONE-2	9.41	True	True	4,000.00	4,010.00	87.2	60.1	443: J-313	45.1	641: J-513	True
J-142	153: ZONE-1	9.36	True	True	4,000.00	4,010.00	68.6	39.7	603: J-476	39.7	603: J-476	True
J-134	153: ZONE-1	9.34	True	True	4,000.00	4,010.00	90.4	61.0	443: J-313	45.3	641: J-513	True
J-129	153: ZONE-1	9.32	True	True	4,000.00	4,010.00	83.0	59.8	443: J-313	44.8	641: J-513	True
J-551	154: ZONE-2	9.31	True	True	4,000.00	4,010.00	88.4	58.9	443: J-313	44.8	641: J-513	True
J-78	153: ZONE-1	9.28	True	True	4,000.00	4,010.00	80.0	37.4	603: J-476	37.4	603: J-476	True
J-113	153: ZONE-1	9.24	True	True	4,000.00	4,010.00	77.6	62.0	443: J-313	45.7	641: J-513	True
J-109	153: ZONE-1	9.23	True	True	4,000.00	4,010.00	86.1	61.0	443: J-313	45.4	641: J-513	True
J-76	153: ZONE-1	9.22	True	True	4,000.00	4,010.00	76.5	61.8	443: J-313	45.7	641: J-513	True
J-316	153: ZONE-1	9.21	True	True	4,000.00	4,010.00	76.5	62.4	443: J-313	45.9	641: J-513	True
J-130	153: ZONE-1	9.19	True	True	4,000.00	4,010.00	64.4	53.6	443: J-313	41.0	641: J-513	True
J-159	153: ZONE-1	9.15	True	True	4,000.00	4,010.00	95.5	56.1	443: J-313	43.9	641: J-513	True
J-140	153: ZONE-1	9.10	True	True	4,000.00	4,010.00	94.0	55.4	443: J-313	43.7	641: J-513	True
J-187	154: ZONE-2	9.07	True	True	4,000.00	4,010.00	86.3	60.7	443: J-313	45.2	641: J-513	True
J-160	153: ZONE-1	9.05	True	True	4,000.00	4,010.00	49.9	40.7	603: J-476	40.7	603: J-476	True
J-161	153: ZONE-1	8.91	True	True	4,000.00	4,010.00	95.1	57.0	443: J-313	44.0	641: J-513	True
J-164	153: ZONE-1	8.85	True	True	4,000.00	4,010.00	89.1	58.1	443: J-313	44.1	641: J-513	True
J-110	153: ZONE-1	8.85	True	True	4,000.00	4,010.00	95.3	60.1	443: J-313	45.0	641: J-513	True
J-549	154: ZONE-2	8.82	True	True	4,000.00	4,010.00	82.3	60.8	443: J-313	45.3	641: J-513	True
J-136	153: ZONE-1	8.80	True	True	4,000.00	4,010.00	80.3	37.4	603: J-476	37.4	603: J-476	True
J-163	153: ZONE-1	8.79	True	True	4,000.00	4,010.00	83.3	60.0	443: J-313	45.0	641: J-513	True
J-137	153: ZONE-1	8.77	True	True	4,000.00	4,010.00	89.5	59.2	443: J-313	44.5	641: J-513	True
J-162	153: ZONE-1	8.75	True	True	4,000.00	4,010.00	84.5	59.6	443: J-313	44.8	641: J-513	True
J-552	154: ZONE-2	8.71	True	True	4,000.00	4,010.00	87.4	59.5	443: J-313	44.7	641: J-513	True
J-111	153: ZONE-1	8.71	True	True	4,000.00	4,010.00	78.1	37.4	603: J-476	37.4	603: J-476	True
J-332	154: ZONE-2	8.70	True	True	4,000.00	4,010.00	82.1	61.0	443: J-313	45.4	641: J-513	True
J-170	154: ZONE-2	8.49	True	True	4,000.00	4,010.00	81.6	37.4	603: J-476	37.4	603: J-476	True
J-547	154: ZONE-2	8.36	True	True	4,000.00	4,010.00	54.1	39.4	603: J-476	39.4	603: J-476	True
J-548	154: ZONE-2	8.32	True	True	4,000.00	4,010.00	79.6	37.4	603: J-476	37.4	603: J-476	True
J-527	154: ZONE-2	8.23	True	True	4,000.00	4,010.00	79.4	37.4	603: J-476	37.4	603: J-476	True
J-453	154: ZONE-2	8.15	False	True	1,000.00	1,010.00	69.2	40.3	603: J-476	40.3	603: J-476	True
J-181	154: ZONE-2	8.02	True	True	4,000.00	4,010.00	74.5	37.4	603: J-476	37.4	603: J-476	True
J-490	154: ZONE-2	7.52	False	True	1,000.00	1,010.00	52.1	40.4	603: J-476	40.4	603: J-476	True
J-554	154: ZONE-2	7.44	True	True	4,000.00	4,010.00	88.6	41.2	603: J-476	41.2	603: J-476	True
J-550	154: ZONE-2	7.26	True	True	4,000.00	4,010.00	72.3	39.1	603: J-476	39.1	603: J-476	True
J-47	153: ZONE-1	7.24	False	True	1,000.00	1,010.00	78.6	37.4	603: J-476	37.4	603: J-476	True
J-553	154: ZONE-2	6.97	True	True	4,000.00	4,010.00	68.1	62.6	332: J-194	46.4	641: J-513	True
J-445	156: ZONE-4	6.89	False	True	1,000.00	1,010.00	75.6	38.0	603: J-476	38.0	603: J-476	True
J-351	153: ZONE-1	6.84	False	True	1,000.00	1,010.00	82.1	55.9	565: J-438	46.0	641: J-513	True
J-347	153: ZONE-1	6.64	False	True	1,000.00	1,010.00	59.9	58.0	481: J-352	46.1	641: J-513	True
J-348	158: ZONE-6	6.64	False	True	1,000.00	1,010.00	81.5	58.0	481: J-352	46.1	641: J-513	True
J-346	158: ZONE-6	6.64	False	True	1,000.00	1,010.00	48.7	60.9	475: J-346	46.1	641: J-513	True
J-350	153: ZONE-1											

J-385	154: ZONE-2	6.56	False	True	1,000.00	1,010.00	83.4	43.8	603: J-476	43.8	603: J-476	True
J-496	154: ZONE-2	6.56	False	True	1,000.00	1,010.00	87.4	43.8	603: J-476	43.8	603: J-476	True
J-200	153: ZONE-1	6.53	False	True	1,000.00	1,010.00	111.4	62.4	555: J-427	46.1	641: J-513	True
J-205	153: ZONE-1	6.53	False	True	1,000.00	1,010.00	123.3	62.4	555: J-427	46.1	641: J-513	True
J-206	153: ZONE-1	6.53	False	True	1,000.00	1,010.00	93.2	62.4	555: J-427	46.1	641: J-513	True
J-201	153: ZONE-1	6.53	False	True	1,000.00	1,010.00	82.9	62.4	555: J-427	46.1	641: J-513	True
J-202	153: ZONE-1	6.53	False	True	1,000.00	1,010.00	79.1	62.4	555: J-427	46.1	641: J-513	True
J-203	153: ZONE-1	6.53	False	True	1,000.00	1,010.00	80.5	62.4	555: J-427	46.1	641: J-513	True
J-511	153: ZONE-1	6.53	False	True	1,000.00	1,010.00	85.1	62.4	555: J-427	46.1	641: J-513	True
J-526	154: ZONE-2	6.52	True	True	4,000.00	4,010.00	70.8	40.3	603: J-476	40.3	603: J-476	True
J-225	153: ZONE-1	6.49	False	True	1,000.00	1,010.00	79.5	62.4	555: J-427	46.1	641: J-513	True
J-227	153: ZONE-1	6.49	False	True	1,000.00	1,010.00	70.5	62.4	555: J-427	46.1	641: J-513	True
J-222	153: ZONE-1	6.49	False	True	1,000.00	1,010.00	87.4	62.4	555: J-427	46.1	641: J-513	True
J-224	153: ZONE-1	6.49	False	True	1,000.00	1,010.00	80.1	62.4	555: J-427	46.1	641: J-513	True
J-223	153: ZONE-1	6.49	False	True	1,000.00	1,010.00	81.3	62.4	555: J-427	46.1	641: J-513	True
J-342	154: ZONE-2	6.48	False	True	1,000.00	1,010.00	76.2	44.1	603: J-476	44.1	603: J-476	True
J-56	153: ZONE-1	6.48	False	True	1,000.00	1,010.00	81.7	62.6	332: J-194	46.4	641: J-513	True
J-437	157: ZONE-5	6.47	False	True	1,000.00	1,010.00	76.6	52.8	563: J-436	46.1	641: J-513	True
J-439	156: ZONE-4	6.47	False	True	1,000.00	1,010.00	80.3	56.0	565: J-438	46.1	641: J-513	True
J-434	153: ZONE-1	6.47	False	True	1,000.00	1,010.00	103.7	61.9	555: J-427	46.1	641: J-513	True
J-435	153: ZONE-1	6.47	False	True	1,000.00	1,010.00	102.7	61.9	555: J-427	46.1	641: J-513	True
J-436	157: ZONE-5	6.47	False	True	1,000.00	1,010.00	50.9	76.6	564: J-437	46.1	641: J-513	True
J-430	153: ZONE-1	6.47	False	True	1,000.00	1,010.00	94.7	61.8	555: J-427	46.1	641: J-513	True
J-431	153: ZONE-1	6.47	False	True	1,000.00	1,010.00	91.7	61.8	555: J-427	46.1	641: J-513	True
J-495	153: ZONE-1	6.46	False	True	1,000.00	1,010.00	86.0	60.1	481: J-352	46.1	641: J-513	True
J-372	153: ZONE-1	6.46	False	True	1,000.00	1,010.00	97.3	62.0	555: J-427	46.1	641: J-513	True
J-411	154: ZONE-2	6.46	False	True	1,000.00	1,010.00	74.2	42.2	603: J-476	42.2	603: J-476	True
J-418	153: ZONE-1	6.46	False	True	1,000.00	1,010.00	57.1	59.5	542: J-414	46.1	641: J-513	True
J-477	154: ZONE-2	6.46	False	True	1,000.00	1,010.00	36.3	37.4	603: J-476	37.4	603: J-476	True
J-494	154: ZONE-2	6.46	False	True	1,000.00	1,010.00	36.4	37.4	603: J-476	37.4	603: J-476	True
J-33	153: ZONE-1	6.46	False	True	1,000.00	1,010.00	74.6	62.6	332: J-194	46.3	641: J-513	True
J-423	153: ZONE-1	6.46	False	True	1,000.00	1,010.00	76.8	61.3	555: J-427	46.1	641: J-513	True
J-499	153: ZONE-1	6.46	False	True	1,000.00	1,010.00	63.4	62.5	443: J-313	45.9	641: J-513	True
J-244	153: ZONE-1	6.46	False	True	1,000.00	1,010.00	82.5	62.6	332: J-194	46.1	641: J-513	True
J-298	154: ZONE-2	6.46	False	True	1,000.00	1,010.00	71.0	46.7	603: J-476	46.5	641: J-513	True
J-507	153: ZONE-1	6.45	False	True	1,000.00	1,010.00	73.9	62.6	332: J-194	46.3	641: J-513	True
J-344	158: ZONE-6	6.45	False	True	1,000.00	1,010.00	137.3	59.4	477: J-348	46.1	641: J-513	True
J-390	154: ZONE-2	6.45	False	True	1,000.00	1,010.00	83.5	42.8	603: J-476	42.8	603: J-476	True
J-407	154: ZONE-2	6.45	False	True	1,000.00	1,010.00	81.4	42.2	603: J-476	42.2	603: J-476	True
J-3	153: ZONE-1	6.45	False	True	1,000.00	1,010.00	69.9	62.6	332: J-194	46.4	641: J-513	True
J-26	153: ZONE-1	6.45	False	True	1,000.00	1,010.00	68.6	62.6	332: J-194	46.4	641: J-513	True
J-231	153: ZONE-1	6.45	False	True	1,000.00	1,010.00	77.4	62.3	555: J-427	46.1	641: J-513	True
J-398	154: ZONE-2	6.45	False	True	1,000.00	1,010.00	86.1	42.4	603: J-476	42.4	603: J-476	True
J-204	153: ZONE-1	6.45	False	True	1,000.00	1,010.00	63.2	62.6	332: J-194	46.5	641: J-513	True
J-546	153: ZONE-1	6.45	False	True	1,000.00	1,010.00	84.1	62.6	332: J-194	46.5	641: J-513	True
J-11	153: ZONE-1	6.45	False	True	1,000.00	1,010.00	70.2	62.6	332: J-194	46.4	641: J-513	True
J-545	153: ZONE-1	6.45	False	True	1,000.00	1,010.00	86.3	62.6	332: J-194	46.5	641: J-513	True
J-449	154: ZONE-2	6.30	False	True	1,000.00	1,010.00	89.5	41.8	603: J-476	41.8	603: J-476	True
J-428	153: ZONE-1	5.72	False	True	1,000.00	1,010.00	70.5	61.8	555: J-427	46.1	641: J-513	True
J-480	158: ZONE-6	5.54	False	True	1,000.00	1,010.00	106.2	59.6	477: J-348	46.1	641: J-513	True
J-345	158: ZONE-6	5.52	False	True	1,000.00	1,010.00	114.3	59.4	477: J-348	46.1	641: J-513	True
J-618	153: ZONE-1	5.47	False	True	1,000.00	1,010.00	75.6	62.6	332: J-194	46.3	641: J-513	True
J-221	158: ZONE-6	5.36	False	True	1,000.00	1,010.00	62.0	59.8	477: J-348	46.1	641: J-513	True
J-354	153: ZONE-1	5.34	False	True	1,000.00	1,010.00	69.9	61.8	555: J-427	46.1	641: J-513	True
J-16	153: ZONE-1	5.12	False	True	1,000.00	1,010.00	68.2	62.6	332: J-194	46.4	641: J-513	True
J-379	153: ZONE-1	5.10	False	True	1,000.00	1,010.00	147.2	62.6	332: J-194	46.0	641: J-513	True
J-17	153: ZONE-1	5.06	False	True	1,000.00	1,010.00	78.5	62.6	332: J-194	46.4	641: J-513	True
J-18	153: ZONE-1	5.02	False	True	1,000.00	1,010.00	78.0	62.6	332: J-194	46.4	641: J-513	True
J-343	158: ZONE-6	4.98	False	True	1,000.00	1,010.00	117.9	59.4	477: J-348	46.1	641: J-513	True
J-220	158: ZONE-6	4.94	False	True	1,000.00	1,010.00	67.9	59.8	477: J-348	46.1	641: J-513	True
J-302	158: ZONE-6	4.92	False	True	1,000.00	1,010.00	96.3	59.7	477: J-348	46.1	641: J-513	True
J-450	154: ZONE-2	4.86	False	True	1,000.00	1,010.00	89.8	39.6	603: J-476	39.6	603: J-476	True
J-291	154: ZONE-2	4.79	False	True	1,000.00	1,010.00	75.5	45.1	603: J-476	45.1	603: J-476	True
J-19	153: ZONE-1	4.77	False	True	1,000.00	1,010.00	73.1	62.6	332: J-194	46.4	641: J-513	True
J-371	153: ZONE-1	4.73	False	True	1,000.00	1,010.00	96.9	62.0	555: J-427	46.1	641: J-513	True
J-448	154: ZONE-2	4.73	False	True	1,000.00	1,010.00	91.8	42.0	603: J-476	42.0	603: J-476	True
J-24	153: ZONE-1	4.72	False	True	1,000.00	1,010.00	68.5	62.6	332: J-194	46.4	641: J-513	True
J-535	153: ZONE-1	4.70	False	True	1,000.00	1,010.00	82.8	62.0	555: J-427	46.1	641: J-513	True
J-410	154: ZONE-2	4.67	False	True	1,000.00	1,010.00	90.1	42.2	603: J-476	42.2	603: J-476	True
J-412	154: ZONE-2	4.65	False	True	1,000.00	1,010.00	79.8	41.6	603: J-476	41.6	603: J-476	True
J-405	154: ZONE-2	4.64	False	True	1,000.00	1,010.00	79.9	41.6	603: J-476	41.6	603: J-476	True
J-471	154: ZONE-2	4.64	False	True	1,000.00	1,010.00	76.3	40.9	603: J-476	40.9	603: J-476	True
J-53	153: ZONE-1	4.63	False	True	1,000.00	1,010.00	76.9	62.6	332: J-194	46.4	641: J-513	True
J-470	154: ZONE-2	4.63	False	True	1,000.00	1,010.00	84.9	39.9	603: J-476	39.9	603: J-476	True
J-404	154: ZONE-2	4.63	False	True	1,000.00	1,010.00	82.8	41.9	603: J-476	41.9	603: J-476	True
J-469	154: ZONE-2	4.63	False	True	1,000.00	1,010.00	84.6	40.2	603: J-476	40.2	603: J-476	True
J-409	154: ZONE-2	4.63	False	True	1,000.00	1,010.00	87.2	42.3	603: J-476	42.3	603: J-476	True
J-408	154: ZONE-2	4.62	False	True	1,000.00	1,010.00	92.2	42.2	603: J-476	42.2	603: J-476	True
J-406	154: ZONE-2	4.61	False	True	1,000.00	1,010.00	88.3	42.2	603: J-476	42.2	603: J-476	True
J-216	153: ZONE-1	4.61	False	True	1,000.00	1,010.00	78.5	62.5	555: J-427	46.1	641: J-513	True
J-403	154: ZONE-2	4.61	False	True	1,000.00	1,010.00	82.5	42.1	603: J-476	42.1	603: J-476	True
J-340	154: ZONE-2	4.61	False	True	1,000.00	1,010.00	96.6	42.4	603: J-476	42.4	603: J-476	True
J-402	154: ZONE-2	4.60	False	True	1,000.00	1,010.00	87.1	42.2	603: J-476	42.2	603: J-476	True
J-612	153: ZONE-1	4.60	False	True	1,000.00	1,010.00	70.2	62.6	332: J-194	46.4	641: J-513	True
J-399	154: ZONE-2	4.60	False	True	1,000.00	1,010.00	82.9	42.2	603: J-476	42.2	603: J-476	True
J-400	154: ZONE-2	4.60	False	True	1,000.00	1,010.00	81.1	42.2	603: J-476	42.2	603: J-476	True
J-339	154: ZONE-2	4.60	False	True	1,000.00	1,010.00	97.7	42.4	603: J-476	42.4	603: J-476	True
J-401	154: ZONE-2	4.59	False	True	1,000.00	1,010.00	83.7	42.3	603: J-476	42.3	603: J-476	True
J-396	154: ZONE-2	4.58	False	True	1,000.00	1,010.00	84.6	42.3	603: J-476	42.3	603: J-476	True
J-489	154: ZONE-2	4.58	False	True	1,000.00	1,010.00	88.6	41.6	603: J-476	41.6	603: J-476	True
J-447	154: ZONE-2	4.58	False	True	1,000.00	1,010.00	85.1	42.1	603: J-476	42.1	603: J-476	True
J-395	154: ZONE-2	4.58	False									

	154: ZONE-2	4.50	False	True	1,000.00	1,010.00	93.3	42.8	603: J-476	42.8	603: J-476	True
J-543	154: ZONE-2	4.49	False	True	1,000.00	1,010.00	100.8	42.9	603: J-476	42.9	603: J-476	True
J-544	154: ZONE-2	4.48	False	True	1,000.00	1,010.00	89.4	43.0	603: J-476	43.0	603: J-476	True
J-386	154: ZONE-2	4.48	False	True	1,000.00	1,010.00	104.3	42.9	603: J-476	42.9	603: J-476	True
J-20	153: ZONE-1	4.40	False	True	1,000.00	1,010.00	76.5	62.6	332: J-194	46.4	641: J-513	True
J-296	154: ZONE-2	4.38	False	True	1,000.00	1,010.00	73.1	47.0	603: J-476	46.5	641: J-513	True
J-297	154: ZONE-2	4.38	False	True	1,000.00	1,010.00	70.5	46.7	603: J-476	46.5	641: J-513	True
J-615	153: ZONE-1	4.32	False	True	1,000.00	1,010.00	85.8	62.6	332: J-194	46.4	641: J-513	True
J-28	153: ZONE-1	4.30	False	True	1,000.00	1,010.00	73.9	62.6	332: J-194	46.4	641: J-513	True
J-2	153: ZONE-1	4.29	False	True	1,000.00	1,010.00	73.2	62.6	332: J-194	46.4	641: J-513	True
J-230	153: ZONE-1	4.28	False	True	1,000.00	1,010.00	85.6	62.3	555: J-427	46.1	641: J-513	True
J-424	153: ZONE-1	4.24	False	True	1,000.00	1,010.00	69.2	61.4	555: J-427	46.1	641: J-513	True
J-21	153: ZONE-1	4.22	False	True	1,000.00	1,010.00	73.8	62.6	332: J-194	46.4	641: J-513	True
J-352	153: ZONE-1	4.22	False	True	1,000.00	1,010.00	58.0	59.0	542: J-414	46.1	641: J-513	True
J-101	153: ZONE-1	4.22	False	True	1,000.00	1,010.00	94.8	62.6	332: J-194	46.3	641: J-513	True
J-40	153: ZONE-1	4.22	False	True	1,000.00	1,010.00	79.1	62.6	332: J-194	46.3	641: J-513	True
J-58	153: ZONE-1	4.21	False	True	1,000.00	1,010.00	76.2	62.6	332: J-194	46.4	641: J-513	True
J-303	156: ZONE-6	4.21	False	True	1,000.00	1,010.00	103.6	59.5	477: J-348	46.1	641: J-513	True
J-59	153: ZONE-1	4.21	False	True	1,000.00	1,010.00	73.9	62.6	332: J-194	46.4	641: J-513	True
J-29	153: ZONE-1	4.20	False	True	1,000.00	1,010.00	77.5	62.6	332: J-194	46.3	641: J-513	True
J-373	153: ZONE-1	4.16	False	True	1,000.00	1,010.00	96.9	61.9	555: J-427	46.1	641: J-513	True
J-611	153: ZONE-1	4.14	False	True	1,000.00	1,010.00	84.7	61.3	555: J-427	46.1	641: J-513	True
J-60	153: ZONE-1	4.13	False	True	1,000.00	1,010.00	86.9	62.6	332: J-194	46.4	641: J-513	True
J-429	153: ZONE-1	4.13	False	True	1,000.00	1,010.00	71.3	61.9	555: J-427	46.1	641: J-513	True
J-37	153: ZONE-1	4.10	False	True	1,000.00	1,010.00	81.3	62.6	332: J-194	46.3	641: J-513	True
J-414	153: ZONE-1	4.10	False	True	1,000.00	1,010.00	58.1	59.0	481: J-352	46.1	641: J-513	True
J-31	153: ZONE-1	4.08	False	True	1,000.00	1,010.00	76.4	62.6	332: J-194	46.3	641: J-513	True
J-43	153: ZONE-1	4.08	False	True	1,000.00	1,010.00	67.7	62.6	332: J-194	46.4	641: J-513	True
J-624	<None>	4.07	False	True	1,000.00	1,010.00	82.0	84.1	1666: J-623	46.3	641: J-513	True
J-36	153: ZONE-1	4.07	False	True	1,000.00	1,010.00	81.9	62.6	332: J-194	46.3	641: J-513	True
J-32	153: ZONE-1	4.06	False	True	1,000.00	1,010.00	79.0	62.6	332: J-194	46.3	641: J-513	True
J-63	153: ZONE-1	4.06	False	True	1,000.00	1,010.00	75.6	62.6	332: J-194	46.3	641: J-513	True
J-35	153: ZONE-1	4.06	False	True	1,000.00	1,010.00	81.9	62.6	332: J-194	46.3	641: J-513	True
J-506	153: ZONE-1	4.04	False	True	1,000.00	1,010.00	77.5	62.6	332: J-194	46.3	641: J-513	True
J-419	153: ZONE-1	4.04	False	True	1,000.00	1,010.00	67.9	60.5	542: J-414	46.1	641: J-513	True
J-349	153: ZONE-1	4.03	False	True	1,000.00	1,010.00	66.5	60.1	481: J-352	46.1	641: J-513	True
J-96	153: ZONE-1	4.01	False	True	1,000.00	1,010.00	79.3	62.6	332: J-194	46.3	641: J-513	True
J-508	153: ZONE-1	4.00	False	True	1,000.00	1,010.00	83.2	62.6	332: J-194	46.4	641: J-513	True
J-509	153: ZONE-1	3.98	False	True	1,000.00	1,010.00	86.2	62.6	332: J-194	46.4	641: J-513	True
J-207	153: ZONE-1	3.97	False	True	1,000.00	1,010.00	85.2	62.4	555: J-427	46.1	641: J-513	True
J-512	153: ZONE-1	3.96	False	True	1,000.00	1,010.00	71.2	62.4	555: J-427	46.1	641: J-513	True
J-104	153: ZONE-1	3.95	False	True	1,000.00	1,010.00	89.6	62.6	332: J-194	46.4	641: J-513	True
J-99	153: ZONE-1	3.95	False	True	1,000.00	1,010.00	90.6	62.6	332: J-194	46.4	641: J-513	True
J-71	153: ZONE-1	3.95	False	True	1,000.00	1,010.00	85.8	62.6	332: J-194	46.4	641: J-513	True
J-100	153: ZONE-1	3.95	False	True	1,000.00	1,010.00	94.4	62.6	332: J-194	46.4	641: J-513	True
J-98	153: ZONE-1	3.95	False	True	1,000.00	1,010.00	92.9	62.6	332: J-194	46.4	641: J-513	True
J-97	153: ZONE-1	3.95	False	True	1,000.00	1,010.00	88.2	62.6	332: J-194	46.4	641: J-513	True
J-70	153: ZONE-1	3.94	False	True	1,000.00	1,010.00	82.7	62.6	332: J-194	46.4	641: J-513	True
J-69	153: ZONE-1	3.94	False	True	1,000.00	1,010.00	84.6	62.6	332: J-194	46.4	641: J-513	True
J-530	153: ZONE-1	3.94	False	True	1,000.00	1,010.00	91.9	62.6	332: J-194	46.3	641: J-513	True
J-68	153: ZONE-1	3.93	False	True	1,000.00	1,010.00	81.0	62.6	332: J-194	46.4	641: J-513	True
J-41	153: ZONE-1	3.92	False	True	1,000.00	1,010.00	79.1	62.6	332: J-194	46.4	641: J-513	True
J-50	153: ZONE-1	3.91	False	True	1,000.00	1,010.00	79.4	62.6	332: J-194	46.4	641: J-513	True
J-42	153: ZONE-1	3.91	False	True	1,000.00	1,010.00	78.3	62.6	332: J-194	46.4	641: J-513	True
J-44	153: ZONE-1	3.90	False	True	1,000.00	1,010.00	66.6	62.6	332: J-194	46.4	641: J-513	True
J-1	153: ZONE-1	3.90	False	True	1,000.00	1,010.00	72.7	62.6	332: J-194	46.4	641: J-513	True
J-45	153: ZONE-1	3.90	False	True	1,000.00	1,010.00	67.0	62.6	332: J-194	46.4	641: J-513	True
J-46	153: ZONE-1	3.90	False	True	1,000.00	1,010.00	68.5	62.6	332: J-194	46.4	641: J-513	True
J-215	153: ZONE-1	3.90	False	True	1,000.00	1,010.00	82.0	62.5	555: J-427	46.1	641: J-513	True
J-48	153: ZONE-1	3.89	False	True	1,000.00	1,010.00	76.8	62.6	332: J-194	46.4	641: J-513	True
J-4	153: ZONE-1	3.88	False	True	1,000.00	1,010.00	75.6	62.6	332: J-194	46.4	641: J-513	True
J-51	153: ZONE-1	3.88	False	True	1,000.00	1,010.00	80.7	62.6	332: J-194	46.4	641: J-513	True
J-49	153: ZONE-1	3.87	False	True	1,000.00	1,010.00	76.4	62.6	332: J-194	46.4	641: J-513	True
J-5	153: ZONE-1	3.87	False	True	1,000.00	1,010.00	76.5	62.6	332: J-194	46.4	641: J-513	True
J-52	153: ZONE-1	3.85	False	True	1,000.00	1,010.00	78.2	62.6	332: J-194	46.4	641: J-513	True
J-6	153: ZONE-1	3.80	False	True	1,000.00	1,010.00	69.9	62.6	332: J-194	46.4	641: J-513	True
J-131	153: ZONE-1	3.80	False	True	1,000.00	1,010.00	97.1	62.6	332: J-194	46.1	641: J-513	True
J-158	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	93.8	62.6	332: J-194	46.1	641: J-513	True
J-157	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	98.4	62.6	332: J-194	46.1	641: J-513	True
J-243	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	94.0	62.6	332: J-194	46.1	641: J-513	True
J-242	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	80.0	62.6	332: J-194	46.1	641: J-513	True
J-240	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	75.4	62.6	332: J-194	46.1	641: J-513	True
J-238	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	78.3	62.6	332: J-194	46.1	641: J-513	True
J-218	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	72.5	62.6	332: J-194	46.1	641: J-513	True
J-217	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	76.7	62.5	555: J-427	46.1	641: J-513	True
J-237	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	67.6	62.6	332: J-194	46.1	641: J-513	True
J-236	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	66.9	62.5	555: J-427	46.1	641: J-513	True
J-212	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	78.3	62.5	555: J-427	46.1	641: J-513	True
J-208	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	84.2	62.4	555: J-427	46.1	641: J-513	True
J-233	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	70.5	62.4	555: J-427	46.1	641: J-513	True
J-228	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	75.3	62.4	555: J-427	46.1	641: J-513	True
J-235	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	67.9	62.4	555: J-427	46.1	641: J-513	True
J-226	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	86.6	62.4	555: J-427	46.1	641: J-513	True
J-232	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	74.9	62.4	555: J-427	46.1	641: J-513	True
J-229	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	87.2	62.4	555: J-427	46.1	641: J-513	True
J-533	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	70.0	62.5	555: J-427	46.1	641: J-513	True
J-534	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	71.1	62.3	555: J-427	46.1	641: J-513	True
J-304	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	76.5	62.1	555: J-427	46.1	641: J-513	True
J-245	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	68.2	62.6	332: J-194	46.1	641: J-513	True
J-305	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	92.1	62.1	555: J-427	46.1	641: J-513	True
J-356	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	72.7	61.9	555: J-427	46.1	641: J-513	True
J-357	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	72.8	61.9	555: J-427	46.1	641: J-513	True
J-353	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	65.7	59.3	481: J-352			



J-366	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	66.2	61.5	555: J-427	46.1	641: J-513	True
J-367	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	95.5	62.1	555: J-427	46.1	641: J-513	True
J-368	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	83.6	62.0	555: J-427	46.1	641: J-513	True
J-432	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	69.4	61.9	555: J-427	46.1	641: J-513	True
J-369	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	96.7	61.9	555: J-427	46.1	641: J-513	True
J-370	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	82.2	61.9	555: J-427	46.1	641: J-513	True
J-609	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	91.0	62.0	555: J-427	46.1	641: J-513	True
J-307	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	87.4	62.1	555: J-427	46.1	641: J-513	True
J-536	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	92.6	62.4	555: J-427	46.1	641: J-513	True
J-246	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	102.1	62.2	555: J-427	46.1	641: J-513	True
J-308	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	72.6	62.6	332: J-194	46.1	641: J-513	True
J-247	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	93.2	62.5	555: J-427	46.1	641: J-513	True
J-248	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	68.0	62.6	332: J-194	46.1	641: J-513	True
J-309	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	65.7	62.6	332: J-194	46.1	641: J-513	True
J-310	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	86.4	62.6	332: J-194	46.0	641: J-513	True
J-374	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	73.5	62.6	332: J-194	46.0	641: J-513	True
J-375	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	105.7	62.6	332: J-194	46.0	641: J-513	True
J-516	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	98.9	62.6	332: J-194	46.0	641: J-513	True
J-311	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	61.3	62.6	332: J-194	46.0	641: J-513	True
J-249	153: ZONE-1	3.79	False	True	1,000.00	1,010.00	70.0	62.6	332: J-194	46.0	641: J-513	True
J-376	153: ZONE-1	3.78	False	True	1,000.00	1,010.00	65.4	62.6	332: J-194	46.0	641: J-513	True
J-312	153: ZONE-1	3.78	False	True	1,000.00	1,010.00	95.4	62.6	332: J-194	46.0	641: J-513	True
J-377	153: ZONE-1	3.78	False	True	1,000.00	1,010.00	71.4	62.6	332: J-194	46.0	641: J-513	True
J-250	153: ZONE-1	3.78	False	True	1,000.00	1,010.00	97.8	62.6	332: J-194	46.0	641: J-513	True
J-313	153: ZONE-1	3.78	False	True	1,000.00	1,010.00	68.6	62.5	443: J-313	46.0	641: J-513	True
J-314	153: ZONE-1	3.77	False	True	1,000.00	1,010.00	62.2	62.6	332: J-194	46.0	641: J-513	True
J-251	153: ZONE-1	3.77	False	True	1,000.00	1,010.00	66.1	62.5	443: J-313	45.9	641: J-513	True
J-252	153: ZONE-1	3.77	False	True	1,000.00	1,010.00	76.0	62.6	332: J-194	46.0	641: J-513	True
J-262	153: ZONE-1	3.77	False	True	1,000.00	1,010.00	85.2	62.6	332: J-194	45.9	641: J-513	True
J-260	153: ZONE-1	3.77	False	True	1,000.00	1,010.00	99.8	62.6	332: J-194	45.7	641: J-513	True
J-623	<None>	3.76	False	True	1,000.00	1,010.00	90.3	62.6	332: J-194	45.7	641: J-513	True
J-7	153: ZONE-1	3.74	False	True	1,000.00	1,010.00	83.8	62.6	1671: J-624	46.3	641: J-513	True
J-355	153: ZONE-1	1.99	True	True	1.00	2.00	70.7	62.6	332: J-194	46.4	641: J-513	True
J-438	156: ZONE-4	1.99	True	True	1.00	2.00	74.3	62.6	332: J-194	46.5	641: J-513	True
J-151	153: ZONE-1	1.99	True	True	1.00	2.00	56.0	56.0	614: J-486	46.5	641: J-513	True
J-474	154: ZONE-2	1.99	True	True	1.00	2.00	109.3	62.6	332: J-194	46.5	641: J-513	True
J-335	154: ZONE-2	1.99	True	True	1.00	2.00	57.3	47.0	603: J-476	46.5	641: J-513	True
J-513	1624: Pump Inlet	1.99	True	False	1.00	0.00	96.9	47.0	603: J-476	46.5	641: J-513	True
J-514	1638: Pump Outlet	1.99	False	False	1,000.00	0.00	46.5	46.5	641: J-513	47.0	603: J-476	True
J-482	154: ZONE-2	1.99	True	True	1.00	2.00	72.2	72.2	642: J-514	46.5	641: J-513	True
							97.7	47.0	603: J-476	46.5	641: J-513	True

\\chs-v1\K-Clients\43-KCWD49\Hydraulic Model\WD49MasterModel.wtg

Scenario 2016 MDOFF  
Noteworthy Alternatives:

Physical: Base Physical w/ 2036 CIP  
Demand: Avg Daily  
Init. Settings: 2016 SAV Rev - inactive

3/13/17 EZ

### Fire Flow Node FlexTable: Fire Flow Report

Label	Zone	Specify Local Fire Flow Constraints?	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)
S 150 ft S 150 ft S 150 ft S 150 ft S/A M A S.	J-121	153: ZONE-1	True	False	4,000.00	3,668.33	20.0
"	J-122	153: ZONE-1	True	False	4,000.00	2,852.44	20.0
"	J-123	153: ZONE-1	True	False	4,000.00	2,437.43	20.0
"	J-124	153: ZONE-1 512	True	False	4,000.00	2,406.87	21.6
"	J-125	153: ZONE-1 513	True	False	4,000.00	2,202.56	35.5
150 ft BIK 4th S.	J-191	154: ZONE-2 512	True	False	4,000.00	3,739.61	40.9
6th SW SW 160 ft	J-199	154: ZONE-2	True	False	4,000.00	3,527.08	40.8
4th SW, SW 160 ft	J-263	154: ZONE-2	True	False	4,000.00	2,306.52	40.8
150 ft BIK 4th S.	J-264	154: ZONE-2	True	False	4,000.00	3,851.26	20.0
Sylv @ 160 ft	J-290	154: ZONE-2 512	True	False	4,000.00	2,617.71	41.2
Sylv MS @ Sylv	J-324	154: ZONE-2	True	False	4,000.00	3,577.49	21.3
HL Hwp @ Sylv	J-325	154: ZONE-2	True	False	4,000.00	3,086.45	21.7
6th Ave SW @ Sylv	J-328	154: ZONE-2	True	False	4,000.00	2,710.33	20.0
SW 160 ft @ 6th Ave S	J-329	154: ZONE-2	True	False	4,000.00	2,683.20	22.3
11th PL Loop off Sylv	J-382	155: ZONE-3	False	False	1,000.00	980.34	61.0
170 ft	J-445	156: ZONE-4	True	False	4,000.00	3,724.43	20.0
Hwp intake	J-473	154: ZONE-2	True	False	4,000.00	3,345.14	20.0
Hwp intake	J-475	154: ZONE-2	True	False	4,000.00	3,096.83	20.0
Hwp intake	J-476	154: ZONE-2	True	False	4,000.00	2,987.12	22.9
	J-513	1624: Pump Inlet	True	False	1.00	0.00	46.5
	J-514	1638: Pump Outlet	False	False	1,000.00	0.00	72.2
Hwp intake ->	J-531	154: ZONE-2	True	False	4,000.00	2,986.51	20.0
3rd Ave SW DE ->	J-532	154: ZONE-2	True	False	4,000.00	3,791.69	23.5
Sylv MS ->	J-326	154: ZONE-2	True	False	4,000.00	2,875.49	20.0
160 ft PI ->	J-622	154: ZONE-2	True	False	4,000.00	3,597.00	37.4
J-1	153: ZONE-1	False	True	1,000.00	1,010.00	72.8	62.6
J-2	153: ZONE-1	False	True	1,000.00	1,010.00	73.4	62.6
J-3	153: ZONE-1	False	True	1,000.00	1,010.00	70.1	62.6
J-4	153: ZONE-1	False	True	1,000.00	1,010.00	75.9	62.6
J-5	153: ZONE-1	False	True	1,000.00	1,010.00	76.6	62.6
J-6	153: ZONE-1	False	True	1,000.00	1,010.00	69.9	62.6
J-7	153: ZONE-1	False	True	1,000.00	1,010.00	70.8	62.6
J-8	153: ZONE-1	True	True	4,000.00	4,010.00	55.9	57.1
J-10	153: ZONE-1	True	True	4,000.00	4,010.00	54.9	54.1
J-11	153: ZONE-1	False	True	1,000.00	1,010.00	70.4	62.6
J-12	153: ZONE-1	True	True	4,000.00	4,010.00	65.2	62.6
J-13	153: ZONE-1	True	True	4,000.00	4,010.00	67.5	62.6
J-14	153: ZONE-1	True	True	4,000.00	4,010.00	73.3	62.6
J-15	153: ZONE-1	True	True	4,000.00	4,010.00	50.5	51.9
J-16	153: ZONE-1	False	True	1,000.00	1,010.00	68.2	62.6
J-17	153: ZONE-1	False	True	1,000.00	1,010.00	78.5	62.6
J-18	153: ZONE-1	False	True	1,000.00	1,010.00	78.0	62.6
J-19	153: ZONE-1	False	True	1,000.00	1,010.00	73.3	62.6
J-20	153: ZONE-1	False	True	1,000.00	1,010.00	76.5	62.6
J-21	153: ZONE-1	False	True	1,000.00	1,010.00	73.9	62.6

See J-494  
"False" to Spec.  
FF constraints,  
If "true"  
Needle = 1,500  
Upper Lim = 3,000

Scenario: 2016MDDFF

Noteworthy Alternatives:

Physical: Base Physical \*

Demand: Avg Daily

Init. Settings: 2016 SPU Fev - inactive.

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# Fire Flow Node FlexTable: Fire Flow Report

Label	Zone	Specify Local Fire Flow Constraints?	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)
J-30	153: ZONE-1	False	False	1,000.00	894.89	20.1	62.6
J-121	153: ZONE-1	True	False	4,000.00	2,229.03	33.4	20.0
J-122	153: ZONE-1	True	False	4,000.00	1,550.34	29.5	20.0
J-123	153: ZONE-1	True	False	4,000.00	1,270.75	23.5	20.0
J-124	153: ZONE-1	True	False	4,000.00	1,243.67	20.0	22.8
J-125	153: ZONE-1	True	False	4,000.00	727.83	20.0	62.6
J-153	153: ZONE-1	True	False	4,000.00	1,410.65	20.0	62.6
J-172	154: ZONE-2	True	False	4,000.00	3,621.09	20.0	39.6
J-173	154: ZONE-2	True	False	4,000.00	3,501.18	20.0	39.8
J-184	154: ZONE-2	True	False	4,000.00	2,492.49	20.0	41.3
J-191	154: ZONE-2	True	False	4,000.00	3,731.14	20.0	40.8
J-199	154: ZONE-2	True	False	4,000.00	3,327.05	20.0	40.5
J-241	153: ZONE-1	False	False	1,000.00	795.29	20.0	62.6
J-263	154: ZONE-2	True	False	4,000.00	1,318.50	20.0	42.3
J-264	154: ZONE-2	True	False	4,000.00	3,823.94	45.9	20.0
J-287	154: ZONE-2	True	False	4,000.00	3,276.63	20.0	39.0
J-290	154: ZONE-2	True	False	4,000.00	2,556.83	20.0	41.0
J-324	154: ZONE-2	True	False	4,000.00	3,567.09	20.0	21.3
J-325	154: ZONE-2	True	False	4,000.00	3,078.69	20.0	21.7
J-328	154: ZONE-2	True	False	4,000.00	2,705.00	20.0	20.0
J-329	154: ZONE-2	True	False	4,000.00	2,678.00	20.0	22.3
J-363	153: ZONE-1	False	False	1,000.00	700.95	20.0	62.6
J-382	155: ZONE-3	False	False	1,000.00	980.34	20.1	61.0
J-426	153: ZONE-1	False	False	1,000.00	609.63	20.0	62.6
J-445	156: ZONE-4	True	False	4,000.00	2,803.62	20.0	39.1
J-462	154: ZONE-2	True	False	4,000.00	3,931.58	20.0	37.4
J-467	154: ZONE-2	True	False	4,000.00	2,590.44	20.0	37.4
J-468	154: ZONE-2	True	False	4,000.00	2,810.06	20.0	37.3
J-473	154: ZONE-2	True	False	4,000.00	2,670.87	20.0	20.0
J-475	154: ZONE-2	True	False	4,000.00	2,578.80	20.0	20.0
J-476	154: ZONE-2	True	False	4,000.00	2,536.96	20.0	22.9
J-513	1624: Pump Inlet	True	False	1.00	0.00	46.5	46.5
J-514	1638: Pump Outlet	False	False	1,000.00	0.00	72.2	72.2
J-522	154: ZONE-2	True	False	4,000.00	2,531.71	20.0	37.0
J-531	154: ZONE-2	True	False	4,000.00	2,536.45	22.6	20.1
J-532	154: ZONE-2	True	False	4,000.00	3,778.85	20.0	23.5
J-326	154: ZONE-2	True	False	4,000.00	2,869.23	22.7	20.0
J-622	154: ZONE-2	True	False	4,000.00	3,516.38	20.0	37.4
J-1	153: ZONE-1	False	True	1,000.00	1,010.00	72.7	62.6
J-2	153: ZONE-1	False	True	1,000.00	1,010.00	73.2	62.6
J-3	153: ZONE-1	False	True	1,000.00	1,010.00	69.9	62.6
J-4	153: ZONE-1	False	True	1,000.00	1,010.00	75.6	62.6
J-5	153: ZONE-1	False	True	1,000.00	1,010.00	76.5	62.6
J-6	153: ZONE-1	False	True	1,000.00	1,010.00	69.9	62.6
J-7	153: ZONE-1	False	True	1,000.00	1,010.00	70.7	62.6

## Scenario Summary Report

### Scenario: 2036 MDD

Scenario Summary			
ID	1662		
Label	2036 MDD		
Notes			
Active Topology	23: Base-Active Topology		
Physical	1665: Base-Physical with 2036 CIP		
Demand	27: Base-Average Daily		
Initial Settings	1651: 2016 SPU FCV-Inactive		
Operational	55: Base-Operational		
Age	56: Base-Age Alternative		
Constituent	57: Base-Constituent		
Trace	58: Base-Trace Alternative		
Fire Flow	59: Base-Fire Flow		
Energy Cost	68: Base-Energy Cost		
Transient	1522: Base Transient		
Pressure Dependent Demand	69: Base Pressure Dependent Demand		
Failure History	1536: Base Failure History		
SCADA	1547: Base SCADA		
User Data Extensions	70: Base-User Data		
Steady State/EPS Solver Calculation Options	1645: 2036 MDD		
Transient Solver Calculation Options	1520: Base		
Hydraulic Summary			
Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	12:00:00 AM
Trials	40	Calculation Type	Hydraulics Only

Scenario: 2036 MDD  
 Current Time Step: 0.000 h  
 FlexTable: Pipe Table

ID	Label	Diameter (in)	Flow (gpm)	Velocity (ft/s)	Has Check Valve?	Has User Defined Length?	Is Closed?
1271	652	10.0	678.06	2.77	False	True	False
1272	653	10.0	678.06	2.77	True	True	False
1273	654	12.0	961.52	2.73	False	True	False
1274	655	12.0	961.52	2.73	True	True	False
1564	P-65	12.0	740.06	2.10	True	True	False
1565	P-66	12.0	740.06	2.10	True	True	False
1026	372	8.0	306.20	1.95	False	True	False
795	91	12.0	-580.31	1.65	False	False	False
796	92	8.0	228.22	1.46	False	False	False
834	138	12.0	492.32	1.40	False	False	False
865	178	12.0	449.93	1.28	False	False	False
1024	370	12.0	-431.51	1.22	False	True	False
832	136	12.0	429.23	1.22	False	False	False
914	237	12.0	-427.68	1.21	False	True	False
833	137	12.0	425.07	1.21	False	False	False
831	135	12.0	417.61	1.18	False	False	False
904	227	10.0	-283.25	1.16	False	True	False
732	18	8.0	177.94	1.14	False	False	False
1012	357	8.0	-177.75	1.13	False	False	False
1599	P-88	6.0	98.50	1.12	False	False	False
840	146	10.0	266.66	1.09	False	False	False
902	224	10.0	-253.20	1.03	False	False	False
903	226	10.0	-251.03	1.03	False	False	False
1350	223	10.0	-242.62	0.99	False	True	False
1027	373	8.0	153.52	0.98	False	False	False
1084	443	8.0	153.17	0.98	False	True	False
726	12	8.0	-151.27	0.97	False	False	False
1374	769	8.0	148.99	0.95	False	True	False
1020	366	8.0	-148.24	0.95	False	False	False
1508	375	4.0	36.50	0.93	False	False	False
780	72	10.0	-223.55	0.91	False	False	False
915	238	8.0	-142.88	0.91	False	True	False
1612	P-96	8.0	-142.88	0.91	False	False	False
1375	770	8.0	142.02	0.91	False	True	False
1310	708	8.0	-138.64	0.88	False	False	False
1019	365	8.0	-135.35	0.86	False	False	False
1315	713	8.0	133.97	0.86	False	False	False
1316	714	8.0	133.97	0.86	False	False	False
1033	380	10.0	-201.97	0.83	False	False	False
733	19	8.0	129.19	0.82	False	False	False
969	304	8.0	126.03	0.80	False	False	False
802	98	10.0	-196.29	0.80	False	False	False
1501	356	8.0	-123.17	0.79	False	False	False
850	156	8.0	121.37	0.77	False	False	False
970	305	8.0	120.45	0.77	False	False	False
727	13	8.0	120.07	0.77	False	False	False
1668	P-118	10.0	186.50	0.76	False	False	False
841	147	10.0	185.48	0.76	False	False	False
916	239	12.0	-258.77	0.73	False	False	False
1357	752	8.0	114.71	0.73	False	False	False
960	294	12.0	257.73	0.73	False	False	False
875	189	10.0	177.66	0.73	False	False	False
800	96	8.0	-112.79	0.72	False	False	False
803	99	10.0	-176.23	0.72	False	False	False
961	295	12.0	252.50	0.72	False	False	False

**Scenario: 2036 MDD**  
**Current Time Step: 0.000 h**  
**FlexTable: Junction Table**

ID	Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Zone	Demand (Maximum) (gpm)
508	J-379	196.0	10.45	553.5	154.7	357.52	153: ZONE-1	10.45
473	J-344	128.0	1.39	460.2	143.7	332.21	158: ZONE-6	1.39
343	J-205	236.0	2.09	553.3	137.3	317.33	153: ZONE-1	2.09
449	J-320	246.0	1.76	553.7	133.1	307.72	153: ZONE-1	1.76
451	J-322	264.0	2.41	553.7	125.4	289.73	153: ZONE-1	2.41
293	J-146	267.2	4.79	554.2	124.2	287.02	153: ZONE-1	4.79
653	J-525	270.0	0.00	554.2	123.0	284.22	153: ZONE-1	0.00
1494	J-588	270.0	0.00	553.7	122.8	283.72	153: ZONE-1	0.00
1495	J-589	270.0	0.00	553.7	122.8	283.72	153: ZONE-1	0.00
472	J-343	177.0	4.18	460.2	122.5	283.21	158: ZONE-6	4.18
338	J-200	272.0	2.44	553.3	121.7	281.33	153: ZONE-1	2.44
452	J-323	274.0	1.76	553.7	121.0	279.72	153: ZONE-1	1.76
474	J-345	189.0	1.39	460.2	117.3	271.22	158: ZONE-6	1.39
314	J-169	284.0	13.13	554.2	116.9	270.20	153: ZONE-1	13.13
295	J-149	287.0	3.41	554.2	115.6	267.22	153: ZONE-1	3.41
389	J-258	287.0	4.19	553.7	115.4	266.74	153: ZONE-1	4.19
292	J-145	288.0	4.79	554.2	115.2	266.22	153: ZONE-1	4.79
684	J-555	290.0	0.00	554.2	114.3	264.22	153: ZONE-1	0.00
608	J-480	197.0	3.14	460.2	113.9	263.19	158: ZONE-6	3.14
514	J-385	177.0	3.83	438.2	113.0	261.20	154: ZONE-2	3.83
313	J-168	294.0	9.80	554.1	112.5	260.11	153: ZONE-1	9.80
561	J-434	295.0	1.39	553.3	111.8	258.31	153: ZONE-1	1.39
562	J-435	295.0	1.05	553.3	111.8	258.31	153: ZONE-1	1.05
296	J-150	296.0	3.43	554.2	111.7	258.22	153: ZONE-1	3.43
294	J-148	296.6	2.83	554.2	111.5	257.62	153: ZONE-1	2.83
433	J-303	205.0	2.44	460.2	110.4	255.19	158: ZONE-6	2.44
685	J-556	300.0	0.00	554.2	110.0	254.22	153: ZONE-1	0.00
392	J-261	300.0	5.23	553.7	109.8	253.74	153: ZONE-1	5.23
290	J-143	301.5	16.27	554.2	109.3	252.71	153: ZONE-1	16.27
297	J-151	302.0	2.86	554.2	109.1	252.22	153: ZONE-1	2.86
503	J-374	302.0	4.18	553.5	108.8	251.48	153: ZONE-1	4.18
515	J-386	187.0	0.00	438.2	108.7	251.15	154: ZONE-2	0.00
519	J-391	188.0	2.44	438.1	108.2	250.11	154: ZONE-2	2.44
241	J-88	305.0	2.62	554.3	107.9	249.34	153: ZONE-1	2.62
291	J-144	305.0	4.90	554.2	107.8	249.23	153: ZONE-1	4.90
298	J-152	306.0	2.15	554.2	107.4	248.22	153: ZONE-1	2.15
312	J-166	306.0	9.27	554.1	107.3	248.10	153: ZONE-1	9.27
385	J-254	306.3	3.49	553.9	107.1	247.60	153: ZONE-1	3.49
687	J-558	307.0	0.00	554.2	107.0	247.24	153: ZONE-1	0.00
265	J-116	307.5	7.81	554.2	106.8	246.74	153: ZONE-1	7.81
266	J-117	307.5	5.89	554.2	106.8	246.74	153: ZONE-1	5.89
1486	J-585	307.0	0.00	553.7	106.7	246.72	153: ZONE-1	0.00
520	J-392	192.0	6.97	438.1	106.5	246.11	154: ZONE-2	6.97
267	J-120	309.0	9.43	554.2	106.1	245.22	153: ZONE-1	9.43
306	J-160	308.9	13.05	554.0	106.0	245.05	153: ZONE-1	13.05
387	J-256	309.0	9.48	553.7	105.9	244.75	153: ZONE-1	9.48
686	J-557	310.0	0.00	554.2	105.7	244.23	153: ZONE-1	0.00
299	J-153	310.0	2.65	554.2	105.7	244.22	153: ZONE-1	2.65
310	J-164	310.0	23.92	554.2	105.6	244.15	153: ZONE-1	23.92
665	J-536	310.0	0.00	553.3	105.3	243.34	153: ZONE-1	0.00
245	J-92	311.0	2.96	554.3	105.3	243.30	153: ZONE-1	2.96
672	J-543	195.0	0.00	438.2	105.2	243.15	154: ZONE-2	0.00
240	J-87	312.0	1.28	554.3	104.9	242.34	153: ZONE-1	1.28
242	J-89	312.0	1.28	554.3	104.9	242.34	153: ZONE-1	1.28
301	J-155	312.0	0.00	554.2	104.8	242.22	153: ZONE-1	0.00
302	J-156	312.0	0.00	554.2	104.8	242.22	153: ZONE-1	0.00

**Scenario: 2036 MDD**  
**Current Time Step: 0.000 h**  
**FlexTable: Junction Table**

ID	Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Zone	Demand (Maximum) (gpm)
641	J-513	265.0	0.00	372.2	46.4	107.17	1624: Pump Inlet	0.00
603	J-476	330.0	0.70	438.0	46.7	107.96	154: ZONE-2	0.70
659	J-531	324.0	0.00	438.0	49.3	113.96	154: ZONE-2	0.00
622	J-494	323.0	1.74	438.0	49.7	114.96	154: ZONE-2	1.74
604	J-477	323.0	1.39	438.0	49.7	114.96	154: ZONE-2	1.39
602	J-475	323.0	1.05	438.0	49.7	114.96	154: ZONE-2	1.05
565	J-438	190.0	0.70	319.5	56.0	129.48	156: ZONE-4	0.70
614	J-486	190.0	0.70	319.5	56.0	129.48	156: ZONE-4	0.70
567	J-440	190.0	1.05	319.5	56.0	129.48	156: ZONE-4	1.05
600	J-473	306.0	5.58	438.0	57.1	131.96	154: ZONE-2	5.58
601	J-474	306.0	0.00	438.0	57.1	131.96	154: ZONE-2	0.00
326	J-185	305.0	7.94	438.8	57.9	133.83	154: ZONE-2	7.94
607	J-479	305.0	7.94	438.8	57.9	133.83	154: ZONE-2	7.94
606	J-478	303.0	9.17	438.8	58.8	135.82	154: ZONE-2	9.17
563	J-436	245.0	1.05	381.7	59.2	136.73	157: ZONE-5	1.05
477	J-348	322.0	2.44	460.2	59.8	138.23	158: ZONE-6	2.44
337	J-199	300.0	5.79	438.8	60.1	138.82	154: ZONE-2	5.79
335	J-197	300.0	8.04	438.8	60.1	138.82	154: ZONE-2	8.04
1610	J-619	299.1	0.00	438.9	60.5	139.80	154: ZONE-2	0.00
336	J-198	299.0	9.80	438.9	60.5	139.86	154: ZONE-2	9.80
327	J-187	299.0	16.38	438.9	60.5	139.92	154: ZONE-2	16.38
475	J-346	318.0	2.44	460.2	61.5	142.23	158: ZONE-6	2.44
325	J-184	295.0	3.67	438.7	62.2	143.73	154: ZONE-2	3.67
422	J-292	295.0	4.53	439.0	62.3	143.99	154: ZONE-2	4.53
332	J-194	295.0	8.83	439.3	62.4	144.26	153: ZONE-1	8.83
626	J-498	294.0	4.95	438.3	62.4	144.29	154: ZONE-2	4.95
643	J-515	293.0	0.00	438.3	62.8	145.26	153: ZONE-1	0.00
394	J-263	292.0	1.74	438.2	63.3	146.22	154: ZONE-2	1.74
342	J-204	353.0	0.70	499.3	63.3	146.32	153: ZONE-1	0.70
443	J-313	406.5	6.97	553.7	63.7	147.21	153: ZONE-1	6.97
354	J-221	312.0	1.74	460.2	64.1	148.18	158: ZONE-6	1.74
644	J-516	405.0	0.00	553.6	64.3	148.58	153: ZONE-1	0.00
330	J-191	290.0	4.98	439.3	64.6	149.26	154: ZONE-2	4.98
555	J-427	404.0	4.53	553.3	64.6	149.30	153: ZONE-1	4.53
323	J-181	289.0	5.19	438.7	64.8	149.71	154: ZONE-2	5.19
324	J-183	289.0	5.19	438.7	64.8	149.73	154: ZONE-2	5.19
390	J-259	288.0	9.04	438.2	65.0	150.24	154: ZONE-2	9.04
419	J-289	288.0	9.12	438.8	65.3	150.82	154: ZONE-2	9.12
329	J-190	287.0	5.14	439.3	65.9	152.26	154: ZONE-2	5.14
328	J-189	287.0	4.45	439.3	65.9	152.27	154: ZONE-2	4.45
481	J-352	400.0	4.53	553.2	66.3	153.23	153: ZONE-1	4.53
542	J-414	400.0	3.48	553.2	66.3	153.24	153: ZONE-1	3.48
553	J-425	400.0	2.09	553.3	66.3	153.30	153: ZONE-1	2.09
331	J-193	285.0	8.83	439.3	66.7	154.26	153: ZONE-1	8.83
380	J-249	398.8	13.24	553.6	67.0	154.84	153: ZONE-1	13.24
379	J-248	397.5	10.11	553.6	67.5	156.05	153: ZONE-1	10.11
444	J-314	397.0	6.97	553.7	67.8	156.72	153: ZONE-1	6.97
544	J-416	396.0	3.83	553.2	68.0	157.24	153: ZONE-1	3.83
509	J-380	204.5	4.18	361.8	68.1	157.35	155: ZONE-3	4.18
334	J-196	282.0	0.00	439.4	68.1	157.39	154: ZONE-2	0.00
333	J-195	282.0	1.55	439.4	68.1	157.40	154: ZONE-2	1.55
202	J-44	395.0	0.00	554.6	69.1	159.64	153: ZONE-1	0.00
420	J-290	279.0	1.73	438.8	69.1	159.82	154: ZONE-2	1.73
423	J-293	279.0	3.48	439.0	69.2	159.99	154: ZONE-2	3.48
546	J-418	393.0	3.14	553.2	69.3	160.24	153: ZONE-1	3.14
494	J-365	393.0	7.32	553.3	69.4	160.31	153: ZONE-1	7.32

Scenario: 2036 MDD  
 Current Time Step: 0.000 h  
 FlexTable: FCV Table

ID	Diameter (Valve) (in)	Flow Setting (Initial) (gpm)	Flow (gpm)	Is Active?	Is Open?	Velocity (ft/s)	Hydraulic Grade (From) (ft)	Hydraulic Grade (To) (ft)
705	4.0	850.00	678.06	True	True	17.31	555.0	555.0
1563	6.0	1,000.00	740.06	True	True	8.40	440.0	440.0
706	8.0	650.00	961.52	True	True	6.14	555.0	555.0
1569	6.0	10.00	0.00	True	True	0.00	438.0	438.0
1566	6.0	10.00	0.00	True	True	0.00	420.0	420.0
1628	6.0	2,000.00	0.00	True	True	0.00	438.0	438.0

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## Scenario Summary Report

### Scenario: 2036 PHD

Scenario Summary	
ID	1663
Label	2036 PHD
Notes	
Active Topology	<I> 23: Base-Active Topology
Physical	24: Base-Physical
Demand	<I> 27: Base-Average Daily
Initial Settings	<I> 1651: 2016 SPU FCV-Inactive
Operational	<I> 55: Base-Operational
Age	<I> 56: Base-Age Alternative
Constituent	<I> 57: Base-Constituent
Trace	<I> 58: Base-Trace Alternative
Fire Flow	<I> 59: Base-Fire Flow
Energy Cost	<I> 68: Base-Energy Cost
Transient	<I> 1522: Base Transient
Pressure Dependent Demand	<I> 69: Base Pressure Dependent Demand
Failure History	<I> 1536: Base Failure History
SCADA	<I> 1547: Base SCADA
User Data Extensions	<I> 70: Base-User Data
Steady State/EPS Solver Calculation Options	1646: 2036 PHD
Transient Solver Calculation Options	<I> 1520: Base

NO CIR

Hydraulic Summary			
Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	12:00:00 AM
Trials	40	Calculation Type	Hydraulics Only

**Scenario: 2036 PHD**  
**Current Time Step: 0.000 h**  
**FlexTable: Pipe Table**

ID	Label	Diameter (in)	Flow (gpm)	Velocity (ft/s)	Has Check Valve?	Has User Defined Length?	Is Closed?
1273	654	12.0	1,582.34	4.49	False	True	False
1274	655	12.0	1,582.34	4.49	True	True	False
1272	653	10.0	1,091.05	4.46	True	True	False
1271	652	10.0	1,091.05	4.46	False	True	False
1564	P-65	12.0	1,206.70	3.42	True	True	False
1565	P-66	12.0	1,206.70	3.42	True	True	False
1026	372	8.0	527.40	3.37	False	True	False
795	91	12.0	-954.14	2.71	False	False	False
796	92	8.0	375.03	2.39	False	False	False
834	138	12.0	824.53	2.34	False	False	False
904	227	10.0	-537.66	2.20	False	True	False
865	178	12.0	744.46	2.11	False	False	False
832	136	12.0	706.89	2.01	False	False	False
833	137	12.0	700.10	1.99	False	False	False
903	226	10.0	-485.11	1.98	False	False	False
831	135	12.0	686.28	1.95	False	False	False
1024	370	12.0	-675.47	1.92	False	True	False
914	237	12.0	-669.22	1.90	False	True	False
1012	357	8.0	-294.73	1.88	False	False	False
1599	P-88	6.0	161.14	1.83	False	False	False
840	146	10.0	428.35	1.75	False	False	False
732	18	8.0	264.46	1.69	False	False	False
1020	366	8.0	-260.25	1.66	False	False	False
1027	373	8.0	259.91	1.66	False	False	False
1084	443	8.0	259.34	1.66	False	True	False
902	224	10.0	-398.37	1.63	False	False	False
1374	769	8.0	252.52	1.61	False	True	False
726	12	8.0	-249.43	1.59	False	False	False
1350	223	10.0	-381.12	1.56	False	True	False
1375	770	8.0	241.16	1.54	False	True	False
1019	365	8.0	-239.23	1.53	False	False	False
780	72	10.0	-372.83	1.52	False	False	False
1033	380	10.0	-371.20	1.52	False	False	False
1508	375	4.0	59.31	1.51	False	False	False
733	19	8.0	236.17	1.51	False	False	False
1310	708	8.0	-229.77	1.47	False	False	False
915	238	6.0	-129.05	1.46	False	True	False
1612	P-96	6.0	-129.05	1.46	False	False	False
1315	713	8.0	216.65	1.38	False	False	False
1316	714	8.0	216.65	1.38	False	False	False
1032	379	10.0	-332.34	1.36	False	False	False
841	147	10.0	322.98	1.32	False	False	False
875	189	10.0	318.90	1.30	False	False	False
1501	356	8.0	-204.01	1.30	False	False	False
964	298	8.0	-202.80	1.29	False	False	False
969	304	8.0	202.70	1.29	False	False	False
802	98	10.0	-312.99	1.28	False	False	False
1238	615	6.0	112.19	1.27	False	False	False
916	239	12.0	-442.48	1.26	False	False	False
960	294	12.0	440.77	1.25	False	False	False
727	13	8.0	195.81	1.25	False	False	False
1668	P-118	10.0	303.71	1.24	False	False	False
970	305	8.0	193.59	1.24	False	False	False
850	156	8.0	192.31	1.23	False	False	False
961	295	12.0	432.25	1.23	False	False	False

**Scenario: 2036 PHD**  
**Current Time Step: 0.000 h**  
**FlexTable: Junction Table**

ID	Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Zone	Demand (Maximum) (gpm)
603	J-476	330.0	1.14	433.6	44.8	103.62	154: ZONE-2	1.14
641	J-513	265.0	0.00	371.5	46.1	106.49	1624: Pump Inlet	0.00
659	J-531	324.0	0.00	433.6	47.4	109.62	154: ZONE-2	0.00
622	J-494	323.0	2.84	433.6	47.9	110.62	154: ZONE-2	2.84
604	J-477	323.0	2.27	433.6	47.9	110.62	154: ZONE-2	2.27
602	J-475	323.0	1.70	433.6	47.9	110.62	154: ZONE-2	1.70
600	J-473	306.0	9.09	433.6	55.2	127.62	154: ZONE-2	9.09
601	J-474	306.0	0.00	433.6	55.2	127.62	154: ZONE-2	0.00
565	J-438	190.0	1.14	319.5	56.0	129.47	156: ZONE-4	1.14
614	J-486	190.0	1.14	319.5	56.0	129.48	156: ZONE-4	1.14
567	J-440	190.0	1.70	319.5	56.0	129.48	156: ZONE-4	1.70
326	J-185	305.0	12.94	436.7	57.0	131.72	154: ZONE-2	12.94
607	J-479	305.0	12.94	436.7	57.0	131.72	154: ZONE-2	12.94
606	J-478	303.0	14.95	436.7	57.9	133.71	154: ZONE-2	14.95
337	J-199	300.0	9.44	436.7	59.1	136.71	154: ZONE-2	9.44
335	J-197	300.0	13.12	436.7	59.1	136.71	154: ZONE-2	13.12
563	J-436	245.0	1.70	381.7	59.2	136.73	157: ZONE-5	1.70
336	J-198	299.0	15.98	436.8	59.6	137.81	154: ZONE-2	15.98
1610	J-619	299.1	0.00	437.0	59.7	137.89	154: ZONE-2	0.00
327	J-187	299.0	26.70	437.0	59.7	138.01	154: ZONE-2	26.70
477	J-348	322.0	3.98	460.2	59.8	138.22	158: ZONE-6	3.98
626	J-498	294.0	8.07	435.3	61.1	141.31	154: ZONE-2	8.07
325	J-184	295.0	5.98	436.4	61.2	141.37	154: ZONE-2	5.98
422	J-292	295.0	7.39	437.2	61.5	142.20	154: ZONE-2	7.39
475	J-346	318.0	3.98	460.2	61.5	142.22	158: ZONE-6	3.98
643	J-515	293.0	0.00	435.3	61.6	142.26	153: ZONE-1	0.00
332	J-194	295.0	14.40	438.2	61.9	143.16	153: ZONE-1	14.40
394	J-263	292.0	2.84	435.2	61.9	143.18	154: ZONE-2	2.84
443	J-313	406.5	11.36	551.8	62.9	145.32	153: ZONE-1	11.36
342	J-204	353.0	1.14	499.3	63.3	146.32	153: ZONE-1	1.14
644	J-516	405.0	0.00	551.3	63.3	146.34	153: ZONE-1	0.00
555	J-427	404.0	7.39	550.6	63.4	146.57	153: ZONE-1	7.39
390	J-259	288.0	14.74	435.2	63.7	147.22	154: ZONE-2	14.74
323	J-181	289.0	8.46	436.3	63.7	147.32	154: ZONE-2	8.46
324	J-183	289.0	8.46	436.4	63.8	147.37	154: ZONE-2	8.46
354	J-221	312.0	2.84	460.1	64.1	148.07	158: ZONE-6	2.84
330	J-191	290.0	8.12	438.2	64.1	148.17	154: ZONE-2	8.12
419	J-289	288.0	14.87	436.7	64.3	148.71	154: ZONE-2	14.87
481	J-352	400.0	7.39	550.4	65.1	150.38	153: ZONE-1	7.39
542	J-414	400.0	5.68	550.4	65.1	150.40	153: ZONE-1	5.68
553	J-425	400.0	3.41	550.6	65.1	150.56	153: ZONE-1	3.41
329	J-190	287.0	8.37	438.2	65.4	151.17	154: ZONE-2	8.37
328	J-189	287.0	7.26	438.2	65.4	151.18	154: ZONE-2	7.26
380	J-249	398.8	21.59	551.5	66.1	152.74	153: ZONE-1	21.59
331	J-193	285.0	14.40	438.2	66.3	153.16	153: ZONE-1	14.40
379	J-248	397.5	16.48	551.3	66.5	153.78	153: ZONE-1	16.48
544	J-416	396.0	6.25	550.4	66.8	154.41	153: ZONE-1	6.25
444	J-314	397.0	11.36	551.8	67.0	154.82	153: ZONE-1	11.36
334	J-196	282.0	0.00	438.6	67.7	156.58	154: ZONE-2	0.00
333	J-195	282.0	2.52	438.6	67.8	156.63	154: ZONE-2	2.52
509	J-380	204.5	6.82	361.8	68.1	157.34	155: ZONE-3	6.82
546	J-418	393.0	5.11	550.4	68.1	157.41	153: ZONE-1	5.11
494	J-365	393.0	11.93	550.6	68.2	157.60	153: ZONE-1	11.93
420	J-290	279.0	2.82	436.7	68.2	157.71	154: ZONE-2	2.82
423	J-293	279.0	5.68	437.2	68.4	158.20	154: ZONE-2	5.68
367	J-236	392.4	11.93	550.8	68.5	158.40	153: ZONE-1	11.93

**Scenario: 2036 PHD**  
**Current Time Step: 0.000 h**  
**FlexTable: Junction Table**

ID	Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Zone	Demand (Maximum) (gpm)
508	J-379	196.0	17.05	551.2	153.7	355.18	153: ZONE-1	17.05
473	J-344	128.0	2.27	460.2	143.7	332.17	158: ZONE-6	2.27
343	J-205	236.0	3.41	550.7	136.1	314.68	153: ZONE-1	3.41
449	J-320	246.0	2.86	551.8	132.3	305.80	153: ZONE-1	2.86
451	J-322	264.0	3.93	551.8	124.5	287.82	153: ZONE-1	3.93
293	J-146	267.2	7.82	553.1	123.7	285.86	153: ZONE-1	7.82
472	J-343	177.0	6.82	460.2	122.5	283.17	158: ZONE-6	6.82
653	J-525	270.0	0.00	553.1	122.5	283.06	153: ZONE-1	0.00
1494	J-588	270.0	0.00	551.8	121.9	281.79	153: ZONE-1	0.00
1495	J-589	270.0	0.00	551.8	121.9	281.79	153: ZONE-1	0.00
338	J-200	272.0	3.98	550.7	120.6	278.68	153: ZONE-1	3.98
452	J-323	274.0	2.86	551.8	120.2	277.80	153: ZONE-1	2.86
474	J-345	189.0	2.27	460.2	117.3	271.20	158: ZONE-6	2.27
314	J-169	284.0	21.40	553.0	116.4	269.00	153: ZONE-1	21.40
295	J-149	287.0	5.55	553.1	115.1	266.07	153: ZONE-1	5.55
292	J-145	288.0	7.82	553.1	114.7	265.07	153: ZONE-1	7.82
389	J-258	287.0	6.84	551.9	114.6	264.85	153: ZONE-1	6.84
608	J-480	197.0	5.11	460.1	113.8	263.09	158: ZONE-6	5.11
684	J-555	290.0	0.00	553.1	113.8	263.07	153: ZONE-1	0.00
313	J-168	294.0	15.99	552.8	111.9	258.75	153: ZONE-1	15.99
514	J-385	177.0	6.25	435.1	111.7	258.12	154: ZONE-2	6.25
296	J-150	296.0	5.60	553.1	111.2	257.06	153: ZONE-1	5.60
294	J-148	296.6	4.61	553.1	111.0	256.47	153: ZONE-1	4.61
561	J-434	295.0	2.27	550.6	110.6	255.62	153: ZONE-1	2.27
562	J-435	295.0	1.70	550.6	110.6	255.62	153: ZONE-1	1.70
433	J-303	205.0	3.98	460.1	110.4	255.14	158: ZONE-6	3.98
685	J-556	300.0	0.00	553.1	109.5	253.08	153: ZONE-1	0.00
392	J-261	300.0	8.52	551.8	109.0	251.84	153: ZONE-1	8.52
290	J-143	301.5	26.53	553.0	108.8	251.52	153: ZONE-1	26.53
297	J-151	302.0	4.66	553.1	108.6	251.06	153: ZONE-1	4.66
503	J-374	302.0	6.82	551.0	107.7	249.04	153: ZONE-1	6.82
241	J-88	305.0	4.27	553.4	107.5	248.37	153: ZONE-1	4.27
291	J-144	305.0	7.99	553.1	107.3	248.09	153: ZONE-1	7.99
515	J-386	187.0	0.00	435.0	107.3	248.04	154: ZONE-2	0.00
298	J-152	306.0	3.50	553.1	106.9	247.06	153: ZONE-1	3.50
519	J-391	188.0	3.98	434.9	106.8	246.94	154: ZONE-2	3.98
312	J-166	306.0	15.12	552.7	106.8	246.74	153: ZONE-1	15.12
687	J-558	307.0	0.00	553.1	106.5	246.12	153: ZONE-1	0.00
385	J-254	306.3	5.69	552.2	106.4	245.93	153: ZONE-1	5.69
265	J-116	307.5	12.73	553.1	106.3	245.62	153: ZONE-1	12.73
266	J-117	307.5	9.61	553.1	106.3	245.61	153: ZONE-1	9.61
1486	J-585	307.0	0.00	551.8	105.9	244.81	153: ZONE-1	0.00
267	J-120	309.0	15.38	553.1	105.6	244.06	153: ZONE-1	15.38
306	J-160	308.9	21.27	552.3	105.3	243.44	153: ZONE-1	21.27
686	J-557	310.0	0.00	553.1	105.2	243.09	153: ZONE-1	0.00
299	J-153	310.0	4.31	553.1	105.2	243.06	153: ZONE-1	4.31
520	J-392	192.0	11.36	434.9	105.1	242.93	154: ZONE-2	11.36
387	J-256	309.0	15.46	551.9	105.1	242.88	153: ZONE-1	15.46
310	J-164	310.0	39.00	552.9	105.1	242.87	153: ZONE-1	39.00
245	J-92	311.0	4.83	553.3	104.8	242.27	153: ZONE-1	4.83
240	J-87	312.0	2.09	553.4	104.4	241.37	153: ZONE-1	2.09
242	J-89	312.0	2.09	553.4	104.4	241.37	153: ZONE-1	2.09
301	J-155	312.0	0.00	553.1	104.3	241.06	153: ZONE-1	0.00
302	J-156	312.0	0.00	553.1	104.3	241.06	153: ZONE-1	0.00
239	J-86	312.5	6.07	553.4	104.2	240.87	153: ZONE-1	6.07
665	J-536	310.0	0.00	550.7	104.1	240.69	153: ZONE-1	0.00

## Scenario Summary Report

### Scenario: 2036 PHD

Scenario Summary			
ID	1663		
Label	2036 PHD		
Notes			
Active Topology	<I> 23: Base-Active Topology		
Physical	<I> 1665: Base-Physical with 2036 CIP		
Demand	<I> 27: Base-Average Daily		
Initial Settings	<I> 1651: 2016 SPU FCV-Inactive		
Operational	<I> 55: Base-Operational		
Age	<I> 56: Base-Age Alternative		
Constituent	<I> 57: Base-Constituent		
Trace	<I> 58: Base-Trace Alternative		
Fire Flow	<I> 59: Base-Fire Flow		
Energy Cost	<I> 68: Base-Energy Cost		
Transient	<I> 1522: Base Transient		
Pressure Dependent Demand	<I> 69: Base Pressure Dependent Demand		
Failure History	<I> 1536: Base Failure History		
SCADA	<I> 1547: Base SCADA		
User Data Extensions	<I> 70: Base-User Data		
Steady State/EPS Solver Calculation Options	1646: 2036 PHD		
Transient Solver Calculation Options	<I> 1520: Base		
Hydraulic Summary			
Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	12:00:00 AM
Trials	40	Calculation Type	Hydraulics Only

**Scenario: 2036 PHD**  
**Current Time Step: 0.000 h**  
**FlexTable: Pipe Table**

ID	Label	Diameter (in)	Flow (gpm)	Velocity (ft/s)	Has Check Valve?	Has User Defined Length?	Is Closed?
1272	653	10.0	1,105.60	4.52	True	True	False
1271	652	10.0	1,105.59	4.52	False	True	False
1273	654	12.0	1,567.79	4.45	False	True	False
1274	655	12.0	1,567.79	4.45	True	True	False
1564	P-65	12.0	1,206.70	3.42	True	True	False
1565	P-66	12.0	1,206.70	3.42	True	True	False
1026	372	8.0	499.27	3.19	False	True	False
795	91	12.0	-946.22	2.68	False	False	False
796	92	8.0	372.12	2.38	False	False	False
834	138	12.0	802.74	2.28	False	False	False
865	178	12.0	733.62	2.08	False	False	False
1024	370	12.0	-703.60	2.00	False	True	False
832	136	12.0	699.88	1.99	False	False	False
914	237	12.0	-697.35	1.98	False	True	False
833	137	12.0	693.09	1.97	False	False	False
831	135	12.0	680.93	1.93	False	False	False
904	227	10.0	-461.85	1.89	False	True	False
732	18	8.0	290.14	1.85	False	False	False
1012	357	8.0	-289.83	1.85	False	False	False
1599	P-88	6.0	160.61	1.82	False	False	False
840	146	10.0	434.79	1.78	False	False	False
902	224	10.0	-412.86	1.69	False	False	False
903	226	10.0	-409.31	1.67	False	False	False
1350	223	10.0	-395.60	1.62	False	True	False
1027	373	8.0	250.32	1.60	False	False	False
1084	443	8.0	249.75	1.59	False	True	False
726	12	8.0	-246.65	1.57	False	False	False
1374	769	8.0	242.93	1.55	False	True	False
1020	366	8.0	-241.72	1.54	False	False	False
1508	375	4.0	59.52	1.52	False	False	False
780	72	10.0	-364.51	1.49	False	False	False
915	238	8.0	-232.97	1.49	False	True	False
1612	P-96	8.0	-232.97	1.49	False	False	False
1375	770	8.0	231.57	1.48	False	True	False
1310	708	8.0	-226.06	1.44	False	False	False
1019	365	8.0	-220.69	1.41	False	False	False
1315	713	8.0	218.44	1.39	False	False	False
1316	714	8.0	218.44	1.39	False	False	False
1033	380	10.0	-329.33	1.35	False	False	False
733	19	8.0	210.64	1.34	False	False	False
969	304	8.0	205.50	1.31	False	False	False
802	98	10.0	-320.05	1.31	False	False	False
1501	356	8.0	-200.84	1.28	False	False	False
850	156	8.0	197.90	1.26	False	False	False
970	305	8.0	196.39	1.25	False	False	False
727	13	8.0	195.77	1.25	False	False	False
1668	P-118	10.0	304.09	1.24	False	False	False
841	147	10.0	302.42	1.24	False	False	False
916	239	12.0	-421.94	1.20	False	False	False
1357	752	8.0	187.04	1.19	False	False	False
960	294	12.0	420.24	1.19	False	False	False
875	189	10.0	289.68	1.18	False	False	False
800	96	8.0	-183.91	1.17	False	False	False
803	99	10.0	-287.35	1.17	False	False	False
961	295	12.0	411.71	1.17	False	False	False

**Scenario: 2036 PHD**  
**Current Time Step: 0.000 h**  
**FlexTable: Junction Table**

ID	Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Zone	Demand (Maximum) (gpm)
508	J-379	196.0	17.05	551.3	153.7	355.34	153: ZONE-1	17.05
473	J-344	128.0	2.27	460.2	143.7	332.17	158: ZONE-6	2.27
343	J-205	236.0	3.41	550.9	136.2	314.87	153: ZONE-1	3.41
449	J-320	246.0	2.86	551.8	132.3	305.83	153: ZONE-1	2.86
451	J-322	264.0	3.93	551.9	124.5	287.85	153: ZONE-1	3.93
293	J-146	267.2	7.82	553.1	123.7	285.86	153: ZONE-1	7.82
472	J-343	177.0	6.82	460.2	122.5	283.17	158: ZONE-6	6.82
653	J-525	270.0	0.00	553.1	122.5	283.06	153: ZONE-1	0.00
1494	J-588	270.0	0.00	551.8	121.9	281.82	153: ZONE-1	0.00
1495	J-589	270.0	0.00	551.8	121.9	281.82	153: ZONE-1	0.00
338	J-200	272.0	3.98	550.9	120.7	278.87	153: ZONE-1	3.98
452	J-323	274.0	2.86	551.8	120.2	277.83	153: ZONE-1	2.86
474	J-345	189.0	2.27	460.2	117.3	271.20	158: ZONE-6	2.27
314	J-169	284.0	21.40	553.0	116.4	269.02	153: ZONE-1	21.40
295	J-149	287.0	5.55	553.1	115.1	266.07	153: ZONE-1	5.55
292	J-145	288.0	7.82	553.1	114.7	265.07	153: ZONE-1	7.82
389	J-258	287.0	6.84	551.9	114.6	264.88	153: ZONE-1	6.84
608	J-480	197.0	5.11	460.1	113.8	263.13	158: ZONE-6	5.11
684	J-555	290.0	0.00	553.1	113.8	263.07	153: ZONE-1	0.00
313	J-168	294.0	15.99	552.8	112.0	258.79	153: ZONE-1	15.99
514	J-385	177.0	6.25	435.6	111.9	258.55	154: ZONE-2	6.25
296	J-150	296.0	5.60	553.1	111.2	257.07	153: ZONE-1	5.60
294	J-148	296.6	4.61	553.1	111.0	256.48	153: ZONE-1	4.61
561	J-434	295.0	2.27	550.8	110.7	255.83	153: ZONE-1	2.27
562	J-435	295.0	1.70	550.8	110.7	255.83	153: ZONE-1	1.70
433	J-303	205.0	3.98	460.1	110.4	255.14	158: ZONE-6	3.98
685	J-556	300.0	0.00	553.1	109.5	253.08	153: ZONE-1	0.00
392	J-261	300.0	8.52	551.9	109.0	251.87	153: ZONE-1	8.52
290	J-143	301.5	26.53	553.0	108.8	251.54	153: ZONE-1	26.53
297	J-151	302.0	4.66	553.1	108.6	251.07	153: ZONE-1	4.66
503	J-374	302.0	6.82	551.2	107.8	249.25	153: ZONE-1	6.82
515	J-386	187.0	0.00	435.4	107.5	248.44	154: ZONE-2	0.00
241	J-88	305.0	4.27	553.4	107.5	248.38	153: ZONE-1	4.27
291	J-144	305.0	7.99	553.1	107.3	248.09	153: ZONE-1	7.99
519	J-391	188.0	3.98	435.3	107.0	247.33	154: ZONE-2	3.98
298	J-152	306.0	3.50	553.1	106.9	247.06	153: ZONE-1	3.50
312	J-166	306.0	15.12	552.8	106.8	246.78	153: ZONE-1	15.12
687	J-558	307.0	0.00	553.1	106.5	246.12	153: ZONE-1	0.00
385	J-254	306.3	5.69	552.3	106.4	245.97	153: ZONE-1	5.69
265	J-116	307.5	12.73	553.1	106.3	245.62	153: ZONE-1	12.73
266	J-117	307.5	9.61	553.1	106.3	245.62	153: ZONE-1	9.61
1486	J-585	307.0	0.00	551.8	105.9	244.84	153: ZONE-1	0.00
267	J-120	309.0	15.38	553.1	105.6	244.06	153: ZONE-1	15.38
306	J-160	308.9	21.27	552.4	105.4	243.51	153: ZONE-1	21.27
520	J-392	192.0	11.36	435.3	105.3	243.33	154: ZONE-2	11.36
686	J-557	310.0	0.00	553.1	105.2	243.09	153: ZONE-1	0.00
299	J-153	310.0	4.31	553.1	105.2	243.06	153: ZONE-1	4.31
387	J-256	309.0	15.46	551.9	105.1	242.91	153: ZONE-1	15.46
310	J-164	310.0	39.00	552.9	105.1	242.91	153: ZONE-1	39.00
245	J-92	311.0	4.83	553.3	104.8	242.28	153: ZONE-1	4.83
240	J-87	312.0	2.09	553.4	104.4	241.38	153: ZONE-1	2.09
242	J-89	312.0	2.09	553.4	104.4	241.38	153: ZONE-1	2.09
301	J-155	312.0	0.00	553.1	104.3	241.06	153: ZONE-1	0.00
302	J-156	312.0	0.00	553.1	104.3	241.06	153: ZONE-1	0.00
665	J-536	310.0	0.00	550.9	104.2	240.91	153: ZONE-1	0.00
239	J-86	312.5	6.07	553.4	104.2	240.88	153: ZONE-1	6.07

**Scenario: 2036 PHD**  
**Current Time Step: 0.000 h**  
**FlexTable: Junction Table**

ID	Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)	Pressure Head (ft)	Zone	Demand (Maximum) (gpm)
603	J-476	330.0	1.14	435.0	45.4	104.96	154: ZONE-2	1.14
641	J-513	265.0	0.00	371.5	46.1	106.50	1624: Pump Inlet	0.00
659	J-531	324.0	0.00	435.0	48.0	110.96	154: ZONE-2	0.00
622	J-494	323.0	2.84	435.0	48.4	111.96	154: ZONE-2	2.84
604	J-477	323.0	2.27	435.0	48.4	111.96	154: ZONE-2	2.27
602	J-475	323.0	1.70	435.0	48.4	111.96	154: ZONE-2	1.70
600	J-473	306.0	9.09	435.0	55.8	128.96	154: ZONE-2	9.09
601	J-474	306.0	0.00	435.0	55.8	128.96	154: ZONE-2	0.00
565	J-438	190.0	1.14	319.5	56.0	129.47	156: ZONE-4	1.14
614	J-486	190.0	1.14	319.5	56.0	129.48	156: ZONE-4	1.14
567	J-440	190.0	1.70	319.5	56.0	129.48	156: ZONE-4	1.70
326	J-185	305.0	12.94	437.1	57.2	132.10	154: ZONE-2	12.94
607	J-479	305.0	12.94	437.1	57.2	132.10	154: ZONE-2	12.94
606	J-478	303.0	14.95	437.1	58.0	134.09	154: ZONE-2	14.95
563	J-436	245.0	1.70	381.7	59.2	136.73	157: ZONE-5	1.70
337	J-199	300.0	9.44	437.1	59.3	137.09	154: ZONE-2	9.44
335	J-197	300.0	13.12	437.1	59.3	137.09	154: ZONE-2	13.12
336	J-198	299.0	15.98	437.2	59.8	138.17	154: ZONE-2	15.98
1610	J-619	299.1	0.00	437.3	59.8	138.21	154: ZONE-2	0.00
477	J-348	322.0	3.98	460.2	59.8	138.22	158: ZONE-6	3.98
327	J-187	299.0	26.70	437.3	59.8	138.33	154: ZONE-2	26.70
626	J-498	294.0	8.07	435.8	61.3	141.76	154: ZONE-2	8.07
325	J-184	295.0	5.98	436.8	61.4	141.85	154: ZONE-2	5.98
475	J-346	318.0	3.98	460.2	61.5	142.22	158: ZONE-6	3.98
422	J-292	295.0	7.39	437.5	61.7	142.51	154: ZONE-2	7.39
643	J-515	293.0	0.00	435.7	61.7	142.71	153: ZONE-1	0.00
332	J-194	295.0	14.40	438.2	61.9	143.16	153: ZONE-1	14.40
394	J-263	292.0	2.84	435.6	62.1	143.61	154: ZONE-2	2.84
443	J-313	406.5	11.36	551.8	62.9	145.32	153: ZONE-1	11.36
342	J-204	353.0	1.14	499.3	63.3	146.32	153: ZONE-1	1.14
644	J-516	405.0	0.00	551.5	63.4	146.50	153: ZONE-1	0.00
555	J-427	404.0	7.39	550.8	63.5	146.81	153: ZONE-1	7.39
390	J-259	288.0	14.74	435.7	63.9	147.66	154: ZONE-2	14.74
323	J-181	289.0	8.46	436.8	63.9	147.81	154: ZONE-2	8.46
324	J-183	289.0	8.46	436.8	64.0	147.85	154: ZONE-2	8.46
354	J-221	312.0	2.84	460.1	64.1	148.10	158: ZONE-6	2.84
330	J-191	290.0	8.12	438.2	64.1	148.17	154: ZONE-2	8.12
419	J-289	288.0	14.87	437.1	64.5	149.08	154: ZONE-2	14.87
481	J-352	400.0	7.39	550.6	65.2	150.63	153: ZONE-1	7.39
542	J-414	400.0	5.68	550.6	65.2	150.64	153: ZONE-1	5.68
553	J-425	400.0	3.41	550.8	65.2	150.79	153: ZONE-1	3.41
329	J-190	287.0	8.37	438.2	65.4	151.17	154: ZONE-2	8.37
328	J-189	287.0	7.26	438.2	65.4	151.18	154: ZONE-2	7.26
380	J-249	398.8	21.59	551.6	66.1	152.84	153: ZONE-1	21.59
331	J-193	285.0	14.40	438.2	66.3	153.16	153: ZONE-1	14.40
379	J-248	397.5	16.48	551.4	66.6	153.92	153: ZONE-1	16.48
544	J-416	396.0	6.25	550.7	66.9	154.66	153: ZONE-1	6.25
444	J-314	397.0	11.36	551.8	67.0	154.83	153: ZONE-1	11.36
334	J-196	282.0	0.00	438.5	67.7	156.49	154: ZONE-2	0.00
333	J-195	282.0	2.52	438.5	67.7	156.52	154: ZONE-2	2.52
509	J-380	204.5	6.82	361.8	68.1	157.34	155: ZONE-3	6.82
546	J-418	393.0	5.11	550.7	68.2	157.65	153: ZONE-1	5.11
494	J-365	393.0	11.93	550.8	68.3	157.82	153: ZONE-1	11.93
420	J-290	279.0	2.82	437.1	68.4	158.08	154: ZONE-2	2.82
423	J-293	279.0	5.68	437.5	68.6	158.51	154: ZONE-2	5.68
367	J-236	392.4	11.93	551.0	68.6	158.58	153: ZONE-1	11.93



**Scenario: 2036 PHD**  
**Current Time Step: 0.000 h**  
**FlexTable: FCV Table**

ID	Diameter (Valve) (in)	Flow Setting (Initial) (gpm)	Flow (gpm)	Is Active?	Is Open?	Velocity (ft/s)	Hydraulic Grade (From) (ft)	Hydraulic Grade (To) (ft)
705	4.0	850.00	1,105.60	True	True	28.23	555.0	555.0
1563	6.0	1,000.00	1,206.70	True	True	13.69	440.0	440.0
706	8.0	650.00	1,567.79	True	True	10.01	555.0	555.0
1569	6.0	10.00	0.00	True	True	0.00	434.9	434.9
1566	6.0	10.00	0.00	True	True	0.00	420.0	420.0
1628	6.0	2,000.00	0.00	True	True	0.00	435.0	435.0

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## Scenario Summary Report

### Scenario: 2036 MDD FF

Scenario Summary			
ID	1677		
Label	2036 MDD FF		
Notes			
Active Topology	<I> 23: Base-Active Topology		
Physical	24: Base-Physical		
Demand	<I> 27: Base-Average Daily		
Initial Settings	<I> 1651: 2016 SPU FCV-Inactive		
Operational	<I> 55: Base-Operational		
Age	<I> 56: Base-Age Alternative		
Constituent	<I> 57: Base-Constituent		
Trace	<I> 58: Base-Trace Alternative		
Fire Flow	<I> 59: Base-Fire Flow		
Energy Cost	<I> 68: Base-Energy Cost		
Transient	<I> 1522: Base Transient		
Pressure Dependent Demand	<I> 69: Base Pressure Dependent Demand		
Failure History	<I> 1536: Base Failure History		
SCADA	<I> 1547: Base SCADA		
User Data Extensions	<I> 70: Base-User Data		
Steady State/EPS Solver Calculation Options	1676: 2036 MDD FF		
Transient Solver Calculation Options	<I> 1520: Base		
Hydraulic Summary			
Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	12:00:00 AM
Trials	40	Calculation Type	Fire Flow

NO CIP  
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Scenario: 2036 MDD FF  
 Current Time Step: 0.000 h  
 Fire Flow Node FlexTable: Fire Flow Report

Label	Zone	Velocity of Maximum Pipe (ft/s)	Pipe w/ Maximum Velocity	Specify Local Fire Flow Constraints?	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)	Is Fire Flow Run Balance
J-30	153: ZONE-1	22.84	753: 41	False	False	1,000.00	892.85	20.1	62.4	332: J-194	46.2	641: J-513	True
J-121	153: ZONE-1	25.33	859: 171	True	False	4,000.00	2,217.05	33.4	20.0	272: J-125	20.0	272: J-125	True
J-122	153: ZONE-1	17.68	859: 171	True	False	4,000.00	1,542.77	29.5	20.0	272: J-125	20.0	272: J-125	True
J-123	153: ZONE-1	14.53	859: 171	True	False	4,000.00	1,264.95	23.5	20.0	272: J-125	20.0	272: J-125	True
J-124	153: ZONE-1	14.23	859: 171	True	False	4,000.00	1,238.28	20.0	22.7	272: J-125	22.7	272: J-125	True
J-125	153: ZONE-1	18.56	863: 175	True	False	4,000.00	725.09	20.0	62.4	332: J-194	46.2	641: J-513	True
J-153	153: ZONE-1	35.98	901: 222	True	False	4,000.00	1,406.74	20.0	62.4	332: J-194	46.1	641: J-513	True
J-172	154: ZONE-2	25.21	994: 332	True	False	4,000.00	3,607.08	20.0	39.1	603: J-476	39.1	603: J-476	True
J-173	154: ZONE-2	22.93	996: 334	True	False	4,000.00	3,488.39	20.0	39.2	603: J-476	39.2	603: J-476	True
J-184	154: ZONE-2	28.27	910: 233	True	False	4,000.00	2,487.83	20.0	41.0	603: J-476	41.0	603: J-476	True
J-191	154: ZONE-2	23.94	905: 228	True	False	4,000.00	3,722.83	20.0	40.7	329: J-190	37.3	332: J-194	True
J-199	154: ZONE-2	21.20	1018: 364	True	False	4,000.00	3,315.57	20.0	40.2	603: J-476	40.2	603: J-476	True
J-241	153: ZONE-1	20.28	959: 293	False	False	1,000.00	790.74	20.0	62.4	332: J-194	46.0	641: J-513	True
J-259	154: ZONE-2	15.01	1329: 240	True	False	4,000.00	3,988.22	20.0	31.1	394: J-263	30.6	643: J-515	True
J-263	154: ZONE-2	14.75	984: 321	True	False	4,000.00	1,298.33	20.0	41.2	603: J-476	41.2	603: J-476	True
J-264	154: ZONE-2	13.73	988: 325	True	False	4,000.00	3,787.75	45.9	20.0	394: J-263	20.0	394: J-263	True
J-287	154: ZONE-2	37.12	1619: P-101	True	False	4,000.00	3,265.27	20.0	38.5	603: J-476	38.5	603: J-476	True
J-290	154: ZONE-2	28.98	1015: 361	True	False	4,000.00	2,551.78	20.0	40.7	603: J-476	40.7	603: J-476	True
J-324	154: ZONE-2	22.78	1071: 425	True	False	4,000.00	3,544.08	20.0	21.3	454: J-325	21.3	454: J-325	True
J-325	154: ZONE-2	19.69	1071: 425	True	False	4,000.00	3,059.91	20.0	21.7	458: J-329	21.7	458: J-329	True
J-328	154: ZONE-2	17.33	1071: 425	True	False	4,000.00	2,689.35	20.1	20.0	458: J-329	20.0	458: J-329	True
J-329	154: ZONE-2	17.16	1071: 425	True	False	4,000.00	2,662.49	20.0	22.3	457: J-328	22.3	457: J-328	True
J-363	153: ZONE-1	17.84	1121: 483	False	False	1,000.00	696.20	20.0	62.3	555: J-427	46.1	641: J-513	True
J-382	155: ZONE-3	25.04	1154: 520	False	False	1,000.00	979.77	20.1	61.0	509: J-480	45.8	641: J-513	True
J-426	153: ZONE-1	15.51	1199: 567	False	False	1,000.00	604.84	20.0	62.3	555: J-427	46.1	641: J-513	True
J-462	154: ZONE-2	25.07	1252: 629	True	False	4,000.00	3,922.71	20.0	37.4	603: J-476	37.4	603: J-476	True
J-467	154: ZONE-2	14.85	1259: 636	True	False	4,000.00	2,578.09	20.0	37.4	603: J-476	37.4	603: J-476	True
J-468	154: ZONE-2	11.03	1260: 637	True	False	4,000.00	2,794.47	20.0	37.3	603: J-476	37.3	603: J-476	True
J-473	154: ZONE-2	12.77	1630: P-107	True	False	4,000.00	2,654.52	20.1	20.1	601: J-474	20.1	601: J-474	True
J-475	154: ZONE-2	12.77	1630: P-107	True	False	4,000.00	2,563.02	20.0	20.0	622: J-494	20.0	622: J-494	True
J-476	154: ZONE-2	12.77	1630: P-107	True	False	4,000.00	2,521.47	20.0	22.9	659: J-531	22.9	659: J-531	True
J-513	1624: Pump Inlet	2.75	1274: 655	True	False	1.00	0.00	46.4	46.4	641: J-513	46.5	603: J-476	True
J-514	1638: Pump Outlet	2.75	1274: 655	False	False	1,000.00	0.00	72.1	72.1	642: J-514	46.4	641: J-513	True
J-522	154: ZONE-2	14.56	1340: 736	True	False	4,000.00	2,524.73	20.0	37.0	622: J-494	37.0	622: J-494	True
J-531	154: ZONE-2	12.77	1630: P-107	True	False	4,000.00	2,520.87	22.6	20.1	603: J-476	20.1	603: J-476	True
J-532	154: ZONE-2	23.99	1362: 757	True	False	4,000.00	3,758.58	20.0	23.5	609: J-482	23.5	609: J-482	True
J-326	154: ZONE-2	18.37	1071: 425	True	False	4,000.00	2,851.92	22.8	20.0	458: J-329	20.0	458: J-329	True
J-622	154: ZONE-2	22.36	1621: P-102	True	False	4,000.00	3,503.22	20.0	37.4	603: J-476	37.4	603: J-476	True
J-1	153: ZONE-1	4.67	1274: 655	False	True	1,000.00	1,010.00	72.5	62.4	332: J-194	46.3	641: J-513	True
J-2	153: ZONE-1	4.65	1274: 655	False	True	1,000.00	1,010.00	73.1	62.4	332: J-194	46.3	641: J-513	True
J-3	153: ZONE-1	6.45	717: 2	False	True	1,000.00	1,010.00	69.7	62.4	332: J-194	46.3	641: J-513	True
J-4	153: ZONE-1	4.65	1274: 655	False	True	1,000.00	1,010.00	75.5	62.4	332: J-194	46.3	641: J-513	True
J-5	153: ZONE-1	4.63	1274: 655	False	True	1,000.00	1,010.00	76.4	62.4	332: J-194	46.3	641: J-513	True
J-6	153: ZONE-1	4.58	1274: 655	False	True	1,000.00	1,010.00	69.7	62.4	332: J-194	46.3	641: J-513	True
J-7	153: ZONE-1	4.51	1273: 654	False	True	1,000.00	1,010.00	70.6	62.4	332: J-194	46.3	641: J-513	True
J-8	153: ZONE-1	23.20	1355: 750	True	True	4,000.00	4,010.00	51.8	56.0	169: J-11	45.9	641: J-513	True
J-10	153: ZONE-1	20.13	1355: 750	True	True	4,000.00	4,010.00	52.2	51.3	169: J-11	46.0	641: J-513	True
J-11	153: ZONE-1	6.45	723: 9	False	True	1,000.00	1,010.00	70.0	62.4	332: J-194	46.3	641: J-513	True
J-12	153: ZONE-1	11.37	1531: 859	True	True	4,000.00	4,010.00	64.6	62.4	332: J-194	46.0	641: J-513	True
J-13	153: ZONE-1	12.65	1272: 653	True	True	4,000.00	4,010.00	67.2	62.4	332: J-194	46.1	641: J-513	True
J-14	153: ZONE-1	17.29	1271: 652	True	True	4,000.00	4,010.00	73.3	62.4	332: J-194	46.3	641: J-513	True
J-15	153: ZONE-1	17.98	727: 13	True	True	4,000.00	4,010.00	50.3	51.7	174: J-16	46.1	641: J-513	True
J-16	153: ZONE-1	5.85	1272: 653	False	True	1,000.00	1,010.00	68.1	62.4	332: J-194	46.3	641: J-513	True
J-17	153: ZONE-1	5.79	1272: 653	False	True	1,000.00	1,010.00	78.4	62.4	332: J-194	46.3	641: J-513	True
J-18	153: ZONE-1	5.75	1271: 652	False	True	1,000.00	1,010.00	77.9	62.4	332: J-194	46.3	641: J-513	True
J-19	153: ZONE-1	5.49	1271: 652	False	True	1,000.00	1,010.00	73.0	62.4	332: J-194	46.3	641: J-513	True
J-20	153: ZONE-1	5.14	1272: 653	False	True	1,000.00	1,010.00	76.4	62.4	332: J-194	46.3	641: J-513	True
J-21	153: ZONE-1	4.97	1271: 652	False	True	1,000.00	1,010.00	73.7	62.4	332: J-194	46.2	641: J-513	True
J-24	153: ZONE-1	5.44	1272: 653	False	True	1,000.00	1,010.00	68.4	62.4	332: J-194	46.3	641: J-513	True
J-25	153: ZONE-1	5.26	1272: 653	False	True	1,000.00	1,010.00	69.7	62.4	332: J-194	46.3	641: J-513	True
J-26	153: ZONE-1	6.45	739: 25	False	True	1,000.00	1,010.00	68.5	62.4	332: J-194	46.3	641: J-513	True
J-27	153: ZONE-1	11.31	1271: 652	True	True	4,000.00	4,010.00	66.9	61.5	443: J-313	45.5	641: J-513	True
J-28	153: ZONE-1	5.03	1271: 652	False	True	1,000.00	1,010.00	73.8	62.4	332: J-194	46.2	641: J-513	True
J-29	153: ZONE-1	4.93	1271: 652	False	True	1,000.00	1,010.00	77.3	62.4	332: J-194	46.2	641: J-513	True
J-31	153: ZONE-1	4.83	1271: 652	False	True	1,000.00	1,010.00	76.2	62.4	332: J-194	46.2	641: J-513	True
J-32	153: ZONE-1	4.81	1271: 652	False	True	1,000.00	1,010.00	78.8	62.4	332: J-194	46.2	641: J-513	True
J-33	153: ZONE-1	6.47	745: 32	False	True	1,000.00	1,010.00	74.3	62.4	332: J-194	46.2	641: J-513	True
J-34	153: ZONE-1	11.08	1272: 653	True	True	4,000.00	4,010.00	69.2	61.3	443: J-313	45.5	641: J-513	True
J-35	153: ZONE-1	4.80	1272: 653	False	True	1,000.00	1,010.00	81.7	62.4	332: J-194	46.2	641: J-513	True
J-36	153: ZONE-1	4.81	1272: 653	False	True	1,000.00	1,010.00	81.7	62.4	332: J-194	46.2	641: J-513	True
J-37	153: ZONE-1	4.84	1272: 653	False	True	1,000.00	1,010.00	81.1	62.4	332: J-194	46.2	641: J-513	True
J-38	153: ZONE-1	25.60	749: 36	True	True	4,000.00	4,010.00	27.7	61.3	443: J-313	45.5	641: J-513	True
J-39	153: ZONE-1	17.30	1429: 826	True	True	4,000.00	4,010.00	70.8	61.2	443: J-313	45.4	641: J-513	True
J-40	153: ZONE-1	4.76	1272: 653	False	True	1,000.00	1,010.00	78.9	62.4	332: J-194	46.2	641: J-513	True
J-41	153: ZONE-1	4.68	1274: 655	False	True	1,000.00	1,010.00	79.0	62.4	332: J-194	46.3	641: J-513	True
J-42	153: ZONE-1	4.67	1274: 655	False	True	1,000.00	1,010.00	78.1	62.4	332: J-194	46.3	641: J-513	True
J-43	153: ZONE-1	4.67	1274: 655	False	True	1,000.00	1,010.00	67.6	62.4	332: J-194	46.3	641: J-513	True
J-44	153: ZONE-1	4.67	1274: 655	False	True	1,000.00	1,010.00	66.5	62.4	332: J-194	46.3	641: J-513	True
J-45	153: ZONE-1	4.66	1273: 654	False	True	1,000.00	1,010.00	66.9	62.4	332: J-194	46.3	641: J-513	True
J-46	153: ZONE-1	4.66	1273: 654	False	True	1,000.00	1,010.00	68.4	62.4	332: J-194	46.3	641: J-513	True
J-47	153: ZONE-1	7.24	1593: P-84	False	True	1,000.00	1,010.00	68.0	62.4	332: J-194	46.3	641: J-513	True
J-48	153: ZONE-1	4.65	1274: 655	False	True	1,000.00							

## Scenario Summary Report

### Scenario: 2036 MDD FF

Scenario Summary			
ID	1677		
Label	2036 MDD FF		
Notes			
Active Topology	<I> 23: Base-Active Topology		
Physical	<I> 1665: Base-Physical with 2036 CIP		
Demand	<I> 27: Base-Average Daily		
Initial Settings	<I> 1651: 2016 SPU FCV-Inactive		
Operational	<I> 55: Base-Operational		
Age	<I> 56: Base-Age Alternative		
Constituent	<I> 57: Base-Constituent		
Trace	<I> 58: Base-Trace Alternative		
Fire Flow	<I> 59: Base-Fire Flow		
Energy Cost	<I> 68: Base-Energy Cost		
Transient	<I> 1522: Base Transient		
Pressure Dependent Demand	<I> 69: Base Pressure Dependent Demand		
Failure History	<I> 1536: Base Failure History		
SCADA	<I> 1547: Base SCADA		
User Data Extensions	<I> 70: Base-User Data		
Steady State/EPS Solver Calculation Options	1676: 2036 MDD FF		
Transient Solver Calculation Options	<I> 1520: Base		
Hydraulic Summary			
Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	12:00:00 AM
Trials	40	Calculation Type	Fire Flow

Scenario: 2036 MDD FF  
 Current Time Step: 0.000 h  
 Fire Flow Node FlexTable: Fire Flow Report

Label	Zone	Velocity of Maximum Pipe (ft/s)	Specify Local Fire Flow Constraints?	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)	Is Fire Flow Run Balanced?
J-121	153: ZONE-1	23.37	True	False	4,000.00	3,646.75	33.4	20.0	272: J-125	20.0	272: J-125	True
J-122	153: ZONE-1	18.21	True	False	4,000.00	2,837.55	29.5	20.0	272: J-125	20.0	272: J-125	True
J-123	153: ZONE-1	15.58	True	False	4,000.00	2,425.60	23.5	20.0	272: J-125	20.0	272: J-125	True
J-124	153: ZONE-1	15.39	True	False	4,000.00	2,395.93	20.0	21.6	272: J-125	21.6	272: J-125	True
J-125	153: ZONE-1	14.09	True	False	4,000.00	2,192.45	20.0	35.4	270: J-123	35.4	270: J-123	True
J-191	154: ZONE-2	23.99	True	False	4,000.00	3,730.67	20.0	40.8	329: J-190	37.3	332: J-194	True
J-199	154: ZONE-2	22.48	True	False	4,000.00	3,516.78	20.0	40.6	603: J-476	40.6	603: J-476	True
J-263	154: ZONE-2	14.65	True	False	4,000.00	2,293.10	20.0	40.4	603: J-476	40.4	603: J-476	True
J-264	154: ZONE-2	13.80	True	False	4,000.00	3,816.24	45.9	20.0	394: J-263	20.0	394: J-263	True
J-290	154: ZONE-2	29.68	True	False	4,000.00	2,614.10	20.0	41.0	603: J-476	41.0	603: J-476	True
J-324	154: ZONE-2	22.86	True	False	4,000.00	3,556.44	20.0	21.3	454: J-325	21.3	454: J-325	True
J-325	154: ZONE-2	19.75	True	False	4,000.00	3,068.18	20.0	21.7	458: J-329	21.7	458: J-329	True
J-328	154: ZONE-2	17.36	True	False	4,000.00	2,695.02	20.1	20.0	458: J-329	20.0	458: J-329	True
J-329	154: ZONE-2	17.19	True	False	4,000.00	2,668.09	20.0	22.3	457: J-328	22.3	457: J-328	True
J-382	155: ZONE-3	25.04	False	False	1,000.00	979.77	20.1	61.0	509: J-380	45.8	641: J-513	True
J-473	154: ZONE-2	12.77	True	False	4,000.00	3,317.81	20.0	20.0	601: J-474	20.0	601: J-474	True
J-475	154: ZONE-2	12.77	True	False	4,000.00	3,070.36	20.0	20.0	622: J-494	20.0	622: J-494	True
J-476	154: ZONE-2	12.77	True	False	4,000.00	2,962.28	20.0	22.9	659: J-531	22.9	659: J-531	True
J-513	1624: Pump Inlet	2.77	True	False	1.00	0.00	46.4	46.4	641: J-513	46.7	603: J-476	True
J-514	1638: Pump Outlet	2.77	False	False	1,000.00	0.00	72.1	72.1	642: J-514	46.4	641: J-513	True
J-531	154: ZONE-2	12.77	True	False	4,000.00	2,961.69	22.6	20.0	603: J-476	20.0	603: J-476	True
J-532	154: ZONE-2	24.08	True	False	4,000.00	3,772.12	20.0	23.5	609: J-482	23.5	609: J-482	True
J-536	154: ZONE-2	18.41	True	False	4,000.00	2,858.53	22.8	20.0	458: J-329	20.0	458: J-329	True
J-622	154: ZONE-2	22.88	True	False	4,000.00	3,585.31	20.0	37.4	603: J-476	37.4	603: J-476	True
J-1	153: ZONE-1	4.60	False	True	1,000.00	1,010.00	72.7	62.4	332: J-194	46.3	641: J-513	True
J-2	153: ZONE-1	4.59	False	True	1,000.00	1,010.00	73.3	62.4	332: J-194	46.3	641: J-513	True
J-3	153: ZONE-1	6.45	False	True	1,000.00	1,010.00	69.9	62.4	332: J-194	46.3	641: J-513	True
J-4	153: ZONE-1	4.59	False	True	1,000.00	1,010.00	75.8	62.4	332: J-194	46.3	641: J-513	True
J-5	153: ZONE-1	4.57	False	True	1,000.00	1,010.00	76.5	62.4	332: J-194	46.3	641: J-513	True
J-6	153: ZONE-1	4.50	False	True	1,000.00	1,010.00	69.8	62.4	332: J-194	46.3	641: J-513	True
J-7	153: ZONE-1	4.44	False	True	1,000.00	1,010.00	70.7	62.4	332: J-194	46.3	641: J-513	True
J-8	153: ZONE-1	14.23	True	True	4,000.00	4,010.00	55.7	56.9	657: J-529	46.0	641: J-513	True
J-10	153: ZONE-1	13.43	True	True	4,000.00	4,010.00	54.7	53.8	169: J-11	46.0	641: J-513	True
J-11	153: ZONE-1	6.45	False	True	1,000.00	1,010.00	70.2	62.4	332: J-194	46.3	641: J-513	True
J-12	153: ZONE-1	11.21	True	True	4,000.00	4,010.00	65.0	62.4	332: J-194	46.1	641: J-513	True
J-13	153: ZONE-1	12.74	True	True	4,000.00	4,010.00	67.3	62.4	332: J-194	46.1	641: J-513	True
J-14	153: ZONE-1	17.28	True	True	4,000.00	4,010.00	73.3	62.4	332: J-194	46.3	641: J-513	True
J-15	153: ZONE-1	17.98	True	True	4,000.00	4,010.00	50.4	51.8	174: J-16	46.1	641: J-513	True
J-16	153: ZONE-1	5.88	False	True	1,000.00	1,010.00	68.1	62.4	332: J-194	46.3	641: J-513	True
J-17	153: ZONE-1	5.82	False	True	1,000.00	1,010.00	78.4	62.4	332: J-194	46.3	641: J-513	True
J-18	153: ZONE-1	5.77	False	True	1,000.00	1,010.00	77.9	62.4	332: J-194	46.3	641: J-513	True
J-19	153: ZONE-1	5.36	False	True	1,000.00	1,010.00	73.2	62.4	332: J-194	46.3	641: J-513	True
J-20	153: ZONE-1	5.08	False	True	1,000.00	1,010.00	76.4	62.4	332: J-194	46.3	641: J-513	True
J-21	153: ZONE-1	4.96	False	True	1,000.00	1,010.00	73.7	62.4	332: J-194	46.2	641: J-513	True
J-24	153: ZONE-1	5.46	False	True	1,000.00	1,010.00	68.4	62.4	332: J-194	46.3	641: J-513	True
J-25	153: ZONE-1	5.28	False	True	1,000.00	1,010.00	69.7	62.4	332: J-194	46.3	641: J-513	True
J-26	153: ZONE-1	6.45	False	True	1,000.00	1,010.00	68.5	62.4	332: J-194	46.3	641: J-513	True
J-27	153: ZONE-1	11.26	True	True	4,000.00	4,010.00	67.1	61.4	443: J-313	45.5	641: J-513	True
J-28	153: ZONE-1	5.05	False	True	1,000.00	1,010.00	73.8	62.4	332: J-194	46.2	641: J-513	True
J-29	153: ZONE-1	4.95	False	True	1,000.00	1,010.00	77.3	62.4	332: J-194	46.2	641: J-513	True
J-30	153: ZONE-1	6.46	False	True	1,000.00	1,010.00	70.9	62.4	332: J-194	46.2	641: J-513	True
J-31	153: ZONE-1	4.84	False	True	1,000.00	1,010.00	76.3	62.4	332: J-194	46.2	641: J-513	True
J-32	153: ZONE-1	4.83	False	True	1,000.00	1,010.00	78.8	62.4	332: J-194	46.2	641: J-513	True
J-33	153: ZONE-1	6.47	False	True	1,000.00	1,010.00	74.4	62.4	332: J-194	46.2	641: J-513	True
J-34	153: ZONE-1	11.04	True	True	4,000.00	4,010.00	69.5	61.2	443: J-313	45.5	641: J-513	True
J-35	153: ZONE-1	4.82	False	True	1,000.00	1,010.00	81.7	62.4	332: J-194	46.2	641: J-513	True
J-36	153: ZONE-1	4.83	False	True	1,000.00	1,010.00	81.7	62.4	332: J-194	46.2	641: J-513	True
J-37	153: ZONE-1	4.86	False	True	1,000.00	1,010.00	81.1	62.4	332: J-194	46.2	641: J-513	True
J-38	153: ZONE-1	25.60	True	True	4,000.00	4,010.00	27.9	61.3	443: J-313	45.5	641: J-513	True
J-39	153: ZONE-1	17.32	True	True	4,000.00	4,010.00	71.0	61.1	443: J-313	45.4	641: J-513	True
J-40	153: ZONE-1	4.79	False	True	1,000.00	1,010.00	78.9	62.4	332: J-194	46.2	641: J-513	True
J-41	153: ZONE-1	4.62	False	True	1,000.00	1,010.00	79.0	62.4	332: J-194	46.3	641: J-513	True
J-42	153: ZONE-1	4.61	False	True	1,000.00	1,010.00	78.2	62.4	332: J-194	46.3	641: J-513	True
J-43	153: ZONE-1	4.61	False	True	1,000.00	1,010.00	67.7	62.4	332: J-194	46.3	641: J-513	True
J-44	153: ZONE-1	4.60	False	True	1,000.00	1,010.00	66.7	62.4	332: J-194	46.3	641: J-513	True
J-45	153: ZONE-1	4.60	False	True	1,000.00	1,010.00	67.4	62.4	332: J-194	46.3	641: J-513	True
J-46	153: ZONE-1	4.59	False	True	1,000.00	1,010.00	69.2	62.4	332: J-194	46.3	641: J-513	True
J-47	153: ZONE-1	4.59	False	True	1,000.00	1,010.00	69.0	62.4	332: J-194	46.3	641: J-513	True
J-48	153: ZONE-1	4.59	False	True	1,000.00	1,010.00	76.8	62.4	332: J-194	46.3	641: J-513	True
J-49	153: ZONE-1	4.57	False	True	1,000.00	1,010.00	76.3	62.4	332: J-194	46.3	641: J-513	True
J-50	153: ZONE-1	4.61	False	True	1,000.00	1,010.00	79.3	62.4	332: J-194	46.3	641: J-513	True
J-51	153: ZONE-1	4.58	False	True	1,000.00	1,010.00	80.6	62.4	332: J-194	46.3	641: J-513	True
J-52	153: ZONE-1	4.55	False	True	1,000.00	1,010.00	78.1	62.4	332: J-194	46.3	641: J-513	True
J-53	153: ZONE-1	4.45	False	True	1,000.00	1,010.00	76.9	62.4	332: J-194	46.3	641: J-513	True
J-54	153: ZONE-1	10.34	True	True	4,000.00	4,010.00	71.6	62.4	332: J-194	46.0	641: J-513	True
J-55	153: ZONE-1	16.20	True	True	4,000.00	4,010.00	63.7	62.4	332: J-194	46.0	641: J-513	True
J-57	153: ZONE-1	11.17	True	True	4,000.00	4,010.00	71.3	62.4	332: J-194	46.0	641: J-513	True
J-58	153: ZONE-1	5.06	False	True	1,000.00	1,010.00	76.1	62.4	332: J-194	46.3	641: J-513	True
J-59	153: ZONE-1	5.11	False	True	1,000.00	1,010.00	74.0	62.4	332: J-194	46.3	641: J-513	True
J-60	153: ZONE-1	4.94	False	True	1,000.00	1,010.00	86.7	62.4	332: J-194	46.3	641: J-513	True
J-61	153: ZONE-1	11.03	True	True	4,000.00	4,010.00	73.7	61.5	443: J-313	45.6	641: J-513	True
J-62	153: ZONE-1	11.11	True	True	4,000.00	4,010.00	72.7	61.4	443: J-313	45.5	641: J-513	True
J-63	153: ZONE-1	4.83	False	True	1,000.00	1,010.00	75.6	62.4	332: J-194	46.2	641: J-513	True
J-65	153: ZONE-1	19.50	True	True	4,000.00	4,010.00	80.4	61.0	443: J-313	45.4	641: J-513	True
J-68	153: ZONE-1	4.64	False	True	1,000.00	1,010.00	80.9	62.4	332: J-194	46.3	641: J-513	True
J-69	153: ZONE-1	4.64	False	True	1,000.00	1,010.00	84.5	62.4	332: J-194	46.3	641: J-513	True
J-70	153: ZONE-1	4.64	False	True	1,000.00	1,010.00	82.6	62.4	332: J-194	46.3	641: J-513	True
J-71	153: ZONE-1	4.65	False	True	1,000.00	1,010.00	85.6	62.4	332: J-194	46.3	641: J-513	True
J-72	153: ZONE-1	13.53	True	True	4,000.00	4,010.00	80.3	62.4	332: J-194	46.3	641: J-513	True
J-73	153: ZONE-1	10.84	True	True	4,000.00	4,010.00	81.7	62.1	443: J-313	45.8	641: J-513	

Scenario: 2036 MDD FF  
 Current Time Step: 0.000h  
 Fire Flow Node FlexTable: Fire Flow Report

Label	Zone	Velocity of Maximum Pipe (ft/s)	Specify Local Fire Flow Constraints?	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)	Is Fire Flow Run Balanced?
J-594	154: ZONE-2	40.50	True	True	4,000.00	4,010.00	39.1	37.4	603: J-476	37.4	603: J-476	True
J-595	154: ZONE-2	33.09	True	True	4,000.00	4,010.00	47.9	37.4	603: J-476	37.4	603: J-476	True
J-596	154: ZONE-2	33.09	True	True	4,000.00	4,010.00	35.5	37.4	603: J-476	37.4	603: J-476	True
J-290	154: ZONE-2	29.68	True	False	4,000.00	2,614.10	20.0	41.0	603: J-476	41.0	603: J-476	True
J-190	154: ZONE-2	25.77	True	True	4,000.00	4,010.00	37.7	36.4	330: J-191	34.3	332: J-194	True
J-327	154: ZONE-2	25.70	True	True	4,000.00	4,010.00	29.2	37.4	603: J-476	37.4	603: J-476	True
J-331	154: ZONE-2	25.69	True	True	4,000.00	4,010.00	79.1	37.4	603: J-476	37.4	603: J-476	True
J-91	153: ZONE-1	25.65	True	True	4,000.00	4,010.00	88.1	60.8	443: J-313	45.3	641: J-513	True
J-92	153: ZONE-1	25.65	True	True	4,000.00	4,010.00	65.4	60.8	443: J-313	45.3	641: J-513	True
J-614	153: ZONE-1	25.64	True	True	4,000.00	4,010.00	77.8	60.8	443: J-313	45.3	641: J-513	True
J-301	154: ZONE-2	25.64	True	True	4,000.00	4,010.00	39.8	36.8	471: J-342	36.8	417: J-287	True
J-287	154: ZONE-2	25.63	True	True	4,000.00	4,010.00	25.9	36.7	1617: J-621	36.7	1617: J-621	True
J-621	154: ZONE-2	25.63	True	True	4,000.00	4,010.00	36.7	36.0	417: J-287	36.0	417: J-287	True
J-87	153: ZONE-1	25.63	True	True	4,000.00	4,010.00	81.8	61.0	443: J-313	45.4	641: J-513	True
J-88	153: ZONE-1	25.63	True	True	4,000.00	4,010.00	54.3	61.0	443: J-313	45.4	641: J-513	True
J-89	153: ZONE-1	25.63	True	True	4,000.00	4,010.00	70.4	61.0	443: J-313	45.4	641: J-513	True
J-462	154: ZONE-2	25.62	True	True	4,000.00	4,010.00	21.4	37.4	603: J-476	37.4	603: J-476	True
J-184	154: ZONE-2	25.62	True	True	4,000.00	4,010.00	31.6	40.3	603: J-476	40.3	603: J-476	True
J-149	153: ZONE-1	25.62	True	True	4,000.00	4,010.00	99.6	60.3	443: J-313	45.1	641: J-513	True
J-107	153: ZONE-1	25.61	True	True	4,000.00	4,010.00	44.9	60.2	443: J-313	45.2	641: J-513	True
J-85	153: ZONE-1	25.61	True	True	4,000.00	4,010.00	60.0	61.0	443: J-313	45.4	641: J-513	True
J-153	153: ZONE-1	25.61	True	True	4,000.00	4,010.00	46.0	60.4	443: J-313	45.2	641: J-513	True
J-504	153: ZONE-1	25.61	True	True	4,000.00	4,010.00	45.3	61.2	443: J-313	45.5	641: J-513	True
J-280	154: ZONE-2	25.61	True	True	4,000.00	4,010.00	24.1	37.4	603: J-476	37.4	603: J-476	True
J-282	154: ZONE-2	25.61	True	True	4,000.00	4,010.00	49.0	37.4	603: J-476	37.4	603: J-476	True
J-285	154: ZONE-2	25.61	True	True	4,000.00	4,010.00	36.9	37.4	603: J-476	37.4	603: J-476	True
J-502	153: ZONE-1	25.61	True	True	4,000.00	4,010.00	47.7	59.8	629: J-501	45.5	641: J-513	True
J-255	153: ZONE-1	25.61	True	True	4,000.00	4,010.00	45.4	55.3	443: J-313	42.0	641: J-513	True
J-38	153: ZONE-1	25.60	True	True	4,000.00	4,010.00	27.9	61.3	443: J-313	45.5	641: J-513	True
J-542	154: ZONE-2	25.59	True	True	4,000.00	4,010.00	68.4	37.4	603: J-476	37.4	603: J-476	True
J-598	154: ZONE-2	25.59	True	True	4,000.00	4,010.00	38.1	37.4	603: J-476	37.4	603: J-476	True
J-569	153: ZONE-1	25.59	True	True	4,000.00	4,010.00	79.8	60.3	443: J-313	45.1	641: J-513	True
J-382	155: ZONE-3	25.04	False	False	1,000.00	979.77	20.1	61.0	509: J-380	45.8	641: J-513	True
J-597	154: ZONE-2	24.76	True	True	4,000.00	4,010.00	58.7	37.4	603: J-476	37.4	603: J-476	True
J-532	154: ZONE-2	24.08	True	False	4,000.00	3,772.12	20.0	23.5	609: J-482	23.5	609: J-482	True
J-191	154: ZONE-2	23.99	True	False	4,000.00	3,730.67	20.0	40.8	329: J-190	37.3	332: J-194	True
J-121	153: ZONE-1	23.37	True	False	4,000.00	3,646.75	33.4	20.0	272: J-125	20.0	272: J-125	True
J-117	153: ZONE-1	23.11	True	True	4,000.00	4,010.00	93.5	60.5	443: J-313	45.2	641: J-513	True
J-622	154: ZONE-2	22.88	True	False	4,000.00	3,585.31	20.0	37.4	603: J-476	37.4	603: J-476	True
J-324	154: ZONE-2	22.86	True	False	4,000.00	3,556.44	20.0	21.3	454: J-325	21.3	454: J-325	True
J-148	153: ZONE-1	22.75	True	True	4,000.00	4,010.00	97.4	60.4	443: J-313	45.1	641: J-513	True
J-199	154: ZONE-2	22.48	True	False	4,000.00	3,516.78	20.0	40.6	603: J-476	40.6	603: J-476	True
J-459	154: ZONE-2	22.28	True	True	4,000.00	4,010.00	66.1	37.4	603: J-476	37.4	603: J-476	True
J-461	154: ZONE-2	22.21	True	True	4,000.00	4,010.00	39.5	37.4	603: J-476	37.4	603: J-476	True
J-460	154: ZONE-2	22.16	True	True	4,000.00	4,010.00	60.9	37.4	603: J-476	37.4	603: J-476	True
J-463	154: ZONE-2	22.10	True	True	4,000.00	4,010.00	45.2	37.4	603: J-476	37.4	603: J-476	True
J-464	154: ZONE-2	22.05	True	True	4,000.00	4,010.00	38.0	37.4	603: J-476	37.4	603: J-476	True
J-492	154: ZONE-2	22.03	True	True	4,000.00	4,010.00	44.4	37.4	603: J-476	37.4	603: J-476	True
J-465	154: ZONE-2	21.86	True	True	4,000.00	4,010.00	66.0	37.4	603: J-476	37.4	603: J-476	True
J-196	154: ZONE-2	21.68	True	True	4,000.00	4,010.00	57.6	41.0	603: J-476	41.0	603: J-476	True
J-295	154: ZONE-2	21.63	True	True	4,000.00	4,010.00	60.6	37.8	603: J-476	37.8	603: J-476	True
J-258	153: ZONE-1	21.53	True	True	4,000.00	4,010.00	50.0	55.8	443: J-313	23.0	641: J-513	True
J-176	154: ZONE-2	20.80	True	True	4,000.00	4,010.00	70.6	38.6	603: J-476	38.6	603: J-476	True
J-102	153: ZONE-1	20.71	True	True	4,000.00	4,010.00	79.7	61.1	443: J-313	45.5	641: J-513	True
J-592	154: ZONE-2	20.50	True	True	4,000.00	4,010.00	66.4	37.4	603: J-476	37.4	603: J-476	True
J-337	154: ZONE-2	20.50	True	True	4,000.00	4,010.00	65.4	37.4	603: J-476	37.4	603: J-476	True
J-493	154: ZONE-2	20.04	True	True	4,000.00	4,010.00	62.0	37.4	603: J-476	37.4	603: J-476	True
J-275	154: ZONE-2	19.86	True	True	4,000.00	4,010.00	73.6	37.6	603: J-476	37.6	603: J-476	True
J-270	154: ZONE-2	19.79	True	True	4,000.00	4,010.00	65.4	37.4	603: J-476	37.4	603: J-476	True
J-325	154: ZONE-2	19.75	True	False	4,000.00	3,068.18	20.0	21.7	458: J-329	21.7	458: J-329	True
J-65	153: ZONE-1	19.50	True	True	4,000.00	4,010.00	80.4	61.0	443: J-313	45.4	641: J-513	True
J-300	154: ZONE-2	19.48	True	True	4,000.00	4,010.00	53.3	37.4	603: J-476	37.4	603: J-476	True
J-128	153: ZONE-1	19.26	True	True	4,000.00	4,010.00	77.6	61.2	443: J-313	45.5	641: J-513	True
J-144	153: ZONE-1	19.16	True	True	4,000.00	4,010.00	95.7	60.4	443: J-313	45.1	641: J-513	True
J-116	153: ZONE-1	18.98	True	True	4,000.00	4,010.00	94.5	60.4	443: J-313	45.2	641: J-513	True
J-145	153: ZONE-1	18.86	True	True	4,000.00	4,010.00	102.1	60.3	443: J-313	45.1	641: J-513	True
J-150	153: ZONE-1	18.43	True	True	4,000.00	4,010.00	76.6	60.4	443: J-313	45.2	641: J-513	True
J-326	154: ZONE-2	18.41	True	False	4,000.00	2,858.53	22.8	20.0	458: J-329	20.0	458: J-329	True
J-503	153: ZONE-1	18.38	True	True	4,000.00	4,010.00	66.4	61.2	443: J-313	45.5	641: J-513	True
J-127	153: ZONE-1	18.21	True	True	4,000.00	4,010.00	78.2	61.3	443: J-313	45.5	641: J-513	True
J-122	153: ZONE-1	18.21	True	False	4,000.00	2,837.55	29.5	20.0	272: J-125	20.0	272: J-125	True
J-566	153: ZONE-1	18.16	True	True	4,000.00	4,010.00	85.4	61.3	443: J-313	45.5	641: J-513	True
J-15	153: ZONE-1	17.98	True	True	4,000.00	4,010.00	50.4	51.8	174: J-16	46.1	641: J-513	True
J-524	153: ZONE-1	17.97	True	True	4,000.00	4,010.00	69.5	62.4	332: J-194	46.0	641: J-513	True
J-540	154: ZONE-2	17.82	True	True	4,000.00	4,010.00	77.3	37.4	603: J-476	37.4	603: J-476	True
J-539	153: ZONE-1	17.80	True	True	4,000.00	4,010.00	84.6	60.9	443: J-313	45.3	641: J-513	True
J-261	153: ZONE-1	17.77	True	True	4,000.00	4,010.00	79.4	53.2	443: J-313	38.1	641: J-513	True
J-466	154: ZONE-2	17.76	True	True	4,000.00	4,010.00	60.0	37.4	603: J-476	37.4	603: J-476	True
J-336	154: ZONE-2	17.49	True	True	4,000.00	4,010.00	73.9	37.4	603: J-476	37.4	603: J-476	True
J-328	154: ZONE-2	17.36	True	False	4,000.00	2,695.02	20.1	20.0	458: J-329	20.0	458: J-329	True
J-39	153: ZONE-1	17.32	True	True	4,000.00	4,010.00	71.0	61.1	443: J-313	45.4	641: J-513	True
J-323	153: ZONE-1	17.31	True	True	4,000.00	4,010.00	85.1	52.7	443: J-313	40.7	641: J-513	True
J-14	153: ZONE-1	17.28	True	True	4,000.00	4,010.00	73.3	62.4	332: J-194	46.3	641: J-513	True
J-152	153: ZONE-1	17.28	True	True	4,000.00	4,010.00	66.4	60.4	443: J-313	45.2	641: J-513	True
J-329	154: ZONE-2	17.19	True	False	4,000.00	2,668.09	20.0	22.3	457: J-328	22.3	457: J-328	True
J-515	153: ZONE-1	17.13	True	True	4,000.00	4,010.00	25.2	59.7	332: J-194	31.8	390: J-259	True
J-166	153: ZONE-1	17.01	True	True	4,000.00	4,010.00	84.4	58.7	443: J-313	44.5	641: J-513	True
J-501	153: ZONE-1	16.87	True	True	4,000.00	4,010.00	59.8	59.3	630: J-502	45.5	641: J-513	True
J-294	154: ZONE-2	16.86	True	True	4,000.00	4,010.00	64.4	38.6	603: J-476	38.6	603: J-476	True



Scenario: 2036 MDD FF  
 Current Time Step: 0.000 h  
 Fire Flow Node FlexTable: Fire Flow Report

Label	Zone	Velocity of Maximum Pipe (ft/s)	Pipe w/ Maximum Velocity	Specify Local Fire Flow Constraints?	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)	Is Fire Flow Run Balanc
J-594	154: ZONE-2	40.50	1508: 375	True	True	4,000.00	4,010.00	39.1	37.4	603: J-476	37.4	603: J-476	Tru
J-595	154: ZONE-2	33.09	1508: 375	True	True	4,000.00	4,010.00	47.9	37.4	603: J-476	37.4	603: J-476	Tru
J-596	154: ZONE-2	33.09	1508: 375	True	True	4,000.00	4,010.00	35.5	37.4	603: J-476	37.4	603: J-476	Tru
J-290	154: ZONE-2	29.68	1015: 361	True	False	4,000.00	2,614.10	20.0	41.0	603: J-476	41.0	603: J-476	Tru
J-190	154: ZONE-2	25.77	905: 228	True	True	4,000.00	4,010.00	37.7	36.4	330: J-191	34.3	332: J-194	Tru
J-327	154: ZONE-2	25.70	1074: 429	True	True	4,000.00	4,010.00	29.2	37.4	603: J-476	37.4	603: J-476	Tru
J-331	154: ZONE-2	25.69	1393: 790	True	True	4,000.00	4,010.00	79.1	37.4	603: J-476	37.4	603: J-476	Tru
J-91	153: ZONE-1	25.65	1422: 820	True	True	4,000.00	4,010.00	88.1	60.8	443: J-313	45.3	641: J-513	Tru
J-92	153: ZONE-1	25.65	1422: 820	True	True	4,000.00	4,010.00	65.4	60.8	443: J-313	45.3	641: J-513	Tru
J-614	153: ZONE-1	25.64	1599: P-88	True	True	4,000.00	4,010.00	77.8	60.8	443: J-313	45.3	641: J-513	Tru
J-301	154: ZONE-2	25.64	1376: 771	True	True	4,000.00	4,010.00	39.8	36.8	471: J-342	36.8	471: J-342	Tru
J-287	154: ZONE-2	25.63	1619: P-101	True	True	4,000.00	4,010.00	25.9	36.7	1617: J-621	36.7	1617: J-621	Tru
J-621	154: ZONE-2	25.63	1618: P-100	True	True	4,000.00	4,010.00	36.7	36.0	417: J-287	36.0	417: J-287	Tru
J-87	153: ZONE-1	25.63	814: 112	True	True	4,000.00	4,010.00	68.4	61.0	443: J-313	45.4	641: J-513	Tru
J-88	153: ZONE-1	25.63	814: 112	True	True	4,000.00	4,010.00	54.3	61.0	443: J-313	45.4	641: J-513	Tru
J-89	153: ZONE-1	25.63	814: 112	True	True	4,000.00	4,010.00	70.4	61.0	443: J-313	45.4	641: J-513	Tru
J-462	154: ZONE-2	25.62	1252: 629	True	True	4,000.00	4,010.00	21.4	37.4	603: J-476	37.4	603: J-476	Tru
J-184	154: ZONE-2	25.62	910: 233	True	True	4,000.00	4,010.00	31.6	40.3	603: J-476	40.3	603: J-476	Tru
J-149	153: ZONE-1	25.62	1412: 810	True	True	4,000.00	4,010.00	99.6	60.3	443: J-313	45.1	641: J-513	Tru
J-107	153: ZONE-1	25.61	836: 140	True	True	4,000.00	4,010.00	44.9	60.2	443: J-313	45.2	641: J-513	Tru
J-85	153: ZONE-1	25.61	813: 111	True	True	4,000.00	4,010.00	60.0	61.0	443: J-313	45.4	641: J-513	Tru
J-153	153: ZONE-1	25.61	901: 222	True	True	4,000.00	4,010.00	46.0	60.4	443: J-313	45.2	641: J-513	Tru
J-504	153: ZONE-1	25.61	1296: 681	True	True	4,000.00	4,010.00	45.3	61.2	443: J-313	45.5	641: J-513	Tru
J-280	154: ZONE-2	25.61	1010: 354	True	True	4,000.00	4,010.00	24.1	37.4	603: J-476	37.4	603: J-476	Tru
J-282	154: ZONE-2	25.61	1005: 349	True	True	4,000.00	4,010.00	49.0	37.4	603: J-476	37.4	603: J-476	Tru
J-285	154: ZONE-2	25.61	1007: 351	True	True	4,000.00	4,010.00	36.9	37.4	603: J-476	37.4	603: J-476	Tru
J-502	153: ZONE-1	25.61	1294: 679	True	True	4,000.00	4,010.00	47.7	59.8	629: J-501	45.5	641: J-513	Tru
J-255	153: ZONE-1	25.61	972: 307	True	True	4,000.00	4,010.00	45.4	55.3	443: J-313	42.0	641: J-513	Tru
J-38	153: ZONE-1	25.60	749: 36	True	True	4,000.00	4,010.00	27.9	61.3	443: J-313	45.5	641: J-513	Tru
J-542	154: ZONE-2	25.59	1383: 779	True	True	4,000.00	4,010.00	68.4	37.4	603: J-476	37.4	603: J-476	Tru
J-598	154: ZONE-2	25.59	1518: 853	True	True	4,000.00	4,010.00	38.1	37.4	603: J-476	37.4	603: J-476	Tru
J-569	153: ZONE-1	25.59	1541: 849	True	True	4,000.00	4,010.00	79.8	60.3	443: J-313	45.1	641: J-513	Tru
J-382	155: ZONE-3	25.04	1154: 520	False	False	1,000.00	979.77	20.1	61.0	509: J-380	45.8	641: J-513	Tru
J-597	154: ZONE-2	24.76	1508: 375	True	True	4,000.00	4,010.00	58.7	37.4	603: J-476	37.4	603: J-476	Tru
J-532	154: ZONE-2	24.08	1362: 757	True	False	4,000.00	3,772.12	20.0	23.5	609: J-482	23.5	609: J-482	Tru
J-191	154: ZONE-2	23.99	905: 228	True	False	4,000.00	3,730.67	20.0	40.8	329: J-190	37.3	332: J-194	Tru
J-121	153: ZONE-1	23.37	859: 171	True	False	4,000.00	3,646.75	33.4	20.0	272: J-125	20.0	272: J-125	Tru
J-117	153: ZONE-1	23.11	1420: 818	True	True	4,000.00	4,010.00	93.5	60.5	443: J-313	45.2	641: J-513	Tru
J-622	154: ZONE-2	22.88	1621: P-102	True	False	4,000.00	3,585.31	20.0	37.4	603: J-476	37.4	603: J-476	Tru
J-324	154: ZONE-2	22.86	1071: 425	True	False	4,000.00	3,556.44	20.0	21.3	454: J-325	21.3	454: J-325	Tru
J-148	153: ZONE-1	22.75	1415: 813	True	True	4,000.00	4,010.00	97.4	60.4	443: J-313	45.1	641: J-513	Tru
J-199	154: ZONE-2	22.48	1018: 364	True	False	4,000.00	3,516.78	20.0	40.6	603: J-476	40.6	603: J-476	Tru
J-459	154: ZONE-2	22.28	1246: 623	True	True	4,000.00	4,010.00	66.1	37.4	603: J-476	37.4	603: J-476	Tru
J-461	154: ZONE-2	22.21	1246: 623	True	True	4,000.00	4,010.00	39.5	37.4	603: J-476	37.4	603: J-476	Tru
J-460	154: ZONE-2	22.16	1246: 623	True	True	4,000.00	4,010.00	60.9	37.4	603: J-476	37.4	603: J-476	Tru
J-463	154: ZONE-2	22.10	1246: 623	True	True	4,000.00	4,010.00	45.2	37.4	603: J-476	37.4	603: J-476	Tru
J-464	154: ZONE-2	22.05	1246: 623	True	True	4,000.00	4,010.00	38.0	37.4	603: J-476	37.4	603: J-476	Tru
J-492	154: ZONE-2	22.03	1246: 623	True	True	4,000.00	4,010.00	44.4	37.4	603: J-476	37.4	603: J-476	Tru
J-465	154: ZONE-2	21.86	1246: 623	True	True	4,000.00	4,010.00	66.0	37.4	603: J-476	37.4	603: J-476	Tru
J-196	154: ZONE-2	21.68	915: 238	True	True	4,000.00	4,010.00	57.6	41.0	603: J-476	41.0	603: J-476	Tru
J-295	154: ZONE-2	21.63	1027: 373	True	True	4,000.00	4,010.00	60.6	37.8	603: J-476	37.8	603: J-476	Tru
J-258	153: ZONE-1	21.53	975: 310	True	True	4,000.00	4,010.00	50.0	55.8	443: J-313	23.0	641: J-513	Tru
J-176	154: ZONE-2	20.80	1408: 806	True	True	4,000.00	4,010.00	70.6	38.6	603: J-476	38.6	603: J-476	Tru
J-102	153: ZONE-1	20.71	1599: P-88	True	True	4,000.00	4,010.00	79.7	61.1	443: J-313	45.5	641: J-513	Tru
J-592	154: ZONE-2	20.50	1508: 375	True	True	4,000.00	4,010.00	66.4	37.4	603: J-476	37.4	603: J-476	Tru
J-337	154: ZONE-2	20.50	1508: 375	True	True	4,000.00	4,010.00	65.4	37.4	603: J-476	37.4	603: J-476	Tru
J-493	154: ZONE-2	20.04	1246: 623	True	True	4,000.00	4,010.00	62.0	37.4	603: J-476	37.4	603: J-476	Tru
J-275	154: ZONE-2	19.86	1407: 805	True	True	4,000.00	4,010.00	73.6	37.6	603: J-476	37.6	603: J-476	Tru
J-270	154: ZONE-2	19.79	988: 325	True	True	4,000.00	4,010.00	65.4	37.4	603: J-476	37.4	603: J-476	Tru
J-325	154: ZONE-2	19.75	1071: 425	True	False	4,000.00	3,068.18	20.0	21.7	458: J-329	21.7	458: J-329	Tru
J-65	153: ZONE-1	19.50	1426: 824	True	True	4,000.00	4,010.00	80.4	61.0	443: J-313	45.4	641: J-513	Tru
J-300	154: ZONE-2	19.48	1027: 373	True	True	4,000.00	4,010.00	53.3	37.4	603: J-476	37.4	603: J-476	Tru
J-128	153: ZONE-1	19.26	1599: P-88	True	True	4,000.00	4,010.00	77.6	61.2	443: J-313	45.5	641: J-513	Tru
J-144	153: ZONE-1	19.16	1417: 815	True	True	4,000.00	4,010.00	95.7	60.4	443: J-313	45.1	641: J-513	Tru
J-116	153: ZONE-1	18.98	1419: 817	True	True	4,000.00	4,010.00	94.5	60.4	443: J-313	45.2	641: J-513	Tru
J-145	153: ZONE-1	18.86	1411: 809	True	True	4,000.00	4,010.00	102.1	60.3	443: J-313	45.1	641: J-513	Tru
J-150	153: ZONE-1	18.43	1415: 813	True	True	4,000.00	4,010.00	76.6	60.4	443: J-313	45.2	641: J-513	Tru
J-326	154: ZONE-2	18.41	1071: 425	True	False	4,000.00	2,858.53	22.8	20.0	458: J-329	20.0	458: J-329	Tru
J-503	153: ZONE-1	18.38	1299: 684	True	True	4,000.00	4,010.00	66.4	61.2	443: J-313	45.5	641: J-513	Tru
J-127	153: ZONE-1	18.21	1599: P-88	True	True	4,000.00	4,010.00	78.2	61.3	443: J-313	45.5	641: J-513	Tru
J-122	153: ZONE-1	18.21	859: 171	True	False	4,000.00	2,837.55	29.5	20.0	272: J-125	20.0	272: J-125	Tru
J-566	153: ZONE-1	18.16	1445: 835	True	True	4,000.00	4,010.00	85.4	61.3	443: J-313	45.5	641: J-513	Tru
J-15	153: ZONE-1	17.98	727: 13	True	True	4,000.00	4,010.00	50.4	51.8	174: J-16	46.1	641: J-513	Tru
J-524	153: ZONE-1	17.97	1345: 740	True	True	4,000.00	4,010.00	69.5	62.4	332: J-194	46.0	641: J-513	Tru
J-540	154: ZONE-2	17.82	1394: 791	True	True	4,000.00	4,010.00	77.3	37.4	603: J-476	37.4	603: J-476	Tru
J-539	153: ZONE-1	17.80	1425: 823	True	True	4,000.00	4,010.00	84.6	60.9	443: J-313	45.3	641: J-513	Tru
J-261	153: ZONE-1	17.77	979: 315	True	True	4,000.00	4,010.00	79.4	53.2	443: J-313	38.1	641: J-513	Tru
J-466	154: ZONE-2	17.76	1246: 623	True	True	4,000.00	4,010.00	60.0	37.4	603: J-476	37.4	603: J-476	Tru
J-336	154: ZONE-2	17.49	1508: 375	True	True	4,000.00	4,010.00	73.9	37.4	603: J-476	37.4	603: J-476	Tru
J-328	154: ZONE-2	17.36	1071: 425	True	False	4,000.00	2,695.02	20.1	20.0	458: J-329	20.0	458: J-329	Tru
J-39	153: ZONE-1												

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