City of Arlington

Final

Comprehensive Water System Plan

Prepared by:

City of Arlington

Water System ID 02950K

With assistance from:

RH2 ENGINEERS PLANNERS SCIENTISTS

and

FCS GROUP Solutions-Oriented Consulting

January 2016

Cover photos:

Foreground photo shows the Stillaguamish River and the Northern Pacific railroad trestle at confluence of the North and South Forks at Arlington. The River is one of three water sources used by the City of Arlington and can produce more than 90 percent of its annual water supply. Background photo shows the Pacific Keystone filter trains within the Water Treatment Plant. Water from riverbank wells is filtered through up to three trains with filtration media consisting of sand and anthracite. The WTP can treat 1700 gpm, or more than 2.4 MGD.

Recommended citation:

City of Arlington. 2016. 2015 Comprehensive Water System Plan, Final. Released January 2016. Prepared with assistance from RH2 Engineering, Inc. and FCS Group Inc.

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A WATER FACILITIES INVENTORY FORM

A.1 WFI DOWNLOADED FROM HEALTH WEB SITE SEPTEMBER 2015

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WATER FACILITIES INVENTORY (WFI) FORM

ONE FORM PER SYSTEM

Quarter: 1
Updated: 10/29/2013
Printed: 9/8/2015
WFI Printed For: On-Demand
Submission Reason: Annual Update

RETURN TO: Central Services - WFI, PO BOX 47822, Olympia WA 98504-7822

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
02950 K	ARLINGTON WATER DEPT	SNOHOMISH	A	Comm

6. PRIMARY CONTACT NAME & MAILING ADDRESS	7. OWNER NAME & MAILING ADDRESS	8. Owner Number 000200
DONALD R. SMITH [WATER UTILITY SUPERV] 154 W COX AVE ARLINGTON, WA 98223	ARLINGTON, CITY OF DALLAS R. SPEED 154 W COX AVE ARLINGTON, WA 98223	TITLE: LEAD WATER PLANT OPERATOR
STREET ADDRESS IF DIFFERENT FROM ABOVE	**STREET ADDRESS IF DIFFERENT FROM**	
ATTN ADDRESS 108 W HALLER CITY ARLINGTON STATE WA ZIP 98223	ATTN ADDRESS 108 W HALLER CITY ARLINGTON STATE WA ZIP 98223	

9. 24 HOUR PRIMARY CONTACT INFORMATION	10. OWNER CONTACT INFORMATION
Primary Contact Daytime Phone: (360) 403-3507	Owner Daytime Phone: (360) 403-3528
Primary Contact Mobile/Cell Phone: 425-754-7432	Owner Mobile/Cell Phone: (425) 754-4291
Primary Contact Evening Phone: (xxx) xxx-xxxx	Owner Evening Phone: (xxx) xxx-xxxx
Fax:(360) 435-7944 | E-mail: XXXXXX	Owner Fax Phone: | E-mail: XXXXXX

WAC 246-290-420(9) requires that water systems provide 24-hour contact information for emergencies.

11. SATELLITE MANAGEMENT AGENCY - SMA (check only one)

- [x] Not applicable (Skip to #12)
- [ ] Owned and Managed — SMA NAME: _____ SMA Number:
- [ ] Managed Only
- [ ] Owned Only

12. WATER SYSTEM CHARACTERISTICS (mark all that apply)

[x] Agricultural	[x] Hospital/Clinic	[x] Residential
[x] Commercial / Business	[x] Industrial	[x] School
[x] Day Care	[x] Licensed Residential Facility	[ ] Temporary Farm Worker
[x] Food Service/Food Permit	[x] Lodging	[x] Other (church, fire station, etc.):
[ ] 1,000 or more person event for 2 or more days per year	[ ] Recreational / RV Park	

13. WATER SYSTEM OWNERSHIP (mark only one)				14. STORAGE CAPACITY (gallons)
[ ] Association	[ ] County	[ ] Investor	[ ] Special District	
[x] City / Town	[ ] Federal	[ ] Private	[ ] State	4,500,000

- SEE NEXT PAGE FOR A COMPLETE LIST OF SOURCES -

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
02950 K	ARLINGTON WATER DEPT	SNOHOMISH	A	Comm

15	16	17	18										19			20	21						22	23	24			
	SOURCE NAME	INTERTIE	SOURCE CATEGORY										USE				TREATMENT						DEPTH		SOURCE LOCATION			
Source Number	LIST UTILITY'S NAME FOR SOURCE AND WELL TAG ID NUMBER. Example: WELL #1 XYZ456 IF SOURCE IS PURCHASED OR INTERTIED, LIST SELLER'S NAME Example: SEATTLE	INTERTIE SYSTEM ID NUMBER	WELL	WELL FIELD	WELL IN A WELL FIELD	SPRING	SPRING IN SPRING FIELD	SEA WATER	SURFACE WATER	RANNEY / INF. GALLERY	OTHER	PERMANEANT	SEASONAL	EMERGENCY	SOURCE METERED	NONE	CHLORINATION	FILTRATION	FLUORIDATION	IRRADIATION (UV)	OTHER	DEPTH TO FIRST OPEN INTERVAL IN FEET	CAPACITY (GALLONS PER MINUTE)	1/4, 1/4 SECTION	SECTION NUMBER	TOWNSHIP	RANGE
S01	InAct 05/05/2004 GWI WELL #1 HALLER BRIDGE PARK				X							X					X	X			X	40	850	SE NW	02	31N	05E
S02	GWI WELL #2 HALLER BRIDGE PARK				X							X			Y		X	X			X	40	570	SE NW	02	31N	05E
S03	GWI WELL #3 HALLER BRIDGE PARK				X							X			Y		X	X			X	40	1140	SE NW	02	31N	05E
S04	ARLINGTON AIRPORT		X									X			Y		X					152	240	SE NW	22	31N	05E
S05	GWI WF HALLER BRIDGE			X								X			Y		X	X			X	24	1710	SE NW	02	31N	05E
S06	809071 SNO PUD	80907 1										X			Y	X							1000	N E	30	31N	06E
S07	GWI WELL 1R HALLER BRIDGE PARK				X									X	Y		X	X			X	36	570	SE SW	02	31N	05E

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
02950 K	ARLINGTON WATER DEPT	SNOHOMISH	A	Comm

	ACTIVE SERVICE CONNECTIONS	DOH USE ONLY! CALCULATED ACTIVE CONNECTIONS	DOH USE ONLY! APPROVED CONNECTIONS
25. SINGLE FAMILY RESIDENCES (How many of the following do you have?)	0	5839	Unspecified
A. Full Time Single Family Residences (Occupied 180 days or more per year)	4582		
B. Part Time Single Family Residences (Occupied less than 180 days per year)	0		
26. MULTI-FAMILY RESIDENTIAL BUILDINGS (How many of the following do you have?)			
A. Apartment Buildings, condos, duplexes, barracks, dorms	245		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	1257		
C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year	0		
27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)			
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.	598	598	
28. TOTAL SERVICE CONNECTIONS		6437	

29. FULL-TIME RESIDENTIAL POPULATION	
A. How many residents are served by this system 180 or more days per	14598

30. PART-TIME RESIDENTIAL POPULATION	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?												
31. TEMPORARY & TRANSIENT USERS	**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?												
32. REGULAR NON-RESIDENTIAL USERS	**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?												

33. ROUTINE COLIFORM SCHEDULE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	15	15	15	15	15	15	15	15	15	15	15	15

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: _____

WS ID	WS Name
02950	ARLINGTON WATER DEPT

Total WFI Printed: 1

B WATER SYSTEM FACILITIES DATA

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City of Arlington
Comprehensive Water System Plan
Well Facilities Data

Well Data

Well Name	Pressure Zone	Year Const.	Current Pumping Rate (gpm)	Max. Well Capacity (gpm)	Max Inst Water Right (gpm)	Casing Size (inches)	Well Depth (feet)	Well Screen Depth (feet)	Pump Intake Depth (feet)	Static Water Depth (feet)	Pumping Water Depth (feet)	Ground Elv (feet)
Airport Well	342	1945, 1996	220	580	580	10	185	N/A	103	33	53	132
Haller Park #1	342	1967, 2002	570	700	1,700	36	36	Range = 13.75"	29.75	N/A	N/A	71.7
Haller Park #2	342	1967, 2001	570	850	1,700*	36	38	Range = 13.75"	29.75	13	10	71.7
Haller Park #3A & 3B**	342	1906 or prior, 2001	570	850	1,700*	72	38	Range = 13.75"	29.75	19	15	71.7
					2,280							

* Haller Park Wells share a water right

** #3A and #3B pump from the same well.

Well Pump Data

Pump Name	Pump Manufacturer	Pump Model	Pump Type	Design Capacity (gpm)	Design Head (feet)	Motor Manufacturer	Motor Size (HP)	Control Valve Size & Model	Have Standby Power	Have E.G. Set Receptacle
Airport Well	Peerless	8 HDX, 10 Stage	Vertical Turbine	580	280	GE	60	Empire 6", Silent Check	EG	No
Haller Park #1	Peerless	10MA, 5 Stage	Vertical Turbine	570	138	USEM	25	6", Wafer?	EG	No
Haller Park #2	Peerless	10MA, 5 Stage	Vertical Turbine	570	138	USEM	25	6", Wafer?	EG	No
Haller Park #3A & 3B	Peerless	(2) 10MA, 5 Stage	(2) Vertical Turbine	570	138	USEM	(2) 25	6", Wafer?	EG	No

Well Pump Curve Data

Well Name	Point 1		Point 2		Point 3		Pump Serial Number	Pump Impeller Diameter
	Flow (gpm)	Head (feet)	Flow (gpm)	Head (feet)	Flow (gpm)	Head (feet)		
Airport Well	0	400	350	330	580	280		5.58 x 6.97
Haller Park #1								
Haller Park #2								
Haller Park #3A & 3B							537478D, 537478A	

Control Data

Well Name	Control Facility	Supplied Pressure Zone	Supply To Zone Priority	Well Have Telemetry
Airport Well	Gleneagle Reservoir	342	Secondary Supply	Yes
Haller Park #1	Water Treatment Plant	342	Primary Supply	Yes
Haller Park #2	Water Treatment Plant	342	Primary Supply	Yes
Haller Park #3A & 3B	Water Treatment Plant	342	Primary Supply	Yes

City of Arlington
Comprehensive Water System Plan
Pump Station Facilities Data

Pump Station Data

Name	Suction Pressure Zone	Discharge Pressure Zone	Year Constructed	Above or Below Grade	Maximum Capacity (gpm)	Meter Size & Model	Have Standby Power	Have E.G. Set Receptacle	Have Surge Protection
Water Treatment Plant	354	354		Above	1,710		EG	No	
520 Pump Station	354	520	1998	Above	790	8" Rockwell	EG	No	

Pump Data

Pump Name	Pump Mfgr	Pump Model	Pump Type	Current Pump Rate (gpm)	Design Capacity (gpm)	Design Head (feet)	Motor Mfgr	Motor Size (HP)	Control Valve Size & Model
Water Plant - Pump 1	Peerless			980	850		USE	100	
Water Plant - Pump 2	Peerless			980	850		USE	100	
Water Plant - Pump 3	Peerless			980	850		USE	100	
Water Plant - Pump 4	Peerless				1,000		USE	25	
Water Plant - Pump 5	Peerless				1,000		USE	25	
520 Pump Station - Pump 1	Peerless	C1125	End Suction	430	395	217	Baldor	40	4" CV
520 Pump Station - Pump 2	Peerless	C1125	End Suction	430	395	217	Baldor	40	4" CV

Pump Curve Data

Pump Name	Point 1		Point 2		Point 3		Pump Serial Number	Pump Impeller Diameter
	Flow (gpm)	Head (feet)	Flow (gpm)	Head (feet)	Flow (gpm)	Head (feet)		
Water Plant - Pump 1								
Water Plant - Pump 2								
Water Plant - Pump 3								
Water Plant - Pump 4								
Water Plant - Pump 5								
520 Pump Station - Pump 1	200	250	395	217	600	144		9.75
520 Pump Station - Pump 2	200	250	395	217	600	144		9.75

Pump Control Data

Pump Name	Control Facility	Supplied Pressure Zone	Supply To Zone Priority	Pump Operation Priority	Station Have Telemetry
Water Plant - Pump 1	Clearwell Level	342	Primary	Primary	Yes
Water Plant - Pump 2	Clearwell Level	342	Primary	1st Lag	Yes
Water Plant - Pump 3	Clearwell Level	342	Primary	2nd Lag	Yes
Water Plant - Pump 4	Backwash of Filters	342	Backwash	N/A	Yes
Water Plant - Pump 5	Backwash of Filters	342	Backwash	N/A	Yes
520 Pump Station - Pump 1	520 Zone Reservoir	520	Secondary	Alternate	Yes
520 Pump Station - Pump 2	520 Zone Reservoir	520	Secondary	Alternate	Yes

City of Arlington
Comprehensive Water System Plan
Storage Facilities Data

Reservoir Data

Reservoir Name	Pressure Zone	Year Const.	Material	Capacity (gallons)	Overall Height (feet)	Diameter (feet)	Water Base Elv (feet)	Overflow Elv (feet)	Ground Elv (feet)	Seismic Restraint (Y or N)
Burn Road Reservoir	342	1962	Steel	500,000	38	48	305.5	342.0	305	N
Gleneagle	342	1975	Concrete	2,000,000	38	100	304.7	342.0	323	Y
520 Reservoir	520	1993	Steel	2,000,000	21	132	499.0	520.0	499	Y

Storage Data

Reservoir Name	Max Water Height (feet)	Volume Per Foot (gallons)
Burn Road Reservoir	342.0	13,699
Gleneagle	342.0	53,634
520 Reservoir	520.0	95,238

Level Control Data

Reservoir Name	Controlled Supply Facility	Reservoir Have Telemetry
Burn Road Reservoir	WTP Clear Well	No
Gleneagle	WTP Clear Well	Yes
520 Reservoir	Altitude Valve	Yes

City of Arlington
Comprehensive Water System Plan
Pressure Reducing Station Data

Station Data

PRV Name	Upper Pressure Zone	Lower Pressure Zone	Year Const.	Ground Elv (feet)	Normal Pressure Inlet (psi)	Normal Pressure Outlet (psi)	Station Operation Status
PRV 1 (Highland View)	520	354		252.28	115	42	Active
PRV 2 (Woodlands Way)	520	354	1994	263.41	112	35	Active
PRV 3 (Cedarbough Loop)	520	354	1994	258.80	100	30	Active
PRV 4 (Woodbine Drive)	520	354	1994	231.76	128	35	Active
Bovee Acres PRV	520	354	2002	245.99			Active
Upper Burn Road PRV	PUD	354	2000	436.00			Active
Lower Burn Road PRV	PUD	354	2000	239.00			Active
186th Street PRV	710	520	2007	440.07			Active

PRV Set Point Data

PRV Name	Description	Valve Size (inches)	Valve Mfgr	Valve Model	Valve Elv (feet)	Valve Set Point (psi)	Valve Set Point (feet H.E.)
PRV 1 (Highland View)	Small PRV	2	Cla-Val	92G-01	247.28	38	335.06
	Large PRV	6	Cla-Val	92G-01B		33	323.51
PRV 2 (Woodlands Way)	Small PRV	2	Cla-Val	90G-01AS	258.41	30	327.71
	Large PRV	6	Cla-Val	92G-01B		25	316.16
PRV 3 (Cedarbough Loop)	Small PRV	2	Cla-Val	90G-01AS	253.80	35	334.65
	Large PRV	6	Cla-Val	92G-01BKC		20	300.00
PRV 4 (Woodbine Drive)	Small PRV	2	Cla-Val	90G-01AS	226.76	30	296.06
	Large PRV	6	Cla-Val	92G-01BKC		25	284.51
Bovee Acres PRV	Small PRV	2			240.99		
	Large PRV	6					
Upper Burn Road PRV	Small PRV	2			431.00	47	539.57
	Large PRV	8					
Lower Burn Road PRV	Small PRV	2			234.00		
	Large PRV	8					

City of Arlington
Comprehensive Water System Plan
Meter Data

Station Data

PRV Name	Water Provider	ARL Pressure Zone	Year Const.	Ground Elv (feet)	Normal Pressure (psi)	Station Operation Status
Marysville Island Crossing Meter	MAR	342	1998	125	50	Inactive
Marysville Municipal Utility Intertie	MAR	342	1978	124	50	Active
PUD Master Meter	MAR	710	2000	605	45	Active

Meter Data

PRV Name	Valve Size (inches)	Valve Mfgr	Valve Model	Valve Elv (feet)
Marysville Island Crossing Meter	6			
Marysville Municipal Utility Intertie	10			
PUD Master Meter	6 and 2			

C HYDRAULIC MODEL NODE DIAGRAM

C.1 HYDRAULIC MODEL NODE DIAGRAM PREPARED BY RH2 ENGINEERING, INC.

Note: For convenience, the hydraulic model node diagram in this bound Water System Plan has been placed with other oversized maps at the very back of the document.

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D PUBLIC WORKS DESIGN AND CONSTRUCTION STANDARDS AND SPECIFICATIONS

D.1 CONSTRUCTION COMPLETION REPORT FORM

D.2 CHAPTER 4 OF JANUARY 2015 DRAFT ENGINEERING STANDARDS

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CONSTRUCTION COMPLETION REPORT FORM

In accordance with the *City of Arlington Public Works Design and Construction Standards and Specifications*, a ***Construction Completion Report*** is required for all utility construction projects. This form will be completed and filed with the City of Arlington within sixty (60) days of completion and before use of any water system facility.

Please type or print legibly in ink:

City of Arlington Water Department — DOH System ID No.: **02950K**

Name of Water System

City of Arlington — City Project ID: _____

Name of Purveyor (Owner or System Contact)

154 W. Cox Avenue — WSP CIP Number: _____

Mailing Address

Arlington, WA 98223 — Field Inspector: _____

City State Zip

PROJECT NAME AND DESCRIPTIVE TITLE: _____

PROFESSIONAL ENGINEER'S ACKNOWLEDGMENT *(Complete items below–Attach additional sheets as needed)*

The undersigned professional engineer (PE), or their designee, has inspected the above-described project which, as to layout, size, type of pipe, valves, materials, reservoir, and/or other designed physical facilities, has been constructed and is substantially completed in accordance with approved construction plans and the *City of Arlington Public Works Design and Construction Standards and Specifications*. In the opinion of the undersigned engineer, the installation, physical testing procedures, water quality tests, and disinfection practices were carried out in accordance with local (City or Snohomish County) and state regulations and principles of standard engineering practice.

P.E.'s Seal

_____
Date Signed

_____
Name of Engineering Firm

_____
Name of PE Acknowledging Construction Completion

_____
Mailing Address

_____
City State Zip

_____
Engineer's Signature

TABLE OF CONTENTS

4-1 GENERAL REQUIREMENTS

4-1.01 STANDARDS

No extension or modification to the City's water system shall be made without approved construction plans with the signature of the City Engineer. Except where modified or amended in these Standards, all work and materials shall conform to the current edition of the following:

(AMC) Arlington Municipal Code
Title 13, and Title 20.6

(COA Comp Plan) City of Arlington Water Comprehensive Plan

(AWWA) American Water Works Association Standards

(WSDOT) Washington Department of Transportation Standard Specifications for Road, Bridge, and Municipal Construction.

These Standards do not include design of the City's general facilities such as wells; pump stations, storage tanks, or treatment plant. The general facilities require special design and will be reviewed and approved by the City on a case-by-case basis in accordance with all applicable codes and best standards of practice.

4-1.02 LIMITS OF PUBLIC WATER SYSTEM

Standards contained within this section shall apply to public water systems owned and maintained by the City of Arlington. Public water systems shall include all water systems within the public right-of-way up to and including water meters. Water appurtenances on the private side of the water meter shall be the responsibility of the property owner and shall be installed in accordance with applicable building and plumbing codes. For extensions of the public water main onto private property, a utility easement shall be established in accordance with Section 1-???? of these Standards.

In the event that submeters are installed by the property owner, the public water system shall be up to and including the master meter but will not include submeters nor piping behind the master meter.

For fire service lines, the public water system shall be up to but NOT including the backflow device. In the event that the backflow device is installed inside a structure, the public water system shall be up to within 5-ft of the face of building.

4-1.03 ORPHANED WATER SYSTEM

Orphaned water systems that seek connection to the City water system, either at the request

of the development or jurisdictional requirement, shall be evaluated by the City to determine what provisions need to be addressed prior to connection. Provisions may include but not limited to a new water main network, backflow prevention device, and master meter. In the event that an orphaned water system is connected to the public water system with a backflow device and master meter, the public water system shall be up to and including the master meter and master backflow device.

4-1.04 PRIVATE WELLS

To receive water services from the City, the property owner shall decommission the existing well on the same lot in accordance with WAC 173-160-381. The owner shall provide a copy of the decommission report to the City Utilities Division.

New services will be locked until compliance is verified by the City's Cross Connection Specialist. Visual inspection of the piping is required for premises retaining active well systems.

4-1.05 WATER MAIN EXTENSION

Residential

It is the policy of the City that anyone who desires water services for more than one (1) single family residence, including single family and multi-family structures, must extend the City's water system to, and past, at least one full side of the property. In addition, the water mains must be installed through all internal streets; loop to all adjacent mains which will, in the City Engineer's opinion, extend past or through the property in the future; and stub to the property line where it is likely that they will be needed to connect to future mains. Depending on the property size, shape and the Water System Plan, the City may require mains to be constructed on more than one, and up to all, full sides of the property.

Non-Residential Properties

It is the policy of the City that anyone who desires water services to non-residential (commercial, industrial or public) property must extend the City's water system to, and past, the entire perimeter of the property and/or stub or connect to present and future mains.

The City also reserves the right to require that extra service lines be installed, at their discretion, to be used for sampling stations.

If a development is located in 2 or more pressure zones, the Developer may be required to install pressure reducing stations, isolation valves, check valves, and/or booster pump

stations if required by the City Engineer.

Dead-end mains shall be minimized by making appropriate looping and tie-ins whenever practical in order to provide increased reliability of service and reduce head loss. Non-looped systems shall only be allowed upon approval by the City Engineer.

If the Developer's project directly benefits other property owners, the Developer may enter into a reimbursement agreement with the City per AMC 12.24.

4-1.06 HYDRAULIC REQUIREMENTS

All water mains shall be sized following a hydraulic analysis based on flow demands and pressure requirements. The system shall be designed to maintain a minimum pressure of 20 psi at ground level along the entire distribution system under all conditions of flow.

Fire flow requirements shall be determined by the City Fire Chief. The available fire flow will be determined by the City's engineering staff using the water system hydraulic model. Flow velocities in water mains shall not exceed 10 feet per second during the highest demand and fire flow.

4-1.07 WATER MAIN LOCATION

It is preferred that water mains and appurtenances are within the right-of-way of public streets and roads. Water mains may be installed within City easements across private properties. Water mains within public right-of-way shall be located on north and east sides of the centerlines. Water mains shall be in the shoulder of the roadway for rural roads, and approximately 6 feet from the street centerline for urban streets. See Standard Detail R-060. Exceptions to this requirement may be made in order to minimize the cutting and replacing of pavement, to avoid conflicts with other underground facilities, to permit sanitary sewers to be installed on the "low side" of streets, or for other approved reasons. As nearly as practical, mains shall be installed on a particular street with the distance from the property line and/or centerline varied as little as possible. Water mains shall not be located under or behind parking lanes, curbs, gutters, or sidewalks. Valve boxes shall be located outside the normal wheel track whenever possible.

If there is an easement across a paved area on private property the water main shall be installed in the driving lanes (not under parking stalls).

Water mains may be laid along road/street curves using pipe joint deflection whenever possible. Pipe joint deflections shall not exceed one-half of pipe manufacturer's recommended maximum deflections. Bends may be required to maintain proper water main alignment within the public right-of-way or easements.

4-1.08 WATER MAIN SIZING

The minimum pipe size of public water main shall be 8-inch. Transmission mains, commercial developments, and specific areas outlined in the City's Water Comprehensive Plan require 12 inch or larger water mains or as directed by the City Engineer. 6-inch pipe is allowed for fire hydrant connections; refer to Section 4-1.15 of these Standards.

Upon approval of the City Engineer, 4 inch pipe may be used to serve water to a tract or the end of a cul-de-sac after the last fire hydrant and when no future extension is required. The length of the 4 inch water main shall not exceed 200 feet and the end of the main shall be blocked tee and a blow off assembly per Standard Detail 180

4-1.09 CONCRETE BLOCKING

When using horizontal and vertical concrete blocking, show locations and type of blocking on the plans. City Standard Details W-160 through W-175. Concrete blocking is required on all fittings including restrained joint fittings.

An 8 inch pipe at a vertical bend shall be restrained a minimum of 36 feet (2 joints) from each side of a bend. A 12 inch or larger pipe at a vertical bend shall be restrained a minimum of 54 feet (3 joints) from each side of a bend. No change in horizontal direction or diameter shall occur within 36 feet of the vertical bend. Special blocking or joint restraint designs may be necessary for poor soil, conflicting utility, etc.

4-1.10 SLOPES

Anchor blocks shall be used in conjunction with joint restraint where slopes are 20% or greater. Timber baffle/hill holders shall be required on unpaved slopes that exceed 20%, maximum spacing shall be 20' foot on center and minimum of 1 holder for each pipe length.

4-1.11 PRESSURE REDUCING STATIONS

If a development is located in two or more pressure zones, pressure reducing stations may be installed by the Developer if required by the City Engineer.

4-1.12 BLOW-OFFS

Each dead-end main shall be provided with a fire hydrant if flow and pressure are sufficient or with an approved flushing hydrant or a blow-off assembly shown in Standard Detail W-180 for flushing purposes. Flushing devices shall be sized to provide flows that will give a velocity of at least 2.5 feet per second in the water main being flushed. No flushing device shall be directly connected to any sewer. Blow-off assemblies shall be located outside the traveled portion of the roadway, behind the curb or sidewalk, and within the public right-of-way or public utility easement.

A 2 inch blow-off assembly shall be required for testing and disinfection of new water mains, where hydrants are not available.

4-1.13 VALVES

Sufficient valves shall be provided on water mains so that interrupted service and sanitary hazards will be minimized during repairs. Valves shall be located at no more than 300 foot intervals in commercial, industrial and multi-family areas and at no more than one block or 400 foot intervals in other areas. At water main intersections, valves shall be placed on 4 legs at each cross, and 3 legs at each tee (unless tapping an existing water main). The valves shall be spaced so that no more than one fire hydrant is removed from service with any separate main shut down.

An auxiliary valve shall be installed on each hydrant run at the tee. Provide a valve at each end of an easement. Additional valves may be required for area isolation and unidirectional flushing. Valves on water mains shall, where practical, be located within paved area of the street. A valve box or chamber shall be provided for every valve.

4-1.14 COMBINATION AIR VALVES

Combination air valves as shown in Standard Detail W-260 shall be installed on high points of new water mains, where the elevation difference between the high point and the next low point exceeds one (1) pipe diameter, or as required by the City. The air valves shall be located outside the traveled portion of the roadway, preferably behind the curb or sidewalk and within the public right-of-way and the public utility easement. If possible, the water main profile shall be adjusted to eliminate the use of the air valves.

4-1.15 FIRE HYDRANTS

Fire hydrants shall be installed for buildings where water is served by the City. The final number of hydrants and their locations shall be approved by the City Fire Chief.

The maximum spacing of fire hydrants serving single-family dwellings or duplex dwellings on individual lots shall be 600 feet and not more than 300 feet from the front property line of the main body of a lot. Required distances shall be measured along the normal fire department hose laying route.

Fire hydrants serving multi-family and commercial lots shall be located not more than 300 feet on center and shall be located so that at least one hydrant is located within 150 feet of all structures or uses. Fire hydrants shall not be closer than 50 feet from multi-family or commercial buildings. On arterial streets without residential access, maximum hydrant spacing shall be 600 feet.

Fire hydrants shall be installed at the ends of each dead end line more than 300 feet in length.

Said fire hydrants may be removed to conform to standard spacing requirements when the main is again extended with the City's approval.

4-1.16 SERVICE CONNECTIONS

Service connections including saddle, service line, meter box and appurtenances shall be installed as part of the construction of all new water system extensions. A fire sprinkler meter per City Standards shall be provided if required by the City Fire Chief. Irrigation systems, fire sprinkler systems and non-residential connections must be protected by a DOH approved backflow prevention assembly in accordance with WAC 246-290-490.

For residential developments, meter boxes shall be located in front of the lot to be served unless otherwise approved by the City. They shall be close to the property line, in a landscape area within public right-of-way or public utility easement, but not in paved areas such as sidewalk or driveway. Meters for two neighboring lots shall be installed near the common lot line to ease meter reading. Meters located close to driveways shall use boxes with traffic rating. The distance from the water main to the meter box shall not exceed 50 feet unless it is approved by the City. Meters shall be located in or as close to the public right-of-way as possible. Service lines shall be perpendicular to the water main if possible. See Standard Details W-040 for residential services and W-050 for non-residential services.

For commercial and multi-family developments, meters shall be located behind the back of a curb or sidewalk and not behind parking space or other obstructions. Meters shall be located for ease of reading.

Minimum allowable service lines from mains to meters shall be 1 inch for a single family residential buildings and 2 inch for multi-family or commercial buildings. All duplexes and triplexes must have separate services and meters for each unit. Multifamily buildings with four or more units must have separate services and meters for each building. Each building shall be served by a separate service and meter. Irrigation and fire sprinklers shall be served by separate services and meters unless otherwise approved by the City Engineer. A minimum pressure of 35 psi at the meter shall be maintained when service is flowing at anticipated maximum flow rates. If friction losses will cause the pressure at the building to drop below the minimum, the service line size shall be increased.

The standard meter size is ⅝ inch × ¾ inch for a single family residential house. Non-residential services and meter sizes (minimum ⅝ inch × ¾ inch) shall be determined by the engineer or architect per the Uniform Plumbing Code and approved by the City Building Official, and the plans shall show the locations and sizes of the services and meters.

Static service pressures at ground floor elevation shall be determined at all lots/buildings to ensure compliance with system pressure standards. Plans shall identify lots/buildings where the builder/owner will install individual pressure reducing valve (PRV). A PRV shall be on the customer side of the meter, outside of the public right of way and a minimum of 3 feet after

water meter box. Plans shall identify location of where PRV will be installed, such as site or within structure.

4-1.17 CROSS-CONNECTION CONTROL

The City strictly prohibits interconnection of other water supplies with the City's water system.

Irrigation systems, fire sprinkler systems, commercial service connections and other water uses which may cause contamination of the City water system require a backflow prevention device to be installed. Approved backflow prevention assemblies shall meet the requirements of the WAC 246-290-490 "Cross Connection Control Regulation in Washington State", and the recommendations of the PNWS-AWWA Cross Connection Control Manual and the City of Arlington Cross Connection Control Program depending upon the degree of hazard. The types of backflow prevention devices to be used for a specific project shall be determined by the City's Cross Connection Specialist.

Fire sprinkler system connections to the City's water system shall be owned and maintained by the property owner, beginning immediately downstream of the valve where the fire sprinkler system connects to the City's water main at the property or right-of-way line.

The backflow prevention assembly on fire sprinkler system connections shall be located as close to the serving water main as possible, either on the owner's property or in an easement.

A master meter used for eight or more units in a multi-family development, or for buildings exceeding thirty feet in height, require double check valve assemblies and a bypass with equal backflow prevention to avoid loss of service during maintenance and repair.

4-2 CONSTRUCTION

4-2.01 WATER MAIN

4-2.01(1) GENERAL REQUIREMENTS

All work shall be constructed as shown in the plans and in accordance with these Standards.

Materials shall be installed in compliance with the manufacturer's instructions and specifications, except where a higher quality of workmanship is required by the plans and these Standards. All work shall be in accordance with any applicable regulations of the State, County and local jurisdictions. The Contractor shall arrange for inspection by these agencies and shall submit evidence of their approval, if requested by the City.

4-2.01(1)A MATERIAL SUBMITTALS

The Developer/Contractor shall provide material submittals to the City for approval after the plans are approved for construction. The Developer shall assume the risk for material or equipment, which is fabricated or delivered prior to the City's approval of material submittals.

Five (5) sets of material submittals are required. The City shall either approve or otherwise indicate the reasons for disapproval. Disapproved submittals shall be resubmitted to the City for approval.

The City's review of material submittals covers only general or conformance to the plans and these Standards. The Developer is responsible for quantity determination. No quantities are to be verified by the City. The Developer is responsible for any errors, omissions or deviations from the contract requirements. Review or approval of submittals by the City does not relieve the Developer from his obligation to furnish required items in accordance with the plans and these Standards.

Each "Material Submittal" section shall follow a cover page and state the category of the materials for this section. Each submittal must have the specific part number(s) checked or highlighted along with its specific purpose. The following shows the preferred order to list the material categories:

1) Pipe, Fittings, Pipe Restraints and Casing.

2) Valves (Gate Valves, Air Valves, Blow-off, and Valve Boxes).

3) Hydrants and Attachments.

4) Service Fittings, Service Pipe, Saddles, Ball Valves, Corps, Sleeves, etc.

5) Boxes for Meters, Sampling Stations, Blow-offs, and Air Valve Assemblies.

6) Cross Connection Control Assemblies (DCDA, RPBA, RPDA, DCVA).

7) Bedding Material with Sieve Analysis.

8) Other items if required.

4-2.01(1)B PRE-CONSTRUCTION CONFERENCE

The Developer/Contractor shall contact the Public Works Department (360-403-3500) to schedule a pre-construction conference after the material submittals, grading, and right-of-way permits are approved. The conference shall include the Developer, Developer's Engineer, and Contractor, representatives from the permit agencies, other utility companies, and City staff. An on-site tailgate meeting between the Contractor and the City Inspector shall be arranged by the Contractor at least 48 hours prior to commencing construction.

4-2.01(1)C CONSTRUCTION SCHEDULE

The Developer/Contractor shall provide the City with the construction schedule a minimum of five (5) business days prior to start of water system extension construction to arrange staking inspection and to give permitting agencies and customers two (2) business days notice. No construction is allowed until the construction plans have been approved and all appropriate permits have been obtained.

4-2.01(1)D DEVIATION FROM PLANS

No deviations from the approved plans and these Standards shall be allowed without the City's approval. Minor changes may be approved by the City Engineer. If major changes are required, the Developer's Engineer shall revise and sign the plans for the City Engineer's approval prior to restart of construction.

If the City is aware of any deviation from the approved plans and determines that it is not acceptable, the City shall give a written notice to the Developer. The project will not be accepted unless the deviation is corrected.

4-2.01(2) MATERIALS

4-2.01(2)A GENERAL

All materials shall be new and undamaged. The same manufacturer of each item shall be used throughout the work.

When specific manufacturers or models are specified in these Standards, no substitutions will be allowed without prior approval by the City. If required by the City, the Contractor shall furnish certification from the manufacturer of the materials being supplied that the inspection and all of the specified tests have been made and the results thereof comply with the requirements of the reference Standards.

4-2.01(2)B PIPE MATERIAL

Ductile iron pipe shall be Class 52 and cement mortar lined unless otherwise specified and shall conform to AWWA/ANSI C151/A21.51. Standard thickness of cement mortar lining shall be in accordance with AWWA/ANSI C104/A21.4.

Upon approval by the City Engineer, High density polyethylene (HDPE) pipe may be used in certain circumstances and shall conform to AWWA C906 and WSDOT Section 9-30.1(6).

4-2.01(2)C PIPE FITTINGS AND JOINTS

All fittings for ductile iron pipe shall be ductile iron compact (short body) fittings conforming

to AWWA/ANSI C153/A21.53 and shall be cement mortar lined conforming to AWWA/ANSI C104/A21.4. Ductile iron pipe fittings shall be pressure rating of 350 psi for push-on or mechanical joint fittings and 250 psi for flange joint fittings drilled in accordance with AWWA/ANSI C111/A21.11, unless otherwise noted. Pipe shall be furnished with restrained joints or rubber gasket push-on joints with "field lock" gaskets, or approved equal, unless flanged joints are required.

Horizontal or vertical bends shall be used when joint deflection would exceed one-half of the pipe manufacturer's recommended maximum deflection. Megalug restraints, or approved equal, are required on all fittings.

Gasket material for flanges shall be neoprene, Buna N, chlorinated butyl, or cloth inserted rubber.

Where restrained joints are required, they shall be either bolted or boltless design, flexible after assembly, and can be disassembled without special tools. Any device utilizing round point set screws shall not be permitted. All couplings installed underground to connect ductile iron pipe shall be manufactured of ductile iron.

Restrained fitting joints shall be Megalug Series 1100, TR Flex, Grinnell 595 shackle clamp, or approved equal.

4-2.01(2)D COUPLINGS

Flexible coupling and transition coupling cast components shall be ductile iron. Bolts and nuts shall be in accordance with ASTM A536-80, Grade 65-45-12. Bolts shall be high strength, low alloy steel track head bolts with national course rolled thread and heavy hex nuts. Gaskets shall meet AWWA/ANSI C111/A21.11 composition specifications.

4-2.01(2)E BOLTS AND NUTS

Bolts, nuts and washers used for securing fittings shall be of similar materials. Steel bolts shall meet the requirements of ASTM A307 or ASTM F568 for carbon steel or ASTM F593 or ASTM F738 for stainless steel. Nuts shall meet the requirements ASTM A563 for carbon steel or ASTM F594 or ASTM F836 for stainless steel. Iron bolts and nuts shall meet the requirements of ASTM A536, grade 65-45-12.

4-2.01(2)F DETECTABLE MARKING TAPE

Utility pipe tracer tape shall be detectable below ground surface, color coded, with utility name printed on tape. Tracer tape shall be detectable type, up to 6 inches in width, and buried 24 inches to 48 inches below finished grades. The color of the tape for water shall be blue with black printing reading "CAUTION WATER BURIED BELOW". Tracer tape shall be "Lineguard Type II Detectable", or approved equal.

4-2.01(2)G CASING SPACERS AND END SEALS

Casing spacers and end seals shall be sized for pipe being installed and shall be manufactured by Advance Products & Systems, Cascade Waterworks, Pipeline Seal and Insulators Co., or approved equal.

4-2.01(2)H STEEL CASING

Steel casing shall be black steel pipe conforming to ASTM A53. Casing shall be as specified in City Standard Detail W-230.

4-2.01(2)I CONCRETE

Thrust blocking, encasement, or slope anchor concrete shall be mixed from materials acceptable to the City and shall have a 30-day compressive strength of not less than 2,500 psi.

The mix shall contain five (5) sacks of cement per cubic yard and shall be of such consistency that the slump is between 1 inch and 5 inches. All concrete shall be mechanically mixed.

4-2.01(2)J CONTROLLED DENSITY FILL

Controlled Density Fill (CDF) shall conform to the requirements of Section 2-???? Of these Standards.

4-2.01(2)K BEDDING MATERIAL

Aggregates for bedding material shall consist of sandy material, free from wood, bark, or other extraneous material, and shall meet the requirements of WSDOT Section 9-03.1(2)B Class 2 Fine Aggregate.

4-2.01(2)L BACKFILL MATERIAL

Backfill material shall be in accordance with Section 2-??? of these standards.

4-2.01(3) CONSTRUCTION

4-2.01(3)A GENERAL

Water mains shall be installed in accordance with WSDOT Section 7-09.3, except as modified in these Standards.

4-2.01(3)B CONSTRUCTION ON EXISTING EASEMENTS

All work on the public utility easements shall be performed in accordance with easement

provisions. Easements shall be restored equal to or better than the original conditions. The Contractor shall not work on easement areas until specifically authorized by the City Engineer. The City and the Contractor shall coordinate with the property owner(s).

4-2.01(3)C ABANDONMENT OF EXISTING WATER MAIN

Abandonment of Water Main

Water mains no longer in service shall be removed and disposed of by the Contractor. The water main may be abandoned in place with the approval of the City Engineer.

When water mains are abandoned, the ends of the pipe and fittings shall be plugged with concrete which shall have a minimum length of 12 inches. The City may require the Contractor to fill the abandoned water mains with sand or cement grout depending on the size, material, and location of the water main.

Abandonment of Structures

Abandonment of structures shall be completed only after water facilities have been properly abandoned. All valves and valve boxes shall be removed on abandoned valves.

4-2.01(3)D COVER DEPTH

A cover depth of 3 feet (36 inches) above the top of water mains shall be maintained if possible. The cover depth shall not be less than 3 feet (36 inches) or more than 5 feet (60 inches) without the approval of the City Engineer.

If the water main is within the State or County right-of-way, the cover depths shall meet the requirements of the State or County.

4-2.01(3)E HORIZONTAL SEPARATION

Water mains shall be laid at least 10 feet horizontally from any existing or proposed sanitary sewer, septic tank and/or absorption field. The distance shall be measured edge to edge. In cases where it is not practical to maintain a 10 foot separation, the City may allow deviation on a case-by-case basis using DOE criteria. Such deviation may allow installation of the water main closer to a sanitary sewer, provided that the water main is laid in a separate trench or on undisturbed earth shelf located on one side of the sanitary sewer at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer. Water service connections and side sewers shall have minimum horizontal clearance of 10 feet unless otherwise approved by the City Engineer.

Minimum horizontal clearances from water mains:

Cable	5’
Gas	5’
Power	5’
Storm drain	5’
Telephone, Fiber optic	5’
Sanitary Sewer	10’

4-2.01(3)F VERTICAL SEPARATION

Wherever practical, water mains shall cross other utilities at right angles. If this is not possible, the crossing angle shall be maintained between 45 and 90 degrees. Water mains crossing sanitary sewers shall be laid to provide a minimum vertical clearance of 18 inches between the outside of the water main and the outside of the sewer. The City prefers that the water main be above the sewer main. Where a water main crosses a sanitary sewer, one full length of water pipe shall be used with the pipe centered over the sewer for maximum joint separation. When the above conditions cannot be met, the City has the right to approve a variance, but shall require that the sewer be constructed of ductile iron pipe and be pressure tested before being activated, and/or be encased as the City deems necessary. DOE criteria will also apply.

Minimum vertical clearances from water mains:

Cable	1’
Gas	1’
Power	1’
Storm drain	0.5’
Telephone, Fiber optic	1’
Sanitary Sewer	1.5’

If the minimum vertical distance between utility pipes is less than 6 inches and such installations are approved by the permitting agency, a rigid foam pad shall be placed between the pipes. The pad shall be; outside diameter (O.D) × O.D. × 2.5 inches thick minimum or as required to protect the pipes and O.D. is equal to the outside diameter of the larger pipe. The pad shall be a polyethylene foam plank (Dow Plastics Ethafoam 220), or approved equal. Additional measures may be necessary to ensure system integrity and may be required as evaluated by the permitting agency on a case by case basis.

4-2.01(3)G SETBACK DISTANCE FROM BUILDINGS

Water mains shall be located a minimum of 5 feet from covered parking, 10 feet minimum from building and retaining walls. Refer to Section 1-??? for easement requirements.

4-2.01(3)H ASBESTOS CONCRETE PIPE CROSSING

When a proposed water main crosses existing asbestos concrete (A.C.) pipe, the City shall require removal and replacement of the A.C. pipe with ductile iron pipe at the Developer's expense. The A.C. pipe to be removed shall be disposed of in accordance with the Puget Sound Air Pollution Control Agency (PSAPCA) requirements. A permit from PSAPCA to perform the A.C. pipe removal is required prior to construction drawing approval. DIP crossings shall be connected to the existing A.C. main with Romac extended range transition couplings.

When working with asbestos cement pipe, the Contractor is required to minimize workers' exposure to asbestos material at or below the exposure limit as prescribed in WAC 296-62-07705 State and Federal Guidelines and Certification and PSAPCA requirements.

4-2.01(3)I STAKING

Staking shall be performed by or under the direct supervision of the Developer's Land Surveyor licensed in the State of Washington. Provide the City with two (2) business days notice to inspect construction staking before construction begins.

Staking shall be placed in 50 foot intervals and at all fittings on base line or edge of easement with stationing, hub elevations, and cuts to top of pipe.

4-2.01(3)J STEEL CASING

Ductile iron pipe shall be encased in a steel casing when crossing under a rockery or wall so that removal or replacement of the water main will not disturb the structures. Casings are required when crossing (1) under rockeries over 5 feet high; (2) under retaining wall footings over 5 feet wide; and (3) under reinforced earth retaining walls (both wall and reinforcing material). Casings shall extend a minimum of 5 feet past each edge of the structure, or a distance equal to the depth of pipe, whichever is greater. Minimum vertical clearance between the bottom of the wall or footing and top of the pipe or casing shall be 2 feet. The pipe trench at the casing shall be backfilled with gravel backfill material when the vertical clearance is less than 3 feet.

Ductile iron pipe shall be encased in a steel casing when crossing under a railroad or State/County highway. Casings shall extend at least 6 feet past the edges of the right-of-way.

The casing pipe and carrier pipe shall be installed in accordance with the applicable Federal, State and local regulations. In the case of railroad crossings, the project shall also comply with regulations established by the railroad company.

The carrier pipe shall be supported by casing spacers. Casing spacers shall be placed under the carrier pipe to ensure approximate centering within the casing pipe and to prevent damage

during installation. See City of Arlington Standard Detail W-230.

Steel casings may also be required when water mains cross creeks or wetlands.

4-2.01(3)K TRENCH EXCAVATION AND BACKFILL

Trench excavation and backfill operations within State right-of-way: All excavation and backfill within the State right-of-way shall adhere to *WSDOT*.

Trench excavation and backfill operations within County right-of-way: Excavation within Snohomish County right-of-way shall conform first to Snohomish County Road Standards, and secondly to *WSDOT*.

Trench excavation and backfill operations within City right-of-way: Excavation within the City right-of-way shall conform to WSDOT Section 7-09.3. Trench backfill shall be in accordance with Section 2-??? of these Standards.

The length of trench excavation in advance of pipe laying shall be kept to a minimum and shall not exceed more than 150 feet without written approval of the City Engineer.

4-2.01(3)L CONCRETE THRUST BLOCKING

Blocking shall, unless otherwise shown or directed, be placed so that pipe and fittings will be accessible for repair. Eight-mil polyethylene sheets shall be installed around all fittings and all bolts, nuts, and glands for future dismantling.

In the event of a shut down where time does not permit the proper setting of the concrete blocking, ecology blocks shall be installed with concrete poured around the connection point of the fitting and the blocks with the approval of the City Inspector.

4-2.01(3)M CONNECTION TO EXISTING MAINS

Connections to existing water mains 8 inches and larger shall be via a hot tap shown in Standard Detail W-200 unless cut-in is required by the City in order to install additional valves. Connections to existing water mains smaller than 8 inch diameter shall be made by cutting in a tee, unless otherwise approved by the City.

4-2.01(3)N HANDLING OF PIPE

Pipe shall be delivered to the site with end caps. Any pipe delivered without end caps shall be rejected by the City.

4-2.01(3)O JOINTS AND FITTINGS

Bolts on mechanical pipe and fittings shall be tightened uniformly with a "Torque" wrench

which measures the torque for mechanical joints as follows:

Bolt Size (in)	Range of Torque (ft*lbs)
5/8	40-60
3/4	60-90
1	70-100
1-1/4	90-120

Nuts spaced 180 degrees apart shall be tightened alternately in order to produce equal pressure on all parts of the gland.

Installation of push-on joint pipe and file lock gaskets shall be in accordance with the manufacturer's instructions.

All parts of the pipe ends, couplings, fittings and appurtenances shall be cleaned to remove oil, grit, or other foreign matters from the joints. Care shall be taken to keep the joints from contacting the soil.

4-2.01(3)P PRESSURE REDUCING STATION

Installation shall be as shown in City Standard Detail W-080, in approved plans, and in accordance with the manufacturer's recommendations. The pressure reducing valves, strainers, pressure relief, pipe and fittings shall be constructed in accordance with the applicable AWWA and Uniform Plumbing Code requirements. Pressure reducing valves 6 inches or larger shall be supported by pipe supports. Supports shall be bolted to the vault floor.

Pressure relief discharge pipe shall be placed in a location that will not be subject to damage or erosion during discharge of water. The Contractor shall schedule and perform a start-up with the presence of the PRV manufacturer's representative(s).

4-2.01(3)Q LAYING PIPE ON CURVES

Ductile Iron Pipe

When it is necessary to deflect pipe from a straight line in either the horizontal or the vertical plane, the amount of joint deflection shall not exceed one half (½) of the maximum deflection recommended by the pipe manufacturer. The Contractor shall submit to the City the pipe manufacturer's joint deflection recommendations prior to pipe installation as a part of the Material Submittals.

Where field conditions require deflection or curves not anticipated on the plans, the City will determine the methods to be used.

4-2.01(3)R INSPECTION AND TESTING

The City Inspector shall have access to the project site for the purpose of inspections and testing at all times. The Contractor shall provide proper facilities for such access, inspection, and testing. It shall be the responsibility of the owner/contractor to notify the City at least (2) business days prior to inspection date.

If any work is covered without approval or consent of the City Inspector, it must be uncovered for inspection if required by the City Inspector.

Pressure testing against installed valves shall be only at the approval of the City Inspector.

Before a pressure test is to be observed by the City Inspector, the Contractor shall make whatever preliminary tests to ensure that the material and/or equipment are in accordance with the plans and these Standards.

Written and/or verbal notices of deficiency shall be given to the Contractor. The Contractor shall correct such deficiencies before final inspection by the City Inspector.

4-2.01(3)S SCHEDULE OF TESTS

The Contractor shall notify the City Inspector at least 2 business days before a section of water main is ready for inspection and test. The Inspector will inspect and observe the hydrostatic test. The Contractor shall contact the City at least 2 business days prior to purity test and flushing, the Contractor shall be present at the project site when the City Inspector takes water samples. The Contractor shall provide sufficient manpower and resources to accomplish the work in a timely manner. Flushing shall be done by or under direct supervision of the City Inspector.

4-2.01(3)T HYDROSTATIC PRESSURE TESTS

Sections to be tested shall normally be limited to a maximum of 1,000 feet.

The Contractor shall rent from the City an approved DCVA to fill the new water mains for testing and flushing. The new water mains shall be filled and remain under 200 psi to 210 psi pressure for 24 to 48 hours to allow air to escape and the pipe lining of the pipe to absorb water.

Prior to calling the City Inspector for pressure test, the Contractor shall have all equipment available for set up but not connected until the City Inspector is present for operation. All services shall be flushed.

4-2.01(3)U DISINFECTION AND FLUSHING OF WATER MAINS

Before being placed into service, new water mains and repaired portions of existing mains shall

be chlorinated and a satisfactory bacteriological report obtained. Disinfection of water mains shall be accomplished by the Contractor in accordance with the requirements of the *Washington State Department of Health*, AWWA Standard C651, WSDOT Section 7-09.3(24) and in a manner satisfactory to the City. Sections shall be disinfected between adjacent valves unless, in the opinion of the City Engineer, a longer section may be satisfactorily handled. All filling and flushing shall be done through a meter with a DCVA rented from the City. Valves shall be operated by City staff only.

4-2.01(3)V FINAL FLUSHING AND TESTING

Following chlorination, chlorinated water shall be flushed from the new water main until the replacement water throughout its length shows absence of chlorine. In the event chlorine is normally used in the source of supply, the tests shall show a residual not in excess of that normally carried in the water supply system (never to exceed 2 mg/l).

After final flushing and before the new water main is connected to the distribution system. The Contractor shall schedule the sample collection with the City a minimum of two (2) business days in advance of test. The number of samples from the source and the number of representative sample points required will be determined by the City Inspector. Appropriate sample taps shall be furnished by the Contractor. No hose or fire hydrant shall be used in the collection of samples.

At least one set of samples shall be collected from every 1,200 feet of the new water main, plus one set from the end of the line and at least one set from each branch. All samples shall be tested for total coliform bacteria and for heterotrophic bacteria by the heterotrophic plate count (HPC) analysis. The maximum allowable coliform content of the flushed sample shall be zero. The maximum allowable HPC population count in all source samples shall be 80/ml. Any source sample that exceeds a count of 80/ml shall be ruled as an indeterminate test and a new set of source and construction samples for analysis shall be required. The maximum allowable HPC population count from any construction sample shall be no greater than twenty (20) counts above the highest source HPC population count.

Before placing the lines into service, a satisfactory report shall be received by the City from the certified laboratory evidencing successful tests on samples collected from representative points in the system extension.

Should the initial test result in an unsatisfactory bacteriological test, additional chlorination using the above procedure shall be repeated until satisfactory results are obtained. The Contractor shall be responsible for disposal of treated water flushed from the mains.

Chlorinated water shall never be flushed into the storm drain or a body of water. This includes lakes, rivers, streams, and stormwater drainage systems, any waters where fish or other natural aquatic life can be expected.

4-2.02 VALVES FOR WATER MAINS

4-2.02(1) GENERAL

Generally valve sizes shall be the same as the water main. All valves smaller than 12 inch shall be resilient seated gate valves and all valves 12 inch and larger shall be butterfly type if approved by the City. If a valve is installed in gravel or unpaved area, a concrete pad shall be set around each valve box at finished grade. See City Standard Detail W-190.

4-2.02(2) MATERIALS

4-2.02(2)A GATE VALVES

All gate valves 12 inches and smaller shall be resilient seated gated valves conforming to the latest revision of AWWA C509, C515, or C550. All gate valves shall be epoxy coated and turn counter clockwise to open. All gate valves shall have ANSI flanges or mechanical joints ends.

Gate valves within below grade valve box shall be non-rising stem suitable for installation with the type and class of pipe being installed. Operating stems shall be equipped with standard 2 inch operation nut, and O-ring stem seals.

Gate valves shall be epoxy coated. The coating shall be fusion bonded (thermosetting) epoxy protective coating and shall function as a physical, chemical and electrical barrier between the base metal to which it is applied and the surroundings. The coating shall comply with AWWA C50 and shall be certified to NSF 61. The coating shall be non-toxic and shall not impart taste or odor to the water.

The coating shall have a gloss finish and shall be suitable for field over-coating and touch up without sanding or special surface preparation, or application of heat in excess of room temperature.

4-2.02(2)B BUTTERFLY VALVES

Butterfly valves shall be in accordance with WSDOT Section 9-30.3(3), Class 250B.

4-2.02(2)C COMBINATION AIR VALVES

Combination air valves shall be designed to operate with potable water under pressure to permit discharging a surge of air from an empty line when filling and relieve the vacuum when draining the system. The air valves shall also release an accumulation of air when the system is under pressure. This shall be accomplished in a single valve body designed to withstand a pressure of 300 psi.

The body and cover shall be cast iron conforming to ASTM A48, Class 30. Floats shall be stainless steel conforming to ASTM A 240 and designed to withstand 1,000 psi. Seats shall be Buna N rubber. Internal parts shall be stainless steel or bronze. Combination air valves shall conform to AWWA C512. See City of Arlington Standard Detail W-260.

4-2.02(2)D VALVE MARKER POSTS

Valve marker posts shall be Carsonite blue plastic markers and labeled "WATER" or approved equal. See City Standard Detail W-250.

4-2.02(2)E VALVE BOXES

Valve boxes shall be installed on all buried valves. The box and lid shall be cast iron, 2 piece slip type. The cover shall have the word "WATER" cast in the upper surface. Valve boxes, lids and extensions shall be Olympic Foundry deep style lid. All castings shall be coated with asphaltic varnish.

A valve operating nut extension shall be furnished and installed on all valves where the finished grade is more than 36 inches above the valve operating nut. Extensions are to be a minimum of 12 inches long with only one extension per valve. The operating nut extension shall extend into the top section of the valve box. See Standard Detail W-190.

4-2.02(2)F VALVE VAULTS

The valve vault shall be dimensioned and sized for valve removal and replacement. The vaults shall be furnished in pre-cast concrete sections with sufficient strength to withstand H-20 traffic loading together with access frames and covers.

4-2.02(2)G TAPPING SLEEVES

Tapping sleeves shall be used in lieu of cut-in tees except at the direction of the City. Tapping valves shall be epoxy coated and resilient seat. Acceptable sleeves include:

Pipe Material	Type of Tapping Sleeve
Ductile Iron or Cast Iron Pipe	Epoxy Coated Fabricated Steel
Asbestos Cement	Fabricated Stainless Steel Full

4-2.02(3) CONSTRUCTION

4-2.02(3)A VALVE INSTALLATION

Prior to installation, valves shall be inspected for approved part numbers/manufacturers; cleanliness of valve ports especially seating surfaces, handling damage, and cracks. Defective valves shall be rejected.

When butterfly valves are installed, the operation nuts must be on the north or east sides of the water mains or as directed by the City Inspector.

The valve and valve box shall be set plumb and centered on the valve. Valves 12 inches or larger shall be supported by a concrete block (16 inches x 16 inches x 4 inch solid concrete) on a sufficiently tamped trench bottom so that the pipe will not be required to support the weight of the valve. In no case shall valves be used to bring misaligned pipe into alignment during installation. Pipe shall be supported in such a manner as to prevent stress on the valve.

Valves shall be installed in the closed position. Where the valve operating nut is more than 3 feet below finished grade, a valve stem extension conforming to the Standard Details must be installed. See City Standard Detail W-190. Tapping valves shall be water tested prior to tapping water main.

A valve box or vault shall be provided for every valve. Valve box top sections shall be adjusted flush with the finished pavement and, in those areas to be excavated for future roadway grades, enough adjustment shall be provided in the valve box to allow the top of the box to be adjusted to the required grade.

Backfill around valves shall be carefully tamped in 6 inch lifts for the full depth of the trench with the valve box in place. Provide a minimum of 2 feet x 2 feet x 4 inch concrete pad for a single valve box and a minimum of 4 feet x 4 feet x 4 inch concrete pad for multiple valve boxes installed in gravel or unpaved areas as shown in Standard Detail W-190.

4-2.02(3)B COMBINATION AIR AND VACUUM RELEASE VALVE

Location of the air/vac shown in the plans is approximate. The Contractor shall set the air valves at the high points of the water main. The water main profile may need adjustment so that the high point and air/vacuum valve is installed in a convenient location with the City Inspector’s approval. Installation shall be as shown in City Standard Detail W-260.

4-2.02(3)C INSTALLATION OF VALVE MARKER POST

Marker posts shall be set for all valves located in unpaved areas and as directed by the City except auxiliary hydrant valves. Installation shall be as shown in City Standard Detail W-250.

4-2.02(3)D ADJUST EXISTING STRUCTURE TO GRADE

Refer to Section 2-??? Of these Standards.

4-2.03 HYDRANTS

4-2.03(1) GENERAL

Any hydrant run exceeding fifty (50) feet in length shall be 8 inches in diameter unless it is approved by the City Engineer. The joints of hydrant runs shall be restrained, bell gaskets shall be "field lock" type or have "Romac Style 611/612" type clamps with shackle rods. No domestic or fire sprinkler service shall be tapped on any hydrant run.

4-2.03(2) MATERIALS

4-2.03(2)A FIRE HYDRANTS

Fire hydrants shall be 5 ¼ inch MVO and meet or exceed the requirements of AWWA C502 as well as the following:

1) Hydrant shall have a standard 4½ inch NST pumper port and two 2½ inch NST side ports, all opening by turning counter clockwise with 1½ inch operating nut;

2) Hydrant shall be painted with two coats of hi-gloss "Federal Safety Yellow" enamel paint, with the distance from the foot valve stenciled on the hydrant; and

3) 5" Storz adaptor.

Fire hydrants shall be the "Traffic Model" type with approved breakaway features. Fire hydrants shall be

- M&H 929 Reliant or
- Mueller Super Centurion 250
- EJ Watermaster 5CD250 with Weather Cap

4-2.03(3) CONSTRUCTION

4-2.03(3)A FIRE HYDRANT INSTALLATION

Fire hydrants shall be set as shown in the City Standard Details W-010 through W-030 and AWWA Standard C600. The portion of the hydrants above the ground shall be painted with 2 coats of high gloss "Federal Safety Yellow" paint. The entire hydrant run shall be restrain jointed.

All hydrants shall stand plumb and shall have their nozzles parallel with or at right angles to the curb or at the City Fire Chief's discretion, with pumper nozzle facing the curb. Hydrants shall be set to the established grade. Hydrants shall be installed so that the breakaway flange

is 2 inches above finished grade.

When a dry barrel hydrant is set, drainage shall be provided at the base of the hydrant by placing 1½ inches of washed drain rock from the bottom of the trench to at least 12 inches above the drain port opening in the hydrant and to a distance of 2 foot around the elbow, the entire drain rock area shall be covered with geotextile fabric or heavy mil plastic sheeting to prevent fines from intruding into drain rock. Fire hydrants shall not be located within 10 feet horizontally of a sanitary sewer main or side sewer.

When a hydrant is installed in an unpaved area, a minimum of 3 feet × 3 feet × 4 inch concrete pad shall be poured 2 inches below the breakaway flange around the hydrant barrel to provide adequate resistance to avoid transmitting shock moment to the lower barrel and inlet connection in the case of vehicle impact. The center of the hydrant shall be at the center of the concrete pad. Prior to pouring concrete, the ground shall be compacted according to the section of Trench Backfill and Compaction in these Standards. See Standard Detail W-010.

Additional information regarding placement of hydrants can be found in AWWA Manual M17.

When fire hydrants are located in parking lots, or other areas where permitted speed limits do not exceed five miles per hour, hydrant guard posts shall be installed where the hydrant is not protected by a cement concrete curb (or extruded curb per Standard Details) on all sides where vehicles may have access. Hydrant guards may be required as directed by the City Engineer. Fire hydrants located in undeveloped or rural areas must have City of Arlington standard hydrant locks installed by the City at the owner/contractor expense.

4-2.04 SERVICE CONNECTIONS

4-2.04(1) GENERAL

4-2.04(2) MATERIALS

4-2.04(2)A WATER SERVICE PIPE

Water service pipe shall be Driscopipe CTS Class 200 Hi-Mol Poly pipe. Driscopipe shall conform to ASTM D-27370SDR9 (PE3408). CTS 110 SS liners for polypipe shall be used.

4-2.04(2)B SADDLES AND CORPORATION STOPS

Service saddles shall be ROMAC 202S and shall have stainless steel double straps. See Standard Details W-040 and W-050

Corporation stops shall be the ball valve type and shall be Ford or Mueller. Corporation stops for use with the saddle shall be of bronze in accordance with AWWA Standard C800 with AWWA IP or CC inlet by compression outlet.

4-2.04(2)C METER

Water meters shall be furnished and installed by the City at the Owner's expense. If needed for installation of smaller meter in a larger meter box, Contractor shall provide meter adapter to be installed by City. All other meter appurtenances as shown in the Standard Details shall be furnished and installed by Owner's Contractor.

4-2.04(2)D METER BOXES

Meter boxes used for meters, sampling stations, and blow-offs shall be high density polyethylene meter boxes with solid ductile iron lids manufactured by Mid States Plastics, Inc., or approved equal. Air valves shall have double concrete meter boxes Fogtite 2T with solid steel lid. Refer to City Standard Detail W-040 and W-050 for sizes and part numbers.

4-2.04(2)E PRESSURE REDUCING STATION

The Developer's Engineer shall design a pressure reducing station for a specific project. Submit to the City for approval. A typical pressure reducing station is shown in City Standard Detail W-080.

4-2.04(2)F REDUCED PRESSURE BACKFLOW ASSEMBLY

All reduced pressure backflow assemblies (RPBA) shall be as listed on the current copy of the "Approved Backflow Prevention Assemblies" published by DOH. The assembly shall include a tightly closing resilient seated shut-off valve on each end of the body and each assembly shall be fitted with four properly located resilient seated test cocks. The RPBA shall be installed in an above ground enclosure. The enclosure shall be Hot Box, or approved equal. See Standard Details W-130 through W-150.

4-2.04(2)G DOUBLE CHECK VALVE ASSEMBLY

All double check valve assemblies (DCVA) shall be as listed on the most current copy of the "Approved Backflow Prevention Assemblies" published by DOH. The assembly shall include a tightly closing resilient seated shut-off valve on each end of the body and each assembly shall be fitted with four properly located resilient seated test cocks. See Standard Details W-090 through W-120.

4-2.04(2)H BEDDING MATERIAL

Aggregates for bedding material shall consist of sandy material, free from wood, bark, or other extraneous material, and shall meet the requirements of WSDOT Section 9-03.1(2)B Class 2 Fine Aggregate.

4-2.04(3) CONSTRUCTION

4-2.04(3)A GENERAL

New Service Installations

Generally, corporation stops are located at ten o'clock or two o'clock positions on the circumference of the pipe, and may be screwed directly into the tapped and threaded main without any additional appurtenances if the pipe diameter is 8 inches or larger, ductile iron pipe with a thickness of Class 52 or higher. Taps may be installed with double strap stainless steel saddles. When more than one tap in an existing cast iron pipe is necessary to deliver the required flow, the taps should be staggered around the circumference at least 12 inches apart (not in line). Service line must be pressure tested before placing in service. Corporation stops with IPT threads are not acceptable, unless approved by the City or are used on large taps.
Detectable marking tape shall be installed on all service connections.

Reconnecting Existing Services

Service connections shall be installed as shown in the approved plans and Standard Details. Install services in paved areas by boring and under sidewalks and curbs by boring and tunneling. Damages shall be repaired by the Contractor. Provide 30 inch minimum cover on service lines. Install service lines at 90 degrees horizontally to the main to intercept the existing meters. Flush the service line prior to connection to the meter. A 10-ft tailpiece shall be installed on all meters.

Install angle ball meter valves, setters (if required) and boxes as shown in City Standard Details W-040 and W-050 or as directed by the City.

Existing service connections shall not be transferred to the new mainline until the new mainline has been successfully flushed, disinfected, tested and approved by the City Inspector. When transferring services from the existing mainline to the new mainline, the Contractor shall take sanitary precautions to protect the potable water supply in both the existing and new mains.

After new service connection is made the Contractor shall test the water pressure on the private side of the meter before and after connection to insure the PRV has not been by-passed or failed during construction.

4-2.04(3)B CONNECTION TO EXISTING WATER MAIN

Points of connection to existing water mains shall be exposed prior to trenching of the new mains, and not less than 48 hours prior to the anticipated connection time. Unless specifically provided for elsewhere in these Standards, the Contractor is responsible for giving at least five

(5) business days notice to the City. The City shall be responsible for notifying the City Fire Chief and customers affected by the shut-off. Water main shut-off shall not be scheduled to take place on Fridays, or on the day before a holiday, unless otherwise approved by the City Engineer.

The Contractor shall ensure that existing fittings are in accordance with the approved plans and that the connection will be made in accordance with the plans. The Contractor shall immediately notify the City Engineer and the Design Engineer if the connection cannot be made in accordance with the plans so that the connection details may be revised and approved by the City Engineer.

Connection to the existing water system shall be done only after the new mains are flushed and have passed pressure and purity tests. All connections to the existing water system must be approved by the City and in the presence of the City Inspector. Only authorized City representatives shall operate the valves in the existing water system.

Connections to existing water system may be made under pressure with a tapping machine by determining the size and type of pipe and installing a tapping tee with a tapping gate valve. Tapping tees shall be installed as shown in City Standard Detail W-200. Work shall not start until all materials, equipment, and labor are ready. The tapping tee and valve shall be installed in a horizontal position so that the valve stem is vertical. Where cut-ins are required in existing pipes, the work shall be conducted as to minimize the interruption of service. Necessary pipe, fittings and gate valves shall be assembled at the site ready for installation prior to the shut-off of water in the existing main. Once the water main has been shut off, the work shall be prosecuted vigorously and shall not be halted until the water main is back to service.

The interiors of all pipe and fittings, particularly couplings and sleeves, to be used in final cut-in connection shall be swabbed or sprayed with a 1% hypochlorite solution before they are installed.

Flushing shall start as soon as repairs or connections are completed and shall be continued until discolored water is eliminated. Flushing shall be done by the City Inspector.

4-2.04(3)C ABANDONING WATER SERVICES

The Contractor shall remove the service lines, corporation stops and plug saddles with MIPT brass plug.

4-2.04(3)D BORING UNDER ROOTS

Boring under the root systems of trees that cannot be removed shall be accomplished by excavating a trench or pit on each side of the tree, being careful to avoid root injury, and then

hand digging or pushing the pipe through the soil under the tree. The pit walls shall be a minimum of 7 feet from the center of the tree and shall have sufficient depth to lay the pipe at the grade shown on the plan and profile. Trees shall be removed unless otherwise directed by the City Engineer.

4-2.04(3)E SITE AND PROPERTY RESTORATION

Any landscaping and lawn damaged by the Contractor shall be restored to conditions prior to construction. The Contractor shall try to minimize the area of disturbance and restore everything as close to the original condition as possible.

4-2.04(3)F VAULT INSTALLATION

Vaults for water facilities (pressure reducing stations, valves, water service, flow meters, backflow prevention devices, etc.) shall be installed at the locations shown on the plan and as staked. It shall be constructed as shown on the plans, Standard Details and as directed by the City Engineer.

The excavation shall have a minimum of one (1) foot clearance between the vault outer surface and the earth bank. The Contractor shall use foundation gravel or bedding concrete on top of undisturbed soil to support the vault. The vault shall be plumb and watertight. The access cover shall be seated properly to prevent rocking and shall be adjusted to match the finished grade.

The vault floor shall drain to daylight, or to a location specified on the plans. Gravity drain pipe shall be a minimum of 3 inches in diameter.

Where knockout locations for the pipe do not coincide with the locations of pipe penetrations into the vault, the Contractor shall core drill openings for pipe.

A sump pump shall be required if directed by the City Engineer.

4-3 STANDARD DETAILS

The following standard details shall be included as part of these standards. In the event that reference to the standard details is not made in the above requirements, the standard details shall still apply.

Detail Number	Detail Name
W - 010	Hydrant
W - 015	Fire Hydrant Marker
W - 020	Hydrant Pad

W - 030	Hydrant Guard Post
W - 040	Meter
W -050	Commercial Meter
W - 060	Large Meter
W - 070	Meter Location
W - 080	PRV
W - 090	DCVA Small
W - 100	DCVA Large
W -110	DCDA Outside
W - 120	DCDA Inside
W - 130	RPBA Small
W - 140	RPDA 2.5
W - 150	RPDA 3
W - 160	Thrust Block
W - 165	Thrust Block
W - 170	Thrust Vertical
w - 175	Thrust Vertical
W - 180	Blow Off
W - 190	Valve Box
W - 200	Tapping Sleeve
W - 210	Air Gap
W - 220	Fire Line
W - 225	Trench Detail
W - 230	Pipe Casing
W - 240	Sampling Station
W - 250	Valve Marker
W -260	Air Vac
W - 270	Trench Detail

E WATER USE EFFICIENCY (WUE) PROGRAM

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E Water Use Efficiency Program

E.1 INTRODUCTION

The City of Arlington (City) recognizes that water is a valuable and essential natural resource that needs to be used wisely. This Water Use Efficiency (WUE) Program presents the City's approach to increasing water use efficiency within the City's water service area (WSA).

Two primary production sources supply water to the City's service area: the Haller Wellfield, which draws groundwater from two wells that are largely fed by the Stillaguamish River; and the Arlington Airport Wellfield, which draws groundwater from a single well in a deep aquifer. This water is blended with surface water purchased from a third source—the City of Everett's (Everett) Spada Reservoir/Sultan River supply via Snohomish County Public Utility District No. 1 (PUD). As a wholesale water purchaser of the PUD, and indirectly of Everett, the City participates and supports the regional goals and programs developed by both water systems.

The City pursues its own supply goals to assure it eliminates inefficient water use and minimizes water losses. It has also established consumption goals to help its customers use water as wisely and efficiently as possible. The City also participates in and supports the regional goals and programs developed by Everett and the PUD. The City's WUE Program that follows includes an introduction to its WUE Program elements, a statement of its goals and objectives, the evaluation and selection of alternative efficiency measures, the schedule and budget, and the method of program monitoring.

E.2 REGULATORY REQUIREMENTS

E.2.1 The Water Use Efficiency Rule

In September 2003, the Washington State Legislature passed the Municipal Water Supply – Efficiency Requirements Act, also known as the Municipal Water Law. The Municipal Water Law required the State to implement the WUE Rule. The intent of this rule is to help reduce the demand that growing communities, agriculture and industry have placed on our State's water resources, and to better manage these resources for fish and other wildlife. Municipal water suppliers are obligated under the WUE Rule to enhance the efficient use of water by the system and/or its consumers. The requirements of the WUE Rule are set forth in Chapter 246-290 of the Washington Administrative Code (WAC), Part 8.

E.2.2 Water Use Efficiency Program Requirements

The Water Use Efficiency Guidebook, 3rd edition released by the Washington State Department of Health (DOH) in January 2011, identifies the water use reporting, forecasting and efficiency program requirements for public water systems. A WUE program meeting these requirements is

a necessary element of a water system plan as required by the DOH and is necessary to obtain water right permits from the Washington State Department of Ecology (Ecology). The Water Use Efficiency Guidebook defines the necessary components of a WUE program as four fundamental elements.

1. Planning requirements, which include collecting data, forecasting demand, evaluating WUE measures, calculating distribution system leakage and implementing a WUE program to meet goals.
2. A distribution system leakage (DSL) standard of 10 percent or less based on a 3-year rolling average for systems with more than 500 connections.
3. Goal setting to provide a benchmark for achievement and to help define the success of the WUE program.
4. Annual performance reporting on progress towards meeting WUE goals.

E.3 REGIONAL WATER USE EFFICIENCY PROGRAM

As a wholesale water customer of the PUD, and indirectly of Everett, the City has historically relied on the regional water conservation program promoted by the Everett Water Utilities Committee (EWUC). The City continues to participate in the EWUC Conservation Subcommittee, and actively supports the regional goals and efforts established by the EWUC.

The Partnership for Water (formerly Partnership for Water Conservation (PWC)), another consortium in the greater Puget Sound area, whose members include cities, water districts, regional water associations, businesses and environmental groups. Its programs include organizing regional water conservation information, education, contract services and industry advocacy with regional decision-makers. The City is a member of the Partnership for Water and has benefitted from its training programs and the networking opportunities.

A primary regional effort of the City since the previous WSP is its role as a primary contributor to PWC's 2012 report *Cooperative Conservation*. The objective of the report is to demonstrate progress towards greater water efficiency among water suppliers across Washington State since adoption of the WUE rule in 2007. The report is included as **Attachment E-1** to this WUE Program.

The City has identified the EWUC, the Partnership for Water, the American Water Works Association, and the Alliance for Water Efficiency as resources for the continued advancement of its own WUE Program.

E.4 CITY OF ARLINGTON WATER USE EFFICIENCY PROGRAM

The City began increased water conservation efforts in the late 1990s in anticipation of a new water treatment plant and with a new wholesale water agreement to purchase water from the PUD. WUE efforts increased in 2004 with the establishing of conservation goals in the 2004

Comprehensive Water System Plan (WSP) and the hiring of staff with duties dedicated to WUE. Current WUE Program elements are summarized in this Program.

E.4.1 Water Use Efficiency Goals and the Public Process

Prior to adoption of the WUE Rule, the City developed and pursued goals within its Water Conservation Program. The most recent goals prior to the WUE Rule were included in the August 2004 WSP, and followed DOH guidance to develop a program with a mix of internal (supply side), external (demand side), and other customer information conservation measures. The City developed one goal for each of these three areas, as summarized in **Attachment E-2**.

Per WAC 246-290-830, WUE goals *must* be set through a public process and *shall* be evaluated and reestablished a minimum of every six years. Consistent with the WUE Rule, which became effective in January 2007, the City adopted it initial WUE Goals in January 2008. The process included public notice of a public hearing on the issues, publication of WUE trends and draft WUE goals on the City's web site, presentation and discussion at a City Council meeting, and a public hearing to present and discuss the goals. No public comments were received for consideration by the City Council and the goals were formally adopted as presented during the forum. The adopted goals were identical to those in the 2004 WSP.

The City's WUE program was presented in a WSP, consistent with the requirements of the WUE Rule, for the first time in its October 2011 WSP update. These are the goals the City has been pursuing just prior to this WSP. The goals were developed in the same public process as in January 2008, and re-established the prior goals with modifications to tighten criteria and extend schedules. Current goals for the 2009 to 2014 water system planning cycle are presented below and summarized in both **Table E-1** and **Attachment E-2**.

- Achieve system-wide average water use reductions of two percent by 2014, and five percent by 2018, from 2008 levels;
- While meeting the DSL standard of 10 percent or less based on a three-year rolling average, maintain 5 to 7 percent or lower DSL in the water system on an annual basis; and
- Increase awareness among all water users of the value and importance of conserving water, and of the methods available to achieve reductions in water use.

Proposed goals for adoption under this 2015 WSP are also presented below and summarized in both in **Table E-1** and **Attachment E-2**. These goals were developed subsequent to the evaluation which follows this section.

- Achieve system-wide average water use reductions of two percent by 2018, from 2013 levels:
    - From 210 gpd/connection to 206 gpd/connection, and
    - From 186 gpd/ERU to 183 gpd/ERU (begin favoring this parameter),

- Maintain system-wide average water use reductions at the levels of the 2018 goals through 2024 (ten years);
- Maintain the system's annual peak day factors (ratio of maximum day demand to average day demand) less than 1.75 (target range 1.50 to 1.75);
- Implement a water loss control action plan to return the three-year rolling average DSL to less than 10 percent of system inputs. Then target 5 to 7 percent or lower DSL in the water system on an annual basis; and
- Increase awareness among all water users of the value and importance of conserving water, and of the methods available to achieve reductions in water use. Emphasize outreach to apartments and other multi-family residences during this planning cycle.

Table E-1

Water Use Efficiency Goals for the 2009-2014 and 2015-2020 Planning Cycles

Focus	Action	Parameter	Units	From: Base Condition		To: Target Condition	
				Year	Value	Year	Value
2009 to 2014 Planning Cycle							
Demand	Reduce	System-wide average water use	gal/day per connection	2008	242	2014	237 (2%)
						2018	230 (5%)
Supply	Reduce	DSL	percent as 3-year running average	2008	6%	Annually	<10%
Both	Increase	Awareness, Education	Qualitative	Annually	Per program	Annually	Per program
2015 to 2020 Planning Cycle							
Demand	Reduce	System-wide average water use	gal/day per connection	2013	210	2018	206 (2%)
						2025	206 (2%)
Demand	Reduce	System-wide average water use	gal/day per ERU	2013	186	2018	183 (2%)
	Maintain					2025	183 (2%)
Demand	Maintain or Reduce	Peak Day Factor (MDD/ADD)	gallons per gallion	2014	Range 1.5 to 1.75	Annually	Range 1.5 to 1.75
Supply	Reduce	DSL	percent as 3-year running average	2014	13.2%	Annually	<10%
Both	Increase	Awareness, Education	Qualitative	Annually	Per program	Annually	Per program

E.4.2 Planning Requirements and WUE Program Activities

The City's water use data, demand forecasts and other planning requirements are contained in **Chapter 4** of this 2015 WSP. The City is committed to continue collecting water use data beyond that presented in **Chapter 4** for evaluation of its WUE Program and water use patterns, and for forecasting demands for future facilities. Consistent with WAC 246-290-810, the WUE Program effectiveness will continue to be evaluated every 6 years, even if the next WSP update is extended to 10 years (the 2015 WSP update includes 6-, 10-, and 20-year planning horizons).

Recent WUE Program activities have involved participation in regional efforts and City-led activities that have included the following.

- Distribution of outdoor and indoor water conservation kits (supplied through the EWUC).
- Public outreach and education at staffed booths each year at the Arlington Eagle Festival in February, Arlington Street Fair and Fly-in in July and the Stillaguamish Tribe's Festival of the River in August (City).
- WUE articles in the quarterly City newsletter, "Arlington Update" (City).
- Monitoring, analysis and presentation of production and consumption data for the WUE Program (City).
- Reporting of WUE efforts in the annual Consumer Confidence Report (CCR) (City). Note: The City refers to their CCR as the Water Quality Report; it contains all of the same elements as the former, it is just named differently. The Water Quality Report will be referred to as the CCR in this document.
- One of 8 pages in the CCR features a conservation focus that is delivered to each customer (City).
- Education programs and presentations in classrooms throughout the Arlington School District (EWUC).
- Rebate programs for water-efficient washing machines and toilets (EWUC) (discontinued 2012).
- Distribution of lawn water calendars (City).
- WUE reminders and usage history on utility bill inserts (City).
- WUE reminders on community access TV (City).
- Participation in regional evaluation of water use efficiency efforts (PWC).

E.4.3 Distribution System Leakage

In 2004, the City began to implement improved accounting and reporting procedures for authorized water consumption, including potable water sales and other non-revenue uses such as fire department and public works' uses. Prior to this effort, DSL was perennially high, ranging from 15 percent to 23 percent since the 1990s. The success of these practices was immediately

evident. Losses in individual years remained below 10 percent in seven of eight consecutive years percent (**Table E-2**), and were often in the four to seven percent range, and the 3-year rolling average was maintained below 10 percent for 10 consecutive years (**Figure E-1**).

The City's only supply side WUE goal established since 2004 has been to reduce and maintain DSL below 10%. Refinements to established accounting and reporting are made regularly as the understanding of water uses and departmental procedures within the City improves. However, beginning in 2012, annual DSL values increased to 11 percent to 15 percent through 2014. Effective 2014, the 3-year rolling average jumped from 8.6 to 13.2 percent (**Table E-2**). Consistent with WAC 246-290-820, since the 3-year rolling average exceeds 10 percent, a water loss control action plan has been included in this WUE Program as **Attachment E-3**. Reasons for and the City's responses to the increase in DSL are addressed in greater detail in this plan.

E.4.4 Water Use Efficiency Program Evaluation and Performance Reporting

The City will continue to evaluate overall demand, per capita water use and the amount of DSL on an annual basis. These values are reported annually to DOH, and to customers in the City's annual Consumer Confidence Report (CCR). This 2015 WUE Plan also evaluates the performance of the WUE Program and the effectiveness of implemented measures by determining the long-term trend towards reducing water usage and meeting WUE goals. Where program monitoring shows that progress towards meeting the WUE goals is not being accomplished, more rigorous program implementation or additional Program items will be considered, along with a cost-effective evaluation of measures.

Continued

Table E-2

Water Consumption and Distribution System Leakage

Water Use Classification	Calendar Year									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Authorized Consumption--Revenue (1,000 gallons)										
Metered Customer Use	447,647	477,747	469,602	457,677	428,421	417,996	421,812	396,705	415,446	426,611
Authorized Consumption--Non-revenue (1,000 gallons)										
WTP Backwashing--Filter Maintenance	35,571	33,455	27,134	19,504	28,125	28,218	35,873	41,813	45,063	56,809
Distribution System Flushing	721	317	388	327	1,037	423	349	265	369	433
Sanitary Sewer Collection System	16	20	19	53	42	22	19	40	40	48
Stormwater System	0	0	0	18	0	16	8	17	17	25
Street Sweeping	0	0	10	49	44	31	30	16	16	14
Unmetered Facilities[2,3]	0	0	0	0	0	0	0	0	357	524
Fire Training & Hoses Tests[4]	0	0	0	0	139	76	76	76	103	168
Heat Relief (Fire Dept)	0	0	0	0	90	0	0	0	0	0
Total Authorized Non-revenue Consumption	36,309	33,792	27,551	19,951	29,477	28,786	36,355	42,227	45,964	58,045
Total Raw Water (1,000 gallons)										
Total Raw Water Production/Supply[1]	508,989	547,087	522,651	509,073	528,057	481,969	465,893	505,769	518,131	574,121
Distribution System Leakage										
Total DSL (1,000 gallons)	25,034	35,548	25,498	31,445	70,160	35,187	7,726	66,837	56,721	89,465
Total DSL (%)	4.9%	6.5%	4.9%	6.2%	13.3%	7.3%	1.7%	13.2%	10.9%	15.6%
Rolling 3-Year Average DSL (%)	4.5%	5%	5%	6%	8%	9%	7%	7.4%	8.6%	13.2%

[1] Total raw water is equal to finished water production plus water used to backwash and maintain WTP filters.

[2] Includes flushing of WTP clearwell after water quality concern for iron and manganese.

[3] Includes 500,000 gallons for partial draining of reservoirs during cleaning.

[4] 2013 and 2014 data include data from Arlington Heights Fire District 21 in addition to Arlington Fire Department.

WUE Effects on Average Day Demand

The City's primary demand-side WUE goal since 2004 has been a consistent reduction in unit consumption measured in gallons per day per connection without regard for connection type (that is, inclusive of all water customers) (**Attachment E-2; Table E-1**). The initial base year for consumption referenced in the 2004 goals is 2002, and goals have been in the range of 2 percent to 5 percent reductions by target years coinciding with WSP planning cycles.

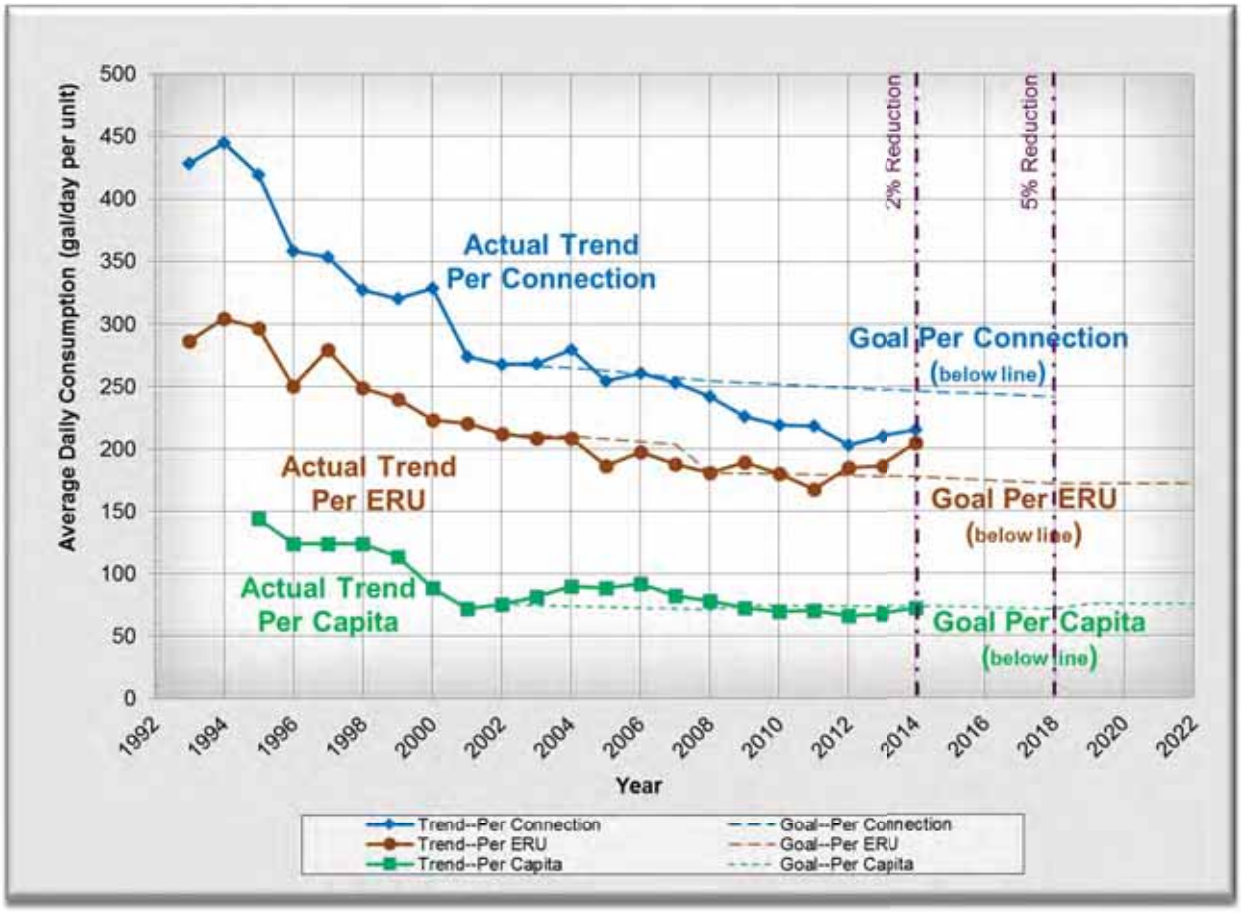
Chart E-1

Distribution System Leakage (DSL) Evaluated Against WUE Goals, 1993 to 2014

WAC 246-290-830 (6)(b) allows a purveyor's discretion and flexibility in the actual units of measure used to track reductions in demand, so gallons per day are evaluated here on a per connection, per ERU, and per capita basis. Results indicate rapid, steady declines in consumption on a per connection basis, meeting the 2018 goal in 2009 (**Chart E-2**). Since that time, consumption per connection has continued to decline on a more gradual basis, but this is certainly due in part to the loss of commercial connections during the economic recession beginning in 2008. On a per capita basis, consumption was slow to decline, but has been maintained at or below the goal since 2009 (**Chart E-2**). Consumption per ERU is probably the most stable of the three measures. Consumption per ERU was immediately responsive to WUE measures implemented in 2004, and continued to track with goals through 2012. Because WUE also reflects non-revenue water and DSL, consumption per ERU did not meet goals for the last three years, 2012 through 2014 (**Chart E-2**).

Chart E-2

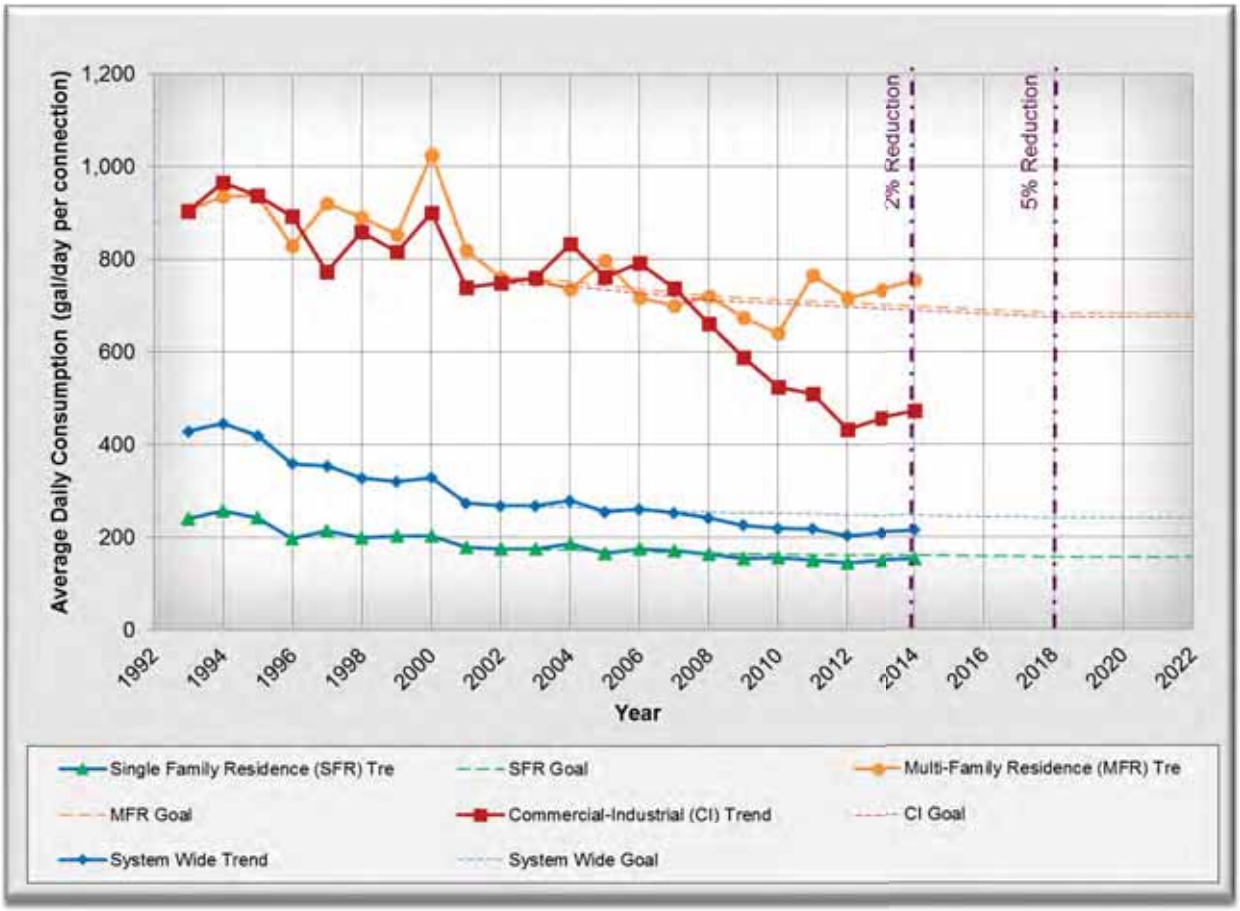
Three Average Daily Consumption-per-Unit Parameters, 1993 to 2014



Average daily consumption per connection has been the City's primary parameter for tracking customer demand. This data was graphed by customer class to assess trends by type of customer (**Chart E-3**). The large number of single family residential (SFR) customers drive the form of the system wide consumption curve, and themselves meet the weighted goal established for that customer class. Commercial and industrial customers have easily met the goal established for their customer class, but this is largely due to declines in both the number of customers and their consumption through the recession (**Chart E-3**). This suggests that at least some recovery in customer water usage may be achieved without causing this goal (or gallons per day per ERU) to be exceeded (**Chart E-3**). **Chart E-3** also reveals that multi-family residential customers are the class that is not meeting its consumption goal as of 2014. Conservation and efficiency measures targeted for multi-family residences may have the greatest influence on achieving system-wide goals.

Chart E-3

Average Daily Consumption-per Connection, by Customer Class, 1993 to 2014



Water consumption per connection has decreased by 20% from 2002 to 2014, and by 4 percent when evaluating per capita and per ERU parameters for the same period. Since the previous WSP (data through 2008), water consumption on a per connection and per capita basis has declined 11 and 8 percent, respectively. Because of the significant increases in DSL, consumption per ERU has increased by 13 percent through 2014. On a per capita basis, WUE measures and other influences on consumption have reduced consumption by more than 197 million gallons since the City began targeting demand reductions in 2002.

As it has since 2008, the City will continue to provide annual WUE performance reports to its consumers in the CCR, and will detail the results of water use monitoring and progress towards achieving the system's WUE goals. A copy of the City's 2014 CCR is included in **Appendix M** of the City's WSP. The City will comply with DOH Annual WUE Performance report requirements, due to DOH by July 1 of each year.

WUE Effects on Annual Maximum Day Demand

Since 2005, WSA population has grown from 13,636 to 16,245 in 2014, an increase of at least 19 percent (**Figure 4**). The apparent decline seen in Figure 4 is an effect of the re-assessment of

population residing in the City of Arlington's Smokey Point neighborhood, which is not served with City water. During the development of this WSP, City planners estimated 2,239 persons in Smokey Point, an increase from the previous built-out estimate of 1,633. This increase in Arlington residents outside of its WSA resulted in a decrease in the estimate of persons inside its WSA. Without this revision, the WSA population would have increased nearly 25 percent.

Despite the increasing population served, the average daily demand (ADD) required to serve that population stayed nearly the same (**Chart E-4**). At the same time, the maximum day demand (MDD) decreased 19 percent. The ratio of MDD to ADD is often used to define and evaluate fire flow and storage requirements. The City's peak day ratios have declined from approximately 2 to 1.5 over the last 10 years (**Chart E-5**). This means more water is left in mains and reservoirs for other uses, including providing fire flow and maintaining pressure.

All of the factors influencing this trend are not fully understood. During the economic recession, several large water users closed their businesses (e.g., sawmills, kilns). New meters were installed at two large users (e.g., Cascade Valley Hospital and the I-5 rest areas). Numerous other businesses also shut down, but none of these is thought to have a seasonal water demand. The high school installed artificial turf, but this did not occur until mid-2014 and would not have influenced this trend. Without a single clear driver, but appreciating the benefits, a new goal is established to maintain the maximum day demand peaking factor in the range of 1.50 to 1.75.

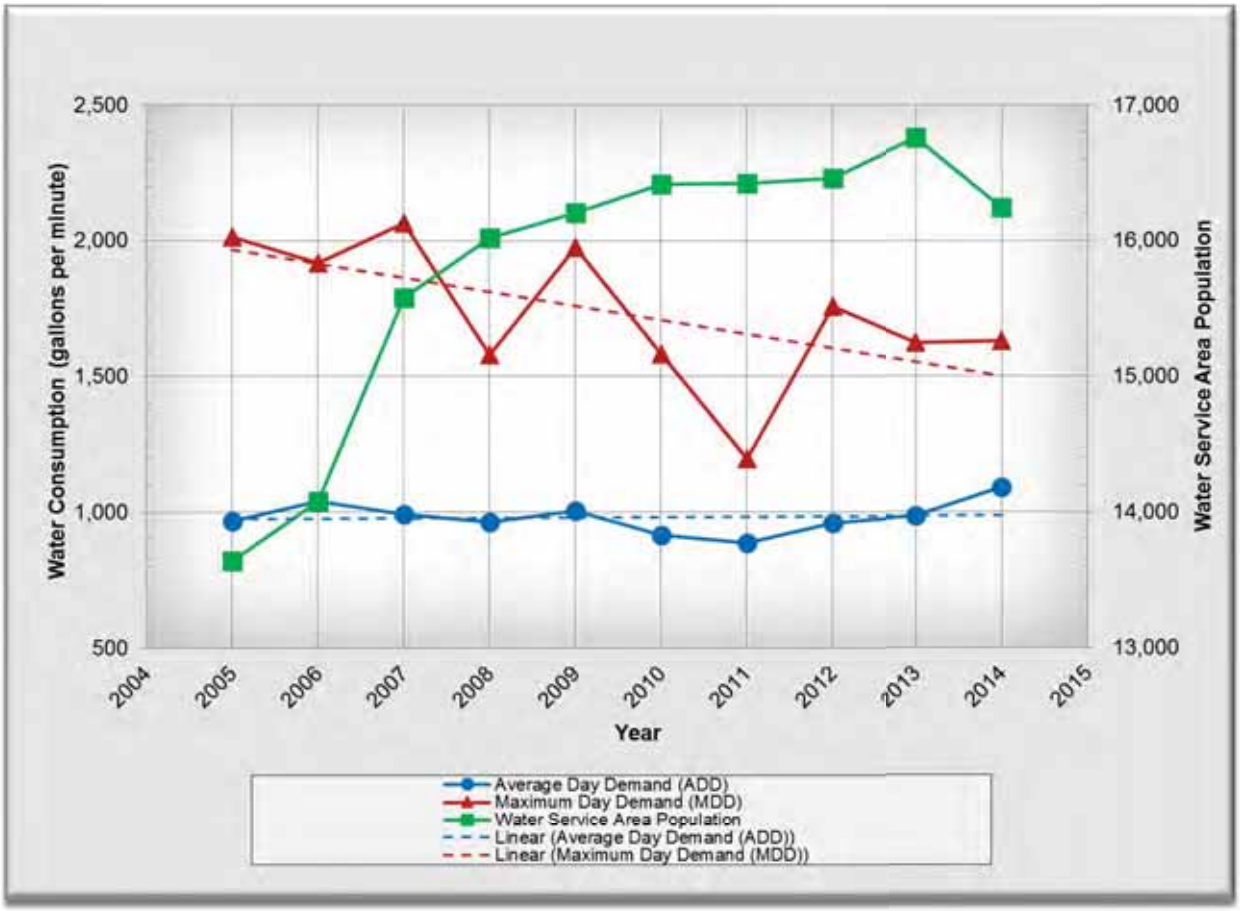
E.5 EVALUATION OF WATER USE EFFICIENCY MEASURES

The City's evaluation of WUE measures and selected levels of implementation are presented within this section. The measures fall within three categories of implementation: 1) mandatory measures that must be implemented; 2) measures that must be evaluated; and 3) additional measures selected by the City that must be either evaluated or implemented.

The City served 5,444 water service connections in 2014, and another 14 hydrant permits using portable meters. Based on the number of connections, at least six WUE measures must be evaluated or implemented. Measures that are mandatory cannot be credited towards the system's WUE measures. Since the City implements or plans on implementing all of the evaluated measures presented here, a cost-effective evaluation is not required.

Chart E-4

System-wide Average Day and Maximum Day Consumption, 2005 to 2014



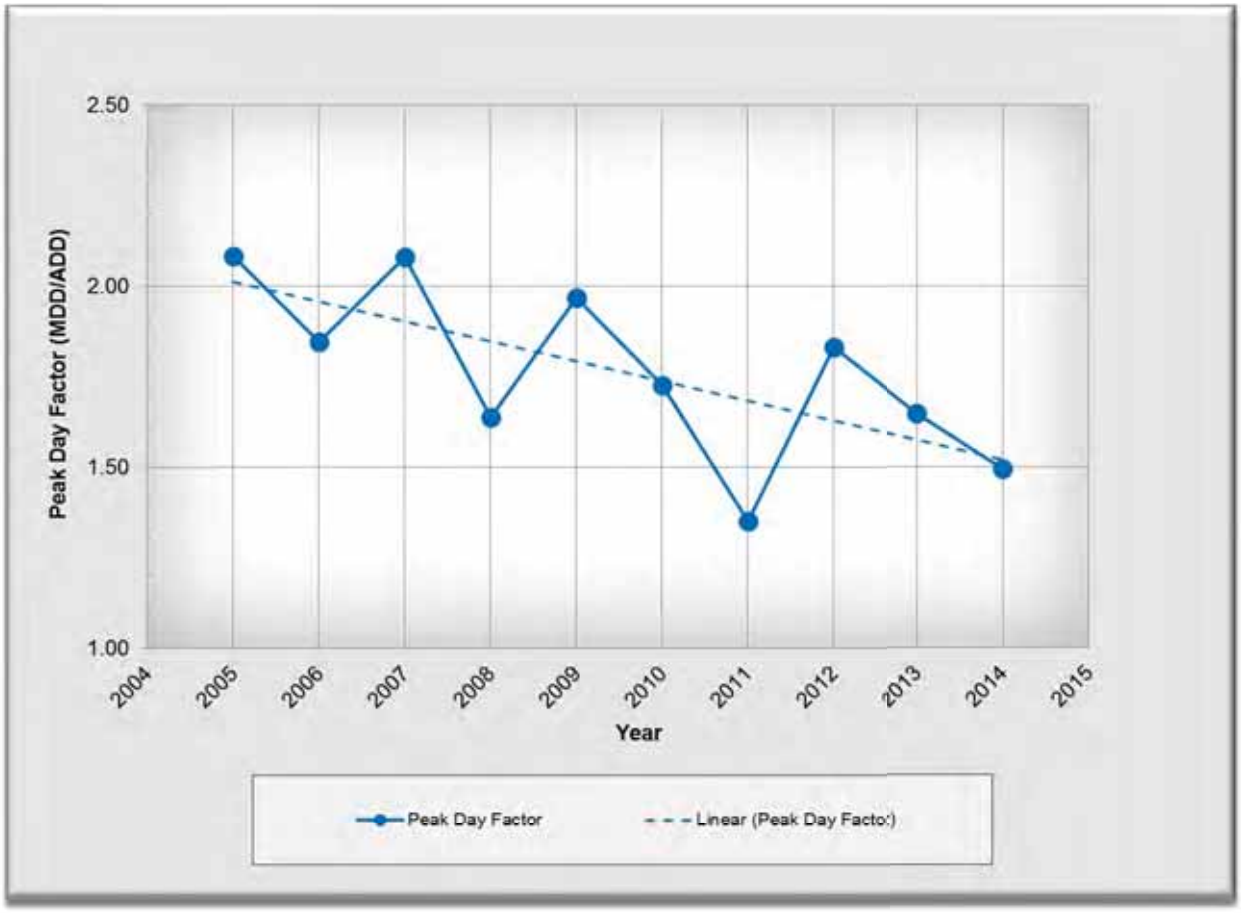
E.5.1 Mandatory Measures

Source Meters

The volume of water produced by the system's sources must be measured using a source meter or other meter installed upstream of the distribution system. Source meters are currently installed and operating at each of the City's sources. The City's Haller Wellfield source meters and PUD intertie source meter were installed in 2001; the Airport Wellfield source meter was replaced in 1995. The WTP actually uses three source meters, one on each of three treatment trains which are summed to obtain total withdrawals from the Haller Wellfield. The City is considering adding an additional source meter on the single influent main entering the WTP. Any new sources installed in the future will be equipped with a source meter.

Figure E-5

Peak Day Factor, 2005 to 2014



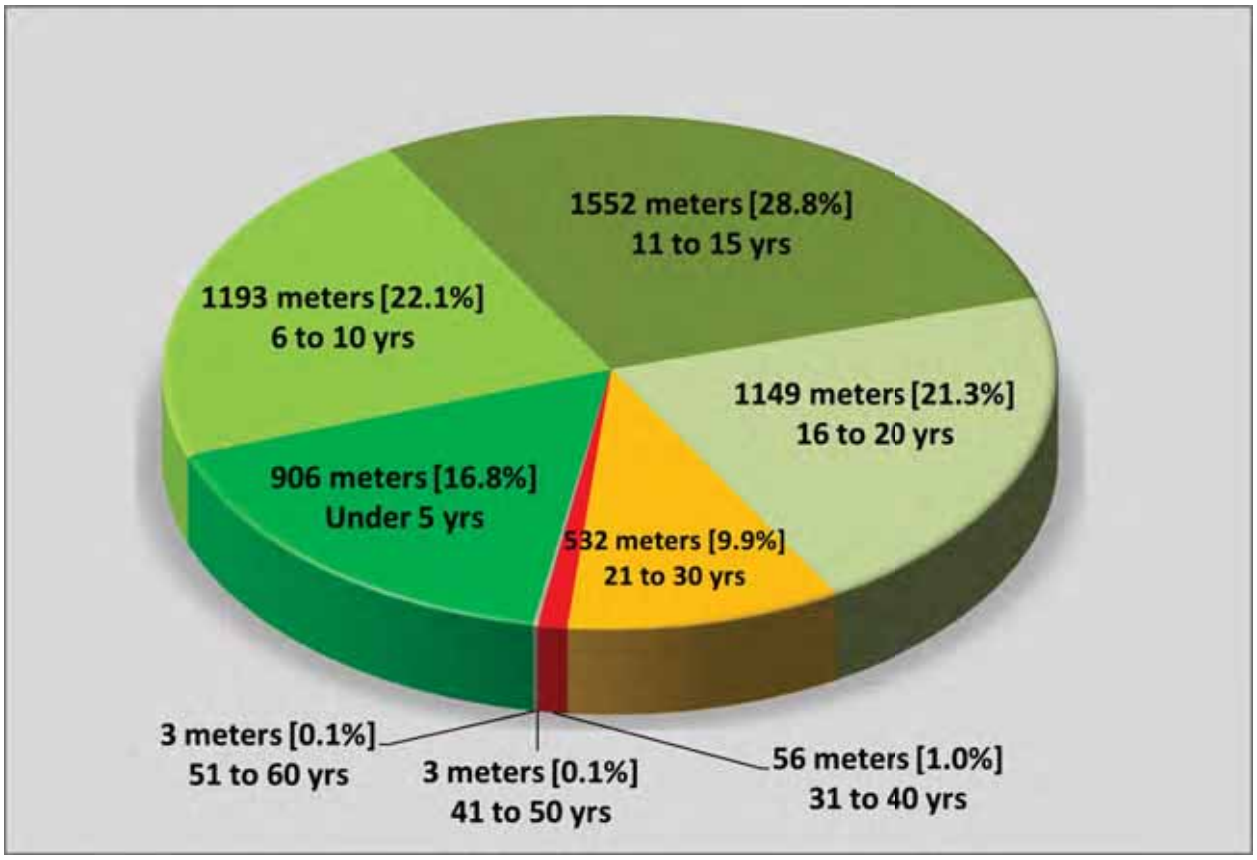
Service Meters

All public water systems that supply water for municipal purposes must install individual service meters for all water users. Service meters are currently installed and operating at all connections throughout the distribution system. The City conducts a regular meter replacement program for ½ to ¾ inch single family residential (SFR) service meters. The goal of the replacement program is to replace meters at least every 20 years, or five percent of all service meters per year. As of May 2015, 90 percent of all meters are 20 years old or less, 9.5 percent are 21 to 30 years, and 0.5 percent of these meters are older than 30 years. The City also replaces larger meters as needed. Age distribution of all customer meters follows a similar pattern (**Chart E-6**). All future connections that are installed or activated will be equipped with a service meter.

While the City does not expect to receive any additional water savings from the program, the upkeep of service meters is vital to maintain current conservation levels and accurate billing for consumption.

Chart E-6

Age Distribution of Service Meters, All Customer Classes, 2015



Meter Calibration

The City must calibrate and maintain meters based on generally accepted industry standards and manufacturer information. Customer meter calibration is performed on an as-needed basis to validate billing accuracy. The City calibrates source meters, at a minimum, based on manufacturer guidelines. Current practice is to calibrate source meters at the WTP annually, most recently in 2014.

Water Loss Control Action Plan

To control leakage, systems that do not meet the DSL standard must implement a Water Loss Control Action Plan. The City's rolling 3-year average DSL is discussed earlier under Distribution System Leakage, including **Table E-2** and **Chart E-1**. In 2014, the City's 3-year DSL jumped to 13.2 percent, exceeding the 10 percent threshold for the first time. A Water Loss Control Action Plan has been prepared and included as Attachment 3 to this WUE Program. The goal of the several action items is to maintain a DSL between five and seven percent on an annual basis, while meeting the DSL standard of ten percent or less based on a three-year rolling average.

Customer Education

Annual customer education regarding the importance of using water efficiency is a required element of all WUE programs. Customer education is provided in the City's CCR to customers

and includes information on the system's water source, treatment method, water contaminants, water quality sampling by the City's Water Department and the PUD, average SFR water consumption, and indoor and outdoor tips for customers on using water more efficiently. Additional customer education and outreach measures are identified in the Selected Measures section.

E.5.2 Measures That Must Be Evaluated

Rate Structure

A rate structure that encourages WUE and provides economic incentives to conserve water must be evaluated, but is not required to be implemented. The City currently implements an inclining block rate structure (charge per unit of water increases with higher use) and is designed to discourage excessive water use. The base rate for water (as of January 15, 2009) was $32.15 for the first 300 cubic feet in a monthly billing cycle. Should the customer exceed the base rate, they are billed an additional $2.94 per 100 cubic feet to a total of 1,000 cubic feet. Should a customer exceed 1,000 cubic feet that month, they are billed $3.10 per each additional 100 cubic feet.

Reclamation Opportunities

Since 2011, the City owns and operates a fully functional Water Reclamation Facility (WRF) using Biological Nutrient Removal (BNR), Membrane Bioreactor (MBR), and ultraviolet disinfection (UV) technologies to produce reclaimed water of Class A (more UV exposure) or Class B (less UV exposure) quality. The City's 2014 NPDES permit is accompanied by a reclaimed water permit which authorizes re-use of Class A reclaimed water in its constructed wetland. Irrigation of the wetland sustains wetland vegetation and functions during the dry summer months, and provides opportunity to adaptively manage effluent by providing for additional polishing and treatment during critical periods (e.g. summer low flows with high temperatures and low dissolved oxygen). When not discharging to the wetland, the WRF continues to discharge effluent (reclaimed water) to the Stillaguamish River to augment stream flows and provide aquatic habitat.

The City evaluated reclamation opportunities prior to the upgrade and expansion which resulted in the WRF. Most of these opportunities are still valid, and would require Washington State Department of Ecology and DOH to issue a modified reclaimed water which specifically authorizes any of the reclaimed water reuse opportunities below.

- Summertime irrigation of a constructed stormwater/mixed use wetland (currently permitted)
- Providing supply to farmers and concrete plant down-valley (i.e. creative water right exchange opportunities);
- Providing small supply to the Bridge of Flowers, a proposed garden on the railroad trestle;
- Providing supply for irrigation of a golf course, cemetery, parks, airport, turf farm and schools (0.88 miles of purple distribution pipe covering 45 percent of the two miles from the WRF to the cemetery were installed in 2014);

- City operations and maintenance use (e.g. street sweeping, vactoring, flushing);
- Construction water and dust control (in lieu of hydrant permits); and
- Other uses, such as firefighting and toilets.

The City is committed to making reclaimed water a part of their integrated water resource management strategy.

E.6 SELECTED MEASURES

The City has chosen to implement nine different WUE measures, many of which are existing measures. The City has six different billing classes; for the purposes of water system planning in this document, those classes have been combined into four different groups: single family residential; multi-family residential; commercial/industrial; and other. The "other" user group consists of parks and open space, school districts, churches, hospitals, etc. If a single WUE measure is implemented for different customer classes, it counts as multiple WUE measures. Multiplying the nine different WUE measures across the customer classes in which they will be implemented, the City will implement a total of 32 WUE measures. This exceeds the requirement of six WUE measures based on the number of service connections.

The most significant WUE efforts the City currently makes are through active participation in the regional programs. In addition to the WUE measures conducted through these partnerships, the City plans to continue implementing its existing WUE measures including conservation rate structures, elements of customer education, mandatory lawn watering calendars and the water consumption history located on customers' bills. New or renewed WUE measures include reclaimed water use and a leak detection program.

E.6.1 Conservation Rate Structures

Evaluation of rate structures to increase water demand efficiency is required (WAC 246-290-100(4)(j)(iv)), but actual implementation of a conservation rate structure counts as a WUE measure (WAC 246-290-810(4)(d)). The City is implementing an inclining block rate structure for its customers. In 2015, the City retained the services of a financial consultant to evaluate and revise the rate structure to achieve greater incentives for efficient water use by all customer classes. A similar effort in 2010 did not result in substantive changes, and City staff and leadership feel the rate structure warrants another look. Since the rate structure applies to all customers, it is equivalent to four WUE measures.

E.6.2 Reclaimed Water

Water systems with 1,000 or more connections must evaluate reclamation opportunities (WAC 246-290-100(4)(f)(vii)), but actual use of reclaimed water counts as a WUE measure (WAC 246-290-810(4)(d)), or multiple WUE measures if the reclaimed water is used for multiple purposes. Use of reclaimed water for wetland irrigation is the primary initial (current) use for the City. Distribution of reclaimed water for re-use is a capital limitation. However, the City has begun installation of a distribution network, with 0.88 miles installed as of 2014. For the near-term,

reclaimed water re-use is considered to improve efficiency for only one the "Other" customer class for its municipal irrigation and open space uses.

Ecology does not yet recognize surface water augmentation and groundwater recharge as appropriate for the City because, despite its fully consumptive water rights, it operates with near-zero flow impacts on the Stillaguamish River by discharging its WRF effluent to the river. In order to fully utilize reclaimed water for improving water use efficiency, regulations will need to be revised to allow for re-use in situations where river or surface water impacts are negligible.

E.6.3 Customer Education

Customer education that is carried out more than once a year counts towards meeting the program requirements for WUE measures. In addition to the mandatory annual customer education in the CCR, the City educates customers to use water wisely using several tools and partnerships.

Perhaps the most effective of these efforts is the school outreach program spearheaded by the EWUC Conservation Committee. From 2008 through 2014, nearly 7,700 students in 281 classes in both high schools, both middle schools, and all four elementary schools received training in water science and management. Trained consultants using AWWA-approved curricula provided the instruction.

Other education efforts implemented by the City will include: quarterly customer education through articles and conservation tips in the City's newsletter, the "Arlington Update"; seasonal water conservation reminders in summer utility bills and on Arlington Community Television; educational booths at the city-sponsored Eagle Festival (February) and Arlington Street Fair (July); outreach at the Stillaguamish Tribe's Festival of the River (August); and participation in additional regional WUE Programs with PUD and the City of Everett. This measure will be implemented for all customer classes.

E.6.4 Outdoor and Indoor Conservation Kits

The City will offer free outdoor and indoor conservation kits to all customers through its partnership with the City of Everett and the PUD. Outdoor kits typically include nozzles, garden hose repair kits, and irrigation timers. In addition, DVDs produced by Cascade Water Alliance provide homeowner instruction on managing installed irrigation systems. Indoor kits include high efficiency showerheads and faucet aerators. Advertising efforts are made to promote the availability of these kits, which include placing notices in utility bills, links on the City's website and displaying the kits at public events. This measure will be implemented for two residential customer classes.

E.6.5 Lawn Watering Calendars

The City will continue to mail lawn watering calendars to both residential and nonresidential properties for seasonal demand management. Additional copies are made available in City offices and public facilities. This measure is implemented for all customer classes.

E.6.6 Rebate Program

The City has participated with Everett and the PUD in washing machine and toilet rebate programs where new washers and toilets must meet the highest WaterSense criteria established. The EWUC Conservation Committee discontinued toilet rebates in 2012, although some member utilities continue to offer toilet rebates on their own. Since most City residents purchase electricity through the PUD, the City continues to support and refer its customers to the washer rebate program ran through the PUD. This measure will be implemented for two residential customer classes.

E.6.7 Leak Detection Program

The City seeks to implement a leak detection program as part of their WUE efforts. It typically has conducted decommissioning type tests, where segments being decommissioned are isolated and tested at typical operating pressures to determine whether leaks are present. This approach has often validated the City's understanding of the effects of various soil characteristics on the condition of asbestos-concrete water main. The City will also implement this approach in a proactive manner in order to prioritize the remaining main in its annual main replacement program. In addition, if the Water Loss Control Action Plan associated with this WUE Program does not promptly return DSL to less than 10 percent, the City anticipates contracting with a leak detection service provider to evaluate 20 to 25 miles of distribution pipe, varying in sizes from 4-inch through 16-inch in 2016 or 2017. This measure will be implemented with benefits for all customer classes.

E.6.8 Water Bill Showing Consumption History

Since 2002, the City has operated its billing system to provide consumption and temperature information on customer bills. The current billing period's consumption and temperature information is compared to the same billing period in the previous year. This measure is implemented for all customer classes.

E.6.9 Low Impact Development and Xeriscaping

The City's land use code gives preference to low water demand landscaping and other water conservation landscaping techniques. Recently emphasized, integrated approaches that are proposed for adoption as required or preferred with the City's 2015 General Comprehensive Plan include the use of rainwater collection systems and rain gardens to reduce the need for potable water for irrigation. The City also uses native, drought resistant landscaping in many City projects. This measure is implemented for the "Other" customer class (including municipal uses), and counts as one WUE measure.

E.7 WATER USE EFFICIENCY PROGRAM SCHEDULE AND BUDGET

The WUE measures described above and selected for implementation by the City are summarized in **Table E-3** with their corresponding schedule and budget. The successful implementation of this Program is expected to maintain the goal of a five percent reduction by 2018, using 2008 as the base year, as shown in **Chart E-1**.

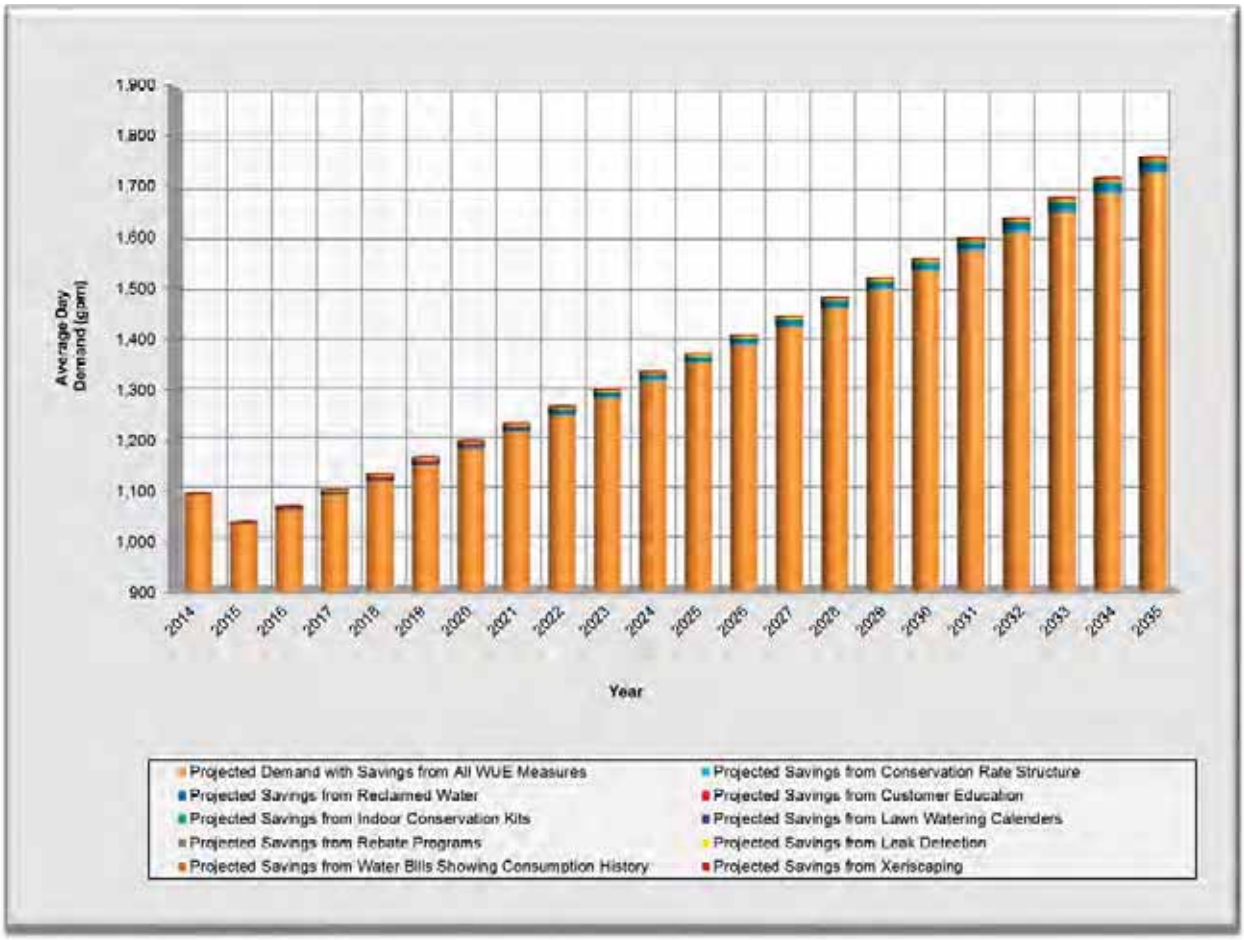
Table E-3

WUE Program Schedule and Budget

Water Use Efficiency Measure		Schedule	Budget
Mandatory Measures			
Source Meters		Ongoing	O&M Funded
Service Meters		Ongoing	O&M Funded
Meter Calibration		Ongoing	O&M Funded
Water Loss Control Action Plan		2015	N/A
Customer Education - Annual Consumer Confience Report		Ongoing	$6,000/yr
Measures That Must be Evaluated			
Rate Structure--Reevaluation		2015	N/A
Reclamation Opportunities		Ongoing	N/A
Selected Measures			
Conservation Rate Structure - To Be Implemented		2016	$5,000
Reclaimed Water Re-use for wetland irrigation		Ongoing	O&M funded
Customer Education - School Outreach, Advertising, etc.	Advertising, outreaches; Instruction in schools	Ongoing	$3,000/yr; Regional Program
Outdoor and Indoor Conservation Kits		Ongoing	Regional Program
Lawn Watering Calendars		Annually	$2,000/yr
Rebate Program		Ongoing	PUD Program
Leak Detection Program	Decommissioning pressure test; Screening contract	Ongoing 2017	O&M funded; $5,000
Water Bill Showing Consumption History		Ongoing	N/A
Low Impact Development, Xeriscaping		Ongoing	$500/yr

Chart E-7

WUE Program Projected Water Savings



Attachment E-1

Cooperative Conservation

A Report on the Implementation of
Washington's Water Use Efficiency Rule

Prepared by

Partnership for Water Conservation

November 6, 2012

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Cooperative Conservation

A Report on the Implementation of Washington's Water Use Efficiency Rule

November 6, 2012

Partnership
For Water Conservation

About the Partnership for Water Conservation

The Partnership for Water Conservation (Partnership) is a nonprofit 501(c)(3) organization dedicated to enhancing water efficiency efforts in the state of Washington. In 2004, the Partnership formed through a unique collaboration between water suppliers, environmental groups, and businesses; it has grown to approximately 85 members. The Partnership works to ensure that water supplies meet the needs of people and our state's economy, while protecting fish and supporting other environmental values that make Washington such a great place to live and work. For more information about the Partnership, please visit: www.partners4water.org

The current board members for the Partnership are Michael Brent (Cascade Water Alliance), Debbie Engel (Kitsap Public Utility District), Jeanne McNeil (Washington State Nursery and Landscaping Association), Heather Pennington (Tacoma Public Utilities), Gene Peterson (CH2M Hill), Emily Resch (Birch Bay Water and Sewer District), Beau Schilz (Pace Engineers), and Laurelin Ward (Silverdale Water District).

Acknowledgments

The Partnership expresses its sincere thanks to the Water Supply Forum for financial support of this project. For more information about the Water Supply Forum, please visit: www.watersupplyforum.org

The Partnership staff and volunteers, in consultation with the Partnership board and the Washington Department of Health, contributed to this report. Primary contributors included Allegra Abramo (consultant), Michael Dexel (Washington State Department of Health), Al Dietemann (Seattle Public Utilities), Julianna Mandler (Partnership), Daniel Muir (Tacoma Public Utilities), Janet Nazy (Partnership), Kristen Numata (Partnership), Debbie Rannfeldt (Woodinville Water District), Janet Sailer (Sammamish Plateau Water and Sewer District), Angie Sanchez-Vinoche (FCS Group), and Mike Wolanek (City of Arlington).

Disclaimer

Data for this report was obtained from water use efficiency reports and water system planning documents submitted to the Washington Department of Health (department), telephone conversations with water supplier staff, and information from water supplier websites. Every effort was made to gather factual data and objectively report the findings. This report does not represent the expressed or implied opinions, views, or policies of any state agency, local government, business, or water supplier.

Executive Summary

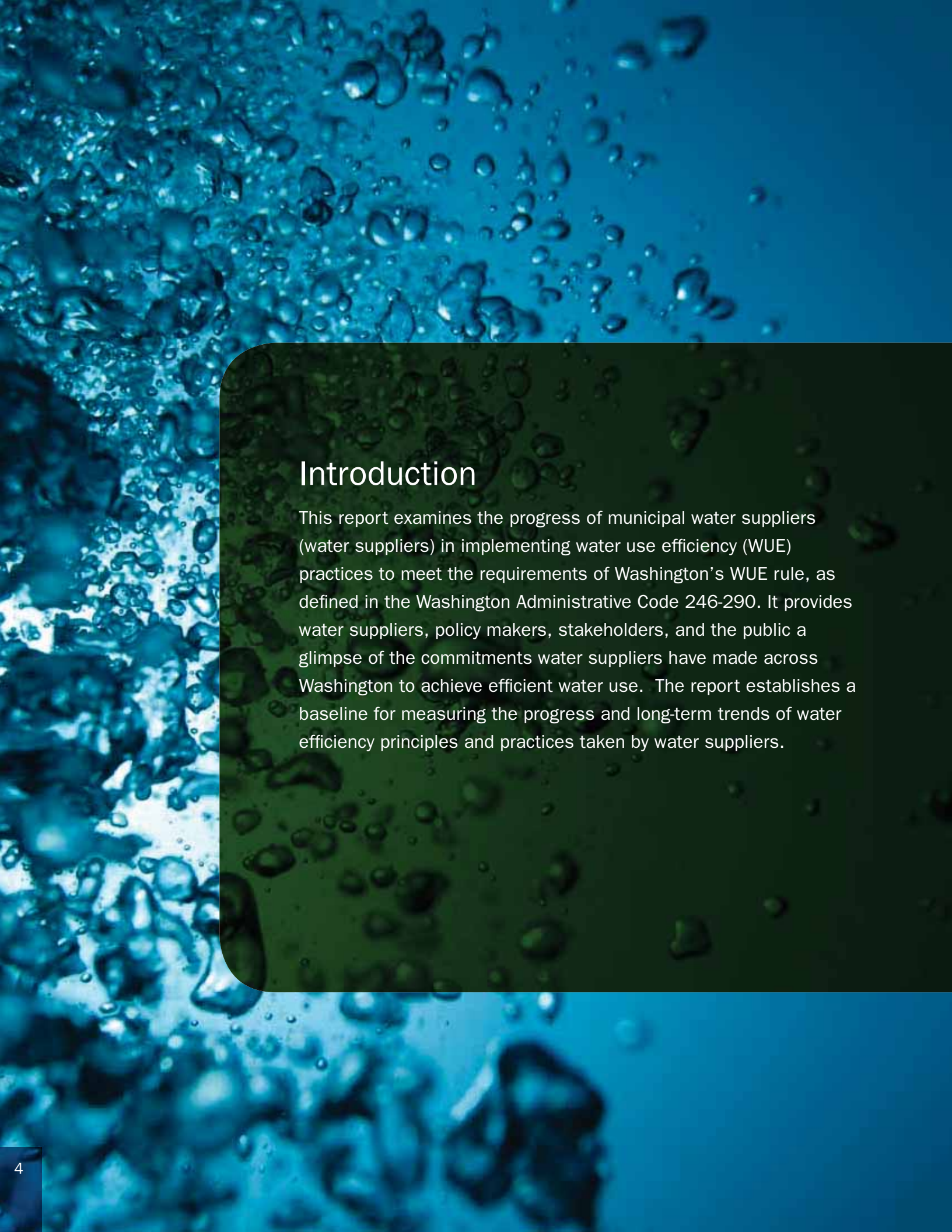
The Partnership for Water Conservation (Partnership) compiled this report to illustrate the status of water efficiency efforts by municipal water suppliers (water suppliers) in Washington. The Washington Legislature directed the Department of Health (department) to adopt the Water Use Efficiency (WUE) rule in response to passage of the 2003 Municipal Water Law (law), which addressed increasing demands on the state's water resources. Under the municipal water law, the Legislature directed water suppliers to use water more efficiently in exchange for certainty and flexibility of water rights to help meet future demand. The WUE rule established the mechanism for achieving compliance with the law.

The objective of this report is to demonstrate progress towards greater water efficiency among water suppliers in Washington since adoption of the WUE rule in 2007. The majority of water suppliers studied have taken significant actions to improve water efficiency including repairing leaks, implementing conservation rate structures, installing customer meters, and setting conservation goals. There are still many options available to water suppliers for increased water efficiency.

The Partnership collected and analyzed data reported to the department by 153 small, medium, and large water suppliers between 2009 and 2012. The 153 water suppliers analyzed represent 32% of the total number of water suppliers that submitted a WUE report in 2009. The main findings are as follows:

- The top three measures utilized to promote water efficiency with customers were literature/public education, conservation rates, and bills that show consumption history.
- Eighty-eight percent (88%) currently meter all service connections.
- Sixty-eight percent (68%) reported three-year rolling average leakage values below the state leakage standard of 10%.
- The average leakage percentage was 11.5%, and the median leakage percentage was 9%.
- Seventy-four percent (74%) have implemented conservation rate structures.
- Seventy-eight percent (78%) established water efficiency goals that include overall water use reduction targets, as opposed to maintaining existing water use levels.
- Sixty-five percent (65%) receive their water from groundwater sources, 24% from surface water, and the remaining use combined surface and groundwater.
- Ninety-two percent (92%) required to submit a 2009 annual water use efficiency report did so.

The Partnership developed this report in the hope that it will be a source of ideas and inspiration for water suppliers and others who want to become more active in preserving Washington's precious water resources. Future trends in municipal water use efficiency can be monitored using this baseline data.



Introduction

This report examines the progress of municipal water suppliers (water suppliers) in implementing water use efficiency (WUE) practices to meet the requirements of Washington's WUE rule, as defined in the Washington Administrative Code 246-290. It provides water suppliers, policy makers, stakeholders, and the public a glimpse of the commitments water suppliers have made across Washington to achieve efficient water use. The report establishes a baseline for measuring the progress and long-term trends of water efficiency principles and practices taken by water suppliers.

History of Water Conservation in Washington

1987 Washington experienced a prolonged drought. Water suppliers throughout the state developed management alternatives to deal with this shortage. Prior to this drought, many water suppliers had installed meters on service connections and managed leaks but rarely developed programs aimed at reducing customer demand. The 1987 drought set the stage for demand-side conservation.

1989 Changes in state building codes increased water use efficiency standards for indoor plumbing fixtures and fittings. As a result, consumers were purchasing more efficient new or replacement fixtures, leading to greater water savings.

1990 The Washington State Departments of Health and Ecology, along with the Washington Water Utility Council, developed interim guidelines for water suppliers that encouraged water use efficiency based on existing state statutes.

1992 and 2001 Additional droughts led to mandatory watering restrictions in some areas of the state. These restrictions opened a dialogue among water suppliers to establish water shortage response plans and develop voluntary water conservation programs to reduce customer demand.

1994 New federal efficiency standards for the manufacture and import of plumbing fixtures, fittings, and water-using appliances transformed the local and national marketplace. Only products meeting national water efficiency standards and state building codes could be installed in Washington. The Department of Health (department) published water conservation planning guidelines. Water suppliers followed these guidelines when completing comprehensive water system plans.

1997 The Washington Legislature allocated temporary funding to the department to provide water conservation technical assistance to water systems.

2003 The Washington Legislature passed the Municipal Water Law, leading to the adoption of the 2007 WUE rule, ultimately replacing the 1994 water conservation guidelines.

2007 The WUE rule took effect on January 22.

Competing Demands

With the passage of the 2003 Municipal Water Law, the Washington Legislature made water efficiency an issue of statewide importance in a region of seemingly abundant supply. Washington's regulatory WUE requirements are robust and compare to states that pursue efficiency due to limited water supplies, extreme water shortages, and drought situations, such as California and Texas. A recent study by the Alliance for Water Efficiency ranked Washington fourth highest in the nation for its progressive water conservation laws and policies.

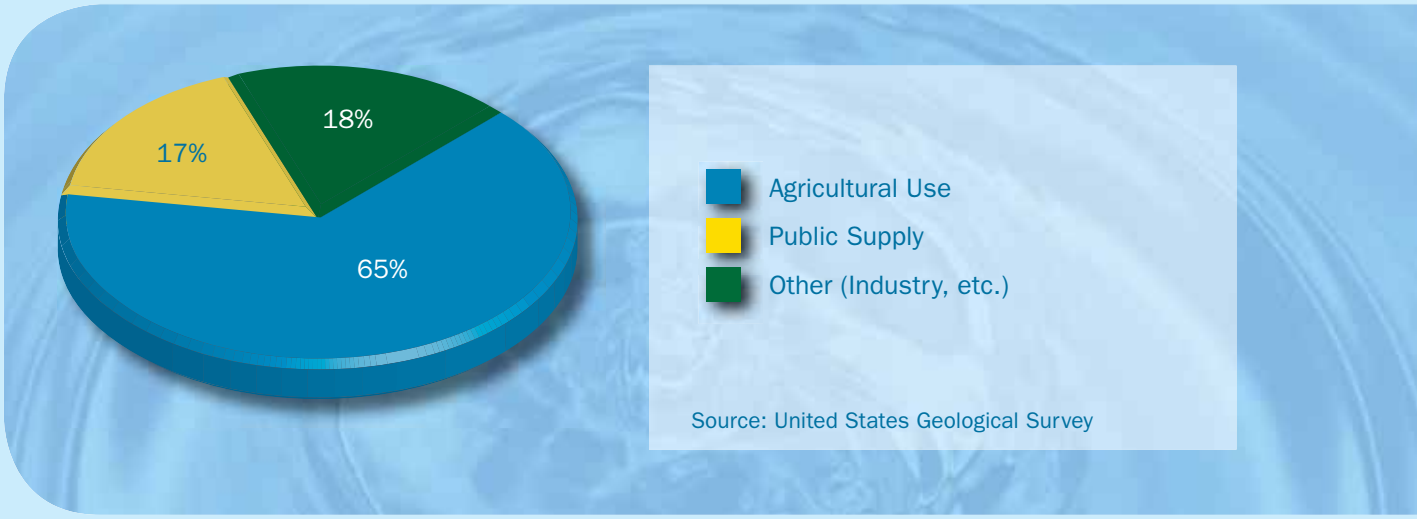
Water supplies can be scarce in many areas of the state due to local and seasonal conditions. Dry summers lead to high demand for water. Washingtonians rely on water resources not only for potable supply, but also for agricultural and industrial production, hydropower, and recreation. In some watersheds, water limitations affect the needs of both people and fish, creating unique challenges to ensure the survival of the state's threatened salmon and trout populations. The effects of climate change may also lead to greater uncertainty on future water supplies.

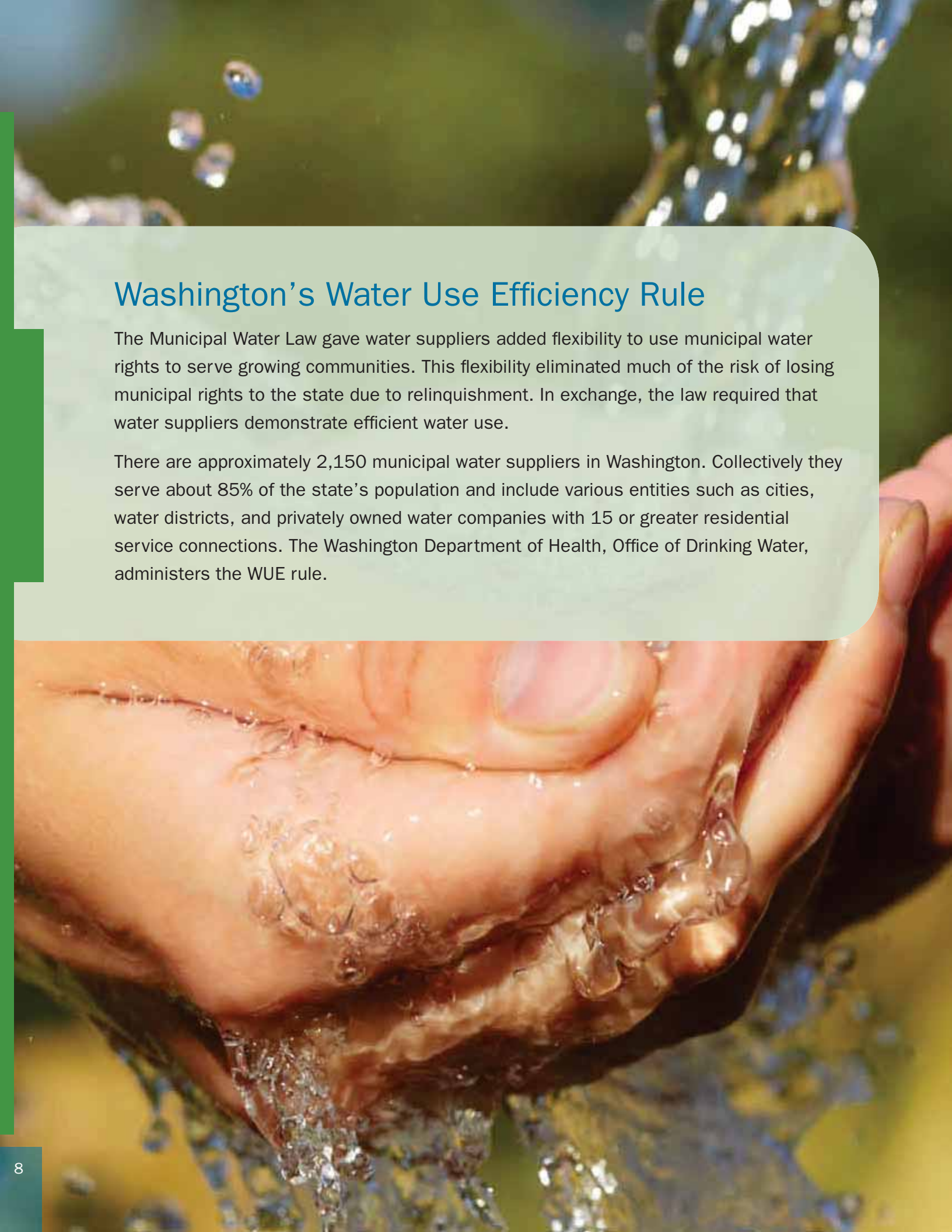
Implementing efficiency measures is generally less expensive than developing new sources of supply. Conservation can help control the long-term cost of water by delaying the need for new infrastructure. It can also help water suppliers reduce operating costs such as pumping and treatment. Efficient water use is a cost effective way to best utilize our valuable water supplies to ensure there is enough water to support a growing population, a vibrant economy, and a sustainable environment for generations to come.

According to Washington's Office of Financial Management, the state population is expected to grow by about 2 million, reaching 8.8 million in 2040. The Water Supply Forum, a regional group of water suppliers in the Puget Sound area, has indicated the demand for water will increase by 63% in Pierce and Snohomish counties and by 47% in King County during the next 50 years. A report regarding water supply and demand in the Columbia River Basin predicts that by the year 2030, an additional 117,500 acre-feet (approximately 38 billion gallons) of water per year will be needed for private and municipal supply.

In a 2009 report, the United States Geological Survey identified the most recent water use trends in Washington. Of the 5.7 billion gallons per day of total freshwater used during 2005 in Washington, public water supply accounted for 990 million gallons per day. In contrast, an average of 3.7 billion gallons per day was used for agricultural needs. As shown in Figure 1, agricultural use (crop irrigation, livestock and aquaculture) accounted for the majority of total water use in the state (65%), while public supply accounted for 17%. The remaining 18% of water use was a combination of other uses, such as industrial, mining and thermoelectric. While other sectors may be implementing water efficiency into their operations, those efforts are not the subject of this report.

Figure 1: Average Water Use by Sector, 2005





Washington's Water Use Efficiency Rule

The Municipal Water Law gave water suppliers added flexibility to use municipal water rights to serve growing communities. This flexibility eliminated much of the risk of losing municipal rights to the state due to relinquishment. In exchange, the law required that water suppliers demonstrate efficient water use.

There are approximately 2,150 municipal water suppliers in Washington. Collectively they serve about 85% of the state's population and include various entities such as cities, water districts, and privately owned water companies with 15 or greater residential service connections. The Washington Department of Health, Office of Drinking Water, administers the WUE rule.

The WUE rule requires that water suppliers accomplish the following:

Install meters on all water sources, interties, and customer connections to track, monitor, and record and report water consumption.

- Source meters were required by January 22, 2007 and customer and intertie meters are required by January 22, 2017.

Establish measurable water efficiency goals through a public process to reduce customer demand.

- Measurable water efficiency goals must be adopted through a public process every six years. At least one demand side goal is required (e.g., reduce per capita consumption by 3% in 6 years); supply side goals (e.g., reduce leakage percentage by 5% in 3 years) are optional.

Implement conservation measures, evaluate water rates that encourage efficient use by customers, and educate customers about using water efficiently.

- A measure is any water supplier initiative designed to conserve water. Depending on the number of connections served, water suppliers must evaluate or implement between one and twelve measures to help customers use water efficiently. Systems with 1,000 or more connections must also evaluate opportunities to use reclaimed water.

Meet a standard of 10% distribution system leakage on a rolling three-year average.

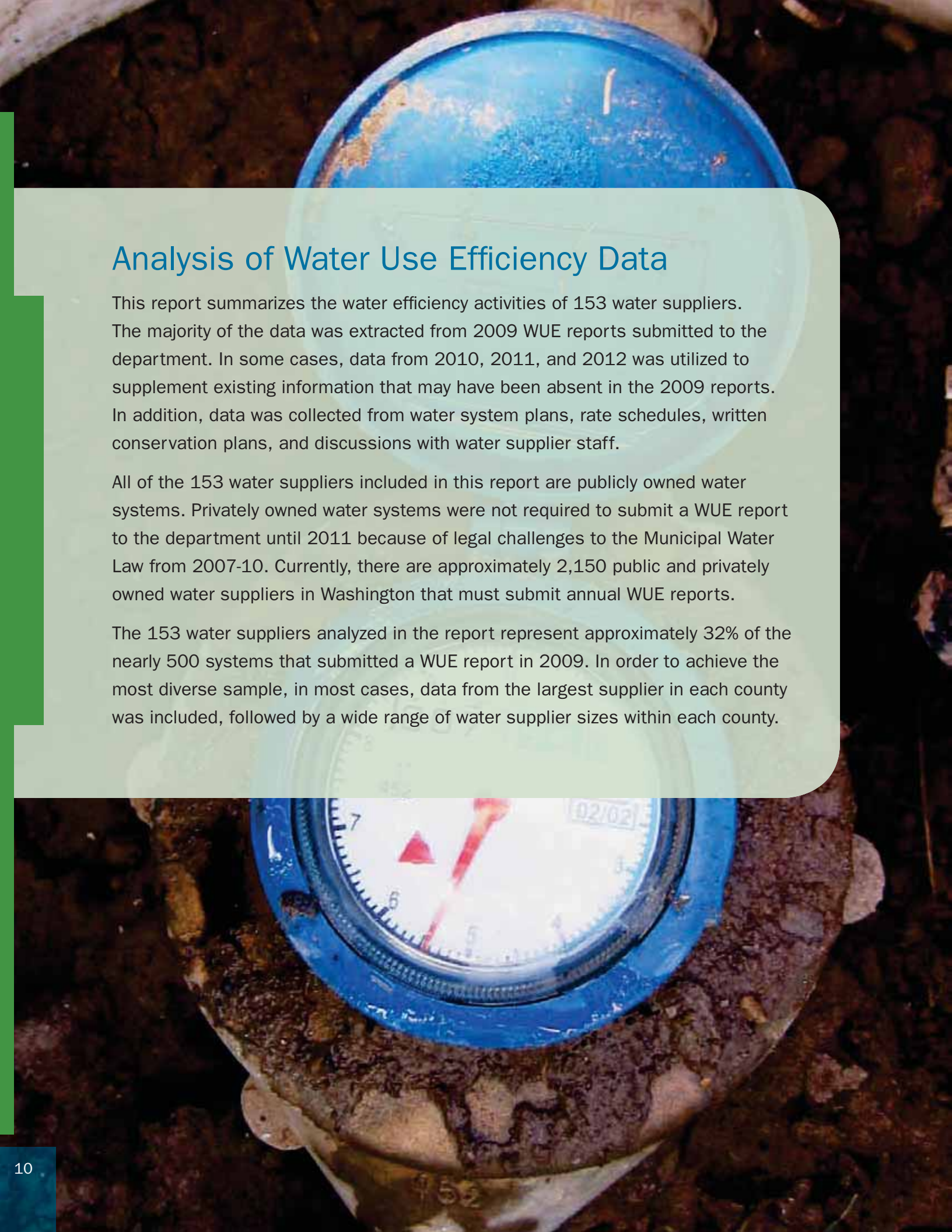
- Distribution system leakage is calculated on reported production and consumption values. Any water supplier that exceeds the 10% standard must implement a water loss control action plan. Water suppliers with fewer than 500 connections may request permission from the department to use a 20% distribution system leakage standard, but the water supplier must provide justification for the request.

Report the production, consumption, and progress towards reaching WUE goals annually to both customers and the Department of Health.

- Annual WUE reports compiled by water suppliers measure water use trends, summarize the success of WUE programs, and verify compliance with the WUE requirements.

Develop and implement a WUE program.

- Every water supplier must complete a comprehensive WUE program. WUE programs encompass all aspects of supply and demand side efficiency and must be included as part of the comprehensive water system planning document.



Analysis of Water Use Efficiency Data

This report summarizes the water efficiency activities of 153 water suppliers. The majority of the data was extracted from 2009 WUE reports submitted to the department. In some cases, data from 2010, 2011, and 2012 was utilized to supplement existing information that may have been absent in the 2009 reports. In addition, data was collected from water system plans, rate schedules, written conservation plans, and discussions with water supplier staff.

All of the 153 water suppliers included in this report are publicly owned water systems. Privately owned water systems were not required to submit a WUE report to the department until 2011 because of legal challenges to the Municipal Water Law from 2007-10. Currently, there are approximately 2,150 public and privately owned water suppliers in Washington that must submit annual WUE reports.

The 153 water suppliers analyzed in the report represent approximately 32% of the nearly 500 systems that submitted a WUE report in 2009. In order to achieve the most diverse sample, in most cases, data from the largest supplier in each county was included, followed by a wide range of water supplier sizes within each county.

Water Supply Source

Figure 2 illustrates the source of water supply for the 153 water suppliers.

Location of Water Suppliers Studied

Sixty percent of the water suppliers in this report are located west of the Cascade Mountains, and forty percent are east of the mountains.

Water Supplier System Size

Figure 3 indicates the number of connections served by water suppliers.

Metering

Installing meters is one of the primary requirements of the WUE rule because it provides a basis for understanding water use patterns, aids in establishing measurable goals, and may be used to identify efficient versus inefficient water use. Meters provide information essential to achieving greater efficiency. Installing both production and consumption meters allow water suppliers to determine how much water is lost through leaks in the distribution system and help identify apparent losses, aiding in better water management.

Water suppliers were required to install meters on all water sources by January 22, 2007, and must install service meters by January 22, 2017. Water suppliers currently lacking service meters must document their progress of meter installation in annual WUE reports until their systems are fully metered.

Figure 4 shows that the majority of water suppliers in our sample (all publicly owned) are fully metered. However, data from the most recent 2011 WUE reports indicate that only 43% of privately-owned water systems are fully metered (not shown in Figure 4).

Figure 2: Water Supply Source for Water Suppliers

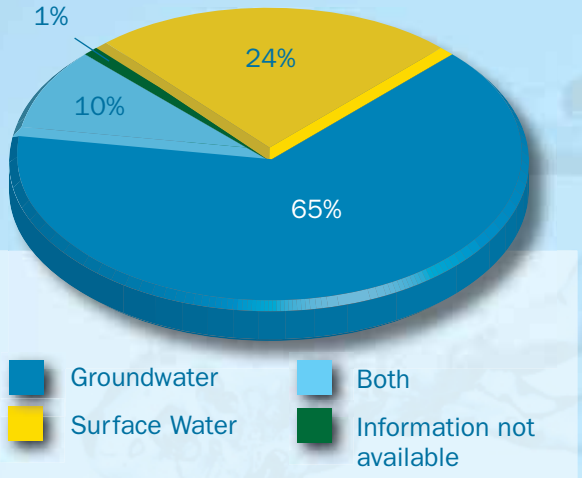


Figure 3: Water System Size

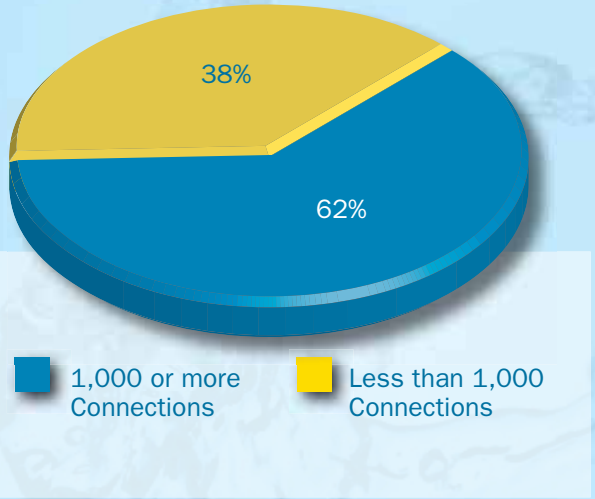
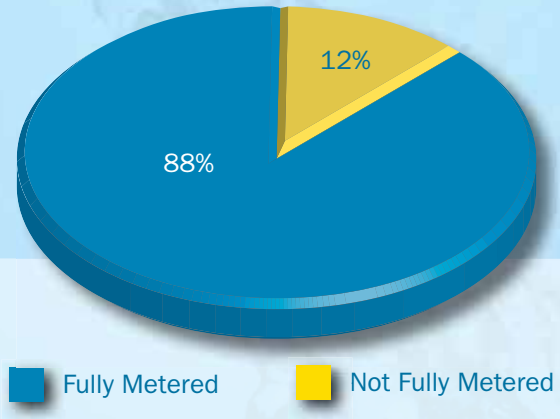


Figure 4: Publicly Owned Metered Systems



Leakage and Leak Detection

The WUE rule requires that water suppliers meet a leakage standard of no more than 10%. Each year by July 1, water suppliers must collect and report to the department the annual totals of all data from their sources, water purchased from other suppliers, and the authorized consumption (metered water use by customers plus any other estimated unmetered use).

Compliance with the 10% leakage standard is based on three years of reported data, as calculated on a rolling three-year average. Of the 153 water suppliers in the sample, 80 had submitted three years of data. Of those 80 water suppliers, 54 (68%) were below the 10% leakage standard, as shown in Figure 5. Water suppliers with greater than 10% leakage can demonstrate compliance with the leakage standard by completing and implementing a water loss control action plan.

The range, average, and median leakage percentages from the 2009 data are shown in Figures 6 and 7. The "Zero/Negative" category in Figure 6 represents negative leakage values (a result of poor data collection or inaccurate meters) and zero values for systems not fully metered.

Figure 5: 2009 Compliance with Three-Year Average Leakage Standard

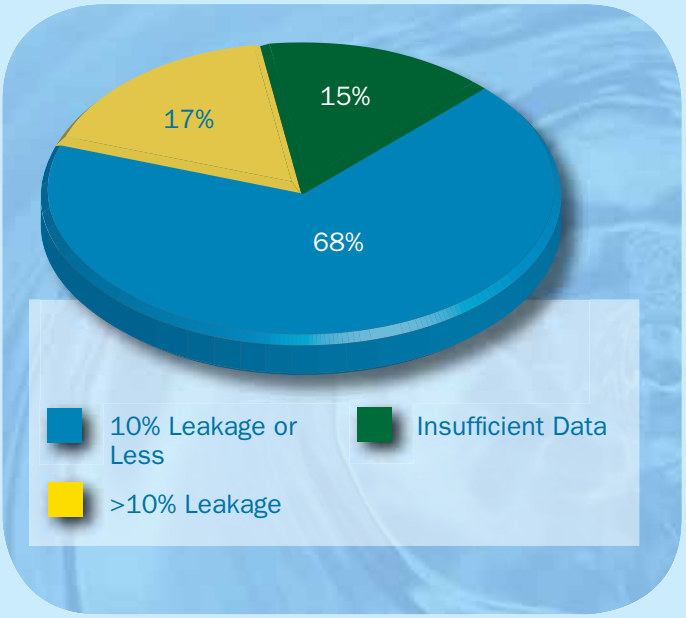


Figure 6: Range of 2009 Reported Leakage Percentage

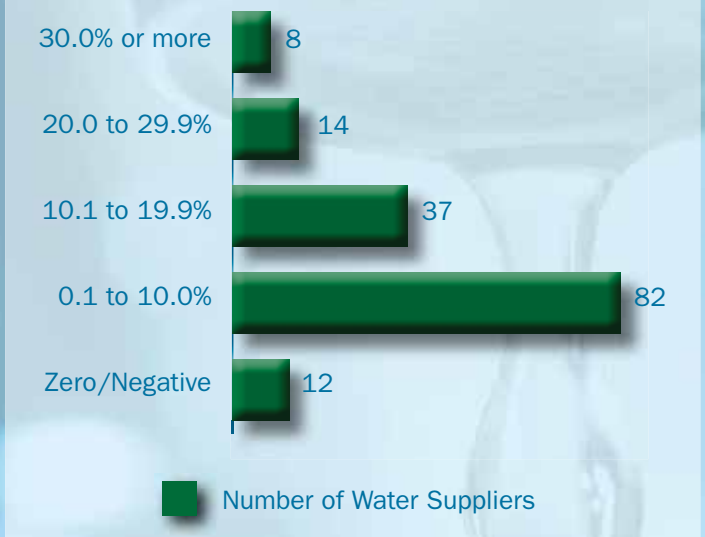
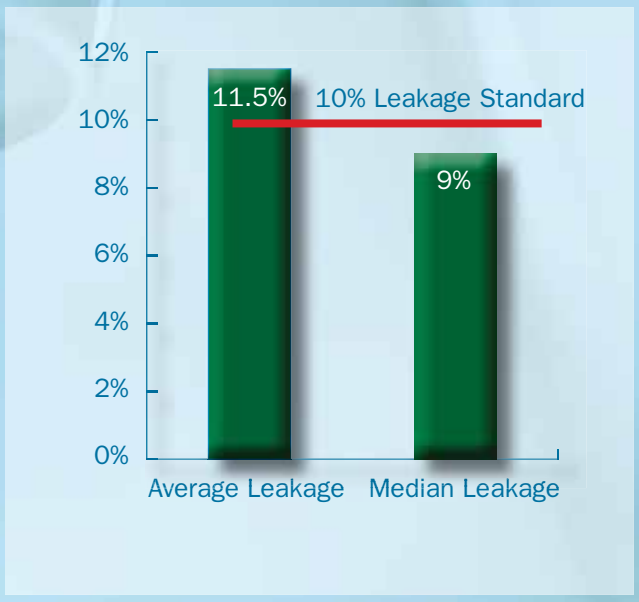


Figure 7: 2009 Average and Median Leakage Percentage



Case Study

Pasadena Park Irrigation District, Spokane County

After conducting a water audit, managers at Pasadena Park Irrigation District in Spokane County discovered their 1940's era water main was leaking in 240 places. The district serves approximately 2,300 connections, to a mostly residential population of about 6,000 people. Leakage ranged from 45-75% depending on the time of year, losing well over 1 million gallons a day during the highest peak. The district quickly realized water loss at this rate was leading to higher electricity costs and substantial wear and tear on infrastructure. To address the problem of leaking water mains and lost revenue, the district replaced over 5,000 feet of aging and failing water mains and began replacing old customer meters with an automated meter reading program with customer leak detection and water demand recording features. Leakage rates currently average 16.5%, recapturing as much as 800,000 gallons of water per day at an estimated value of $175,000 per year.

Conservation Based Rate Structures

As part of the WUE rule, water suppliers are required to evaluate the adoption of conservation based rate structures, which encourage efficient water use by their customers. Under the WUE rule, adoption of a conservation rate structure qualifies as a water use efficiency measure.

Commonly used conservation rate structures include inclining block and seasonal rates. In an inclining block rate structure, customers pay a higher rate for water at each tier of the pricing system. In a seasonal rate structure, customers pay more for peak season usage than they do during the winter months. A uniform or declining rate structure (one in which customers pay the same amount or less per unit of water) is not considered a conservation rate structure. Likewise, flat rates are not considered conservation rates because customers pay one price for water regardless of the amount of water used.

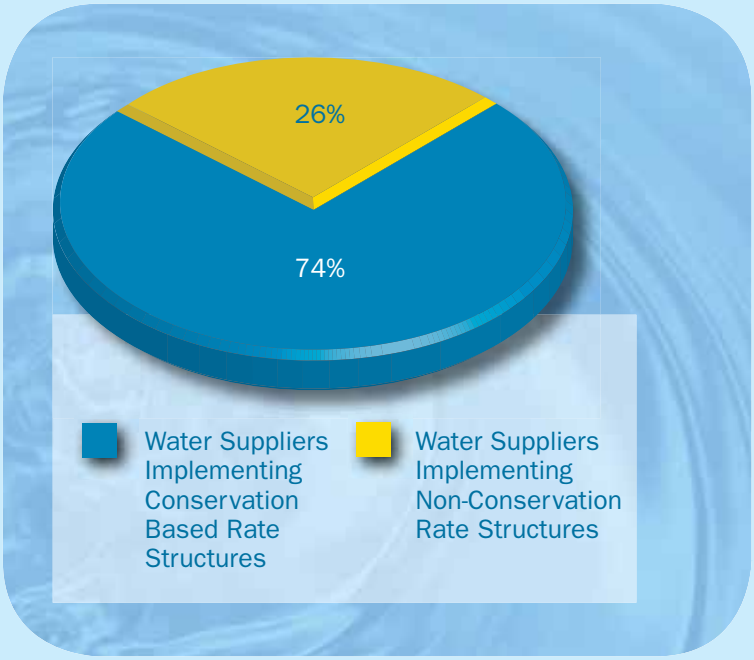
A rate structure analysis should evaluate whether water suppliers are meeting their fixed and variable costs and accumulating cash reserves while at the same time reducing customer demand. Precise valuing of water through the use of conservation based rate structures do the following:

- Keep rates reasonable at the lower tiers for consumers who use water only for basic needs.
- Encourage customers to use water wisely and to minimize water waste, particularly with discretionary uses such as landscape irrigation.
- Help water suppliers control water usage during peak season demand.

Rate Structure Analysis

For this portion of the report, only single-family residential rates for the years 2011 or 2012 were examined. As shown in Figure 8, 74% of the water suppliers had conservation based rate structures, indicating that most are encouraging their customers to use water efficiently by sending a price signal based on the amount of water used.

Figure 8: Water Rate Types for Single Family Residential Customers



Case Study

Silverdale Water District, Kitsap County

The Silverdale Water District has a four-tier rate structure. During the last five years, the District has gradually increased the difference between the tiers to promote water efficiency. Each meter size has an allocated volume of water and corresponding price for each tier. In 2007, the increase between the first and fourth tier was only $1.36. The gradual five-year transition now equates to a $3.50 difference between tiers. These rate structure changes made by the District have resulted in 16.8% fewer customers reaching the fourth tier. Currently, fewer than 20% of the District's single-family home customers use more than 330 gallons per day during the peak billing period. In addition, while total demand has decreased, revenue has slightly increased over this transition to the new rate structure.

Water Use Efficiency Goal Setting

Water suppliers must establish a WUE goal that clearly identifies a water savings target over a specified time period. Goals must be established through a public process and adopted by the elected governing board or owner of the water supplier. Goal setting engages customers in a dialogue with their water suppliers to establish water efficiency programs. A goal must be established at least once every six years.

Goal Analysis

The report found three general categories of WUE customer goals. These categories are:

- Peak season reduction (aimed at limiting outdoor water use and reducing peak demand).
- Overall reduction (general water use reduction).
- Maintaining water usage with no proposed reduction in consumption.

Figure 9 illustrates the types of conservation goals.

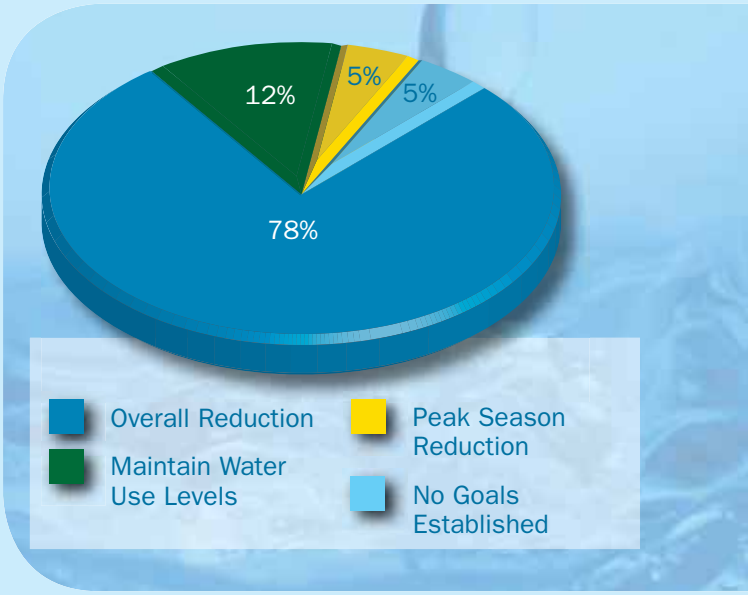
Most water systems (78%) established WUE goals with overall water use reduction targets. These included reductions in per capita use per day, average day demand, or other types or combinations of general reduction targets. This trend indicates a clear pattern to reduce current consumption within customer bases.

General Trends in Goal Setting

There was no notable difference in water reduction targets between Eastern and Western Washington's water suppliers. Some of the general trends in WUE goal setting are summarized here and illustrated in Figure 10:

- About 10% of water suppliers are participating in a regional goal program, administered by a separate water supplier. The Saving Water Partnership (Seattle area), City of Everett, and Cascade Water Alliance (suburban King County) have all established regional water conservation goals for participating water suppliers in their respective areas.
- Forty-four percent (44%) of water suppliers established more than one goal to achieve water savings. This is noteworthy because the department only requires one demand reduction goal to be in compliance. Some water suppliers established two or more demand reduction goals, while others included a supply side goal to supplement the demand side goal.

Figure 9: Conservation Goal Types



- Thirty-four percent (34%) established a goal to reduce leaks
- Of the water suppliers that established overall reduction targets in water use, 60% of the targets were in the range of 1-5 % demand reduction per year.
- Twenty-two percent (22%) established goals with a six-year horizon.

Figure 10: Trends in Conservation Goal Setting

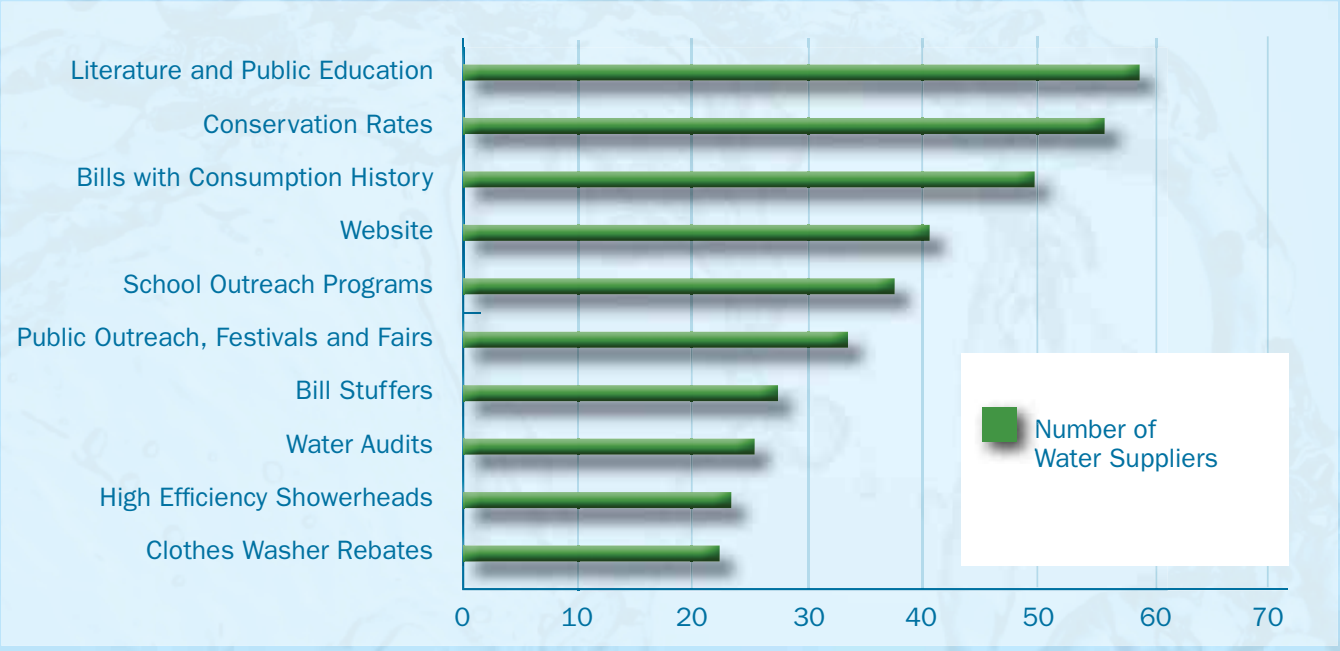
Measures

Water use efficiency measures are tools water suppliers can use to meet their goals. Measures may include water efficient devices, actions, business practices, or policies or ordinances that promote efficient water use. Water suppliers must implement mandatory measures such as installing source and service meters, performing meter calibration, or implementing a water loss control action plan (if leakage is greater than 10%), and, at least once per year, educating customers on how to use water efficiently. In addition, water suppliers must evaluate rates that encourage water efficiency, and suppliers with more than 1,000 connections must evaluate water reclamation opportunities. The number of measures that must be implemented is determined by water supplier size.

The report identified 42 measures that have been implemented by water suppliers. In addition to the top ten measures shown in Figure 11, many suppliers reported pursuing other innovative conservation actions, such as rebates for high-efficiency fixtures and appliances, peak season demand management, indoor and outdoor conservation kits, rainwater harvesting, rebates for commercial conservation programs, and a great variety of public outreach and education techniques.

Most water suppliers analyzed have made concerted efforts to meet the WUE requirements. The report revealed the most common measures are public education and rates. Hardware programs and audits are also popular with many water suppliers.

Figure 11: Top Ten Measures Implemented by Water Suppliers



Case Studies

Issaquah zHome, King County

The Issaquah zHome project is the nation's first community of WaterSense labeled homes. zHome units have the most efficient fixtures and appliances available. Rainwater harvesting for toilets and clothes washers means that zHome residents will use, on average, only 29 gallons of municipal drinking water per person per day, compared to the Environmental Protection Agency (EPA) national average of 100 gallons per person in a typical existing home. With support from Cascade Water Alliance, all zHome units received certification through the EPA's WaterSense New Homes Program.

Issaquah zHome, King County

Northwest University, King County

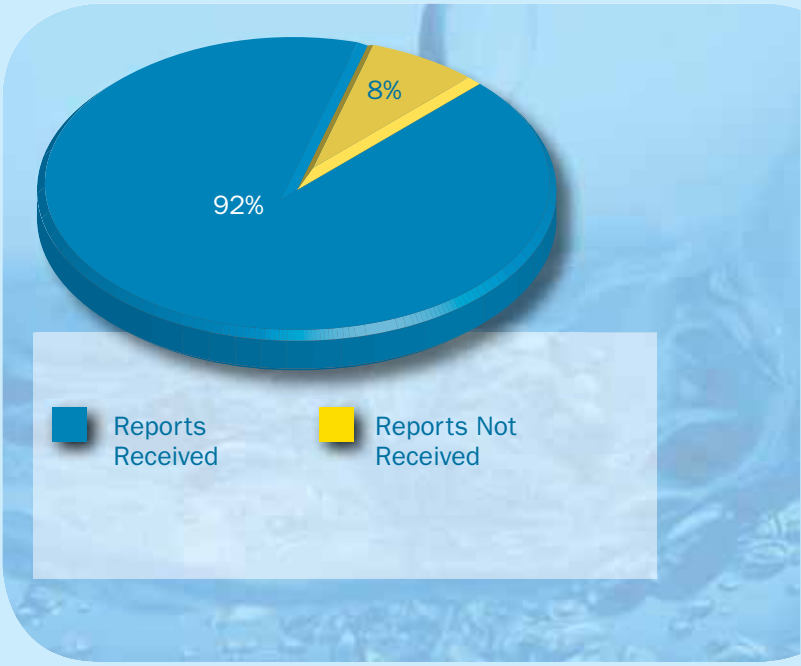
The Northwest University in Kirkland has a beautiful 56-acre campus, including large expanses of irrigated grass. In 2010, the University undertook a major renovation of its automatic irrigation system. The system was antiquated, prone to leaks and expensive to operate. The project included installing weather-based controllers, pressure reduction valves, flow sensors with automatic shut offs, and hundreds of efficient sprinkler heads. The results were dramatic: total irrigation water use for 2011 showed an astounding 50% drop compared to the previous five years, from an average of 9.9 million gallons in 2010 to 4.9 million gallons in 2011, resulting in tens of thousands of dollars saved in reduced water bills. Moreover, the campus and landscape are just as beautiful as ever.

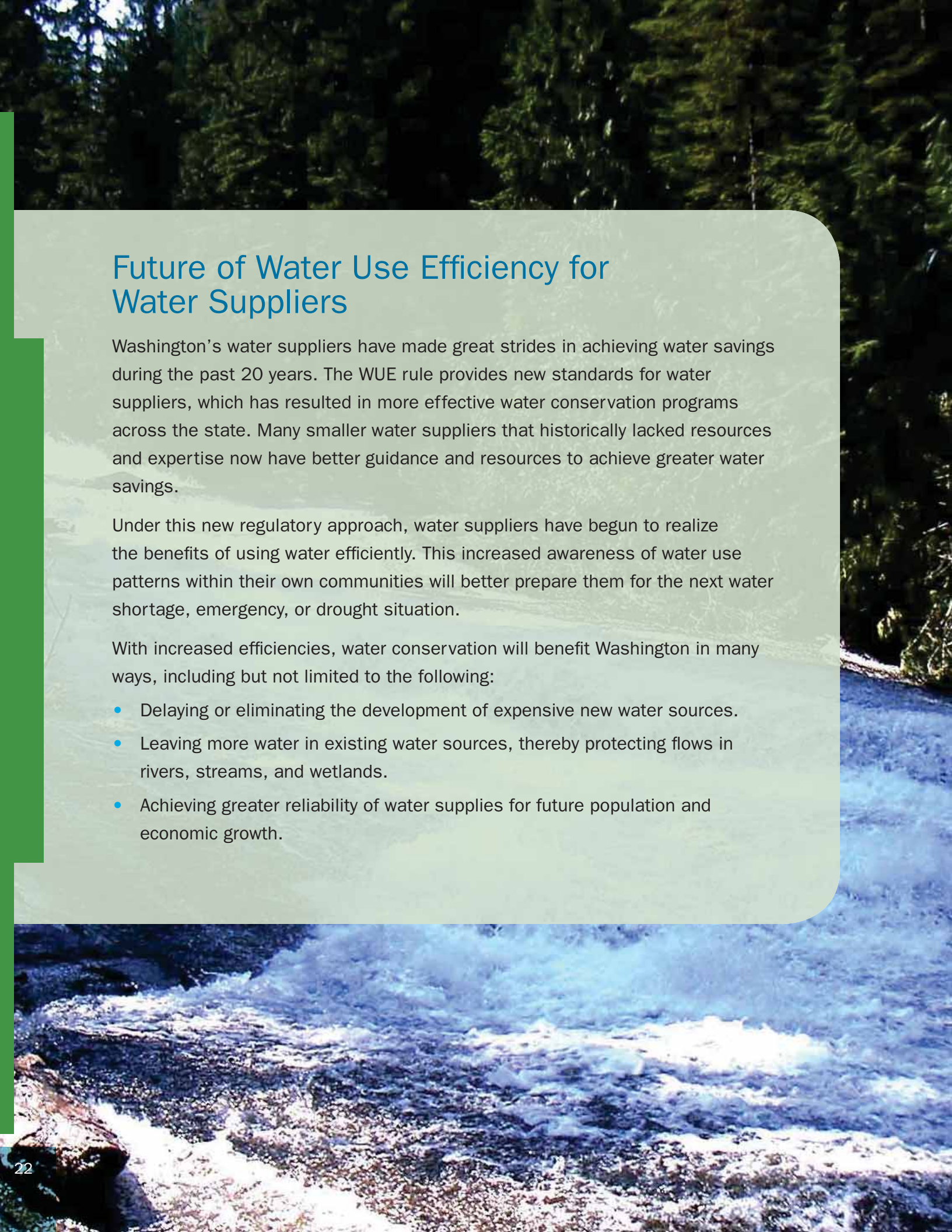
Reporting

The WUE rule contains an annual reporting requirement. Water suppliers must report production totals, authorized consumption, and progress toward achieving the supplier's water saving goals to both the department and its customers.

Figure 12 indicates that the majority of water suppliers submitted their water use efficiency reports to the department in 2009.

Figure 12: Annual Reports Submitted to the Department by Water Suppliers, 2009





Future of Water Use Efficiency for Water Suppliers

Washington's water suppliers have made great strides in achieving water savings during the past 20 years. The WUE rule provides new standards for water suppliers, which has resulted in more effective water conservation programs across the state. Many smaller water suppliers that historically lacked resources and expertise now have better guidance and resources to achieve greater water savings.

Under this new regulatory approach, water suppliers have begun to realize the benefits of using water efficiently. This increased awareness of water use patterns within their own communities will better prepare them for the next water shortage, emergency, or drought situation.

With increased efficiencies, water conservation will benefit Washington in many ways, including but not limited to the following:

- Delaying or eliminating the development of expensive new water sources.
- Leaving more water in existing water sources, thereby protecting flows in rivers, streams, and wetlands.
- Achieving greater reliability of water supplies for future population and economic growth.

Examples of Potential Savings

In 2011, roughly 1,100 Washington water suppliers consumed an average of 715 million gallons per day of water. If those water suppliers achieved a combined average 5% reduction in their current water use, it would save 36 million gallons of water per day. That is enough to supply water to more than 200,000 new homes built to EPA's WaterSense New Homes specifications.

About 900 water suppliers lost roughly 26 billion gallons of water in 2011 due to leaks and unauthorized use. If those water suppliers achieved a 1% reduction in total volume lost, it would result in 260 million gallons of water saved. This volume of water would be enough to serve the drinking water needs for the 6,000 water customers of the City of Bainbridge Island for an entire year.

Achieving these kinds of water reductions will not happen overnight, but there are approaches Washington's water suppliers can utilize to reach greater conservation savings. There are new technologies and avenues that remain largely unexplored, including:

- Encouraging customers to purchase WaterSense labeled products.
- Research the use of advanced metering infrastructure, which provides instantaneous water use information to customers and helps water suppliers identify water use patterns in real-time.
- Utilize more effective rate structures that encourage customers to conserve.
- Promote new irrigation technologies such as weather-based "smart" controllers and efficient sprinkler heads.
- Consider alternative sources for non-potable use, such as rainwater harvesting or grey water harvesting.

Water use efficiency has a promising future in Washington. The Partnership is dedicated to helping all stakeholders, including water suppliers, businesses, and environmental groups across the state to work together to use our precious water resources wisely and create a more sustainable future.

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Attachment E-2

City of Arlington Water Use Efficiency Goals and Results Since 2007 by Date and Decision Document

Focus	Action	Parameter	Units	From: Base Condition		To: Target Condition		Actual Condition		Goal Achieved?	Comments
				Year	Value	Year	Value	Year	Value		
2004 WSP--Adoption by City Council											
Demand	Reduce	System-wide average water use	gal/day per connection	2002	268	2008	255 (5%)	2007	253 (5.5%)	Yes	
						2018	241 (10%)	2008	242 (9.6%)	On target	Nearly met 10 yrs early
Supply	Reduce	Un-accounted for water	percent	2002	16%	Annually	<10%	2004 to 2007	Range 4% to 7%	Yes	
Both	Increase	Awareness, Education	Qualitative	Annually	Per program	Annually	Per program	Annually	Per program	Yes	
2008 City Council Resolution											
Demand	Reduce	System-wide average water use	gal/day per connection	2002	268	2008	255 (5%)	2008	242 (9.6%)	Yes	Achieved twice the intended reduction in 6 years
						2018	241 (10%)	2010	219 (18%)	On target	Exceeded reduction by 80% in half the time
Supply	Reduce	Distribution system leakage (DSL)	percent as 3-year running average	2004	12%	Annually	<10%	2006 to 2008	Range 5% to 6%	Yes	
Both	Increase	Awareness, Education	Qualitative	Annually	Per program	Annually	Per program	Annually	Per program	Yes	
2011 WSP--Adoption by City Council											
Demand	Reduce	System-wide average water use	gal/day per connection	2008	242	2014	237 (2%)	2014	215 (11%)	Yes	Achieved 5 times the intended reduction in 6 years
						2018	230 (5%)	2014	215 (11%)	On target	Doubled the target reduction with 4 years left
Supply	Reduce	DSL	percent as 3-year running average	2008	6%	Annually	<10%	2009 to 2013, 2014	7% to 9%, 13%	Yes No	Individual years >10% since 2012
Both	Increase	Awareness, Education	Qualitative	Annually	Per program	Annually	Per program	Annually	Per program	Yes	
2015 WSP--Adoption by City Council											
Demand	Reduce	System-wide average water use	gal/day per connection	2013	210	2018	206 (2%)	2014	209 (-2.3%)	Going backward	
						2025	206 (2%)	--	--	TBD	
Demand	Reduce	System-wide average water use	gal/day per ERU	2013	186	2018	183 (2%)	2014	204 (-9.5%)	Going backward	
	Maintain					2025	183 (2%)	--	--	TBD	
Demand	Maintain or Reduce	Peak Day Factor (MDD/ADD)	gallons per gallion	2014	Range 1.5 to 1.75	Annually	Range 1.5 to 1.75	--	--	TBD	
Supply	Reduce	DSL	percent as 3-year running average	2014	13.2%	Annually	<10%	TBD	TBD	TBD	
Both	Increase	Awareness, Education	Qualitative	Annually	Per program	Annually	Per program	TBD	TBD	TBD	

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Attachment 3

City of Arlington

Water Loss Control Action Plan

Developed to Reduce Distribution System Losses

Per WAC 246-290-820 (4)

Prepared by

Arlington Water Department

May 2015

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EE Water Loss Control Action Plan

EE.1 INTRODUCTION

EE.1.1 Background

Since passage of the Municipal Water Law in 2003, the City of Arlington Water Department has seen marked and consistent reductions in its "unaccounted for" water. For 3 years prior to the implementation of the Water Use Efficiency Rule (Rule) in 2007, the City was well under the threshold of (i.e., no more than) 10% established for distribution system losses (DSL) measured as a 3-year running average [WAC 246-290-820(4)]. For the 2012 through 2014, however, the City's DSL were 13.2 percent, 10.9 percent, and 15.6 percent. Consequently, in 2014, the City's 3-year running average DSL jumped from 9 percent to 13 percent.

The Rule requires utilities whose 3-year average DSL exceeds the threshold to develop and implement a water loss control action plan with control methods commensurate with the level of leakage. The water loss control action plan is submitted to the Department of Health with the City's water use efficiency program. This action plan is a key component of the Water Use Efficiency program submitted with the City's 2015 WSP.

EE.1.2 Consistency with Regulatory Requirements

WAC 246-290-820 indicates the following five items shall be included in a water loss control action plan for utilities with DSL between 10 percent and 20 percent. The subsection in parentheses indicates where that requirement may be found in this plan.

- The control methods necessary to achieve compliance with the distribution system leakage standard (E.3);
- An implementation schedule (E.4);
- A budget that demonstrates how the control methods will be funded (E.5);
- Any technical or economic concerns which may affect the system's ability to implement a program or comply with the standard including past efforts and investments to minimize leakage (E.6); and
- If the average distribution system leakage is greater than ten and less than twenty percent of total water produced and purchased, the water loss control action plan must assess data accuracy and data collection (E.3; E.6).

EE.1.3 Format of this Action Plan

Following this introduction, this water loss control action plan addresses:

- 5.2 Water Balance History—a quantitative history of the various components of the Water Department's Water Balance.
- 5.3 Summary of Control Methods—Recommendation identified under the Discussion section are brought forward and summarized here by water balance component.
- 5.4 Implementation Schedule—for a 6-year cycle.
- 5.5 Budget
- 5.6 Discussion of Water Balance Components—a review of trending and rationale for recommendations made for each component.

EE.2 WATER BALANCE HISTORY

A water balance for the period 2005 through 2014 is presented in **Table EE-1** *(found at the back of this water loss control action plan).*

EE.3 SUMMARY OF CONTROL METHODS

Recommendations for reducing water loss are summarized by water balance component in **Table EE-2**. Each recommendation is ranked qualitatively based on the proportion of the balance affected, and the ease of implementation.

Table EE-2

Recommended Actions for Reducing Distribution System Losses

Water Balance Category	Description	Percent of Total Supply	Recommendation	Priority
Total Water Supply by Source (1,000 gallons)				
Water Supply (Production and Purchase Sources)	Haller Wellfield (production)	88.5%	A. Install single source meter on WTP raw water line. B. Request vendor re-calibration of suspect meter. C. 3rd party validation of meter calibrations. D. Portable meter for in-house quality control.	H H M L
	Airport Wellfield (production)	3.3%	E. Calibrate meter	H
	PUD (purchase)	8.3%	None	--
	Marysville intertie (purchase)	0.0%	N/A	--
Water Demand by Revenue Type (1,000 gallons)				
Authorized Revenue Water Demand	Metered, Billed	77.6%	A. Audit utility billing software--structure B. Audit utility billing software--queries C. Audit utility billing process (data input, mgt) D. Review meter replacement schedule, priorities E. Review capability for customer meter testing	H H H M L
	Hydrant meters, Billed	0.1%	F. Test meters and calibrate as needed	M
	Bulk water, Estimated, Billed	0.0%	None	--

Table EE-2, continued

Recommended Actions for Reducing Distribution System Losses

Water Balance Category	Description	Percent of Total Supply	Recommendation	Priority
Water Demand by Non-Revenue Type (1,000 gallons)				
Authorized Non-Revenue Water Demand	WTP Backwash Waste	9.0%	A. Conduct trend & mass balance analysie on all meters involved in measuring backwash processes	M
	Water Quality Monitoring	--	None	--
	Distribution System Flushing	0.1%	B. Purchase hose/diffusers w/ built in flow meters. C. Enter data monthly or quarterly. D. Send bi-annual email reminder.	M L M
	Unmetered Facilities	0.1%	None	--
	Metered, Unbilled Facilities	0.0%	None	--
	Sanitary Sewer Collections	0.0%	E. Send bi-annual email reminder.	L
	Stormwater System	0.0%	F. Review procedures for each activity w/ M&O lead. G. Address one M&O staff meeting. H. Send bi-annual email reminders.	L L M
	Street Sweeping	0.0%		
	Airport Seasonal Watering	0.0%		
	Parks Seasonal Watering	0.0%		
	Fire Training & Hoses Tests	0.0%	I. Evaluate data & assumptions in light of literature. J. Develop bi-annual (April, Oct) email reminder. K. Tips for standardizing methods to increase accuracy.	L M L
	Heat Relief	0.0%		
	Fire Suppression	0.0%		
	Other Fire Depts (Arlington Hts)	0.0%	L. Contact Fire Chief and recommend log book. M. Provide portable meter for filling from hydrants. N. Send bi-annual email reminders. O. Consult other area Depts.	M L M M
Total Unauthorized Water Demand by Type (1,000 gallons)				
Unauthorized Water Demand	Theft	ND	None	--
	Errors	ND	A. See Water Supply and Revenue Water recommendations B. Intra-departmental audit of all water budget procedures using AWWA's free audit software	H - H -
	Leaks	5.2%	C. Implement leak detection surveys	H
	Breaks (mains, hydrants)	0.1%	D. Implement a main break database within the City's asset management system (Cartegraph). E. Develop form to facilitate post-repair data collection	M - L -
	Unaccounted-for Water	11.5%	None	--

EE.4 IMPLEMENTATION SCHEDULE AND BUDGET

The recommendations developed in **Table EE-2** are scheduled for implementation and budgeted over three years in **Table EE-3**. Estimated cost for implementing all recommendations is $13,250.

Table EE-3.

Schedule and Budget of Action Plan Recommendations

Number	Recommendation	Priority	Schedule	Budget
	1. Water Supply and Source Recommendations			
1A	Install single source meter on WTP raw water line.	H	2016	$0
1B	Request vendor re-calibration of suspect raw water meter on WTP train.	H	2015	$250
1C	3rd party validation of WTP meter calibrations.	M	2016	$500
1D	Portable meter for WTP in-house quality control.	L	2017	$1,000
1E	Calibrate airport well source meter	H	2016	$500
1	Total for Source and Supply			$2,250
	2. Revenue Water Recommendations			
2A	Audit utility billing software--structure	H	2016	$1,000
2B	Audit utility billing software--queries	H	2016	$1,000
2C	Audit utility billing process (data input, mgt)	H	2016	$1,000
2D	Review meter replacement schedule, priorities	M	2015	$0
2E	Review capability for customer meter testing	L	2017	$0
2F	Test hydrant meters and calibrate as needed	M	2016	$500
2	Total for Revenue Water			$3,500
	3. Authorized Non-revenue Water Recommendations			
3A	Conduct trend & mass balance analysie on all meters involved in measuring WTP backwash processes	M	2015	$0
3B	Purchase hose/diffusers w/ built in flow meters for distribution system flushing.	M	2016	$500
3C	Enter water main flushing data monthly or quarterly.	L	2016	$0
3D	Send bi-annual email reminder to Water staff.	M	2015	$0
3E	Send bi-annual email reminder to Wastewater staff.	L	2015	$0
3F	Review accounting procedures w/ M&O leads for Stormwater maintenance, street sweeping, airport maintenance, and park watering.	L	2016	$0
3G	Address one M&O staff meeting.	L	2016	$0
3H	Send bi-annual email reminders.	M	2015	$0
3I	Evaluate data & assumptions for fire water demands in light of literature.	L	2015	$0
3J	Develop bi-annual (April, Oct) email reminder to Arlington Fire Dept staff.	M	2015	$0
3K	Develop tips for standardizing Fire Dept accounting methods to increase accuracy.	L	2016	$0
3L	Contact Chiefs of neighboring Fire Depts and recommend log book.	M	2016	$0
3M	Provide portable meter to neighboring Fire Depts for filling from hydrants.	L	2017	$1,000
3N	Send bi-annual email reminders to neighboring Fire Depts.	M	2016	$0
3O	Consult other area Fire Depts. Re: accounting procedures and possible use of Arlington water.	M	2016	$0
3	Total for Authorized Non-revenue Water			$1,500

Table EE-3, continued

Schedule and Budget of Action Plan Recommendations

Number	Recommendation	Priority	Schedule	Budget
	4. Unauthorized Water Recommendations			
4A	See Water Supply and Revenue Water recommendations re: metering and accounting errors..	H	2016	N/A
4B	Intra-departmental audit of all water budget procedures using AWWA's free audit software.	H	2015	$0
4C	Implement leak detection surveys.	H	2017	$6,000
4D	Implement a main break database within the City's asset management system (Cartegraph).	M	2016	$0
4E	Develop form to facilitate post-repair data collection on	L	2016	$0
4	Total for Unauthorized Water			$6,000
	Totals			
Totals by year			2015	$250
			2016	$5,000
			2017	$8,000
Grand Total				$13,250

EE.5 DISCUSSION—WATER BALANCE COMPONENTS

EE.5.1 Water Supply

After completion of a cost of water supply in 2011, the City made the decision to produce more of its own water and reduce its reliance on the PUD. Over the course of several months in late 2011, the City reduced its demand for wholesale water from PUD from nearly 40 percent to less than 10 percent. It compensated by increasing reliance on the Haller well field and WTP from about 60 percent up to nearly 90 percent. This change in the City's water portfolio could compound any measurement errors made with source meters. Source meters at the WTP have not changed, and they are calibrated annually. One meter on each of three treatment trains measures the raw water influent through each train. These values are read and summed to quantify WTP input. Finished water production is metered on the single discharge line leaving the WTP. The difference between WTP influent and discharge is calculated as backwash waste for filter maintenance. On occasion, meters received back from the service provider calibrating the source meters appear to result in aberrant data—evident when trending pre- and post-calibration measurements from each of the meters. Corrective measures may include: installation of a single influent meter on the line from

the Haller well field into the WTP; re-calibration of meters producing spurious results; confirmation of calibrations using a 3rd party service provider; periodic duplicate measurements using a portable meter; etc.

The PUD regularly maintains the meter monitoring the water purveyed to the City, and the City regulates the flow from the PUD through a flow control valve. It is not suspected as a source of error.

The meter at the airport well has not been recently calibrated. It provides about three percent to six percent of the City's water on an annual basis. Calibration of the airport meter is warranted and recommended.

EE.5.2 Authorized Revenue Water

Regarding revenue water, the City's Finance Department changed accounting software in 2012, and the Water Department transitioned from bi-monthly to monthly billing that same year. It may be possible that errors in the programming of city procedures within the software were made, or that database fields or query procedures within the software are not fully understood. Given the timing of these events with the increased magnitude and consistency of unaccounted for water, it is thought that these changes are the most likely explanations.

Water usage from hydrants by contractors is understood to be well-documented by the City's hydrant permit system and use of portable meters leased from the Water Department. The City's only bulk water filling station near the WTP operated using its own permit system was discontinued in 2008 for safety and security reasons during construction of wastewater reclamation facilities. This reduced one source of loss, but could conceivably have increased theft by users from more remote hydrants. Recommendations include testing and re-calibration of portable meters, and reconsideration of a bulk water station.

EE.5.3 Authorized Non-Revenue Water

WTP Backwashing

Authorized, non-revenue uses of potable water include Water Department operations, other public works' uses, and Fire Department operations. By far the greatest non-revenue uses are filter maintenance and water main flushing by the Water Department. Backwashing of the clarifiers and filters in each of the three treatment trains in the WTP uses approximately 10 percent of the raw water drawn from the Haller well field, and 8 percent of all water into the system. As described earlier in this section, the installation of a single source meter on the raw water line from the Haller well field into the WTP could reduce possible errors introduced by reading and summing the values from meters on the three individual trains. Existing meters at the WRF headworks and at the inlet to the constructed wetland (both of which receive backwash waste) measure could be analyzed to help validate the accuracy of WTP meters which quantify the backwash at its source.

Water Main Flushing

Water main flushing to maintain water quality, particularly in dead-end mains, is a regular practice within the Water Department. It is the second greatest authorized use of water for nonrevenue purposes, but uses less than one percent of the water used in backwashing. Multiple staff conduct flushing for regular preventative maintenance, for disinfection during construction, and in response to water quality complaints (calls regarding high chlorine levels and brown, manganese-stained water are most common). Each flushing event is documented on a form developed for this purpose. However, flow estimates appear to vary by observer, and perhaps through time for each staff person. Use of a diffuser with a pitot tube or flow meter or another gage at the hydrant would remove the variability and error in these flow estimates. Alternatively, staff could benefit from the development of a flow rate chart, using physical data (e.g., pressure zone, elevation, data from previous flow tests) and empirical data (e.g., characteristics of the discharge stream, deflection of the fire hose) to help develop flow estimates.

Other Public Works' Uses

Other divisions of the City's Publics Works Department are authorized to use water from hydrants without a fee. The Wastewater Department uses water for sewer flushing. The Maintenance and Operations (M&O) Department uses water for maintenance of storm sewers, street sweeping, and beautification of parks, planters, and the municipal airport. Lead staff report usage on an annual basis, except Wastewater staff record water usage on an event or work order basis in their asset management program. Recommendations for improvement include meeting with the M&O lead to review procedures for each activity, addressing one M&O staff meeting, and sending out e-mail reminders to lead staff every 6 month.

Fire Department Uses

Authorized, non-revenue uses by the Arlington Fire Department include training, testing of hoses and pumps, fleet maintenance (washing), and occasional heat relief for area children. Current procedure is that the Fire Dept. Training Capt. reports annually using Fire Department records. Reports are made within a spreadsheet containing all prior year estimates and rationale. The Training Captain position has high turnover; and the assumptions made and estimates provided have not been audited, but use of the same spreadsheet each year is intended to maintain consistency in the uses tracked and reported. Recommendations include an evaluation of historic fire data and assumptions in light of the literature. Bi-annual (April, Oct) email reminders for Fire Dept. uses should include tips for standardizing methods and improving the accuracy of estimates, and should be sent through the Chief to the Captains.

Use of hydrants for emergency fire suppression is obviously an authorized use, but has been tracked within the WUE Program under Unauthorized Uses as an apparent loss. This is based on the premise that metering at hydrants or through fire trucks during emergency procedures is unrealistic or technically infeasible. Neither has it been assumed that fire fighters would consciously determine or estimate the flows used in fighting any particular fire. Without hard estimates of flow rates and durations for fire suppression, requested data has been limited to

number of fires where water has been used. Nevertheless, in recent years, the Arlington Fire Department has provided estimates of water used even in firefighting. Recommendations with regard to the water budget include: evaluate historic data and assumptions in light of the literature; evaluate billing data for revenue water charged to the Fire Department; develop a bi-annual (April, Oct) email reminder to Fire Captains through the Chief, including tips for standardizing methods and improving accuracy of water use estimates.

At least one other Fire District (Arlington Heights No. 21) obtains its water from hydrants served by the City. Based on a single conversation with the Assistant Fire Chief, a lump sum estimate of 75,000 gallons has been entered in the water budget. Recommendations include contacting the Fire Chief to request a log book and standardized procedures for typical operations, sending bi-annual email reminders, and querying other area fire departments as well. The City may also consider providing a portable meter for filling from hydrants.

EE.5.4 Unauthorized Water and DSL

Total unauthorized uses are divided into apparent losses and real losses. Apparent losses include emergency fire suppression, theft from hydrants, theft from unauthorized connections, and errors of all types. Real losses include main and hydrant breaks and leaks. Estimates are provided for these classes when known.

Apparent Losses

Theft from hydrants is thought to be limited by the use of 93 hydrant locks in the more remote parts of the WSA. The biggest likely offender is thought to be hydroseeders. Theft from unauthorized connections is also relatively rare. One illicit connection was discovered and corrected at an industrial facility on the airport in 2014. Errors cannot be known until they are discovered. The best way to reduce them is to define and implement, careful, consistent procedures, and to audit those procedures on a regular basis. As an example, it was an audit of billing and tracking procedures in 2004 that consumption from meters measuring in gallons was being combined with consumption from meters measuring cubic feet, and that exports for tracking purposes were being converted, with errors, to hundred cubic feet. As mentioned above, it is perceived that errors in the current billing and reporting procedures explain a significant fraction of unauthorized uses (distribution system losses) experienced from 2012 through 2014. Recommendations include an inter-departmental review of current revenue water procedures as described previously, as well as an intra-departmental audit of all water budget procedures using AWWA's free audit software.

Real Losses

Volumes of real water loss through main breaks and hydrant breaks are typically not estimated, but numbers and locations of breaks are maintained in a log book at the Water Department. SCADA controls and careful production management have prevented any reservoir overflows in the corporate memory of Water Department staff (up to 30 years). Recommendations include implementation of a main break database within the City's asset management system (Cartegraph). A form should be developed and implemented to facilitate collection of appropriate field data using

appropriate procedures. Once in the database, operations staff can evaluate main break information and distribution system management practices relating to main breaks in order to prioritize water mains within future replacement programs.

Any leaks that may be discovered are typically addressed within hours. The City has not executed a pro-active leak detection program in the past 10 years, and has instead focused its annual main replacement program on those segments where breaks had been most frequently occurring. With the completion of the annual program in 2014, all of the Water Department's high priority segments have been replaced (i.e., older AC main in areas with wet [till-based] soils and a history of repeated main breaks). In areas where main has replaced or abandoned in place, the City has conducted "post-mortem" pressure checks to validate its assumptions that, though replaced, the line was still competent to provide service without leaks at water pressures greater than the typical service pressure. To date, these efforts have successfully validated staff opinions that the preventatively replaced mains were indeed not leaking. Recommendations include implementation of this same procedure on remaining AC main and the older DI main in the distribution system to facilitate the development of an updated main replacement program.

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Table EE-1

City of Arlington Potable Water Balance

Water Budget Category	Description	Calendar Year 2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Averages of Selected Years as Percent of Category: 2008, 2010, 2011	2012–2014	Averages of Selected Years as Percent of Total Supply: 2008, 2010, 2011	2012–2014
Total Water Supply by Source (1,000 gallons)															
Water Supply (Production and Purchase Sources)	Haller Wellfield (production)[1]	334,604	341,210	337,884	311,015	334,292	307,264	324,928	448,713	477,628	485,625	54.3%	88.5%	54.3%	88.5%
	Airport Wellfield (production)	17,612	7,807	10,404	9,507	12,369	19,069	12,038	13,502	9,587	30,052	1.3%	3.3%	1.3%	3.3%
	PUD (purchase)	153,183	196,910	173,369	187,517	181,396	155,636	128,928	43,554	30,917	58,445	19.8%	8.3%	19.8%	8.3%
	Marysville intertie (purchase)	2,756	0	0	0	0	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%
Total Water Supply		508,989	547,087	522,651	509,073	528,057	481,969	465,893	505,769	518,131	574,122	100%	100%	100.0%	100.0%
Water Demand by Revenue Type (1,000 gallons)															
Authorized Revenue Water Demand	Metered, Billed[2]	447,647	477,747	469,602	457,677	428,421	417,996	421,812	396,705	415,446	426,611	100.0%	100.0%	84.3%	77.6%
	Hydrant meters, Billed[3]	721	317	388	327	1,037	423	349	265	369	433	0.0%	0.1%	0.0%	0.1%
	Bulk water, Estimated, Billed[3]	16	20	19	53	42	22	19	40	40	48	0.0%	0.0%	0.0%	0.0%
Total Demand for Revenue Water		447,647	477,747	469,602	457,677	428,421	417,996	421,812	396,705	415,446	426,611	100%	100%	84.3%	77.6%
Water Demand by Non-Revenue Type (1,000 gallons)															
Authorized Non-Revenue Water Demand	Water Treatment Plant Backwash Waste[4,5]	35,571	33,455	27,134	19,504	28,125	28,218	35,873	41,813	45,063	56,809	97.1%	98.2%	4.0%	9.0%
	Inline Water Quality Monitoring[4,5]	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Distribution System Flushing[4]	721	317	388	327	1,037	423	349	265	369	433	0.5%	0.7%	0.0%	0.1%
	Unmetered Facilities[4,8]	0	0	0	0	0	0	0	0	357	500	0.0%	0.5%	0.0%	0.1%
	Metered, Unbilled Facilities[4,8]	0	0	0	0	0	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%
	Sanitary Sewer Collection System[4]	16	20	19	53	42	22	19	40	40	48	0.0%	0.1%	0.0%	0.0%
	Stormwater System[6]	0	0	0	18	0	16	8	17	17	25	0.0%	0.0%	0.0%	0.0%
	Street Sweeping[6]	0	0	10	49	44	31	30	16	16	14	0.0%	0.0%	0.0%	0.0%
	Airport Seasonal Watering[6]	ND	ND	ND	ND	ND	ND	ND	ND	ND	15	ND	0.0%	ND	0.0%
	Parks Seasonal Watering[6]	ND	ND	ND	ND	ND	ND	ND	ND	ND	10	ND	0.0%	ND	0.0%
	Fire Training & Hoses Tests[7]	0	0	0	0	139	76	76	76	103	93	0.1%	0.2%	0.0%	0.0%
	Heat Relief[7]	0	0	0	0	90	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%
	Fire Suppression[7]	ND	ND	ND	ND	55	76	ND	ND	42	25	0.3%	0.1%	0.0%	0.0%
	Other Fire Depts (Arlington Heights)[4]	ND	ND	ND	ND	ND	ND	ND	ND	75	75	ND	0.1%	ND	0.0%
Total Demand for Non-Revenue Water		36,309	33,792	27,551	19,951	29,532	28,862	36,355	42,227	46,081	58,046	100%	100%	4.0%	9.1%
Total Unauthorized Water Demand by Type (1,000 gallons)															
Unauthorized Water Demand	Apparent Losses: Theft (hydrants, illicit connections	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Apparent Losses: Errors (metering, accounting)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Real Losses: Leaks	ND	ND	ND	ND	ND	ND	ND	ND	ND	30,000	ND	33.5%	ND	5.2%
	Real Losses: Breaks (mains, hydrants)	ND	ND	ND	ND	ND	ND	ND	ND	ND	500	ND	0.6%	ND	0.1%
	Unaccounted-for water	25,034	35,548	25,498	31,445	70,105	35,111	7,726	66,837	56,604	58,965	100%	65.9%	5%	11.5%
Total Unauthorized Water Demand		25,034	35,548	25,498	31,445	70,105	35,111	7,726	66,837	56,604	89,465	100%	100%	5%	13.2%
Distribution System Leakage (DSL)															
Total DSL (1,000 gallons)		25,034	35,548	25,498	31,445	70,105	35,111	7,726	66,837	56,604	89,465				
Total DSL (%)		4.9%	6.5%	4.9%	6.2%	13.3%	7.3%	1.7%	13.2%	10.9%	15.6%				
Rolling 3-Year Average DSL (%)		4.5%	5%	5%	6%	8%	9%	7%	7.4%	8.6%	13.2%				

[1] Total raw water from Haller well field influent to WTP and upstream of filters and backwash processes.

[2] Billed by Finance Dept.

[3] Billed by Water Dept.

[4] Data tracking by Public Works Dept. Utilities Division

[5] Difference between WTP finished and raw water meters. A negligible amount of water used for inline water quality monitoring and sampling is included with backwash.

[6] Data tracking by Maintenance & Operations Dept.

[7] Data tracking by Fire Dept

[8] Includes flushing of WTP clearwell after water quality concern for iron and manganese (2013), and 500,000 gallons for partial draining of reservoirs during cleaning (2014).

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F WATERSHED AND WELLHEAD PROTECTION PROGRAM

F.1 2011 WSP VERSION NOT REVISED FOR THE 2015 WSP UPDATE

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F Wellhead Protection and Watershed Control Program

F.1 INTRODUCTION

All federally defined Group A public water systems that use groundwater as their source are required to develop and implement a wellhead protection program. In addition, purveyors of water systems using groundwater under the direct influence of surface water (GWI) sources are also required to develop and implement a watershed control program. The Washington State Department of Health (DOH) has concluded that the City of Arlington's (City) Haller Wellfield is in hydraulic continuity with the Stillaguamish River (1994 *Comprehensive Water System Plan*); therefore, subject to the watershed control program requirements. The following information is a combined wellhead and watershed protection control plan for the City.

F.1.1 Wellhead Protection and Watershed Control Elements

The DOH administers the Washington State wellhead protection program. The required elements for wellhead protection and watershed control programs are contained in Washington Administrative Code (WAC) 246-290-135 which include:

- Description of the watershed (location, hydrology and land ownership);
- Documentation of source water quality trends;
- Identification of current watershed control measures and monitoring activities;
- Completed susceptibility assessment of each water source;
- Delineation of wellhead protection areas for each water source;
- An inventory of known and potential contaminant sources (this inventory list must be updated every two years);
- Documentation of the purveyor's notification to all owners/operators of known and potential sources of contamination within wellhead protection areas;
- Documentation of the purveyor's notification to regulatory agencies and local governments of the defined boundaries of the wellhead protection areas and the findings of the contaminant source inventory;

- A contingency plan to ensure that customers have an adequate supply of water in the event that contamination causes a temporary or permanent loss of the system's principal source of supply; and
- Documentation of the purveyor's coordination with local emergency spill responders (i.e. police, fire and health departments) regarding wellhead protection area boundaries, source susceptibility and contingency plans.

In addition to the requirements of the wellhead protection program, purveyors of water systems using surface water or GWI sources are required to develop and implement a watershed control program. The City withdraws water from a groundwater wellfield that is in hydraulic continuity with the Stillaguamish River and is therefore subject to the watershed control program requirements. The minimum required elements of a watershed control program for water systems in Washington State are as follows.

- A description of the watershed that includes its location, hydrology and land ownership, and the identification of activities that may have a negative impact on source water quality.
- An inventory of all potential sources of surface water contamination, including the locations of owners/operators located within the watershed that have a significant potential to contaminate the source water quality.
- Watershed control measures that include documentation of ownership and relative written agreements as well as monitoring activities and water quality.
- System operation and emergency provisions.
- Documentation of water quality trends.

F.1.2 Description of the Watershed

The City is located in northwestern Snohomish County, Washington, at the confluence of the north and south forks of the Stillaguamish River. The City is located primarily on glacial outwash terraces above the Stillaguamish River flood plain. The last glacial epoch, ending approximately 13,000 years ago, deposited meltwater and sediment from receding glaciers. Once the glacier receded, the Stillaguamish River eroded the floodplain created by the glacier and produced alluvial terraces in the river valley.

The water service area's geology is typical of recessional outwash terraces and alluvial deposits composed of primarily sand and gravels. The sand and gravels are from 100 to 200 feet deep and provide good drainage throughout those areas. Alluvial formations are primarily located near the Haller Wellfield, due to its immediate proximity to the Stillaguamish River.

Soils in the terrace area are generally classified as Everett gravelly sandy loam, which are very permeable and slightly erosive. The characteristics provide a good soil for development, although shallow excavations are difficult to construct. South and east of the alluvial terrace soils are

primarily Tokul gravelly loam soils. Two to four feet of impermeable hardpan is usually found beneath the glacial till soils, which may result in high water tables during wet seasons.

The topography of the City's water service area varies greatly in elevation. The lowest elevations within the service area are located near Interstate 5 at Island Crossing where the elevation is approximately 40 feet above mean sea level (NAVD 88). A majority of the water service area is on a terrace above the Stillaguamish River's flood plain. Ground elevations range from 40 feet near the crossing of Interstate 5 and State Route 530 to 400 feet near the crossing of State Route 9 and State Route 531. The highest areas served are in the eastern portion of the service area where elevations along Burn Road reach approximately 600 feet. Steep slopes are located along the Stillaguamish River, where elevations drop 80 to 100 feet, and along transitions between the Getchell Plateau and the Marysville Trough, and between the Marysville Trough and the alluvium of the Stillaguamish floodplain.

F.2 DOCUMENTATION OF SOURCE WATER QUALITY TRENDS

The quality of the City's sources has been good and meets or exceeds all drinking water standards, except for slightly higher than allowable levels of manganese at the Airport Wellfield, which was only apparent in 2001. Monitoring of inorganic compounds (IOC) and physical substances was accomplished once per year since 2001. The City received a waiver that only required one complete IOC sample from January 2002 through December 2010. Nitrate monitoring has also been performed once per year since 2001. The results of this monitoring indicate that IOC primary and secondary standards were met. Volatile organic compounds (VOCs) were also monitored and all standards were met. The results of radionuclide monitoring performed in September 2004 indicated that all of the City's sources were in compliance with the regulations. As required by DOH, the City sampled for the chemical ethylene dibromide (EDB), which was once commonly used as a pesticide and gasoline additive, and the chemical dibromo-chloropropane (DBCP) in 1998 and 2001. The results of the EDB and DBCP monitoring indicated that the City is meeting the regulatory requirements. Since then, the City has been granted a state waiver for these synthetic organic chemical (SOC) compounds through 2010. Most recently, the City collected annual arsenic samples from 2001 through 2008 and found that the levels were well below the maximum contaminant levels (MCLs), per the arsenic rule.

In the Fall of 2009, increased fish activity within the Stillaguamish River generated increased organic compounds. This impacted the water supply from the Haller Wellfield, which led to taste issues and numerous customer complaints. While the finished water from the treatment facility met all safe drinking water regulations, the treatment process does not have a granular activated carbon filter or similar process to improve tastes and odors.

F.3 IDENTIFICATION OF CURRENT WATERSHED CONTROL MEASURES AND MONITORING ACTIVITIES

The City's efforts toward protection of its water resources include:

- Restricting access to wellfields;
- Limiting development activity near wellfields;
- Requiring parks and airport maintenance staff to discontinue the use of herbicides/pesticides around wellhead sites;
- Daily monitoring of river water quality, which affects the Haller Wellfield;
- Daily inspection of all source of supply and well sites;
- Daily water quality monitoring of well sources; and
- Being observant of potential harmful activities that can eventually affect the sources of supply.

F.4 SUSCEPTIBILITY ASSESSMENTS

Susceptibility assessments, initial wellhead protection zone mapping and a contaminant source inventory were completed by the City in the mid-1990s. DOH assigned a moderate susceptibility rating to the Airport Well and a high susceptibility rating for the Haller Wells, based on the results of the susceptibility assessment survey for each source.

F.5 DELINEATION OF WELLHEAD PROTECTION AREAS

The City's wellhead protection capture zones were delineated in a memo prepared Pacific Groundwater Group in February 2007, which is included as **Appendix 1**. The wellhead protection capture zone delineations are shown in **Figure 1**.

F.6 INVENTORY OF POTENTIAL CONTAMINANT SOURCES

An essential element of wellhead protection and watershed control program is an inventory of all potential sources of contamination throughout delineated wellhead protection and watershed control areas. The purpose of the inventory is to identify past, present and proposed activities that may pose a threat to the sources of water supply. The watershed control component of the Haller Wellfield requires an inventory of potential surface water contaminant sources located within the Stillaguamish River watershed.

F.6.1 Inventory Approach

An inventory of potential sources of groundwater contamination and a compilation of Stillaguamish River water quality data was conducted in 2010 during preparation of the City's 2010 *Comprehensive Water System Plan*.

Washington State Department of Ecology (DOE) maintains a Facility/Site Database online that lists facilities and sites that could pollute the air or water. These include:

- State cleanup sites;
- Federal superfund sites;
- Hazardous waste generators;
- Solid waste facilities;
- Underground storage tanks;
- Dairies; and
- Enforcement.

The DOE information that was compiled for this report is included in **Appendices 2 and 3**.

Stillaguamish River water quality data was obtained from Section 303(d) lists of the Clean Water Act and is included in **Appendix 4**.

F.6.2 Inventory Findings

The inventory efforts described above revealed multiple potential sources of contamination within all of the wellhead protection zones as shown in **Table F1**. These potential sources include leaking underground storage tanks, airplane fuel storage and hazardous waste sites. A detailed assessment of existing potential sources is needed.

Appendices 2 and 3 include contaminant source inventory data for the six-month, one-year, five-year and 10-year time-of-travel zones, and their associated buffers, for the Haller Wells and the Airport Well, respectively. This inventory data represents primarily database research with very limited field assessment. A more exhaustive field inventory and assessment is needed. Future assessments shall include examination of septic system databases available from the Snohomish County Health District.

F.6.3 Stillaguamish River Contaminants

The Haller Wellfield is located within the Stillaguamish River drainage basin, which is shown in **Figure 2**. The basin consists of approximately 694 square miles of land, ranges from 6,844 feet to sea level in elevation and has over 4,600 miles of streams and creeks. The north and south forks of the Stillaguamish River originate in the Cascade foothills and they come together to form the mainstem Stillaguamish River near the Haller Wellfield. The waters of the Stillaguamish are classified as Class A from its mouth to several miles into the north and south forks, and Class AA up into the headwaters of each of the forks (WAC 173-201A-130).

Table F-1

Potential Contaminants in Time of Travel (TOT) Zones

Potential Contaminant Type	6-Month Buffer	6-Month	1-Year Buffer	1-Year	5-Year Buffer	5-Year	10-Year Buffer	10-Year
Haller Wells								
Hazardous Waste	0	1	0	0	0	3	0	0
Leaking Underground Storage Tanks	0	0	0	1	0	1	0	0
Spills	0	0	0	0	0	1	0	0
Stormwater Discharge[1]	0	1	0	1	0	0	0	1
Underground Storage Tanks	0	0	0	1	0	1	0	0
Private Septic Systems	Unknown							
Haller Wells Totals per TOT Zone	**0**	**2**	**0**	**3**	**0**	**6**	**0**	**1**
Airport Well								
Hazardous Waste	1	0	0	0	0	0	0	0
Leaking Underground Storage Tanks	0	1	0	0	0	0	0	0
Stormwater Discharge[1]	1	0	0	0	0	1	0	0
Toxic Cleanup Site	1	1	0	0	0	0	0	0
Private Septic Systems	Unknown							
Ariport Well Totals per TOT Zone	**3**	**2**	**0**	**0**	**0**	**1**	**0**	**0**

(1) Construction sites that disturb 1 or more acres of land through clearing, grading, excavating or stockpiling of fill material that discharge stormwater to State waters.

The DOE maintains several water quality monitoring stations on the Stillaguamish River, near and upstream of the City. Section 303(d) of the Clean Water Act requires Washington State to maintain a list of surface waters throughout the State that are impaired by pollutants. Contaminants that exceed water quality standards in the Stillaguamish River are fecal coliform, ammonia-N, mercury, lead, copper and arsenic. Other parameters which exceed water quality standards include temperature, dissolved oxygen and pH.

The development of a Total Maximum Daily Load (TMDL) is required for waters placed on the 303(d) list. A TMDL is currently available for the Stillaguamish River for fecal coliform, dissolved oxygen, pH, mercury, oxygen and temperature. Copies of these publications can be found on the DOE website. DOE is also considering the addition of other parameters and other water bodies. Under consideration are water bodies in hydrologic connection with the Airport Wellfield aquifer, including Portage Creek and Quilceda Creek.

F.6.4 Other Potential Sources

Other potential sources of contamination that were not inventoried at this time include:

Agricultural Practices – Agricultural activities within the wellhead protection areas can be a threat to the City's groundwater sources.

Creeks – Creeks located within wellhead protection areas can carry contaminants that may pose a threat to the City's groundwater sources.

Hazardous Household Materials – Almost all households have hazardous materials that are commonly used for a variety of cleaning and maintenance purposes. Some of these materials include cleaning solvents, paints, antifreeze and engine oil.

Hazardous Spills from Highways, Railways or Airways – The Burlington Northern Railway passes through the six-month, one-year and five-year wellhead protection zones of the Haller Wellfield. State Route 530 passes through the five-year and five-year buffer wellhead protection zones of the Airport Wellfield. State Route 9 passes through the ten-year buffer wellhead protection zone of the Airport Wellfield. Automobile or train accidents within these sections of the highway or railway could result in spills of gasoline or other transported hazardous materials that would threaten the aquifers of the Haller or Airport Wellfields. In addition, chronic long-term inputs of highway related pollutants may impact the wellfields. The Airport Wellfield's aquifer location beneath the Arlington Airport puts it at risk for spills related to airport operations and airplane accidents.

Home Oil Furnace Tanks – Some residents in the City may be using oil furnaces to heat their homes. The fuel for oil furnaces can be stored in above-grade or buried tanks.

Pesticide and Herbicide Use Along Roads – Pesticides and herbicides are often applied along the State highways by the Washington State Department of Transportation.

Private Wells – Improperly abandoned wells may pose a threat to the City's groundwater sources. Wells with insufficient seals can provide a pathway for contaminants to enter the aquifer used by the City's wells.

Septic Systems – Septic systems for wastewater disposal and treatment may be found in areas of the City that are not served by the City's sewage collection system. The ability to remove pollutants from the discharge of these systems depends on the type of the surrounding soil. In addition, septic systems may be unlawfully used for disposal of toxic materials.

Stormwater – Stormwater runoff can potentially contaminate the City's groundwater sources. Runoff from industrial and commercial areas can contain high levels of metals and hydrocarbons. Runoff from residential areas is typically high in nutrients, pesticides and metals. The City's consideration of regional detention and infiltration facilities could potentially impact the aquifers. The City plans to work with the DOE accordingly.

Wastewater Treatment Plant – The City's wastewater treatment plant is located within the six-month wellhead protection zone of the Haller Wellfield. The probability of contamination from effluent released by the treatment plant is reduced because it discharges to the Stillaguamish River downstream of the wellfield. Upland activities at the wastewater treatment plant need to be carefully evaluated and monitored to avoid groundwater contamination.

10.1.1Inventory Update Requirements

In accordance with WAC 246-290-135, the inventory list of actual and potential groundwater contaminant sources located within the delineated wellhead protection areas must be updated every two years. It is recommended that the timing of the updates be scheduled such that every third update is accomplished at the same time as the re-evaluation of the wellhead protection area boundaries, which is required during each six-year Comprehensive Water System Plan (WSP) update.

F.7 DOCUMENTATION AND NOTIFICATION

The City will be conducting the following.

- Documentation of the purveyor's notification to all owners/operators of known and potential sources of contamination within wellhead protection areas.
- Documentation of the purveyor's notification to regulatory agencies and local governments of the defined boundaries of the wellhead protection areas and the findings of the contaminant source inventory.
- Documentation of the purveyor's coordination with local emergency spill responders (i.e. police, fire and health departments) regarding wellhead protection area boundaries, source susceptibility and contingency plans.

F.8 CONTINGENCY PLAN

An Emergency Response Plan and a vulnerability assessment have been prepared that conform to the requirements of the Bioterrorism Act of 2002. The documents contain a vulnerability assessment of the City's water system facilities, a contingency operation plan for responding to emergency events, a list of water personnel responsible for making decisions in emergency situations and other elements. The Vulnerability Assessment and Emergency Response Plan also contain detailed action plans and other confidential information that is exempt from public disclosure under the provisions of Revised Code of Washington (RCW) 42.56.210.

A summary of the contingency operation plan for the wells in the event of contamination of the water sources is as follows.

F.8.1 Emergency Condition: Aquifer Contamination

Impact on System: Potentially major impact. Water not suitable for potable use causing a major loss of supply. The City currently uses two independent aquifers for supply: Marysville Trough Aquifer (Airport Wellfield); and Stillaguamish Aquifer (Haller Wellfield).

Emergency Response:

1. Shut down the wells that pump water from the aquifer and obtain water quality samples.
2. Notify DOH of the aquifer contamination.
3. Notify all customers of the problem and instruct them to boil all water to be used for consumption and cooking, if boiling is effective for the type of contamination.
4. Close distribution main valves to isolate the area of contamination within the distribution system.
5. Analyze water quality of water within reservoirs and dispose of properly if contaminated.
6. Disinfect reservoirs, treatment plant and water mains, as necessary, to remove contaminated residuals, if disinfection is effective for the contamination type.
7. Adjust control of system facilities, as necessary, to provide supply from storage facilities if water within them is not contaminated.
8. Flush and disinfect the well as needed to remove contaminant from aquifer. Flush to sewer, if approved by wastewater treatment plant.
9. Monitor water quality at affected well field and investigate cause of contamination.
10. Implement water use reduction measures, as necessary, to ensure an adequate supply of water.

The City's plan to pursue long-term alternative sources of supply, including groundwater wells, wholesale interties and emergency interties, will improve the City's ability to maintain uninterrupted water supply during times of source water quality emergencies.

F.9 RECOMMENDATIONS

The City's Wellhead Protection and Watershed Control Program is an ongoing effort that requires staffing and resources to ensure its effectiveness in protecting the source of drinking water that is supplied to the City's customers. As discussed previously in this document, the regulations require that the City perform an inventory of all potential sources of groundwater contamination throughout the delineated wellhead protection areas every two years. At a minimum, the City must re-evaluate the wellhead protection area boundaries during the WSP update process, which occurs every six years.

The following tasks are recommended for ongoing wellhead and watershed protection.

- Perform a more detailed inventory and assessment of potential sources of groundwater contamination within the wellhead protection areas. Especially review leaking

underground storage tanks, fuel/petroleum (large quantity) storage facilities, septic systems and agricultural practices.

- Perform a more detailed inventory of potential sources of surface water contamination within the Stillaguamish River Watershed and monitor the status of the TMDL currently under development for the watershed.
- Confirm location, condition and proper closure of abandoned private wells, especially those within one-year time of travel zones.
- Perform a more accurate delineation of the wellhead protection area boundaries utilizing analytical models, hydrogeologic mapping and computer flow models.
- Distribute the required notifications as a result of updated delineations and inventory findings.
- Develop and distribute public education materials within the wellhead protection areas to address groundwater protection and household, landscape and gardening practices that could affect groundwater quality.
- Develop and adopt a wellhead protection ordinance that addresses permitted uses and performance standards for properties located within designated wellhead protection areas. Evaluate restricting land uses in the one-year time of travel zones that pose a high risk to groundwater such as gas stations; oil recycling; dry cleaners; fuel storage facilities; high density animal keeping; high density septic systems and golf courses. Coordinate these efforts with Snohomish County.
- Develop signage at the perimeter of and at strategic locations around the wellhead protection areas to inform people that they are entering an area that contains the City's drinking water source that is vulnerable to surface activities.

APPENDICES

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APPENDIX 1

Pacific Groundwater Group

Wellhead Protection Capture Zone Memo

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APPENDIX 2

DOE Pollution Facilities/Site

Haller Wellfield Wellhead Protection Capture Zone

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APPENDIX 3

DOE Pollution Facilities/Site

Airport Wellfield Wellhead Protection Capture Zone

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APPENDIX 4

Clean Water Act Section 303(d)

Stillaguamish River

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G CROSS CONNECTION CONTROL PROGRAM

G.1 2011 WSP VERSION NOT REVISED FOR THE 2015 WSP UPDATE

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G Cross-Connection Control Program

G.1 INTRODUCTION

A cross-connection control (CCC) program is a proactive and ongoing effort of a water purveyor to protect the health of its customers by preventing contamination of the municipal water supply. This is done by preventing backflow of contaminants or pollutants through cross-connection. A cross-connection is any physical connection, actual or potential, between a water system and any source of non-potable substance. All public water systems in Washington State are required to implement a CCC program. All required elements of a local CCC program must be documented and included in either the Comprehensive Water System Plan (applicable to the City of Arlington) or Small Water System Management Program document (not applicable). The State mandate for CCC programs and the required elements of a CCC program are contained in Washington Administrative Code (WAC) 246-290-490 Cross-Connection Control, which became effective in April of 1999. The minimum required elements in a CCC program are as follows.

- An adopted local ordinance, resolution or code that establishes the purveyor's legal authority, describes operating policies and the corrective actions of a CCC program.
- Develop and implement procedures and schedules for evaluating new and existing service connections to assess hazards.
- Develop and implement procedures and schedules that eliminate or control cross-connections and ensure approved backflow preventers are properly installed.
- Ensure that personnel, including one certified Cross-Connection Control Specialist (CCS), are provided to develop and implement the CCC program.
- Develop and implement procedures to ensure approved backflow preventers are properly inspected and tested.
- Develop and implement a backflow prevention assembly testing quality control assurance program.
- Develop and implement procedures for backflow incident response.
- Include CCC program information in customer education materials.
- Develop and maintain CCC program records.
- Meet any additional CCC requirements if reclaimed water is distributed or received in the water service area.

G.2 PURPOSE AND SCOPE

This document establishes minimum standards for the City of Arlington (City) to protect the public water supply from possible contamination from backflow. This document also describes minimum CCC program operating policies and provides guidelines for installation, testing and maintenance of approved backflow assemblies. In addition, permitting and inspection requirements for existing and new backflow prevention assemblies are described. The document concludes with recommendations the City is advised to address in order to comply with the updated CCC program requirements.

G.3 AUTHORITY

The Federal Safe Drinking Water Act of 1974 and the statutes of the revised code of Washington (RCW) Title 43 require purveyors to protect the public water systems from contamination. In addition, WAC 246-290-490 establishes CCC program requirements for the State. In Washington State, the Department of Health (DOH) and the Department of Community, Trade and Economic Development are the lead agencies for the development and administration of the State's CCC program. The City adopted a CCC ordinance on September 5, 2006; it is located in Chapter 13.32 of the Arlington Municipal Code (AMC). This code establishes the City's authority in implementing a CCC program and prohibits cross-connections.

G.4 RESPONSIBILITY

The City is responsible for protecting its public water supply from contamination due to backflow of pollutants through water service connections. If the City determines that a backflow prevention assembly is necessary at a customer's premises, the City will notify the customer to install an approved backflow assembly. Installation of said backflow assembly shall be a condition of continued water service from the City. Upon installation, the customer shall notify the City and arrange for inspection and testing of said assembly. The customer will be responsible for all applicable testing and inspection fees.

G.5 FAILURE TO COMPLY

Any person, firm, or corporation who violates any of the provisions of this document or AMC Chapter 13.32, may be punished in accordance with the AMC. Any person, firm or corporation who violates any provisions and requirements of this document shall be subject to discontinuance of supply of City water to the premises. Discontinuance of the City's potable supply to the premises shall remain in effect until corrective action, as required by the City, is completed, tested and approved.

G.6 CROSS-CONNECTION CONTROL PROGRAM

The City has implemented the required elements of the CCC program as listed above. This document is the City's current CCC program, and discusses program elements that the City needs to continue. The City is committed to protecting the public water supply from contamination by eliminating potential cross-connections. The City's CCC program that follows includes a

statement of its goals and objectives, the evaluation of CCC elements, the program implementation schedule and recommendations.

G.6.1 Cross-Connection Control Program Goals and Objectives

The goals and objectives of the City's CCC Program consist of:

- Preventing contamination of the public water supply by eliminating or properly protecting actual or potential cross-connections;
- Taking inventory of all potential cross-connections; and
- Establishing an inspection and testing program for all backflow prevention assemblies.

The City will achieve these goals and objectives through the implementation of the CCC program that follows.

G.6.2 Evaluation of Cross-Connection Control Program Elements

The City is required to develop and implement a CCC program. All required elements of a local CCC program must be documented and included in the City's Comprehensive Water System Plan. The evaluation of the City's CCC program elements and current level of implementation are presented below.

G.6.3 Cross-Connection Control Ordinance

This CCC program element requires that the purveyor "adopt a local ordinance, resolution, code, bylaw, or other written legal instrument" outlining the purveyor's program. In addition, this document must establish the purveyor's legal authority to implement a CCC program. Operating policies, technical provisions and corrective actions of the CCC program must also be addressed in the legal document. Ordinance 1398 was adopted by the City on September 5, 2006, to establish the City's authority to enforce CCC requirements, thereby creating Chapter 13.32 of the AMC. Under Chapter 13.32, the City has the authority to enforce the CCC requirements specified by WAC 246-290, and to implement a CCC program that relies on premises isolation as defined in WAC 246-290-010. The City is also responsible for the administration of CCC for in-premises protection defined in WAC 246-290-010.

Documents adopted by reference in Chapter 13.32 include the City of Arlington Plumbing Code as adopted by ordinance and administered and enforced by the City building official for the purpose of CCC, the City's current Public Works Construction Standards and Specifications, and the most current edition of the Cross-Connection Control Manual, Accepted Procedure and Practice, as published by Pacific Northwest Section of the American Water Works Association (PNWS-AWWA).

This CCC program meets the requirements of AMC Chapter 13.32 and contains all of the elements required in WAC 246-290-490.

G.6.4 Evaluation of Service Connections

This CCC program element requires that the purveyor develop and implement procedures for evaluating existing and new service connections to assess the degree of hazard of connecting the consumer's premises to the purveyor's public water system. This element also requires that the purveyor notify the consumer within a reasonable time frame of the evaluation results. New connections are required to be evaluated prior to service. Existing connections shall be inspected on a schedule acceptable to DOH.

The City has an established procedure for evaluating new service connections for potential cross-connection. The City reviews all new permit applications for CCC requirements. The CCS determines the appropriate backflow prevention assembly for commercial and industrial water service customers (an Air Gap or reduced pressure backflow assembly (RPBA)) according to the degree of hazard. In addition to new connections, all mobile homes, recreational vehicle parks and wholesale customers will be assessed for the degree of hazard and required to install a backflow assembly. The City keeps inventory of all installed backflow prevention assemblies. The City will inform the owner or contractor that final approval shall not be granted or water service restored until the CCC requirements are met (proper installation, inspection and testing is completed). Periodic inspections are conducted of severe and high-health hazard facilities, and then other facilities with a lesser degree of hazard. The City will coordinate a CCC program with the wholesale administrator.

All premises inside or outside City limits desiring to connect to the City's potable water system must properly disconnect and decommission all auxiliary water sources per Washington State Department of Ecology standards.

The City will inspect and monitor all temporary water connections used for water main construction. This inspection will be for proper disinfections sampling and backflow applications. The City will require the contractors to provide their own assembly, tested by an approved backflow assembly tester (BAT), and will require a copy of the test report. No contractor shall operate any water system valves.

Existing customers are evaluated during the building permit review process for structure alterations or additions and during the business license review process. If a backflow assembly is required as a result of this evaluation, the assembly, owner's name, property address and other pertinent information is recorded in a database that is maintained at the City's Utilities Administration Office. The CCS shall contact the owner or tenant of the facility and schedule an appointment for inspection with the owner or person familiar with the property or building in question within (5) working days. Following inspection, the CCS will write a Cross-Connection Inspection Report (CCIR) indicating the assembly required to meet compliance. The schedule for CCC program compliance for the various levels of hazard is as follows.

- Customers with an immediate high health hazard cross-connection must eliminate them immediately, or the water service will be terminated and shall not be restored until the purveyor water system is protected to the satisfaction of the CCS.
- Customers with a cross-connection that does not pose an immediate high health hazard shall have 15 days to install the required assembly to meet compliance and have the assembly tested. The customer will schedule an inspection by the CCS and provide a copy of the test report.
- Customers with a low health hazard cross-connection shall have 30 days to install the required assembly to meet compliance and have the assembly tested. The customer will schedule an inspection by the CCS and provide a copy of the test report.

All backflow prevention assemblies shall appear on the current University of Southern California (USC) *Manual of Cross-Connection Control* List of Approved Backflow Assemblies and be tested by a certified State of Washington BAT.

The priority for reevaluation of backflow protection assemblies is as follows.

1. Facilities that pose an immediate high health hazard cross-connection have the highest priority.
2. Facilities with severe or high hazard cross-connections.
3. Facilities with high hazard equipment.
4. Annually, when backflow assembly testing is due.
5. When there is a history of backflow incidents.
6. When there is a history of failed backflow test reports.
7. When there is a change in the use of the premise.
8. When a plumbing permit is issued and the premise becomes high hazard.
9. When there is a backflow incident.

Known sites with severe or high hazards will have a routine evaluation annually as time and resources allow.

Table G-1 lists standard acronyms for backflow prevention assemblies. These acronyms will be used in the tables that follow.

Table G-1

Cross Connection Control Acronyms

Abbreviation	Description	Level of Production
AG	Air Gap	1
RPBA	Reduced Pressure Backflow Assembly	2
RPDA	Reduced Pressure Detector Assembly	2
DCVA	Double Check Valve Assembly	3
DCDA	Double Check Detector Assembly	3
PVBA	Pressure Vacuum Breaker Assembly	4
AVB	Atmospheric Vacuum Breaker	5
SVBA	Spill Resistant Vacuum Beaker	5

Table G-2 lists the severe and high-health hazard cross-connection premises that are required to have isolation by an air gap or reduced pressure backflow assembly to prevent contamination of the public water system.

Table G-2

Premises Requiring Mandatory Service Isolation by AG or RPBA

Premises	Premises
Agricultural (farms and dairies)	Mortuaries
Beverage Bottling Plants	Nursing Homes
Car Washes	Petroleum Processing or Storage Plants
Chemical Plants	Piers and Docks
Commercial Laundries and Dry Cleaners	Premises with Potable and Reclaimed Water
Dental Clinics	Survey Access Denied or Restricted
Film Processing Facilities	Wastewater Lift Stations
Premises with Separate Irrigation Systems Using City Water with Chemical Addition	Radioactive Material Processing Plants and Nuclear Reactors
Food Processing Plants	Wastewater Treatment Plants
Hospitals, Medical Centers and Clinics	Unapproved Auxiliary Supply
Laboratories	Veterinary Clinics
Metal Plating Industries	

Table G-3 shows the appropriate backflow protection device for a given degree of hazard, as recommended in WAC 246-290-490.

Table G-3

Appropriate Methods of Backflow Protection

Degree of Health Hazard	Application Condition	Appropriate Approved Backflow Preventer
High	Backsiphonage or backpressure backflow	AG, RPBA or RPDA
Low	Backsiphonage or backpressure backflow	AG, RPBA, RPDA, DCVA or DCDA

Table G-4 lists fixtures, equipment and areas that have the potential to contaminate the public drinking water system, and the minimum protection required by the City to prevent such contamination. Any known used water (such as water used for water cooling and heating equipment) will have installed a backflow assembly commensurate with the degree of hazard at each point of connection, per WAC 246-290-490.

Table G-5 summarizes the number of each type of backflow prevention assembly protecting the distribution system as of June 6, 2011. City staff inspects all air gaps and backflow preventers at the Cascade Valley Hospital on an annual basis. All other backflow prevention assembly devices are inspected on an as-needed basis, such as a change in ownership of a building. The compliance rates for these devices have been 100 percent in recent years.

All trucks and equipment that are constructed with holding tanks for water, and have requested to fill their holding tanks within the City's service area must draw water from a designated water source (fire hydrant). They shall have an approved AG. The CCS shall inspect their truck or equipment for approval. In the event the AG is not present the City will provide an approved backflow assembly.

Table G-4

Fixtures, Equipment and Areas with Backflow Potential

Fixtures, Equipment and Areas	Protection	Fixtures, Equipment Areas	Protection
Air Compressors	DCVA	Janitor Sinks	AVB
Air Conditioning Systems	RPBA	Kitchen Equipment	AVB
Air Washers	RPBA	Laboratory Equipment	RPBA
Aquarium Make-Up Water	AG/RPBA	Laundry Machines, Commercial	RPBA
Aspirators, Medical	AVB	Lavatories	AVB
Aspirators, Vault Drain	RPBA	Livestock Drinking Tanks	DCVA
Aspirators, Weedicide/Herbicide/Pesticide	RPBA	Make-Up Tanks	AG/RPBA
Autoclaves	RPBA	Mobile Carpet Cleaners	RPBA
Autopsy Tables	RPBA	Mop Sinks	AVB
Baptismal Fountain	RPBA,AG/AVB	Outboard Motor Test Tanks	AG/RPBA
Bathtub, Below Rim Filler	Not Allowed	Perchlorethylene Reclaim	AG/RPBA
Bedpan Washers	RPBA	Pesticide Applicator Trucks	AG/RPBA
Beverage Dispensers using CO_2	RPBA	Photo Developing Tanks and Sinks	RPBA
Bidets	AVB/AG-Internal	Photostat Equipment	RPBA
Boat Lifts	RPBA	Pipette Washers	AVB
Boiler Feed Lines	AG/RPBA	Potato Peelers	AVB
Bottle Washing Equipment	RPBA	Poultry Feeders	RPBA
Box Hydrants	DCVA	Private Hydrants	DCVA
Brine Tanks	AG/DCVA	Processing Tanks	AG/RPBA
Can Washing Equipment	RPBA	Pump Seal Water	AG/RPBA
Chemical Feeder Tanks	AG/RPBA	Pumps, Pneumatic Ejector	RPBA
Chilled Water Systems	RPBA	Pump Prime Lines	RPBA/DCVA
Chlorinators	RPBA	Pumps, Water Operated Ejector	RPBA
Coffee Urns	AG/AVB	Radiator Flushing Equipment	RPBA
Computer Cooling Lines	AG/RPBA	Recreational Vehicle Dump Stations	RPBA
Condensate Tanks	AG/RPBA	Serrated Faucets	AVB
Cooking Kettles	AG/AVB	Service Sinks	AVB
Cooling Towers	AG/RPBA	Sewer Connected Equipment	AG
Decorative Ponds	AG/RPBA	Sewer Flushing	AG
Degreasing Equipment	RPBA	Shampoo Basins/Hose Rinse	AVB
Demineralized Water System	RPBA	Showers, Telephone	AVB
Dental Cuspidors	RPBA	Sitz Baths	AVB
Detergent Dispensers (Dishwasher)	AVB	Soap Mixing Tanks	AG/RPBA
Dialysis Equipment	RPBA	Solar Heating Systems	RPBA
Dishwashers	AVB	Solution Tanks	AG/RPBA
Drinking Fountains	AG	Spas	AG/RPBA
Dye Vats and Tanks	AG/RPBA	Specimen Tanks	AG/RPBA
Dynamometers	DCVA	Starch Tanks	AG/RPBA
Emergency Generators	RPBA	Stream-Air Sprays	RPBA
Etching Tanks	AG/RPBA	Steam Cleaners	RPBA
Fermenting Tanks	AG/RPBA	Steam Ejectors	RPBA
Fertilizer Injection Equipment	RPBA	Steam Generating Facilities	RPBA
Film Processors	RPBA	Sterilizers	RPBA
Fire Department Connections w/o chemicals	DCVA/DCDA	Stills	RPBA
Fire Department Connections with chemicals	RPBA/RPDA	Sumps	AG
Fire Sprinkler Systems w/o chemicals	DCVA/DCDA	Swimming Pools	AG/RPBA
Fire Sprinkler Systems with chemicals	RPBA/RPDA	Toilets (Internal)	AG
Floor Drains	AG	Trap Primers	AG
Flushing Floor Drains	AVB	Ultrasonic Baths	AG
Foamite Systems	RPBA/RPDA	Urinals (Internal)	AG
Fountains, Ornamental	AG/RPBA	Used Water Systems	RPBA
Fume Hoods	RPBA	Vats	AG/RPBA
Garbage Can Washers	RPBA	Washing Pools	AG/RPBA
Garbage Disposals	RPBA	Wall Hydrants	AVB

Continued on Next Page

Table G-4 (Continued)

Fixtures, Equipment and Areas with Backflow Potential

Table Continued			
Heat Exchangers	RPBA	Wash Basins	AG/AVB
Heat Pumps	RPBA	Wash-Up Sinks	AG/AVB
High Pressure Washers w/o chemicals	DCVA	Wash Tanks	AG/RPBA
High Pressure Washers with chemicals	RPBA	Wastewater Lines	AG
Hose Bibs	AVB	Water-Air Sprays	DCVA
Hoses, Kitchen Rinse	AVB	Water Closets (Internal)	AG
Hot Tubs	AG/RPBA	Water Cooled Equipment	RPBA
Hot Water Heating Systems	RPBA	Water Ejectors	RPBA
Hot Water Boilers	RPBA	Water Recirculating Systems	DCVA
Humidifier Tanks and Boxes	AG	Water Settling	RPBA
Hydraulically Operated Equipment	RPBA	Water Treatment Tanks	AG/RPBA
Hydrotherapy Baths	RPBA	Water Trucks	DCVA
Ice Makers	RPBA	Wet Vacuum Systems	RPBA
Industrial Fluid Systems	RPBA	Whirlpool Baths	AVB/DCVA
Interties (Looped) Water Systems	DCVA	Windshield Washer Fluid Aspirators	RPBA
Irrigation Systems w/o chemicals	DCVA	X-Ray Processors	RPBA
Irrigation Systems with chemicals	RPBA	Yard Hydrants	RPBA

Table G-5

Summary of Backflow Prevention Assemblies

Type of Device	Quantity
AG	3
RPBA	283
DCVA	306
PVBA	1
SVBA	1
AVB	N/A
DCDA	73

G.6.5 Cross-Connection Control and Elimination

This CCC program element requires that the purveyor eliminate existing cross-connections whenever possible. If elimination is not possible, approved backflow prevention assemblies should be properly installed to reduce the risk of contamination.

The City will endeavor to eliminate potential cross-connections where possible, pursuant to AMC 13.32.080. When cross-connections cannot be eliminated, they are controlled by the installation of an approved backflow assembly commensurate with the degree of hazard, pursuant to AMC 13.32.090. Approved backflow assemblies are to be installed according to WAC 246-290-490 subsection (6).

- The CCS may require the installation of a backflow assembly for a single-family residence based upon issuance of a plumbing permit where a backflow assembly is required (i.e. irrigation or private fire sprinkler system).
- The CCS will review commercial facility construction plans where fire sprinkler systems are required and approve/request an assembly commensurate to the degree of hazard. A fire system without chemical addition will require a DCVA or DCDA. A fire system with chemical addition will require a RPBA or RPDA.
- If a change of facility use or plumbing requires the addition of chemical at an existing commercial or residential facility with a low hazard fire system, a RPBA or RPDA shall be installed within 30 days of a notification letter from the CCS.
- The City will contact the Local Administrative Authority (LAA), Snohomish Health District (SHD), DOH and the City attorney when an immediate health hazard exists on a required fire protection system. The City will install/contract the installation of appropriate backflow assembly at the right of way line to protect the public water system and water users.

Owners shall be responsible for following the provisions of the City's CCC program. Owners are responsible for the elimination or protection of all cross-connections on their premises and will be held responsible for damage caused to City owned appurtenances within the easements on the Owner's premises, including damage caused by steam, hot water, chemical, etc. Failure on the part of any service customer to eliminate or control cross-connections, or refusal of a facility survey inspection, is sufficient cause for the termination of water service to the premises. Water service is not resumed until the appropriate assembly is installed or the cross-connection is removed and the CCS has inspected the premises. The City keeps an inventory of existing backflow assemblies that it currently operates, maintains and inspects and of all assemblies on customers' premises that are the responsibility of the customer to maintain on file at the Utilities Administration Office.

G.6.6 Personnel Certification

WAC 246-290-490 requires that personnel, including one certified CCS, are provided by the purveyor to develop and implement a CCC program. **Table G-6** shows the City's personnel certifications. Mr. Don Smith; Mr. Dallas Speed; Mr. Bill Cochinella; Ms. Carrie Kneeland; Mr. Gus Tararan; Mr. Gary Schlagel; Mr. Brian Fritts; and Mr. Jeff Pitman are all certified as CCSs. The City has the properly certified staff to implement and maintain a CCC program as outlined by the State. The CCS will keep abreast of all new instructions and materials for CCC by attending classes and seminars, and retaining certificates needed for their position. The City will continue to provide properly certified personnel to implement the CCC program.

Table G-6

Water Department Personnel Certification

Name	Position	Certification
Earl Anderson	Lead Water Distribution Specialist	WDS, WTPO-IT, CCS
Bill Cochinella	Water Treatment Plant Operator	WTPO-2, CCS
Brian Fritts	Water Service Specialist	WDS, CCS
Carrie Kneeland	Senior Water Service Specialist	WDM-2, WDS, WTPO-IT, CCS
Jeff Pitman	Senior Water Distribution Specialist	WDM-2, WDS, WTPO-2, CCS
Gary Schlagel	Senior Water Distribution Specialist	WTPO-IT, WDS, CCS
Don Smith	Water Utility Supervisor	WDM-2, WDS, WTPO-3, CCS
Dallas Speed	Senior Water Treatment Plant Operator	WTPO-2, CCS
Gus Tararan	Cross-Connection Specialist	BAT, WDS, WTPO-IT, CCS

Certification Definitions

BAT - Backflow Assembly Tester
CCS - Cross-Connection Control Specialist
IT - In Training
WDM - Water Distribution Manager
WDS - Water Distribution Specialist
WTPO - Water Treatment Plant Operator

G.6.7 Backflow Assembly Inspection and Testing

DOH requires that all backflow assemblies are routinely inspected and tested by certified personnel. Inspections are required at the time of installation, annually thereafter, after a backflow incident, and/or after the assembly is repaired, reinstalled or relocated.

The City is responsible for maintaining those assemblies that are installed on the public water distribution system, not including those assemblies installed after a meter on private premises. The customer will be subject to all applicable testing, maintenance and repair fees. On new installations, the City: 1) provides an on-site evaluation and/or inspection of plans to determine the type of backflow device, if any, that will be required; 2) issues permits; and 3) performs inspection of the existing premises, the City performs evaluations and inspections of plans and/or premises and informs Owners by letter of any corrective action deemed necessary, the method of achieving the correction and the time allowed for the correction to be made. Ordinarily, corrections must be made within 30 days; however, the City may shorten this time period depending on the degree of hazard involved and the history of the device(s) in question. The City then inspects the premises on or after the expiration date of the required action to correct a cross-connection. If found to not be in compliance with the City's request, the owner receives written notice that water service to the premises will be discontinued. If the owner informs the City of extenuating circumstances as to why the correction has not been completed within five working

days of receipt of the notice of termination, the City may grant a time extension up to, but not exceeding, 30 days.

Inspection and testing of devices shall be performed: 1) during the initial installation; 2) during on-site reviews of existing installations; 3) after any repairs or maintenance; 4) after any relocation; and 5) on an annual basis. When an initial installation or annual test indicates that a backflow device is not functioning properly, the Owner shall correct the malfunction within five working days as directed by the City. The Owner shall contact the City after correcting the problem for re-inspecting and testing of the device(s).

The Owner shall be responsible for the payment of all fees for permits, annual or semi-annual device inspection/testing, re-testing if the device fails to operate correctly and any re-inspections for non-compliance with City requirements.

G.6.8 Testing Quality Control Assurance Program

This program element requires development and implementation of a quality control assurance program for the testing of backflow prevention assemblies. Successful implementation of this program element assures that all backflow prevention assemblies are tested in a similar manner and kept in optimal condition.

The City shall ensure that all testing procedures are completed in a consistent manner. Only certified personnel shall be utilized to test backflow assemblies. The City has a process for approving backflow assembly testers and only testers appearing on the City's approved list may be used for testing and repair. To be admitted to the City's list of qualified BATs, personnel must submit their current BAT validation card, current instrument calibration certificate, Washington State business license and insurance certificate.

Testing shall be recorded on the proper forms and maintained at the City's Utilities Administration Office. Examples of testing forms can be found in the AWWA *Recommended Practice for Backflow Prevention and Cross-Connection Control* manual. Personnel shall be trained as outlined by the State, fulfilling all necessary requirements in order to comply with WAC 246-290-490.

Testing procedures accepted by the City conform to DOH testing procedures. Testing personnel shall adhere to the following steps: 1) use only properly operating and calibrated gauge equipment; 2) follow proper field test procedure; 3) consult the manufacturer's repair and maintenance manual when disassembly is required; 4) use only original manufacturer spare parts; and 5) retest the backflow assembly immediately after repair or maintenance.

In addition to the above steps, the following testing procedures shall be performed by a certified test personnel: 1) advise customer of an impending test/inspection so that the customer's staff may participate; 2) notify the fire department when shut down of a fire service is necessary; 3) flush residual dirt through test cocks before attaching test gauges; 4) ensure that the high and low pressure bypass hoses of the test kit are connected to the proper test cocks (open test cocks slowly

when bleeding air through the bypass hoses); 5) test gauges shall be properly calibrated by a certified testing agency; and 6) assemblies should be tested before the warranty expiration date. For further testing details, refer to the AWWA manual.

G.6.9 Incident Response

This CCC program element requires that the purveyor develop a backflow incident response plan. The following paragraph outlines the City's response to a backflow incident. Other emergency response procedures are included in the *City of Arlington Emergency Response Plan*.

Emergency Condition: Water System Contamination Due to a Backflow Incident

Impact on System: Potentially major impact: water not suitable for potable use; loss of supply.

Emergency Response:

1. Shut down the affected mains if possible to contain the contaminants.
2. Notify the City CCS personnel.
3. Notify DOH and SHD of the backflow incident no later than the end of the next business day.
4. Notify all customers of the problem and instruct them to boil all water to be used for consumption and cooking or issue a no-drinking warning.
5. Flush affected water mains to remove contaminants.
6. Disinfect reservoirs and water mains, as necessary, to remove contaminated residuals.
7. Analyze water quality in other parts of the distribution system to ensure that all contaminants were contained.

This document and the *City of Arlington Emergency Response Plan* outline procedures to be followed if an emergency arises. When a CCC emergency is called into the Arlington Police Department or other emergency responder during non-business hours, the responder will notify the Public Works Department on-call person. This person assesses the emergency and will notify any Water Department personnel as deemed necessary, depending on the severity of the emergency. Until the Utilities Manager position is filled, all emergencies are reported to Mr. Don Smith, who is responsible for coordinating with Water Department personnel, as well as other emergency responders, if necessary.

The City includes all backflow incidents report(s) in the Annual Summary Report (ASR). The City of Arlington Utilities Division maintains on file all of the water quality complaints (i.e. dirty water, odors, etc.) Also on file for reference is the *Backflow Incident Investigation Procedure* published by PNWS-AWWA.

G.6.10 Public Education

Another CCC program requirement is that educational information of the CCC program be included in existing water system materials that are distributed to customers. Educational materials can be included in pamphlets, brochures, bill inserts, public service announcements and consumer confidence reports.

The City currently makes available a supply of handouts at the Utility Administration Office explaining the intent and responsibility of the CCC program, with contact information for the CCS. With every new water service, a Cross-Connection Survey application is required for submittal to the CCS, who reviews the application and then sends the applicant a requirement for the installation of a backflow assembly or approves the survey as is without further requirements.

G.6.11 Record Keeping

Purveyors must also develop and maintain records of their CCC program, as mandated by DOH. At a minimum, purveyors must maintain the following records:

- A master list of service connections and/or premises where backflow prevention assemblies are protecting the public water system or fixtures;
- Assessed hazard level of each backflow assembly;
- Inventory information on approved AGs, including location, degree of hazard, installation date, inspection history, inspection results and personnel conducting inspections;
- Backflow assembly inventory information, including location, assembly description, installation date, inspection history, test and repair history, test results, and inspecting personnel;
- An AVB and SRVB inventory, including location, description, installation date, inspection history and inspecting personnel; and
- A program summary and backflow incident reports.

The City currently maintains program records, including hazard reports and backflow assembly inspection reports, at the Utilities Administration Office.

G.6.12 Reclaimed Water Requirements

The final CCC program requirement is for systems that distribute or receive reclaimed water within their water service area. For these systems, additional CCC requirements may be imposed by DOH in any permits issued in accordance with Chapter 90.46 RCW.

The City's wastewater treatment plant uses reclaimed water from its effluent for maintenance and operation activities within the wastewater treatment facility, but these facilities are not connected to the City's domestic water system. Otherwise the City currently does not distribute or receive reclaimed water within its service area; therefore, these requirements are not applicable. However,

if reclaimed water is used in the future, the City will follow all requirements of the permits issued under Chapter 90.46 RCW.

G.7 PROGRAM IMPLEMENTATION AND RECOMMENDATIONS

The City's CCC program is an ongoing effort that requires staffing and resources to ensure its effectiveness in protecting the quality of drinking water in the distribution system. The City should continue its inspection practices of installed approved backflow devices and documenting inspection to comply with regulatory requirements.

The City should continue its hazard evaluation program based on risk to the public drinking water supply. The City should continue its CCC elimination program, following the schedule provided above based on hazard levels.

The City is in the process of developing an interlocal agreement between the City building department and Snohomish County that will track in-premises assemblies and send annual test notices.

The City currently meets the regulatory requirement of having at least one CCS within the Water Department to administer its CCC program. The City is encouraged to continue its active training program in order to comply with these requirements.

Finally, it is recommended that the City update its disseminated public education materials to include information on the City's CCC program. The City currently makes available a supply of handouts at the Utilities Administration Office explaining the intent and the responsibility of the CCC program, with contact information for the CCS. The City could add its educational material regarding the CCC program to existing material that is disseminated to customers, like bill inserts or the consumer confidence report.

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H WATER QUALITY MONITORING PLAN

H.1 REVISED FOR THE 2015 WSP UPDATE

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H Water Quality Monitoring Plan

H.1 INTRODUCTION

This Water Quality Monitoring Plan presents the requirements for monitoring water quality at the sources and in the distribution system in accordance with the drinking water regulations contained in Washington Administrative Code (WAC) 246-290-300. This plan also provides a summary of the existing water system facilities and system operation.

H.2 EXISTING WATER SYSTEM DESCRIPTION

H.2.1 Water System Information

The City of Arlington (City) is a municipal corporation that owns and operates a public water system. Water system data on file at the Washington State Department of Health (DOH) for the City's system is as follows in **Table H-1**.

Table H-1

Water System Ownership Information

Information Type	Description
System Type	Group A - Community - Public Water System
System Name	Arlington Water Department
County	Snohomish
DOH System ID Number	02950K
Owner Number	200
Address	154 West Cox Avenue, Arlington, WA 98223
Contact	Mr. Donald Smith, Utilities Manager
Contact Phone Number	(360) 403-3507

H.2.2 Water System Operation and Control

Overview

Water supply is provided by two wellfields and a wholesale purchase agreement with the Snohomish County PUD No. 1 (PUD), with the primary source of water coming from the City's three wells at the Haller Wellfield.

Haller Wellfield

The Haller Wellfield is located near the Stillaguamish River and supplies water to the water treatment plant where the water is treated via direct filtration methods. Treated water is supplied to the Gleneagle Reservoir, which combine to directly serve the City's 342 Zone. During periods of high demands or emergency conditions such as a fire event, water supply to the 342 Zone is supplemented from upper zones through six pressure reducing valves (PRVs).

Airport Wellfield

The Airport Wellfield Well is controlled by water levels in the Gleneagle Reservoir, and directly supplies the City's 342 Zone. The water treatment plant operator inputs reservoir operating set points into the main control panel to operate the well as needed. Water from the Airport Wellfield is disinfected with sodium hypochlorite prior to entering the City's distribution system.

Snohomish County PUD No. 1 Master Meter

The City has one connection to the PUD water system and has entered into a wholesale water agreement to withdraw a maximum of 1,000 gallons per minute (gpm). The PUD connection and a pressure reducing station on Burn Road at 95th Avenue NE provide a continuous source of supply to the City's customers in the 540 and 710 Zones along the Burn Road Transmission Line.

The 520 Zone is supplied with water purchased from the PUD, through the 186th Street flow control valve (FCV) from the 710 Zone. The 186th Street FCV is currently set as a continuous source of supply to the 520 Zone and the 520 Zone Reservoir. The 520 Zone can also be supplied by the 520 Zone Booster Pump Station, which has two pumps that are not normally in operation.

H.2.3 Pressure Zones

A list of the City's existing pressure zones and their respective maximum hydraulic elevations is presented in **Table H-2**. The table also shows the estimated connections and population in each pressure zone in 2008, based on a review of 2008 water supply data.

Table H-2

Pressure Zones

Name	Maximum Hydraulic Elevation	Water Demand Allocation	Connections in 2014	Population in 2014
342	342 feet	74%	4,027	12,031
520	520 feet	25%	1,380	4,124
540	608 feet	0.1%	3	9
710	710 feet	1%	28	83
Totals			5,438	16,245

H.2.4 Water Sources

A list of the City's existing water sources is presented in **Table H-3**.

Table H-3

Water Sources

Well	Pressure Zone	Year Drilled	Pumping Capacity (gpm)	Well Depth (feet)	Well Diameter (inches)	Pump Type	Pump Motor Size (hp)	Water Treatment[1]	Control Facility
Airport Well	342	1945, 1996	220	166	10	Vertical Turbine	60	NaOCl	Gleneagle Reservoir
Haller No. 1	342	~1963, 2002	570	36	16	Vertical Turbine	25	NaOH, NaOCl	Water Treatment Plant
Haller No. 2	342	1961, 2001	570	38	36	Vertical Turbine	25	NaOH, NaOCl	Water Treatment Plant
Haller No. 3	342	1906 or prior, 2001	570	38	72	(2) Vertical Turbine	(2) 25	NaOH, NaOCl	Water Treatment Plant

(1) NaOH: Sodium hydroxide corrosion control; NaOCl: chlorination.

H.2.5 Water Storage

A list of the City's existing water storage facilities is presented below in **Table H-4**.

Table H-4

Water Storage Facilities

Reservoir	Location	Pressure Zone	Year Constructed	Material	Capacity (MG)	Diameter (feet)	Base Elevation (feet)	Overflow Elevation (feet)	Overflow Height (feet)
Gleneagle	17913 Oxford Drive	342	1975	Concrete	2	100	304.7	342.0	37.3
520 Zone	17003 91st Ave NE	520	1993	Steel	2.0	132	499.0	520.0	21.0

H.2.6 Pump Stations

A summary of the City's existing booster pump station is presented in **Table H-5**.

Table H-5

Booster Pump Station

Pump Station	Suction Pressure Zone	Dischrage Pressure zone	Year Constructed	Existing Pumping Capacity (gpm)	Number of Pumps	Pump Type	Pump Motor Size (hp)
520 Zone Booster Pump Station	342	520	1998	790	4 (3 Operating)	End Suction	(3) 40

H.2.7 Pressure Reducing Stations

The City's water system has a total of seven pressure reducing stations and one FCV. A list of the City's existing pressure reducing stations and FCV is presented below in **Table H-6**.

Table H-6

Pressure Reducing Stations

Name	Location	Pressure Zone (From)	Pressure Zone (To)	Valve Size (inches)	Pressure Setting (psi)	Hydraulic Grade Setting (feet)
Pressure Reducing Valves						
PRV 1 (Highland View)	17700 Highland View Drive	520	342	6 and 2	38	340
PRV 2 (Woodlands Way)	6850 Woodlands Way	520	342	6 and 2	30	333
PRV 3 (Cedarbough Loop)	Cedarbough Loop and Woodbine Drive	520	342	6 and 2	35	340
PRV 4 (Woodbine Drive)	Woodbine Drive and Silverleaf Place	520	342	6 and 2	30	301
Bovee Acres PRV	6900 Bovee Lane	520	342	6 and 2	38	334
Lower Burn Road PRV	Burn Road and 209th Street NE	540	342	8 and 2	35	320
Upper Burn Road PRV	Burn Road and 95th Avenue NE	710	540	8 and 2	45	540
Flow Control Valves						
186th Street FCV	8756 186th Street NE	710	520	6	---	---

H.2.8 Water Treatment

The water treatment plant, originally constructed in 1924 and replaced in 2001, is located within the City's Utilities Compound, and treats water from the Haller Wellfield. Water is pumped from the Haller Wellfield to the direct filtration system, which consists of three filter beds. Primary coagulant and filter aid are added to the combined filter influent, which is also chlorinated prior to filtration. The total capacity of the filtration system is 1,710 gpm. The plant operates with one or two filter beds in the winter and increases to three in the peak of the summer. Filtered water is then chlorinated by a 0.8 percent chlorine solution as it enters a 270,000 gallon clear well which provides adequate contact time for disinfection and provides storage. The chlorine solution is produced by an on-site sodium hypochlorite generation system. As the water exits the clear well, sodium hydroxide is added to adjust the pH level for corrosion control, and the water is disinfected in the distribution system as outlined below. Three pumps are available for pumping the water into the distribution system, although only two can operate simultaneously. The design pumping capacity with one pump operating is 910 gpm and 1,710 gpm with two pumps operating. For unknown reasons, capacity was reduced to 1,650 gpm approximately 7 to 10 years ago. With just

one pump running, capacity has declined to about 800 to 850 gpm. Two additional pumps are available for backwashing the filter beds.

The City's water is disinfected in the distribution system by flow-pacing diluted sodium hypochlorite during operation of the pump at the Airport Wellfield. Bulk 12.5 percent sodium hypochlorite is diluted and then injected into the City's pumped water through metering pump feed systems with a target dose of 0.5 milligrams per liter (mg/L).

H.3 SOURCE WATER QUALITY MONITORING

The City is required to perform water quality monitoring at each of its active sources for inorganic chemicals and physical substances, organic chemicals, unregulated inorganic and organic chemicals, and radionuclides. The monitoring requirements that the City must comply with are specified in WAC 246-290-300. The City must comply with the requirements for both groundwater and groundwater under the influence of surface water. **Table H-7** summarizes the source water quality monitoring requirements for the next several years. Source water quality monitoring for GWI sources also includes monthly fecal coliform numeric counts. The table is based on information available at the time that this document was prepared and may change in the future.

H.3.1 Monitoring Requirements and Procedures

Inorganic Chemical and Physical – A minimum of one sample shall be taken after treatment at the entry point to the distribution system for each source. Monitoring for primary and secondary inorganic chemical (IOC) and physical substances, except for nitrate, nitrite, and asbestos, shall be accomplished once every three years. If a maximum contaminant level (MCL) is exceeded, quarterly sampling is required for at least two quarters. The City has an IOC waiver that allows for only one IOC sample for each source between January 2011 and December 2019. The City obtained all required samples for this monitoring period in 2013, and should prepare for sampling again in 2020 or after. However, the City has been taking IOC optional (investigative, non-compliance) samples at each source on an annual basis.

Monitoring for nitrate shall be accomplished once per year. The repeat monitoring frequency shall be quarterly for at least one year following any one sample in which the concentration is greater than or equal to 50 percent of the MCL for nitrate or nitrite.

Monitoring for asbestos requires one sample during the nine-year compliance cycle, which started January 1, 2011. Systems not vulnerable to asbestos contamination at the source or in the distribution system (due to systems with less than 10 percent asbestos cement pipe) may apply to the State for a waiver of the monitoring requirements. Since the City's distribution system contains 10.4 percent asbestos cement pipe, asbestos monitoring is required. A sample must be taken at a customer tap served by an asbestos cement pipe where asbestos contamination is most likely to occur. The City has been sampling asbestos on an annual basis, and Health accepted the September

13, 2013 taken from Cobb Avenue for compliance purposes. If the MCL is exceeded, quarterly sampling is required for at least two quarters. The City is scheduled to collect its next asbestos sample in 2020; however, it is likely that the City will qualify for a permanent sampling waiver before then as it's AC main replacement program should have reduced the length of AC pipe in operation to much less than 10 percent by that time.

Volatile Organic Chemicals – A minimum of one sample shall be taken after treatment at the entry point to the distribution system for each source. Monitoring for volatile organic chemicals (VOCs) shall be accomplished once every three years for each compliance period (2014—2016, 2017—2019, etc.). If an MCL is exceeded, quarterly sampling is required for at least two quarters. The State may then allow annual monitoring, if the results are satisfactory. After three consecutive annual samples that comply with the MCLs, a waiver for reduced monitoring (once every three-year compliance period) may then be applied for again. The City currently is under a 6-year waiver at the Airport Well Field with the May 14, 2015 sample qualifying for compliance purposes. At the Haller Well Field, the sample with the same date qualified for compliance on a standard 3-year cycle.

Synthetic Organic Chemicals – A minimum of one sample shall be taken after treatment at the entry point to the distribution system for each source. Monitoring for synthetic organic chemicals (SOCs) shall be accomplished once every three years for each compliance period (2014—2016, 2017—2019, etc.), if a monitoring waiver is not provided by the State. If an MCL is exceeded, quarterly sampling is required for at least two quarters. The State may then allow annual monitoring, if the results are satisfactory. After three consecutive annual samples that comply with the MCLs, a waiver for reduced monitoring may then be applied for again. The City monitors for herbicides, general pesticides, and insecticides. A State waiver removes the responsibility to monitor for ethylene dibromide (EDB), other soil fumigants, dioxin, endothall, diquat and glyphophate. The City will sample again for herbicides after its 9-year waiver in June 2020.

Unregulated Inorganic Chemicals – Sulfate is the only unregulated inorganic chemical that must be monitored under the current State regulations. A minimum of one sample shall be taken after treatment at the entry point to the distribution system for each source. Initial monitoring had to be completed prior to December 31, 1995. Monitoring, thereafter, is required at least once every five years, unless a waiver is granted by the State. The City monitors for sulfate when monitoring is done for regulated inorganic compounds.

Unregulated Volatile Organic Chemicals – A minimum of one sample shall be taken after treatment at the entry point to the distribution system for each source. Initial monitoring had to be started no later than January 1, 1991. Monitoring, thereafter, is required at least once every five years. The City monitors for unregulated VOCs when samples for regulated VOCs are taken.

Table H-7

Monitoring Schedule for 2015 through 2020

When	Monitor	Monitoring Group	Test Method	Upon Violation
		2015		
March	All Treatment Plants	Stage 2 Disinfection Byproducts	TTHM and HAA5	1 per Plant per Quarter
April	All Active Sources	Nitrate	NIT	Quarterly for 1 Year
May	All Active Sources	Volatile Organic Chemicals	VOC - 524.2	Quarterly for 2 Quarters
May	All Active Sources	Radionuclides	RAD	Quarterly
June	All Treatment Plants	Stage 2 Disinfection Byproducts	TTHM and HAA5	1 per Plant per Quarter
July	30 Homes in Arlington	Lead and Copper	LCR	(2) - 6 Month Periods
September	All Treatment Plants	Stage 2 Disinfection Byproducts	TTHM and HAA5	1 per Plant per Quarter
December	All Treatment Plants	Stage 2 Disinfection Byproducts	TTHM and HAA5	1 per Plant per Quarter
		2016		
March	All Treatment Plants	Stage 2 Disinfection Byproducts	TTHM	1 per Plant per Quarter
April	All Active Sources	Nitrate	NIT	Quarterly for 1 Year
June	All Treatment Plants	Stage 2 Disinfection Byproducts	TTHM	1 per Plant per Quarter
September	All Treatment Plants	Stage 2 Disinfection Byproducts	TTHM	1 per Plant per Quarter
December	All Treatment Plants	Stage 2 Disinfection Byproducts	TTHM	1 per Plant per Quarter
		2017		
February	All Treatment Plants	Stage 2 Disinfection Byproducts	TTHM and HAA5	1 per Plant per Quarter
April	All Active Sources	Nitrate	NIT	Quarterly for 1 Year
May	All Treatment Plants	Stage 2 Disinfection Byproducts	TTHM and HAA5	1 per Plant per Quarter
August	All Treatment Plants	Stage 2 Disinfection Byproducts	TTHM and HAA5	1 per Plant per Quarter
November	All Treatment Plants	Stage 2 Disinfection Byproducts	TTHM and HAA5	1 per Plant per Quarter
		2018		
February	All Treatment Plants	Stage 2 Disinfection Byproducts	TTHM and HAA5	1 per Plant per Quarter
April	All Active Sources	Nitrate	NIT	Quarterly for 1 Year
April	Four Sites in Distribution	Stage 2 Disinfection Byproducts	TTHM and HAA5	2 per Site per Quarter for 1 Year
July	30 Homes in Arlington	Lead and Copper	LCR	(2) - 6 Month Periods
August	Four Sites in Distribution	Stage 2 Disinfection Byproducts	TTHM and HAA5	2 per Site per Quarter for 1 Year
November	Four Sites in Distribution	Stage 2 Disinfection Byproducts	TTHM and HAA5	2 per Site per Quarter for 1 Year
		2019		
February	Four Sites in Distribution	Stage 2 Disinfection Byproducts	TTHM and HAA5	2 per Site per Quarter for 1 Year
April	All Active Sources	Nitrate	NIT	Quarterly for 1 Year
May	Four Sites in Distribution	Stage 2 Disinfection Byproducts	TTHM and HAA5	2 per Site per Quarter for 1 Year
August	Four Sites in Distribution	Stage 2 Disinfection Byproducts	TTHM and HAA5	2 per Site per Quarter for 1 Year
November	Four Sites in Distribution	Stage 2 Disinfection Byproducts	TTHM and HAA5	2 per Site per Quarter for 1 Year
		2020		
February	Four Sites in Distribution	Stage 2 Disinfection Byproducts	TTHM and HAA5	2 per Site per Quarter for 1 Year
April	All Active Sources	Nitrate	NIT	Quarterly for 1 Year
April	All Active Sources	Inorganic Contaminants+SO_4+Mn	IOC	Quarterly for 1 Year
April	All Active Sources	Volatile Organic Chemicals	VOC - 524.2	Quarterly for 2 Quarters
May	One Site in Distribution	Asbestos	ASB	Quarterly for 2 Quarters
May	Four Sites in Distribution	Stage 2 Disinfection Byproducts	TTHM and HAA5	2 per Site per Quarter for 1 Year
June	All Active Sources	SOCs, herbicides, pesticides	SOC - 515.2, 525.2, 531.1	Quarterly for 2 Quarters
July	All Active Sources	Radionuclides	RAD	Quarterly
July	30 Homes in Arlington	Lead and Copper	LCR	(2) - 6 Month Periods
August	Four Sites in Distribution	Stage 2 Disinfection Byproducts	TTHM and HAA5	2 per Site per Quarter for 1 Year
November	Four Sites in Distribution	Stage 2 Disinfection Byproducts	TTHM and HAA5	2 per Site per Quarter for 1 Year

Unregulated Synthetic Organic Chemicals – A minimum of one sample shall be taken after treatment at the entry point to the distribution system for each source. Initial monitoring had to be completed prior to December 31, 1995. Monitoring, thereafter, is required at least once every five years, unless a waiver is granted by the State.

Radionuclides – A minimum of one sample shall be taken after treatment at the entry point to the distribution system for each source. Initial monitoring for gross alpha particle radioactivity, radium-226 and radium-228 required four consecutive quarterly samples. Monitoring thereafter requires four consecutive quarterly samples at least once every 48 months. The analysis for radium-226 and radium-228 may be omitted, if the results from the gross alpha particle radioactivity analysis are less than 5 picocuries per liter (pCi/L). In addition, if the results of the initial analysis are less than half of the established MCL, the required monitoring may be reduced to a single sample collected every 48 months. The initial radionuclide samples collected in 1999 resulted in levels much less than the MCL and close to detection limits. The City may now monitor for radionuclides once every six years. The most recent samples were collected May 14, 2015 for the period 2014 through 2019. The next samples will be collected in 2020 or after.

H.4 DISTRIBUTION SYSTEM WATER QUALITY MONITORING

The City is required to perform water quality monitoring within the distribution system for coliform bacteria, disinfectant (chlorine) residual concentration, disinfection by-products, lead and copper, and THMs in accordance with WAC 246-290.

H.4.1 Monitoring Requirements and Procedures

Coliform Bacteria Routine Sampling – Specific requirements are contained in WAC 246-290-300. Based on providing water service to 16,245 people in 2014, a minimum of 15 samples per month are required from different locations throughout the system. The City currently takes 15 samples a month to obtain an adequate representation of the pressure zones, reservoirs and distribution system.

Table H-8 lists the locations of the City's routine sampling sites, including the upstream and downstream sampling locations in the event that repeat sampling is necessary. The sample sites are also shown in **Figure 1** and correspond to the assigned numbers in the table.

A total of 15 system samples and one source sample are collected each month in accordance with the schedule shown in **Table H-8**. Some of the sampling sites are the same each month and others alternate every other month allowing for a thorough sampling of all parts of the system. The schedule repeats every other month.

When the actual population served by the City increases beyond 17,200 people, 20 total samples will be required each month. The future sampling locations will include the existing locations shown in **Table H-8**, and five additional sampling sites.

Coliform Bacteria Repeat Sampling – In the event that a sample tests positive for coliform, a repeat sample shall be taken at the same location as the suspect sample and two additional samples shall be taken within five service connections upstream and downstream of the suspect sample. **Table H-8** shows the repeat sampling locations for the City. These repeat samples shall be taken by the end of the next business day after receiving the unsatisfactory results. If the results conclude that a MCL is exceeded (i.e., coliform are present in two or more samples for the month, including repeat samples), the City shall proceed with public notification in accordance with WAC 246-290-495.

Disinfectant Residual Concentration – The City must comply with disinfectant residual concentration requirements for treated groundwater and groundwater under the influence of surface water. Disinfection requirements applicable to City's Airport Well are contained in WAC 246-290-451, which states that a disinfectant residual concentration shall be detectable in all active parts of the distribution system. Disinfection requirements applicable to the City's Haller Wellfield are contained in WAC 246-290-662 for filtered systems, which states that a minimum 0.2 mg/L disinfectant residual concentration shall be maintained at the point the water enters the system and that the disinfectant residual concentration in the distribution system is detectable in at least 95 percent of the samples taken each calendar month. The City's chlorination target is to maintain a residual disinfectant concentration of at least 0.2 mg/L throughout the distribution system.

Samples collected and submitted for coliform testing shall also be tested for disinfectant residual concentration to ensure the disinfectant residual meets the regulatory requirements and achieves the target levels set by the City.

Lead and Copper – Specific requirements are contained in Title 40, Parts 141.86, 141.87, and 141.88 of the Code of Federal Regulations (CFR). Initial monitoring, beginning July 1992, required 40 samples for each 6-month monitoring period for the City's population. After two consecutive 6-month monitoring periods of meeting the lead and copper action levels, 20 samples taken during June, July, August or September were required once per year. After three consecutive years of monitoring and meeting the lead and copper action levels, 10 samples taken during June, July, August, or September are required every three years. If the lead and copper action levels are exceeded during the first two consecutive 6-month monitoring periods, the system is required to implement corrosion control treatment. Within 36 months of optimal corrosion control installation, systems of the City's size are required to monitor for lead and copper during two consecutive monitoring periods. If the water quality parameters are met during the follow-up monitoring, the system may reduce monitoring to once per year or less frequently as required by the State.

Table H-8

Coliform Monitoring Sampling Locations

Sample Number	Sample Type	Address	Pressure Zone
1	**Routine**	520 Pump Station	520
	Repeat	17916 Oxford Drive	520
	Repeat	17910 Oxford Drive	520
	Repeat	17904 Oxford Drive	520
	Repeat	Inside the 520 Pump Station	520
2	**Routine**	Airport Well	342
	Repeat	Old Prop Stop	342
	Repeat	Airport Office	342
	Repeat	Tap by Hydrant North of Airport Well Site	342
	Repeat	18306 59th Avenue NE	342
3	**Routine**	High Clover Boulevard and 200th Street NE	342
	Repeat	4623 200th Street NE	342
	Repeat	4628 200th Street NE	342
	Repeat	4619 200th Street NE	342
	Repeat	4624 200th Street NE	342
4	**Routine**	Crown Ridge Boulevard and Knoll Drive	520
	Repeat	7923 Crown Ridge Boulevard	520
	Repeat	7915 Crown Ridge Boulevard	520
	Repeat	7907 Crown Ridge Boulevard	520
	Repeat	7831 Crown Ridge Boulevard	520
5	**Routine**	Water Treatment Plant	342
	Repeat	Waste Water Office	342
	Repeat	Waste Water Lab	342
	Repeat	Utilities Office	342
	Repeat	Water Department Office	342
6	**Routine**	S 100 Block French Avenue	342
	Repeat	418 E 1st Street	342
	Repeat	124 S French Avenue	342
	Repeat	118 S French Avenue	342
	Repeat	202 S French Avenue	342
7	**Routine**	520 Reservoir	520
	Repeat	Espresso Stand	520
	Repeat	Shooting Range	520
	Repeat	7818 Condor Drive	520
	Repeat	East Room of Reservoir	520
8	**Routine**	River Crest	342
	Repeat	6115 204th Street NE (Gray's)	342
	Repeat	20326 61st Drive NE (Green)	342
	Repeat	6024 206th Street NE	342
	Repeat	6014 206th Street NE	342

Table H-8

Coliform Monitoring Sampling Locations – Continued

9	**Routine**	51st Avenue Lift Station	342
	Repeat	17600 51st Avenue NE - West Side of Airport	342
	Repeat	17600 51st Avenue NE - West Side of Airport	342
	Repeat	17600 51st Avenue NE - West Side of Airport	342
	Repeat	Hayford's Hanger	342
10	**Routine**	Norwood Condo's	342
	Repeat	307 S Hamlin Drive (Senff)	342
	Repeat	1003 E Union Street (Bennett)	342
	Repeat	301 S Hamlin Drive	342
	Repeat	910 Medical Center Drive (Building G)	342
11	**Routine**	Sweet Water - 20505 66th Drive NE (Lot 31)	342
	Repeat	20506 66th Drive NE (Lot 32)	342
	Repeat	20514 66th Drive NE (Lot 33)	342
	Repeat	20511 66th Drive NE (Lot 28)	342
	Repeat	20517 66th Drive NE (Lot 27)	342
12	**Routine**	Walnut Ridge - 4410 189th Place NE	342
	Repeat	18926 45th Drive NE	342
	Repeat	4404 189th Place NE	342
	Repeat	4410 189th Place NE	342
	Repeat	4416 189th Place NE	342
13	**Routine**	Eagle Heights (Park) - 8321 179th Place NE	520
	Repeat	8326 179th Place NE	520
	Repeat	17910 83rd Drive NE	520
	Repeat	8330 179th Place NE	520
	Repeat	Park	520
14		No Current Sampling	
15		No Current Sampling	
16		No Current Sampling	
17	**Routine**	Falcon Ridge - 19231 107th Avenue NE (Lot 4)	710
	Repeat	19226 107th Avenue NE (Lot 1)	710
	Repeat	19310 107th Avenue NE (Lot 2)	710
	Repeat	19322 107th Avenue NE (Lot 3)	710
	Repeat	19323 107th Avenue NE (Lot 5)	710
18	**Routine**	20820 Smokey Point Boulevard	342
	Repeat	20613 Smokey Point Boulevard	342
	Repeat	19829 Smokey Point Boulevard	342
	Repeat	2313 SR 530	342
	Repeat	20850 Smokey Point Boulevard	342
19	**Routine**	Brickwood - 18119 31st Avenue NE	342
	Repeat	18113 31st Avenue NE	342
	Repeat	18125 31st Avenue NE	342
	Repeat	18129 31st Avenue NE	342
	Repeat	18203 31st Avenue NE	342

The City collected 20 samples for each of the two consecutive 6-month monitoring periods during 1992 and 1993. Approximately 10 samples were also collected during two consecutive 6-month periods in 1997. Ten samples were taken during the winter of 1998 and another set of ten samples was taken in 1999. The results indicated that the 90th percentile concentration of lead from each group of samples exceeded the action level, except for 1999 when the 90th percentile equaled the action level of .015 mg/L. The 90th percentile concentration of copper exceeded the action level in the initial monitoring periods, but did not exceed the action level in recent triennial monitoring. The City changed the corrosion control treatment technique from the addition of blended polyphosphate to pH adjustment with sodium hydroxide in 2000 at the new water treatment plant, which was a more successful procedure. Lead and copper monitoring completed in 2002 and 2003 indicated lead and copper levels were below the action levels at the 90th percentile. Lead and copper monitoring must now be completed at 30 customers' homes within a three-year cycle (2013 – 2015, 2016 – 2018, 2019 – 2021.

Sample sites shall be selected based on the known existence of lead pipes, copper pipes and copper pipes with lead solder in accordance with 40 CFR 141.86(a). All samples, except for lead service line samples, shall be "first draw tap samples" taken at a cold water tap in which water has not been drawn from the tap for at least six hours. Lead service line samples shall be collected in one of three ways in accordance with 40 CFR 141.86(b). The locations of future sample sites shall be the same as past sample sites, unless unavoidable conditions prevent sampling at the same locations.

Fluoride Concentration – Specific requirements are contained in WAC 246-290-460 for systems that are fluoridating drinking water. The City does not currently fluoridate its water. The wholesale water purchased from the PUD is treated with fluoride and it is the responsibility of the PUD to monitor the concentrations. For informational purposes, the City samples for fluoride concentration within the distribution weekly at several sample sites. During the course of a month, all established sample sites are sampled once and a running log of fluoride concentration levels, including average concentration, for each sample site is kept. By tracking fluoride levels, the City is able to provide their customers with information regarding current and/or average fluoride concentration levels near their home. All customers inquiring about fluoride concentration levels are advised to consult with their dental or health professional regarding fluoride supplements. The City also works closely with the dental health professionals at Snohomish County Health District so they can properly advise customers living in the City.

If the City decides to fluoridate the water supply in the future, the concentration of fluoride shall be maintained in the range of 0.7 through 1.3 mg/L. Determinations of fluoride concentrations shall be made daily, and reports of the analyses shall be submitted to DOH within 10 days of the end of the reporting month. Monthly check samples shall be taken downstream of each fluoride injection point, at the first sample tap where adequate mixing has occurred.

Disinfection Byproducts – Specific requirements are contained in WAC 246-290-300. The City is required to monitor for total trihalomethanes (TTHM) and haloacetic acids (HAA5) quarterly at each of four sample locations throughout the distribution system. The City may reduce to one sample per treatment plant per quarter if monitoring results qualify.

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I INTEGRATED WATER RESOURCE MANAGEMENT PROGRAM

I.1 2011 WSP VERSION NOT REVISED FOR THE 2015 WSP UPDATE*

* Note that, since this appendix was not updated in the 2015 WSP, references to TDR Receiving Areas in Section I.2.1 do not reference changes to receiving areas made in the City's 2015 General Comprehensive Plan. The 2015 update identifies West Arlington as a TDR Receiving Area, and discontinues that designation for Brekhus-Beach.

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I Framework for an Integrated Water Resource Management Program

I.1 INTRODUCTION

The City of Arlington is interested in developing a program to integrate the management of the City's multiple water uses within the framework of the natural climate, water resources, and other water uses of the Stillaguamish and Quilceda basins. The Integrated Water Resource Management Program (IWRMP) is intended to develop policies and actions that flexibly manage the City's water resources to cost-effectively improve water availability and reliability while also improving environmental quality. The City actively manages sources of surface water (Haller Well Field) and groundwater (Airport Well Field) for municipal supply; provides sanitary sewer collection, treatment and discharge; and manages stormwater runoff and discharge within City limits. The City also purchases out-of-basin water, originating in the Sultan River, from the City of Everett and Snohomish PUD. The City has an interest in larger regional water resource and land use issues within the Stillaguamish and Quilceda basins that affect the generally availability and quality of water in the watersheds. The IWRMP area includes those lands where beneficial water use is actively managed by the City and where land uses both inside and outside City jurisdiction could affect the quantity and quality of water resources under City control. The IWRMP is intended to provide rationale, objectives, and recommendations for City planning and policy development for land and water resources. The City intends the IWRMP to provide guidance for incorporating IWRMP objectives into City policies.

This summary of the IWRMP includes:

1. Identification of the IWMRP area including service areas and natural features.
2. A summary of quantities and types of water in the natural environment and under active management.
3. A summary of regulatory compliance requirements for all beneficial water use and management, and identifies the current degree of compliance and challenges of meeting new regulations (e.g., water use efficiency, TMDL and ESA)
4. Potential opportunities for innovative and adaptive water management in the IWRMP to efficiently improve water resource use, environmental sustainability, redundancy, and security.

I.2 SUMMARY OF IWRMP AREA

The IWRMP area includes areas of active water use management, including the North Snohomish County Coordinated Water System Plan (CWSP), City water service area, City sanitary sewer service area, City boundary/urban growth area, and special protection areas within the City, including wellhead/watershed protection areas, stormwater comprehensive plan (SCP) planning area, critical areas, and areas identified for the transfer of development rights (TDRs). Portions of some or all of these areas may overlap. The IWRMP also includes those lands where water flows and water quality are of direct concern to the City but not under its jurisdiction; in these regions, the City is one of several land and water management stakeholders. The stakeholder area includes the watershed protection area for the Haller Well Field which extends upstream to include the entire North Fork and South Fork basins of the Stillaguamish River.

Detailed summaries of the management or service areas are presented in the respective comprehensive plans. The following provides an overview of each type of management area.

I.2.1 Land Management Areas

Within the City limits, the City manages land use and urban growth under its Comprehensive Plan. The City also tracks the implementation of Snohomish County Surface Water Division resource management programs, the Stillaguamish Watershed Chinook Salmon Recovery Plan, and participates in its own critical areas planning that matches similar management of critical areas by Snohomish County

Environmentally Critical Areas

The City has established regulations for the protection of Environmentally Critical Areas to provide long-term preservation of natural systems and their functions through prohibitions, mitigation requirements, and minimum standards for the use and development of properties that contain or adjoin environmentally critical areas. The areas include fish and wildlife conservation areas, frequently flooded areas, geologically hazardous areas, surface water bodies, wetlands, and aquifer recharge areas.

The City conducted a hydrogeologic conceptual study in 2007 in preparation for the update of its wellhead and watershed protection plans and to improve the understanding and performance of its groundwater supply. Wellhead protection areas for the Airport well field and the watershed protection area for the Haller well field have been designated to support public awareness of potential risks to groundwater supply and to influence land use policy in the protection areas.

TDR Management Areas

The City has developed a transfer of development rights (TDR) program. The Stillaguamish Valley Transfer of Development Rights (TDR) program is a partnership between the City of Arlington, Snohomish County and landowners of the sending and receiving areas to preserve the

farmed land of the Stillaguamish River Valley, located between Interstate 5 and Highway 9 along the Highway 530 corridor. The following summarizes elements of the City's TDR program.

TDR Sending Area: Located in the Stillaguamish Valley northeast of Arlington. The area is roughly bordered by Interstate 5, Highway 9, the northern City limits of Arlington, and the Stillaguamish River. The valley was historically dominated by dairy farms which have all closed. Those farmers who knew dairying are ready to retire and don't want to re-tool for a new type of agriculture. In order to make it economically equitable for those retired farmers to keep the farms in large acreages the TDR program was developed. A farmer can sell the development rights while retaining ownership of the entire farm along with the rights to continue farming. Currently, farmland is worth more to break in to 10-acres lots to be sold as small "farmettes", than it is to sell a large 100-acre farm as a single unit. There are over 3,000 acres of land in the valley with about 2,500 of those acres that are eligible to participate in the program.

TDR Receiving Areas: The current City regulations require that a developer has to purchase TDR Certificates to develop in the Brekhus/Beach Area, comprised of 337 acres with a significant portion of those areas being protected critical areas. This area was annexed into the City of Arlington in 2007, with the clear notion that it would be a designated receiving area for TDR certificates. That regulation was agreed to between the City, County and a majority of the landowners in the receiving area as a means to be included in the City of Arlington Urban Growth Area. A developer can build up to four homes or two high density dwelling units in exchange for a TDR Certificate. The area also allowed a specified amount of commercial development. The City is trying to plan for and build modern walkable communities and would like to encourage small corner markets for basics such as milk, bread and locally grown products.

The City has also identified the West Arlington area along Smokey Point Blvd. as a prospective receiving area for the development of commercial and high density residential parcels.

Economic Development Planning Areas.

In 2004 the City Council authorized development of a plan that would guide the City on activities related to business attraction and retention. The policy document, completed in 2005, is known as the Economic Development Plan, and it has become an important part of the City's Comprehensive Plan. The Economic Development Plan is comprehensive and long term. The original Plan offers the reader a complete overview of the analysis and public input that went into this blueprint for the City's development.

I.2.2 Water Service Area

The City of Arlington manages potable water supply in the water service control area WSCAs and WHPAs and watershed.

The City CWSP retail water service area extends beyond the City limits and will likely increase with the addition of an area along the current western border of the service area. Five small water systems operating within the City retail water service area, and several individual lots, rely upon wells for supply. The City is currently pursuing additional groundwater sources to meet its projected 50-year demand.

The City of Arlington relies on multiple water sources for potable municipal supply. The primary source (63% in 2007) derives from the Haller well field on the shoreline at the confluence of the North and South Fork of the Stillaguamish River. The Haller well field naturally filters Stillaguamish River water by drawing it through the riverbank into wells at the surface water/groundwater interface. The City derived 2 percent of its supply in 2007 from groundwater aquifer at its Airport well field. These two groundwater sources are replenished by natural runoff and recharge of precipitation. The City imported 35 percent of its supply in 2007 via an intertie with Snohomish PUD, which receives water from the City of Everett's Spada Reservoir near the headwaters of the Sultan River. The City also has a minor source from its interties with the City of Marysville. **Figure I-1** identifies the location of the sources. **Table 1** summarizes the natural flows and withdrawals of water within the retail service area.

I.2.3 Stormwater Management Area

The City is preparing a Stormwater Comprehensive Plan (SCP) that updates the Stormwater Management Plan completed in 1995. The update presents current conditions of the stormwater infrastructure in the city and Urban Growth Area (UGA), revises or adds hydraulic and water quality modeling, identifies issues and challenges facing stormwater utility management (infrastructure, operations, regulations), and presents capital improvement project (CIP) options for stormwater management along with associated cost of each CIP option.

In 1995, the City developed its most recent SCP to address the management of stormwater quantity and quality issues, including local flooding and stormwater pollution problems. Since that time, the city has experienced many changes, including continuing land development, annexations, regulatory updates/additions, and improved inventories of its stormwater infrastructure and natural environment. These changes are extensive, and require that stormwater management within the City of Arlington be updated.

The SCP is not to be confused with the separate Stormwater Management Program (SWMP) required under the NPDES Phase II Municipal Stormwater Permit. The SWMP will serve as an annual work plan to meet permit requirements.

The SCP focuses primarily on stormwater infrastructure and management in those areas currently within the city limits and those located within the Growth Management Act (GMA) urban growth area (UGA) boundary. While not currently within the city limits and the UGA, basins west (downstream), south (downstream), and southeast (upstream) of Arlington are included in the SCP

planning area (Figure I-1). These areas also contribute stormwater runoff to the streams and aquifers

Table I-1

Summary of City of Arlington Water Resources

Water Resource	Annual Flows (typical range)
Natural Flows in Stillaguamish Basin	
Stillaguamish River Flow at Confluence	500 to 5,000 cfs
Portage Creek Flow	5 to 15 cfs
March Creek Flow	2 to 5 cfs
Groundwater recharge to aquifers	~ 1.5 cfs per square mile
Groundwater underflow in Alluvial Well Field Aquifer at Confluence	10 to 100 cfs
Groundwater underflow in Airport Well Field Aquifer into Portage Basin	5 to 15 cfs
Beneficial Withdrawals from Stillaguamish Basin	
Groundwater Withdrawal (GWI) at Haller Well Field	1.3 cfs (2007)
Groundwater Withdrawal at Airport Well Field	0.04 cfs (2007)
(Imported surface water from Snohomish PUD)	0.7 cfs (2007)
(Imported water from Edwards Springs – Cougar Creek)	< 100,000 gpd (2007)
Private well groundwater withdrawals	1-3 cfs; estimated, assuming 500 wells
Managed Discharge into Stillaguamish Basin	
Discharge from WWTP to Stillaguamish River	1.7 cfs (2007)
Loss from Water Distribution	<< 1 cfs
Discharge from domestic septic systems within City limits	< 1 cfs
Stormwater runoff from City into SF Stilly upstream of Confluence	10 cfs; 20 inches of runoff from 5,000 acres
Stormwater runoff from City into Portage Creek and March Creek	<< 1 cfs
Natural Flows in Quilceda Sub-Basin	
Quilceda Creek Flow (Type 1 Stream)	5 to 20 cfs
Edgecomb Creek Flow (Trib of MF Quilceda Cr)	2 to 5 cfs
Groundwater recharge to aquifers	~ 1.5 cfs per sq. mile; annual average (PGG, 2007)
Groundwater underflow in Airport Well Field Aquifer to Quilceda Basin	5 to 15 cfs
Beneficial Withdrawals from Quilceda Sub-Basin	
Groundwater Withdrawal at Airport Well Field	0.04 cfs; average in 2007
Private well groundwater withdrawals	0.2-1 cfs; assuming 100 wells
Managed Discharge into Quilceda Sub-Basin	
Stormwater runoff from City into Quilceda Creek	<< 1 cfs
Stormwater runoff from City into Edgecomb Creek	<< 1 cfs
Loss from Water Distribution	<< 1 cfs
Discharge from domestic septic systems within City limits	< 1 cfs

by which the City benefits, and for which the City is partly responsible. Portions of these drainages are also likely areas for future growth.

I.2.4 Sanitary Sewer Service Area

The City provides sanitary sewer service to an area of approximately 9.1 square miles under its Comprehensive Sewer Plan. Much of the sewer service area boundary follows the City limits,

with the exclusion of the southwest corner of the City (served by the City of Marysville), and the inclusion of areas outside the City but inside the Urban Growth Area located near the rest areas along I-5 and near the intersection of SR 530 and SR 9. Some areas within the City are not connected to sewer, however, and rely upon septic systems for sanitary waste treatment and disposal.

I.3 SUMMARY OF WATER USES

The City, through its direct management of water resources and land use policies, impacts the natural condition of water quantity and quality. The significance of the impact varies according to the location of natural water systems, the rate and timing of natural water flows and the quantities of water that the City withdrawals for beneficial use and discharges after, collection and treatment, and the extent of the land use policies. The IWRMP would consider the significance of the impacts as part of the identification of important objectives. The following summarize the types of natural and managed water systems within the IWMRP area.

I.3.1 Natural Flows

Natural water systems within the IWRMP area include surface water and groundwater which the City influences through withdrawals and discharges into these systems. In general, the natural flows are not measured except at a few gauges on the mainstem Stillaguamish River and its main forks.

Surface Water

Precipitation within the Stillaguamish River and Quilceda Creek watersheds ultimately supply all surface water in the IWMRP. The distribution and patterns of precipitation and runoff affect the locations and patterns of stream flow within each surface water body. Precipitation ranges from approximately 80 inches per year at the headwaters of the Stillaguamish River and 32 inches per year at the confluence of Portage Creek and the Stillaguamish River. Runoff reaches maximum flows in late spring (April May) and lowest flows during fall (September October). **Table 1** summarizes the typical flows of the Stillaguamish River mainstem and its tributaries and of Quilceda Creek.

Groundwater

Precipitation patterns and seasonal patterns also ultimately control all groundwater within the IWMRP. The amount of groundwater is also controlled by proximity to areas of higher recharge and to areas of greater exchange of surface water. The Stillaguamish River aquifer, the large alluvial groundwater system underlying and adjacent to the mainstem and forks, is recharged through some precipitation recharge within the alluvial aquifer but is largely controlled by the exchange of water with the Stillaguamish River. In contrast, the Airport aquifer, a glacial sediment groundwater system, is largely controlled by recharge from the surrounding area and uplands to the east of the airport. Groundwater in the Stillaguamish River discharges in the direction of the Stillaguamish River, whereas, groundwater in the airport aquifer discharges towards Portage

Creek, and partially towards Quilceda Creek. More detailed summaries of groundwater systems are available in the wellhead protection program documents and CWSP.

Table 1 summarizes the estimates of groundwater flow within the two primary groundwater systems for comparison to the surface water flow.

I.3.2 Arlington Beneficial Use of Water and Discharge of Collected and Treated Water

City Water Withdrawals

The City withdraws groundwater from two sources: the Haller well field at the point of hydraulic connection between the Stillaguamish River mainstem and the adjacent alluvial aquifer; and from the "Airport Aquifer" at the Airport well field. The City also receives water from the Snohomish PUD from Spada Lake outside the Stillaguamish basin and from the City of Marysville. The importation of water from these sources increases the natural water balance of the Stillaguamish River basin water resources.

The impacts of the withdrawals from the Haller and Airport wells vary according to the condition of the source at the time of withdrawal and the quantity of withdrawal. Potential impacts include changes in water flow rates, volume of water storage, and/or temperature of the water in the Stillaguamish River, and to a minor degree in the alluvial aquifer adjacent to the river. Much of the municipal water is returned to the environment via WWTP discharge, but a percentage is lost from the natural water balance. Municipal water loss results primarily from evaporation of landscape irrigation. Any unaccounted leakage from water and sewer line returns to the alluvial and/or Airport aquifers and is not actually lost from the total water balance.

Future impacts of water withdrawals at current points of withdrawal are expected to increase with projected population growth. New impacts could arise when the City brings new sources of supply on line from new points of withdrawal obtained from transferred or new water rights. The City is currently considering acquiring new water rights from individuals and corporations and would transfer their points of withdrawal to the Haller and Airport well fields. Although no current plans exist, in the future the City may incorporate and connect individual and small water systems that currently use local groundwater wells for supply. These connections could result in greater groundwater storage in aquifers and potentially increase groundwater flow and seepage to surface water. Increasing importation of water from Spada Lake would increase the overall water balance.

City Water Discharges

The City manages stormwater runoff within the City stormwater utility service area and manages municipal wastewater from the treatment plant (WWTP) 400 feet downstream of the Haller wells. Discharge of these waters increases surface water flow, and potentially reduces water quality at the points of discharge, depending on the location and condition of the receptor at the time of discharge. The City is upgrading its WWTP to comply with discharge limits, support TMDL

implementation, reduce energy costs, and generate a source of non-potable reuse water. Smaller quantities of discharge within City limits include the discharge from septic systems in non-sewered areas, and discharge to surface water from non-point stormwater runoff from residential and agricultural lands not served by the stormwater utility.

Future impacts of water discharges are expected to increase with population growth. The City is constructing the WWTP to handle up to 2.7 MGD of capacity, which is projected to meet 2025 flows. The City may connect unsewered areas to the sewer distribution system, which would reduce the quantity of groundwater recharge in these areas and potentially impact shallow groundwater storage and discharge to surface water.

Indirect Uses or Impacts of Water within IWMRP

The City relies upon water resources that are replenished in areas outside the City's control. Objectives of the IWRMP could include participation in regional land use and water resource policies to achieve the reliability and sustainability objectives of the IWRMP. Potential water discharges or uses that the City may address in subsequent phases of the IWRMP development include:

- Discharges from POTW, septic, NPDES and non-point stormwater discharges into the Stillaguamish River basin upstream of Haller and the Portage basin upgradient of the Airport well field.
- Discharge from septic systems or stormwater within City limits
- Consumptive groundwater withdrawals from exempt wells and small water systems upgradient of the Haller and Airport well fields

The City intends to periodically update the watershed and wellhead protection plans to protect sources of supply in areas that are outside City limits.

I.3.3 Conceptual Water Balance

A schematic water balance conceptualizes the relationships between natural and City-managed water resources by schematically connecting the water resources and their direction of flow (**Chart I-1**). The diagram illustrates the complexity of water distribution and exchanges within the City management areas. Further development of the water balance during implementation of City water resource management will guide the City's prioritization of integrated water management strategies.

Figure I-1
Potable water sources in the planning area

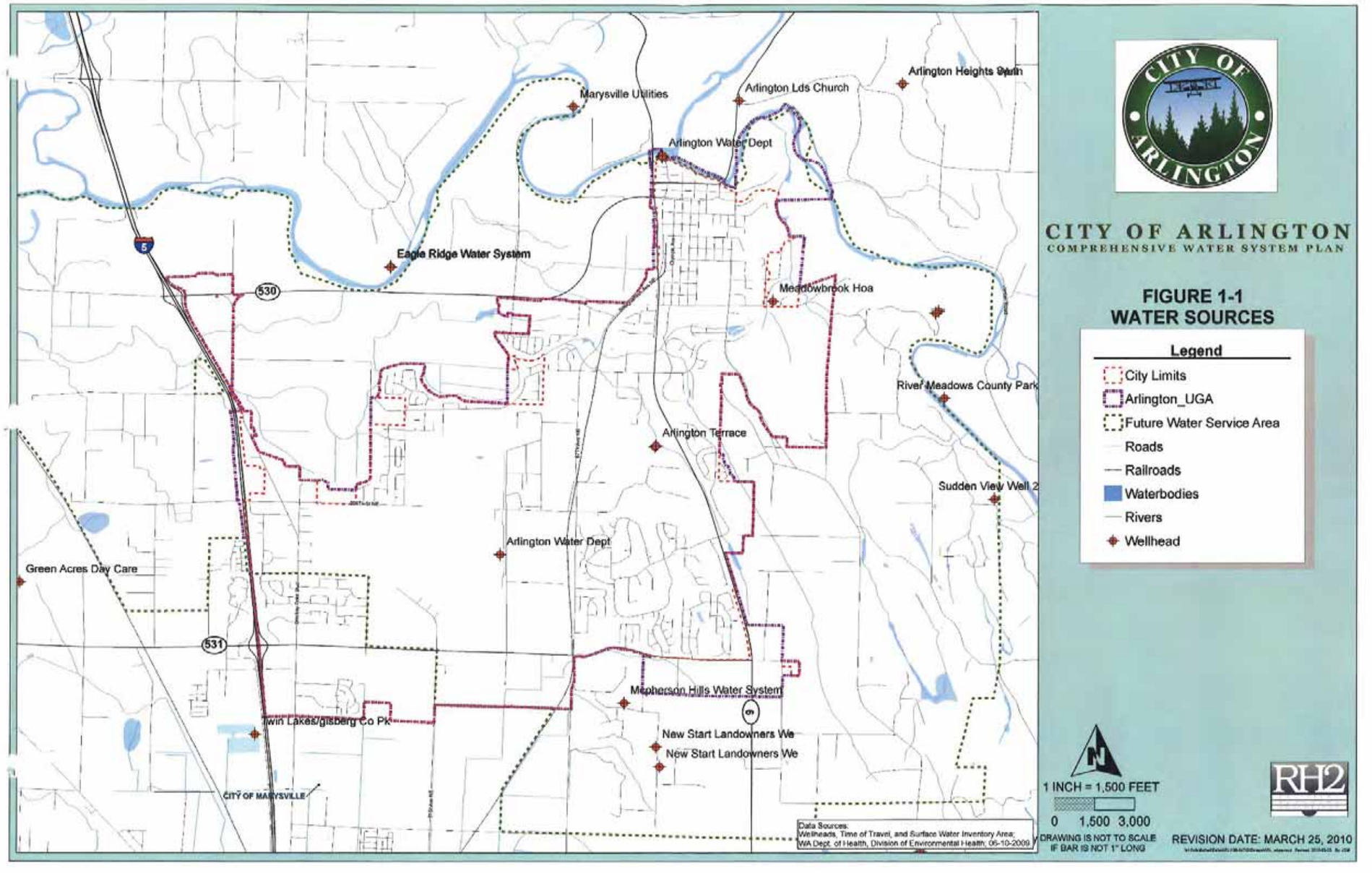
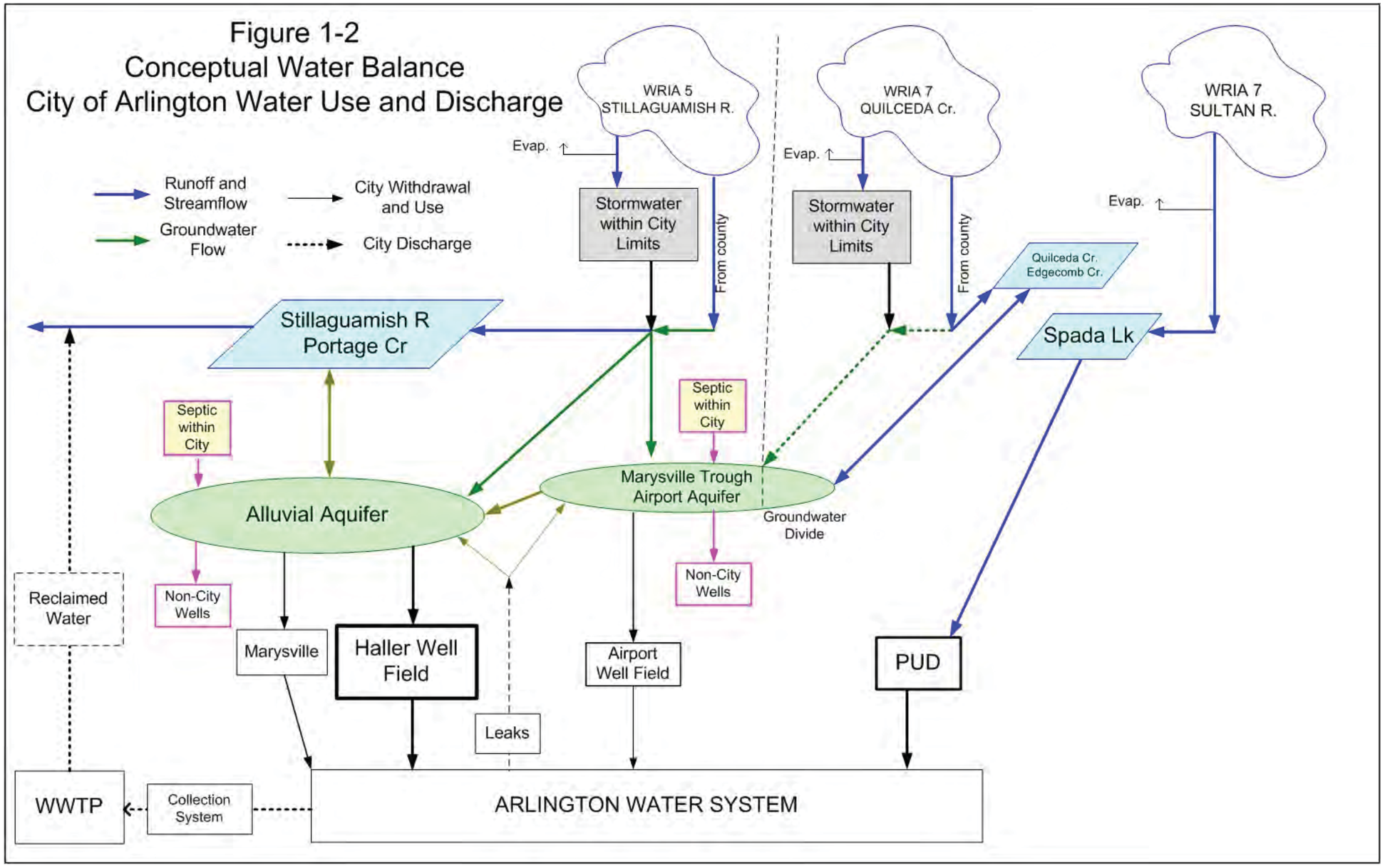


Chart I-1

Natural and City-managed water resources in a conceptual water balance



I.4 SUMMARY OF COMPLIANCE REQUIREMENTS

I.4.1 Beneficial Water Use

The initial phase of developing the IWRMP includes documenting regulatory compliance requirements for all water withdrawals, uses and releases. The City use and discharge of water resources is regulated primarily by City and State authority. **Table 2** summarizes the regulations affecting the City's water resource use and discharge into a water resource, and summarizes current and potential challenges of compliance with current regulations.

Water withdrawals for municipal use are regulated by the City's water rights (Washington Department of Ecology; Chapters 90.03 and 90.44 RCW), and Group A water system permit (Washington Department of Health; Chapter 246-290 WAC). The City's certificated and inchoate (not yet perfected) rights have priorities that are senior to the 2005 Stillaguamish Instream Flow Rule (WAC 173-505) which restricts junior right holder withdrawal of water that is in hydraulic continuity with the river and with its tributaries, including Portage Creek. Therefore, changes to existing water rights and new rights that could affect stream flow would be junior to the Stillaguamish Instream Flow Rule and would be subject to curtailment during low stream flow unless impacts are mitigated. Resolving the status of the City's PSPL water right will result in additional inchoate water that would be derived from the Haller source.

Water supply from the Haller wells is under the influence of surface water; water treatment is regulated by DOH under WAC 246-290. The Airport well supply is untreated.

The Municipal Water Law that governs designation and current and future use of water for municipal supply is under legal challenge at the Washington State Supreme Court. Pending the resolution of the challenge, DOE and DOH have implemented interim policies to regulate changes to existing and establishment of new municipal rights. Once the Supreme Court has issued its decision, the decision will need to be carefully evaluated to determine how and to what degree it affects the City's water rights.

I.4.2 Water Discharges

Treated wastewater discharge is regulated by the City's NPDES permit for the WWTP. In 1998, the City upgraded its WWTP to a sequencing batch reactor (SBR) treatment facility. Sudden growth in the City subsequent to the 1998 expansion caused the wastewater treatment plant to be near capacity by 2004. This required the City to enhance the existing treatment process and begin planning for an expansion to the treatment plant to meet projected flows (from 1.1 MGD in 2007 to 2.7 MGD in 2025). As part of the State's clean-up efforts for the Stillaguamish River under the TMDL implementation plan, increasingly stringent discharge limits were placed on the treatment plant's discharge, requiring an increase in treatment technology to produce cleaner effluent. The City has completed a draft comprehensive sewer plan in 2008. The City plans to treat all sewer influent at the WWTP and is considering adaptive management alternatives to reuse the water including a constructed wetland next to the Stillaguamish River or other beneficial uses. Reuse of

Table I-2

Summary of water use and discharge regulations in the City of Arlington

Water Resource	Regulatory Agency	Application to City	Current performance	Compliance Challenges
Withdrawals for Municipal Use under Group A Permit				
Groundwater from Stillaguamish River /Alluvial Aquifer at Haller Wells	Dept. of Ecology RCW 90.03 RCW 90.44	Provisions define quantity, location, type, and timing of use	• Current withdrawals comply with water right provisions.	*• Pursuing additional water rights to meet future demand.*
Groundwater from Airport Aquifer at Airport Well – Portage Basin				*• Resolution of Municipal Water Lawmay affect designation of inchoate rights.*
Groundwater from Airport Aquifer at Airport Well – Quilceda Basin				*• Stillaguamish Instream FlowRule constrains water right changes and*
Groundwater from Stillaguamish River /Alluvial Aquifer at Haller wells	Dept of Health WAC 246-290	Wellhead and Watershed Protection Plans	• Protection plans are in effect.	*• The City is updating the wellhead protection plan.*
Groundwater from Airport Aquifer at Airport Well – Portage Basin		Water Use Efficiency Rule	• Current Distribution System Leakage is 5%	*• The City has an active leak reduction program.*
Groundwater from Airport Aquifer at Airport Well – Quilceda Basin		Water treatment rules	• Water treatment is in compliance.	*• Reclaimed water use from WWTP would be regulated by Reclaimed Water Rule in development*
Groundwater from Stillaguamish River /Alluvial Aquifer at Haller wells	Dept of Ecology /EPA Clean Water Act (303d)	TMDL listing - reduced flow in river	• TMDL for Temperature • TMDL for fecal coliform, DO, pH, Hg, As	*• Cleanup plan in place; IWMRP should reduce or flatten overall water*
Discharges to Water Resources				
Discharge from WWTP to Stillaguamish River; Leaks from sewer distribution system	Dept of Ecology /EPA Clean Water Act (303d)	NPDES Permit to discharge treated wastewater	• TMDL for fecal coliform, DO, pH, Hg, As • Sewer Utility complies with NPDES permit.	*• Cleanup Plan promulgated and under implementation; TMDL implementation plan is supported by WWTP upgrade, and performance of Phase II Stormwater Permit*
Stormwater runoff within City limits discharging to Stillaguamish R	Dept of Ecology /EPA Clean Water Act	NPDES Phase II stormwater discharge Permit	• TMDL for fecal coliform, DO, pH, Hg, As	
	Arlington Municipal Code	Other City land use agencies that affect stormwater discharge.	• 303d list for Fecal Coliform	
Stormwater runoff within City limits discharging to Portage Creek	Dept of Ecology /EPA Clean Water Act	Non point and permitted (NPDES) discharge from City	• TMDL for fecal coliform, DO, pH, Hg, As	
	Arlington Municipal Code	City land use policies and stormwater utility that regulate stormwater runoff		
Stormwater runoff within City limits discharging to Quilceda Creek	Dept of Ecology /EPA Clean Water Act	Non point and permitted (NPDES) discharge from City	• 303d list for turbidity	*• A bacterial pollution control plan (BPCP) and program is a permit condition for the Snohomish TMDL and is anticipated under the*
	Arlington Municipal Code	City land use policies and stormwater utility that regulate stormwater runoff	• TMDL for Fecal Coliform and DO	
Discharge from septic systems within City limits	Arlington Municipal Code	Septic system regulations, building code	• Active permitting and enforcement in place through Snohomish Health District, although minor leaks and failing systems likely occur.	*• SCP planning did not attempt to analyze the potential for septic systems in the vicinity of Arlington to contribute to fecal coliform loads in area streams. The Stillaguamish TMDL identifies an assessment of septic systems in Arlington and their soil characteristics and proximity to streams in order to prioritize septic systems for performance evaluations.*

the effluent would be regulated under the reclaimed water regulation which is under development by DOE.

The City is responsible for managing all aspects of stormwater within its jurisdiction. The City operates and maintains drainage facilities that are located within the public right of way or public easements. The current stormwater permit was issued by Ecology on January 17th, 2007. The City is developing its Stormwater Management Program (SWMP) 2009 work plan as part of requirements under the NPDES Phase II Stormwater Permit which include addressing goals of the Stillaguamish and Quilceda TMDL implementation plan. Future development of the stormwater management program would incorporate the objectives of the IWRMP.

Only the Snohomish River Tributaries TMDL for fecal coliform has current regulatory requirements defined for the City. The City's obligations under the Stillaguamish TMDLs for fecal coliform, dissolved oxygen, temperature, and other parameters will not be required as permit conditions until the NPDES permit renews in 2012. Nevertheless, the City intends to meet its responsibilities in the Stillaguamish basin during the current cycle as the TMDL is complete and the City's tasks are clearly defined.

In and near the City of Arlington, a number of stream and river segments are identified as impaired, and three water clean-up plans are in place for a number of priority pollutants, particularly fecal coliform, dissolved oxygen, and temperature. In all TMDLs, the City is identified as a contributor to these impairments, either through point discharges from its wastewater treatment plant, or point and nonpoint discharges of stormwater, or both. The City has water clean-up and monitoring responsibilities under TMDLs prepared by Ecology (with assistance from the City), which are intended to restore water quality. The NPDES Phase II permit is the regulatory authority for implementing TMDL requirements.

The following TMDLs for water bodies within the City of Arlington have been promulgated:

- Lower Snohomish Tributaries Fecal Coliform Bacteria TMDL: this TMDL applies in part to the Quilceda Creek basin, the upper portion of which lies within the City, including Edgecomb Creek, a Quilceda Creek tributary.
- Stillaguamish River Temperature TMDL
- Stillaguamish River Multi-Parameter TMDL: this TMDL addresses fecal coliform bacteria, dissolved oxygen, pH, arsenic and mercury in the Stillaguamish River and some of its tributaries including Portage Creek and March Creek.

I.4.3 Indirect Regulation of Water Resources that Affect Arlington

Regional land use and watershed regulations or policies may also affect the City's use of water resources. This includes implementation of the Snohomish County Surface Water Division resource management programs, the Stillaguamish Watershed Chinook Salmon Recovery Plan,

Snohomish County planning and critical areas ordinances, the Stillaguamish and (Lower) Snohomish Tributaries TMDL implementation plans, and Washington State and Federal environmental policies that regulate fisheries and habitat including the Chinook Salmon Recovery Plan. Again, the IWRMP may include participation in developing regional land and watershed resource policies to achieve the reliability and sustainability objectives of the IWRMP.

I.5 POTENTIAL OPPORTUNITIES FOR ADAPTIVE MANAGEMENT OF WATER RESOURCES

The City intends the IWRMP to guide the sustainable use of water resources and increase reliability and security while reducing costs and environmental impacts. The following summarizes potential objectives for consideration as the IWRMP is developed and identifies preferred or more feasible options.

I.5.1 Potable Supply

Increase availability and sustainability of water quantity

- Protect watershed runoff to maintain natural flows that supply current and future sources
- Protect critical aquifer recharge areas and identify areas to enhance natural recharge that supplies current and future sources
- Protect legal access to current and inchoate sources of water to meet forecasted demand
- Implement long-term monitoring program to document trends in:
    - Water balance and performance of IWRMP , particularly relationship between precipitation and runoff, and surface water-groundwater interactions Demand from growth – update growth trends to modify demand-based actions
    - Climate change - update water flow data and compare to forecasted short-term and long-term climate trends
    - Environmental effects - - update water flow and quality data and compare to development impacts and management (e.g., LID, density, stormwater systems)
- Identify opportunities to reduce demand and improve beneficial water use efficiency
    - Discharge reclaimed water (see wastewater) to replace other potable water uses (e.g., park irrigation, industrial use)
- Identify opportunities to improve supply-side conservation
    - Production and Distribution costs – identify opportunities to reduce energy, improve efficiency, and effectively maintain infrastructure
    - Treatment costs – identify opportunities to reduce reliance on poor quality water

Improve source water quality protection and reduce vulnerability

- Implement (and update when warranted) wellhead and watershed protection objectives.
- Develop UIC program to increase groundwater protection
- Develop septic system maintenance program and/or schedule for sewering priority parcels

Increase reliability of water infrastructure

- Maintain contingencies (and improve where needed) for source security, flexibility, and redundancy for natural events (drought, global climate change, seasonal water quality changes) and artificial events (spills, power loss, accident) – focus on wellhead and watershed protection areas
- Identify storage improvements to mitigate peak demands
- Identify ASR opportunities to store surplus stormwater for summer withdrawal and use
- Identify ASR opportunities to store reclaimed water for summer withdrawal and use
- Implement well inspection and maintenance program to improve system reliability
    - Identify useful lifetime of points of withdrawal, and anticipate replacement well or potential well field requirements
- Implement seasonal or variable water source management (e.g., decision criteria for reduction of source impacts) addresses. Adjust withdrawals to:
    - Improve instream flows
    - Minimize drought impacts
    - Minimize water quality risks and concerns
    - Minimize source (well and distribution) operation and maintenance
- New vs. expanding sources
- Interties - Maintain working relationship with the Snohomish PUD to sustain imported water sources
- Identify and secure future sources of water to meet forecasted demand
    - Exempt or small systems that may be cost-effectively retired or absorbed into system
    - Water right transfers in both Stillaguamish River and Quilceda basins
    - Develop and expand airport wellfield
    - Use of other city irrigation water rights (three-Hammer, Cemetery, Airport)

Improve water use efficiency

- Reuse or recharge of water reclaimed from wastewater to offset potable use or potable impact
- Reuse or recharge of treated stormwater to improve water availability and minimize withdrawal impact – e.g., "purple pipe" distribution to non-potable uses (identify potential recipients); groundwater recharge; stream enhancement; small package/scalping plants
- Implement conservation-based rate structures and other conservative BMPs

I.5.2 Improve environmental conditions in IWRMP Area

- Flow enhancement along depleted streams – e.g., stream flow augmentation using reclaimed water
- Habitat enhancement in exchange for beneficial water uses; includes identification of potential receptors
- Construct wetland to support wastewater/stormwater return
- Quality enhancement - improve WWTP and stormwater treatment

Surface water management opportunities

- Implement TMDLs for streams adjacent to city
- Attain wasteload allocations for wastewater and (generally) stormwater discharges
- Manage Monitor and manage surface water quality in Stillaguamish River, which affects drinking water quality and/or treatment costs
- Cooperate with or influence upstream land uses in Stillaguamish basin, which affects surface water quality
- Comply with stormwater management goals under NPDES II to protect surface water quality affects drinking water and wastewater treatment requirements and costs, and vice versa
- Develop watershed control program to protect water quantity and quality in upper Stillaguamish River basin

Wastewater management opportunities

- Convert WWTP to WRF (reclamation facility) to produce water of reclaimed quality
- Discharge reclaimed water to river to maintain flows
- Discharge reclaimed water to constructed storm wetland for temperature reduction and nutrient (DO) polishing

- Discharge reclaimed water to ground/infiltration for groundwater recharge and instream mitigation
- Pretreatment program to reduce toxics in waste stream and receiving waters
- Pharmaceuticals take-back and education program to reduce EDCs in waste stream and receiving waters

Stormwater management opportunities

- Identify potential discharges that may significantly affect surface water quality and identify corrective measures; focus on stormwater wetland near river
- Correct untreated outfalls to surface waters to improve surface water quality with focus on 303d parameters and TMDL commitments
- Implement UIC program to address infiltration system effects on groundwater and aquifer quality

I.6 GEOGRAPHIC INFORMATION SYSTEM FOR INTEGRATED WATER RESOURCE MANAGEMENT

The City has compiled water, land, and land use information in GIS format illustrating the distribution of natural and infrastructure systems in its management areas as specific map layers with descriptive attributes for each specific layer type. The City regularly updates the GIS database as new data and priorities develop. The current GIS database contains layers as summarized in **Table 3**. Maps to support the development of an IWRMP may be prepared from the GIS database to illustrate areas where resource management activities coincide and may readily benefit from joint management of a water resource. For example, areas where stormwater conveyance traverse areas of high soil permeability could be considered for groundwater recharge. Managing the GIS database to readily allow interactive comparisons of natural and infrastructure layers could promote the development of new opportunities for integrated water resource management and to facilitate the prioritization of opportunities based on potential benefits and challenges to implementation.

Table I-3

Summary of City of Arlington GIS Mapping Data

GIS Layer	Attributes for Each Layer
Managed Areas	
City Boundary	Limits, area
UGA	Limits, area
Land Use	Limits, type, area
Parcels	Limits, type, area
Zoning	Limits, type, area
PLSS	Township, Range, Section
TDR	Limits, area
Natural Systems	
Topography	10-foot contours
LIDAR	Sub-meter contours (from PS Lidar)
Soils	Limits, class (from NRCS)
Geology	Limits, class (from WADNR)
Wetlands	Limits, class
Fish and Wildlife Conservation Areas	Limits, class
Geo Hazards	Limits, conditions (from Sno. Co.)
Average Annual Precipitation	Area, Rate
Surface Water	
Surface Water Bodies	Mean, min, max flow
WRIA Boundaries	Limits, designation
Surface water points of withdrawal	Quantities, rights
TMDL listed waters	Component, criteria
303d listed waters	Component, criteria
Watershed protection areas	Limits, class
Shorelines	Limits, class, restrictions
FEMA floodplains	Limits, class, restrictions
ESA listed waters	Reach, species,
Groundwater	
Wellhead Protection Areas	Time-of-Travel limits
Water Rights points of withdrawal	Location, quantities, conditions
Aquifers	Limits, characteristics
Critical Aquifer Recharge Areas	Limits, conditions
Exempt wells	Depth

Table I-3, continued

Summary of City of Arlington GIS Mapping Data

GIS Layer	Attributes for Each Layer
Potable Water	
Conveyance	Diameter, composition
Storage	Volume
Points of Withdrawal	Type, water right
Treatment	Capacity, system
Wastewater	
Conveyance	Diameter, composition
Storage	Volume
Points of Discharge - NPDES	Type, conditions, permit
Treatment	Capacity, system
Stormwater	
Surface Conveyance - Water pipes and pumps, wastewater pipes and pumps, drain points, channels	Diameter, volume, composition, capacity
Surface Storage – Detention centroids, lines, ponds; drain points, channels, basins	Diameter, volume, composition, capacity
Sub-Surface Conveyance – catch basins, stormpipes	Diameter, volume, composition, capacity

I.7 PRIORITIZATION OF POTENTIAL ACTIVITIES FOR ADAPTIVE MANAGEMENT OF WATER RESOURCES

As the City considers opportunities to adaptively manage water resources under its jurisdiction, the City will identify and prioritize possible actions that would improve one or more conditions of a water resource or an environmental quality that directly or indirectly benefits water resources. Actions include developing new sources of supply or adaptively managing existing resources to meet a water resource management objective. Potential evaluation criteria that consider the objectives described in Section 4 include, but are not necessarily limited to, increasing water quantity; improving water quality and environmental sustainability; reducing operational costs; and increasing water supply redundancy and security. This section evaluates potential new sources against these criteria and provides planning level costs for developing or implementing the potential new source.

I.7.1 Evaluation Criteria for Proposed Activities

Developing a new potable source or adaptively managing existing water resources of water are expected to advance a water resource management objective. Implementation of the IWRMP is expected to improve conditions when one or more improvement criteria are clearly met. Prioritizing management activities could be based on ease of implementation (low cost, few restrictions), greatest degree of benefit, or whether the activity has an area-wide or long-term benefit.

As the IWRMP is developed, criteria for prioritizing water resource management activities may become more specific or weighted more heavily if greater benefits are achieved with increasing understanding of effectiveness and implementation challenges. The weighting of the prioritization criteria could also be modified by the cost limitations, regulatory restrictions, natural variability, public participation, or enforceability of the implemented activity. The effectiveness of an action that would improve a condition or the management of a water resource may be measurable through monitoring or calculation, or incremental, where the benefit is long-term or regional. Examples of activities that measurably improve a condition include acquiring new water rights, constructing peaking storage, or reducing water loss or demand. Qualitative, non-measurable improvements that promote a water resource management objective would include increased public awareness of water resource management goals, changes in land use policy that reduce non-point source loads, or implementation of low impact development (LID) policies in the IWRMP area.

Table 4 illustrates an evaluation matrix for potential water management actions identified in Section 4. This type of matrix facilitates prioritization of possible actions through side-by-side comparison of potential limitations and benefits of implementing the action.

Potential benefits include:

- Measurable benefits that can be directly monitored or calculated
- Incremental benefits that cannot be directly measured, but there is a high probability of improvement or increase
- Long-Term benefits endure for more than 10 years or are permanent

Potential limitations include:

- Limited opportunity – difficult to acquire or implement
- Cost - Total cost or over cost over 10 years
- Medium Cost - $50,000 to $500,000;
- High Cost – greater than $500,000
- Seasonal benefits only occur during a part of the year
- Short-term benefits endure for less than 10 years
- Permitting implementation involves multiple regulatory agencies and stakeholders for approve

continued

Table I-4

Potential Water Resource Management Actions, Benefits, and Limitations

Current and Future Potential Actions	Evaluation Criteria						
	Potential Limitations	Potential Benefits					
		Increases availability of source water quantity instantaneous or annual rights	Improves source water quality by reducing contaminants in sources	Improves long-term sustainability through source protection and redundancy	Reduces total or peak demand for potable water	Reduces operational cost through efficiency, energy use, maintenance	Improves environmental conditions or reduces impacts
Surface Water Sources							
Promote watershed control program to protect quantity and quality of watershed runoff that supplies current and future sources	Medium Cost	Incremental, Long-Term	Incremental, Long-Term, Medium Cost	Incremental, Long-Term, Medium Cost	-	-	Incremental, Long-Term
Implement surface water monitoring program to document trends in surface water runoff from urbanization and climate change	Medium Cost	Incremental, Long-Term	-	Incremental, Long-Term	-	-	Incremental, Long-Term
Protect legal access to current and inchoate sources of water to meet forecasted demand	Medium Cost	Incremental, Long-Term	-	Incremental, Long-Term	-	-	-
Acquire new sources of surface water supply, primarily irrigation rights	Limited	Measurable, Long-Term	-	Measurable, Long-Term	-	-	-
Groundwater Sources							
Implement groundwater monitoring program to document trends in groundwater recharge from urbanization and climate and other withdrawals	Medium Cost	Incremental, Long-Term	-	Incremental, Long-Term	-	-	Incremental, Long-Term
Identify and develop new sources of groundwater supply – Airport well field, exempt wells, small domestic system, convert City irrigation rights	Limited, High cost, Permitting	Measurable, Long-Term	-	Incremental, Long-Term	-	-	
Protect critical aquifer recharge areas and identify areas to enhance natural recharge that supplies current and future sources	Medium Cost	Incremental, Long-Term	Incremental, Long-Term	Incremental, Long-Term	-	-	Incremental, Long-Term
Promote passive and active groundwater recharge of stormwater	High cost, Permitting, Seasonal	Incremental, Long-Term	-	Incremental, Long-Term	-	-	Incremental, Long-Term
ASR using surplus Haller Well Field supply	High cost, Permitting	Incremental, Long-Term	Measurable, Long-Term	Measurable, Long-Term	Measurable, Long-Term	-	-
ASR using reclaimed water	High cost, Permitting	Incremental, Long-Term	Measurable, Long-Term	Measurable, Long-Term	Measurable, Long-Term	-	-
ASR using stormwater	High cost, Permitting, Seasonal	Incremental, Long-Term	Measurable, Long-Term	Measurable, Long-Term	Measurable, Long-Term	-	-
Coordinate with Ecology to enforce UIC program to increase groundwater protection	Medium Cost	-	Incremental, Long-Term	Incremental, Long-Term	-	-	Incremental, Long-Term
Implement groundwater well inspection and maintenance program – useful well life, replacement well locations	Medium Cost	-	-	Incremental, Long-Term	-	Incremental, Long-Term	-
Develop septic system maintenance program and/or schedule for sewering priority parcels	Medium Cost	-	Incremental, Long-Term	Incremental, Long-Term		-	Incremental, Long-Term
Adjust seasonal withdrawals for economic benefit – energy costs, treatment and maintenance costs	Medium Cost	-	-	-	Measurable, Long-Term	Measurable, Long-Term	-
Adjust seasonal withdrawals for environmental benefit – instream flow, habitat	Medium Cost	-	-	-	Measurable, Long-Term	-	Measurable, Long-Term

Table I-4, continued

Potential Water Resource Management Actions, Benefits, and Limitations

Current and Future Potential Actions	Evaluation Criteria						
	Potential Limitations	Potential Benefits					
		Increases availability of source water quantity instantaneous or annual rights	Improves source water quality by reducing contaminants in sources	Improves long-term sustainability through source protection and redundancy	Reduces total or peak demand for potable water	Reduces operational cost through efficiency, energy use, maintenance	Improves environmental conditions or reduces impacts
Potable Water System							
Mitigate peak demand with reservoir storage	High Cost	-	-	Measurable, Long-Term	Measurable, Long-Term	Measurable, Long-Term	-
Intertie maintenance – regular communication with interties	Medium Cost	-	-	Incremental, Long-Term	-	-	-
Meet irrigation and industrial demand with reclaimed water	High Cost, Permitting	Measurable, Long-Term	-	-	Measurable, Long-Term	-	Measurable, Long-Term
Implement efficiency rules	Medium Cost	Measurable, Long-Term	-	Measurable, Long-Term	Measurable, Long-Term	Measurable, Long-Term	Measurable, Long-Term
Rate structure to reduce demand	Medium Cost	Measurable, Long-Term	-	Measurable, Long-Term	Measurable, Long-Term	Measurable, Long-Term	Measurable, Long-Term
Wastewater							
Develop septic system maintenance program and/or schedule for sewering priority parcels	Medium Cost	-	Incremental, Long-Term	Incremental, Long-Term	-	-	Incremental, Long-Term
WWTP to WRF (reclamation facility) produces water of reclaimed quality	High Cost, Permitting	Measurable, Long-Term	-	Measurable, Long-Term	Measurable, Long-Term	-	Incremental, Long-Term
Discharge reclaimed water to river to maintain flows	High Cost, Permitting	-	-	-	-	-	Incremental, Long-Term
Discharge reclaimed water to constructed storm wetland for temperature reduction and nutrient (DO) polishing	High Cost, Permitting	-	-	-	-	-	Measurable, Long-Term
Discharge reclaimed water to ground/infiltration for groundwater recharge and instream mitigation	High Cost, Permitting	Incremental, Long-Term	-	Incremental, Long-Term	-	-	Incremental, Long-Term
Pretreatment program to reduce toxics in waste stream and receiving waters	High Cost, Permitting	-	-	-	-	-	Incremental, Long-Term
Pharmaceuticals take-back and education program to reduce EDCs in waste stream and receiving waters	High Cost, Permitting	-	-	-	-	-	Incremental, Long-Term
Improve WWTP discharge to reduce waste allocation	High Cost, Permitting	-	-	-	-	-	Measurable, Long-Term
Stormwater							
Identify potential non-point source discharges that may significantly affect surface water quality and identify corrective measures; focus on stormwater wetland near river	Medium Cost	-	-	-	-	-	Measurable, Long-Term
Correct untreated outfalls to surface waters to improve surface water quality with focus on 303d parameters and TMDL commitments	High Cost, Permitting	-	-	-	-	-	Measurable, Long-Term
Implement UIC program to address infiltration system effects on groundwater and aquifer quality	Medium Cost	-	-	Incremental, Long-Term	-	-	Incremental, Long-Term
Promote passive (LID) and active groundwater recharge (ponds) of stormwater	High Cost, Permitting	Incremental, Long-Term	-	Incremental, Long-Term	-	-	Incremental, Long-Term

I.8 CONCLUSIONS AND RECOMMENDATIONS

The City intends to adaptively manage water resources and associated water infrastructure and influence land use policies that affect water resources under its jurisdiction. The complex interaction of natural water systems and City-managed water infrastructure creates a challenging management environment to monitor the natural and man-made effects of the quantity and quality of water as it flows into the City management areas is put to beneficial use, and flows out of the City management area. The City recognizes its responsibility as a steward of its water resources for public and environmental benefit by regular updating and implementation of comprehensive plans for water, wastewater, and stormwater, and sees an integrated water resource management program as a way to achieve similar objectives for the planning efforts and avoid direct or inadvertent conflicts of water resource management actions.

This initial summary of the objectives, information, and opportunities to compare water resource management actions provides the framework to proceed with more detailed evaluation of how to implement an integrated water resource management program. Much of the work set forth in the scope to develop the IWRMP strategy are presented in this summary. Time and budget constraints have reduced the opportunity to refine the prioritization of adaptive management actions, and to establish the means to integrate the existing water management programs into an effective integrated approach.

Recommendations for the next step toward developing an integrated approach would include using the available GIS database to identify areas of water resource management overlap and review existing programs for aligned objectives or potential conflicts. The prioritization table in Section 6 could be further refined to assign greater weight to those benefits that current water management programs have identified as priorities. Subsequent water resource planning updates could be structured to identify objectives and priorities that are also identified in other programs to elevate the priority and awareness of a potential action based on its multiple benefits. Finally, developing an IWRMP will require a team approach and team leader to be aware of the City's water and land resource management objectives and responsibilities and to connect each water resource program to achieve their complementary objectives.

J CONSUMER CONFIDENCE REPORT

J.1 REVISED FOR THE 2015 WSP UPDATE

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City of Arlington
Annual Water Quality Report

Water Testing Performed in 2014

PWS ID# 02950K

Continuing Our Commitment

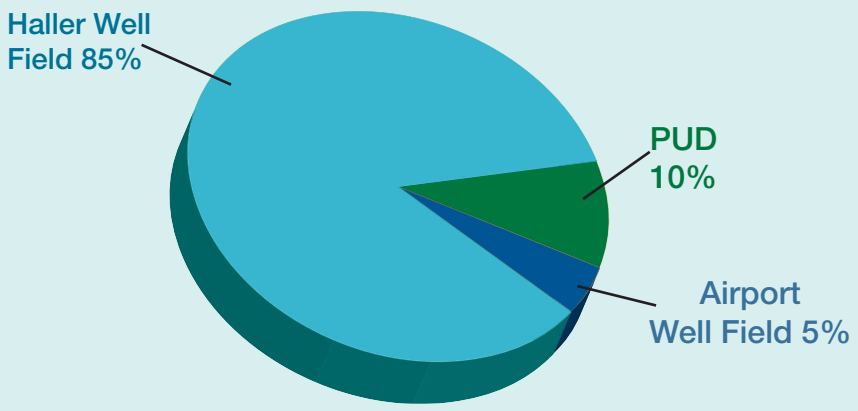
The City of Arlington is pleased to report that your drinking water is of high quality and compliant with all state and federal drinking water laws. We are committed to delivering the best quality drinking water, and to that end, we make more than 16,000 water quality observations and tests every year. This edition of our annual water quality report summarizes only the key findings of testing completed from January through December 2014. For more information about this report, or for any questions relating to your drinking water, please call the Water Department at (360) 403-3526.

Where Does Our Water Come From?

Three primary sources supply water to the Arlington service area. Arlington produces most of its water from the Haller and Airport well fields. The Haller well field naturally filters Stillaguamish River water by drawing it through the riverbank. The Airport well field draws groundwater from a deep aquifer. The origin of both these sources is precipitation that falls across the Stillaguamish Basin and infiltrates the ground surface.

The water we produce is blended with water the City purchases from its third source, Snohomish County Public Utility District (PUD). This water is obtained from the City of Everett's Spada Reservoir near the headwaters of the Sultan River.

The graph shows how each source contributed to our total water production of 1,762 acre-feet in 2014.



HOW IS MY WATER TREATED AND PURIFIED?

Haller Well Field

Groundwater drawn from our well field located near the Stillaguamish River is treated in several steps at Arlington's water treatment facility. First, raw (untreated) water is pumped from the well field to the treatment plant, where a primary treatment chemical is added that causes small particles to stick together and form bigger particles called floc. Next, polymer is added to aid the filtering process and the water is passed through a clarifying filter where 60% to 70% of the floc is removed. The water then passes through a finishing filter where the remaining floc is taken out, and chlorine is added for disinfection. Finally, we add sodium hydroxide to adjust the pH level, making the water less corrosive to your pipes and plumbing fixtures.

Airport Well Field

Water drawn from our well near the Arlington Airport does not require filtration, but we do add chlorine for disinfection.

PUD

Drinking water purchased from Snohomish County PUD is treated at the City of Everett water treatment plant using a treatment process similar to the process used by Arlington. Everett adds fluoride to the water for enhanced dental protection.

ARLINGTON WATER SUPPLY 2014

Working Hard to Bring You the Best Water in the State — Efficiently

HIGH QUALITY WATER
2001 - 2014

Under the Safe Drinking Water Act (SDWA), the U.S. Environmental Protection Agency (EPA) is responsible for setting national limits for hundreds of substances in drinking water, and also specifies various treatments that water systems must use to remove these substances. Arlington Water Department continually monitors for these substances and reports our findings to the Washington Department of Health (DOH), who confirms you are receiving clean water. DOH records indicate ***we consistently provide you with clear, high quality water meeting stringent standards, and have done so for 14 consecutive years!***

For more information see:

www.doh.wa.gov/CommunityandEnvironment/DrinkingWater/SourceWater/RapidRateFiltration

and

www.doh.wa.gov/Portals/1/Documents/4200/wt0911.pdf.

This report you are holding conforms to the regulation under SDWA requiring water utilities to provide detailed water quality information to each of their customers annually. We are committed to providing you with this information about your water supply because ***customers who are well informed are our best allies in supporting improvements necessary to maintain the highest drinking water standards.***

Regulated Substances

Samples were collected in finished water at our sources and/or throughout the distribution system				Arlington Water Department		Snohomish County PUD		Defin bottо
Substance (units)	**Year**	**MCL (MRDL)**	**MCLG (MRDLG)**	**Amount**	**Range**	**Amount**	**Range**	**Com**
Arsenic (ppb)	2014	10	0	1	ND – 1	2	ND - 2	Y
Barium (ppm)	2014	2	2	0.009	0.008 – 0.01	0.01	ND - 0.01	Y
Chlorine (ppm)	2014	(4)	(4)	0.79	0.10 – 1.75	0.57	0.20 – 0.79	Y
Chromium (ppm)	2014	100	100	4	ND - 4	ND	NA	Y
Fluoride (ppm)	2014	4	4	0.10	ND – 0.77	0.55	0.15 – 0.78	Y
HAAs [Haloacetic Acids] (ppb)	2014	60	NA	12.6	6.6 – 34.7	34.3	0.0 – 37.6	Y
Nitrate (ppm)	2014	10	10	0.90	0.3 – 1.5	0.05	0.01 – 0.09	Y
TTHMs [Total Trihalomethanes] (ppb)	2014	80	NA	17.7	9.5 – 35.8	42.1	2.7 - 55.4	Y
Turbidity (NTU)[1]	2014	TT	NA	0.055	0.022 – 0.055	0.11	ND – 0.11	Y

Lead and Copper

Tap water samples were collected for lead and copper analyses from homes throughout the service areas				Arlington Water Department		Snohomish County PUD		
Substance (units)	**Year [2] sampled**	**AL**	**MCLG**	**90th Percentile**	**Homes Above AL/ Total Homes Sampled**	**90th Percentile**	**Homes Above AL/ Total Homes Sampled**	**Comp**
Copper (ppm)	2012	1.3	1.3	0.430	0 / 31	0.109	0 / 108	Y
Lead (ppb)	2012	15	0	3	0 / 31	2	0 / 108	Y

Unregulated Subtances [3]

Samples were collected in finished water at our sources and at one location in the distribution system			Arlington Water Department		Snohomish County PUD		
Substance (units)	**Year sampled**	**Detection Limit**	**Amount Detected**	**Range Low-High**	**Amount Detected**	**Range Low-High**	**Com**
Chlorate (ppb)	2013-2014	20	69.1	44 – 110	44.9	34 – 67	N
Chromium-6 (ppb)	2013-2014	0.03	0.50	0.13 – 3.04	0.25	0.22– 0.30	N
Strontium (ppb)	2013-2014	0.3	62.5	36 – 140	33.5	14 – 102	N
Vanadium (ppb)	2013-2014	0.2	0.57	0.2 – 1.5	ND	ND	N

Footnotes
1 Turbidity, a measure of the cloudiness of water, is monitored because it is a good indicator of the effectiveness of the filtration system.
2 Lead and copper samples are collected from area homes every 3 years. Samples in both the Arlington and PUD service areas were collected in 2012, and are scheduled for collectio
3. These substances are not yet regulated in drinking water, but monitoring was required under the third round of the Unregulated Contaminant Monitoring Rule. Only the listed parame parameters may be regulated in the future.

Table Definitions

AL (Action Level): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

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.

MCLG (Maximum Contaminant Level Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

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 (e.g. chlorine, chloramines, chlorine dioxide).

MRDLG (Maximum Residual Disinfectant Level Goal): 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

NA: Not applicable.

ND: Not detected.

NTU (Nephelometric Turbidity Units): A meas water.

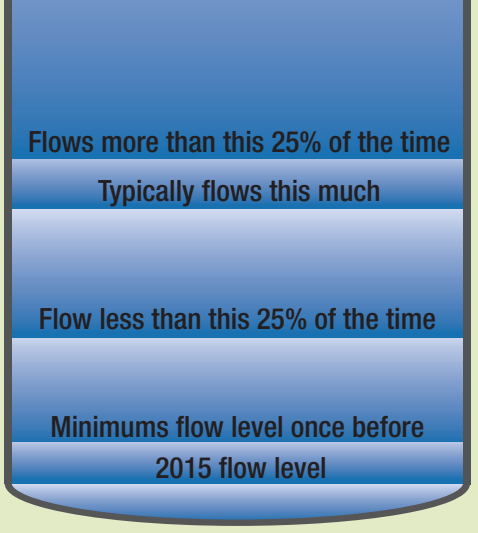
ppb (parts per billion): One part substance per

ppm (parts per million): One part substance pe

TT (Treatment Technique): A required process in drinking water.

90th Percentile: Out of every 10 homes samp or below this level.

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).



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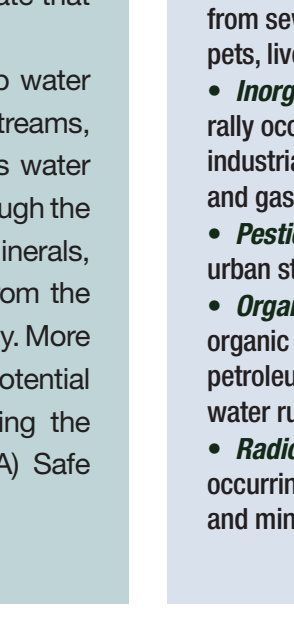
Water Use Efficiency Information

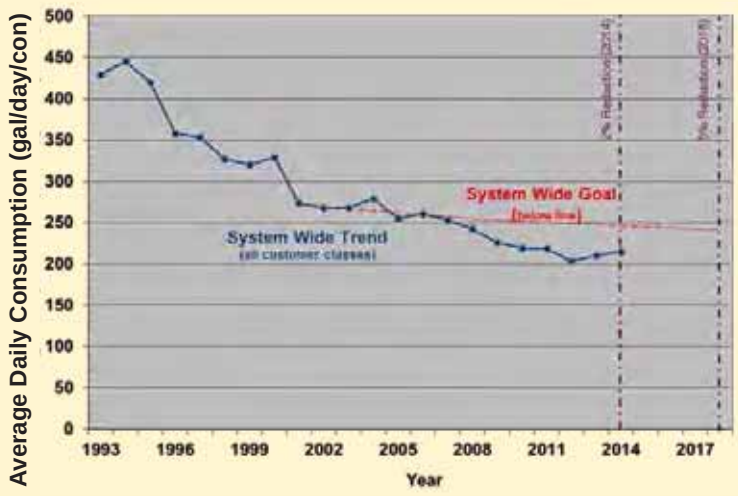
Arlington is making great progress toward goals required by the state's 2007 Water Use Eff
WUE goals were developed after a public hearing and City Council approval of the Octob

2014 Arlington Water Use Statistics

Total water into the system (gallons)	574,120,924
Total authorized, quantified uses (gallons)	484,631,739
Unauthorized and/or unquantified uses and leaks (gallons)	89,489,185
Unauthorized and/or unquantified uses and leaks (percent)	15.6%



Goal: Achieve additional system-wide average water use reduction of 2 percent by the year 2014, and 5 percent by the year 2018, with 2008 as the base year.



When it comes to supplying water to a growing community, wise and efficient use of our existing water sources is much cheaper than the development of new supplies. Results indicate our customers are increasingly conscientious of their water use. Water consumption has dropped more than 11% by 2014 to 215 gallons/ day/ connection. We are on track for meeting our 2018 goal of 230 gal/day/connection. With these efforts in place, the City's savings from 2002 to 2025 will exceed 122 million gallons.

Goal: Reduce unac or less.

The WUE Rule requi of the water we make, 93%--with unaccounte system at less than 7% 3 years with losses up increase. Possible sou theft, meter calibration rolling average of 13% 10%. We have prepare losses.

Substances That May Be in Your Drinking Water

To ensure that tap water is safe to drink, the Department of Health and EPA prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. The Food and Drug Administration (FDA) and the Washington Department of Agriculture regulations establish limits for contaminants in bottled water that must provide the same protection for public health. 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.

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals, and can pick up substances resulting from the presence of animals or from human activity. 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).

Con Pr

- ***Micro*** from se pets, liv
- ***Inorg*** rally occ industri and gas
- ***Pesti*** urban st
- ***Orga*** organic petroleu water ru
- ***Radio*** occurrin and min

A water service specialist will contact you to solve the problem.

I need my water shut off.

If you are stopping service: call Utility Billing at 360-403-3421.

If you are doing repairs: call Public Works Administration at 360-403-3526. We'll need your name, phone number, address and when you want the water shut off. A water service specialist will shut the water off, or call you to arrange a time to do so.

I need my water turned on.

If you are moving in: call Utility Billing at 360-403-3421.

If you are doing repairs: call Public Works Administration at 360-403-3526. We'll need your name, phone number, address, and when you want the water turned on. A water service specialist will turn the water on, or will call you to arrange a time to do so.

I need to report a leak.

Call Public Works Administration at 360-403-3526, or the emergency pager at 360-386-5926. Tell us your name, phone number, and the address of the leak.

Is there fluoride in my water?

Water we produce has low natura
water we purchase is "fully fluorid
City of Everett. While primarily d
sources do blend to create a sm
centrations. Only services east o
Street receive appreciable fluor
compares this range of fluoride l
dren promoted by the ADA. Cop
Works Administration, or where ut

Community Participatio

You are invited to participate in
and voice your concerns abo
City Council meets the first a
beginning at 7 p.m. at the Coun
Arlington, WA (enter off of Oly
meeting information, call City H
Web site at www.arlingtonwa.g

This Could Be Your Last Issue!!

Actually, we have to—and want to—provide you with this once a year Consumer Confidence Report on the quality of the water your family enjoys every day. However, the law now provides the opportunity to provide it to you electronically, and you have the opportunity to get the information you need in a format to your liking. Please watch your mail later this year—probably your utility bill—for the opportunity to specify your preference:

- ✓ Receive a paper copy in th
- ✓ Type a direct link found on
- ✓ Click a direct link in an e-m
- ✓ Receive a pdf attachment
- ✓ I'm a rental customer that
  me a copy as I've indicate

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K WATER RIGHTS INFORMATION

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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Ave SE • Bellevue, WA 98008-5452 • 425-649-7000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

NOV 30 2011

Michael Wolanek
City of Arlington
154 West Cox Avenue
Arlington, WA 98223

RE: Administrative Order No. 11WRNR – DE 7563 to Ground Water Certificate 5169

Dear Mr. Wolanek:

Enclosed is Administrative Order No. 11WRNR – DE 7563 to change Ground Water Certificate 5169.

If you have any questions, please contact Doug Wood at 425.649.7077 or at Doug.Wood@ecy.wa.gov.

Sincerely,

Jerry Liszak, LHG
Acting Section Manager
Water Resources Program

jl/dw/mc

By certified mail: 7010 3090 0000 1910 0791

Enclosure(s): Order No. 11WRNR – DE 7563

BEFORE THE
DEPARTMENT OF ECOLOGY
STATE OF WASHINGTON

IN THE MATTER OF CERTIFICATE OF GROUND WATER RIGHT 5169 ISSUED July 2, 1965 TO THE CITY OF ARLINGTON	))))	REPORT OF INVESTIGATION, FINDINGS OF FACT, DETERMINATION, AND ORDER DOCKET NO. 11WRNR – DE 7563

REPORT OF INVESTIGATION

Background

Certificate of Ground Water Right 5169 (GWC-5169) was issued on July 2, 1965 to the City of Arlington, Washington. The maximum instantaneous quantity allocated is 1,700 gallons per minute (gpm) and the annual quantity is 1,344 acre-feet per year (af/yr) for municipal supply purposes. The priority date of the application is February 12, 1965.

The issuance of this water right was initiated after the City of Arlington had contacted the Division of Water Resources (predecessor to the Department of Ecology) in September 1964 seeking information on the extent of their water rights.

In September 23, 1964, a letter to the Division of Water Resources, the City of Arlington requested information on water rights associated with the Haller Wellfield and the Airport Well. In September 29, 1964, a reply to the City of Arlington, Robert H. Russell, Assistant Supervisor of the Division of Water Resources stated that a search did not find any water rights issued to the City of Arlington for its wells.

In a second letter to the Division of Water Resources dated October 1, 1964, the City of Arlington suggested looking for water rights issued to Puget Power and Light, which had originally operated the water system. An October 6, 1964, a reply from Robert H. Russell at the Division of Water Resources stated that a search for Puget Sound Power and Light water rights was similarly unsuccessful. He further recommended that the city complete applications for new water rights for both the Haller Wellfield and the Airport Well.

It is apparent that the 1964 searches were limited to the files for ground water. Records for ground water rights were kept separate from records for surface water rights prior to the early 1970, when both were incorporated into Ecology's current water right tracking system. If they had also searched the files for surface water rights in 1964, the search would almost certainly have found the file for Certificate of Water Right (SWC) 194, issued to Puget Sound Power and Light Company on June 21, 1927.

SWC 194 was issued for 5 cubic feet per second (cfs) to serve the domestic needs of the City of Arlington. The priority date is established as the date the application was accepted on October 10, 1924. The description of the point of diversion and water works in the file are clearly same as the Haller Wellfield, with the addition of a water intake pipe extending into the Stillaguamish River.
Puget Light and Power Company had operated the Haller Wellfield beginning in 1916 to serve the town of Arlington. The surface water right was added to its existing ground water wells due to supply problems that were likely associated with a barrier to flow within the alluvial aquifer of the Stillaguamish River.

City of Arlington has supplied documents that indicate the Haller Wellfield operated as a hybrid SW/GW supply between 1926, when SWC 194 was issued, and 1939, when the city ceased direct diversions from the Stillaguamish River. This decision was based on a recommendation by the Department of Health, and on rehabilitation work on the Haller wells which encountered more reliable groundwater flow in their recently deepened well (see Figure 1).

The City of Arlington managed the Haller Wellfield from 1939 until 1964 and added the Airport Well sometime in the late 1940's when the military transferred control of the airport to the city.

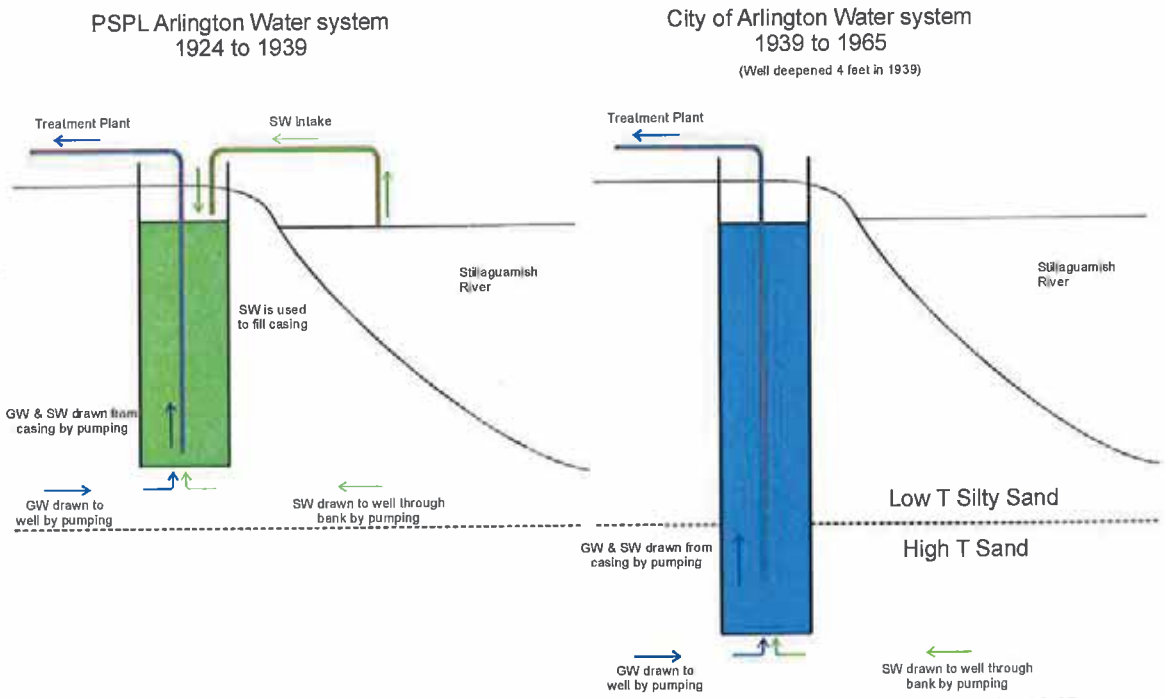

Figure 1: Haller Wellfield as it was configured in 1924 to 1939, and as modified in 1965.

A review of the facts regarding the fate of SWC 194 has convinced the Water Resources Program that this right has been in constant use since the right was developed. The modifications made to the system, both in 1926 and in 1939 are viewed by the program as de-facto changes to the right. While the true priority date of the groundwater portion of the right likely extends back to 1916, when the Arlington Water Works were first constructed, October 10, 1924 is the priority date of relevance to SWC 194.

The Water Resources Program has encountered many similar de-facto changes during the course of over 90 years of managing water rights. Our methods of dealing with such changes however have changed over time. Prior to the 1970's nearly all rights for surface and groundwater rights were kept separate. As noted above, this separation extended to keeping separate records for each type of water right. It was therefore quite likely that separate groundwater rights would have been issued for the Haller Wellfield in 1965 regardless of whether there were existing rights for surface water from the same project.

However, during the 1960's agency practice for the issuance of groundwater rights to entities that held sufficient quantities of water under surface water rights was to issue what were termed "supplemental" rights. These "supplemental" rights would issue for independent Qi (pumping rate) but share Qa (annual consumptive use) with a "primary" surface water right. Depending on the potential for expansion, the Qi may also have been made "supplemental" to the primary right. The purpose of issuing "supplemental" rights was to help preserve the priority of municipal rights.

In the case of SWC 194 and GWC 5169 the agency would almost certainly have tied the rights together to preserve the priority of the town water supply had the agency known of SWC 194 in 1965. A review of the files for GWC 5169 suggests that the 1,700 gpm and 1,344 af/yr allocated under that right was sufficient for the then size of the community for planned growth until 1975.

The term "supplemental" is no longer used. In its place the Water Resources Program now uses the term "non-additive" to indicate that a water right includes quantities that are not added to the total portfolio of rights held. Both Qi and Qi can be issued as being either "additive" or "non-additive" with respect to the total portfolio of quantities held by an entity.

FINDINGS OF FACT

The Division of Water Resources erred in its 1964 search for existing water rights for the City of Arlington, and specifically failed to search both the surface and ground water files for a water right issued to Puget Sound Power and Light Company. Had the division searched the surface water rights files they almost certainly would have found SWC 194 and recognized that this right was issued for the City of Arlington Haller Wellfield water supply facility.

In order to rectify the error the best course of action is to treat the issuance of GWC 5169 as being partly issued in error, in so far as this right would likely have been issued in 1965, but as a "supplemental" or non-additive right attached to SWC 194 for all or a portion of its Qi and Qa.

DETERMINATION AND ORDER

Based on the above, it is ORDERED that instantaneous annual quantities allocated through Groundwater Certificate 5169 (G1-*07494) be amended to reflect the history of water use by the City of Arlington though its Haller Wellfield.

Specifically, Ground Water Certificate 5169 (G1-*07494C) shall be amended so that both instantaneous and annual quantities (Qi and Qa) be referenced as "Non-Additive" and that total instantaneous and annual quantities associated with Water Right Certificate 194 (S1-*01194C) and Ground Water Certificate 5169 (G1-*07494C) shall not exceed the maximum quantity allocated through Water Right Certificate 194 (S1-*01194C).

The maximum instantaneous quantity allocated through Water Right Certificate 194 (S1-*01194C) is 5 cubic feet per second (2,244.15 gpm). Continuous diversion at a rate of 5 cfs can produce 3,619.84 af/yr, which is typically recognized as the maximum annual quantity (Qa) for surface water rights that were issued without specified Qa limits.

The Table below shows the relationships between the three water rights which share the Haller Wellfield as of the date of this order.

Haller Wellfield Water Rights – per this Order									
Ecology Tracking #	Certificate #	Priority	Qi Cert (gpm)	Qi Add (gpm)	Qi N Add (gpm)	Qa Cert (af/yr)	Qa Add (af/yr)	Qa N-Add (af/yr)	Source
G1-*07494C	GWC 5169	2/12/1965	1,700		1,700	1,344		1,344	Haller Wellfield
S1-*01194C	SWC 194	10/10/1924	2,244.15	2,244.15		3,619.84	3,619.84		Haller Wellfield
G1-300889CL(A)†		1931	135	135		72.18	72.18		Haller Wellfield

† Transferred to the City of Arlington in 2009

You have a right to appeal this action to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of this document. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal, you must do the following within 30 days of the date of receipt of this document:

- File your appeal and a copy of this document with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.

- Serve a copy of your appeal and this document on Ecology in paper form - by mail or in person. (See addresses below.) Email is not accepted.

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503 Pollution Control Hearings Board Environmental Hearings Office 1111 Israel Road SW, Suite 301 Tumwater, WA 98501	Department of Ecology Attn: Appeals Processing Desk P.O. Box 47608 Olympia, WA 98504-7608 Pollution Control Hearings Board P.O. Box 40903 Olympia, WA 98504-0903

For additional information visit the Environmental Hearings Office Website: http://www.eho.wa.gov

To find laws and agency rules visit the Washington State Legislature Website: http://www1.leg.wa.gov/CodeReviser

Dated at Bellevue, Washington this 30 day of November, 2011.

Jerry Liszak
Acting Section Manager
Water Resources
Northwest Regional Office
Department of Ecology

City of Arlington Public Works

Administration • Water • Sewer • Storm

January 3, 2012 (sent by email and postmarked)

Jerry Liszak
NWRO Water Resources Acting Section Manager
Washington Department of Ecology
3190 160th Ave SE
Bellevue, WA 98008-5452

RE: Administrative Order No. 11WRNR—DE 7563 to Groundwater Certificate 5169

Dear Mr. Liszak:

The City of Arlington received the above administrative order on December 2, 2011. We wish to clarify some facts in the Report of Investigation section of the Order. The City has spent considerable time researching the history behind nearly 50-year old administrative errors which this order corrects. We would like the record to accurately reflect these findings.

The corrections in the attached table will not affect your decision. This is not an appeal, and we are not requesting revision of the decision document. We hope you will include this letter in Ecology's files for SWC 194 and GWC 5169. If you have any questions about this information, please don't hesitate to call me at 360-403-3541. Please confirm your decision and handling of this matter with me at your convenience.

We appreciate the efforts and professionalism of your staff in correcting historic administrative errors and validating these critical components of the City's water rights portfolio.

Sincerely,

Michael D Wolanek

Michael D. Wolanek
Water Resources Planner

Cc: Doug Wood, (Ecology)

154 W. Cox Avenue | Arlington, WA 98223 | Phone: 360.403.3526 | Fax: 360.435.7944

Clarifications of Facts within the Report of Investigation Section of Administrative Order 11WRNR—DE 7563

Page	Paragraph	Sentence within the Order reads	Sentence with Corrected information (bold, underlined)
1	6	The surface water right was added to its existing ground water wells due to supply problems that were likely associated with a barrier to flow within the alluvial aquifer of the Stillaguamish River.	The surface water right was added to its existing ground water wells due to **water quality** problems that were likely associated with **pile driving adjacent to the well during bridge construction across** the Stillaguamish River.
2	1	City of Arlington has supplied documents that indicate the Haller Wellfield operated as a hybrid SW/GW supply between 1926, when SWC 194 was issued, and 1939, when the city ceased direct diversions from the Stillaguamish River.	City of Arlington has supplied documents that indicate the Haller Wellfield operated as a hybrid SW/GW supply between **1924**, when **direct surface water augmentation of the well was initiated**, and 1939, when the city ceased direct diversions from the Stillaguamish River.
2	2	The City of Arlington managed the Haller Wellfield from 1939 until 1964 and added the Airport Well sometime in the late 1940s...	The City of Arlington managed the Haller Wellfield **as a single well** from 1939 until 1964**, when it was expanded to three wells. The** Airport Well **was added** sometime in the late 1940s...
2	3	The modifications made to the system, both in 1926 and in 1939...	The modifications made to the system, both in **1924** and in 1939...

Background information on the Puget Sound Power & Light Water Right SWC194

a surface water right with a priority date of October 10, 1924, for withdrawal of water from the Haller Wellfield (SWC 194). In the early 1900s, a well at the Haller Wellfield location on the south bank of the Stillaguamish River was used by a shingle mill to provide water and power supply to the City. Rapid recharge of the well from the river provided adequate water supply to operate a steam generator for mill operations and the City's water and power supply. With the decline of the shingle industry, the City continued to operate the well for distribution through its wood stave mains. In 1916, the City awarded Puget Sound Power and Light Company (PSPL) a franchise to operate the water utility. PSPL operated the same shallow well used by the shingle mill. In 1924, pile driving adjacent to the Haller Wellfield location for bridge construction fractured substrata and released high levels of manganese and/or iron into the wellfield. As a result, PSPL completed improvements in 1924, including a water treatment plant and a pipe to the river to dilute the well water within the well. The treatment plant, which was used until 2001 and which still stands today, pumped the blended water from the same well as it did when the water was untreated.

In 1927, PSPL received a surface water certificate (SWC 194) with a priority date of October 10, 1924, for domestic supply of 5.0 cubic feet per second (cfs) for the Town of Arlington. Although no annual quantity was specified, historical records suggest that PSPL intended to and did operate a continuous diversion. In 1939, PSPL deepened the well and exposed strata to improve the well's recharge rate and water quality. With the improved water quality recharging the well, engineers from the Washington State Department of Health required PSPL to remove piping connecting the Stillaguamish River and the well. Later in 1939, PSPL conveyed back to the City "the water system in and adjacent to the City of Arlington, Washington…" This conveyance included "… all public and private grants or rights of way and operating rights for the operation of said water works."

Through the previous transitions, from shingle mill to the City to PSPL and back to the City, the well source at the Haller Wellfield location remained the same. It remains active today as Haller Well No. 3 and is in direct hydraulic continuity with the river at the original point of withdrawal..

In the early 1960s, the City was anticipating a period of rapid growth. Arlington had recently re-acquired the airport from the military. It was expecting development of a business park, and was, with Olympia, vying for selection as the seat of what was to become Evergreen State College. Development and long-term protection of adequate water supplies was a big part of the City's efforts, due to concerns about the impact on the City's water supply of various proposals for upstream water diversions.

In 1964, following the construction of Haller Wells No. 1 and No. 2, the City began a series of inquiries with Ecology's predecessor agency, the Department of Conservation's Division of Water Resources, in an attempt to document and protect its water right. After several file searches and exchanges of letters, the Department of Conservation advised the City that it could not locate any

record of a water right for Arlington or for PSPL. The Department advised the City to apply for a new water right for the Haller Wellfield. Based upon the State's erroneous failure to discover the PSPL right and its connection to the City, the City filed applications for water rights for the Haller Wellfield as well as for the airport. The City received water right certificate GWC 5169 for the Haller Wellfield with a priority date of February 12, 1965. GWC 5169 authorizes 1,700 gpm instantaneous withdrawal, and an annual volume of 1,344 acre-feet. But for the Department's failure to locate the PSPL water right, the City probably would not have applied for GWC 5169 as a new water right; if it had, it is likely that GWC 5169 would have been issued as a "supplemental" (non-additive) right to SWC 194

From 2004 to 2005, the City was in discussion with Ecology over the development of the pending Stillaguamish Instream Flow Rule (IFR). In addition to the quantification of minimum instream flow levels for various seasons, the IFR threatened to close the basin, thus preventing the development of new water appropriations. The City advocated and petitioned for a municipal reserve within the IFR, but it was not granted. The final IFR suggests that future municipal water supplies would be obtained through the transfer of existing water rights, development of reclaimed water, and other alternatives to new water rights.

In response to the pending IFR, City staff began an evaluation of the existing water rights recognized in the IFR that might be transferable to the City. It was during this time that City staff discovered the record of the PSPL water right, which is still listed as an active water right in Ecology's records. Subsequently, staff performed extensive research into the history of this water right and the Haller Wellfield. The City alerted Ecology to the record of the PSPL right, and in 2008 began discussions with Ecology regarding a process for appropriate recognition of the right and its continuous use by the City. Ecology's records identify this right as a surface water right, although the water has continuously been withdrawn from the riverbank wellfield, which is in direct and immediate hydraulic continuity with the river, somewhat similar to a Ranney-type well. In light of the hybrid nature of this water diversion/withdrawal, it may be appropriate to formally document the current water source as groundwater under the influence of surface water. However, regardless of the outcome of these discussions, the City's continuous use of the PSPL right makes it appropriate for inclusion in the City's water rights portfolio in this WSP update.

The PSPL right authorized the withdrawal of 5.0 cfs and did not specify an annual quantity. If water were continuously withdrawn at the rate of 5.0 cfs – the intent described in the public notice for the water right application – the annual volume would be 3,619.84 acre-feet. The total water right amounts for Haller Wellfield in the 2011 and 2015 WSPs include SWC 194 (the PSPL water right) and GWC 5169 (the latter as non-additive to SWC 194 for both instantaneous and annual quantities).

Ecology issued an administrative order # _____ regarding SWC 194, reco

All of these water rights, including SWC 194, are recognized by Ecology as active in 2005 with the passage of the Stillaguamish IFR, and remain so today. And all of these water rights, including SWC 194, were recognized and treated as 100-percent consumptive, out-of-stream uses when Ecology quantified minimum instream flows in the IFR.

Ground Water Permit No. 7040

CERTIFICATE OF GROUND WATER RIGHT

Recorded in the office of the State Supervisor of Water Resources, Olympia, Washington, in Book No. 11 of Ground Water Right Certificates, on page 5169-A, on the 2nd day of July 19 65.

STATE OF WASHINGTON,
County of _____ } ss.

I certify that the within was received and duly recorded by me in Volume _____ of Book of Water Right Certificates, at page _____, on the _____ day of _____, 19____

_____

STATE PRINTING PLANT OLYMPIA, WASH., 1964

S. C. No. 7361—1-64—3M. 83360.

1792798

1627 5/12 83-2

CERTIFICATE RECORD NO. 11 PAGE NO. 5169-A

STATE OF WASHINGTON, COUNTY OF Snohomish

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY *That* CITY OF ARLINGTON

of Arlington, Washington, *has made proof to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the ground waters of* two (2) wells

located within Government Lot 7

Sec. 2, *Twp.* 31 *N., R.* 5 *E. W.M.,*

for the purpose of municipal supply for a population of 6,000 as of 1975

under and subject to provisions contained in Ground Water Permit No. 7040 *issued by the State Supervisor of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water Resources of Washington and entered of record in Volume* 11 *at page* 5169-A; *that the right hereby confirmed dates from* February 12, 1965; *that the quantity of ground water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed* 1,700 gallons per minute; 1,344 acre-feet per year for municipal supply.

Special provisions required by the Supervisor of Water Resources: A master meter, individual service meters or other suitable measuring devices shall be installed in this system to measure the total amount of the withdrawal.

A description of the lands to which such ground water right is appurtenant:

City of Arlington

1792798

DEEDS

RECORDED
VOL. OF
PAGE
REQ. OF Dept of Ecology
1965 JUL 6 AM 9 24

STANLEY F. [illegible] AUDITOR
SNOHOMISH COUNTY, WASH.
DEPUTY

Helen Bergen
City Clerk
Arlington, Wash.

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources affixed this 2nd *day of* July, 19 65.

STATE OF WASHINGTON DIVISION OF WATER RESOURCES DEPT. OF CONSERVATION

Robert H. Russell
State Supervisor of Water Resources.

ENGINEERING DATA

DEEDS VOL. 830 PAGE 646

#198832

CERTIFICATE OF CHANGE OF POINT OF WITHDRAWAL OF GROUND WATER

In accordance with the provisions of Chapter 263, Laws of Washington for 1945, and the regulations of the State Director of Ecology.

THIS IS TO CERTIFY That the City of Arlington, Washington, has complied with all of the requirements of the Revised Code of Washington 90.44.100 and is hereby granted the right to change the point of withdrawal of waters of two wells in the amount of 1,700 gallons per minute, 1,344 acre-feet per year, as granted in Ground Water Certificate No. 5169-A.

That the water is being used for the purpose of municipal supply and that water has been withdrawn from said two wells at two points situated in Government Lot 7 of Section 2, Township 31 North, Range 5 East W.M.

That the City of Arlington has retained the above two points of withdrawal and has added a third point of withdrawal at a point situated about 50 feet west and 135 feet north from center of Sec. 2, All being within Government Lot 7 of Sec. 2, T. 31 N., R. 5 E.W.M., Snohomish County, Washington.

Given under my hand and seal of this office at Olympia, Washington, this 4th day of June, 1971.

JOHN A. BIGGS, Director
Department of Ecology

By _____
GLEN H. FIEDLER, Supervisor
Central Operations Division

#198832

RECORDED:
Volume 3, page 1150
Records of Change of
Point of Withdrawal
of Ground Water

OFFICIAL RECORDS
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SNOHOMISH COUNTY, WASH.
DEPUTY

OFFICIAL RECORDS
VOL 509 PAGE 675

ENGINEERING DATA
D.K. 2nd

City of Arlington
City Engr. - Bldg. Olympia

Ground Water Permit No. 7041

CERTIFICATE OF GROUND WATER RIGHT

Recorded in the office of the State Supervisor of Water Resources, Olympia, Washington, in Book No. 11 of Ground Water Right Certificates, on page 5170-A, on the 2nd day of July 19 65.

STATE OF WASHINGTON,
County of _____ } ss.

I certify that the within was received and duly recorded by me in Volume _____ of Book of Water Right Certificates, at page _____, on the _____ day of _____, 19____

_____

STATE PRINTING PLANT OLYMPIA, WASH., 1964

S. F. No. 7361—1-64—3M. 85360.

1792799 16275 63/2

CERTIFICATE RECORD NO. 11 PAGE NO. 5170-A

STATE OF WASHINGTON, COUNTY OF Snohomish

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY *That* CITY OF ARLINGTON

of Arlington, Washington, *has made proof to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the ground waters of a* well

located within SE¼NW¼ (Arlington Airport)

Sec. 22, *Twp.* 31 *N., R.* 5 E. *W.M.,*

for the purpose of municipal and industrial supply

under and subject to provisions contained in Ground Water Permit No. 7041 *issued by the State Supervisor of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water Resources of Washington and entered of record in Volume* 11 *at page* 5170-A; *that the right hereby confirmed dates from* February 12, 1965; *that the quantity of ground water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed* 200 gallons per minute; 320 acre-feet per year for municipal supply (a population of 2,000 as of 1975) and industrial use.

Special provisions required by the Supervisor of Water Resources: A master meter, individual service meters or other suitable measuring devices shall be installed in this system to measure the total amount of the withdrawal.

A description of the lands to which such ground water right is appurtenant:

Area served by the City of Arlington

DEEDS RECORDED VOL. OF PAGE REQ. OF Dept of Conservation JUL 6 1965 AM 9 24 STANLEY DUBUQUE, AUDITOR SNOHOMISH COUNTY, WASH. DEPUTY

Helen Bergan City Clerk - Arlington, Wash 2-20-

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

In witness whereof, the seal and signature of the State Supervisor of Water Resources affixed this 2nd *day of* July, 19 65.

STATE OF WASH. DEPT. OF CONSERVATION DIV. OF WATER RESOURCES

Robert H Russell
asst State Supervisor of Water Resources.

ENGINEERING DATA

DEEDS VOL 890 PAGE 647

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

CERTIFICATE OF WATER RIGHT

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
September 17, 1986	G1-24900	G1-24900P	G1-24900C

NAME
City of Arlington

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
238 North Olympic Avenue	Arlington	Washington	98223

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown, but is limited to an amount actually beneficially used.

PUBLIC WATER TO BE APPROPRIATED

SOURCE
Well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
--	580	*696.0

QUANTITY, TYPE OF USE, PERIOD OF USE
Municipal supply - continuously

*Supplemental to existing rights.

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
1000 feet north and 100 feet west from center of Section 2.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
SE¼NW¼	22	31	5E	5	Snohomish

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by City of Arlington

City of Arlington
238 North Olympic Avenue
Arlington, WA 98223

RECORDED
89 SEP 28 AM 11:11

8909280151

VOL. 2268 PAGE 0600

ECY 040-1-2 (Rev. 4-81) (SEE REVERSE SIDE) CERTIFICATE

PROVISIONS

Installation and maintenance of an access port as described in Ground Water Bulletin No. 1 is required. An air line and gauge may be installed in addition to the access port.

An approved measuring device shall be installed and maintained in accordance with RCW 90.03.360, WAC 508-64-020 through WAC 508-64-040 (Installation, operation and maintenance requirements attached hereto).

Prior to final approval and certification, the applicant must provide data to this office on the actual pumping capacity of the well and average daily pumping duration.

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390, and 90.44.020.

This certificate of water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.

Given under my hand and the seal of this office at Redmond *Washington, this* 15th *day of* September, *19* 89

ENGINEERING DATA
OK

Department of Ecology

by Herman H. Huggins

Herman H. Huggins, Section Supervisor Water Resources

FOR COUNTY USE ONLY

VOL. 2268 PAGE 0601

8909280151

23738. S. F. No. 369—1925. Approved as to Form by Dept. of Efficiency.

CERTIFICATE RECORD NO. One, PAGE NO. 194

STATE OF WASHINGTON, COUNTY OF Snohomish

CERTIFICATE OF WATER RIGHT

(For rights perfected under original, enlargement or secondary permits.)
(In accordance with the provisions of Chapter 117, Laws of Washington for 1917, and the regulations of the State Hydraulic Engineer thereunder.)

This is to certify, that Puget Sound Power & Light Company, *of* Everett, *State of* Washington, *has made proof to the satisfaction of the State Supervisor of Hydraulics of Washington, of a right to the use of the waters of* Stillaguamish River, *a tributary of* Stillaguamish River, *for the purposes of* domestic use, *under* Appropriation *Permit No.* 902, *of the State Supervisor of Hydraulics, and that said right to the use of said waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Hydraulics of Washington and entered of record in Volume* One, *at Page* 194, *on the* 21st *day of* June, *19* 27; *that the right hereby confirmed dates from* October 10, *19* 24; *that the amount of water to which such right is entitled and hereby confirmed, for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed* Five *cubic feet per second.*

A description of [redacted] *the place where such water is put to beneficial use, is as follows:*

Township	Range	Section	Forty-Acre Tract	[redacted]	[redacted]
31 N.	5 E.	2	SE¼ of the NW¼	Point of Diversion	

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Section 39, Chapter 117, Session Laws 1917.

WITNESS the seal and signature of the State Supervisor of Hydraulics affixed this 21st *day of* June, *19* 27.

State Supervisor of Hydraulics.

STATE OF WASHINGTON, } ss.
COUNTY OF THURSTON.

This is to certify that I have examined the foregoing application and do hereby grant the same, subject to the following limitations and conditions: If for irrigation, this appropriation shall be subject to such reasonable rotation system as may be ordered by the State Hydraulic Engineer

The amount of water appropriated shall be limited to the amount which can be applied to beneficial use and not to exceed --Five-----*cubic feet per second, or its equivalent in case of rotation. The priority date of this permit is* October 10, 1924

Actual construction work shall begin on or before May 23, 1928 *and shall thereafter be prosecuted with reasonable diligence and be completed on or before* May 23, 1929

Complete application of the water to the proposed use shall be made on or before October 23, 1929

WITNESS my hand this 23rd *day of* May, *19* 27.

R. K. TIFFANY
State Hydraulic Engineer.

This form approved by the State Hydraulic Engineer, 1917.

Application No. 1194 *Permit No.*

PERMIT

To Appropriate the Public Waters of the State of Washington

Filed by Puget Sound Power & Light Company / *County of* Snohomish

This instrument was first received in the office of the State Hydraulic Engineer, Olympia, Washington, on the 10th *day of* October, *19* 24, *at* 8:35 *o'clock* A. M.

Returned to applicant for correction

Corrected Application received *Approved* May 23, 1927

R. K. TIFFANY
State Hydraulic Engineer.

Before your certificate of water right is issued it will be necessary for you to fill out and file with the State Hydraulic Engineer a copy of the following reports:

1st. Notice of water right appl
2nd. Notice to begin construct
3rd. Notice of prosecution of with diligence.
4th. Notice of completion of construction.
5th. Notice of application of water to a beneficial use.

Upon a satisfactory showing that the appropriation has been perfected as provided by statute the State Hydraulic Engineer will issue a water right certificate.

Certificate # 194 issued June 21, 1927

*Permit No. ......

APPLICATION FOR A PERMIT

To Appropriate the Public Waters of the State of Washington

I, Puget Sound Power & Light Company (Name of Applicant),

of Everett (Postoffice), *County of* Snohomish,

State of Washington, *do hereby make application for a permit to appropriate the following described public waters of the State of Washington subject to existing rights:*

If the applicant is a corporation, give date and place of incorporation July 8, 1912, Massachussetts

1. *The source of the proposed appropriation is* Stillaguamish River (Name of stream), *tributary of* Stillaguamish River

2. *The amount of water which the applicant intends to apply to beneficial use is* Five *cubic feet per second.*

3. *The use to which the water is to be applied is* Domestic (Irrigation, power, mining, manufacturing, domestic supply, etc.)

4. *Time during which water will be required each year* Continuously

5. *The approximate point of diversion is located* North 7 degrees 54 minutes West (Give distance and bearing to section corner) Distance 397.0 feet from the center of Section 2, Township 31 North Range 5 E. W.M. *being within the* SE¼ of the NW¼ (Give smallest legal subdivision) *of Sec.* 2, *Tp.* 31 N. (No. N. or S.), *R.* 5 E. (No. E. or W.) *W. M., in the county of* Snohomish

6. *The* pipe line (Main ditch, canal or pipe line) *to be* 150 feet ~~xxx~~ *in length, terminating in the* SE¼ of the NW¼ (Smallest legal subdivision) *of Sec.* 2, *Tp.* 31 N. (No. N. or S.), *R.* 5 E. (No. E. or W.) *W. M., the proposed location being shown throughout on the accompanying map.*

7. *The name of the ditch, canal or other work is* source of supply for the Town of Arlington, Snohomish County, Washington.

8. *Estimated cost of development necessary to fully utilize the appropriation herein asked for $* 25,000.00

DESCRIPTION OF WORKS.

DIVERSION WORKS—

9. (a) *Height of diversion dam* ...... *feet; length on top* ...... *feet; length at bottom* ...... *feet; material to be used and character of construction* ......

(Loose rock, concrete, masonry, rock and brush, timber crib, etc., wasteway over or around dam)

(b) *Description of headgate* Suction pipe in river.

CANAL SYSTEM—

10. (*a*) *Give approximate dimensions at each point of canal where materially changed in size, stating miles from headgate. At headgate: Width on top (at water line)* ..... *feet; width on bottom* ..... *feet; depth of water* ..... *feet; grade* ..... *feet fall per one thousand feet.*

(*b*) *At* ..... *miles from headgate: Width on top (at water line)* ..... *feet: width on bottom* ..... *feet; depth of water* ..... *feet; grade* ..... *feet; depth of water* ..... *feet; grade* ..... *feet fall per one thousand feet.*

.....

.....

.....

.....

FILL IN THE FOLLOWING INFORMATION WHERE THE WATER IS USED FOR:

IRRIGATION—

11. *The land to be irrigated has a total area of* ..... *acres, described as follows:* ..... (Give legal subdivision by section, township and range)

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... (If more space is required, attach separate sheet)

DUTY OF WATER—

12. *Character of soil: Depth* ....., *sandy* ....., *volcanic ash* ....., *loam* ....., *clay* ....., *Etc.* .....; *Annual precipitation* ..... *inches, precipitation during growing season* ..... *inches; Depth of irrigation water required* ..... (Expressed in feet or inches)

.....

.....

POWER, MINING, MANUFACTURING, OR TRANSPORTATION PURPOSES—

13. (*a*) *Total amount of power to be developed* ..... (Theoretical horsepower) *H. P.*

(*b*) *Total fall to be utilized* ..... (Head) *feet.*

(*c*) *The nature of the works by means of which the power is to be developed* .....

.....

.....

.....

(*d*) *Such works to be located in* ..... (Legal subdivision) *of Sec.* ....., *Tp.* ....., (No. N. or S.) *R.* ..... (No. E. or W.) *W. M.*

(*e*) *To what stream is the water to be returned* ..... *Sec.* .....,

(*f*) *Locate point of return* .....

Tp. ....., (No. N. or S.) *R.* ..... (No. E. or W.) *W. M.*

(*g*) *The use to which power is to be applied is*

MUNICIPAL SUPPLY—

14. *To supply the* ~~city~~ Town *of* Arlington (Name)

Snohomish *County, having a present population of* 2000

and an estimated population of 4000 *in 19* 30.

15. *Estimated present requirement* 1 cu. foot per second

16. *Estimated future requirement* 4 cu. feet per second

17. *Construction work will begin on or before* October 15, 1924

18. *Construction work will be completed on or before* December 31, 1924

Duplicate maps of the proposed ditch or other works, prepared in accordance with the rules of the State Hydraulic Engineer, accompany this application.

Puget Sound Power & Light Co.
(Name of Applicant)
Northeastern District
Geo. Newell
Manager

Signed in the presence of us as witnesses:

(1) A. M. Chitty (Name), Everett, Washington (Address of Witness)

(2) Frances H. Durr (Name), Everett, Washington (Address of Witness)

Remarks:

STATE OF WASHINGTON, } ss.
COUNTY OF THURSTON. }

This is to certify that I have examined the foregoing application (Received (Date)*) together with the accompanying maps and data, and return the same* (Date of return)

for correction or completion as follows:

In order to retain its priority, this application must be returned to the State Hydraulic Engineer, with corrections, on or before , 19 .

WITNESS my hand this day of , 19 .

State Hydraulic Engineer.

23628. S. F. No. 380—1923. Appr[illegible] as to Form by Dept. of Efficiency.

Application No. ..... *Permit No.* 902

COUNTY OF Snohomish

RECEIVED

PROOF OF APPROPRIATION OF WATER

From Stillaguamish *, tributary of* .....

1. *Name* Puget Sound Power & Light Company
2. *Postoffice address* Arlington
3. *For what purpose is water used?* Domestic water supply
4. *Did you begin the actual construction of the* Pumping plant *ditch (or other distributing works described in said permit), on or before* Oct. 15th, 1927 -Yes ?
5. *Give the date of completion of such construction work* June 15th, 1925
6. *When was all the water completely applied to the proposed use?* June 15th, 1925
7. *The description of land given below corresponds to that found in your permit covering land to be irrigated, or, if for other purposes, the place of use. In the blank column on the right, headed "No. acres actually irrigated," fill in the number of acres you have irrigated in each of the tracts described.*

Township	Range	Section	Forty-Acre Tract	No. Acres Described in Permit	No. Acres Actually Irrigated
Not used for irrigation purposes					

8. *During what months is water beneficially used?* All year
9. *State the character of the soil and kind of crops raised* .....
10. *Does the map filed with your permit show correctly the location of diverting works and area of land where water is used?* Shows diverting works
11. *If not, state wherein such map is in error* .....
12. *If the dimensions of your ditch or dam do not correspond to those described in your permit and the plans and specifications now on file in the office of the State Supervisor of Hydraulics, state what changes have been made, giving dimensions of ditch (or other distributing works).* Original permit correct
13. *If water is used for power, mining, domestic, municipal, storage, manufacturing, or any other purpose than irrigation, give the extent and method of such use* All used for domestic purposes

PUGET SOUND POWER AND LIGHT COMPANY
By Geo Russell
Manager, Northeastern District

STATE OF WASHINGTON,
County of Snohomish } *ss.*

I, Geo. Russell Manager N.E. Dist. Puget Sound Power & Light Co *, being first duly sworn, depose and say that I have read the above and foregoing proof of appropriation of water; that I know the contents thereof; and that the facts therein stated are true.*

IN WITNESS WHEREOF, I have hereunto set my hand this 11th *day of* June *, 192*7

Subscribed and sworn to before me this 11th day of June 1927.

H. M. Conrad
Notary Public

Geo Russell

23625. S. 1 No. 379—1923. Approv[illegible]s to Form by Dept. of Efficiency.

Notice of Complete Application of Water to a Beneficial Use

I, P Sound Power & Light Company, holder of Permit No. 902 issued by the State Supervisor of Hydraulics of Washington for the appropriation of 5 second-feet of the waters of the Stillaguamish River, in accordance with the tenor of such permit and the limitations endorsed thereon by the State Supervisor of Hydraulics, completely applied the waters to a beneficial use on the 15th day of June, 1925, being within the time limitation as fixed in said permit or extended by the State Supervisor of Hydraulics for the complete application of water to a beneficial use.

If all water granted in the permit has not been fully applied to benefical use, give amount used in percentage to the whole, so that subsequent appropriators may have notice. If permit is for irrigation use, state per cent of lands not now watered.

Domestic water supply

IN WITNESS WHEREOF, I have hereunto set my hand this ____ day of ____, 19____

(Present Address)

Puget Sound Power & Light Co.,
(Signature of Applicant) N. E. District
By [signature]
Manager

Affidavit of Publication

STATE OF WASHINGTON, }
County of Snohomish, } ss.

I, ... being first daly sworn on oath depose and say: That I am the head clerk of the EVERETT DAILY HERALD, a daily newspaper printed and published in the City of Everett, County of Snohomish, and State of Washington; that said newspaper is a newspaper of general circulation in said County and state, and that the notice ..... a printed copy of which is hereunto attached, was published in said newspaper proper and not in supplement form, in the regular and entire edition of said paper on the following days and times, namely:—

..... and that said newspaper was regularly distributed to its subscribers during all of said period.

.....

Subscribed and sworn to before me this ..... day of ..... 192..

.....

Notary Public in and for the State of Washington, residing at Everett, Snohomish County.

Legal Notice

NOTICE OF WATER RIGHT APPLICATION

State of Washington,
Office of Supervisor of Hydraulics,
Olympia.

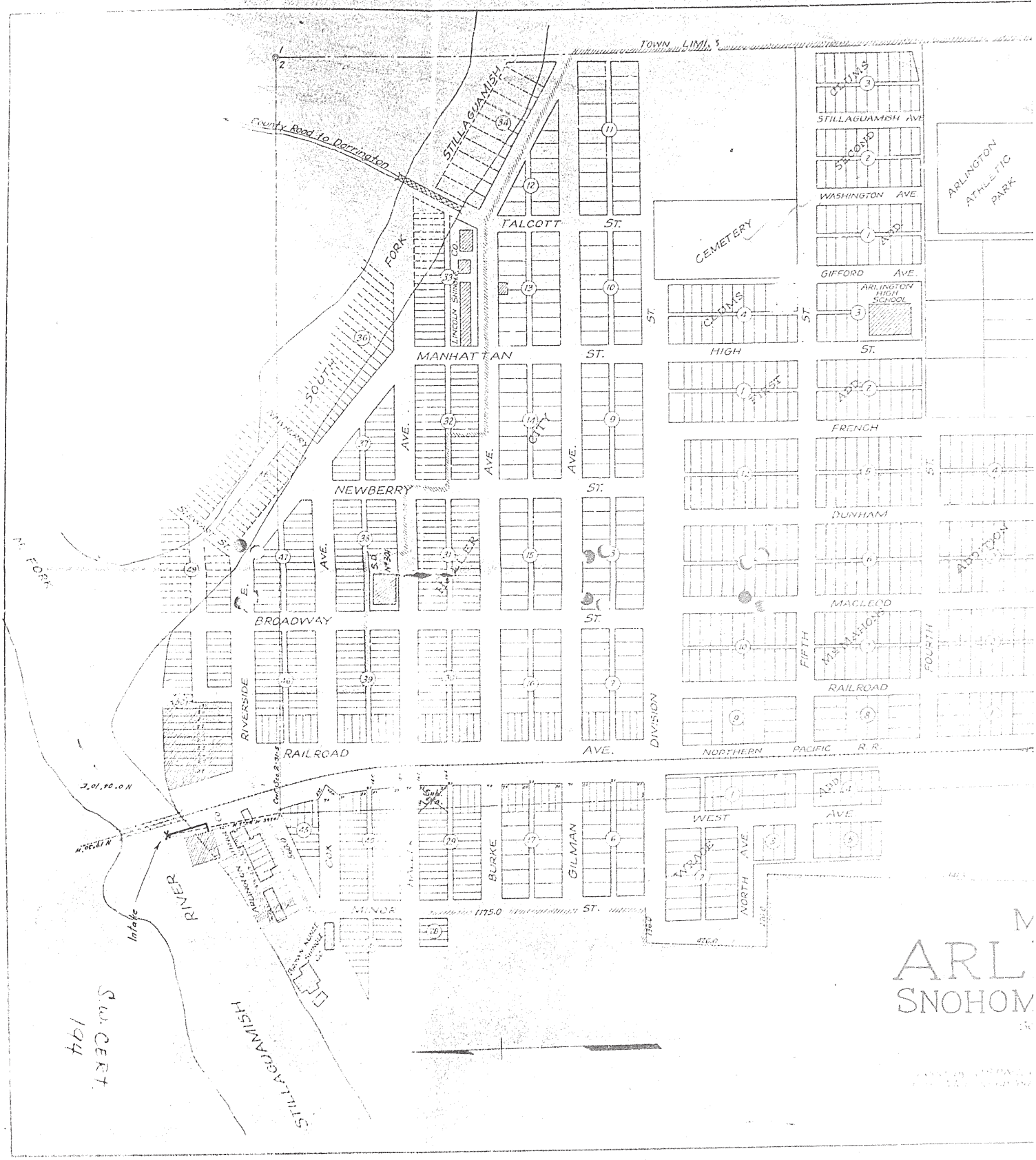
To Whom It May Concern:

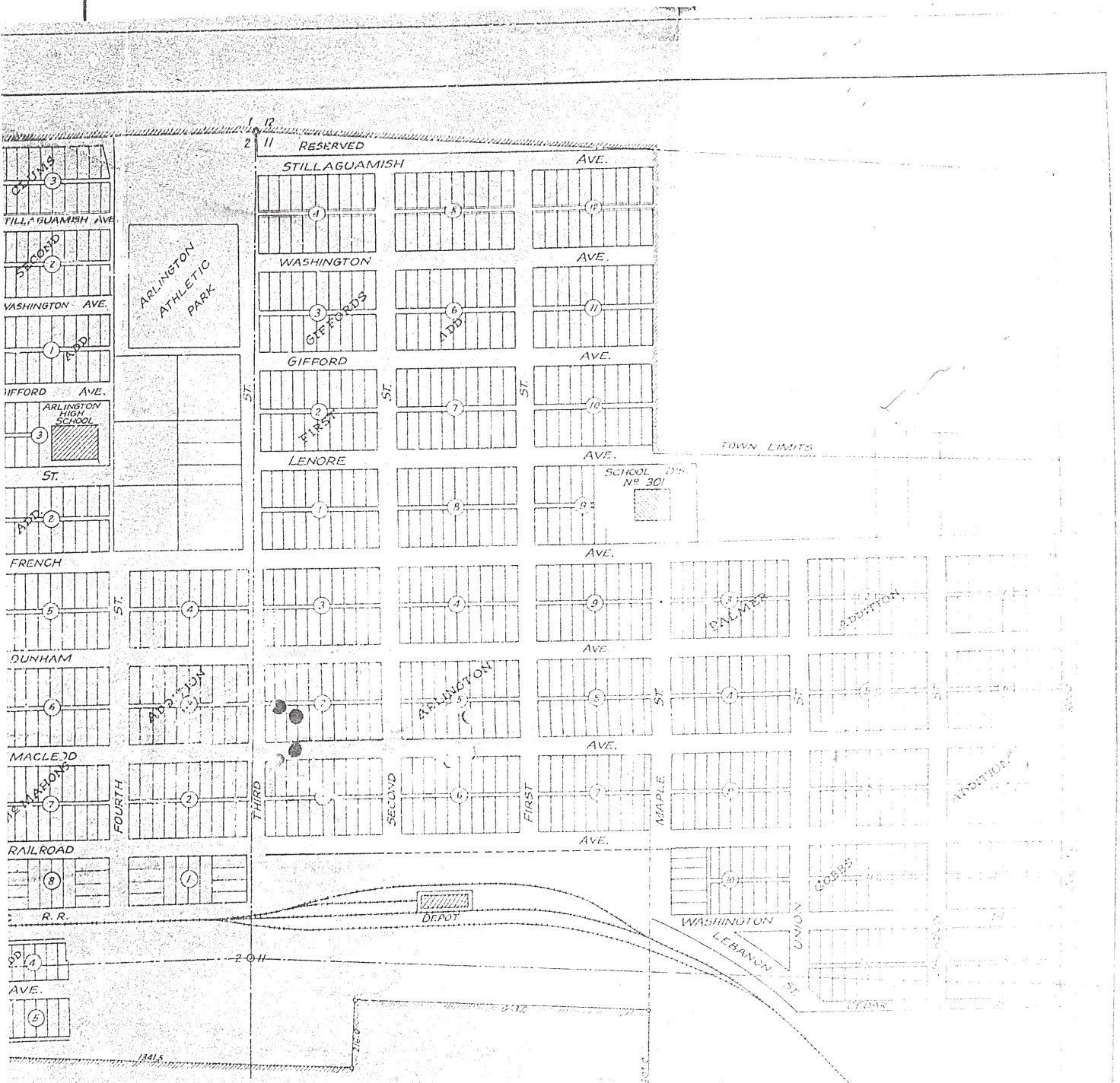
Notice is hereby given that Puget Sound Power and Light company, of Everett, County of Snohomish, State of Washington, under date of October 10, 1924, filed with the state supervisor of hydraulics, Olympia, Washington, an application for a permit to divert the public waters of Stillaguamish river, tributary of Stillaguamish river, in an amount of five second feet, subject to existing rights, continuously of each year, for the purpose of domestic supplies that the approximate point of diversion is located in se¼ of nw¼ of section 2, township 31 north, range 5 east, W. M. A map showing the location and dimensions of said canal and the place of the proposed diversion and use is on file in the office of the state supervisor of hydraulics, Olympia, Washington, together with such other information as is required by law.

Any person, firm or corporation whose right will be injuriously affected by the said application may file with the state supervisor of hydraulics, at Olympia, Washington, such objection or representations, in writing, as he may desire to make, within thirty (30) days after date of last publication, which date is November 15, 1924.

Witness my hand and official seal this 11th day of October, A. D. 1924.

(Seal) MARVIN CHASE,
State supervisor of hydraulics.


TOWN LIMITS
STILLAGUAMISH
County Road to Darrington
FORK
SOUTH
CEMETERY
CLUNS
STILLAGUAMISH AVE
SECOND
WASHINGTON AVE
ARLINGTON ATHLETIC PARK
GIFFORD AVE.
ARLINGTON HIGH SCHOOL
TALCOTT
ST.
MANHATTAN
HIGH
FRENCH
DUNHAM
MACLEOD
RAILROAD
NEWBERRY
BROADWAY
RIVERSIDE
AVE.
DIVISION
NORTHERN PACIFIC R.R.
WEST
NORTH
BURKE
GILMAN
MINOR
FOX
RIVER
Intake
STILLAGUAMISH
CREEK



MAP OF
ARLINGTON
SNOHOMISH CO. WASH.

SCALE 1" = 200 FEET

Traced by P.S.P.&L. Co. Seattle Div. - Nov. 25th 1922
from Map compiled by Coast Eng. Co. - Everett, Wash.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Ave SE • Bellevue, WA 98008-5452 • 425-649-7000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

JUN 11 2009

CERTIFIED MAIL
7007 3020 0000 3068 5106

City of Arlington
238 North Olympic Avenue
Arlington WA 98223

Re: Change to Water Right Claim Application No. CG1-300889CL(A)@1

Dear Sir or Madam:

Enclosed is a copy of the Department of Ecology's *Report of Examination for Change*. This report contains our decision regarding your application.

A copy of this *Report of Examination for Change* has been sent to the protestant(s).

Your application has been approved.

You must meet the provisions of your change authorization before we will issue a final *Certificate of Change of Water Right.* We are enclosing a *Proof of Appropriation of Water form* which is to be filed when the water has actually been put to full beneficial use. This form will need to include your County Assessor's Parcel Number and must be notarized. If you cannot put the water to full beneficial use by **December 31, 2028,** you must contact this office to apply for an extension.

You have a right to appeal this decision. To appeal this you must:

- File your appeal with the Pollution Control Hearings Board within 30 days of the "date of receipt" of this document. Filing means actual receipt by the Board during regular office hours.
- Serve your appeal on the Department of Ecology within 30 days of the "date of receipt" of this document. Service may be accomplished by any of the procedures identified in WAC 371-08-305(10). "Date of receipt" is defined at RCW 43.21B.001(2).

Be sure to do the following:

- Include a copy of this document that you are appealing with your Notice of Appeal.
- Serve and file your appeal in paper form; electronic copies are not accepted.

1. To file your appeal with the Pollution Control Hearings Board

Mail appeal to:

The Pollution Control Hearings Board
PO Box 40903
Olympia WA 98504-0903

OR Deliver your appeal in person to:

The Pollution Control Hearings Board
4224 – 6th Ave SE Rowe Six, Bldg 2
Lacey WA 98503

2. To serve your appeal on the Department of Ecology

Mail appeal to:

The Department of Ecology
Appeals & Relief Coordinator
PO Box 47608
Olympia WA 98504-7608

OR Deliver your appeal in person to:

The Department of Ecology
Appeals & Relief Coordinator
300 Desmond Dr SE
Lacey WA 98503

3. And send a copy of your appeal to:

Andrew B. Dunn
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue WA 98008

For additional information visit the Environmental Hearings Office Website: http://www.eho.wa.gov . To find laws and agency rules visit the Washington State Legislature Website: http://www1.leg.wa.gov/CodeReviser .

If you have any questions, please contact Noel Philip at 425-649-4451.

Sincerely,

Andrew B. Dunn, LG, LHG
Section Manager
Water Resources Program

AD/ng
CG1-300889CL(A)@1

cc: Mike Wolanek, Representative for City of Arlington

Enclosures: Report of Examination for Change
Proof of Appropriation of Water
Your Right To Be Heard

DEPARTMENT OF ECOLOGY
State of Washington

STATE OF WASHINGTON

PROTESTED REPORT OF EXAMINATION FOR CHANGE TO WATER RIGHT CLAIM

Water Right Control Number CG1-300889CL(A)@1

Purpose [X] Place of Use [X] Point of Diversion/Withdrawal [X] Season [ ] Consolidation [ ]

PRIORITY DATE	CLAIM NO.	PERMIT NO.	CERTIFICATE NO.
1931	300889CLA		

NAME
Arlington, City of

ADDRESS/STREET	CITY/STATE	ZIP CODE
238 North Olympic Avenue	Arlington, WA	98223

PUBLIC WATERS TO BE APPROPRIATED

SOURCE	WRIA	COUNTY
Well	5	SNOHOMISH

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	135	72.18

QUANTITY, PURPOSE OF USE, PERIOD OF USE
72.18 acre-feet, Municipal, Seasonal (March 1- September 30), year-round
Of the 72.18 acre-feet authorized for change, 68.94 acre-feet are for seasonal (March 1 - September 30) use, and 3.24 acre-feet are year-round use.

Ecology performed a tentative determination of extent and validity to split vested water rights per Water Right Claim 300889CL into two separate claims: 300889CL(A) and 300889CL(B). A report of examination issued to file 300889CL(B) details the transfer of 50 gallons per minute (gpm) and 30 acre-feet per year (afy) of the claim to Noah Israel and Kay Crabtree (Godstream Technologies). The remaining volume and rate of water use is claimed by 300889CL(A) and transferred to City of Arlington as detailed in this report of examination.

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION--WITHDRAWAL
Haller Well Field 160 feet north and 100 feet west of the center of Section 2, Township 31N, Range 05 E. W.M.

SOURCE	PARCEL	QTR/QTR	SECTION	TOWNSHIP	RANGE	COUNTY
Well 1R	00461804400000	SE/NW	2	31	05E	Snohomish Co.
Well 2	00461804400000	SE/NW	2	31	05E	Snohomish Co.
Well 3	00461804400000	SE/NW	2	31	05E	Snohomish Co.

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED
[Attachment 1 shows location of the authorized place of use and point(s) of diversion or withdrawal]

The place of use (POU) of this water right is the service area described in the most recent Water System Plan/Small Water System Management Program approved by the Washington State Department of Health, so long as Arlington City is and remains in compliance with the criteria in RCW 90.03.386(2). RCW 90.03.386 may have the effect of revising the place of use of this water right.

DESCRIPTION OF PROPOSED WORKS

As detailed in City of Arlington Water System Plan; prepared to satisfy Washington State Department of Health requirements.

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE	COMPLETE PROJECT BY THIS DATE	WATER PUT TO FULL USE BY THIS DATE
		December 31, 2028

PROVISIONS

STANDARD PROVISIONS

1. **Wells, Well logs and Well Construction Standards**

1.1. All wells constructed in the state shall meet the construction requirements of WAC 173-160 titled "Minimum Standards for the Construction and Maintenance of Wells" and RCW 18.104 titled "Water Well Construction". Any well which is unusable, abandoned, or whose use has been permanently discontinued, or which is in such disrepair that its continued use is impractical or is an environmental, safety or public health hazard shall be decommissioned.

1.2. All wells shall be tagged with a Department of Ecology unique well identification number. If you have an existing well and it does not have a tag, please contact the well-drilling coordinator at the regional Department of Ecology office issuing this decision. This tag shall remain attached to the well. If you are required to submit water measuring reports, reference this tag number.

1.3. Installation and maintenance of an access port as described in WAC 173-160- 291(3) is required.

2. **Measurements, Monitoring, Metering and Reporting**

2.1. An approved measuring device shall be installed and maintained for each of the sources identified by this water right in accordance with the rule "Requirements for Measuring and Reporting Water Use", WAC 173-173.

2.2. Water use shall be recorded daily and submitted according to the guidelines in Section 2.6 (below).

2.3. Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the records of water use that are kept to meet the above or any other conditions set forth by Ecology, and to inspect at reasonable times any measuring device used to meet the above conditions.

2.4. Reported water use data shall be submitted via the Internet. To set up an Internet reporting account, access https://fortress.wa.gov/ecy/wrx/wrx/Meteringx/. If you do not have Internet access, contact the Northwest Region Office for forms to submit your data.

2.5. WAC 173-173 describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition the Department of Ecology for modifications to some of the requirements. Installation, operation and maintenance requirements are enclosed as a document entitled "Water Measurement Device Installation and Operation Requirements". http://www.ecy.wa.gov/programs/wr/measuring/measuringhome.html

2.6. In order to maintain a sustainable supply of water, pumping must be managed so that static water levels do not progressively decline from year to year. Water levels shall be measured and recorded monthly, using a consistent methodology. The length of the pumping period or recovery period prior to each measurement shall be constant, and shall be included in the record. Data for the previous year shall be submitted by January 31 to the Department of Ecology.

Static water levels data shall be submitted in digital format and shall include the following elements:

1. Unique Well ID Number
2. Measurement date and time
3. Measurement method (air line, electric tape, pressure transducer, etc.)
4. Well status (pumping, recently pumped, etc.)
5. Water level accuracy (to nearest foot, tenth of foot, etc.)
6. Description of the measuring point (top of casing, sounding tube, etc.)
7. Measuring point elevation above or below land surface to the nearest 0.1 foot
8. Land surface elevation at the well head to the nearest foot.
9. Static water level below measuring point to the nearest 0.1 foot.

3. **Department of Health Requirements**
Prior to any new construction or alterations of a public water supply system, the State Board of Health rules require public water supply owners to obtain written approval from the Office of Drinking Water of the Washington State Department of Health. Please contact the Office of Drinking Water at Northwest Drinking Water Operations, 20435 72nd Avenue S, Suite 200, K17-12, Kent, WA 98032-2358, (253) 396-6750, prior to beginning (or modifying) your project.

4. **Municipal Place of Use**
If the criteria in RCW 90.03.386(2) are not met and a Water System Plan/Small Water System Management Program was approved after September 9, 2003, the place of use of this water right reverts to the service area described in that document. If the criteria in RCW 90.03.386(2) are not met and no Water System Plan/Small Water System Management Program has been approved after September 9, 2003, the place of use reverts to the last place of use described by The Department of Ecology in a water right authorization.

5. **Water Use Efficiency**
Use of water under this authorization shall be contingent upon the water right holder's maintenance of efficient water delivery systems and use of up-to-date water conservation practices consistent with established regulation requirements and facility capabilities.

FINDINGS OF FACT AND ORDER

Upon reviewing the investigator's report, I find all facts, relevant and material to the subject application, have been thoroughly investigated. Furthermore, I find the change of water right as recommended will not be detrimental to existing rights or the public welfare.

Therefore, I ORDER the requested change to purpose and place of use, and point of diversion under Groundwater Change Application No. CG1-300889CL(A)@1, subject to existing rights and the provisions specified above.

You have a right to appeal this decision. To appeal this you must:

- File your appeal with the Pollution Control Hearings Board within 30 days of the "date of receipt" of this document. Filing means actual receipt by the Board during regular office hours.
- Serve your appeal on the Department of Ecology within 30 days of the "date of receipt" of this document. Service may be accomplished by any of the procedures identified in WAC 371-08-305(10). "Date of receipt" is defined at RCW 43.21B.001(2).

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Olympia WA 98504-7608

OR

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Lacey WA 98503

3. And send a copy of your appeal to:

Andrew B. Dunn, LG, LHG
Section Manager
Water Resources Program -- Department of Ecology
3190 160th Avenue SE
Bellevue, WA 98008-5452

For additional information visit the Environmental Hearings Office Website: http://www.eho.wa.gov . To find laws and agency rules visit the Washington State Legislature Website: http://www1.leg.wa.gov/CodeReviser .

If you have any questions, please contact Noel Philip of Ecology at (425) 649-4451.

Signed at Bellevue, Washington, this 10th day of June, 2009.

Andy B. Dunn, LG, LHG
Section Manager
Water Resources Program
Northwest Region Office

INVESTIGATOR'S REPORT
Noel S. Philip, LG, Department of Ecology
Water Right Control Number CG1-300889CL(A)@1

BACKGROUND

Description and Purpose of Proposed Change

City of Arlington is acquiring water from Split Claim 300889CL(A). Ecology processed a change request in 2006 to split and transfer a portion of the parent claim (300889CL), resulting in two claims 300889CL(A) and CG1-300889CL(B). Water Right Claim 300889CL(B) is authorized for 50 gallons per minute (gpm) and 30 acre-feet per year (afy). The amount of water available in Water Right Claim 300889CL(A) is based on the appropriated volume and rate Donald A and Beverly J. Klein put to beneficial use less the amount authorized for claim 300889(B). WestWater Research, a consultant firm retained by City of Arlington, compiled evidence including photographs, utility records, affidavits, etc. in its report to City of Arlington in 2007 detailing Kleins' water use. The purpose, point of diversion, and place of use are subject to change with this application.

Attributes of the Change Application and Proposed Change

Table 1. Summary of Proposed Changes to Water Right Change Application No. 300889CLA@1

Attributes	Existing	Proposed
Name	Donald A. and Beverly J. Klein	Arlington City
Priority Date	1931	
Date of Application for Change	February 26, 2007	
Instantaneous Quantity	135 gpm	135 gpm
Annual Quantity	72.18	72.18
Source	well	Well 1R (emergency Well) Well 2 Well 3
Point of Withdrawal	Approx. 1600 feet North and 1800 feet east From SW corner of Sec. 35	Haller Well Field: SE/NW T31N/R05E-2
Purpose of Use	IR, ST, DM	MU
Period of Use	Seasonal, year-round	Seasonal, year-round
Place of Use	NE/SW T32N/R05E-35	Detailed in City of Arlington water system plan

Legal Requirements for Proposed Change

The following is a list of requirements that must be met prior to authorizing the proposed change in purpose, point of diversion, place of use, and season of use.

- **Public Notice**

  ArlingtonTimes, December 5 and 12, 2007. Tulalip Tribes protested the application. Discussion of the protest is found on Page 10 of this Report of Examination.

- **State Environmental Policy Act (SEPA)**

A water right application is subject to a SEPA threshold determination (i.e., an evaluation whether there are likely to be significant adverse environmental impacts) if any one of the following conditions are met.

- It is a surface water right application for more than 1 cubic feet per second, unless that project is for agricultural irrigation, in which case the threshold is increased to 50 cubic feet per second, so long as that irrigation project will not receive public subsidies;
- It is a groundwater right application for more than 2,250 gallons per minute;
- It is an application that, in combination with other water right applications for the same project, collectively exceed the amounts above;
- It is a part of a larger proposal that is subject to SEPA for other reasons (e.g., the need to obtain other permits that are not exempt from SEPA);
- It is part of a series of exempt actions that, together, trigger the need to do a threshold determination, as defined under WAC 197-11-305.

Because this application does not meet any of these conditions, it is categorically exempt from SEPA and a threshold determination is not required.

Water Resources Statutes and Case Law

RCW 90.03.380(1) states that a water right that has been put to beneficial use may be changed. The point of diversion, place of use, and purpose of use may be changed if it would not result in harm or injury to other water rights.

The Washington Supreme Court has held that Ecology, when processing an application for change to a water right, is required to make a tentative determination of extent and validity of the claim or right. This is necessary to establish whether the claim or right is eligible for change. *R.D. Merrill v. PCHB* and *Okanogan Wilderness League v. Town of Twisp.*

RCW 90.03.380 states the holder of the right may change the manner or purpose of use. A change in the purpose of use can be approved only after the water has first been applied to beneficial use.

RCW 90.44.100(1) states that a ground water permit can be amended to replace or add wells.

INVESTIGATION

History of Water Use

The history of use by Donald A. and Beverly J. Klein is documented back to 1931. A compilation of data providing evidence of this assertion is presented in a report from WestWater Research, a consultant retained by the applicant. Ecology verified the methods of calculating beneficial use quantities and evidence of historic use.

Department of Ecology (Ecology) personnel investigated Water Right Claim 300889 to tentatively determine the actual quantity Donald Klein (Klein) historically put to beneficial use on the property formerly farmed and used to keep stock (through 2004). While ultimate quantities hadn't been quantified, Ecology determined enough water existed to process a water right split-claim change application (CG1-300889CL(B)). Noah Israel and Kay Crabtree (Crabtree) received a portion of the water right claim in the amounts of 50 gallons per minute (gpm) and 30 acre-feet per year (afy). The water right is in permit status as a Report of Examination on file with Ecology. Klein holds a Certificate of Change to Water Right Claim CG1-300889CL(A) authorizing a 300 gpm and 90 afy withdrawal.

City of Arlington submitted water right split-claim change application to Ecology February 26, 2007, to transfer ownership of the remaining right, and appurtenance from the Klein farm acreage to its municipality. The application seeks change to the purpose and place of use, and point of withdrawal.

Ecology determined same source with respect to the Klein and Crabtree points of withdrawal. While in relatively close proximity to one another, investigation is made to determine whether the same can be stated for the City of Arlington and Klein points of withdrawal and their relative affect on the Stillaguamish River.

The period of use varies due to the nature of the multiple applications of water on the dairy farm Klein historically operated at this place of use. Thus, a portion (68.94 afy) is designated seasonal (March 1 - September 30), and 3.24 afy designated year-round (Table 3). The season of use is taken from a climate station close to Arlington found in the December 17, 1992 update to the 1985 version of the Washington Irrigation Guide.

Proposed Use

City of Arlington seeks a change to the claim to provide water for municipal purpose.

Other Rights Appurtenant to the Place of Use

The Department of Ecology Water Rights Application Tracking System (WRATS) and Well Log databases show the existence of 3 water right certificates, and 13 water right claims within a 1/2-mile radius of Haller Well Field. At least four of the 10 wells of record within one half mile are likely tied to these water rights, and some are likely exempt from the application process. Still others may be sources for existing water right certificates or claims under a different name.

A water right claim is a statement describing the beneficial use of water occurring prior to the adoption of the water right codes and is not authorized by a state-issued permit or certificate. It is unknown whether the nearby claims are valid, not valid, or once valid and now relinquished back to the state. The Department of Ecology cannot verify the validity of these claims, as water right claims can only be confirmed in an adjudication by the Washington State Superior Court. Thus, no investigation is made into their validity. Exempt withdrawal of public groundwater is defined in RCW 90.44.050.

Hydrologic/Hydrogeologic Evaluation

Snohomish County/WRIA 5 Hydrogeology

Snohomish County extends westward from Cascade Mountain Range to Puget Sound. WRIA 5 is an administrative area assigned to coincide with the Stillaguamish River watershed. Newcomb describes the geology and occurrence of groundwater in USGS Water Supply Paper 1135. USGS Professional Paper 1424-C released in 1999 corroborates Newcomb's analysis at a smaller, regional scale.

The formerly glaciated topography shows features commonly associated with such events. In the lowlands, unconsolidated units mantle pre- Tertiary and Tertiary materials. These include Vashon Drift members showing generally horizontal stratification and great lateral extent. Among these are quaternary glacial till of Pleistocene age, along with Admiralty and Pilchuck Clays and Esperance Sands. Unconsolidated sediments transition generally eastward to pre-Vashon deposits in the foothills, and further east to older volcanic, igneous, and metamorphic rocks in the mountainous side of the county. The largest streams run west and northwest to Puget Sound and the geology shows typical geomorphic activity associated with large river valleys; each is home to a continuous veneer of alluvium.

Most wells produce from beneath the Vashon glacial till from sand and gravel aquifers where they are positioned to receive percolating precipitation and store groundwater. Wells tapping ancient stream channels and more recent alluvium also produce in quantities sufficient to sustain single- and multi- family development depending on well construction. However, these wells are typically in direct hydraulic continuity with nearby streams and have an impact on local instream flow in many cases. Wells completed in igneous and metamorphic upland rock formations are not typically viable unless they penetrate a fractured area that holds a groundwater body.

Hydrogeology Near CG1-300889CL(A)@1

The Arlington well described by Newcomb in 1952 is part of the Haller Well Field, less than 500 feet from the confluence of the North and South Forks of the Stillaguamish (Attachment 1). Three production wells are currently completed approximately 36 feet below ground surface (bgs), within 50 feet of one another. Wells 2 and 3AB are the primary supply wells, and Well 1R is the designated emergency well. A fourth well, Well 1, was decommissioned in May, 2002 (Ecology Well Log Notice of Intent #A43038). These and the Klein wells, described in Table 1, withdraw water from the same source: an unconfined aquifer in direct hydraulic connection with the Stillaguamish. Geology mapped in Newcomb's report shows the Stillaguamish sand member extending throughout the river valley. The Stillaguamish sand member is sand, silt, clay, and gravel deposited in the valley to thicknesses of 300 feet. It is classified a moderate producing hydrogeologic unit in areas where material is coarser.

The well logs from the Klein property and Arlington's wells describe material downhole closely resembling that described in the Newcomb report. This serves as a check to local conditions described in the report because it used one of Arlington's wells as a well representative of the area. All wells discussed in this memo produce water from a screened interval (or open bottom) in a zone of sand and gravel.

A report submitted by Pacific Groundwater Group in November, 2002, details the lithology to 38 feet below ground surface (bgs) at Well 1R. The Stillaguamish sand member terminates at 35 feet bgs upon the occurrence of low-grade metamorphic bedrock.

Table 2. Wells of interest in the split to Claim CG1-300889CLA@1.

Owner	Name	Well Tag	Completion Date	Completion Depth	Casing Diameter[0]	Wellhead MSL[1]	Static Water MSL	Screened Interval MSL
Arlington	Well 2	AGB 953	12/1961	36	36	72.8[2]	53[2]	38-50
Arlington	Well 3[3]	AGB 951	1921[2]	36	72	72.8[2]	53[2]	38-50
Arlington	Well 1R	AFT 307	5/8/2002	38	20,16,18	72.8[2]	DNA	39-45
Klein		AGO 219	8/1/2001	35.5	6	62[1]	58[5]	open bottom
Klein		207038[4]	2/3/1993	36	6	62[1]	56[5]	open bottom

Notes:

DNA = Did not attempt. Ecology personnel measured static water level with e-tape 11/05/2008.

0) Units are inches

1) MSL= feet relative to mean sea level; taken from Ecology GIS database Zone 10 DEM

2) information reported by applicant

3) Well 3 is fitted with two pumps Ecology Well Log database Notice of Intent (start card) no.

4)Ecology Well Log database Notice of Intent (start card) no.

5) Taken from Ecology Well Log Database well log image files and converted to elevation

Water Availability, Pump Test Data (PGG, 2002)

Arlington has been pumping water from the Haller Well Field (point of withdrawal) for decades, and a typical constant rate pumping test to determine water availability and aquifer productivity is not necessary. It is sufficient to observe the results from extended pumping to determine adequacy of availability. However, it is helpful to make determinations regarding drawdown at distance from the point of withdrawal to ascertain whether there is risk of impairment to water rights in the immediate vicinity. To that end, this report looks to data recorded during a pumping step test Pacific Groundwater Group (PGG) performed in Well 1R during 2002. It provides more recent insight into the aquifer characteristics and its ability to transmit and store water.

A step drawdown test that included an extended final step (over four hours), shows Well 1R sustained a withdrawal rate of 570 gpm during the final 240 minutes of the test. Water levels in the pumped well declined approximately 6.5 feet, reaching this level in 240 minutes. The report contains no raw data, but Figure 2 shows recovery occurring rapidly to pre-pumping conditions. The remainder of the image shows a plot of background water levels and pumping step test water levels. It is noteworthy how closely (and how rapidly) the water levels in the wells respond to Stillaguamish River stage. It is a more realistic indicator of the city's ability to pump water from all three wells at once with respect to instream flows. The PGG report discusses the inability of the well field to produce from all three wells at their maximum pumping capacity in periods of low stage in the river, and mitigating pumping schemes during these times.

The pump step test data confirm the source of these wells is the Stillaguamish River. The groundwater source of the Klein withdrawal is known to be in direct hydraulic continuity with Armstrong Creek, a named tributary of the South Fork Stillaguamish River in WAC 173-505-040[1], the administrative rule setting minimum flows in the Stillaguamish through the year. It is important to note Armstrong Creek is a tributary stream of the Main Stem Stillaguamish. Thus, the water source for these two withdrawals is the same, as it pertains to this change application.

Impairment Considerations

Drawdown of approximately 9 inches in Well 1 during the test approximately 25 feet from the pumping well (Figure 2) shows how the aquifer responds at distance within the well field between wells.

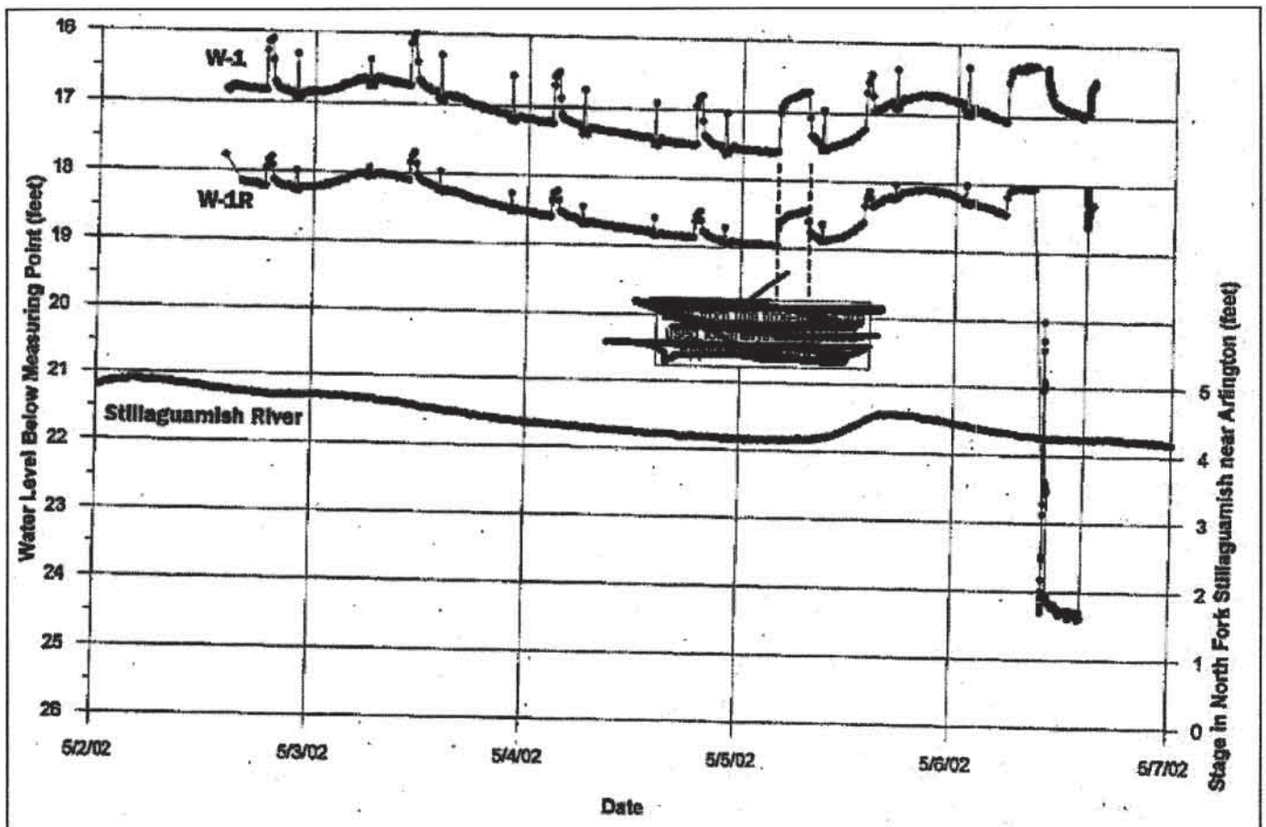


Figure 2. Pumping step test data showing close correlation between water levels in wells and river stage. W-1 is Well 1, W-1R is Well 1R. Modified from PG&G, 2002.

Extrapolating this response shows negligible theoretical drawdown outside the well field. Washington water law does not consider drawdown to be an impairment of existing water rights, unless the affected wells fully penetrate the aquifer and can no longer produce their allocations. Therefore, impairment to any senior water rights due to pumping at the Haller Well Field wells is unlikely.

Impairment, Qualifying Ground Water Withdrawal Facilities, and Well Interference

There are three concepts that are important when considering whether a withdrawal of water from a well would impair another existing water right. The concepts are defined as follows:

Impairment is an adverse impact on the physical availability of water for a beneficial use that is entitled to protection i.e. water rights that are both senior and junior in priority to the right the applicant seeks to change.

Qualifying ground water withdrawal facilities are defined as those wells which in the opinion of the Department are adequately constructed. An adequately constructed well is one that (a) is constructed in compliance with well construction requirements; (b) fully penetrates the saturated thickness of an aquifer or withdraws water from a reasonable and feasible pumping lift (WAC 173-150); (c) the withdrawal facilities must be able to accommodate a reasonable variation in seasonal pumping water levels; and (d) the withdrawal facilities including pumping facilities must be properly sized to the ability of the aquifer to produce water.

Well interference may occur when several wells penetrate and withdraw ground water from the same aquifer. Each pumping well creates a drawdown cone. When several wells pump from the same aquifer, well density, aquifer characteristics, and pumping demand may result in individual drawdown cones that intersect and form a composite drawdown cone. At any point in an aquifer, the composite drawdown caused by pumping wells will be greatly influenced by the transmissivity (T) of the aquifer. In aquifers with high Ts, composite drawdown will generally be much less than in aquifers with similar properties but with low Ts. Transmissivity is related to hydraulic conductivity (K) and the saturated thickness (b) of an aquifer by the relationship T=Kb.

An aquifer's hydraulic conductivity (K) is derived from the physical properties of both the fluid and geologic materials that form an aquifer. Once formed, an aquifer's saturated thickness (b) becomes important in evaluating its transmissivity. For regions of similar K in an aquifer, a large saturated thickness will result in a much higher T than a small saturated thickness. As a result, regions of similar K in an aquifer with a large saturated thickness will experience less composite drawdown or well interference than with a small saturated thickness.

Some conditions, however, will increase or steepen composite drawdown in an aquifer. For instance, where characteristics (such as very fine, clay-rich, or poorly sorted sediments) of an unconfined aquifer cause significant drawdown relative to the saturated thickness, the composite drawdown will increase as saturated thickness is reduced and T becomes smaller. Additionally, in regions where negative or no-flow boundaries occur, such as near the edges of a valley fill aquifer where it is bounded by bedrock, composite drawdown will be steeper than in the central part (generally the greatest thickness region) of the aquifer. Consequently, it is commonly understood that the greatest composite drawdown or well interference is more likely to occur in regions of low transmissivities, thin saturated thicknesses and near negative or no-flow boundaries than in regions of high transmissivities, large saturated thicknesses, and away from negative or no-flow boundaries.

Enlargement

The City of Arlington is receiving a transferred quantity based on a tentative determination of extent and validity. Only that water put to beneficial use is transferred, and only that amount is authorized to be withdrawn (by this authorization) from the wells in Haller Well Field. Thus, no enlargement is anticipated.

Public Interest Considerations

Factors considered in determining whether this use of water is in the public interest include but were not limited to: consideration given to exempt wells; existing water right certificates, applications, and claims; potential impacts to the aquifer subject to withdrawal as it pertains to drawdown and water quality (i.e. aquifer degradation); beneficial use of water as a resource defined in this report. No detriment to the public interest could be identified during the investigation of the subject application. Available data show existing wells in the area are not expected to be impaired by the anticipated operation of the subject wells.

Consideration of Protests and Comments

Tulalip Tribes submitted a protest April 30, 2007, detailing a number of concerns regarding this change application. They are identified and addressed individually for clarity and completeness in addressing the protestant's arguments:

"...Tulalip objects to the transfer of a groundwater claim used seasonally for irrigation and year round for three homes to year round municipal uses. This action changes a claim, which is subject to relinquishment, to a municipal water right which is not subject to relinquishment." A water right is relinquished if it endures 5-year period of unjustifiable non-use, and is thus not a water right. There is tentatively established beneficial use from the present extending back in time to 1931. The water right in question is not subject to relinquishment. The seasonality of the change from irrigation to municipal supply is discussed elsewhere in this report.

"...seasonal use of the majority of the claimed water for irrigation would at least return water to the groundwater system." Wastewater from Arlington is channeled away from the city via surface water, a source shown to be in direct hydraulic connectivity with groundwater in the river basin.

"...we find that Arlington, with its ability to purchase water from Snohomish PUD and Marysville, does not need the transfer..." The ability to purchase water is not a vested water right. The city still has a right to apply for change to existing rights and augment its supply to provide water for its population growth estimates supported in documentation in a water system plan. While it's possible the city may have water rights adequate for the present, they have demonstrated a determined future development in their water system plan requiring the acquisition of additional water rights to provide for their citizens in the future.

Tulalip Tribes are worried withdrawal will negatively affect summer flows in the Stillaguamish. The season of irrigation use is March 1 to September 30 each year. Arlington is within its rights to pump during the summer regardless of flows, due to the seniority of the water right to instream flows.

CONCLUSIONS

The Klein claim (300889CLA) is tentatively determined valid in the amounts given below (Table 3) for irrigation (seasonal use), stockwatering, and domestic purposes ("Classification column" and associated figures). West Water Research arrived at the values based on water use data not including metering data, and affidavits from the water right holder. A portion of water was split from the original claim and transferred in change G1-300889CL(B). The remainder is transferred to City of Arlington in this decision.

The water split from the original claim and subsequently transferred to Water Right Claim 300889CL(B) was for development of 35 homes, stockwatering, and irrigation. Annual water allocation required by an applicant for year

round domestic purpose of use is calculated using the number of anticipated connections and water use per connection. Residential water use is based on historical and current data from similarly-sized water systems. Presently, these systems indicate average use per connection is approximately one-third (0.3) acre-foot per year. At this rate, the annual water quantity required by the holder of claim 300889(B) to serve 35 residential connections is 10.5 acre-feet per year. This year round use absorbs most of the available water for year round use in the Klein claim. The remainder (19.5) is for stockwatering and seasonal irrigation, transferred from the irrigation portion of the Klein claim. The total transferred to 300889CL(B) was 30 afy. The instantaneous withdrawal rate transferred was 50 gpm.

There remains 3.24 afy to transfer to City of Arlington for year round use (combining stockwatering, dairy activities, and domestic uses), and 68.94 afy are classified seasonal (irrigation).

Table 3. Destination of available water in Water Right Claim 300889 based on purposes of use.

Classification	Used by Klein	GPM	Transferred to 300889CL(B)	Transferred to 300889CL(A)
Instantaneous		185	50 gpm	135 gpm
Irrigation	88.44		19.50	68.94
Stock Water	10.78		10.5	0.28
Dairy Activities	1.46		0	1.46
Domestic	1.50		0	1.50
Total	102.18		50 gpm, 30 afy	135 gpm, 72.18 afy

Note:
1) Units are acre-feet per year (afy) unless otherwise indicated.

RECOMMENDATIONS

Based on the above investigation and conclusions, I recommend that the request for change to Water Right Claim 300889CL(A) be approved in the amounts and within the limitations listed below and subject to the provisions beginning on Page 2, et seq.

Purpose of Use and Authorized Quantities

The amount of water recommended is a maximum limit and the water user may only use that amount of water within the specified limit that is reasonable and beneficial:

- 135 gpm
- 72.18 acre-feet per year: 68.94 seasonal (March 1 - September 30), 3.24 year-round.
- Municipal Supply

Point of Withdrawal

SE¼, NW¼, Section 2, Township 31 North, Range 05 E.W.M.

Place of Use

As described on Page 1 of this Report of Examination.

Report by: _____ Date 06/10/2009

Noel S. Philip, LG
Water Resources Program

References

Jones, M.A., 1999. United States Geological Survey Professional Paper 1424-C: Geologic Framework for the Puget Sound Aquifer System, Washington and British Columbia.

National Resource Conservation Service. Washington Irrigation Guide. United States Department of Agriculture, National Resource Conservation Service, 2007. Available for download as of May 22, 2008 at: http://www.wa.nrcs.usda.gov/technical/ENG/irrigation_guide/index.html.

Newcomb, R.C., 1952. United States Geological Survey Water-Supply Paper 1135, Ground-Water Resources of Snohomish County, Washington. US Government printing office, Washington.

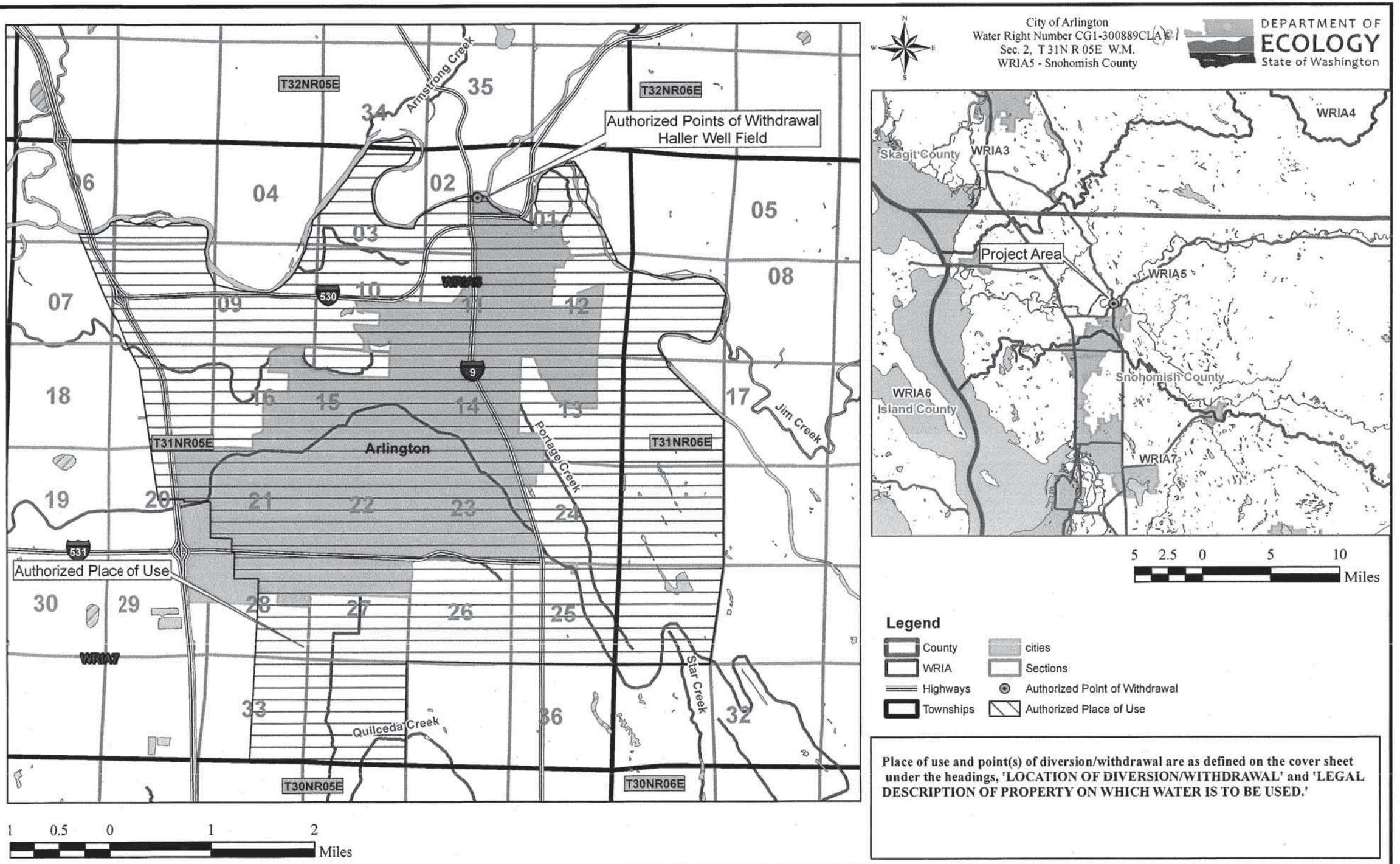
Pacific Groundwater Group, 2002. Constructing and Testing Replacement Well No. 1 (Well-1R) Haller Park Well Field.

Washington State Department of Ecology, Water Resources Program, 2006. Report of Examination CG1-300889CLB.

Washington State Department of Ecology, current. Well Log Database. Accessible online: http://apps.ecy.wa.gov/welllog/

WestWater Research, 2007. Water Right Summary and Beneficial Use Analysis of Ground Water Right Claim 300889CLA (Donald and Beverly Klein).

If you need this publication in an alternate format, please call Water Resources Program at (360) 407-6600. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.



Attachment 1

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

REPORT OF EXAMINATION
*Change Application CG1-*02115C*
To Groundwater Certificate 1488

PRIORITY DATE	CLAIM NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
September 4, 1951			*1488-A*

NAME
City of Arlington

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
154 Cox Avenue	Arlington	WA	98223

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
Three wells in the City of Arlington Haller Wellfield
TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	90	40

QUANTITY, TYPE OF USE, PERIOD OF USE

Municipal Water Supply
- *Continuously April 16 to September 30*
- *Interruptible October 1 to April 15 subject to meeting minimum instream flows established under WAC 173-505-040*

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION--WITHDRAWAL

Haller Wellfield: 2,900 feet north and 2,770 feet west from the SE Corner of Section 2, T.31N., R.5E., W.M.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
SE 1/4 NW 1/4	2	31N.	5E.	5	Snohomish

PARCEL NUMBER	LATITUDE	LONGITUDE	DATUM
31050300101000	48.2029 N	122.1284 W	NAD83

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

[Attachment 1 shows location of the authorized place of use and point(s) of diversion or withdrawal]

Area served by the City of Arlington as described within the most recently approved Water System Plan

DESCRIPTION OF PROPOSED WORKS

The City of Arlington's water system consists of three wells in the Haller Wellfield (Wells 1, 2, and 3), the Airport Well, water treatment and disinfection facilities, distribution system piping, pumps, and meters. The system has been constructed and is in use.

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Completed (infrastructure in place)	*N/A*	*N/A*

PROVISIONS

This authorization for change is issued subject to all applicable State laws and regulations and to the following provisions:

1. The quantities transferrable through this change are an instantaneous quantity of 90 gpm and an annual quantity of 40 AF/yr, subject to minimum instream flows outside of the irrigation season for pasture/turf (October 1 through April 15), as established for the Mainstem of the Stillaguamish River as provided in Table 2 under WAC 173-505-050.

2. All wells constructed in the state shall meet the "Minimum Standards for the Construction and Maintenance of Wells" (WAC 173-160) and "Water Well Construction" (RCW 18.104). In general, wells shall be located at least 100 feet from sources of contamination and at least 1,000 feet of the boundary of a solid waste landfill. Any well which is unusable, abandoned, or is an environmental, safety, or public health hazard shall be decommissioned.

3. All wells shall be tagged with a Department of Ecology unique well identification number. If you have an existing well and it does not have a tag, please contact the well-drilling coordinator at the regional Department of Ecology office issuing this decision. This tag shall remain attached to the well. If you are required to submit water measuring reports, reference this tag number.

4. Required installation and maintenance of an access port as described in WAC 173-160- 291(3).

5. An approved measuring device shall be installed and maintained for each diversion/withdrawal of the sources identified by this water right in accordance with the rule "Requirements for Measuring and Reporting Water Use", Chapter 173-173 WAC.

   Water use data shall be recorded weekly. The maximum monthly instantaneous rate of diversion/withdrawal and the monthly total volume shall be submitted to Ecology by January 31st of the following year. Ecology is requiring submittal of monthly meter readings to collect seasonal information for water resource planning, management and compliance.

   The following information shall be included with each submittal of water use data: owner, contact name if different, mailing address, daytime phone number, Permit/Certificate/Claim No., source name, volume including units, Department of Health WFI water system number and source number(s) (for public drinking water systems), and well tag number (for ground water withdrawals). In the future, Ecology may require additional parameters to be reported or more frequent reporting. Ecology prefers web based data entry, but does accept hard copies. Ecology will provide forms and electronic data entry information.

   Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the records of water use that are kept to meet the above conditions, and to inspect at reasonable times any measuring device used to meet the above conditions.

   Chapter 173-173 WAC describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition Ecology for modifications to some of the requirements. Installation, operation and maintenance requirements are enclosed as a document entitled "Water Measurement Device Installation and Operation Requirements".

   Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the records of water use that are kept to meet the above conditions, and to inspect at reasonable times any measuring device used to meet the above conditions.

6. This decision may indicate a Real Estate Excise Tax liability for the seller of water rights. The Department of Revenue has requested notification of potentially taxable water right related actions, and therefore will be given notice of this decision, including document copies. Please contact the state Department of Revenue to obtain specific requirements for your project. Phone: (360) 570-3265. The mailing address is: Department of Revenue, Real Estate Excise Tax, PO Box 47477, Olympia WA 98504-7477 Internet: http://dor.wa.gov/ E-mail: REETSP@DOR.WA.GOV.

7. If the criteria in RCW 90.03.386(2) are not met and a Water System Plan/Small Water System Management Program was approved after September 9, 2003, the place of use of this water right reverts to the service area described in that document. If the criteria in RCW 90.03.386(2) are not met and no Water System Plan/Small Water System Management Program has been approved after September 9, 2003, the place of use reverts to the last place of use described by The Department of Ecology in a water right authorization.

8. Prior to any new construction or alterations of a public water supply system, the State Board of Health rules require public water supply owners to obtain written approval from the Office of Drinking Water of the Washington State Department of Health. Please contact the Office of Drinking Water at Northwest Drinking Water Operations, 20435 72nd Avenue S, Suite 200, K17-12, Kent, WA 98032-2358, (253) 396-6750, prior to beginning (or modifying) your project.

9. The water right holder is required to maintain efficient water delivery systems and use of up-to-date water conservation practices consistent with RCW 90.03.005.

10. A superseding certificate shall be issued upon a showing that sufficient infrastructure is in place at the new point of withdrawal to accommodate the additional Qi and Qa that results from this decision.

FINDINGS OF FACT AND DECISION

Upon reviewing the investigator's report, I find all facts, relevant and material to the subject application, have been thoroughly investigated. Furthermore, I find the change of water right as recommended will not be detrimental to existing rights or the public welfare.

Therefore, I ORDER the requested change under Ground Water Change Application No. CG1-*02115C be approved, subject to existing rights and the provisions specified above.

You have a right to appeal this decision to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of this decision. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal you must do the following within 30 days of the date of receipt of this decision:

- File your appeal and a copy of this decision with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.

- Serve a copy of your appeal and this decision on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503 Pollution Control Hearings Board 1111 Israel Road SW Suite 301 Tumwater, WA 98501	Department of Ecology Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608 Pollution Control Hearings Board PO Box 40903 Olympia, WA 98504-0903

For additional information visit the Environmental Hearings Office Website: http://www.eho.wa.gov. To find laws and agency rules visit the Washington State Legislature Website: http://www1.leg.wa.gov/CodeReviser.

Signed at Bellevue, Washington, this 4th day of April, 2012.

Jacqueline Klug, Section Manager
Water Resources Program
Northwest Regional Office

BACKGROUND

The City of Arlington (City) submitted change application CG1-*02115C for Certificate 1488 on March 23, 2010. The City entered into a cost reimbursement agreement with the Department of Ecology to process this application for change along with two other applications for change. This report of examination was prepared by Golder Associates Inc. through Ecology's Cost-Reimbursement Program.

The City also submitted two applications for change along with this application for change:

- Application for change CS1-18929C (Certificate 10024) seeks to transfer 269 gpm (0.60 cfs) and 125 AF/year from an irrigation and stockwatering right to the City for the purpose of municipal water supply
- Application for change CS1-10680C (Certificate 5983) seeks to transfer 112 gpm (0.25 cfs) and 50 AF/year from an irrigation right to the City for the purpose of municipal water supply

These two change applications are being processed concurrently with this application.

Description and Purpose of Requested Change

The City purchased an irrigation water right and proposes to transfer the water to the City's existing points of withdrawal at the Haller Wellfield for the purpose of year round municipal water supply within the City's water service area.

Attributes of the Certificate and Proposed Change

Attributes of the Original Certificate

Owner name	Linda Neunzig
Name on Certificate:	P.V. Robertson
Priority Date:	September 4, 1951
Instantaneous Quantity:	90 gallons per minute (gpm)
Annual Quantity:	40 acre-feet per year (AF/yr)
Point of Withdrawal:	T31N R5E Sec 3, SE ¼ NE ¼
Purpose of Use:	Irrigation of 30 acres
Period of Use:	Not Specified
Place of Use:	Beginning at a point on east and West Quarter line 15 feet west of East of section; thence North 968 feet; thence West to Easterly bank of Stillaguamish River; thence Southerly along said Easterly bank to an intersection with said East and West quarter line; thence East to point of beginning, Sec. 3, Twp. 31 N., Rge. 5 E.W.M.

Proposed Change

Name of Applicant:	City of Arlington
Date of Application for Change:	March 23, 2010
Points of Withdrawal:	SE¼ NW¼ of Section 2, Township 31 North, Range 5 East (Haller Wellfield)
Purpose of Use:	Municipal Water Supply
Period of Use:	Continuously
Place of Use:	Area served by the City of Arlington as described within the most recently approved Water System Plan
Notice of Publication:	The Everett Herald, July 21, 2010 and July 28, 2010
Protests:	None

Legal Requirements for Proposed Change

- **Water Resources Statues and Case Law**

This application is subject to legal requirements in statute, administrative rules, and relevant case law which must be considered prior to issuance of the requested change(s). Among these legal requirements:

- The Washington State Supreme County has held that Ecology, when processing an application for a change to a water right, is required to make a tentative determination of extent and validity of the claim or right. This is necessary to establish whether the claim or right is eligible for change. *R.D. Merrill v. PCHB* and *Okanogan Wilderness League v. Town of Twisp.*
- RCW 90.03.380(1) allows for a water right that has been put to beneficial use to be changed. The point of diversion, place of use, and purpose of use may be changed if the change would not result in harm or injury to existing water rights.
- RCW 90.14.160 states that any person entitled to divert water through an appropriation authorized through a general adjudication, who abandons or voluntarily fails, without sufficient cause, to divert all or any part of said right for a period of five successive years after July 1, 1967, shall relinquish such right or portion thereof, to the state.
- RCW 90.44.100 allows Ecology to amend a ground water permit or certificate to (1) allow the user to construct a replacement or additional well at a new location outside of the location of the original well, or to (2) change the manner or place of use of the water, if:

  (a) The additional or replacement well taps the same body of public ground water as the original well. RCW 90.44.100(2)(a),

(b) Where a replacement well is approved, the user must discontinue use of the original well and properly decommission the original well. RCW 90.44.100(2)(b),
(c) Where an additional well is constructed, the user may continue to use the original well, but the combined total withdrawal from all wells shall not enlarge the right conveyed by the original permit or certificate. RCW 90.44.100(2)(c),
(d) Other existing rights shall not be impaired. RCW 90.44.100(2)(d).

- **Public Notice**

Public notice of the proposed application for change was published on July 21, 2010 and July 28, 2010 in the Everett Herald. No protests were received.

- **State Environmental Policy Act (SEPA)**

This application is exempt from the provisions of the State Environmental Policy Act (SEPA), Chapter 43.21 RCW, due to the fact that the cumulative quantity of water constitutes a withdrawal of less than 2,250 gallons per minute (gpm) of groundwater (WAC 197-11-800(4)).

INVESTIGATION

In considering this application, the investigation included, but was not limited to, research and/or review of:

- Ecology's online Water Rights Tracking System (WRTS) database
- Records of water rights in the vicinity
- Ecology's online Well Log Database
- Topographic and local area maps
- Site visit
- LANDSAT photographs of the area for years 2001 through 2008, inclusive
- Available regional geologic and hydrogeological information including:
    - Golder Associates, 2007, Phase I Summary Technical Memorandum: City of Arlington Water Right Application G1-26641. Prepared for the Washington State Department of Ecology.
    - Golder Associates, 2011, Phase I Summary Technical Memorandum: City of Arlington Water Right Applications CS1-10681C, CS1-18929C, and CG1-02115C. Prepared for the Washington State Department of Ecology. February 1.
    - Pacific Groundwater Group, January 2007. City of Arlington Hydrogeologic Conceptual Model Summary Report, prepared for the City of Arlington.
    - Pacific Groundwater Group, February 2007. Hydrogeologic Analysis for Klein Water Right Transfer.
    - Newcomb, R.C., 1952, Ground-Water Resources of Snohomish County, Washington, U.S. Geological Survey Water-Supply Paper 1135.
    - RH2 Engineering Inc., 2010, City of Arlington Draft Comprehensive Water System Plan, November.
    - Thomas, B.E., J.M. Wilkinson and S.S. Embrey, 1997. The Ground-Water System and Ground-Water Quality in Western Snohomish County, Washington. USGS Water Resources Investigations Report 96-4312.
    - USDA-ARS Washington Irrigation Guide, Appendix B. 1992. Available online at http://www.wa.nrcs.usda.gov/technical/ENG/irrigation_guide/index.html.
    - WestWater Research LLC, 2010, Water Right Summary and Proof of Beneficial Use for Ninety Farms and Water Right Certificate No. 1488, prepared for the City of Arlington, February 24.

Tentative Evaluation of the Extent and Validity of the Water Right Proposed for Change

The original water right was issued to P.V. Robertson in 1951 for irrigation of 30 acres. A series of property ownership transfers occurred over the years since the original water right was issued. Linda Neunzig purchased the property December 2002 from Gerald Klein.

WestWater Research LLC (2010) completed a beneficial use evaluation for the existing water right. As part of their research, they undertook the following:

- Review of the property ownership and water right history
- Review of historic color and black and white aerial photographs over the period 1941 to 2006
- Site visit
- Estimates of water use
- Source assessment and impairment analysis
- Affidavit from Linda Neunzig, current owner of the property, concerning water use

The WestWater evaluation concluded that water had been put to beneficial use for irrigation of 30 acres from 1951 through 2008 based on the aerial photos and the affidavit of the current owner. They also concluded that of the 40 AF/yr allowable under the original certificate, 34.67 AF were available for transfer.

Review of the WestWater report and information from the site visit and discussions with the applicant indicate:

- The irrigation right was not used for a period starting in January 2009 because of damage to the pump and irrigation equipment from flooding in January 2009. According to the City of Arlington, the owner irrigated the property again in 2011.
- The pump used to supply water for the irrigation system after 2002 was gasoline powered. The flood-damaged pump was observed during the site visit. Because the pump was gasoline powered, there are no electrical records to confirm water use.
- WestWater used color and black and white aerial photographs to evaluate water use. The photos are from 1941, 1965, 1976 (color), 1980, 1987, 1996, 2001 (color), 2004 (color), 2005 (color), and 2006 (color). The month of the photos is not indicated but it is likely that they were taken during later spring, summer or early fall. Some of the photos appear to show evidence of irrigation use in the form of green vegetation (2004 and 2005) while others (2001 and 2006) appear to have patches of dry vegetation suggesting no irrigation. (An evaluation of water use was conducted by Golder Associates for the period 2001 through 2008 using Landsat photos and is discussed later in this report.)
- WestWater estimated water use using information on the pump and the distribution system and estimated the instantaneous pumping rate was about 114 gpm. This appears to be reasonable given the rated pump capacity of 116 gpm and the distribution system characteristics, and is higher than the instantaneous quantity for the certificate of 90 gpm, suggesting the system was capable of producing at least 90 gpm.
- The crop irrigation requirement for pasture is given as 11.12 inches/year for the Sedro Woolley area by WestWater; however, Everett is considered more representative of the Arlington area. The total crop irrigation requirement for pasture based is 14.89 inches/year (for the Everett area, based on the Washington Irrigation Guide, Appendix B (1992). The corresponding amount of water required for irrigation of 30 acres of pasture is 49.6 AF.
- WestWater estimated an annual consumption of 34.67 AF based on the period of use of 138 days between May 15 and October 1, pump operation over 12 hours per day, and the estimated pumping rate of 114 gpm, and this value was requested by the change application . Although the instantaneous pumping rate is limited to 90 gpm by the certificate, the annual consumption estimated by WestWater appears low based on the estimated withdrawal requirement of 49.6 AF yr using the crop irrigation requirements, irrigated acres, system efficiency, and period of use. Given this information, the certificated amount of 40 AF appears reasonable to transfer.

Landsat Evaluation

Review of aerial photographs between 2001 and 2008 suggested that there may have been a period of non-use of the water right. Landsat imagery was evaluated In order to identify if there was a five-year period of non-use between 2002 when the property was purchased through 2008 when the water right was reported to be last used by the owner.

Landsat satellites used for gathering data on land surface reflectance have been in place since 1972. The satellites are equipped with an array of sensors that scans the ground as the satellite passes over a point and records the amount of reflected energy in certain wavelength bands. These bands are then combined to make a color image. For example, one sensor only sees in the red wavelength, one sees only green, and another sees only blue. These are combined to make a color image that we interpret as "true color." The benefit is that the sensors can record both visible and infrared components of the spectrum. Each pixel in the Landsat imagery is a 30 by 30 meter square (approximately 100 by 100 feet). The Landsat bands are summarized in the following table:

Band	Wavelength (μm)	Portion of spectrum	Use
1	0.45-0.52	Blue	blue, suspended sediments
2	0.52-0.60	Green	green, vegetation
3	0.63-0.69	Red	red, chlorophyll absorption
4	0.76-0.90	Near Infrared	water/land interface, vegetation
5	1.55-1.75	Mid Infrared	vegetation, soil moisture
6^	10.40-12.50	Thermal Infrared	surface temperature, geology
7*	2.08-2.35	Mid infrared	vegetation moisture, soils, geology, burns

^ Band six is not included in the 6 layer .img Landsat file
*This is layer 6 is the .img Landsat files

Varying combinations of the bands provide information on photosynthesizing vegetation, variations in vegetation types and moisture content, and plant health.

Review of Landsat images over the period 2002 through 2008 suggests that irrigation use may have been limited in certain years (e.g. 2002 through 2004 and 2006) but there was good evidence of water use in 2005, 2007, and 2008, demonstrating recent use of the water right.

Proposed Use

The proposed use is municipal water supply for the City of Arlington.

- ***Beneficial Use***

  According to RCW 43.27A.020, RCW 90.14.031, and RCW 90.54.020, municipal water supply is considered a beneficial use.

- ***Water Demand***

  The City's average and peak day demands are forecast to increase (RH2 2010). The 2010 Water System Plan (RH2 2010) identified source capacity deficiencies at the Haller Wellfield. Transfer of this water right to the Haller Wellfield will help the City meet current and projected future demands and increase the reliability of their water supply.

- *Development Schedule*

  The City's water system is fully developed and undergoes periodic upgrades and maintenance as needed to maintain a safe, reliable supply of water.

Other Rights Appurtenant to the Place of Use

The City of Arlington holds four water right certificates and one water right claim for its sources of municipal supply. The City's existing rights are summarized in the following table:

Water Right Tracking #	Certificate #	Priority Date	Qi (cert)	Qi Additive	Qi Non-Additive	Qa (cert)	Qa Additive	Qa Non-Additive	Source
G1-*07495C	GWC 5170	2/12/1965	200	200		320	320		Airport Well
G1-*07494C	GWC 5169	2/12/1965	1,700		1,700	1,344		1,344	Haller Wellfield
S1-*01194C	SWC 194	10/10/1924	2,244.15	2,244.15		3,619.84	3,619.84		Haller Wellfield
G1-24900C		9/17/1986	380	380		386		376	Airport Well
G1-300889CLA		1931	135	135		72.18	72.18		Haller Wellfield
Totals			**4,659.15**	**2,959.15**	**1,700**	**5,742.02**	**4,012.02**	**1,720**	

Note: provided by Doug Wood, Ecology NWRO.

The Haller Wellfield includes three wells (Wells 1, 2, and 3). The instantaneous pumping capacity of each well is 570 gpm, for an instantaneous wellfield capacity of 1,710 gpm. The instantaneous capacity of the water treatment plant is also 1,710 gpm.

Site Visit

A site visit was made on January 11, 2011, to the existing points of withdrawal and diversion and the proposed points of withdrawal. The site visit was made by Michael Klisch (Golder), Doug Wood (Ecology), and Mike Wolanek (City of Arlington). The existing point of withdrawal for CG1-*02115C is a 36-inch diameter concrete-cased well. Based on information on the well log, the well was drilled in 1952 and is 25 feet deep. At the time of drilling (October 1952) the depth to water was 11 feet below top of casing. The well log noted a pumping rate of 94 gpm with two feet of drawdown using a 5 hp electric motor. The depth to water at the time of the site visit was estimated to be about 10 feet below the top of the casing.

At the time of the site visit, there was no electrical service to the well, and there was no pump installed. Evidence of irrigation equipment was observed near the well, including irrigation pipe, a cannon-type sprinkler, and couplings and connectors. Similar equipment was documented in the West Water Report (West Water Research 2010). The gasoline-powered centrifugal pump used for irrigation was located in another portion of the farm. The pump was damaged during flooding in January 2009. The pump information indicates the pump was a 5-hp centrifugal pump with a capacity of 6,960 gallons per hour (116 gpm). The pump was rated for a total head of 187 feet and a maximum suction head of 26 feet.

Hydrologic/Hydrogeologic Evaluation

The hydrogeology of the Arlington area has been described in Newcomb (1953), Thomas and others (1997), and Pacific Groundwater Group (2007). The City of Arlington is located at the confluence of the North and South Forks of the Stillaguamish River (WRIA 5). Thomas and others (2007) delineated the hydrogeologic units in the vicinity of Arlington. The geologic units are summarized in the following table:

Epoch	Hydrogeologic Unit	Typical Thickness (feet)	Maximum Thickness (feet)	Lithology	Hydrogeology
Holocene	Bog/Peat/Marsh Deposits	3	10	Peat, organic-rich mud	Thin and discontinuous, not an aquifer or aquitard
	Alluvium	40	120	Fluvial and beach deposits of fine to coarse sand with lenses of silt and gravel	Unconfined aquifer
Pleistocene	Recessional Outwash	40	250	Sand and gravel, grades to silt	Unconfined aquifer or perched groundwater
	Till	70	250	Compact unsorted sand and gravel in silt and clay matrix	Aquitard with occasional thin confined aquifers
	Advance Outwash	120	350	Fine sand, grades to gravel or silt	Unconfined to confined aquifer
	Transitional Beds	100	400	Sand to silty clay	Aquitard with occasional thin confined aquifers
	Undifferentiated Sediments	500	1,000	Glacial drift and interglacial deposits of sand and gravel with some silt	Confined aquifer and aquitards
Eocene	Bedrock	Unknown	Unknown	Varying sedimentary and volcanic lithologies	Small amounts of confined water in fractures, with some potential for porous flow in sandstone units

Note: Modified from Thomas and others (2007), Table 3.

The City's Haller Wellfield is located immediately downstream of the confluence of the North and South Forks of the Stillaguamish River, about 50 feet south of the main stem Stillaguamish River. The Haller Well Field includes three shallow wells completed in the unconfined alluvial aquifer adjacent to the main stem Stillaguamish River at depths ranging from 34 to 36 feet below ground surface. The unconfined alluvial aquifer is present in the valleys of the North and South Forks of the Stillaguamish and the main stem Stillaguamish River. The existing point of withdrawal well is also a shallow well completed to a depth of 25 feet below ground in unconfined alluvial materials adjacent to the main stem Stillaguamish River.

The Haller Well Field area is underlain by unconsolidated alluvial sand and gravel. The depth to the underlying Tertiary bedrock is uncertain. Bedrock was interpreted by Pacific Groundwater Group (2007) to be at a depth of about 40 feet below ground in the wellfield area. However, it is possible that alluvial materials include large boulders, such as glacial erratics, that due to the difficult drilling conditions, may have been misinterpreted as "bedrock" at the time of drilling as the wells were not advanced beyond the "bedrock" (Mike Wolanek, City of Arlington, personal communication 2011). The alluvial aquifer is moderately to highly permeable, with hydraulic conductivities ranging from about 3.6 to 3,200 ft/d, and a median hydraulic conductivity of 88 ft/d (Thomas and others 2007).

Pumping tests in the Haller Well Field show that the alluvial aquifer is in direct hydraulic continuity with the main stem and South Fork Stillaguamish River (WWR 2010), and the wellfield is considered to be groundwater under the direct influence of surface water by the Washington Department of Health.

Minimum instream flows for WRIA 5 were established in 2005 under WAC 173-505-050 for the main stem Stillaguamish River and tributaries. The following table summarizes instream flow requirements for the main stem Stillaguamish River from the mouth at Port Susan to the confluence of the North and South Forks. The control point for this reach of the river is Ecology gaging station #05A070 at River Mile 11.2 (near Silvana).

Month	Day	Instream flow (cfs)
January	1-31	2,200
February	1-29	2,000
March	1-15	2,000
	16-31	2,000
April	1-30	2,000
May	1-31	2,000
June	1-15	2,000
	15-30	2,000
July	1-15	2,000
	15-31	2,000
August	1-15	1,700
	15-31	1,700
September	1-15	1,700
	15-30	1,700
October	1-15	1,700
	15-31	1,700
November	1-15	2,200
	15-30	2,200
December	1-31	2,200

Under WAC 173-505-070, the main stem Stillaguamish River from the mouth to the confluence of the North and South Forks at River Mile 17.8 has water available above instream flow requirements over the period October 16 to June 30. Because the water right proposed for transfer has a priority date of September 4, 1951, it is senior to the instream flow regulations during the irrigation season (the prior approved period of use) and is therefore not subject to interruption during this time (April 16 to September 30). Outside of the irrigation season, during the additional period of use approved by this report, the water right is subject to interruption when instream flows are not met.

Impairment Considerations

The existing point of withdrawal and the wells in the Haller Wellfield are completed in a highly-permeable alluvial aquifer that is in direct hydraulic communication with the main stem Stillaguamish River. There will be no impairment to the main stem Stillaguamish River minimum instream flow by moving the point of withdrawal of a water right utilizing the same source that is senior to the minimum flow established in WAC 173-505-070, provided that the water right is subject to instream flows outside of the irrigation season. The Haller Wellfield wells have been in operation for many years indicting water is physically available. There have been no reports of interference to other wells or water right holders since the wells have been in operation. Testing completed by Pacific Groundwater Group in 2002 in Well 1R (referenced in the Report of Examination for CG1-300889CL(A)@1) showed there was about 6.5 feet of drawdown in Well 1R when the well was pumped at 570 gpm over a 4-hour period, with rapid recovery to pre-test levels following pump shutdown. Approximately 9 inches of drawdown were observed in Well 1, located about 25 feet from Well 1R, confirming little drawdown is expected outside the immediate wellfield area.

A search of the well log database indicted that there were 11 wells on file within about 0.5 miles of the Haller Wellfield. Other wells may be present that do not have logs filed with Ecology. With the exception of one well which is completed in bedrock (McMahan) all of the wells are completed in the alluvial aquifer. No impairment to these wells is expected based on the observed drawdown during the 2002 testing, the high aquifer transmissivity, and the good hydraulic connection to the river.

Well Owner	Well Depth (feet bgs)	Date Completed	Completion Aquifer	Location
ASSOCIATED SAND & GRAVEL	64		Alluvial	T31/R5E-2NWNE
ASSOCIATED SAND AND GRAVEL	26	03/10/69	Alluvial	T31/R5E-2NWNE
C D HAMMER	19		Alluvial	T31/R5E-2NESW
CITY OF ARLINGTON	38	05/08/02	Alluvial	T31/R5E-2SENW
CITY OF ARLINGTON	36		Alluvial	T31/R5E-2SENW
CITY OF ARLINGTON	36		Alluvial	T31/R5E-2SENW
DENNIS DEARINGER	74	08/12/98	Alluvial	T31/R5E-2NENW
HENRY MILLER	40	04/10/99	Alluvial	T31/R5E-2SENW
LEE FLATO	37	08/09/91	Alluvial	T31/R5E-2SWSW
LYNN GRANSTROM	50	09/16/02	Alluvial	T31/R5E-2NESE
MIKE HANLOCK	30	04/03/81	Alluvial	T31/R5E-2SWNE
PETE VECHL	38	07/12/00	Alluvial	T31/R5E-2SENW
TOM MC MAHAN	211	06/25/92	Bedrock	T31/R5E-2NWSE

The Water Rights Application Tracking System database was queried to located water rights and claims within a 0.5 mile radius of the Haller Wellfield. Twelve water right claims for groundwater, one surface water certificate, and two groundwater certificates are within 0.5 miles of the subject application for change (excluding rights held by the City of Arlington). At least one groundwater certificate and one groundwater claim can be tied to available well logs. Some of the well logs may be associated with water rights or claims filed under a different name or are exempt from the application process. No impairment to these rights is expected based on the observed drawdown during the 2002 testing, the high aquifer transmissivity, and the good hydraulic connection to the river.

File Number	Certificate Number	Person	Document Type	Priority Date	Purpose of Use	Qi	Unit of Measure	Qa	Location	Source
G1-153724CL		MILLER HENRY C	Claim S		NR		GPM		T31N/R5E-	
G1-135771CL		VAN SLAGEREN TOM	Claim L		ST,DG		GPM		T31N/R5E-	WELL
G1-124942CL		LEWIS ORWILL P	Claim S		IR,DG		GPM		T31N/R5E-	
G1-123457CL		WILSON MARVIN W	Claim L		ST,IR		GPM		T31N/R5E-	WELL
G1-119434CL		VALLEY GEM FARMS	Claim L		ST,DG		GPM		T31N/R5E-	WELL
G1-111124CL		HAMMER CURTIS D	Claim S		ST,DG		GPM		T31N/R5E-	
G1-093046CL		GROENDYK JOHN	Claim S		IR,DG		GPM		T31N/R5E-	
G1-091257CL		RICKARD JOHN C	Claim S		IR,DG		GPM		T31N/R5E-	
G1-050157CL		KROEZE JOHN	Claim S		DG		GPM		T31N/R5E-	WELL
G1-035541CL		DESPRES CLARA M	Claim L		DG		GPM		T31N/R5E-	WELL
G1-035723CL		BREEKVELDT BERT	Claim S		DG		GPM		T31N/R5E-	
G1-025841CL		KLEIN PAUL	Claim L		DG		GPM		T31N/R5E-	
S1-008945CL		SOPER FRANCES M. M.	Claim L		DG		CFS		T31N/R5E-	
S1-*11473AWC	06447A	KROEZE J	Cert	6/23/1952	IR	0.32	CFS		T31N/R5E-	UNNAMED SLOUGH
S1-*01194C	194	Puget Sound Power & Light Co	Cert	10/10/1924	DM	5	CFS		T31N/R5E-SE/NW	STILLAGUAMISH RIVER
G1-*09495C	6379	Associated Sand & Gravel Co Inc	Cert	6/4/1968	CI	150	GPM	36	T31N/R5E-	WELL
G1-*07494C	5169	Arlington City	Cert	2/12/1965	MU	1700	GPM	1344	T31N/R5E-	WELL
G1-*02442C	2968	HAMMER C D	Cert	4/9/1952	IR	156	GPM	30	T31N/R5E-	WELL
CG1-*02115C	1488	Arlington City	ChgApp	3/23/2010	MU	90	GPM	34.67	T31N/R5E-SE/NW	WELL 1
CS1-*18929C	10024	Arlington City	ChgApp	4/7/2010	MU	0.6	GPM		T31N/R5E-SE/NW	Haller well field
CS1-*10680C	5983	Arlington City	ChgApp	4/7/2010	MU	0.25	GPM		T31N/R5E-SE/NW	Haller well field

Enlargement

No enlargement will result from approval of this change. The City of Arlington is receiving a transferred quantity based on a tentative determination of extent and validity. Only water that was previously put to beneficial use is transferred, and only that amount is authorized to be withdrawn (by this authorization) from the wells in the Haller Wellfield.

Public Interest Considerations

Factors considered for evaluating whether the proposed change is in the public interest included but were not limited to: potential impacts to exempt wells, existing water rights, permits, and claims holders, other water right change applications, potential impact to groundwater

and surface water resources, and beneficial use of the resource. No detriment to the public interest was identified during the investigation of the subject application. The available information shows other wells in the area are not expected to be impaired by the anticipated

CONCLUSIONS

In accordance with state law, the following considerations were addressed as part of the process of evaluating this change request:

- The potential for enlargement of the original right,
- The potential for impairment of other rights,
- Consideration of the public interest and welfare,
- Physical availability of water,
- Whether the new point of withdrawal would tap the same body of public groundwater as the original well, and
- Protests or Letters of Concern

Potential for Enlargement

The annual quantity and maximum instantaneous quantity will not be enlarged by this change.

Impairment of Other Rights

No impairment of other rights is expected because the alluvial aquifer is highly permeable with a direct hydraulic connection with the main stem and South Fork of the Stillaguamish River. Interference drawdown from pumping the Haller Wellfield in areas outside the immediate wellfield is expected to be negligible. There are no reports of impairment by other groundwater or surface water users since the wellfield has been in operation. The existing point of withdrawal and the Haller Wellfield are in the same body of groundwater in direct communication with the main stem Stillaguamish River. Because the water right proposed for transfer has a priority date of September 4, 1951, it is senior to the instream flow regulations during the irrigation season, and is therefore not subject to interruption when flows are not met. Outside of the irrigation season, the water right is subject to instream flows for the expanded period of use. No impairment to instream flows is expected from approval of this water right.

Public Interest

No detriment to the public interest was identified during the investigation of this application for change. Municipal water supply is a beneficial use under RCW 43.27A.020, RCW 90.14.031, and RCW 90.54.020.

Availability of Water

Availability of water from the source was determined when the original permit was issued. Physical availability of water from the Haller Wellfield has been established through operation of the field for more than 100 years with no reports during that time of decreased water availability.

Same Body of Groundwater

The existing and proposed points of withdrawals are both in the alluvial aquifer which is in direct continuity with the main stem of the Stillaguamish River.

Protests or Letters of Concern

Public notice of the proposed application for change was published on July 21, 2010 and July 28, 2010 in the Everett Herald. No protests were received.

RECOMMENDATIONS

Based on the above investigation and conclusions, I recommend that the request for change to Certificate 1488-A (G1-02115C) be authorized, in the amounts and within the limitations listed below and subject to the provisions beginning on Page 2, et seq.

Purpose of Use and Authorized Quantities

The amount of water recommended is a maximum limit and the water user may only use that amount of water within the specified limit that is reasonable and beneficial.

90 gpm, 40 acre-ft/yr for municipal water supply.

Point of Withdrawal

SE¼, NW¼, Section 2, Township 31 North, Range 5 East W.M.

Place of Use

As described on Page 1 of this Report of Examination.

State of Washington
Hydrogeologist
1100
Licensed Geologist
Carl M. Einberger

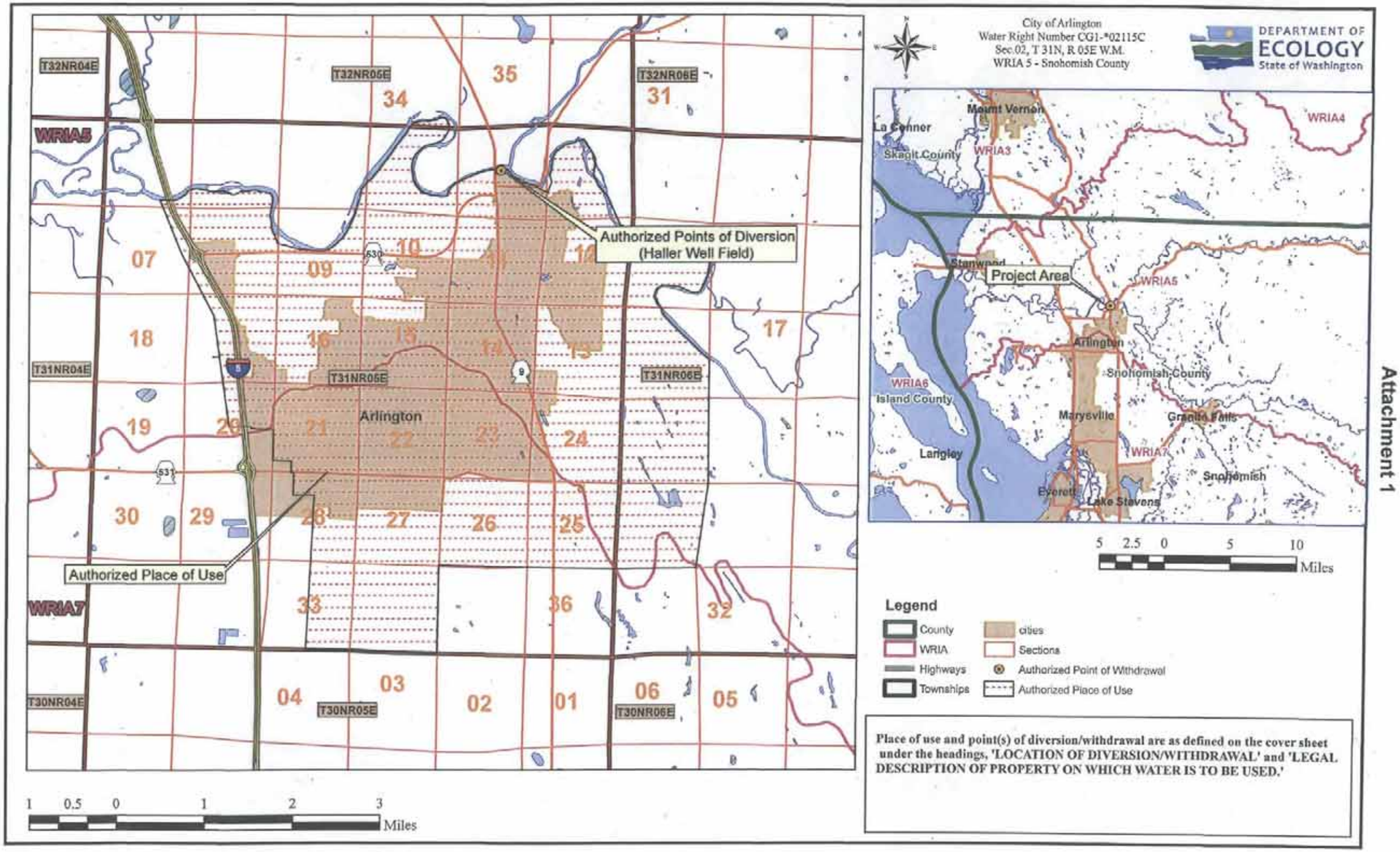
exp. 10/22/12

REPORT BY _____ DATE March 27, 2012

Carl Einberger, L.Hg.
Senior Consultant, Water Resources
Golder Associates Inc.

REVIEWED BY Douglas H. Wood DATE April 3, 2012

Douglas H. Wood, LHG
Water Resources
Department of Ecology



Attachment 1

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

REPORT OF EXAMINATION
*Change Application CS1-*10680C*
To Surface Water Certificate 5983

PRIORITY DATE	CLAIM NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
August 30, 1951			*5983*

NAME
City of Arlington

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
154 Cox Avenue	Arlington	WA	98223

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
Three wells in the City of Arlington Haller Wellfield
TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	112	49.09

QUANTITY, TYPE OF USE, PERIOD OF USE

Municipal Water Supply

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION--WITHDRAWAL

Haller Wellfield: 2,900 feet north and 2,770 feet west from the SE Corner of Section 2, T.31N., R.5E., W.M.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
SE 1/4 NW 1/4	2	31N.	5E.	5	Snohomish
PARCEL NUMBER	LATITUDE		LONGITUDE	DATUM	
31050300101000	48.2029 N		122.1284 W	NAD83	

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

[Attachment 1 shows location of the authorized place of use and point(s) of diversion or withdrawal]

Area served by the City of Arlington as described within the most recently approved Water System Plan

DESCRIPTION OF PROPOSED WORKS

The City of Arlington's water system consists of three wells in the Haller Wellfield (Wells 1, 2, and 3), the Airport Well, water treatment and disinfection facilities, distribution system piping, pumps, and meters. The system has been constructed and is in use.

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Completed (infrastructure in place)	*N/A*	*N/A*

PROVISIONS

This change authorization is issued subject to all applicable State laws and regulations and to the following provisions:

1. The quantities transferrable through this change are an instantaneous quantity (Qi) of 112 gpm and an annual quantity (Qa) of 49.09 AF/yr, approved for continuous withdrawal without added restrictions.

2. All wells constructed in the state shall meet the "Minimum Standards for the Construction and Maintenance of Wells" (WAC 173-160) and "Water Well Construction" (RCW 18.104). In general, wells shall be located at least 100 feet from sources of contamination and at least 1,000 feet of the boundary of a solid waste landfill. Any well which is unusable, abandoned, or is an environmental, safety, or public health hazard shall be decommissioned.

3. All wells shall be tagged with a Department of Ecology unique well identification number. If you have an existing well and it does not have a tag, please contact the well-drilling coordinator at the regional Department of Ecology office issuing this decision. This tag shall remain attached to the well. If you are required to submit water measuring reports, reference this tag number.

4. Required installation and maintenance of an access port as described in WAC 173-160- 291(3).

5. An approved measuring device shall be installed and maintained for each diversion/withdrawal of the sources identified by this water right in accordance with the rule "Requirements for Measuring and Reporting Water Use", Chapter 173-173 WAC.

   Water use data shall be recorded weekly. The maximum monthly instantaneous rate of diversion/withdrawal and the monthly total volume shall be submitted to Ecology by January 31st of the following year. Ecology is requiring submittal of monthly meter readings to collect seasonal information for water resource planning, management and compliance.

   The following information shall be included with each submittal of water use data: owner, contact name if different, mailing address, daytime phone number, Permit/Certificate/Claim No., source name, volume including units, Department of Health WFI water system number and source number(s) (for public drinking water systems), and well tag number (for ground water withdrawals). In the future, Ecology may require additional parameters to be reported or more frequent reporting. Ecology prefers web based data entry, but does accept hard copies. Ecology will provide forms and electronic data entry information.

   Chapter 173-173 WAC describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition Ecology for modifications to some of the requirements. Installation, operation and maintenance requirements are enclosed as a document entitled "Water Measurement Device Installation and Operation Requirements".

   Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the project location, and to inspect at reasonable times, records of water use, wells, diversions, measuring devices and associated distribution systems for compliance with water law.

6. This decision may indicate a Real Estate Excise Tax liability for the seller of water rights. The Department of Revenue has requested notification of potentially taxable water right related actions, and therefore will be given notice of this decision, including document copies. Please contact the state Department of Revenue to obtain specific requirements for your project. Phone: (360) 570-3265. The mailing address is: Department of Revenue, Real Estate Excise Tax, PO Box 47477, Olympia WA 98504-7477 Internet: http://dor.wa.gov/ E-mail: REETSP@DOR.WA.GOV.

7. If the criteria in RCW 90.03.386(2) are not met and a Water System Plan/Small Water System Management Program was approved after September 9, 2003, the place of use of this water right reverts to the service area described in that document. If the criteria in RCW 90.03.386(2) are not met and no Water System Plan/Small Water System Management Program has been approved after September 9, 2003, the place of use reverts to the last place of use described by The Department of Ecology in a water right authorization.

8. Prior to any new construction or alterations of a public water supply system, the State Board of Health rules require public water supply owners to obtain written approval from the Office of Drinking Water of the Washington State Department of Health. Please contact the Office of Drinking Water at Northwest Drinking Water Operations, 20435 72nd Avenue S, Suite 200, K17-12, Kent, WA 98032-2358, (253) 396-6750, prior to beginning (or modifying) your project.

9. The water right holder is required to maintain efficient water delivery systems and use of up to date water conservation practices consistent with RCW 90.03.005.

10. A superseding certificate shall be issued upon a showing that sufficient infrastructure is in place at the new point of withdrawal to accommodate the additional Qi and Qa that results from this decision.

FINDINGS OF FACT AND DECISION

Upon reviewing the investigator's report, I find all facts, relevant and material to the subject application, have been thoroughly investigated. Furthermore, I find the change of water right as recommended will not be detrimental to existing rights or the public welfare.

Therefore, I ORDER the requested change under Change Application No. CS1-*10680C be approved, subject to existing rights and the provisions specified above.

You have a right to appeal this decision to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of this decision. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal you must do the following within 30 days of the date of receipt of this decision:

- File your appeal and a copy of this decision with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.

- Serve a copy of your appeal and this decision on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503 Pollution Control Hearings Board 1111 Israel Road SW Suite 301 Tumwater, WA 98501	Department of Ecology Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608 Pollution Control Hearings Board PO Box 40903 Olympia, WA 98504-0903

For additional information visit the Environmental Hearings Office Website: http://www.eho.wa.gov . To find laws and agency rules visit the Washington State Legislature Website: http://www1.leg.wa.gov/CodeReviser .

Signed at Bellevue, Washington, this 4th day of April, 2012.

Jacqueline King, Section Manager
Water Resources Program
Northwest Regional Office

BACKGROUND

The City of Arlington (City) submitted change application CS1-*10680C for Certificate 5983 on April 7, 2010. The City entered into a cost reimbursement agreement with the Department of Ecology to process this application for change along with two other applications for change. This report of examination was prepared by Golder Associates Inc. through Ecology's Cost-Reimbursement Program.

The City also submitted two applications for change along with this application for change:

- Application for change CS1-18929C (Certificate 10024) seeks to transfer 269 gpm (0.60 cfs) and 125 AF/year from an irrigation and stockwatering right to the City for the purpose of municipal water supply
- Application for change CG1-02115C (Certificate 1488) seeks to transfer 90 gpm and 34.67 AF/year from an irrigation right to the City for the purpose of municipal water supply

These two change applications are being processed concurrently with this application.

Description and Purpose of Requested Change

The City purchased an irrigation water right and proposes to transfer the water to the City's existing points of withdrawal at the Haller Wellfield for the purpose of year round municipal water supply within the City's water service area.

Attributes of the Certificate and Proposed Change

Attributes of the Original Certificate

Owner Name	City of Arlington
Name on Certificate:	J. Floyd Sill
Priority Date:	August 30, 1951
Instantaneous Quantity:	0.25 cubic feet per second (cfs)
Annual Quantity:	Not Specified
Point of Withdrawal:	Gov. Lots 5 and 10 within Section 2, Township 31 North, Range 5 East
Purpose of Use:	Irrigation of 25 acres
Period of Use:	Not Specified
Place of Use:	BEGINNING at a point 990 feet East of Southwest corner of Lot 5, then North to river bank; thence southerly along said bank to point West of point of beginning; thence east to Point of Beginning, Sec. 1, Twp. 31 N, Rge. 5 E.W.M. BEGINNING at Southwest corner of Sec. 1, Twp. 31 N, Rge. 5 E.W.M., thence north 2°51'10" east along West line of section 1337.37 feet to point of beginning; thence North 79°26' east 344.74 feet; thence north 58°32'East 227.8 feet; thence North 22°30' West 63.4 feet; thence North 59°33'30" East 392.2 feet; thence South 86°10'30" West 490 feet more or less to East Line of Lot 10; thence North to Northeast corner of said Lot 10; thence West to Stillaguamish River; thence Southerly along said river to West line of section; thence south to the point of beginning, less county road.

Proposed Change

Name of Applicant:	City of Arlington
Date of Application for Change:	April 7, 2010
Points of Withdrawal:	SE¼ NW¼ of Section 2, Township 31 North, Range 5 East (Haller Wellfield)
Proposed Instantaneous Quantity:	112 gallons per minute (gpm)
Proposed Annual Quantity:	50 AF/yr
Purpose of Use:	Municipal Water Supply
Period of Use:	Continuously
Place of Use:	Area served by the City of Arlington as described within the most recently approved Water System Plan
Notice of Publication:	The Everett Herald, July 21, 2010 and July 28, 2010
Protests:	None

Legal Requirements for Proposed Change

- **Water Resources Statues and Case Law**

This application is subject to legal requirements in statute, administrative rules, and relevant case law which must be considered prior to issuance of the requested change(s). Among these legal requirements:

- The Washington State Supreme County has held that Ecology, when processing an application for a change to a water right, is required to make a tentative determination of extent and validity of the claim or right. This is necessary to establish whether the claim or right is eligible for change. *R.D. Merrill v. PCHB* and *Okanogan Wilderness League v. Town of Twisp*.
- RCW 90.03.380(1) allows for a water right that has been put to beneficial use to be changed. The point of diversion, place of use, and purpose of use may be changed if the change would not result in harm or injury to existing water rights.
- RCW 90.14.160 states that any person entitled to divert water through an appropriation authorized through a general adjudication, who abandons or voluntarily fails, without sufficient cause, to divert all or any part of said

right for a period of five successive years after July 1, 1967, shall relinquish such right or portion thereof, to the state.

- A point of diversion for a surface water right may be changed to a groundwater point of withdrawal. The authority is derived from RCW 90.03.380, RCW 90.44.020-030, RCW 90.44.100 and RCW 90.54.020(9). RCW 90.03.380(1) states that a water right that has been put to beneficial use may be changed if it would not result in detriment or injury to other water rights. Additionally, moving the point of diversion to a groundwater withdrawal requires compliance with the groundwater code (RCW 90.44), including a finding that there be no detriment to the public welfare and that the source of the existing diversion and the proposed point of withdrawal be part of the same water body.

- **Public Notice**

  Public notice of the proposed application for change was published on July 21, 2010 and July 28, 2010 in the Everett Herald. No protests were received.

- **State Environmental Policy Act (SEPA)**

  This application is exempt from the provisions of the State Environmental Policy Act (SEPA), Chapter 43.21 RCW, due to the fact that the cumulative quantity of water constitutes a withdrawal of less than 2,250 gallons per minute (gpm) of groundwater (WAC 197-11-800(4)).

INVESTIGATION

In considering this application, the investigation included, but was not limited to, research and/or review of:

- Ecology's online Water Rights Tracking System (WRTS) database
- Records of water rights in the vicinity
- Ecology's online Well Log Database
- Topographic and local area maps
- Site visit
- LANDSAT and aerial photographic images of the area for the month of July in years 2001 through 2009, inclusive
- Letter of February 1, 2010 from Lawrence A. Costich, of Schwabe, Williamson, and Wyatt to Henry and Betty Graafstra , regarding availability of water rights, file number 118547/158668
- Available regional geologic and hydrogeological information including:

  - Falk, Dean E., 2010, Fresh Water Needs for Dairy Farms, Idaho Association of Soil Conservation Districts. http://oneplan.org/Stock%5CDairyWater.asp

  - Golder Associates, 2007, Phase I Summary Technical Memorandum: City of Arlington Water Right Application G1-26641. Prepared for the Washington State Department of Ecology.

  - Golder Associates, 2011, Phase 1 Summary Technical Memorandum: City of Arlington Water Right Applications CS1-10681C, CS1-18929C, and CG1-02115C. Prepared for the Washington State Department of Ecology.. February 1.

  - Pacific Groundwater Group, January 2007. City of Arlington Hydrogeologic Conceptual Model Summary Report, prepared for the City of Arlington.

  - Newcomb, R.C., 1952, Ground-Water Resources of Snohomish County, Washington, U.S. Geological Survey Water-Supply Paper 1135.

  - RH2 Engineering Inc., 2010, City of Arlington Draft Comprehensive Water System Plan, November.

  - Thomas, B.E., J.M. Wilkinson and S.S. Embrey, 1997. The Ground-Water System and Ground-Water Quality in Western Snohomish County, Washington. USGS Water Resources Investigations Report 96-4312.

  - USDA-ARS Washington Irrigation Guide, Appendix B. 1992. Available online at http://www.wa.nrcs.usda.gov/technical/ENG/irrigation_guide/index.html.

Tentative Evaluation of Extent and Validity of the Water Right Proposed for Change

The perfected quantity of the right is the maximum amount that has historically been applied to beneficial use under the right.
The history of water use is documented in an affidavit included in the 2010 Schwabe, Williamson, and Wyatt (2010) letter. Certificate 5983 (the subject of this change application) and the land appurtenant to it were purchased by Henry Graafstra in 1959. Graafstra purchased Certificate 10024 (the subject of a concurrent change application) and the appurtenant land in the 1970's. The two certificates were used to operate a dairy farm from 1959 until 2006.

Review of materials provided by the City for these two water rights indicates that there have been several de facto changes to the point of diversion, place of use, and purpose of use since the water rights were certificated. The dairy owner indicates he implemented these changes through his farm plan in response to regulations requiring him to comply with the Clean Water Act (Schwabe, Williamson, and Wyatt 2010). The water rights continued to be associated with agricultural use while the dairy farm was operational. The de facto changes include:

- The original point of diversion for Certificate 5983 was within Government Lots 5 and 10, Section 1, T31N/R5E. The original point of diversion for Certificate 10024 was within Government Lot 7, Section 1, T31N/R5E. The point of

diversion was changed to a point of withdrawal (a well) in Government Lots 5 or 10, Section 1, T31N/R5E, sometime in the 1970s.

- The two water right certificates are appurtenant to 85 acres of land, 25 acres for Certificate 5983 and 60 acres for Certificate 10024. Water was also used for irrigation of adjacent leased lands.
- Certificate 5983 is for 0.25 cfs for irrigation of 25 acres. Certificate 10024 is for 0.58 cfs and 120 AF/yr for irrigation of 60 acres (over the irrigation season) and 0.02 cfs and 5 AF over the entire year for stock watering. The total Qa under both rights is 175 AF/yr, with 5 AF/yr for stock watering and 170 AF for irrigation.

  Information provided by the City (Schwabe, Williamson, and Wyatt 2010) indicates that the purpose of use has changed from that originally stated on the certificates at some time after 1985 when the manure lagoon was constructed:

  - Irrigation: 93.25 AF/yr for irrigation (81.25 AF/yr for grass silage and 12 AF/yr for corn) of 85 acres owned and 17.87 AF/yr for acres leased to grow row crops for cattle feed. The total irrigation diversion was estimated to be 111.12 AF/yr. The 17.87 AF/yr estimated for use on off-site leased land was used on leased lands an only a partial source of water to those acres, and actual quantities of use have not been well established. However, based on pumping records discussed below, this amount of estimated use appears to be reasonable.
  - Stock watering: 52.81 AF
  - Domestic Use, Dairy, and Animal Operations: 19.83 AF/yr including 1.09 AF for domestic use, 1.12 AF for animal operations, 17.62 AF for milk and ice cream production.
- The total water use claimed is 183.76 AF/yr, slightly more than the combined total of 175 AF/yr requested by this change application and the companion application for certificate 10024.

According to Graafstra's affidavit, the irrigated acreage included 65 acres of grass pasture land, and 18 acres of corn silage land. Using the Washington State Irrigation Guide for Everett, about 14.89 inches (1.25 feet) of water are needed annually for pasture/turf. Thus the water required for the irrigation of 65 acres of pasture is about 81.25 AF. The irrigation requirement for field corn is 0.67 feet of water. For 18 acres of corn, 12 AF are required for annual irrigation.

Graafstra estimated stockwatering use to be 100 gallons per day per milk cow and 16 gallons per day to water dry cows and heifers, for a total of 52.81 AF/yr. The 100 gallons per day was based on stockwatering in five Arizona dairies and likely overestimates water requirements for dairy cows in western Washington. Based on information for Idaho summarized by Falk (2010), approximately 50 gallons per milk cow and 16 gallons per day per dry cows and heifers may be more representative for the Arlington area. With consideration to both Graafstra's estimates and Falk (2010), an average value of 75 gallons per day has been used in this analysis for milk cows. Graafstra's affidavit indicates that 450 milk cows on average were tended, resulting in an estimated use of 37.81 AF/yr. An additional 45 dry cows, 30 springing heifers, and 95 yearly heifers were tended, with associated water use estimated to be 3.05 AF/yr. The estimate of 19.83 AF/yr of water use for milk and ice cream production, animal operation, and domestic use appear to be reasonable.

The Schwabe, Williamson, and Wyatt (2010) letter included attachments documenting electrical consumption and water use. The flow meter and electric meter on the pump were read weekly for about one month in the late spring of 2006. Over this period, approximately 1,077,992 gallons were pumped using 245 KWH of electricity. Thus, about 4,400 gallons are pumped per KWH:

Date	Flow Meter (gallons)	Gallons	Electric Meter Total (KWH)	KWH	Gallons/KWH
5/16/2006	3,367,666		29,466		
5/24/2006	3,762,550	394,884	29,544	78	5,063
6/1/2006	4,027,555	265,005	29,609	65	4,077
6/7/2006	4,217,917	190,362	29,656	47	4,050
6/13/2006	4,445,658	227,741	29,711	55	4,141
Total	-	**1,077,992**	-	**245**	**4,400**

The last five years of operation of the water right were 2001 to 2006. A new electric meter was installed on the power feed to the pump on May 3, 2004 to replace a faulty meter that appeared to under-record the electrical consumption at the well. Therefore, water use information is only available for part of 2004, all of 2005, and part of 2006. From May 3, 2004 through October 6, 2006, the meter recorded 30,897 KWH of electricity used based on meter readings made approximately every two months. Using the gallons/KWH factor calculated above of 4,400 gallons/KWH, this suggests about 136 million gallons were pumped over that period (886 days or 2.43 years). This is equivalent to approximately 175 AF/yr pumped under this right and Certificate 10024. Certificate 10024 is for 125 AF/yr, and this application requests 50 AF/yr which appears reasonable based on the pumping records.

The total estimate for all beneficial water use for water pumped under this right and Certificate 10024 based on Ecology's analysis is 171.81 AF/yr (111.12 AF/yr for irrigation, 40.86 AF/yr for stock watering, and 19.83 AF/yr for domestic use, dairy, and animal operations). Of this amount, 111.12 AF/yr is interruptible as the irrigation season portion of the transfer, and 60.69 AF/yr is not interruptible as the year-round portion of the transfer previously used for stock watering and other year-round farm operations. Proration of the amount of this water attributable to this change application (Certificate 5983) yields a transferable quantity to the City of Arlington of 49.09 AF/yr. All of this water will be transferred to the City as non-interruptible for this portion of the transfer. The remainder of the non-interruptible quantity, 11.6 AF/yr, along with all of the 111.12 AF/yr interruptible quantity, will be transferred under the Certificate 10024 change application Report of Examination.

Proposed Use

The proposed use is municipal water supply for the City of Arlington.

- ***Beneficial Use***

According to RCW 43.27A.020, RCW 90.14.031, and RCW 90.54.020, municipal water supply is considered a beneficial use.

- ***Water Demand***

  The City's average and peak day demands are forecast to increase (RH2 2010). The 2010 Water System Plan (RH2 2010) identified source capacity deficiencies at the Haller Wellfield. Transfer of this water right to the Haller Wellfield will help the City meet current and projected future demands and increase the reliability of their water supply.

- ***Development Schedule***

  The City's water system is fully developed and undergoes periodic upgrades and maintenance as needed to maintain a safe, reliable supply of water.

Other Rights Appurtenant to the Place of Use

The City of Arlington holds four water right certificates and one water right claim for its sources of municipal supply. The City's existing rights are summarized in the following table:

Water Right Tracking #	Certificate #	Priority Date	Qi (cert)	Qi Additive	Qi Non-Additive	Qa (cert)	Qa Additive	Qa Non-Additive	Ecology Source
G1-*07495C	GWC 5170	2/12/1965	200	200		320	320		Airport Well
G1-*07494C	GWC 5169	2/12/1965	1,700		1,700	1,344		1,344	Haller Wellfield
S1-*01194C	SWC 194	10/10/1924	2,244.15	2,244.15		3,619.84	3,619.84		Haller Wellfield
G1-24900C		9/17/1986	380	380		386		376	Airport Well
G1-300889CLA		1931	135	135		72.18	72.18		Haller Wellfield
Totals			**4,659.15**	**2,959.15**	**1,700**	**5,742.02**	**4,012.02**	**1,720**	

Note: provided by Doug Wood, Ecology NWRO

The Haller Wellfield includes three wells (Wells 1, 2, and 3). The instantaneous pumping capacity of each well is 570 gpm, for an instantaneous wellfield capacity of 1,710 gpm. The instantaneous capacity of the water treatment plant is also 1,710 gpm.

Site Visit

A site visit was made on January 11, 2011 to the existing points of withdrawal and diversion and the proposed points of withdrawal by Michael Klisch (Golder), Doug Wood (Ecology), and Mike Wolanek (City of Arlington). The original point of diversion associated with this right was the South Fork of the Stillaguamish River. Suction lines were placed into the river at the points of diversion to supply the wheel line irrigation system. Sometime in the 1970's, the property owner installed a well to replace this surface water diversion and the diversion associated with Certificate 18929C and discontinued use of the diversions. The original diversions were not visible. Both the original and current points of diversion and withdrawal, respectively, are upstream of the proposed point of withdrawal.

The well is a dug well that is completed with 60-inch-diameter concrete casing. The depth of the well is 22 feet below ground. There is no well log on file for the well. The well was previously equipped with two pumps which have been removed. One pump fed the early irrigation system which consisted of distribution pipe and hand lines across the floodplain. The second pump fed the uphill dairy system, from which some water subsequently drained to the manure lagoon. The lagoon doubled as an irrigation reservoir beginning with its construction in about 1983. There is electrical service to a pole near the well location.

There was no evidence of former irrigation equipment in the field except for the 6-inch line from the well, which was partially exposed adjacent to the well. In the former dairy area, a former water treatment building was partially standing. The building included several pressure tanks and other tanks for chlorination. Most of the piping for the system had been removed.

Hydrologic/Hydrogeologic Evaluation

The hydrogeology of the Arlington area has been described in Newcomb (1953), Thomas and others (1997), and Pacific Groundwater Group (2007). The City of Arlington is located at the confluence of the North and South Forks of the Stillaguamish River (WRIA 5). Thomas and others (2007) delineated the hydrogeologic units in the vicinity of Arlington. The geologic units are summarized in the following table:

Epoch	Hydrogeologic Unit	Typical Thickness (feet)	Maximum Thickness (feet)	Lithology	Hydrogeology
Holocene	Bog/Peat/Marsh Deposits	3	10	Peat, organic-rich mud	Thin and discontinuous, not an aquifer or aquitard
	Alluvium	40	120	Fluvial and beach deposits of fine to coarse sand with lenses of silt and gravel	Unconfined aquifer
Pleistocene	Recessional Outwash	40	250	Sand and gravel, grades to silt	Unconfined aquifer or perched groundwater
	Till	70	250	Compact unsorted sand and gravel in silt and clay matrix	Aquitard with occasional thin confined aquifers

Epoch	Hydrogeologic Unit	Typical Thickness (feet)	Maximum Thickness (feet)	Lithology	Hydrogeology
	Advance Outwash	120	350	Fine sand, grades to gravel or silt	Unconfined to confined aquifer
	Transitional Beds	100	400	Sand to silty clay	Aquitard with occasional thin confined aquifers
	Undifferentiated Sediments	500	1,000	Glacial drift and interglacial deposits of sand and gravel with some silt	Confined aquifer and aquitards
Eocene	Bedrock	Unknown	Unknown	Varying sedimentary and volcanic lithologies	Small amounts of confined water in fractures, with some potential for porous flow in sandstone units

Note:
Modified from Thomas and others (2007), Table 3.

The City's Haller Wellfield is located immediately downstream of the confluence of the North and South Forks of the Stillaguamish River, about 50 feet south of the main stem Stillaguamish River. The Haller Well Field includes shallow three wells completed in the unconfined alluvial aquifer adjacent to the main stem Stillaguamish River at depths ranging from 34 to 36 feet below ground surface. The unconfined alluvial aquifer is present in the valleys of the North and South Forks of the Stillaguamish and the main stem Stillaguamish River. The existing point of withdrawal well is also a shallow well completed to a depth of 22 feet below ground in unconfined alluvial materials adjacent to the South Fork Stillaguamish River.

The Haller Well Field area is underlain by unconsolidated alluvial sand and gravel. The depth to the underlying Tertiary bedrock is uncertain. Bedrock was interpreted by Pacific Groundwater Group (2007) to be at a depth of about 40 feet below ground in the wellfield area. However, it is possible that alluvial materials include large boulders that, such as glacial erratic, that due to the difficult drilling conditions, may have been misinterpreted as "bedrock" at the time of drilling as the wells were not advanced beyond the "bedrock" (Mike Wolanek, City of Arlington, personal communication 2011). The alluvial aquifer is moderately to highly permeable, with hydraulic conductivities ranging from about 3.6 to 3,200 ft/d, and a median hydraulic conductivity of 88 ft/d (Thomas and others 2007).

Pumping tests in the Haller Well Field show that the alluvial aquifer is in direct hydraulic continuity with the main stem and South Fork Stillaguamish River (WWR 2010), and the wellfield is considered to be groundwater under the direct influence of surface water by the Washington Department of Health.

Minimum instream flows for WRIA 5 were established in 2005 under WAC 173-505-050 for the main stem Stillaguamish River and tributaries. The following table summarizes instream flow requirements for the main stem Stillaguamish River from the mouth at Port Susan to the confluence of the North and South Forks. The control point for this reach of the river is Ecology gaging station #05A070 at River Mile 11.2 (near Silvana).

Month	Day	Instream flow (cfs)
January	1-31	2,200
February	1-29	2,000
March	1-15	2,000
	16-31	2,000
April	1-30	2,000
May	1-31	2,000
June	1-15	2,000
	15-30	2,000
July	1-15	2,000
	15-31	2,000
August	1-15	1,700
	15-31	1,700
September	1-15	1,700
	15-30	1,700
October	1-15	1,700
	15-31	1,700
November	1-15	2,200
	15-30	2,200
December	1-31	2,200

Under WAC 173-505-070, the main stem Stillaguamish River from the mouth to the confluence of the North and South Forks at River Mile 17.8 has water available above instream flow requirements over the period October 16 to June 30. Under WAC 1173-505-100, the total consumptive withdrawals from the existing and future water rights in the Stillaguamish River basin during open periods shall not exceed a total of 300 cubic feet per second (cfs) as measured at Ecology station #05A070 at river mile (RM) 11.2 (WAC 173-505-100(2)). Of that 300 cfs, the maximum allocation that may be taken from the South Fork of the Stillaguamish River from RM 17.9 (confluence with the North Fork) to RM 34.9 is 150 cfs during open period from November 1 to June 15 as measured at Ecology station #05B090. Ecology also reserved one cfs of water for future stockwatering (WAC 173-505-080) and five cfs at River Mile 11.2 for future permit-exempt groundwater use (WAC 173-505-090). The five cfs reservation includes a maximum of two cfs from the North Fork Stillaguamish River (River Mile 6.5) and 1.5 cfs from the South Fork Stillaguamish River (River Mile 6.5). Because the water right

proposed for transfer has a priority date of September 4, 1951, it is senior to the instream flow regulations and is therefore not subject to interruption.

Impairment Considerations

The wells in the Haller Wellfield are completed in a highly permeable unconfined alluvial aquifer that is in direct hydraulic communication with the main stem Stillaguamish River. There will be no impairment to the main stem Stillaguamish River minimum instream flow by moving the point of withdrawal of a water right utilizing the same source that is senior to the minimum flow established in WAC 173-505-070.

The Haller Wellfield wells have been in operation for many years indicating that water is physically available. There have been no reports of interference to other wells or water right holders since the wells have been in operation. Testing completed by Pacific Groundwater Group in 2002 in Well 1R (referenced in the Report of Examination for CG1-300889CL(A)@1) showed there was about 6.5 feet of drawdown in Well 1R when the well was pumped at 570 gpm over a 4-hour period, with rapid recovery to pre-test levels following pump shutdown. Approximately 9 inches of drawdown were observed at the end of the test in Well 1, located about 25 feet from Well 1R, confirming little drawdown is expected outside the immediate wellfield area.

A search of the well log database indicted that there were 11 wells on file within about 0.5 miles of the Haller Wellfield. Other wells may be present that do not have logs filed with Ecology. With the exception of one well which is completed in bedrock (McMahan) all of the wells are completed in the alluvial aquifer. No impairment to these wells is expected based on the observed drawdown during the 2002 testing, the high aquifer transmissivity, and the good hydraulic connection to the river.

Well Owner	Well Depth (feet bgs)	Date Completed	Completion Aquifer	Location
ASSOCIATED SAND & GRAVEL	64		Alluvial	T31/R5E-2NWNE
ASSOCIATED SAND AND GRAVEL	26	03/10/69	Alluvial	T31/R5E-2NWNE
C D HAMMER	19		Alluvial	T31/R5E-2NESW
CITY OF ARLINGTON	38	05/08/02	Alluvial	T31/R5E-2SENW
CITY OF ARLINGTON	36		Alluvial	T31/R5E-2SENW
CITY OF ARLINGTON	36		Alluvial	T31/R5E-2SENW
DENNIS DEARINGER	74	08/12/98	Alluvial	T31/R5E-2NENW
HENRY MILLER	40	04/10/99	Alluvial	T31/R5E-2SENW
LEE FLATO	37	08/09/91	Alluvial	T31/R5E-2SWSW
LYNN GRANSTROM	50	09/16/02	Alluvial	T31/R5E-2NESE
MIKE HANLOCK	30	04/03/81	Alluvial	T31/R5E-2SWNE
PETE VECHL	38	07/12/00	Alluvial	T31/R5E-2SENW
TOM MC MAHAN	211	06/25/92	Bedrock	T31/R5E-2NWSE

The Water Rights Application Tracking System database was queried to located water rights and claims within a 0.5 mile radius of the Haller Wellfield. Twelve water right claims for groundwater, one surface water certificate, and two groundwater certificates are within 0.5 miles of the subject application for change (excluding rights held by the City of Arlington). At least one groundwater certificate and one groundwater claim can be tied to available well logs. Some of the well logs may be associated with water rights or claims filed under a different name or are exempt from the application process. No impairment to these rights is expected based on the observed drawdown during the 2002 testing, the high aquifer transmissivity, and the good hydraulic connection to the river.

File Number	Certificate Number	Person	Document Type	Priority Date	Purpose of Use	Qi	Unit of Measure	Qa	Location	Source
G1-153724CL		MILLER HENRY C	Claim S		NR		GPM		T31N/R5E-	
G1-135771CL		VAN SLAGEREN TOM	Claim L		ST,DG		GPM		T31N/R5E-	WELL
G1-124942CL		LEWIS ORWILL P	Claim S		IR,DG		GPM		T31N/R5E-	
G1-123457CL		WILSON MARVIN W	Claim L		ST,IR		GPM		T31N/R5E-	WELL
G1-119434CL		VALLEY GEM FARMS	Claim L		ST,DG		GPM		T31N/R5E-	WELL
G1-111124CL		HAMMER CURTIS D	Claim S		ST,DG		GPM		T31N/R5E-	
G1-093046CL		GROENDYK JOHN	Claim S		IR,DG		GPM		T31N/R5E-	
G1-091257CL		RICKARD JOHN C	Claim S		IR,DG		GPM		T31N/R5E-	
G1-050157CL		KROEZE JOHN	Claim S		DG		GPM		T31N/R5E-	WELL
G1-035541CL		DESPRES CLARA M	Claim L		DG		GPM		T31N/R5E-	WELL
G1-035723CL		BREEKVELDT BERT	Claim S		DG		GPM		T31N/R5E-	
G1-025841CL		KLEIN PAUL	Claim L		DG		GPM		T31N/R5E-	
S1-008945CL		SOPER FRANCES M. M.	Claim L		DG		CFS		T31N/R5E-	
S1-*11473AWC	06447A	KROEZE J	Cert	6/23/1952	IR	0.32	CFS		T31N/R5E-	UNNAMED SLOUGH
S1-*01194C	194	Puget Sound Power &	Cert	10/10/1924	DM	5	CFS		T31N/R5E-	STILLAGUA

File Number	Certificate Number	Person	Document Type	Priority Date	Purpose of Use	Qi	Unit of Measure	Qa	Location	Source
		Light Co							SE/NW	MISH RIVER
G1-*09495C	6379	Associated Sand & Gravel Co Inc	Cert	6/4/1968	CI	150	GPM	36	T31N/R5E-	WELL
G1-*07494C	5169	Arlington City	Cert	2/12/1965	MU	1700	GPM	1344	T31N/R5E-	WELL
G1-*02442C	2968	HAMMER C D	Cert	4/9/1952	IR	156	GPM	30	T31N/R5E-	WELL
CG1-*02115C	1488	Arlington City	ChgApp	3/23/2010	MU	90	GPM	34.67	T31N/R5E-SE/NW	WELL 1
CS1-*18929C	10024	Arlington City	ChgApp	4/7/2010	MU	0.6	GPM		T31N/R5E-SE/NW	Haller well field
CS1-*10680C	5983	Arlington City	ChgApp	4/7/2010	MU	0.25	GPM		T31N/R5E-SE/NW	Haller well field

Because the proposed change will move the point of withdrawal downstream, there is a net benefit to flows in the main stem and South Fork Stillaguamish River between the proposed and existing points of withdrawal.

Enlargement

No enlargement will result from approval of this change. The City of Arlington is receiving a transferred quantity based on a tentative determination of extent and validity. Only water that was previously put to beneficial use is transferred, and only that amount is authorized to be withdrawn (by this authorization) from the wells in the Haller Wellfield.

Public Interest Considerations

Factors considered for evaluating whether the proposed change is in the public interest included but were not limited to: potential impacts to exempt wells, existing water rights, permits, and claims holders, other water right change applications, potential impact to groundwater and surface water resources, and beneficial use of the resource. No detriment to the public interest was identified during the investigation of the subject application. The available information show other wells in the area are not expected to be impaired by the proposed change, and the proposed change will provide a net benefit to flows in the main stem and South Fork Stillaguamish River between the proposed and existing points of withdrawal.

CONCLUSIONS

In accordance with state law, the following considerations were addressed as part of the process of evaluating this change request:

- The potential for enlargement of the original right,
- The potential for impairment of other rights,
- Consideration of the public interest and welfare,
- Physical availability of water,
- Whether the new point of withdrawal would tap the same body of public groundwater as the original well, and
- Protests or Letters of Concern.

Potential for Enlargement

The annual quantity and maximum instantaneous quantity will not be enlarged by this change.

Impairment of Other Rights

No impairment of other rights is expected because the alluvial aquifer is highly permeable with a direct hydraulic connection with the main stem and South Fork of the Stillaguamish River. Interference drawdown from pumping the Haller Wellfield in areas outside the immediate wellfield is expected to be negligible. There are no reports of impairment by other groundwater or surface water users since the wellfield has been in operation. Review of materials provided by the City indicated that a de facto change to the original point of diversion was made by the dairy owner sometime in the 1970s to address requirements of the Clean Water Act. The dairy owner indicates he implemented these changes through his farm plan in response to regulations requiring him to comply with the Clean Water Act (Schwabe, Williamson, and Wyatt 2010). The point of diversion was changed to a nearby point of withdrawal (a well). The existing point of withdrawal and the Haller Wellfield are in the same body of groundwater in direct communication with the main stem and South Fork of the Stillaguamish River. Because the water right proposed for transfer has a priority date of August 30, 1951, it is senior to the instream flow regulations adopted in 2005 and is therefore not subject to interruption when flows are not met. No impairment to instream flows are expected from approval of this water right.

Public Interest

No detriment to the public interest was identified during the investigation of this application for change. Municipal water supply is a beneficial use under RCW 43.27A.020, RCW 90.14.031, and RCW 90.54.020.

Availability of Water

Availability of water from the source was determined when the original permit was issued. Physical availability of water from the Haller Wellfield has been established through operation of the field for over 100 years with no reports during that time of decreased water availability.

Same Body of Groundwater

The existing and proposed points of withdrawals are both in the alluvial aquifer which is in direct continuity with the main stem and South Fork Stillaguamish River.

Protests or Letters of Concern

Public notice of the proposed application for change was published on July 21, 2010 and July 28, 2010 in the Everett Herald. No protests were received.

RECOMMENDATIONS

Based on the above investigation and conclusions, I recommend that the request for change to Certificate 5983 be authorized, in the amounts and within the limitations listed below and subject to the provisions beginning on Page 2, et seq.

Purpose of Use and Authorized Quantities

The amount of water recommended is a maximum limit and the water user may only use that amount of water within the specified limit that is reasonable and beneficial.

112 gpm, 49.09 acre-ft/yr for municipal water supply. The combined transferable quality for Certificates 5983 and 10024 shall not exceed 171.81 AF.

Point of Withdrawal

SE¼, NW¼, Section 2, Township 31 North, Range 5 East W.M.

Place of Use

As described on Page 1 of this Report of Examination.

REPORT BY _____ DATE March 27, 2012

Carl Einberger, L.Hg.
Senior Consultant, Water Resources
Golder Associates Inc.

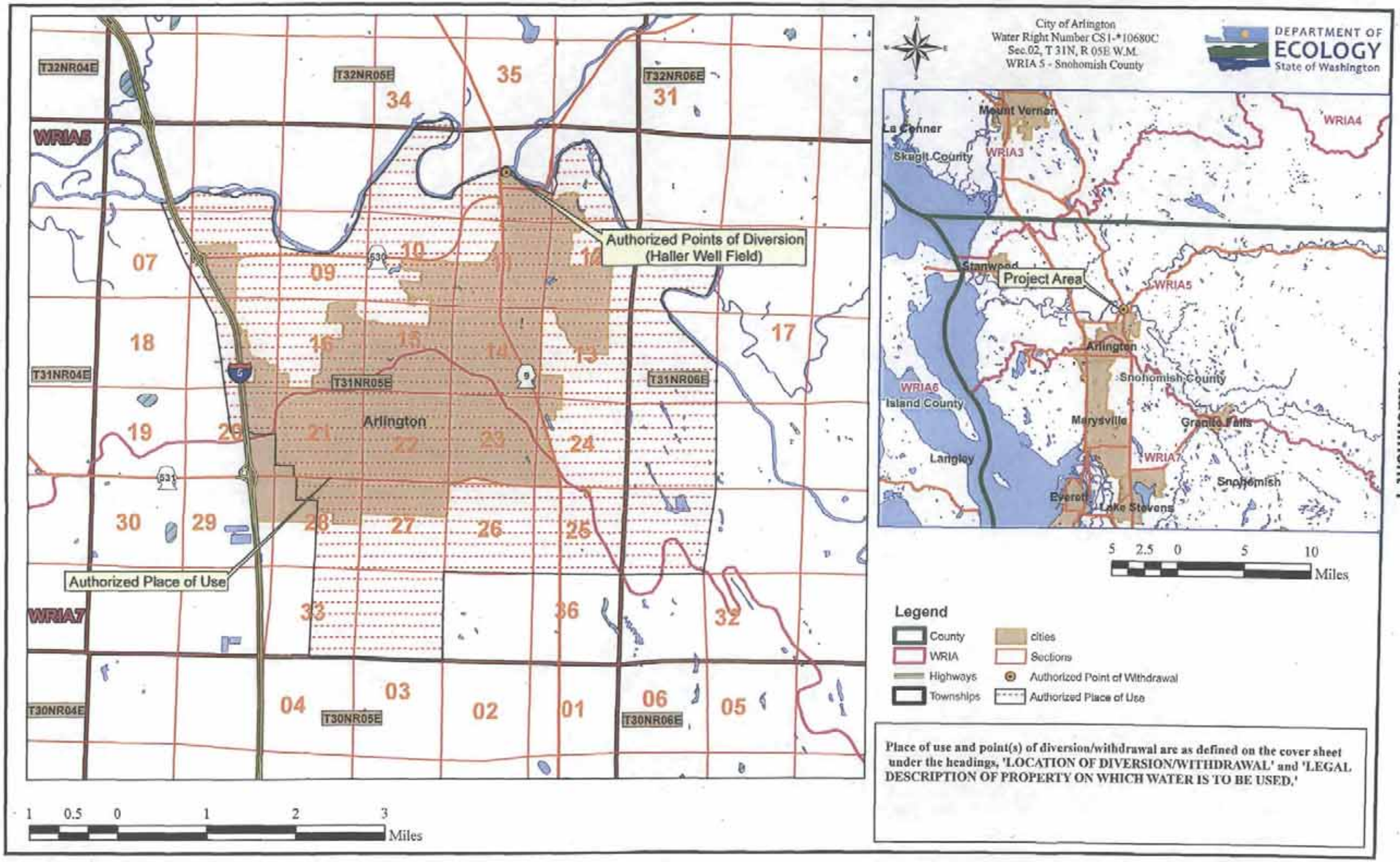
State of Washington
Hydrogeologist
1100
Licensed Geologist
Carl M. Einberger

exp. 10/22/12

REVIEWED BY _____ DATE April 3, 2012

Douglas H. Wood, LHG
Water Resources
Department of Ecology

State of Washington
Hydrogeologist
952
Licensed Geologist
DOUGLAS H. WOOD



Attachment 1

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

REPORT OF EXAMINATION
*Change Application CS1-*18929C*
To Surface Water Certificate 10024

PRIORITY DATE	CLAIM NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
March 29, 1965			*10024*

NAME
City of Arlington

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
154 Cox Avenue	Arlington	WA	98223

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
Three wells in the City of Arlington Haller Wellfield
TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	*269**	122.72*

QUANTITY, TYPE OF USE, PERIOD OF USE

Municipal Water Supply
* *244 gpm and 111.12 AF/yr*
  - *Continuously April 16 to September 30*
  - *Interruptible October 1 to April 15 subject to meeting minimum instream flows established under WAC 173-505-040*
* *25 gpm and 11.6 AF/yr*
  - *Continuously all year*

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION–WITHDRAWAL

Haller Wellfield: 2,900 feet north and 2,770 feet west from the SE Corner of Section 2, T.31N., R.5E., W.M.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP	RANGE, (E OR W.) W.M.	W.R.I.A.	COUNTY
SE 1/4 NW 1/4	2	31N.	5E.	5	Snohomish
PARCEL NUMBER	LATITUDE		LONGITUDE	DATUM	
31050300101000	48.2029 N		122.1284 W	NAD83	

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

[Attachment 1 shows location of the authorized place of use and point(s) of diversion or withdrawal]

Area served by the City of Arlington as described within the most recently approved Water System Plan

DESCRIPTION OF PROPOSED WORKS

The City of Arlington's water system consists of three wells in the Haller Wellfield (Wells 1, 2, and 3), the Airport Well, water treatment and disinfection facilities, distribution system piping, pumps, and meters. The system has been constructed and is in use.

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE	COMPLETE PROJECT BY THIS DATE	WATER PUT TO FULL USE BY THIS DATE
Completed (infrastructure in place)	*N/A*	*N/A*

PROVISIONS

This change authorization is issued subject to all applicable State laws and regulations and to the following provisions:

1. The quantities transferrable through this change are an instantaneous quantity of 269 gpm and an annual quantity of 122.72 AF/yr.
   a. 100.95 AF/yr, which was perfected for irrigation use and limited to the irrigation season shall be subject to minimum instream flows during the non-irrigation season (October 1 to April 15), as established for the Mainstem of the Stillaguamish River as provided in Table 2 under WAC 173-505-050.
      i. This quantity shall be attached to a pumping capacity of 244 gpm
   b. 11.6 AF/yr which was perfected for other uses not restricted to the irrigation season are approved for continuous withdrawal without added restrictions
      i. This continuous quantity shall be attached to a pumping capacity of 25 gpm

2. All wells constructed in the state shall meet the "Minimum Standards for the Construction and Maintenance of Wells" (WAC 173-160) and "Water Well Construction" (RCW 18.104). In general, wells shall be located at least 100 feet from sources of contamination and at least 1,000 feet of the boundary of a solid waste landfill. Any well which is unusable, abandoned, or is an environmental, safety, or public health hazard shall be decommissioned.

3. All wells shall be tagged with a Department of Ecology unique well identification number. If you have an existing well and it does not have a tag, please contact the well-drilling coordinator at the regional Department of Ecology office issuing this decision. This tag shall remain attached to the well. If you are required to submit water measuring reports, reference this tag number.

4. Required installation and maintenance of an access port as described in WAC 173-160-291(3).

5. An approved measuring device shall be installed and maintained for each diversion/withdrawal of the sources identified by this water right in accordance with the rule "Requirements for Measuring and Reporting Water Use", Chapter 173-173 WAC.

   Water use data shall be recorded weekly. The maximum monthly instantaneous rate of diversion/withdrawal and the monthly total volume shall be submitted to Ecology by January 31st of the following year. Ecology is requiring submittal of monthly meter readings to collect seasonal information for water resource planning, management and compliance.

   The following information shall be included with each submittal of water use data: owner, contact name if different, mailing address, daytime phone number, Permit/Certificate/Claim No., source name, volume including units, Department of Health WFI water system number and source number(s) (for public drinking water systems), and well tag number (for ground water withdrawals). In the future, Ecology may require additional parameters to be reported or more frequent reporting. Ecology prefers web based data entry, but does accept hard copies. Ecology will provide forms and electronic data entry information.

   Chapter 173-173 WAC describes the requirements for data accuracy, device installation and operation, and information reporting. It also allows a water user to petition Ecology for modifications to some of the requirements. Installation, operation and maintenance requirements are enclosed as a document entitled "Water Measurement Device Installation and Operation Requirements".

   Department of Ecology personnel, upon presentation of proper credentials, shall have access at reasonable times, to the project location, and to inspect at reasonable times, records of water use, wells, diversions, measuring devices and associated distribution systems for compliance with water law.

6. This decision may indicate a Real Estate Excise Tax liability for the seller of water rights. The Department of Revenue has requested notification of potentially taxable water right related actions, and therefore will be given notice of this decision, including document copies. Please contact the state Department of Revenue to obtain specific requirements for your project. Phone: (360) 570-3265. The mailing address is: Department of Revenue, Real Estate Excise Tax, PO Box 47477, Olympia WA 98504-7477 Internet: http://dor.wa.gov/ E-mail: REETSP@DOR.WA.GOV.

7. If the criteria in RCW 90.03.386(2) are not met and a Water System Plan/Small Water System Management Program was approved after September 9, 2003, the place of use of this water right reverts to the service area described in that document. If the criteria in RCW 90.03.386(2) are not met and no Water System Plan/Small Water System Management Program has been approved after September 9, 2003, the place of use reverts to the last place of use described by The Department of Ecology in a water right authorization.

8. Prior to any new construction or alterations of a public water supply system, the State Board of Health rules require public water supply owners to obtain written approval from the Office of Drinking Water of the Washington State Department of Health. Please contact the Office of Drinking Water at Northwest Drinking Water Operations, 20435 72nd Avenue S, Suite 200, K17-12, Kent, WA 98032-2358, (253) 396-6750, prior to beginning (or modifying) your project.

9. The water right holder is required to maintain efficient water delivery systems and use of up to date water conservation practices consistent with RCW 90.03.005.

10. A superseding certificate shall be issued upon a showing that sufficient infrastructure is in place at the new point of withdrawal to accommodate the additional Qi and Qa that results from this decision.

FINDINGS OF FACT AND DECISION

Upon reviewing the investigator's report, I find all facts, relevant and material to the subject application, have been thoroughly investigated. Furthermore, I find the change of water right as recommended will not be detrimental to existing rights or the public welfare.

Therefore, I ORDER the requested change under Change Application No. CS1-*10680C be approved, subject to existing rights and the provisions specified above.

You have a right to appeal this decision to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of this decision. The appeal process is governed by Chapter 43.21B RCW and Chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal you must do the following within 30 days of the date of receipt of this decision:

- File your appeal and a copy of this decision with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this decision on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

You must also comply with other applicable requirements in Chapter 43.21B RCW and Chapter 371-08 WAC.

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503 Pollution Control Hearings Board 1111 Israel Road SW Suite 301 Tumwater, WA 98501	Department of Ecology Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608 Pollution Control Hearings Board PO Box 40903 Olympia, WA 98504-0903

For additional information visit the Environmental Hearings Office Website: http://www.eho.wa.gov . To find laws and agency rules visit the Washington State Legislature Website: http://www1.leg.wa.gov/CodeReviser .

Signed at Bellevue, Washington, this 4th day of April, 2012.

Jacqueline Klug, Section Manager
Water Resources Program
Northwest Regional Office

BACKGROUND

The City of Arlington (City) submitted change application CS1-*18929 for certificate 10024 on April 7, 2010. The City entered into a cost reimbursement agreement with the Department of Ecology to process this application for change along with two other applications for change. This report of examination was prepared by Golder Associates Inc. through Ecology's Cost-Reimbursement Program.

The City also submitted two applications for change along with this application for change:

- Application for change CS1-18929C (Certificate 5983) seeks to transfer 269 gpm (0.60 cfs) and 125 AF/year from an irrigation and stockwatering right to the City for the purpose of municipal water supply
- Application for change CG1-02115C (Certificate 1488) seeks to transfer 90 gpm and 34.67 AF/year from an irrigation right to the City for the purpose of municipal water supply

These two change applications are being processed concurrently with this application

Description and Purpose of Requested Change

The City purchased an irrigation water right and proposes to transfer the water to the City's existing points of withdrawal at the Haller Wellfield for the purpose of year round municipal water supply within the City's water service area.

Attributes of the Certificate and Proposed Change

Attributes of the Original Certificate

Owner Name	City of Arlington
Name on Certificate:	G. Foerester
Priority Date:	March 29, 1965
Instantaneous Quantity:	0.60 cubic feet per second (cfs), 0.58 cfs for irrigation, 0.02 cfs for stockwatering
Annual Quantity:	125 AF (120 AF for irrigation, 5 AF for stockwatering)
Point of Withdrawal:	T31N R5E Sec 1, SW ¼ NW ¼
Purpose of Use:	Irrigation of 60 acres
Period of Use:	Irrigation season for 120 AF, continuous year-round for stockwatering for 5AF
Place of Use:	In Section 1, T.31N. R. 5 E.W.M.: Parcel A: That part of SW ¼ NE ¼ lying westerly of the present course of the South Fork Stillaguamish River ; AND: Parcel B: That part of Government Lots 3 and 7 lying southerly and westerly of the present course of the South Fork Stillaguamish River ; AND: Parcel C: That part of Government Lot 6 lying easterly of a line parallel to, and 990 feet east of, the west line of Sec. 1; AND: Parcel D: That part of Government Lot 8 lying westerly of the present course of the South Fork of the Stillaguamish River; AND: Parcel E: Government Lot 9, EXCEPT tract conveyed to Victor and Clare Wrobleski by deed under Auditor's file N0. 924646. Vol. 437, Page 553, described as follows: Beginning at the intersection of center line of East 5th Street and the easterly line of Plat of Victor Heights, division No. 1 as recorded on page 188, Vol. 12 of Plats; thence north 52° 40' east 487.9 feet; thence south 37° 12' east 15 feet; thence north 80° 28' east 98.4 feet; more or less, to the east line of Government Lot 10, the true point of beginning; thence north 80° 28' east 40 feet; more or less; thence north 8°14' east 380 feet, thence north 79°51' west 32 feet, thence south 50° 00' west 62 feet, more or less, to the east line of Government Lot 10; thence southerly to the true point of beginning; AND EXCEPT tract conveyed to Dale G. and Elizabeth M. Huber by deed under Auditor's File No. 924647, Vol. 637, Page 554, described as follows: beginning at the intersection of center line of East 5th Street and the easterly line of Plat of Victor Heights Division No. 1 as recorded on page 188, Vol. 12 of Plats; thence north 52° 48' east 487.9 feet, thence south 37° 12' east 15 feet thence north 80° 28' east 138.4 feet to true point of beginning; thence north 8° 14' east 380 feet; thence south 79° 41' east to west margin of Sill Slough; thence southerly 805 feet more or less, along west margin of said Sill Slough to a point on a line bearing south 81°46' east from true point of beginning; thence north 81° 46' west to true point of beginning, AND: Parcel F: Accretion lands of that part of the bed of the North Fork Stillaguamish River as defined in the Surveyor General's Report of December 27, 1875 between a line parallel with east 990 feet easterly of the wets line of said Section 1 and the south line of said Government Lot 9.

Proposed Change

Name of Applicant:	City of Arlington
Date of Application for Change:	April 7, 2010
Points of Withdrawal:	SE¼ NW¼ of Section 2, Township 31 North, Range 5 East (Haller Wellfield)
Proposed Instantaneous Quantity:	269 gallons per minute (gpm)
Proposed Annual Quantity:	125 AF/yr
Purpose of Use:	Municipal Water Supply
Period of Use:	Continuously

Place of Use:	Area served by the City of Arlington as described within the most recently approved Water System Plan
Notice of Publication:	The Everett Herald, July 21, 2010 and July 28, 2010
Protests:	None

Legal Requirements for Proposed Change

- **Water Resources Statues and Case Law**

This application is subject to legal requirements in statute, administrative rules, and relevant case law which must be considered prior to issuance of the requested change(s). Among these legal requirements:

- The Washington State Supreme County has held that Ecology, when processing an application for a change to a water right, is required to make a tentative determination of extent and validity of the claim or right. This is necessary to establish whether the claim or right is eligible for change. *R.D. Merrill v. PCHB* and *Okanogan Wilderness League v. Town of Twisp.*
- RCW 90.03.380(1) allows for a water right that has been put to beneficial use to be changed. The point of diversion, place of use, and purpose of use may be changed if the change would not result in harm or injury to existing water rights.
- RCW 90.14.160 states that any person entitled to divert water through an appropriation authorized through a general adjudication, who abandons or voluntarily fails, without sufficient cause, to divert all or any part of said right for a period of five successive years after July 1, 1967, shall relinquish such right or portion thereof, to the state.
- A point of diversion for a surface water right may be changed to a groundwater point of withdrawal. The authority is derived from RCW 90.03.380, RCW 90.44.020-030, RCW 90.44.100 and RCW 90.54.020(9). RCW 90.03.380(1) states that a water right that has been put to beneficial use may be changed if it would not result in detriment or injury to other water rights. Additionally, moving the point of diversion to a groundwater withdrawal requires compliance with the groundwater code (RCW 90.44), including a finding that there be no detriment to the public welfare and that the source of the existing diversion and the proposed point of withdrawal be part of the same water body.

- **Public Notice**

Public notice of the proposed application for change was published on July 21, 2010 and July 28, 2010 in the Everett Herald. No protests were received.

- **State Environmental Policy Act (SEPA)**

This application is exempt from the provisions of the State Environmental Policy Act (SEPA), Chapter 43.21 RCW, due to the fact that the cumulative quantity of water constitutes a withdrawal of less than 2,250 gallons per minute (gpm) of groundwater (WAC 197-11-800(4)).

INVESTIGATION

In considering this application, the investigation included, but was not limited to, research and/or review of:

- Ecology's online Water Rights Tracking System (WRTS) database
- Records of water rights in the vicinity
- Ecology's online Well Log Database
- Topographic and local area maps
- Site visit
- LANDSAT and aerial photographic images of the area for the month of July in years 2001 through 2009, inclusive
- Letter of February 1, 2010 from Lawrence A. Costich, of Schwabe, Williamson, and Wyatt to Henry and Betty Graafstra , regarding availability of water rights, file number 118547/158668
- Available regional geologic and hydrogeological information including:

  - Falk, Dean E., 2010, Fresh Water Needs for Dairy Farms, Idaho Association of Soil Conservation Districts. http://oneplan.org/Stock%5CDairyWater.asp
  - Golder Associates, 2007, Phase I Summary Technical Memorandum: City of Arlington Water Right Application G1-26641. Prepared for the Washington State Department of Ecology.
  - Golder Associates, 2011, Phase I Summary Technical Memorandum: City of Arlington Water Right Applications CS1-10681C, CS1-18929C, and CG1-02115C. Prepared for the Washington State Department of Ecology.. February 1.
  - Pacific Groundwater Group, January 2007. City of Arlington Hydrogeologic Conceptual Model Summary Report, prepared for the City of Arlington.
  - Newcomb, R.C., 1952, Ground-Water Resources of Snohomish County, Washington, U.S. Geological Survey Water-Supply Paper 1135.
  - RH2 Engineering Inc., 2010, City of Arlington Draft Comprehensive Water System Plan, November.
  - Thomas, B.E., J.M. Wilkinson and S.S. Embrey, 1997. The Ground-Water System and Ground-Water Quality in Western Snohomish County, Washington. USGS Water Resources Investigations Report 96-4312.

- USDA-ARS Washington Irrigation Guide, Appendix B. 1992. Available online at http://www.wa.nrcs.usda.gov/technical/ENG/irrigation_guide/index.html.

Tentative Evaluation of Extent and Validity of the Water Right Proposed for Change

The perfected quantity of the right is the maximum amount that has historically been applied to beneficial use under the right. The history of water use is documented in an affidavit included in the 2010 Schwabe, Williamson, and Wyatt (2010) letter. Certificate 10024 (the subject of this change application) and the land appurtenant to it were purchased by Henry Graafstra in the 1970s. Graafstra purchased Certificate 5983 (the subject of a concurrent change application) and the appurtenant land in the 1959. The certificates were used to operate a dairy farm from 1959 until 2006.

Review of materials provided by the City for these two water rights indicates that there have been several de facto changes to the point of diversion, place of use, and purpose of use since the water rights were certificated. The dairy owner indicates he implemented these changes through his farm plan in response to regulations requiring him to comply with the Clean Water Act (Schwabe, Williamson, and Wyatt 2010). The water rights continued to be associated with agricultural use while the dairy farm was operational. The de facto changes include:

- The original point of diversion for Certificate 5983 was within Government Lots 5 and 10, Section 1, T31N/R5E. The original point of diversion for Certificate 10024 was within Government Lot 7, Section 1, T31N/R5E. The point of diversion was changed to a point of withdrawal (a well) in Government Lots 5 or 10, Section 1, T31N/R5E, sometime in the 1970s.
- The two water right certificates are appurtenant to 85 acres of land, 25 acres for Certificate 5983 and 60 acres for Certificate 10024. Water was also used for irrigation of adjacent leased lands.
- Certificate 5983 is for 0.25 cfs for irrigation of 25 acres. Certificate 10024 is for 0.58 cfs and 120 AF/yr for irrigation of 60 acres (over the irrigation season) and 0.02 cfs and 5 AF over the entire year for stock watering. The total Qa under both rights is 175 AF/yr, with 5 AF/yr for stock watering and 170 AF for irrigation

  Information provided by the City (Schwabe, Williamson, and Wyatt 2010) indicates that the purpose of use has changed from that originally stated on the certificates at some time after 1985 when the manure lagoon was constructed:

  - Irrigation: 93.25 AF/yr for irrigation (81.25 AF/yr for grass silage and 12 AF/yr for corn) of 85 acres owned and 17.87 AF/yr for acres leased to grow row crops for cattle feed. The total irrigation diversion was estimated to be 111.12 AF/yr. The 17.87 AF/yr estimated for use on off-site leased land was used on leased lands an only a partial source of water to those acres, and actual quantities of use have not been well established. However, based on pumping records discussed below, this amount of estimated use appears to be reasonable.
  - Stock watering: 52.81 AF
  - Domestic Use, Dairy, and Animal Operations: 19.83 AF/yr including 1.09 AF for domestic use, 1.12 AF for animal operations, 17.62 AF for milk and ice cream production.
- The total water use claimed is 183.76 AF/yr, slightly more than the combined total of 175 AF/yr requested by this change application and the companion application for certificate 5983.

According to Graafstra's affidavit, the irrigated acreage included 65 acres of grass pasture land, and 18 acres of corn silage land. Using the Washington State Irrigation Guide for Everett, about 14.89 inches (1.25 feet) of water are needed annually for pasture/turf. Thus the water required for the irrigation of 65 acres of pasture is about 81.25 AF. The irrigation requirement for field corn is 0.67 feet of water. For 18 acres of corn, 12 AF are required for annual irrigation.

Graafstra estimated stockwatering use to be 100 gallons per day per milk cow and 16 gallons per day to water dry cows and heifers, for a total of 52.81 AF/yr. The 100 gallons per day was based on stockwatering in five Arizona dairies and likely overestimates water requirements for dairy cows in western Washington. Based on information for Idaho summarized by Falk (2010), approximately 50 gallons per milk cow and 16 gallons per day per dry cows and heifers may be more representative for the Arlington area. With consideration to both Graafstra's estimates and Falk (2010), an average value of 75 gallons per day has been used in this analysis for milk cows. Graafstra's affidavit indicates that 450 milk cows on average were tended, resulting in an estimated use of 37.81 AF/yr. An additional 45 dry cows, 30 springing heifers, and 95 yearly heifers were tended, with associated water use estimated to be 3.05 AF/yr. The estimate of 19.83 AF/yr of water use for milk and ice cream production, animal operation, and domestic use appear to be reasonable.

The Schwabe, Williamson, and Wyatt (2010) letter included attachments documenting electrical consumption and water use. The flowmeter and electric meter on the pump were read weekly for about one month in the late spring of 2006. Over this period, approximately 1,077,992 gallons were pumped using 245 KWH of electricity. Thus, about 4,400 gallons are pumped per KWH:

Date	Flow Meter (gallons)	Gallons	Electric Meter Total (KWH)	KWH	Gallons/KWH
5/16/2006	3,367,666		29,466		
5/24/2006	3,762,550	394,884	29,544	78	5,063
6/1/2006	4,027,555	265,005	29,609	65	4,077
6/7/2006	4,217,917	190,362	29,656	47	4,050
6/13/2006	4,445,658	227,741	29,711	55	4,141
Total	-	**1,077,992**	-	**245**	**4,400**

The last five years of operation of the water right were 2001 to 2006. A new electric meter was installed on the power feed to the pump on May 3, 2004 to replace a faulty meter that appeared to under-record the electrical consumption at the well. Therefore, water use information is

only available for part of 2004, all of 2005, and part of 2006. From May 3, 2004 through October 6, 2006, the meter recorded 30,897 KWH of electricity used based on meter readings made approximately every two months. Using the gallons/KWH factor calculated above of 4,400 gallons/KWH, this suggests about 136 million gallons were pumped over that period (886 days or 2.43 years). This is equivalent to approximately 175 AF/yr pumped under this right and Certificate 10024. Certificate 10024 is for 125 AF/yr, and this application requests 50 AF/yr which appears reasonable based on the pumping records.

The total estimate for all beneficial water use for water pumped under this right and Certificate 5983 based on Ecology's analysis is 171.81 AF/yr (111.12 AF/yr for irrigation, 40.86 AF/yr for stock watering, and 19.83 AF/yr for domestic use, dairy, and animal operations). Of this amount, 111.12 AF/yr is interruptible as the irrigation season portion of the transfer, and 60.69 AF/yr is not interruptible as the year-round portion of the transfer previously used for stock watering and other year-round farm operations. Proration of the amount of this water attributable to this change application (Certificate 10024) yields a transferable quantity to the City of Arlington of 122.72 AF/yr. All of the interruptible portion of the combined transfers (111.12 AF/yr) will be applied to this transfer under Certificate 10024, along with 11.6 AF/yr of the non-interruptible quantity for the combined transfers. The remainder of the non-interruptible quantity, 49.09 AF/yr, will be transferred under the Certificate 5983 change application Report of Examination.

Proposed Use

The proposed use is municipal water supply for the City of Arlington.

- ***Beneficial Use***

  According to RCW 43.27A.020, RCW 90.14.031, and RCW 90.54.020, municipal water supply is considered a beneficial use.

- ***Water Demand***

  The City's average and peak day demands are forecast to increase (RH2 2010). The 2010 Water System Plan (RH2 2010) identified source capacity deficiencies at the Haller Wellfield. Transfer of this water right to the Haller Wellfield will help the City meet current and projected future demands and increase the reliability of their water supply.

- ***Development Schedule***

  The City's water system is fully developed and undergoes periodic upgrades and maintenance as needed to maintain a safe, reliable supply of water.

Other Rights Appurtenant to the Place of Use

The City of Arlington holds four water right certificates and one water right claim for its sources of municipal supply. The City's existing rights are summarized in the following table:

Water Right Tracking #	Certificate #	Priority Date	Qi (cert)	Qi Additive	Qi Non-Additive	Qa (cert)	Qa Additive	Qa Non-Additive	Ecology Source
G1-*07495C	GWC 5170	2/12/1965	200	200		320	320		Airport Well
G1-*07494C	GWC 5169	2/12/1965	1,700		1,700	1,344		1,344	Haller Wellfield
S1-*01194C	SWC 194	10/10/1924	2,244.15	2,244.15		3,619.84	3,619.84		Haller Wellfield
G1-24900C		9/17/1986	380	380		386		376	Airport Well
G1-300889C1.A		1931	135	135		72.18	72.18		Haller Wellfield
Totals			**4,659.15**	**2,959.15**	**1,700**	**5,742.02**	**4,012.02**	**1,720**	

Note: provided by Doug Wood, Ecology NWRO.

The Haller Wellfield includes three wells (Wells 1, 2, and 3). The instantaneous pumping capacity of each well is 570 gpm, for an instantaneous wellfield capacity of 1,710 gpm. The instantaneous capacity of the water treatment plant is also 1,710 gpm.

Site Visit

A site visit was made on January 11, 2011 to the existing points of withdrawal and diversion and the proposed points of withdrawal by Michael Klisch (Golder), Doug Wood (Ecology), and Mike Wolanek (City of Arlington). The original point of diversion associated with this right was the South Fork of the Stillaguamish River. Suction lines were placed into the river at the points of diversion to supply the wheel line irrigation system. Sometime in the 1970's, the property owner installed a well to replace this surface water diversion and the diversion associated with Certificate 18929C and discontinued use of the diversions. The original diversions were not visible. Both the original and current points of diversion and withdrawal, respectively, are upstream of the proposed point of withdrawal.

The well is a dug well that is completed with 60-inch-diameter concrete casing. The depth of the well is 22 feet below ground. There is no well log on file for the well. The well was previously equipped with two pumps which have been removed. One pump fed the early irrigation system which consisted of distribution pipe and hand lines across the floodplain. The second pump fed the uphill dairy system, from which some water subsequently drained to the manure lagoon. The lagoon doubled as an irrigation reservoir beginning with its construction in about 1983. There is electrical service to a pole near the well location.

There was no evidence of former irrigation equipment in the field except for the 6-inch line from the well, which was partially exposed adjacent to the well. In the former dairy area, a former water treatment building was partially standing. The building included several pressure tanks and other tanks for chlorination. Most of the piping for the system had been removed.

Hydrologic/Hydrogeologic Evaluation

The hydrogeology of the Arlington area has been described in Newcomb (1953), Thomas and others (1997), and Pacific Groundwater Group (2007). The City of Arlington is located at the confluence of the North and South Forks of the Stillaguamish River (WRIA 5). Thomas and others (2007) delineated the hydrogeologic units in the vicinity of Arlington. The geologic units are summarized in the following table:

Epoch	Hydrogeologic Unit	Typical Thickness (feet)	Maximum Thickness (feet)	Lithology	Hydrogeology
Holocene	Bog/Peat/Marsh Deposits	3	10	Peat, organic-rich mud	Thin and discontinuous, not an aquifer or aquitard
	Alluvium	40	120	Fluvial and beach deposits of fine to coarse sand with lenses of silt and gravel	Unconfined aquifer
Pleistocene	Recessional Outwash	40	250	Sand and gravel, grades to silt	Unconfined aquifer or perched groundwater
	Till	70	250	Compact unsorted sand and gravel in silt and clay matrix	Aquitard with occasional thin confined aquifers
	Advance Outwash	120	350	Fine sand, grades to gravel or silt	Unconfined to confined aquifer
	Transitional Beds	100	400	Sand to silty clay	Aquitard with occasional thin confined aquifers
	Undifferentiated Sediments	500	1,000	Glacial drift and interglacial deposits of sand and gravel with some silt	Confined aquifer and aquitards
Eocene	Bedrock	Unknown	Unknown	Varying sedimentary and volcanic lithologies	Small amounts of confined water in fractures, with some potential for porous flow in sandstone units

Note:
Modified from Thomas and others (2007), Table 3.

The City's Haller Wellfield is located immediately downstream of the confluence of the North and South Forks of the Stillaguamish River, about 50 feet south of the main stem Stillaguamish River. The Haller Well Field includes shallow three wells completed in the unconfined alluvial aquifer adjacent to the main stem Stillaguamish River at depths ranging from 34 to 36 feet below ground surface. The unconfined alluvial aquifer is present in the valleys of the North and South Forks of the Stillaguamish and the main stem Stillaguamish River. The existing point of withdrawal well is also a shallow well completed to a depth of 22 feet below ground in unconfined alluvial materials adjacent to the South Fork Stillaguamish River.

The Haller Well Field area is underlain by unconsolidated alluvial sand and gravel. The depth to the underlying Tertiary bedrock is uncertain. Bedrock was interpreted by Pacific Groundwater Group (2007) to be at a depth of about 40 feet below ground in the wellfield area. However, it is possible that alluvial materials include large boulders, such as glacial erratic, that due to the difficult drilling conditions, may have been misinterpreted as "bedrock" at the time of drilling as the wells were not advanced beyond the "bedrock" (Mike Wolanek, City of Arlington, personal communication 2011). The alluvial aquifer is moderately to highly permeable, with hydraulic conductivities ranging from about 3.6 to 3,200 ft/d, and a median hydraulic conductivity of 88 ft/d (Thomas and others 2007).

Pumping tests in the Haller Well Field show that the alluvial aquifer is in direct hydraulic continuity with the main stem and South Fork Stillaguamish River (WWR 2010), and the wellfield is considered to be groundwater under the direct influence of surface water by the Washington Department of Health.

Minimum instream flows for WRIA 5 were established in 2005 under WAC 173-505-050 for the main stem Stillaguamish River and tributaries. The following table summarizes instream flow requirements for the main stem Stillaguamish River from the mouth at Port Susan to the confluence of the North and South Forks. The control point for this reach of the river is Ecology gaging station #05A070 at River Mile 11.2 (near Silvana).

Month	Day	Instream flow (cfs)
January	1-31	2,200
February	1-29	2,000
March	1-15	2,000
	16-31	2,000
April	1-30	2,000
May	1-31	2,000
June	1-15	2,000
	15-30	2,000
July	1-15	2,000
	15-31	2,000
August	1-15	1,700
	15-31	1,700
September	1-15	1,700

Month	Day	Instream flow (cfs)
	15-30	1,700
October	1-15	1,700
	15-31	1,700
November	1-15	2,200
	15-30	2,200
December	1-31	2,200

Under WAC 173-505-070, the main stem Stillaguamish River from the mouth to the confluence of the North and South Forks at River Mile 17.8 has water available above instream flow requirements over the period October 16 to June 30. Under WAC 1173-505-100, the total consumptive withdrawals from the existing and future water rights in the Stillaguamish River basin during open periods shall not exceed a total of 300 cubic feet per second (cfs) as measured at Ecology station #05A070 at river mile (RM) 11.2 (WAC 173-505-100(2)). Of that 300 cfs, the maximum allocation that may be taken from the South Fork of the Stillaguamish River from RM 17.9 (confluence with the North Fork) to RM 34.9 is 150 cfs during open period from November 1 to June 15 as measured at Ecology station #05B090. Ecology also reserved one cfs of water for future stockwatering (WAC 173-505-080) and five cfs at River Mile 11.2 for future permit-exempt groundwater use (WAC 173-505-090). The five cfs reservation includes a maximum of two cfs from the North Fork Stillaguamish River (River Mile 6.5) and 1.5 cfs from the South Fork Stillaguamish River (River Mile 6.5). Because the water right proposed for transfer has a priority date of September 4, 1951, it is senior to the instream flow regulations and is therefore not subject to interruption.

Impairment Considerations

The wells in the Haller Wellfield are completed in a highly permeable unconfined alluvial aquifer that is in direct hydraulic communication with the main stem Stillaguamish River. There will be no impairment to the main stem Stillaguamish River minimum instream flow by moving the point of withdrawal of a water right utilizing the same source that is senior to the minimum flow established in WAC 173-505-070.

The Haller Wellfield wells have been in operation for many years indicating that water is physically available. There have been no reports of interference to other wells or water right holders since the wells have been in operation. Testing completed by Pacific Groundwater Group in 2002 in Well 1R (referenced in the Report of Examination for CG1-300889CL(A)@1) showed there was about 6.5 feet of drawdown in Well 1R when the well was pumped at 570 gpm over a 4-hour period, with rapid recovery to pre-test levels following pump shutdown. Approximately 9 inches of drawdown were observed at the end of the test in Well 1, located about 25 feet from Well 1R, confirming little drawdown is expected outside the immediate wellfield area.

A search of the well log database indicted that there were 11 wells on file within about 0.5 miles of the Haller Wellfield. Other wells may be present that do not have logs filed with Ecology. With the exception of one well which is completed in bedrock (McMahan) all of the wells are completed in the alluvial aquifer. No impairment to these wells is expected based on the observed drawdown during the 2002 testing, the high aquifer transmissivity, and the good hydraulic connection to the river.

Well Owner	Well Depth (feet bgs)	Date Completed	Completion Aquifer	Location
ASSOCIATED SAND & GRAVEL	64		Alluvial	T31/R5E-2NWNE
ASSOCIATED SAND AND GRAVEL	26	03/10/69	Alluvial	T31/R5E-2NWNE
C D HAMMER	19		Alluvial	T31/R5E-2NESW
CITY OF ARLINGTON	38	05/08/02	Alluvial	T31/R5E-2SENW
CITY OF ARLINGTON	36		Alluvial	T31/R5E-2SENW
CITY OF ARLINGTON	36		Alluvial	T31/R5E-2SENW
DENNIS DEARINGER	74	08/12/98	Alluvial	T31/R5E-2NENW
HENRY MILLER	40	04/10/99	Alluvial	T31/R5E-2SENW
LEE FLATO	37	08/09/91	Alluvial	T31/R5E-2SWSW
LYNN GRANSTROM	50	09/16/02	Alluvial	T31/R5E-2NESE
MIKE HANLOCK	30	04/03/81	Alluvial	T31/R5E-2SWNE
PETE VECHL	38	07/12/00	Alluvial	T31/R5E-2SENW
TOM MC MAHAN	211	06/25/92	Bedrock	T31/R5E-2NWSE

The Water Rights Application Tracking System database was queried to located water rights and claims within a 0.5 mile radius of the Haller Wellfield. Twelve water right claims for groundwater, one surface water certificate, and two groundwater certificates are within 0.5 miles of the subject application for change (excluding rights held by the City of Arlington). At least one groundwater certificate and one groundwater claim can be tied to available well logs. Some of the well logs may be associated with water rights or claims filed under a different name or are exempt from the application process. No impairment to these rights is expected based on the observed drawdown during the 2002 testing, the high aquifer transmissivity, and the good hydraulic connection to the river.

File Number	Certificate Number	Person	Document Type	Priority Date	Purpose of Use	Qi	Unit of Measure	Qa	Location	Source
G1-153724CL		MILLER HENRY C	Claim S		NR		GPM		T31N/R5E-	
G1-135771CL		VAN SLAGEREN TOM	Claim L		ST,DG		GPM		T31N/R5E-	WELL

File Number	Certificate Number	Person	Document Type	Priority Date	Purpose of Use	Qi	Unit of Measure	Qa	Location	Source
G1-124942CL		LEWIS ORWILL P	Claim S		IR,DG		GPM		T31N/R5E-	
G1-123457CL		WILSON MARVIN W	Claim L		ST,IR		GPM		T31N/R5E-	WELL
G1-119434CL		VALLEY GEM FARMS	Claim L		ST,DG		GPM		T31N/R5E-	WELL
G1-111124CL		HAMMER CURTIS D	Claim S		ST,DG		GPM		T31N/R5E-	
G1-093046CL		GROENDYK JOHN	Claim S		IR,DG		GPM		T31N/R5E-	
G1-091257CL		RICKARD JOHN C	Claim S		IR,DG		GPM		T31N/R5E-	
G1-050157CL		KROEZE JOHN	Claim S		DG		GPM		T31N/R5E-	WELL
G1-035541CL		DESPRES CLARA M	Claim L		DG		GPM		T31N/R5E-	WELL
G1-035723CL		BREEKVELDT BERT	Claim S		DG		GPM		T31N/R5E-	
G1-025841CL		KLEIN PAUL	Claim L		DG		GPM		T31N/R5E-	
S1-008945CL		SOPER FRANCES M. M.	Claim L		DG		CFS		T31N/R5E-	
S1-*11473AWC	06447A	KROEZE J	Cert	6/23/1952	IR	0.32	CFS		T31N/R5E-	UNNAMED SLOUGH
S1-*01104C	194	Puget Sound Power & Light Co	Cert	10/10/1924	DM	5	CFS		T31N/R5E-SE/NW	STILLAGUA MISH RIVER
G1-*09495C	6379	Associated Sand & Gravel Co Inc	Cert	6/4/1968	CI	150	GPM	36	T31N/R5E-	WELL
G1-*07494C	5169	Arlington City	Cert	2/12/1965	MU	1700	GPM	1344	T31N/R5E-	WELL
G1-*02442C	2968	HAMMER C D	Cert	4/9/1952	IR	156	GPM	30	T31N/R5E-	WELL
CG1-*02115C	1488	Arlington City	ChgApp	3/23/2010	MU	90	GPM	34.67	T31N/R5E-SE/NW	WELL 1
CS1-*18929C	10024	Arlington City	ChgApp	4/7/2010	MU	0.6	GPM		T31N/R5E-SE/NW	Haller well field
CS1-*10680C	5983	Arlington City	ChgApp	4/7/2010	MU	0.25	GPM		T31N/R5E-SE/NW	Haller well field

Because the proposed change will move the point of withdrawal downstream, there is a net benefit to flows in the main stem and South Fork Stillaguamish River between the proposed and existing points of withdrawal.

Enlargement

No enlargement will result from approval of this change. The City of Arlington is receiving a transferred quantity based on a tentative determination of extent and validity. Only water that was previously put to beneficial use is transferred, and only that amount is authorized to be withdrawn (by this authorization) from the wells in the Haller Wellfield.

Public Interest Considerations

Factors considered for evaluating whether the proposed change is in the public interest included but were not limited to: potential impacts to exempt wells, existing water rights, permits, and claims holders, other water right change applications, potential impact to groundwater and surface water resources, and beneficial use of the resource. No detriment to the public interest was identified during the investigation of the subject application. The available information show other wells in the area are not expected to be impaired by the proposed change, and the proposed change will provide a net benefit to flows in the main stem and South Fork Stillaguamish River between the proposed and existing points of withdrawal.

CONCLUSIONS

In accordance with state law, the following considerations were addressed as part of the process of evaluating this change request:

- The potential for enlargement of the original right,
- The potential for impairment of other rights,
- Consideration of the public interest and welfare,
- Physical availability of water,
- Whether the new point of withdrawal would tap the same body of public groundwater as the original well, and
- Protests or Letters of Concern.

Potential for Enlargement

The annual quantity and maximum instantaneous quantity will not be enlarged by this change.

Impairment of Other Rights

No impairment of other rights is expected because the alluvial aquifer is highly permeable with a direct hydraulic connection with the main stem and South Fork of the Stillaguamish River. Interference drawdown from pumping the Haller Wellfield in areas outside the immediate wellfield is expected to be negligible. There are no reports of impairment by other groundwater or surface water users since the wellfield has been in operation. Review of materials provided by the City indicated that a de facto change to the original point of diversion was made by the dairy owner sometime in the 1970s to address requirements of the Clean Water Act. The dairy owner indicates he implemented these changes through his farm plan in response to regulations requiring him to comply with the Clean Water Act (Schwabe, Williamson, and Wyatt 2010). The point of diversion was changed to a nearby point of withdrawal (a well). The existing point of withdrawal and the Haller Wellfield are in the same body of groundwater in direct communication with the main stem and South Fork of the Stillaguamish River.

Certificate 10024 limits the beneficial use of quantities allocated for irrigation purposes to the irrigation season (typically from May through October). The proposed change to continuous use could impair minimum instream flows established under WAC 173-505-050 for the mainstem of the Stillaguamish River. In order to prevent impairment of instream flows, the portion of the transfer perfected for irrigation (100.95 AF/yr) cannot be used if instream flows are not met. The quantities perfected for non-irrigation purposes (4.21 AF/yr) can be transferred without further limitations since these quantities are senior and therefore not subject to the minimum instream flow. No impairment to instream flows are expected from approval of this water right if the irrigation portion is made subject to instream flows.

Public Interest

No detriment to the public interest was identified during the investigation of this application for change. Municipal water supply is a beneficial use under RCW 43.27A.020, RCW 90.14.031, and RCW 90.54.020.

Availability of Water

Availability of water from the source was determined when the original permit was issued. Physical availability of water from the Haller Wellfield has been established through operation of the field for over 70 years with no reports during that time of decreased water availability.

Same Body of Groundwater

The existing and proposed points of withdrawals are both in the alluvial aquifer which is in direct continuity with the main stem and South Fork Stillaguamish River.

Protests or Letters of Concern

Public notice of the proposed application for change was published on July 21, 2010 and July 28, 2010 in the Everett Herald. No protests were received.

RECOMMENDATIONS

Based on the above investigation and conclusions, I recommend that the request for change to Certificate 10024 be authorized, in the amounts and within the limitations listed below and subject to the provisions beginning on Page 2, et seq.

Purpose of Use and Authorized Quantities

The amount of water recommended is a maximum limit and the water user may only use that amount of water within the specified limit that is reasonable and beneficial.

244 gpm and 111.12 AF/yr
- Continuously April 16 to September 30
- Interruptible October 1 to April 15 subject to meeting minimum instream flows established under WAC 173-505-040

25 gpm and 11.6 AF/yr
- Continuously all year

The combined transferable quality for Certificates 5983 and 10024 shall not exceed 171.81 AF.

Point of Withdrawal

SE¼, NW¼, Section 2, Township 31 North, Range 5 East W.M.

Place of Use

As described on Page 1 of this Report of Examination.

REPORT BY _____ DATE March 27, 2012

Carl Einberger, L.Hg.
Senior Consultant, Water Resources
Golder Associates Inc.

State of Washington Licensed Geologist Hydrogeologist 1100

exp. 10/22/12

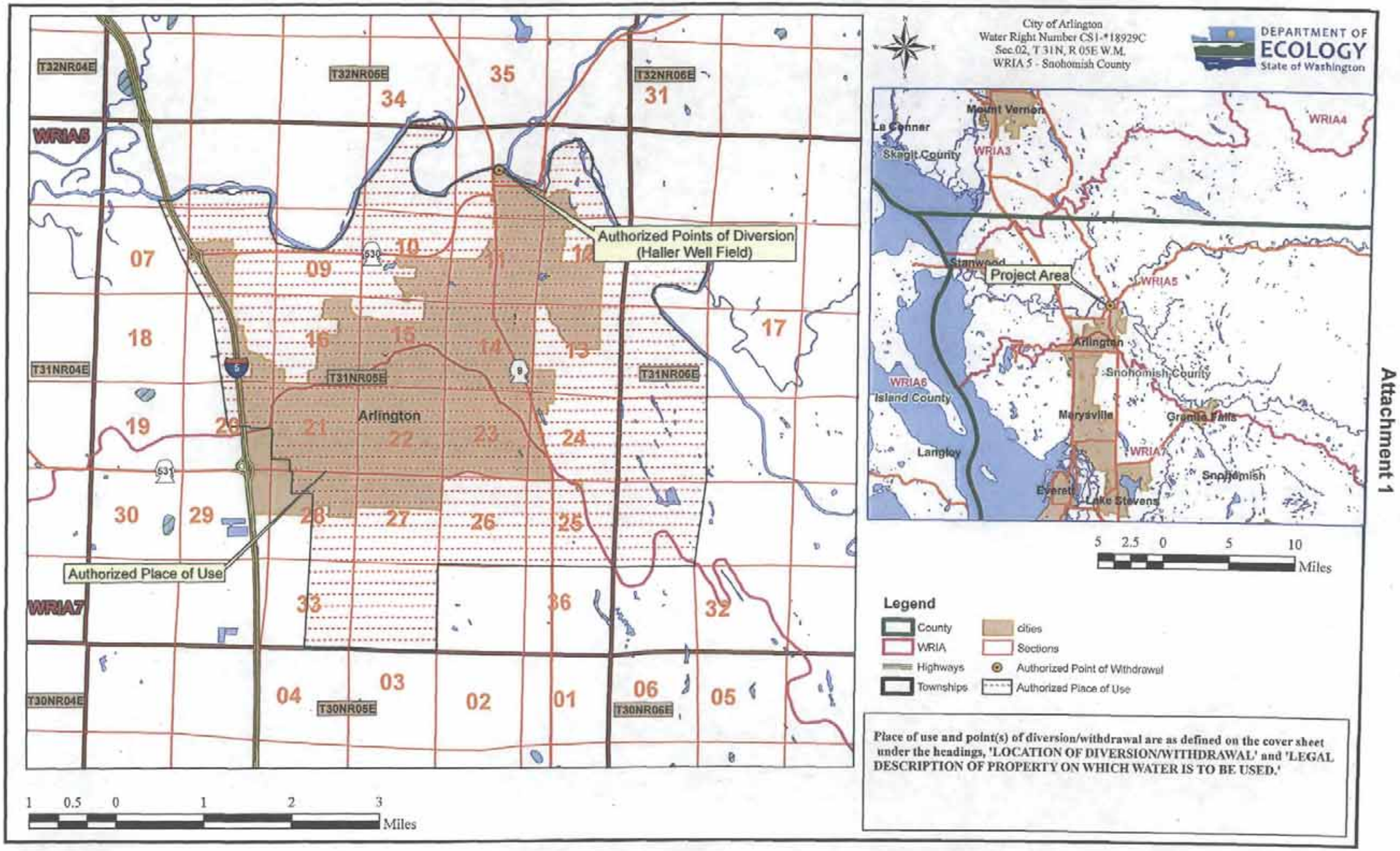
Carl M. Einberger

REVIEWED BY _____ DATE April 3, 2012

Douglas H. Wood, LHG
Water Resources
Department of Ecology

State of Washington Licensed Geologist Hydrogeologist 952

DOUGLAS H



Attachment 1

L RETAIL WATER SERVICE AREA AGREEMENTS

L.1 CWSP 2015 BOUNDARY ADJUSTMENT (MARYSVILLE) CORRESPONDENCE AND AGREEMENT

L.2 CWSP BOUNDARY ADJUSTMENT (MARYSVILLE) MAP

L.3 CWSP WATER PURVEYORS MAP 2015

L.4 NORTH SNOHOMISH COUNTY COORDINATED WATER SYSTEM PLAN (CWSP) SIGNED AGREEMENT—1990

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WATER SERVICE AREA CHANGE AGREEMENT

between

CITY OF ARLINGTON and

CITY OF MARYSVILLE

An Agreement between the City of Arlington (Arlington) and the City of Marysville (Marysville), individually a "Party" and collectively the "Parties":

WHEREAS, the above Parties each provide retail water service to a Water Service Area agreed to and established in the North Snohomish County Coordinated Water System Plan and identified on the Coordinated Water Service Plan (CWSP); and

WHEREAS, Arlington and Marysville each previously signed an "Agreement for Establishing Water Utility Service Area Boundaries," on file with Snohomish County Planning and Development Services (PDS), an example of which can be found in Appendix D of the 2010 update to the North Snohomish County Coordinated Water System Plan; and

WHEREAS, the current respective water service areas of the Parties to this Agreement are indicated in Figure 1-1 of the CWSP (December 2010 edition); and

WHEREAS, Section Ill 2.D. of the CWSP allows service area boundaries to be revised at any time with the execution of revised service area agreements by authorized representatives of each affected purveyor; and

WHEREAS, this Agreement shall serve as an amendment to the agreements on file with PDS;

NOW, THEREFORE, the Parties hereby agree to adjust their respective water service areas to match the Proposed Boundaries on Exhibit A attached hereto and included herein by reference.

THIS AGREEMENT SHALL BE EFFECTIVE with respect to each Party when that Party's authorized representative executes the agreement. The original signature pages shall be delivered to the attention of Gary ldleburg at PDS, which maintains the file of water service area agreements under the CWSP. Copies of the signature pages shall be delivered to each Party to this Agreement. This Agreement may be executed in counterparts.

IN AGREEMENT WHEREOF, the undersigned parties execute this Agreement

City of Arlington

_____
Barbara Tolbert
Mayor

_____
Date

City of Marysville

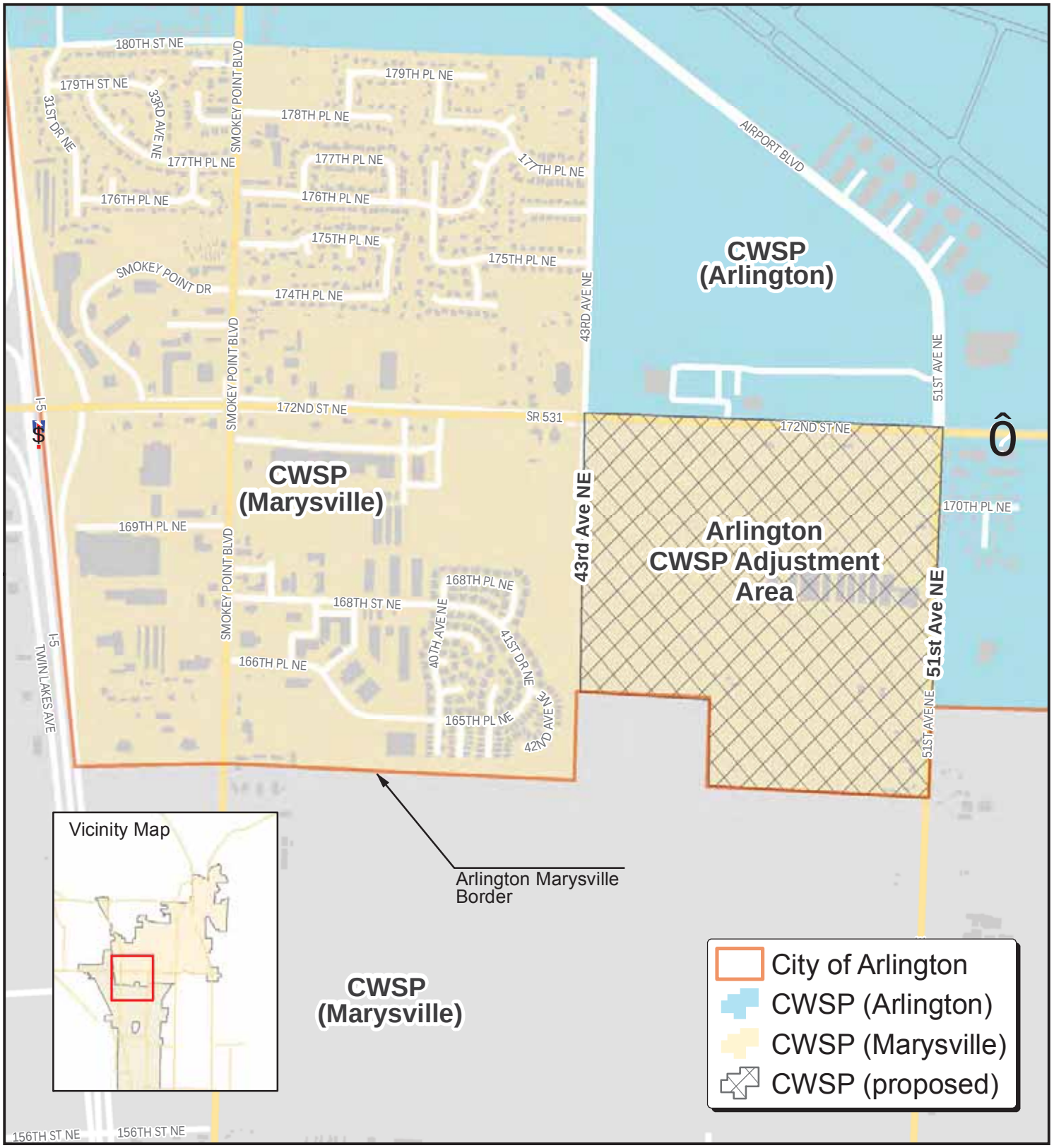
_____
Jon Nehring
Mayor

_____
Date

Receipt Acknowledged

_____
Gary Idleburg
Senior Planner
PDS-Snohomish County

_____
Date



Legend

State Routes
Roads
Buildings

Maps and GIS data are distributed "AS-IS" without warranties of any kind, either express or implied, including but not limited to warranties of suitability for a particular purpose or use. Map data are compiled from a variety of sources which may contain errors and users who rely upon the information do so at their own risk. Users agree to indemnify, defend, and hold harmless the City of Arlington for any and all liability of any nature arising out of or resulting from the lack of accuracy or correctness of the data, or the use of the data presented in the maps.

City of Arlington

South Arlington CWSP Adjustment

Scale:	File:
1 inch = 1,000 feet	SArlMarUtilExp8.5x11portrait_15
Date:	**Cartographer:**
5/14/2015	akc

May 14, 2015

Gary Idleburg
Senior Planner
Snohomish County Planning & Development
3000 Rockefeller Ave. M/S #604
Everett, WA 98201

Re: CWSP Boundary Adjustment

Mr. Idleburg,

The City of Arlington and the City of Marysville met on March 10, 2015 to discuss adjustment of our mutual water service area boundary as defined in the North Snohomish County Coordinated Water System Plan (CWSP). Specifically, the area in question is bounded on the east/west by 51st Ave./43rd Ave. and from 172nd St. south to Arlington city limits, please see attached map.

This area is currently undeveloped land within Arlington city limits. Arlington and Marysville are working on the creation of a Manufacturing Industrial Center (MIC) and we have all agreed that future development would be better served if this water service area was consistent with the city limits.

The City of Arlington is finalizing the 2015 update to its Comprehensive Water Plan and would like to include the revised CWSP in the final draft that is submitted to Department of Health. Please call me at 360.403.3505 if you need any additional information or if we can assist with the processing of this request for a CWSP Boundary Adjustment.

Sincerely,

James X. Kelly,
Public Works Director

cc: Kevin Nielsen

attach (1)