
Marysville Water Comprehensive Plan Technical Memorandum



Date: May 21, 2008
Subject: Watershed Control Plan Update
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From: Jeff Hansen, HDR
CC: Kelly O'Rourke, HDR
Project No.: 61281

This technical memorandum presents the City's Watershed Control Plan Update for the Stillaguamish Ranney Well Collector source of supply.

1. Purpose of Watershed Control Plan Update

The City of Marysville (City) has developed a Watershed Control Plan (WCP) for the Stillaguamish Ranney Well Collector, a source of supply categorized as "groundwater under the direct influence (GUI) of surface water" by the Washington State Department of Health (DOH). Typically, the Washington Administrative Code (WAC) source protection requirements for GUI are limited to a Wellhead Protection Program (WHPP). However, the Stillaguamish source collects water from a shallow well directly beneath the Stillaguamish River and, according to DOH, is "highly susceptible" to contamination. As such, the DOH Regional Engineer requested that the City prepare a WCP, rather than a WHPP, for the source in 2001 (Heneghan 2001). The WCP was developed in 2002 to meet the source water protection requirements defined in WAC 246-290-135(4).

The City's 2002 WCP was developed to meet the following objectives:

- to describe the watershed;
- maintain an up-to-date land use inventory;
- identify potential sources of contamination;
- describe watershed control measures;
- evaluate water quality trends and monitoring practices;
- evaluate treatment operations;
- evaluate the risks associated with potential sources of contamination;
- describe planned public education and outreach programs;

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- summarize existing emergency spill response and contingency plans; and
 - provide recommendations for future watershed program improvements.

To meet requirements in WAC 246-290-135, systems must update their watershed control plans every six years as part of updating Water Comprehensive Plans.

This Watershed Control Plan Update (WCP Update) has been developed to document and summarize changes in the watershed, activities conducted by the City to manage and protect water quality of this source, and planned efforts to continue protecting the City's Stillaguamish supply.

2. Update Approach

This WCP Update was prepared as part of the City's Water Comprehensive Plan, due to be completed in 2009. This update was developed by reviewing available data and information from the City, discussions with City staff, and a windshield survey conducted to review land use near the source. Finally, Washington State Department of Ecology's (DOE) Facility/Site Identification Database was used to develop the potential point source contaminant inventory. No additional data were collected in conjunction with this update.

3. Relevant Source Water Programs and Planning Efforts

There are a number of Federal, State, and local laws, regulations, and programs that relate to general watershed protection. The 2002 WCP outlined each of these programs and how they impact the City's Stillaguamish Ranney Well Collector source. Many of the programs collect water quality data, land use data, or otherwise provide information that can support the City's watershed planning efforts. Application of these programs and efforts has not changed significantly with regard to the Stillaguamish, except for adoption of the Critical Aquifer Recharge Areas regulations.

In 2007, Snohomish County adopted Chapter 30.62C Critical Aquifer Recharge Areas as part of the county's planning regulations. The purpose of this regulation is to "safeguard the public health, safety, and welfare and to protect groundwater resources." The regulation establishes sole source aquifers, Group A wellhead protection areas and areas sensitive to groundwater contamination as potential Critical Aquifer Recharge Areas (CARAs). In this regulation, Snohomish County establishes a process for designating an area as a CARA and establishes standards and requirements for the protection of these areas. This added regulation will serve to bolster protection of the City's Stillaguamish GUI source by prohibiting, conditioning, or otherwise regulating certain activities and uses within the watershed area.

4. Watershed Description

The 2002 WCP includes a comprehensive description of the Stillaguamish Watershed. This Update describes only the following aspects of the watershed that may have changed between 2002 and 2007:

- Source Description, and

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- Water Quality.

For detailed information on location of the source and hydrology, refer to the City of Marysville Watershed Control Plan (2002).

4.1 Source Description

The Stillaguamish watershed, located in Snohomish and Skagit Counties, contains all of the Stillaguamish River basin east of the City's source. It collects water from approximately 540 square miles and drains approximately 78% of WRIA 5. The watershed extends east from the City's Stillaguamish Ranney Well Collector, located near the City of Arlington, to the foothills of the Cascade Mountains in the Mount Baker National Forest. The City's watershed boundaries can be delineated by the boundaries of WRIA 5, east of the Ranney Well Collector.

The Stillaguamish Ranney Well Collector was constructed and brought online in 1978. The collector well has the capacity to supply the full 3.2 MGD water right. Two 100-HP, 1,125 gpm capacity submersible pumps are installed in a 16-foot-diameter, 38-foot-deep caisson buried in the riverbed. During the construction of the new Stillaguamish Water Treatment Plant, the Ranney pumps were de-staged and variable frequency drives were added to the pump controls. Seven screened, 10-inch collector lines, each approximately 100 feet long, extend out radially from the caisson bottom. Subsurface water is screened through the collectors and flows by gravity to the caisson pumps where it is pumped to the Stillaguamish River Water Treatment Plant for treatment and is then pumped into the distribution system.

The Stillaguamish source was designated as a GUI source in 2000. As a GUI source, all Surface Water Treatment Rule regulations apply to the Stillaguamish Source, including those for disinfection and filtration. The City constructed a new membrane facility, which was put into service in December 2006. The new membrane plant was designed to treat the Ranney Well Collector source water in compliance with the Surface Water Treatment Rule and the Long-Term 2 Enhanced Surface Water Treatment Rule. The primary treatment process for the Water Treatment Plant is a filtration process utilizing low-pressure, submerged membrane technology manufactured and supplied by Zenon Environmental, Inc. Filtered water is pumped by vacuum from the membrane tanks and is disinfected with sodium hypochlorite, followed by storage and disinfection contact in an above-grade, 0.2 MG steel clearwell before being pumped into the City's distribution system.

4.1 Water Quality

DOE currently monitors water quality within the watershed at four permanent locations. Water quality parameters typically measured through this program include: conductivity, dissolved oxygen, pH, temperature, total suspended solids, turbidity, fecal coliform bacteria, soluble reactive phosphorus, total phosphorus, ammonia, nitrate plus nitrite, and total nitrogen. Selected sites are also sampled for dissolved and total recoverable metals each year. The DOE Stations along the Stillaguamish are:

- 05B110 - North Fork Stillaguamish near Darrington
- 05B070 – North Fork Stillaguamish at Cicero
- 05A110 – South Fork Stillaguamish near Granite Falls

- 05A090 – South Fork Stillaguamish at Arlington

Table 1 presents a comparison of water quality data collected between 1991-2001 and 2001-2006 at Stations 05A090 – South Fork Stillaguamish at Arlington and 05B70 – North Fork Stillaguamish at Cicero.

Table 1 Water Quality Data for Two Monitoring Sites Nearest City Source

Water Quality Parameter	Unit	South Fork at Arlington Station # 05A090		North Fork at Cicero Station # 05B070	
		2002 – 2006 Average	1991 – 2001 Average	2002 – 2006 Average	1991 – 2001 Average
Fecal Coliform	#/100 ml	48	57	18	57
Ammonia-N	mg/L	0.01	0.01	0.01	0.01
Nitrate/Nitrite-N	mg/L	0.20	0.21	0.15	0.16
Oxygen	mg/L	11.60	11.45	11.80	11.62
pH	pH unit	7.48	7.43	7.67	7.48
Suspended Solids	mg/L	95	90	69	99
Temperature	°C	10.5	9.0	9.8	8.4
Total Phosphorous	mg/L	0.07	0.05	0.06	0.06
Turbidity	NTU	60.6	45.8	40.5	39.1

DOE indicates that water quality at these stations has on occasion exceeded water quality criteria established in WAC 173-201A between 2002 and 2006. Table 2 summarizes these exceedences.

Table 2 Exceedences of Ecology Water Quality Criteria for Two Monitoring Sites Nearest City Source Between 2002 and 2006

Water Quality Parameter	Ecology Criterion	South Fork at Arlington Station # 05A090		North Fork at Cicero Station # 05B070	
		Number of Exceedences	Range of Exceedences	Number of Exceedences	Range of Exceedences
Fecal Coliform	200 /100 ml	4	260 - 650	1	250
pH	8.5	0		1	9.0
Temperature	18.0 °C	8	18.5 – 22.5	5	18.8 – 19.8

5. Land Use

The Stillaguamish watershed is large and much of the area is privately owned. The City does not have fee title to any land within the Stillaguamish Watershed other than the actual points of diversion at the source intake pumps. As such, the City has little to no control over land use activities in the large Stillaguamish watershed. It would not be possible for the City to reach agreements with each party owning land within the watershed or to develop a comprehensive watershed control plan for the entire watershed. The City's Watershed Control Plan focuses on land ownership and land use activities nearest to the City's source of supply.

Land use in the City's watershed is varied and ranges from urban areas to undeveloped forest. Within five miles of the City's source, about 45 percent of the land use is rural or residential. Agriculture accounts for approximately 35 percent of the land use within five miles of the City's source. As discussed in the 2002 Watershed Control Plan, the City of Arlington's Urban Growth Area (UGA) is located in close proximity to the Stillaguamish Ranney Well Collector and has the potential to adversely impact the City's source water quality. The northern border of Arlington's UGA has been identified (Watershed Control Plan, 2002) as being a specific area of future urban growth which could impact the City's source water quality.

Land use in the proximity of the City's source has not changed significantly since the last Watershed Control Plan. However, the City has more control over drinking water quality due to the construction and implementation of the Stillaguamish Water Treatment Plant. The 2002 WCP includes a comprehensive description of land use in the Stillaguamish Watershed and potential for non-point source pollution.

6. Potential Point Source Inventory

This section provides an update to the Contaminant Inventory presented in the City's 2002 Watershed Control Plan. Because the Stillaguamish is such a large watershed, the 2002 Plan focused on types of potential point sources located within two and five miles of the Stillaguamish source of supply. This updated potential point source contaminant inventory also focuses on potential point sources two and five miles from the Stillaguamish Ranney Well Collector. This inventory update has been developed using Ecology's Facility/Site Identification Database. This database lists any operation that is a potential or active source of pollution. This could include gas stations, automotive stores, dry cleaners, gravel pits, waste management sites, and industrial facilities. Only active sites were included in this inventory. Table 3 lists sites located within a two-mile radius of the Stillaguamish source.

Table 3. Potential Point Sources of Contamination Within a Two-Mile Radius of the Stillaguamish Ranney Well Collector

DOE Facility ID	Site Name	Type of Business	Type of Point Source	Ecology Program
38543624	7-Eleven Store	No description available in F/SD	Underground storage tank	Toxics
3317886	Absolute Manufacturing	Machine shop	Hazardous waste generator	Hazardous Waste
4886943	Arlington BP	No description available in F/SD	Underground storage tank	Toxics
38271946	Arlington Chevron	No description available in F/SD	Underground storage tank	Toxics
12421282	Arlington School District 16	No description available in F/SD	Underground storage tank, Leaking underground storage tank	Toxics
24784647	BNSF Railway Company	Railroads, line-hauling operations	Hazardous waste management	Hazardous Waste
2787	Christianson Co.	Repair Shops and related services	State clean-up site	Toxics
39345415	City of Arlington	Municipality	Wastewater discharge	Water Quality
1842364	City of Arlington Right of Way Tank F	No description available in F/SD	Leaking underground storage tank	Toxics
3962921	Country Charm Dairy	Dairy farm	Dairy	Water Quality
22951757	Dean T Olsen Arlington Shell Service	No description available in F/SD	Underground storage tank	Toxics
67387112	Dwayne Lanes Arlington Chevrolet Geo	New and used car dealers	Hazardous waste generator	Hazardous Waste
15751864	Fliteline Services Inc	No description available in F/SD	Underground storage tank	Toxics
45456544	Frontier Bank	No description available in F/SD	Leaking underground storage tank	Toxics
81112349	Granite Falls Central Office 20	No description available in F/SD	Hazardous waste storage	Hazardous Waste

DOE Facility ID	Site Name	Type of Business	Type of Point Source	Ecology Program
74881881	Klein Breekveldt Waste Storage Pond	Sewerage system	Dam site	Water Resources
5315172	Marysville City Utilities Department	Waste management facility (air, water, and solid)	Hazardous waste storage	Hazardous Waste
54633244	Modern Furniture	Wood household furniture	Stormwater permit	Water Quality
71818116	Nelson Distributing Inc.	Petroleum bulk stations and terminals	Underground storage tank	Toxics
4398128	Nelson Petroleum	No description available in F/SD	Underground storage tank	Toxics
2658071	Newsom Brothers	Site preparation activities	Hazardous Waste Management Activity	Hazardous Waste
5992053	North Olympic Avenue	No description available in F/SD	Voluntary clean-up site	Toxics
88192336	Olson & Taylor Inc	No description available in F/SD	Underground storage tank	Toxics
73627377	Petrocard System Inc.	No description available in F/SD	Underground storage tank	Toxics
4386335	Pioneer 76 Gas	No description available in F/SD	Underground storage tank	Toxics
99766737	Pioneer Manufacturing	Wood office furniture manufacturing	Hazardous waste generator	Hazardous Waste
81346678	Plaines Marketing LP	Liquid petroleum gas dealers	Hazardous waste management	Hazardous waste
66353676	R & L Auto Repair	General automotive	Hazardous waste generator	Hazardous Waste
19131529	Rinker Materials	Concrete, sand and gravel processing facility	Hazardous waste storage, wastewater discharge	Hazardous Waste, Water Quality
8374137	Rinker Materials BNI Pit	Construction sand and gravel	Wastewater discharge permit	Water Quality
3233784	Safeway Fuel Center	No description available in F/SD	Underground storage tank	Toxics

DOE Facility ID	Site Name	Type of Business	Type of Point Source	Ecology Program
94869379	Smokey Point Concrete	Crushed and broken stone	Underground storage tank	Toxics
3495597	Snohomish County PUD 1 – Eagle Ridge Community	Postal Service	Hazardous waste management	Hazardous Waste
2327474	Twin City Foods	Frozen fruits and vegetables	Hazardous waste management	Hazardous Waste
575472	Van Slageren Dairy	Dairy farm	Dairy	Water Quality
54414854	Verizon Northwest Inc	No description available in F/SD	Hazardous waste storage	Hazardous Waste
3816335	Washington Department of Transportation	Project site	Project site	Shorelines and Environmental Assistance
5679382	Washington Department of Transportation	Construction sand and gravel	Wastewater Discharge	Water Quality
7335837	Washington Department of Transportation Pit Site	Construction sand and gravel	Hazardous waste storage, Underground storage tank	Water Quality

Within a five-mile radius of the source, there are 119 potential point sources of contamination. Within two miles of the source, there are 39 potential point sources of contamination. This is significantly more than the 13 potential point sources identified within the same area as part of the 2002 WCP. The difference is likely due to changes in how DOE tracks and stores facility information. Many of these facilities are close to or within the City of Arlington.

According to DOE, there are 13 underground storage tanks within two miles of the Stillaguamish Ranney Well Collector and an additional three leaking underground storage tanks. These sites could contaminate groundwater in the area and have the potential to affect the water quality at the source.

Sites that handle or generate hazardous waste also present potential for surface and groundwater contamination. The type of contamination that could occur is specific to each location and the materials being handled.

Finally, wastewater is discharged directly into the Stillaguamish River upstream of the City's source of supply by the City of Arlington's Sewage Treatment Plant. The presence of a sewage outfall two miles upriver from the Stillaguamish source creates the potential for contamination due to fecal coliform, elevated temperatures, and residual chlorine. This facility is permitted through a National Pollutant Discharge Elimination System (NPDES) permit (i.e., permit number WA-0022560). This permit expires June 30, 2008. The City will track the renewal of the permit, and will note any modifications to effluent limitations or other requirements which may pose an adverse impact to the water quality of the Stillaguamish source.

7. Marysville's Watershed Management Activities (2002 - 2007)

This section describes the City's watershed management activities between 2002 and 2007.

7.1 Water Quality Monitoring

The City is required to follow numerous monitoring requirements at each of its water sources. These activities are described in detail in Chapter 7 of the Water Comprehensive Plan Update (2008).

7.2 Source Treatment

As described in the Source Description section, the City recently constructed and brought online a membrane treatment facility for the Stillaguamish source of supply. This assists the City in controlling the quality of the City's drinking water supply, something that has been challenging since the City cannot control watershed activities or high turbidity levels that occasionally occur.

7.3 Contingency Planning

The City developed a contingency plan in 2002 to cover water supply disruptions during emergencies. In brief, the Contingency Plan addresses the following topics:

- Hazard analysis, covering both natural and human-caused hazards;
- Vulnerability Assessment, addressing the vulnerability of key water system components to the hazards identified;
- Mitigation plan, addressing facility protection and backup systems;
- Preparedness planning, including linkage to the City's Emergency Response Plan; and
- Training of City personnel to respond to emergencies affecting the water system.

According to the Contingency Plan, the probability of a hazardous material release impacting a City well or spring is thought to be low to moderate. However, in the event that the Stillaguamish Ranney Well Collector water quality becomes compromised, the City can be supplied from several other sources, including the Edwards Springs sources, Lake Goodwin Well No. 2, Everett water through several interties, and an intertie with the City of Arlington distribution system. As such, the loss of the Stillaguamish source would not significantly impact the system's ability to satisfy average day or peak day demands.

7.4 Watershed Planning

The City has constructed fencing in portions of the watershed, and upgraded Ranney Well collectors and pumps.

7.5 Public Outreach and Education

The City has developed a brochure that describes watershed control activities. This brochure is available to customers at the City offices.

8. Future Watershed Management Activities

The City plans to continue constructing fencing in the watershed, and maintaining the collector piping.