5. SOURCE WATER PROTECTION

5.1 Overview

The objective of this chapter is to develop a program to protect and, if possible, improve source water quality used by the City's water system. This objective is accomplished by identifying, monitoring, limiting, and controlling—to the extent feasible—all facilities and activities within the zone of contribution which may adversely impact source water quality.

5.2 Wellhead Protection Plan

The City supplies all potable water for its water system from groundwater sources. The goal of the Wellhead Protection Plan (WHPP) is to prevent contamination of these groundwater sources. Robinson and Noble prepared a WHPP for the water system in 2001. The City's WHPP has been developed based on the criteria established in the Washington State Wellhead Protection Program Guidance Document, DOH publication No. 331018. This WHPP was included in the City's 2002 Water System Plan and is provided in Appendix 5A.

At the time that the WHPP was prepared the City had Wells 1 and 2 in operation and two additional wells, Well 3 (Casavante Well) and Well 3A, were identified as potential future sources. Since that time, Wells 3 and 3A have both been completely decommissioned. In addition, Well 1A has been drilled and placed into service in close proximity to Wells 1 and 2. Well 1 is now a monitoring well and Wells 1A and 2 are the City's production wells.

This WSP describes the development of new sources for the Yelm water system at the southwest Yelm wellfield. Development of these sources will increase the reliability of the system by moving production away from the downtown wells. Development of these sources will require that new WHPPs be prepared and approved by DOH for each source.

A WHPA is defined as the surface and subsurface area surrounding a well, wellfield, or spring that provides a public water supply through which contaminants are likely to pass and eventually reach the water well(s). In other words, it is the area managed by a community to protect groundwater-based public drinking water supplies. A typical WHPA consists of as many as five zones:

- The sanitary control area
- Three primary management zones, based on 1-, 5-, and 10-year time-of-travel rates
- A buffer zone, if necessary.

The first component of a WHPA is the protective area required by WAC 246-290-135 called a sanitary control area (SCA). The SCA for a well is required by the WAC to have a 100-foot radius unless an engineering justification shows that a smaller area can provide an adequate level of source water protection. This justification needs to address geological and hydrological data, well construction details, mitigation measures, and other relevant factors necessary to ensure adequate sanitary control. DOH may require a larger SCA or additional mitigation measures if land use, geological, and/or hydrological data support the decision.

It is the responsibility of the water purveyor to protect sources from existing and potential sources of contamination. Furthermore, the purveyor is required to prohibit the construction, storage, disposal, or application of any source of contamination within the SCA without the permission of the purveyor. The

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WAC requires that (a) the SCA be owned by the purveyor in fee simple, or (b) the purveyor have the right to exercise complete sanitary control of the land through other legal provisions.

Development of the WHPP requires the delineation of the WHPAs around the protected well. WHPAs are based primarily on travel-time-related capture zones. These zones are estimates of the region surrounding a well that contributes flow to a well within a specified time. As described in DOH's wellhead protection document the management zones are described as follows:

- **Zone 1.** This zone is defined by the surface area overlying the portion of the aquifer that contributes water to the well within a 1-year period. Within Zone 1, potential sources of microbial contamination should be managed strictly to eliminate or reduce the possibility that microbial contamination of the water supply will occur. The 1-year time of travel also defines the area for intensive management to protect the wellhead from direct chemical contamination. Within Zone 1, chemicals capable of contaminating groundwater should not be stored or used, or should be stored and used with sufficient precautions to protect the groundwater resource. A serious chemical release within Zone 1 may provide only a very limited time for a purveyor/community to respond aggressively, identify the spill, implement emergency remedial actions, and prevent the contamination from reaching the distribution system.
- **Zone 2.** The entire area within the 5-year time-of-travel boundary defines Zone 2. This zone should be actively managed for control of potential contaminants. The primary difference between potential contaminant sources for Zones 1 and 2 is that release in Zone 2 provides more time for response. All potential contaminant sources should be identified and controlled in this zone, with an emphasis on pollution prevention and risk reduction management.
- **Zone 3.** The outer border of Zone 3, the area within the 10-year time-of-travel boundary, determines the boundary of the WHPA. Within Zone 3, an inventory for potential contaminant sources should be conducted. High-risk operations and facilities should be identified and steps should be taken to reduce contaminant loading.
- **Buffer Zone.** The Buffer Zone is an area up-gradient of Zone 3. It can extend to include the entire zone of contribution or may focus on selected areas of concern such as recharge areas. The buffer zone can be used to provide an area of added protection for the WHPA. This zone helps compensate for errors when calculating WHPA boundaries, and provides information useful for long-term planning. A primary goal of the Buffer Zone is to provide information to planners on potential contaminant sources outside Zone 3 that have the potential for releasing contaminants into the WHPA.

Figure 5-1 presents the WHPA zones identified in the WHPP.

5.3 Contaminant Source Inventory

The City previously submitted a susceptibility assessment of its wells as part of the DOH-approved 1995 Comprehensive Water Plan Update. This assessment showed that the wells at the downtown wellfield, which now include Well 1A, are rated as being highly susceptible to potential contamination.

An inventory of the known and potential contaminant sources within the WHPAs is required as part of the WHPP. This inventory was updated in 2010 and the results of the inventory are included in Appendix 5B. The development of additional wells in the Southwest Yelm wellfield may change the groundwater flow and updates to the current WHPP may be necessary as a result.

The findings of the WHPP are required to be forwarded to state and local agencies in order for them to achieve the following objectives:

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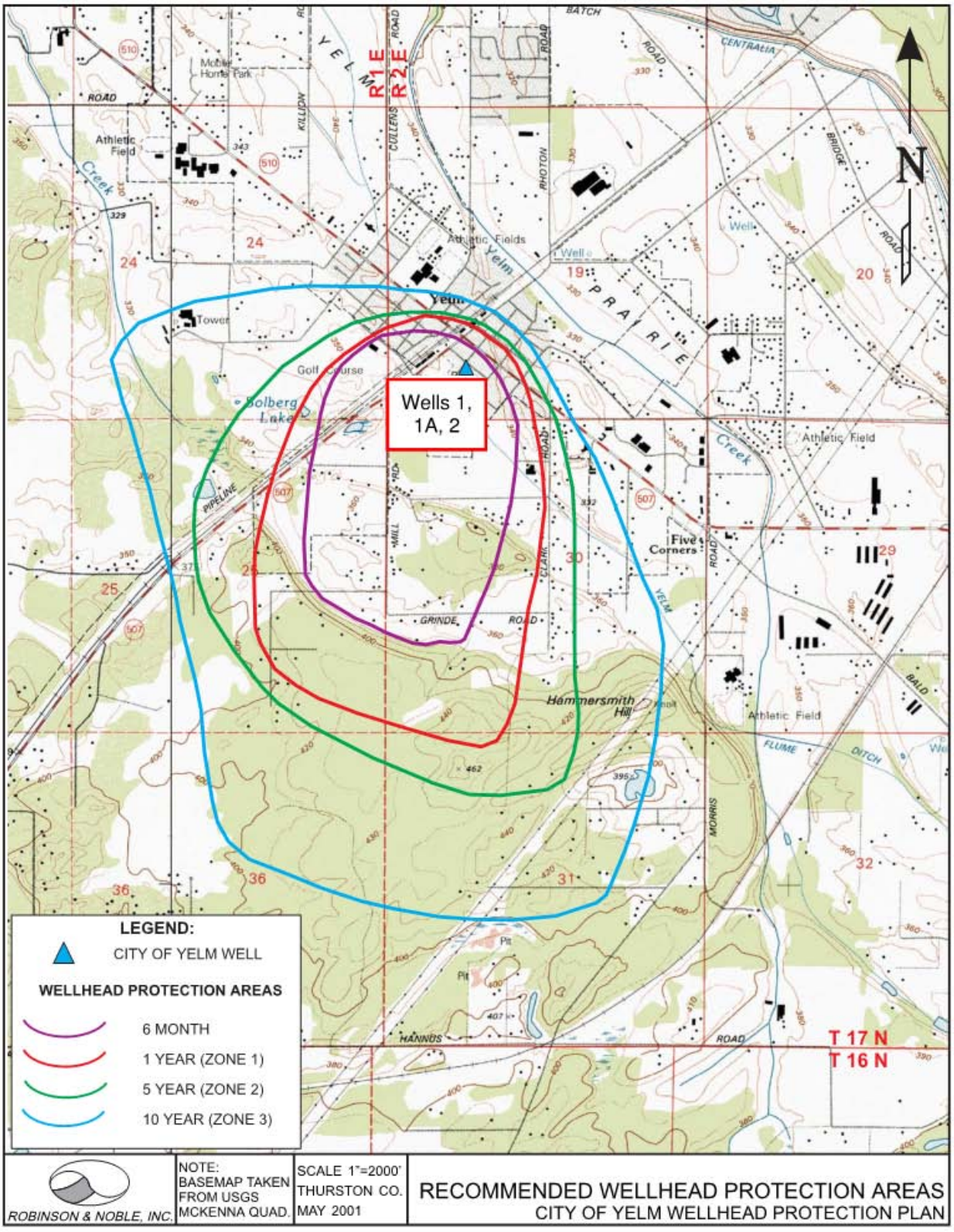

FIGURE 5-1

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- Help prioritize local and state pollution control outreach efforts
- Provide incentives for risk reduction by identified potential contaminant sources
- Be incorporated into local land use planning decisions.

The appropriate regulatory agencies, local governments, and owners and operators of known and potential sources of contamination identified in the updated inventory were notified in June 2010. Samples of the letters used to provide this notification and a list of recipients are provided in Appendix 5B.

5.4 Contingency Plan

5.4.1 Summary

A contingency plan is required as part of the WHPP. Contingency planning is important for all systems because, even with careful planning, unforeseen incidents can occur. Groundwater contamination can still occur due to leaks, spills, accidental releases, illegal discharges, and other activities in and around the WHPA. The specific response depends on the contamination type, size, and contamination source location.

Yelm's two main supply sources, Wells 1A and 2, are located in close proximity to one another, in the same aquifer, capture zone, and WHPA. The contamination of one well would likely mean that the second well would also be contaminated and Yelm is solely reliant on these two wells.

The City recognizes the need to implement a comprehensive contingency plan in the event that the existing wells become contaminated. The City currently has no alternative water supply sources. Well 3A was decommissioned after it was determined to be GWI (groundwater under the influence of surface water). In the event of a catastrophic failure of the City's other wells, Well 3A could be placed back into service but it is considered only an emergency backup. Well 3A is not currently connected to the system and would require some time to reconnect. Even as an emergency potable water source it would only have the capacity to produce water at a rate of 400 gpm.

The most effective contingency efforts will be the development of Southwest Yelm Well 1A, planned to be in operation in 2012. In addition to continuing with the planning, permitting, design, and construction of this well, this WSP presents an initial evaluation of the feasibility of developing other alternative water sources, including connection to the Nisqually Pines, McKenna, or Rainier water systems. This evaluation, presented below, shows that neighboring systems have little extra capacity and implementation of an inter-connection between the Yelm water system and one of these systems would have little benefit in terms of contingency planning for the loss of an existing source. If the City determines in the future that an interconnection is warranted, the next step in the planning process would be to negotiate an agreement with one or more adjacent water suppliers to secure an emergency water supply.

Trucking in water from Fort Lewis would be an option of last resort under dire emergency circumstances before seeking assistance from the National Guard, Red Cross, or other disaster relief agency.

5.4.2 Regulatory Guidelines

Guidelines for development of Contingency Plans are included in the Department of Health Water System Planning Handbook. Chapter 5, Source Water Protection, states the following:

> "A contingency plan is required. It should address long term replacement of the current principal source of supply (e.g., major well(s) or wellfield), and the cost of developing the new source of supply. This documentation can be integrated with the other contingency planning efforts described in Chapter 6, *Operation and Maintenance Program*."

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5.4.3 Alternate Drinking Water Supplies

The City of Yelm has assessed alternate sources of water supplies that may be exercised in case of emergency. The most cost-effective contingency plan for the City is to continue to pursue additional water rights that will allow the development of the Southwest Yelm wells. The City is currently working to develop the first Southwest Yelm well and plans to have it operational in 2012. The projected cost for Southwest Yelm Well 1A is $1,530,000. The new well would be used in conjunction with the existing downtown wells. The new well will be located approximately 1.7 miles from the downtown wells. Completion of the 6-year CIP (no MPC scenario) would result in the Yelm water system having sources at two separate locations (downtown and at the Southwest Yelm wellfield).

The following sections evaluate the feasibility of implementing an intertie with another water system in the area. Three water systems in the vicinity of the City of Yelm were identified as potential water sources in the case of loss of existing wells due to groundwater contamination or spills. Due to the size and capacity of these neighboring systems, the benefit of an intertie with a neighboring system in terms of providing long term replacement of existing sources is minimal. There may be some benefits to providing emergency interties from the City of Yelm to these systems. In the future, the City may explore the option of interconnecting to the neighboring systems.

5.4.3.1 Nisqually Pines

Nisqually Pines is a water system serving 2,000 residents located adjacent to Yelm. This is the largest neighboring water system and is also the closest system to the Yelm water system. It borders the northeastern service area, and could potentially be interconnected by extending the waterline northeast along Northern Pacific Road NW approximately one mile to the Nisqually Pines area.

According to DOH records, Nisqually Pines' wells have a total combined source capacity of 2.78 MGD. Between 2000 and 2002, the average annual withdrawal at Nisqually Pines was 192 acre-feet. Water right limitations restricted the system to a total annual withdrawal of 180 ac-ft, indicating that the Nisqually Pines system had very little, if any, additional capacity available (based on records obtained at the Department of Ecology). The system applied for additional water rights in 1999. If this application was approved, water rights would total 270 acre-feet. If the Nisqually Pines is able to secure additional water rights in the future, the City may re-evaluate the feasibility of an intertie. Table 5-1 summarizes information available for the Nisqually Pines system.

Table 5-1. Nisqually Pines Water System Summary

Population – 2,000				
Nonresidential Population – 0				
Total Approved Connections - 820				
Total Calculated Connections - 763				
184,000 Gallon Storage Capacity				
Source	Status	Effective Date	Usage	Capacity (gpm)
Well #2	Active	1993	Emergency	110
Well #4	Active	1970	Permanent	210
Well #3	Decommissioned	2002	Permanent	180
Well #5	Active	1970	Permanent	485
WF (Source 7)	Active	1997	Permanent	860
Well #6	Active	1970	Permanent	375

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5.4.3.2 McKenna

The McKenna water system serves 600 residents in a community located approximately 3.5 miles from downtown Yelm. Yelm's existing service extends to roughly a mile to the west of McKenna, and could be extended along State Highway 507. This assumes that a connection point can be established at State Highway 507 and 356th Street South in McKenna. Major crossings would include the Nisqually River, which would increase the cost of connecting. According to DOH records, McKenna currently has 67 available connections which could be available if an intertie were to be established. The amount of infrastructure construction which would be required is cost-prohibitive when compared with the available capacity. Information on the McKenna water system is summarized in Table 5-2.

Table 5-2. McKenna Water System Summary

Residential Population – 600				
Nonresidential Population - 0				
Total Approved Connections – 323				
Total Calculated Connections – 256				
Available Connections = Approved – Calculated Connections = 67				
120,000 Gallon Storage Capacity				
Source	Status	Effective Date	Usage	Capacity (gpm)
Well #2	Inactive	2000	Emergency	200
Well #3	Active	1970	Permanent	150
Well #4	Active	1997	Permanent	270

5.4.3.3 Rainier

The Rainier water system serves 1,675 residents in a community located approximately 5.5 miles southeast of downtown Yelm. An interconnection to Rainier would require extending a waterline southwest along State Highway 507, assuming that a connection point can be established at State Highway 507 and Centre Street in Rainier. The extension would require crossing a railroad corridor, which would increase the cost of connecting. According to the City of Rainier's 2007 Comprehensive Plan, the total source capacity, including emergency sources and restrictions due to water rights, is 0.79 mgd. Based on DOH records, the system has the capacity to support 234 additional connections. Given the costs associated with constructing infrastructure, it is unlikely that an intertie between Yelm and Rainier would be beneficial. Information on the Rainier water system is summarized in Table 5-3.

5.5 Spill Response Plan

A spill response plan is required to be part of the WHPP. In the event that a spill threatens or impacts the City's water supply, the City needs to coordinate with local emergency responders (e.g., police, fire department, Washington State Patrol), DOH, the Ecology Spill Operation Section, CTED's Emergency Management program, and the Thurston County Health Department.

The City's Spill Response Plan is provided in Appendix 5C and includes the following information:

1. Identification of potential spills and discharge prevention measures
2. Spill response procedures and critical City staff notification information, including a phone tree that covers all City departments.

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Table 5-3. Rainier Water System Summary				
Residential Population - 1,675				
Nonresidential Population - 1,000				
Total Approved Connections – 924				
Total Calculated Connections – 690				
Available Connections = Approved – Calculated Connections = 234				
385,000 Gallon Storage Capacity				
Source	Status	Effective Date	Usage	Capacity (gpm)
Well #1	Active	1970	Emergency	50
Well #3	Active	1970	Permanent	200
Well #2	Active	1970	Emergency	50
Well #4	Active	1970	Permanent	50
Well #6	Active	1996	Permanent	200

3. A list of regulatory agencies that require notification along with their addresses and phone numbers. The method and responsibility for contacting the following agencies are identified:
   - Washington State Department of Health
   - Washington State Department of Ecology
   - Thurston County Environmental Health
   - U.S. Environmental Protection Agency (EPA).

5.6 Watershed Control Program

The City's potable water supply is from groundwater sources. The City has no surface water supply sources, nor does it plan to develop a surface source. Consequently, a watershed control program is not required.

5.7 WHPP Deficiencies and Improvements

The WHPP analysis presented above identifies the following action items to be undertaken:

1. Prior to Southwest Yelm Well 1A being placed into production, a WHPP will be prepared and submitted to DOH for review.

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