Planning and Financial Viability

Water System Planning Guidebook

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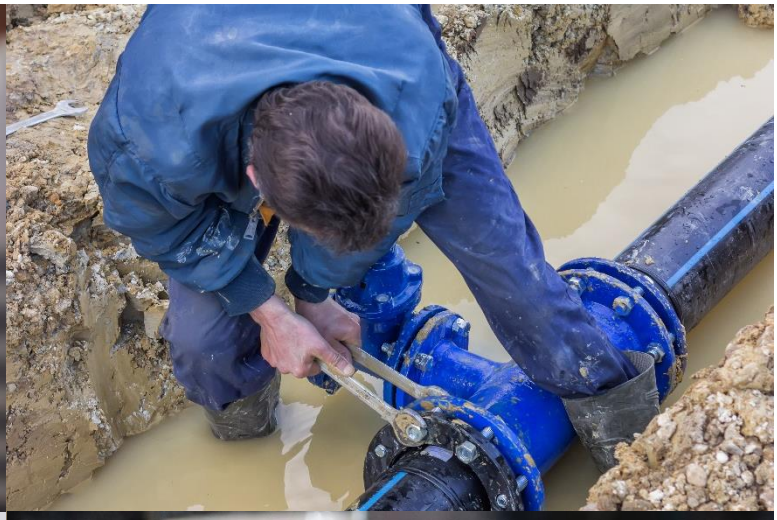

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INTRODUCTION

Water System Planning Guidebook Purpose

The mission of the Department of Health (DOH) Office of Drinking Water is to work with others to protect the health of the people of Washington state by ensuring safe and reliable drinking water. We believe water system owners and governing board members, operators, community planners, and consulting engineers share this mission.

The principal goal of water system planning is to identify current demands and future needs and apply available resources most efficiently in order to provide high quality service at the lowest cost while protecting the community's health. Planning is a cornerstone of water system capacity. Water systems with strong technical, managerial, and financial capacity are well positioned to provide efficient, high quality service now and into the future.

All public water systems **must** develop and implement a technical, managerial, and financial plan appropriate to the system's size, complexity, and performance; expected demographic changes; community-specific resource constraints; and planning history (see WAC 246-290-100 and 105). We know water systems with resilient capacity continually plan, do, check, and plan again in a step-by-step process to achieve their strategic objectives, including delivery of safe and reliable drinking water.

Planning Tip

After scoping your WSP or plan update, and before your planning work begins in earnest, contact your regional planner to schedule a preplan conference.

Please do not rely solely on this guidebook to establish the appropriate level of planning for your water system.

Prior consultation with our planners, together with the information in this guidebook, will clarify expectations, identify areas of focus, and reduce the time it takes to prepare, review, and approve the plan.

Our *Water System Planning Guidebook* DOH 331-068 is written to help water system governing bodies and managers understand their role in water system planning, and assist water systems and their consultants prepare a Water System Plan (WSP) that satisfy planning requirements outlined in WAC 246-290-100. This guidebook presents a framework and orderly process to build an appropriate plan for each water system. Water systems preparing their WSP are not required to follow this framework, but must include all required information.

Elements of technical capacity are found in chapters 2, 3, and 6; managerial capacity in chapters 1, 4, 5, 7, and 10; and financial capacity in chapters 8 and 9. To learn more about water system capacity, see *Water System Capacity* DOH 331-283 and visit our Capacity Development webpage.

Planning Requirements

Community water systems falling in one of the following categories must prepare a WSP and submit it to DOH for review and approval (WAC 246-290-100(2)).

- Community systems serving one thousand or more service connections.
- Community systems required to develop WSPs under the Public Water System Coordination Act of 1977 (chapter 70.116 RCW).
- Community systems experiencing problems related to system capacity, as determined by DOH.
- All newly created community systems.
- Community systems proposing to:
  - Increase or otherwise modify the service area identified in a previously approved planning document.
  - Increase the geographical area where direct service is provided if a planning or engineering document has not been previously approved.
  - Install additions, extensions, or changes to existing source, storage, or transmission facilities and increase the approved number of service connections.
  - Any system proposing to use the document submittal exception process in WAC 246-290-125.
  - Any system operating under or proposing to operate under an unspecified number of service connections.

All other community, non-transient non-community, and transient non-community water systems must develop and implement a Small Water System Management Program (SWSMP) (see WAC 246-290-105). With the following exceptions, a water system is not required to submit a SWSMP for approval.

- Chapter 246-296 WAC identifies an approved WSP or approved SWSMP as an eligibility requirement for a drinking water state revolving loan.
- New non-transient non-community water systems must submit a SWSMPs for approval.
- Any non-community water system with demonstrated operational, managerial, or financial problems, and we determine submitting their SWSMP for our review and approval will help correct those problems.
- Any non-community water system wishing to obtain existing system as-built approval. Existing system as-built approval is up to the discretion of DOH.

A current WSP or SWSMP is required for a system to be eligible for Drinking Water State Revolving Fund (DWSRF) applications and may be applicable for other water funding programs, such as Public Works Trust Fund (PWTF), Community Development Block Grant (CDBG), and United State Department of Agriculture (USDA) Rural Development.

See *Planning Requirements for Public Drinking Water Systems* DOH 331-202 and the guidebooks for developing SWSMPs for community water systems (DOH 331-134) and non-community water systems (DOH 331-474) for more detail.

Pre-Planning Conference

We recognize water system size, complexity, resources, etc. will differ from one system to another. Since no two water systems are identical, there is no fixed scope and level of detail required for all WSPs. WAC 246-290-100(3) recognizes this fact, and invites water systems to enter into a discussion over the

appropriate scope and level of detail needed in each section of the WSP **before** the water system and engineering consultant prepare the plan. This pre-plan conference is grounded in the water system's current circumstances, intended to address priorities as seen by the water system and DOH.

Water systems should track expiration of their current WSP approval and contact the regional planner to schedule a pre-plan conference about two years before the date the current plan approval will lapse. The regional office planning team—consisting of the regional planner and regional engineer—are available to help coordinate conference scheduling.

Pre-plan conference attendees differ based on each individual water system's circumstances. The regional planner and regional engineer will attend. The water system manager and consultant(s) should attend. We may invite representatives of the Utilities and Transportation Commission and the Department of Ecology, as agreed upon by our interagency Memorandum of Understanding with these agencies. We may also invite federal, tribal, and other state and local government representatives as appropriate. We suggest water system managers extend an invitation to a representative of the water system governing board, operations staff, and the treasurer or finance manager.

We will provide a pre-plan checklist that specifically addresses each item in WAC 246-290-100 as applied to the unique situation of the water system. Topics typically covered during the pre-plan conference include:

- Water system planning priorities.
- DOH planning priorities.
- Local government(s) from whom the water system must obtain a consistency statement.
- Limiting factor(s) analysis (i.e., source, storage, transmission).
- Water rights.
- Asset management, financial viability, and rate setting.
- Data availability (population, water production, water consumption, distribution system leakage).
- Tribal interests and tribal coordination (as applicable).
- SEPA responsibilities.
- Sections of the plan that may be completed by a non-professional engineer (see below).
- Plan approval period.
- Adjacent water systems and needed water system coordination
- Coordination Act requirements (as applicable).
- Plan approval and local adoption process. See *Approval Requirements for Water System Plans* DOH 331-368.

After each pre-plan conference, the regional planner documents and shares the meeting notes with each participant, including agreed-upon scope, level of detail, and anticipated or expected draft submittal date.

Circumstances may change between time of the pre-plan conference and submittal of the planning document, warranting change in scope of the planning document. If DOH staff, the water system, or

other pre-plan participants identify such a change, the DOH planning team, in consultation with the water system, may amend the pre-plan agreement prior to planning document submittal.

Plan Submittal

Water systems must submit their WSP to DOH for review and approval. DOH approval of a WSP is effective for up to ten years from the date of written approval unless we request an updated plan. Water systems should prepare a WSP update sufficiently in advance so that they obtain DOH approval before the current plan approval expires. We suggest submitting the WSP update one year before the date current plan approval will lapse.

Water systems should submit planning documents in paper and electronic form. Depending on the regional office, the water system may be asked to submit its plan in paper format, electronic format, or both. We will discuss submittal format, number of copies, and who should be sent a copy of the plan at the pre-plan meeting. A completed *Water System Plan Submittal Form* DOH 331-397 is required when submitting a WSP for approval.

Other Agencies

DOH water system planning requirements attempt to bring together the interests of many of our partners, including local governments, Tribes, and sister agencies. The planning process enables information sharing and engagement with these partners. The DOH approval process for a WSP is not intended to be an enforcement tool for another agency's requirements. However, another agency's appealable action may impact DOH approval.

Plan Approval Period

Identify your **plan approval period** as you consider priorities and scope of your new or updated WSP. This is the period, from the date of DOH approval, that such approval will be effective. WAC 246-290-100(9) allows you to designate a plan approval period for up to ten years. Please note the need for consistency with your designated plan approval period throughout your WSP. As you will read in more detail later in this guidebook, it is necessary to identify project, spending, water use efficiency, water resource analysis, and budget information for each individual year within your selected plan-approval period.

WSP Review

Under RCW 43.20.250, we have 90 days to complete our initial review of the planning document. If necessary, we can extend the review period for another 90 days but must notify the water system within the first 90 days of the extended review period. The 90-day review period begins when we deem the submittal complete in scope.

While it rarely occurs, we have received a few WSP documents that were deemed grossly deficient in scope, level of detail, and/or accuracy. If this occurs, our planning team will offer a meeting with the water system, consultant, and other interested parties to discuss the deficiencies, redirect the planning effort, and reestablish or reinforce the re-submittal scope and level of detail. If the water system does

not agree to voluntarily rescind the document, the planning team may reject and return the document. In doing so the planning team will provide general comments describing the draft plan's inadequacies and inaccuracies.

When we are ready to approve the WSP, we will notify the water system to submit a signed resolution or other form documenting WSP approval by the governing body (WAC 246-290-100(8)(b)). We will issue WSP approval upon receipt of this documentation.

"Must" versus "Should"

Throughout this guidebook we use "must," "will," "shall," or "required" when practice is sufficiently standardized to permit specific delineation of requirements, or where safeguarding public health justifies definitive criteria or action (such as state statute or rule requirements). Consultants and water systems have an obligation to satisfy the criteria in such instances.

"Should" or "recommend" indicate procedures, criteria, or methods that represent our view of best practices and can be approached with some degree of flexibility. Consultants and water systems need to explain the basis of the altered approach or, in specific circumstances, why another approach may be more applicable.

We base our recommendations on our experience and role of asking questions to help water systems develop the best plan possible for a given planning period. Each water system begins a planning effort at a unique starting point. Asking good questions helps identify potential risks and consequences around an issue so that a water system can set priorities consistent with their understanding of these risks. Above all, we want water systems to be successful in providing safe and reliable drinking water now and into the future.

Professional Engineering Requirements

WAC 246-290-040 requires the water system to secure the services of a licensed, Professional Engineer (P.E.) to prepare a WSP under WAC 246-290-100. A P.E. is not required to prepare an SWSMP under WAC 246-290-105.

Some WSP elements are best developed by water system staff, while other plan elements must be completed by a P.E. We do not intend to define the practice of engineering—that is the purview of the Washington State Licensing Board. The DOH planning team, the water system, and their consulting engineer should discuss at the pre-plan conference who is most appropriate to develop the individual elements of a WSP.

A P.E. must stamp the entire WSP if it is the initial WSP submitted by the water system. A P.E. may stamp only those WSP update or amendment portions that the water system and its consulting engineer agree includes engineering-related subject matter.

Municipal Water Law

The planning requirements of the 2003 Municipal Water Law (MWL) apply to Municipal Water Suppliers (MWS). MWS were granted more water right flexibility and certainty in exchange for addressing additional topics in their planning documents, such as:

- Consistency with local government plans.
- Identification of Retail Service Area (RSA) and affirmation of the duty to serve within the RSA.
- Completed water use efficiency program.

The water rights place of use is the area within which the water system has the right to supply water. Under the MWL, approval of an MWS's WSP administratively changes the water right(s) place of use to the service area described in the approved plan. In other words, water system planning is the vehicle used to communicate future service plans and coordinate those plans with other local and state agencies. For more information visit our Municipal Water Law web page.

Municipal Water Suppliers. Certain sections of this guidebook apply only to an MWS. RCW 90.03.015 defines a MWS to include all water systems that serve 15 or more residential connections, which includes most Group A community water systems. However, not every Group A system is an MWS.

Our regulations consider both residential and non-residential connections when defining group classification (i.e., Group A or Group B), and public water system type (i.e., community, non-transient non-community, and transient non-community). See WAC 246-290-020 for more details. A water system using a water right to serve 15 homes matches the definition of an MWS. A water system serving 14 homes and a business would not match that definition because a business is a non-residential connection. Both systems, however, are Group A community water systems because they both serve 25 or more of the same residents.

Some non-community water systems may be an MWS. Non-community water systems providing water used in a residential manner (such as drinking, cooking, cleaning, and sanitation) may be considered an MWS. A second home development serving 15 or more residences occupied less than 180 days but more than 60 per year is an example of a non-community MWS.

The Department of Ecology determines if a water right is applicable for municipal purposes. DOH determines whether a water system is an MWS or not. Owners of a non-community water system uncertain whether its water right is for municipal purposes or not should contact the Department of Ecology. Owners of a non-community water system meeting the definition above of an MWS should contact the DOH regional planner.

Review Fees

Our review of planning documents are assessed a review fee based on the size of the water system and/or the number of reviews. The current DOH review fee schedule can be found in WAC 246-290-990. These fees may change periodically. After we complete a detailed review of the WSP, we will issue a comment letter or approval to the water system owner with an invoice for the review fee. A fee

estimator worksheet is available through our Water System Design webpage. A copy of the comment or approval letter is sent to the consulting engineer, the Department of Ecology, and each local government.

Notes on this Guidebook

We're interested in hearing from users of the *Water System Planning Guidebook*. Please contact one of our regional offices with any comments or questions. We periodically review our planning guidance and update it as appropriate.

This guidebook serves as an index for a host of other guidance publications. These additional guidance publications are summarized at the end of each chapter, listed in alphabetical order.

Publications Reference List

Approval Requirements for Water System Plans DOH 331-368

Planning Requirements for Public Water Systems DOH 331-202

Small Water System Management Program Guide for Community Water Systems DOH 331-134

Small Water System Management Program Guide for Non-Community Water Systems DOH 331-474

Water System Capacity DOH 331-283

Water System Plan Submittal Form DOH 331-397

CHAPTER 1 DESCRIPTION OF THE WATER SYSTEM

Objective

This chapter's objective is to provide basic water system information that serves as a foundation for developing a comprehensive planning document meeting current and future water system needs.

Plan Content

This chapter addresses the following topics.

1.1 Ownership and Management
1.2 System History and Background
1.3 Related Plans
1.4 Service Area, Maps, and Land Uses
1.5 System Policies
1.6 Duty to Serve
1.7 Local Government Consistency
1.8 Watershed Consistency

1.1 Ownership and Management

Purpose. Identifies the water system ownership and management structure under which it plans, operates, and satisfies the requirements of WAC 246-290-100(4)(a)(i). A thorough planning document begins with the people and the organizational structure they work in.

Ownership. Identify owner type (e.g., association, investor, special purpose district, city/town, private, county, state, or federal). If the owner is related to another organization, such as a subsidiary or parent company, describe the relationship and how it affects development and implementation of water system policies, resources, budget, legal responsibility, and decision-making. The owner has the fiduciary responsibility for the water system and ensures that the water system has technical, managerial, and financial capacity to provide safe and reliable drinking water now and into the future. Identify if the water system is currently regulated by the Utilities and Transportation Commission (UTC), or is expected to be placed under UTC regulation within the next ten years. For more information on UTC regulatory scope and authority over water systems, see Chapter 9 and visit the UTC web site.

Management. Identify the organizational structure and individuals responsible for setting and implementing policy, establishing and carrying out operating practices, budgeting, disseminating public information, enforcing local ordinances and by-laws, and prioritizing resources. The Certified Operator is "in responsible charge" to make decisions that directly impact water quality and quantity, or public health protection of the water system; and daily operational activities, process control, or system

integrity of a water treatment plant or distribution system (WAC 246-292-101(46)). Include individuals outside the organization with any of these responsibilities, such as attorneys, consulting engineers, contractors, and satellite management agencies.

Include any other names, addresses, and telephone numbers of the owner(s), operator(s), and emergency contact person(s) for the system not included in the Water Facility Inventory (WFI). Place an updated WFI in the WSP appendix. Include other relevant information in this chapter's narrative.

1.2 System History and Background

Purpose. Provides geographic and historical context for the WSP and satisfies the requirements of WAC 246-290-100(4)(a)(ii). Describing the trajectory of the water system through time provides meaningful context to predictions and expectations for the future.

Geography. Describe the geographic features of the water system's service area that affect the provision of water service and consumer demand. These may include natural barriers to water service such as flood plain or other natural hazard zones, rivers, and freeways; topography dictating the need for multiple pressure zones; irrigation systems that provide non-potable water for use during the growing season; and rainfall and soil type as these may affect the outdoor use of water.

History. Briefly describe the water system's history. Emphasize past growth type and reasons for this growth. Discuss past means of supplying water to the area. Take note of the way the water system and its predecessors responded to prior growth in order to explain how historical responses apply to present and future water system direction. Present a chronology of major system facility improvements and expansion of the system, and highlight significant events such as response to contamination or water shortage.

1.3 Related Plans

Purpose. Identify and discuss related plans This section recognizes the applicability of related plans, and documents how they could affect water system planning, operation, and management and satisfies WAC 246-290-100(4)(a)(iii) requirements. A thorough WSP cannot be created or implemented in isolation to other plans guiding the community.

> **Planning Tip**
>
> Developed but not yet adopted plans and draft plan updates provide context and helps the water system prepare for change; however, land use, projected population, and other planning data should be based only on adopted plans.

Adopted plans. Discuss the following adopted plans in the WSP, as applicable. Place emphasis on how related plans affect system planning and operations, including topics such as population and demand forecasting; development, design standards, and fire flow requirements; water availability; and the type and level of coordination with nearby water systems.

- City and county comprehensive plan.
- Local land use and zoning.
- Coordinated Water System Plans (CWSP).
- Abbreviated Coordinated Water System Plans (ACWSP). See RCW 70.116.050.

- County water and sewer general plans. See RCW 36.94.030.
- Groundwater management plans.
- Watershed plans for Water Resource Inventory Areas (WRIA).
- Regional water supply plans.
- Water system plans for:
  - Water systems located within and adjacent to the service area.
  - Consecutive water systems.

1.4 Service Area, Maps, and Land Use

Purpose. The maps and land use section satisfies some of the requirements of WAC 246-290-100(4)(a)(iv). Depicts and describes service area boundaries and land use that affect water system planning. Service area and land use maps visually inform the reader of the community's unique attributes, and place many other parts of the WSP—not least of which is population and demand forecasting—into useful context.

Service area maps. Include a map of the system's service area and retail service area. Multiple layers may be shown on the same map. Please provide a clear legend, scale, and date on each map. The map(s) should depict the service areas of adjacent water systems, the location of the water system's emergency and non-emergency interties, and the service areas of each system that is planned or considered for consolidation.

Include the following maps in the WSP.

- **Service area.** The service area includes all of the following.
  - The specific area in which the water system currently makes direct service connections available.
  - The service area of other public water systems to which wholesale water is provided through a permanent or seasonal intertie.
  - Areas planned for future water service.

Under the MWL, approval of a municipal water supplier's WSP administratively changes the water right(s) place to the service area described above. As such, the water right place of use is identical to the designated service area. The water right place of use is the area within which the water system has the right to supply water. See Section 1.8 for additional guidance.

The service area of a water system located in a Critical Water Supply Service Area (CWSSA) already includes its future service area (as that term is defined under Chapter 70.116 RCW and Chapter 246-293 WAC), as well as its retail service area.

If a water system wants to serve outside of its approved service area it must first update its WSP.

- **Retail service area.** A Retail Service Area (RSA) includes the area for which the water system accepts a duty to serve (See Section 1.6). The RSA includes the properties of all existing direct services and clustered entities, parcels that the system has an obligation to serve, and parcels that the system accepts a duty to serve. A water system is not

required to provide service outside of its RSA. However, a water system may provide service outside of its RSA if its policies permit it. See *Municipal Water Law: Duty to Provide Service Requirement* DOH 331-366 and *Municipal Water Suppliers: Service areas in Planning Documents* DOH 331-432 for more information.

- **Coordinated WSP.** Systems located within a CWSSA can supply a map that demonstrates its service area is identical to the boundaries shown in the coordinated WSP, or a signed service area agreements, or both, supporting a change to the coordinated WSP service area map.

Elements to be included on other maps. Include other maps to satisfy water rights place of use, local government consistency, and demand projection needs.

- **City and county boundaries.** For the purposes of determining consistency with local plans and regulations, provide applicable city and county boundaries.
- **Land use and zoning maps.** For the purpose of projecting future demand and determining consistency with local plans and regulations, include land use and zoning maps. Include a legend and brief narrative describing the permitted uses within each zone or land use area.
- **Other public water systems.** Include service area information for public water systems located adjacent to and inside the water system's service area. Sources of service area information include the adjacent water systems themselves, the county's coordinated WSP service area map, the county utility service office, and county GIS data base.

1.5 System Policies

Purpose. This section documents adopted policies that affect system planning and operations and satisfies some of the requirements of WAC 246-290-100(4)(a)(v). Every water system has policies governing its management and administration. Many water systems have inter-local agreements for mutual aid, water supply, service area boundaries, or dispute resolution. Including this information helps DOH identify any critical gaps in authority, failure to comply with state rules, and missed opportunities to strengthen the technical, managerial, and/or financial capacity of the system.

Service area agreements. Service area agreements between water systems is a foundational element of the Public Water System Coordination Act. The agreement governs where each water system is permitted to provide service in the future. Describe or reference each agreement as applicable to planning for the provision of water service. Include a copy of each service area agreement in the "Other Documents" chapter of the WSP. For water systems not located within a CWSSA:

- Service area agreements may be required by county government under the growth management act.
- All systems should attempt to enter into service area agreements with neighboring water systems.

Service area policies. These guide the water system's infrastructure development and financing and direct how a water system responds to requests for water service. Service area policies should be

derived from the goals of the water system and be clearly defined prior to submitting the WSP. There is a wide variety of service area policies that should be addressed. For a list of the kinds of policies to consider, please see *Service Area Policies* DOH 331-438.

Annexation. Cities, towns, and special purpose districts add new territory through the annexation process. This may affect your water system. Address the following policy questions.

- Is annexation or a signed annexation agreement required prior to obtaining water service?
- How does city, town, or district annexation relate to the provision of water service?
- Do different design and performance standards apply in different jurisdictions?

Consolidation. We encourage all water systems to evaluate water system consolidation opportunities to take advantage of economies of scale. Consolidation begins with identifying adjacent water purveyors and developing proactive policies that engage and encourage partnerships. Over time these partnerships can transition into combining management, planning, finances, and operations into one consolidated entity.

Conditions of service. Discuss the specific requirements that facilitate implementation of the water system's service area policies. For more information on conditions of service, please see *Service Area Policies* DOH 331-438. For more information on "timely and reasonable" standards for both municipal water suppliers and CWSSA systems, see *Timely and Reasonable Water Service* DOH 331-444.

Satellite management. A Satellite Management Agency (SMA) is a person or entity that owns or manages and operates public water systems without the necessity for a physical connection between the systems.

Satellite management agency requirement. Water systems **must** report whether they are, or may be required to be owned or operated by an SMA (WAC 246-290-100(4)). All newly created water systems must be owned or managed and operated by an approved SMA if an SMA is available. An existing water system created on or after July 1, 1995, that is now in violation of financial viability or other operating requirement(s) and was approved without SMA ownership or management shall be owned or operated and managed by an SMA if such ownership or management can be made with reasonable economy and efficiency (WAC 246-290-035).

Water systems owning or operating satellite systems. If the water system has a large service area extending well beyond its current distribution system, include a policy on whether and when new developments within the undeveloped portion of the service area must either connect directly to the water system or operate as a satellite (or remote) system. If satellite systems are allowed, include the conditions and standards under which a satellite system may be created and criteria for determining if and when the satellite system must connect to the main system. Newly developed satellite water systems within an existing system's CWSSA are not required to be owned or operated by an SMA if the existing system agrees to own the new satellite water system.

Water systems owned or operated by an SMA. Systems owned or operated by an SMA **must** identify the SMA and services the SMA provides to the water system (WAC 246-290-100(4)). If the water system is owned or managed and operated by an SMA, include a signed operations contract in the WSP Other Documents chapter (see Chapter 10 of this guidebook). If the system is managed and operated by the SMA, provide documentation that the SMA is performing, at a minimum, all of the duties of a certified operator in responsible charge. For more information on the duties of an operator in responsible charge, see *Waterworks Operator Certification Program Guideline* DOH 331-109.

1.6 Duty to Serve

Purpose. This section documents the processes associated with the municipal water supplier's duty to serve under the MWL and satisfies requirements of WAC 246-290-106. This section applies to MWS only. The duty to serve within the retail service area is an integral component of the MWL, and water systems must fulfill this responsibility in order to receive the benefits of the law.

Duty to serve statement. All MWS have a duty to serve their retail service area (see Section 1.4). A WSP submitted by a MWS **must** affirm the water system has a duty to serve an applicant for new service within its retail service area when the following four thresholds are met (WAC 246-290-106). The WSP must include this threshold list.

- The water system has sufficient capacity to serve water in a safe and reliable manner.
- The service request is consistent with adopted local plans and development regulations.
- The water system has sufficient water rights to provide service.
- The water system can provide service in a timely and reasonable manner.

WSPs typically list these thresholds as part of the duty to serve statement. Address how each of the four thresholds is evaluated at the time of the service application. Examples include:

- Keep accurate account of the number (and associated demand) of new connections placed in service and ensure the system does not exceed its approved number of connections.
- Signed determinations by the appropriate city, town, and county planning departments confirming consistency with adopted local plans and development regulations.

For additional information on duty to serve, see *Municipal Water Law: Duty to Provide Service Requirement* DOH 331-366.

1.7 Local Government Consistency

Purpose. The local government consistency section satisfies the requirements of WAC 246-290-100(7) and WAC 246-290-108 for municipal water suppliers. Insuring consistency between the WSP and local comprehensive plans, development regulations, and other local codes supports orderly planning and development, minimizes conflicts and legal entanglements, and is necessary to receive the benefits of the Municipal Water Law (see RCW 43.20.260), including expanding a water right place of use. See *Municipal Water Law: Expanding a water right place of use* DOH 331-367.

Applicable subjects of review. A local government consistency review covers the following subjects:

- Land use and zoning.
- Growth projections for the plan approval period.
- Water system service extension policies.
- Service area policies.
- Critical areas.
- Other relevant elements related to water supply planning as determined by DOH. See *Local Government Consistency—Other Relevant Elements* DOH Policy B.07.

Documenting consistency. Use the *Local Government Consistency Determination Form* DOH 331-568 to document consistency with local plans and regulations. The WSP **must** contain a completed and signed determination form from each city, town, and county whose boundaries lie within the MWS's service area (WAC 246-290-108). Additionally, for water systems located within a CWSSA we suggest you check with the local Coordinated Water System Plan administrator to determine whether our local government consistency form suffices, or if the administrator requires use of a separate CWSP consistency form.

If the local government does not respond, WAC 246-290-108(3) outlines contingent procedures. If local government(s) find that a WSP is inconsistent with their locally adopted plans or regulations, provisions in WAC 246-290-108(2) apply.

1.8 Watershed Plan Consistency

Purpose. Documents municipal water supplier's compliance with MWL criteria to permit expansion of its certificated water rights place of use to equal the service area (see Section 1.4) and satisfies some of the requirements of WAC 246-290-107. This section applies to municipal water suppliers only.

Determination by Ecology. For municipal water suppliers expanding their water rights place of use, the new area within the water rights place of use service area must be "not inconsistent" with any watershed plan approved under Chapter 90.82 RCW or a comprehensive watershed plan approved under RCW 90.54.040(1) after September 3, 2003, if such a watershed plan has been approved for the area (WAC 246-290-107). Contact the Department of Ecology regarding compliance with this requirement prior to submittal of the WSP to DOH. Include Ecology's determination in this chapter's narrative and all related correspondence in the WSP *Other Documents* chapter.

Publications Reference List

Local Government Consistency Determination Form DOH 331-568

Local Government Consistency—Other Relevant Elements DOH Policy B.07

Municipal Water Law: Duty to Provide Service Requirement DOH 331-366

Municipal Water Law: Expanding a water right place of use DOH 331-367

Municipal Water Suppliers: Service areas in planning documents DOH 331-432

Service Area Policies DOH 331-438

Timely and Reasonable Water Service DOH 331-444

Waterworks Operator Certification Program Guideline DOH 331-109

CHAPTER 2 BASIC PLANNING DATA

Objective

Provides current population and water demand information; estimates future population and water demand; validates data; and compares these estimates with locally adopted plans.

Chapter 3 of the *Water System Design Manual* DOH 331-123 (WSDM) supplements guidance presented below. We wrote the WSDM with the intent to support water system planning efforts. WSDM Chapter 3 focuses on evaluating production and consumption data, estimating demands, and generating water system Equivalent Residential Unit (ERU) values. DOH planners and engineers involved in review of WSPs will refer to the WSDM when participating in pre-planning conferences and during review of WSPs submitted for approval.

Planning Tip

WSDM Chapters 3 and 4 were written with water system planning in mind. These chapters provide guidance on using water production and consumption data to predict future demands and assess a water system's capacity to serve additional customers.

Plan Content

This chapter addresses the following topics.

2.1 Current Population, Service Connections, and Equivalent Residential Units (ERUs)
2.2 Water Production and Usage
2.3 Distribution System Leakage
2.4 Water Supply Characteristics
2.5 Water Supply Reliability Evaluation
2.6 Future Population Projections and Land Use
2.7 Future Water Demand

2.1 Current Population, Service Connections, and ERUs

Purpose. Identifies current population, service connections, and ERUs of the water system, and satisfies requirements of WAC 246-290-100(4)(b)(i). In order to establish useful projections, planners need to start with accurate accounting of current service population, number and type of connections served, and the number of ERUs supplied by the system. Future water system demands are based in part on this information.

Current population. Identify the current residential and non-residential population served. The current residential and non-residential population presented in the plan should equal the totals listed on the water system's WFI.

For most communities, resident population has a much greater effect on water system planning than non-resident population. It is important to account for as many of the people that reside for at least

180 days per year in your community as possible. Recommended methods for estimating residential population include:

- **Housing Unit Method.** Obtain average population per residential unit (including single-family and multi-family dwellings). To determine residential population served, multiply number of residential dwellings by average household population for the area. Housing unit and average household size information for counties, cities, and towns is available on the Office of Financial Management (OFM) website. Please note that housing unit method will not count individuals living in dormitories or institutions, such as college students, farm worker housing, and residents housed in correctional institutions. Add these populations to the housing unit method total.
- **Annual April 1 OFM Estimate.** Use this information if the water system service area is the same as the area used in the population estimate. To bring population estimate up to date, apply the latest population trend information (annual rate of increase) to the latest official OFM estimate. To estimate people served outside OFM census areas, apply housing unit method by multiplying average household size by number of dwelling units (single family homes plus multi-family dwellings such as apartments, condominiums, and duplex units) located outside OFM census areas.

OFM resident population information includes college students, military duty personnel, and dependents, and any correctional institution population. Seasonal, vacation, and day-visitor populations values are not included in OFM resident population estimates.

Many community water systems serve non-resident populations. Some, like large metropolitan areas, draw daily non-residents (students, commuters) in numbers that are significant to their resident population. Other communities hold events or have attractions that draw significant numbers of visitors. Some examples of non-resident populations to consider include:

- Daily student commuter (not otherwise counted as a resident of the water system service area) population, including public and private primary and secondary schools, and post-secondary institutes of higher learning (community college, college, university).
- Daily employee commuter (not otherwise counted as a resident of the water system service area) population.
- Seasonal or migrant workers.
- Seasonal residents and tourists.
- Events or attractions that draw a significant number of day visitors from outside the community, such as state or local fairs, sporting events, festivals, and performances.

Total service connections. Identify current number of service connections for each customer class. Commonly used classes are: Single Family Residential, Multi-Family Residential, Commercial, Industrial, and Institutional. In accordance with the *WFI Instructions* DOH 331-621, count each multi-family dwelling unit as a separate connection, but do not count the multi-family building itself as a separate connection. Show this information in table format. See Worksheet 4-1 from the WSDM.

Equivalent residential units. Water systems **must** establish the average daily and maximum daily demand of a typical single family residence served by the system (WAC 246-290-222). An equivalent residential unit (ERU) is central to the evaluation and design of water systems with significant residential demand. An ERU is defined as "a system-specific unit of measure used to express the amount of water consumed by a typical full-time single family residence," WAC 246-290-010. This value is particular to the existing water system from which it was derived. ERU values reflect various demand scenarios. These terms are defined below.

- **ERU_{MDD}** is the amount of water consumed by a typical full-time single family residence during high demand. It is intended to approximate maximum daily demand of a typical full time single family home. It is the ERU value used in physical capacity analysis (see Chapter 3 of this guidebook).
- **ERU_{ADD}** value is intended to approximate average daily demand of a typical full-time single family residence. Use the ERU_{ADD} value in assessing factors bounded annually, such as a water supply safe annual yield and a water right annual volume (Qa).

ERU_{MDD} Conversion Example	
Basic Information A water system serves: • 100 single family homes. • One school. • One small business. **Water Use Data** After analyzing metered consumptive data for full-time occupied single family homes, the ERU_{MDD} value for this system is determined to be 800 gpd. • The MDD of the school during the same high-demand period is estimated at 8,000 gpd. • The MDD for the business is estimated at 1,600 gpd. • Distribution System Leakage (DSL) is determined to be 1.5 million gallons per year, or about 4,000 gallons per day.	**Analysis** Based upon the water system information and water use data, the 102 service connections represent 117 ERUs. • 100 homes = 100 ERUs. • School = 8,000 gpd/800 gpd per ERU = 10 ERUs. • Business = 1,600 gpd/800 gpd per ERU = 2 ERUs. • DSL = 4,000 gpd/800 gpd per ERU = 5 ERUs.

For more information on ERUs, please refer to Chapter 3 in the *Water System Design Manual* DOH 331-123 and *Water System Service Capacity in Equivalent Residential Units* DOH 331-441.

2.2 Water Production and Usage

Purpose. Provides current water production and usage data needed to estimate future demand and satisfies requirements of WAC 246-290-100(4)(b)(ii). Critically evaluate recent production, consumption, and DSL data for apparent trends and anomalies. Doing so should lead to reasonably conservative and defensible projections of future water supply production requirements. Data validation and assessment is crucial to making these projections, in assessing service capacity, and for reporting water use efficiency (see Chapter 4).

Data collection. WSPs **must** contain currently available data on water usage (WAC 246-290-100(4)). Meters are required for the collection of source production and water usage data. Service meters **must** be installed on all existing direct service connections and clustered entities (WAC 246-290-496(2)). Water systems that have not collected source and service meter data sufficient to establish the current average daily and maximum daily water supply requirement should describe their plan to do so. Include in the commitment a schedule identifying when they will collect the required data and what improvements, if any, they will make to ensure the data is collectable and accurate.

Address the following in the WSP (WAC 246-290-100(4)):

- Monthly and annual production totals for each source, including interties.
- Annual usage totals for each customer class.
- Annual usage totals for water supplied to other public water systems.
- For systems with 1,000 or more connections, provide data showing seasonal variations in annual usage for each customer class.

Water system capacity assessment (see Chapter 3) requires identifying maximum daily demand for the residential customer class. Where available, identify maximum daily demand for commercial, industrial, and other system-defined customer classes.

For more information, please refer to Chapter 3 of the *Water Use Efficiency Guidebook* DOH 331-375.

2.3 Distribution System Leakage

Purpose. This section establishes current percentage and volume of DSL and satisfies, in part, requirements of WAC 246-290-820. DSL is a component of the system's estimated future water supply requirement. An accurate assessment of current DSL is important to creating an accurate accounting of current ERUs. The DSL data presented in the WSP and the DSL data submitted in the most recent annual water use efficiency report should be consistent.

DSL is water lost from the distribution system and includes both apparent and real losses. Apparent losses include things such as theft, meter inaccuracies, and data collection errors. Real losses are physical losses from the distribution system and include such things as reservoir overflows, leaky valves and fittings, pinholes, and water main breaks. Neither apparent nor real losses are authorized uses of water, therefore they are considered DSL even if they are not actual "leaks." DSL can be expressed in terms of volume (gallons) or in terms of percentage of production lost.

Authorized but unmetered water use is not DSL. Examples include water used for filter backwash, street cleaning, distribution main flushing, dust control, and firefighting purposes if the use and quantities of water are documented. Include in the WSP *Water Use Efficiency* chapter documentation of estimated authorized unmetered water type and use, including the estimate basis for each type of use.

Losses in transmission lines should be counted as DSL unless there is a production meter located upstream of the entry to the distribution system. If transmission line losses are excluded from the DSL calculation, include an estimate of transmission line leakage and efforts to reduce it.

DSL percentage and volume. Provide the most current three-year average for DSL volume and DSL percentage. Chapter 4 revisits DSL, providing guidance on methodology and triggered actions to address excessive DSL. For more information, refer to Chapter 6 of the WUE Guidebook.

2.4 Water Supply Characteristics

Purpose. Describe the bodies of water from which water systems withdraw or divert water and the effect that withdrawal or diversion has on them and satisfies the requirements of WAC 246-290-100(4)(f)(ii)(B) and WAC 246-290-100(4)(f)(vi). This section provides the information necessary to evaluate water supply reliability in the next section.

Planning Tip

When discussing water supply characteristics, focus on the aquifer, watershed, lake, or stream, not the well or diversion.

Water supply characteristics. Provide a narrative description of factors that may affect availability and suitability of water source to reliably supply near- and long-term water supply requirements.

See the extensive discussion and example in Appendix C of the WUE Guidebook for the full range of issues that should be discussed.

Use impacts. When water is diverted or withdrawn from a supply, it may have an impact on the water body's ability to continue to provide historic water quantity and quality. For example, water levels may drop and water quality issues may develop impacting the supply's ability to continue to serve as a reliable source. Discuss any foreseeable impact the predicted use of each source may have on its productive quality and quantity.

Water rights mitigation. More often, as new and amended water rights are being approved by Ecology, Ecology is requiring water rights mitigation. Water rights mitigation can include habitat restoration, offsetting water pumping, land purchase and maintenance, continued monitoring, removal of fish passage barriers and other projects. These mitigation obligations will need to be funded by the water system and all mitigation obligations should be listed in this section to assure continued efforts with compliance and financial support. The financial chapter, Chapter 9, should include sufficient budgeting to satisfy required mitigation.

2.5 Water Supply Reliability Evaluation

Purpose. Provides an analysis of the long-term reliability of the water system's sources based on the information in the prior section, and satisfies requirements of WAC 246-290-100(4)(f)(ii)(B) and WAC 246-290-100(4)(f)(v).

Safe and reliable drinking water begins with reliable sources of supply. Each public water system has an obligation to secure drinking water from the highest quality source feasible (WAC 246-290-130(1)) with sufficient capacity to reliably meet current and future customer demands (WAC 246-290-222(4) and WAC 246-290-420). Meeting this obligation is challenging given our state's limited water resources, a changing climate, and the variety of potential contaminant sources in our environment.

Chapter 5 of the WSDM focuses on source, including assessing the safe yield and reliability of sources to meet future water supply requirements. DOH planners and engineers involved in the review of WSPs will refer to the WSDM when participating in pre-planning conferences and during the review of WSPs submitted for approval.

Specifically, refer to these sections of the WSDM:

- Section 5.4 Source water quantity and reliability.
- Section 5.4.4 Seawater intrusion.
- Section 5.6.1 Spring source safe yield.
- Section 5.8.1 Surface water safe yield.
- Section 5.9.1 Reliability of purchased water (non-emergency interties).
- Section 5.9.2 Emergency interties.
- Section 5.11.1 Power supply reliability.
- Sections 5.12.1, 5.12.2, and 5.12.3 Temporary, interruptible, and leased water rights.

Water supply reliability also factors into Emergency Response Planning. See Section 6.4 *Emergency Response*. It is important to know the reliability of the water system's water supply in times of drought and other natural disasters. The water supply should be evaluated for potential sources of contamination. It is also important to develop alternative water supply sources when current sources of water are negatively impacted or have reduced quantity or quality of water.

2.5.1 Interties

Purpose. Identifies and characterizes existing interties and satisfies the requirements of WAC 246-290-100(4(f). New and existing public water systems may be supplied in whole or in part by purchased water from another water system. Interties properly planned, designed, and operated support system reliability. DOH encourages their development wherever appropriate. All interties must be approved by both DOH and Department of Ecology. Intertie projects are not exempt from project report and construction documents submittal per WAC 246-290-132.

Describe each source intertie in a table or narrative, covering the topics listed below. The description or table should identify for each source intertie:

- The supplying water system.
- Name and location.
- Intended use (i.e. permanent, seasonal, or emergency).
- Date of first use.
- Physical and legal (agreed) capacity (annual and instantaneous, and any other restriction).
- Pressure zone served.
- Type of intertie control (i.e., manual or automatic "on demand").
- Date of current intertie agreement and expiration date.
- Intertie meter, backflow protection, and sample tap on the downstream side of the meter.

Each water system supplied by an intertie should assess its reliability relative to the terms written into the purchased water agreement. Improved system performance and supply reliability cannot be achieved by an intertie through which supply may be curtailed or terminated just when it is needed most.

Existing interties. Include all existing interties on the water system WFI and in the WSP *System Inventory* chapter. In some instances two water systems share a two-way intertie. A two-way intertie is one that is intended to provide flow in either direction. A two-way intertie represents a source (emergency or non-emergency) to each water system, and thus the same intertie should be listed on each system's WFI.

Intertie agreements. Discuss any limiting factors written into existing intertie agreements, such as clauses that allow the wholesaling system to curtail or cut off supply. All intertie agreements must be included in the WSP *Other Documents* chapter. See Chapter 10. (WAC 246-290-100(4)(k)). Intertie agreements **must** include, at a minimum (WAC 246-290-132(7)):

- Identification of specific time periods in which water will be provided.
- Identification of the volume of water available for use, including any seasonal or other restrictions.
- Identification of how water conservation programs, data collection, water demand forecasting, and other operational matters will be coordinated.

Emergency interties. In accordance with RCW 90.03.383 (2), an "emergency-use intertie" does not trigger a requirement to change the upstream water system's water right, and does not require a place-of-use change. If the consecutive system satisfactorily demonstrates all of the following criteria, we consider the intertie as "emergency."

1. The consecutive system's own source(s) of supply, booster pumps, and reservoirs are capable of meeting the Maximum Daily Demand (MDD) and Peak Hourly Demand (PHD) while maintaining design standards of WAC 246-290-230 without supplemental supply delivered through the intertie; and,

2. The events intended to be addressed by the intertie, and documented in the intertie agreement between the two parties, are limited to one or both of the following:
   a. Temporary failure of one or more non-emergency sources where the remaining sources of supply cannot maintain 20 pounds per square inch (psi) during PHD throughout the downstream water system's distribution system.
   b. Fire where the fire suppression requirement (flow rate and duration) combined with MDD cannot be met by the downstream water system's own system while maintaining 20 psi throughout the consecutive system's distribution system.

If frequent activity of an emergency-use intertie is the result of chronic and frequent source failure brought on by inadequate and inattentive maintenance of the source or transmission infrastructure, then the WSP should identify a corrective action plan (see Chapter 3). Until corrective action is complete, the WSP should designate such an intertie as a non-emergency intertie.

The original circumstances and associated design intent of the intertie may change with time. If the criteria listed above is no longer met, then the WSP should designate the intertie to "non-emergency." In the transition from an "emergency use intertie" to a "non-emergency intertie," the WSP should demonstration all applicable requirements of WAC 246-290-132(3)(a) are met.

An emergency intertie cannot be used in the evaluation of system capacity, or to justify expansion of the consecutive system (WAC 246-290-222).

Intertie meters. Interties used as a permanent or seasonal source **must** be metered (WAC 246-290-496 (1)(e). If an intertie is not metered:

- Provide a meter installation schedule if one or more existing permanent or seasonal interties are not metered. The schedule should include milestones demonstrating steady and continuous progress.
- Identify the cost of meter installation and replacement (as applicable), and carry this information to the improvement plan summary. See Chapter 8.

We encourage metering each emergency-use intertie and regularly reading each intertie meter to improve accounting for "authorized use" when determining DSL. Further, metering or SCADA interface will enable both the supplying and consecutive systems to track the frequency of intertie activity.

Proposed interties. Interconnections (interties) between water systems are an alternative to developing new supply sources. A water system considering an intertie to augment its own supply sources **must** satisfy the requirements of WAC 246-290-100 and -132. These requirements exist to ensure the wholesaling (selling) and consecutive (purchasing) systems have the physical and legal capacity to sell and purchase the expected volume and flow of water. Planning documents submitted to support constructing a new or expanding consecutive system must include the intertie agreement. There are different standards for emergency interties and purchased water (non-emergency interties).

Proposals for nonemergency interties must include, at a minimum, information required by WAC 246-290-132(3). Proposals for emergency interties must include, at a minimum, information

required by WAC 246-290-132(4). Interties with private entities that lack a written agreement and interties designated for emergency use cannot be used in the evaluation of system capacity or to justify expansion of the consecutive water system.

2.6 Future Population Projections and Land Use

Purpose. Projects future population, service connections, and ERUs, validates these projections against adopted zoning and future land use plans to ensure that they are consistent, and satisfies the requirements of WAC 246-290-100(4)(b)(iii). The demand projections **must** target the intended plan approval period and twenty years into the future (WAC 246-290-100(4)).

Population, service connection, and ERU projections within the service area for the plan approval period and a minimum 20-year planning period. Forecast population consistent with projections developed by the appropriate local planning agency, based on information obtained from the Office of Financial Management. If a different forecasting basis is used, provide justification and review the alternative basis and population projection with the local planning agency prior to WSP submittal. Include comments from the local planning agency with the WSP.

Analysis of comprehensive plan land use and zoning for consistency with the service area population projections. Local government consistency is required through the planning process and is intended to encourage water system planners to take adopted comprehensive plans into consideration when developing projections independent of approved local plans (WAC 246-290-100(7) and -108). Briefly describe and reference the land use map (see Chapter 1 of this guidebook) for the existing land use patterns as a starting point for projecting future growth. Analyze zoning designations within the water system's retail service area and service area for consistency with anticipated growth trends. Assess other adopted local and regional land use planning documents, such as local, city, county comprehensive plans, and buildable land analysis, and explain deviations from growth projections. Project land use patterns for both the plan approval period and a long-term planning period of not less than 20 years.

The following land use parameters should be considered when estimating future water demand and the infrastructure necessary to satisfy that demand.

- **Type of development:** Water use varies with the type of development. Therefore, it is important to distinguish between residential (single family vs. multi-family), commercial, industrial, and other categories of development.
- **Amount of development:** Establish current population density or the intensity of nonresidential development.
- **Location of development:** Sizing and routing of facilities depends upon the location of future development.
- **Timing of development:** When growth will occur is a crucial dimension of land use that affects both the design and scheduling of water system improvements.

2.7 Future Water Demand

Purpose. Establishes estimates for future water demand and satisfies the requirements of WAC 246-290-100(4)(b)(iii), WAC 246-290-100(4)(c), and WAC 246-290-100(4)(d). An accurate forecast of future water supply requirements ensures water availability as growth occurs.

Knowing the quantity, location, and timing of future water needs allows systems to plan for new source development and other new infrastructure so that they can ensure sufficient capacity. By using water demand forecasts, and combining them with an analysis of current system source capacity, hydraulics, and storage, water systems can forecast when and where they will need new infrastructure. The financing and permit approval process necessary to develop new sources and other significant water infrastructure depends on these forecasts. Present water demand forecasts in a table, chart, or graph, and include a map showing location and volume of significant water demands.

Water Rights Self-Assessment. Limitations on annual withdrawal or diversion (Qa), limitations on instantaneous withdrawal (Qi), or both, is a significant factor in water system planning. Water rights are often a limiting factor in establishing an approved number of connections, and thus impacts local government adequacy determinations. In preparing a WSP, water systems must document their legally available water supply in relationship to current and future water supply requirements. WSPs **must** include a completed *Water Rights Self-Assessment Form* (WAC 246-290-100(4)(f)(iv)). See section 3.4.1. Water systems should complete and review their water right self-assessment with the Department of Ecology **before** submitting the WSP to DOH for approval.

The Department of Ecology administers Washington's water rights permitting program. DOH's role is limited to ensuring inclusion of water rights self-assessment in the WSP and sharing that information with Ecology. Ecology may take an appealable action if it determines inconsistency between the water right information in the WSP and their own records.

Projected non-residential water needs. Estimating future water demand for non-residential users is vital in planning for and serving these customers. To estimate future water demand for non-residential users, water systems should identify current non-residential water uses, define future projected water use based on anticipated land use, and project water needs within each non-residential customer class (e.g., industrial, commercial, municipal). Describe any assumptions used in developing demands for non-residential customers.

Projected unmetered water. Unmetered water can include intentional uses such as main flushing and hydrant use, unintentional losses from leaking pipes, undocumented connections, and apparent losses from meter inaccuracies. It is important to incorporate projected unmetered water into the system's estimated future water demand.

When water demand forecasts indicate that water supply requirements will exceed water right limits on annual quantity (Qa) or instantaneous withdrawal rate (Qi) within the next 20 years, water systems **must** evaluate alternative sources and begin to plan for obtaining additional water rights (WAC 246-290-100(4)). See Chapter 3 *Water Rights Self-Assessment*.

Create water demand forecasts without projected water use efficiency savings. Future water demand **must** include projections for all customer classes, DSL, and unmetered demands (WAC 246-290-100(4)(c)). In forecasting water demands, establish estimates for ADD, MDD, PHD, and ERU_{ADD} and ERU_{MDD} for the plan approval period and 20 years into the future. It is helpful to display water demand projections in graphical format. Do not include expected future water use efficiency savings in water demand projections in this chapter. See Section 4.4 for a discussion on identifying expected water use efficiency savings (WAC 246-290-100(4)).

For a complete description on establishing current and projected water supply requirements necessary to assess current and future physical capacity limitations refer to Chapter 3 of the WSDM.

Publications Reference List

Water Code Chapter 90.03 RCW

Water System Design Manual DOH 331-123

Water System Service Capacity in Equivalent Residential Units DOH 331-441

Water Use Efficiency Guidebook DOH 331-375

WFI Instructions DOH 331-621

CHAPTER 3 SYSTEM ANALYSIS AND ASSET MANAGEMENT

Objective

This chapter's objective is to identify existing facilities and determine their capacity to reliably satisfy current and projected water demands with safe drinking water. The cost of addressing identified infrastructure deficiencies and operational and maintenance shortfalls should be addressed in priority order in Chapter 8.

Link to Water System Design Manual

Chapter 4 of the *Water System Design Manual* DOH 331-123 (WSDM) is devoted to analyzing water system capacity. Other chapters of the WSDM provide additional details of analyzing the ERU capacity of individual system components, as summarized in Table 3-1. We wrote the WSDM with the intent to support water system planning efforts. DOH planners and engineers involved in the review of WSPs will refer to it when participating in pre-planning conferences and during the review of WSPs submitted for approval.

Table 3-1

WSDM Cross-Reference	
WSDM	**Water System Planning Link**
Chapter 2	Design submittal exceptions for distribution main construction
Chapter 3	Estimating residential and non-residential demands
Chapter 4	Physical capacity analysis
Chapter 5	Source development and reliability, water quality, interties, back-up power, water rights
Chapter 6	Distribution system hydraulic analysis, sewer-water main separation, looping, minimum design standards, water quality
Chapter 7	Reservoir sizing criteria, natural hazards, water quality
Chapter 8	Booster pump stations, back-up power, natural hazards
Chapters 10 and 11	Water treatment, water quality, monitoring, process control and reliability, natural hazards, operational complexity and staffing needs

Plan Content

This chapter addresses the following topics.

3.1 Asset Management – Asset Inventory and Analysis
3.2 Water Quality
3.3 Design Standards
3.4 Capacity Analysis

3.5 Summary of System Deficiencies

3.1 Asset Management—Asset Inventory and Analysis

Purpose. This section establishes a date-based inventory of all water system-owned assets and satisfies the requirements of WAC 246-290-100(4)(e)(iii).

This section also addresses the physical condition, life expectancy, and system criticality of existing facilities to ensure that capital facilities planning promotes minimum life-cycle cost for each asset.

Best management practices dictate water systems plan for, and act to rehabilitate, critical assets to minimize life-cycle costs. Assets that are beyond rehabilitation because of age or other factors, or where rehabilitation is not feasible (sometimes true for buried pipelines, wells, and antiquated treatment technology), it is incumbent upon water system managers to proactively address their replacement and identify the financial means to do so.

For more information on managing a water system's infrastructure and other assets to deliver a desired level of service at the lowest lifecycle cost:

- *Asset Inventory Worksheet* (Excel).
- *AWWA Asset Management Definition Guidebook*, AWWA 2018.
- *Leading Business Practices in Asset Management—Case Study Report*, AWWA 2017.
- *Water, Wastewater, and Storm Water Infrastructure Management* (Grigg, Neil S.), available through the AWWA on-line bookstore.
- *Taking Stock of Your Water System*, EPA Publication 816-K-03-002
- *Asset Management: A Handbook for Small Systems,* EPA Publication 816-R-03-016.
- *Asset Management for Small Systems* DOH 331-445.

Planning Tip

The Environmental Protection Agency (EPA) is a primary funder of the Office of Drinking Water and the Drinking Water State Revolving Fund (DWSRF).

EPA continues to stress the importance of Asset Management and requires state funders to meet criteria in this area.

Because of this, ODW and DWSRF encourage systems develop and maintain an asset management program to help systems financially plan for operation, maintenance, repair, and replacement of assets.

3.1.1 Asset Inventory

Purpose. An asset inventory is the bedrock of an asset management program. Providing an inventory of all water system-owned assets supports two main goals of water system planning:

- Thoroughly assessing asset condition to appropriately and prudently plan for replacement of antiquated facilities (see section 3.1.2).
- Accurately assessing water system capacity to satisfy consumer demands (see section 3.5).

We recommend showing the interrelationship among major elements of the system's assets, with a scaled map of the system showing:

- All sources and emergency and non-emergency interties, including their operating capacity.
- All major pipelines—the water system's pipe inventory will dictate degree of pipe-mapping detail possible. Include pipe diameter and material.
- All reservoirs, including their capacity.
- All booster pump stations, including their operating capacity.
- All distribution system pressure reducing valves (for systems with multiple pressure zones).
- Pressure zone boundaries (for systems with multiple pressure zones).

There are a number of ways to manage an asset inventory, such as a simple table or spreadsheet, a purchased software program, or an internally-developed program. See Table 3-2 for an example of such a summary and the **free** Rural Community Assistance Corporation (RCAC) *Asset Inventory Worksheet* (Excel) for an example of a spreadsheet. Whichever method you choose, the WSP must include a brief narrative description of your asset inventory and how it is used and updated. Include inventory screenshots or attach your inventory as an appendix to the plan that includes:

- Name, capacity, and number of units.
- Date of original installation/construction.
- Date of any subsequent expansion, rehabilitation, or reconstruction.
- Life expectancy of the asset with appropriate reference(s).
- Condition assessment.
- Criticality assessment.
- Replacement cost and schedule.

Because pipelines are the most expensive and often least-regarded type of infrastructure, special consideration should be given to providing two types of transmission and distribution pipe inventory:

- Aggregate pipe length sorted by size; and,
- Aggregate pipe length sorted by age (perhaps grouped by decade if records allow) and pipe material (e.g., 10,000 feet of asbestos cement pipe installed in the 1940s; 20,000 feet of asbestos cement pipe installed in the 1950s).

Planning Tip

DOH recommends the development and implementation of a comprehensive asset management program to identify the age, condition, probability of failure, consequence of failure, and priority dates for replacement of your water system's assets.

Additionally, the *Asset Inventory Worksheet* (and similar programs) is a valuable tool to specify these asset management characteristics and identify the rate increases necessary to cover asset replacement.

3.1.2 Asset Condition & Criticality

Purpose. Condition assessment and criticality are part of the integrated asset management strategy. This strategy includes identification of assets critical to meeting basic

consumer expectations and regulatory requirements. Water systems should focus their condition assessment efforts on such assets first, for the consequence of failure is greatest.

Completing an asset condition assessment and criticality rating may identify deficiencies. Deficiencies requiring action in the first ten years of the planning period should be addressed and remedied by a specific project or action, including a project schedule. Deficiencies identified in years 11 through 20 (and beyond) may be placed in the capital improvement program as an unscheduled project.

Provide text descriptions of major assets, including their conditions, as detailed in the following sections. Asset condition and criticality columns are also provided on Table 3-2, the *Asset Inventory Worksheet* (Excel), and other asset management programs. Completion of all columns is recommended for all assets.

Source Description and Condition. Provide the following information in this section.

- Facility age and estimate of future life expectancy.
- Current condition of source assets.
- Condition and capacity of transmission mains.
- Criticality assessment.
- Maximum instantaneous withdrawal rate and sustainable withdrawal rate
- Limiting factors, such as dry season pumping conditions, water rights, and installed equipment.
- Risk from natural hazards such as flooding, tsunami, landslide, earthquake, and wildfire.
- Fluctuations and/or trends in withdrawal capacity (e.g., reduction due to sand buildup, seasonal or permanent drawdown).
- Variations in water table levels, river flows, etc.

Water Treatment Description and Condition. If the system currently has a treatment process, provide the following information in this section.

- Facility age and estimate of future life expectancy.
- Current condition of treatment facilities.
- Criticality assessment.
- Maximum instantaneous treatment rate and sustainable treatment rate for each facility.
- Fluctuations and/or trends in treatment capacity (e.g., reduction in treatment rates due to higher turbidity).
- Risk from natural hazards such as flooding, tsunami, landslide, earthquake, and wildfire.
- Type of treatment process.
- Evaluation of treatment performance.

Storage Description and Condition. Provide the following information in this section.

- Facility age and estimate of future life expectancy.
- Current condition of reservoirs.
- Criticality assessment.

- The type, material and usable capacity of storage facilities used.
- Risk from natural hazards such as flooding, tsunami, landslide, earthquake, and wildfire.
- Turnover of water (e.g., residence time).
- Date of last inspection/cleaning/coating, if applicable.

Distribution System Description and Condition. Provide the following information in this section.

- Facility age and estimate of future life expectancy.
- Criticality assessment.
- A map showing the location of water main leaks, breaks, and failures over the past ten years.
- A map showing the location of low pressure complaints over the past ten years.
- A map showing the location of discolored water or odor complaints over the past ten years.
- How system pressures are monitored and reported.
- Risk from natural hazards such tsunami, landslide, and earthquake.
- Method(s) of recording changes in the distribution system (e.g. computer mapping system, manually).

3.2 Water Quality

Purpose: Documents the system's water quality compared to drinking water standards and satisfies the requirements of WAC 246-290-100(4)(e)(ii). Raw water quality may require mandatory or voluntary treatment to meet regulatory requirements or consumer expectations, adding considerable time and expense to drinking water production. Group A public water systems must comply with the water quality standards in Part 4 of chapter 246-290 WAC.

Provide water quality analysis of source water. If source water is untreated, describe trends and Maximum Contaminant Level (MCL) violations over time, including such parameters as nitrate, turbidity, arsenic, iron/manganese, chloride and total dissolved solids (for wells subject to salt water intrusion).

If source water is treated, describe:

- Raw (untreated) water quality for each source, along with trends observed over time.
- Finished (treated) water quality for each source, along with trends observed over time.
- Treatment objectives and optimized treatment goals, and the degree to which these are met.
- Certification requirements.
- Water quality and treatment technique violations and a description of the actions taken to address these violations.

Provide water quality analysis of distribution system water. Describe the history of water quality within the distribution system (e.g., coliform, disinfection residual, disinfection byproducts, and lead/copper). Describe:

- Seasonal water quality changes in the distribution system.

- Distribution water quality objectives and optimized goals (e.g., chlorine residual, DBPs, HPC, turbidity), and the degree to which these are met.
- Water quality, action level exceedances, and treatment technique violations and a description of the actions taken to address these exceedances or violations.

3.3 Design Standards

Purpose. A water system is the sum of all inputs and decisions over its history. Identifying the appropriate standards and level of service is the first step in the process of evaluation, prioritization, and development of the capital improvement program (Chapter 8). Many water systems choose to provide a higher level of service and reliability than the state minimum. The design standards should consider all standards that apply to the system, such as:

- Water system-adopted design standards, ordinances, standard drawings and specifications.
- Chapter 246-290 WAC.
- *Water System Design Manual* DOH 331-123 (WSDM).
- Regional supplement of a coordinated WSP.
- County/city level of service standards.
- WSDOT Standards for Road, Bridge, and Municipal Construction.
- AWWA standards.
- *Recommended Standards for Water Works* (10 State Standards).

Provide. The design standards section should include a discussion of standards that apply to the system. The standards must be adequate to protect public health and, at a minimum, meet state requirements and minimum standards.

At a minimum, standards should be established and listed in the WSP for the following:

- Water quality parameters.
- Storage requirements.
- Fire flow rate and duration.
- Minimum system pressure.
- Minimum pipe sizes.
- Telemetry systems.
- Backup power requirements.
- Valve and hydrant spacing.
- Other system policies that affect performance and design.

In addition to identifying the system's design standards, the water system may establish and include standard construction details/drawings and specifications for installation of water mains in the WSP. See Chapter 7 for guidance on developing and providing a complete set of construction standard details/drawings for the submittal exception.

3.4 Capacity Analysis

Purpose: Assesses the legal and physical capacity of the water system based on the system's available water rights, sources, treatment, storage, and distribution components, and satisfy the requirements of WAC 246-290-100(4)(e)(iii). The capacity analysis will determine if the water system can adequately serve existing customers and keep pace with future demand and consumer expectations (level of service).

Provide: A summary of the capacity analysis with a completed Worksheet 4-1 from the WSDM, or equivalent, to summarize the legal and physical capacity analysis and identify the limiting factor(s).

3.4.1 Water Rights

Purpose. Evaluates system water rights, for legal capacity of the system. This section may determine the water right is the system's limiting factor. Upon completing the current and future demand projections for the current, 10-year, and 20-year planning horizon, plug the appropriate data into the *Water Right Self-Assessment* (WRSA) form. In addition to providing the WRSA form, summarize the following in either graphic and/or narrative form in the WSP (the regional preference will be identified during the pre-planning conference).

- Current water production and demand, expressed in the appropriate units, based on the system's ADD and MDD.
- Future water production and demand projections for the 10-year and 20-year planning period.
- A list of all water rights held with source-specific instantaneous and annual withdrawal/diversion limits for each and summary of all.
- A list of interruptible water rights, their limitation, and the time period of interruption. Include any mitigation requirements or conditions.

Planning Tip

Discussions with the Washington State Department of Ecology regarding the status of all applicable water rights for your system is recommended prior to drafting the WSP.

The information presented on the WRSA form must be consistent with future water demand projections (see Section 2.7). All summaries of water system capacity analysis relative to water rights should refer to the WRSA.

3.4.2 Physical Capacity Analysis

Purpose. Assesses the physical capacity of existing infrastructure to identify limiting factor(s) and the number of ERUs the system can serve. This determines approved capacity, in number of connections and/or ERUs, for the plan approval period.

Completing a capacity analysis of the existing infrastructure may identify deficiencies. Deficiencies in capacity identified in the first ten years of the planning period should be addressed and remedied by a specific project or action, including a project schedule. Deficiencies identified in years 11 through 20 (and beyond) may be placed in the capital improvement program as an unscheduled project.

The WSP **must** assess the capacity of each system component, such as source, treatment, storage, transmission and distribution mains, individually and in combination with each other (WAC 246-290-222). The goal is to provide water of adequate quality, quantity, and pressure during minimum supply and maximum demand scenarios.

If the system has more than one pressure zone, conduct a zone-by-zone capacity analysis. For detailed guidance on system analysis review the content of Chapter 4 of the WSDM. Depending on the type of infrastructure undergoing analysis, you may also need to review Chapter 5 (sources), Chapter 6 (transmission and distribution mains), Chapter 7 (reservoirs), and Chapter 8 (pump stations) of the WSDM.

The physical capacity analysis should include the source's pumping rate and maximum day production, treatment plant design flow, and storage volumes compared to the design standards identified Section 3.3 and the systems current and projected demands.

Hydraulic Analysis. The physical capacity analysis must also include a detailed hydraulic analysis to determine that minimum pressures can be met during peak hour demand and fire flow scenarios now and in the future. The hydraulic analysis is used to size and evaluate a new and expanding distribution system (WAC 246-290-230(1)). A poorly calibrated hydraulic model may result in inadequate fire flow, pressure problems, incorrect pipe sizing, or other issues with significant repercussions on the water system's ability to provide safe and reliable drinking water.

Hydraulic analysis takes four steps:

1. Collect data.
2. Develop the model.
3. Calibrate the model.
4. Analyze the distribution system.

The hydraulic analysis should clearly identify how the model was developed, calibrated, and summarize the output. Include a summary in the WSP text and provide node map and modeled results in the appendices. For detailed guidance on hydraulic analysis review the content of Chapter 6 of the WSDM.

3.4.3 New Source of Supply Analysis

Purpose. Evaluate potential new supply sources for systems that intend to add sources or seek additional water rights within the next 20 years and satisfies the requirements of WAC 246-290-100(4)(f)(ii)(A).

Depending on the water system's location and circumstance, the evaluation may be as simple as evaluating the feasibility of increasing the size of a pump in an existing well, or as complicated as evaluating the development of a new surface water supply, with all the attendant legal, regulatory, political, and economic factors that need to be considered.

An evaluation of a new or expanding drinking water supply should include:

- Water quality impacts to the distribution system. See Section 5.3 of the WSDM.

- Existing source quantity and reliability. See Section 2.5.
- Water rights, including any associated mitigation requirements, and whether the contemplated new source will require new water rights or a change of existing water rights.
- Additional demand-and-supply-side water use efficiency measures. Every gallon of water demand reduced, every gallon of water stopped from leaking, and every gallon of water saved from waste or theft is the equivalent to a new gallon of water available to supply new customers. See sections 4.3 and 4.4 for additional details.

3.5 Summary of System Deficiencies

Purpose: Documents system deficiencies identified in the water system's capacity analysis, and satisfies the requirements of WAC 246-290-100(4)(e)(iv). We recommend creating a table to summarize component deficiencies and the project solution identified to address each deficiency. See Table 3-3 as an example of such a summary. The summary of component deficiencies serves as a check to ensure all the deficiencies and solutions identified in this chapter have been addressed.

The summary of component deficiencies and project solutions should be rolled over into the WSP's Capital Improvement Program summary. See Chapter 8.

The licensed professional engineer submitting the WSP is responsible for providing evidence that the proposed solution will address the deficiency.

The plan may include alternative analysis for each deficiency. The plan should clearly state if such an analysis is intended to meet the Project Report (PR) requirements of WAC 246-290-110. Contact your Regional Engineer to discuss the scope of the PR if this section is intended to meet these requirements.

Describe selected improvements in a clear and concise manner. Focus attention on alternatives directly affecting public health. The project implementation schedule **must** prioritize improvements addressing enforcement action (WAC 246-290-050). Include a map showing the location and sizing of proposed improvements, where applicable.

Include a summary of the improvements needed to address all identified water system component deficiencies. See Table 3-3 for an example of such a summary.

Planning Tip

Interviewing operators and managers can identify other necessary capital expenses, such as:

- New computer hardware and software.
- WSP update.
- Source water protection planning.
- New or replacement auxiliary power generators.
- SCADA upgrade or replacement.
- New instrumentation (lab, field test kits).
- Seismic resiliency measures.

Table 3-2

Example Existing Component Inventory

(Add or remove rows as needed)

Distribution System Inventory Components	Units	Number of Units	Remaining Useful Life	Condition Rating	Criticality Rating	Replacement Cost
Distribution Pipelines ≤ 6 inch	feet					
Distribution Pipelines 8 -10 inch	feet					
Distribution Pipelines 12-14 inch	feet					
Distribution Pipelines 16-20 inch	feet					
Distribution Pipelines 24-30 inch	feet					
Distribution Pipelines 36-42 inch	feet					
Distribution Pipelines 48-60 inch	feet					
Distribution Pipelines 66-84 inch	feet					
Distribution Pipelines 90-96 inch	feet					
Distribution Pipelines > 96 inches	feet					
Service and Intertie Meters ≤ 1.0 inch	Each					
Service and Intertie Meters 1.5 inch	Each					
Service and Intertie Meters 2 inch	Each					
Service and Intertie Meters 3 inch	Each					
Service and Intertie Meters 4 inch	Each					
Service and Intertie Meters 6 inch	Each					
Service and Intertie Meters > 6 inch	Each					
Pressure Reducing Valves ≤ 6 inch	Each					
Pressure Reducing Valves 8-12 inch	Each					
Pressure Reducing Valves 14-16 inch	Each					
Pressure Reducing Valves 18-24 inch	Each					
Pressure Reducing Valves > 24 inches	Each					

Distribution System Inventory Components	Units	Number of Units	Remaining Useful Life	Condition Rating	Criticality Rating	Replacement Cost
System-Owned Testable Backflow Devices ≤ 0.75 in	Each					
System-Owned Testable Backflow Devices 1 inch	Each					
System-Owned Testable Backflow Devices 1.5 in	Each					
System-Owned Testable Backflow Devices 2 inch	Each					
System-Owned Testable Backflow Devices 3 inch	Each					
System-Owned Testable Backflow Devices 4 inch	Each					
System-Owned Testable Backflow Devices 6 inch	Each					
System-Owned Testable Backflow Devices 8 inch	Each					
System-Owned Testable Backflow Devices > 8 inch	Each					
Transmission Pipeline Inventory	**Units**	**Number of Units**	**Remaining Useful Life**	**Condition Rating**	**Criticality Rating**	**Replacement Cost**
Transmission Pipelines 8-10 inch	feet					
Transmission Pipelines 12-14 inch	feet					
Transmission Pipelines 16-20 inch	feet					
Transmission Pipelines 24-30 inch	feet					
Transmission Pipelines 36-42 inch	feet					
Transmission Pipelines 48-60 inch	feet					
Transmission Pipelines 66-84 inch	feet					
Transmission Pipelines 90-96 inch	feet					
Transmission Pipelines 108-120 inch	feet					
Transmission Pipelines > 120 inch	feet					

Raw and Finished Storage Inventory	Size, MG	Facility Name	Remaining Useful Life	Condition Rating	Criticality Rating	Replacement Cost
Storage Type: Choose an item.						
Storage Type: Choose an item.						
Storage Type: Choose an item.						
Storage Type: Choose an item.						
Storage Type: Choose an item.						
Booster Pump Station Inventory List total installed pumping capacity. Do not list individual pumps.	**Capacity MGD**	**Facility Name**	**Remaining Useful Life**	**Condition Rating**	**Criticality Rating**	**Replacement Cost**
Booster Pump Station						
Booster Pump Station						
Booster Pump Station						
Booster Pump Station						
Booster Pump Station						

Source Pump Inventory. List individual pumps.	Capacity per pump, MGD	No. of Pumps	Facility Name	Remaining Useful Life	Condition Rating	Criticality Rating	Replacement Cost
Pump Type: Choose an item.							
Pump Type: Choose an item.							
Pump Type: Choose an item.							
Pump Type: Choose an item.							
Pump Type: Choose an item.							
Pump Type: Choose an item.							

Back Up Power Inventory	Capacity per unit, kW	Number of Units	Facility Name	Remaining Useful Life	Condition Rating	Criticality Rating	Replacement Cost
Backup Power Generating Unit							
Backup Power Generating Unit							
Backup Power Generating Unit							
Backup Power Generating Unit							
Backup Power Generating Unit							
Water Treatment Plant Inventory		**Capacity MGD**	**Facility Name**	**Remaining Useful Life**	**Condition Rating**	**Criticality Rating**	**Replacement Cost**
Groundwater Treatment Type: Choose an item.							
Groundwater Treatment Type: Choose an item.							
Groundwater Treatment Type: Choose an item.							
Groundwater Treatment Type: Choose an item.							
Groundwater Treatment Type: Choose an item.							
Surface Water Treatment Type: Choose an item.							
Surface Water Treatment Type: Choose an item.							
Other				**Remaining Useful Life**	**Condition Rating**	**Criticality Rating**	**Replacement Cost**
SCADA control system is installed		Yes or No					

Table 3-3

Component Deficiencies and Project Solution

(Add additional rows as required)

Classification of deficiency[1]	Description of Project Solution	Total project cost[2]	Anticipated source of funding	Location in WSP where deficiency is identified	Location in WSP where the analysis demonstrates deficiency will be addressed by the project

1. Select from among all that apply: Enforcement, water quality, water quantity, end of useful life (replacement), pressure, reliability, resiliency, growth, public safety/fire flow, energy efficiency, and other.
2. Include total project costs, including engineering design, financing, state taxes, contingency, and construction. State whether the cost is in current dollars or inflated dollars. Describe all assumptions about costs.

Publications Reference List

Asset Management: A Guidebook for Small Systems EPA Publication 816-R-03-016

*Asset Management for Small Systems D*OH 331-445

AWWA Asset Management Definition Guidebook, AWWA 2018

Leading Business Practices in Asset Management—Case Study Report, AWWA 2017

Taking Stock of Your Water System EPA Publication 816-K-03-002

Water Right Self-Assessment form

Water System Design Manual DOH 331-123

CHAPTER 4 WATER USE EFFICIENCY PROGRAM

Objective

Describe the water system's program to improve Water Use Efficiency (WUE). WUE contributes the long-term water supply reliability, and promotes good stewardship of the state's water resources. For additional information visit ODW's Water Use Efficiency webpage.

Plan Content

This chapter addresses the following topics.

4.1 Source and Service Metering
4.2 Distribution System Leakage
4.3 Water Use Efficiency Program
4.4 Water Use Efficiency Savings

Planning Tip

The Washington Department of Ecology has additional metering requirements found in the following; RCW 90.03.360, RCW 90.44.450, and WAC 173-173.

4.1 Source and Service Metering

Purpose. Describes the water system's tools used to monitor and report water production and consumption and satisfies some of the requirements of WAC 246-290-496. Water meters properly selected, installed, maintained, and read are indispensable management tools. They provide information necessary to consumers, managers, and operators to:

- Allocate costs fairly and transparently.
- Manage and predict costs and revenue.
- Identify operational problems (e.g., leaks, poor source and pump performance).
- Understand past and current consumer demand patterns, and predict future water supply requirements.
- Comply with state law.

Production meters. All sources **must** be metered (WAC 246-290-496(1)(a)). Provide a description of all source meters, including the manufacturer, type of meter, years in service, and last calibration date.

Service meters. All new direct service connections **must** be metered at the time of service activation (WAC 246-290-496(2)(d)). With the exception of water users supplied within clustered entities (see section 2.7 of *Water Use Efficiency Guidebook* DOH 331-375, public water systems that supply water for municipal water supply purposes **must** have installed service meters on existing direct service connections as of January 22, 2017 (WAC 246-290-496(2)(c)).

In this section:

- Describe the water system's adopted standard for meters (type and installation), read frequency (operation), calibration frequency, and meter maintenance and replacement schedule. Operation, calibration, and maintenance **must** follow industry standards and information from the manufacturer (WAC 246-290-496(3)).
- Identify the cost of meter installation and replacement (as applicable), and carry this information to the improvement plan summary. See Chapter 8.
- If the water system is required to meter each customer and has not yet done so, provide:
  - A schedule and cost to comply with WAC 246-290-496(2)(f)(i).
  - A description of field activities, such as periodic leak detection and actively repairing leaks (WAC 246-290-496(2)(f)(ii)).

4.2 Distribution System Leakage

Purpose. Summarizes distribution system leakage (DSL) data reported in Chapter 2, provides a plan as needed to reduce water loss DSL, and satisfies the requirements of WAC 246-290-100(4)(f)(i) and WAC 246-290-820. Even though this section only applies to municipal water suppliers, every water system should pursue identifying the location and extent of distribution system leakage, and develop and implement a plan to address it. The DSL data presented in the WSP and the DSL data submitted in the most recent annual WUE report should be consistent.

4.2.1 Water Audits

Methodology. Describe the method(s) and assumptions used in calculating total DSL. Chapter 6 of the WUE Guidebook addresses distribution system leakage, including calculation methods. Water systems may use an alternative method for calculating the effect of leakage under WAC 246-290-820(3). At this time, the only alternative methodology approved by DOH is the American Water Works Association Water Audit methodology. See AWWA Manual M36 (Fourth Edition). A water system intending to use an alternative methodology should discuss with the DOH regional planner at the pre-plan conference.

Water loss control action plan. Water systems **must** adopt a water loss control action plan (WLCAP) when DSL exceeds an average of 10 percent over the most recent three-year period (WAC 246-290-820(1)), as calculated under WAC 246-290-820(2). A WLCAP must include all of the following (WAC 246-290-820(4)):

- The control methods necessary to achieve no more than 10 percent DSL.
- An implementation schedule. *(Include in the Capital Improvement Program).*
- A budget that shows how the control methods will be funded. *(Include in the Financial Program).*
- Any technical or economic concerns that may affect the system's ability to achieve the standard, including past efforts.
- An assessment of data accuracy and data collection.

Increasingly assertive activities are required based on the calculated level of DSL (WAC 246-290-820(4)(f-g):

- For 20 percent DSL and above: Implementation of WLCAP activities described above, plus field activities such as actively repairing leaks or maintaining meters within 12 months of determining standard exceedance.
- For 30 percent DSL and above: Implementation of WLCAP activities described above, plus additional control methods to reduce leakage within six months of determining standard exceedance.

We will work collaboratively with a system using the approved alternative methodology to ensure that control methods and level of activity are commensurate with the level of leakage.

Systems serving under five hundred connections. Water systems with fewer than 500 connections may petition DOH for approval of a three-year average DSL up to 20 percent. WAC 246-290-820(1)(b)(iii) and WAC 246-290-820(5)(a-d) requires submittal to DOH all of the following information to support such a request:

- Three-year annual average production volume.
- Three-year annual average DSL volume.
- A copy of a leak detection survey report documenting leak detection efforts undertaken since the previous WSP plan approval date or during the past six years in the case where there is no previous WSP.

Notify the DOH regional planner at the pre-plan conference if seeking approval for up to 20 percent DSL.

Reporting water use efficiency performance. Water systems **must** report annually their WUE program performance (WAC 246-290-840). Describe in this section the general progress in implementing WUE activities and the trend line toward reaching WUE goals. Include the previous three annual WUE reports in the WSP Appendix.

4.3 Water Use Efficiency Program

Purpose. Describes decisions and actions taken by a water system to use its drinking water supply as efficiently as is economically feasible to satisfy WAC 246-290-100(4)(f)(i) requirements and, for municipal water suppliers, Part 8 of chapter 246-290 WAC. WUE requirements support safe and reliable drinking water by contributing to long-term water supply reliability, public health protection, good stewardship, and efficient operations and management of water systems.

All water systems need a reliable supply of water to meet current and future demand. WUE activities help water systems operate efficiently to reduce public health risks and consumer complaints associated with:

- Temporary water service interruptions during peak usage.
- Long-term or repeated water disruptions due to limited water supply.

- Contamination of the water supply due to leaky pipes.

Public health is always at risk during these events. Water systems position themselves to provide a reliable drinking water supply for their customers by implementing an effective WUE program.

The major elements of a municipal water supplier's WUE program include:

- Source meters and service meters.
- Distribution system leakage.
- Water demand projections with and without WUE savings.
- Water-saving goals.
- Customer communication and education.
- Evaluate and select water-saving measures.
- Water loss control action plan, when triggered.

WUE goals. WUE goals are what WUE measures are designed to achieve. Design goals to enhance efficient use of water by the water system's customers (demand-side goals) and efficient production and delivery by the water system (supply-side goals). Chapter 7 of the *Water Use Efficiency Guidebook* DOH 331-375 covers goal-setting. Goals must be (WAC 246-290-830(2)):

- Notice to the public-at-large, not just community members. Posting goals to ODW's WUE Goal Setting Public Form webpage counts as notice to the public.
- Set in a public forum.
- Reflective of the water system's forecasted demand and supply characteristics.
- Measurable.
- Scheduled for implementation.
- Flexible.

WUE measures. The purpose of each WUE measure is to achieve one or more of the water system's WUE goals. Depending on the community and its goals, certain measures will be more impactful than others. No single set of measures will serve the best interests of every community. However, finding common interests with other water systems and respected outside institutions may yield economies of scale, and consistent and resonant messaging across a single media market.

WAC 246-290-810 identifies the number of WUE measures that must be evaluated or implemented based on the number of connections served. Establish measures that are goal-based, and designed to achieve WUE goals that are cost-effective from a societal perspective. Measures should be understandable, achievable, and set in a transparent, public process. Chapter 5 of the WUE Guidebook offers many suggestions on how to develop a WUE program.

Annual consumer education about using water efficiently is required of all municipal water suppliers. Annual consumer education does not count as a WUE measure. See WAC 246-290-810(4)(f) and the WUE Guidebook, section 5.7.

Water use efficiency-related requirements for non-municipal water suppliers differ from what is described above. Consult with your regional planner and the WUE guidebook, Appendix U.

4.4 Water Use Efficiency Savings

Purpose. Quantifies the reduction in water supply requirements expected as a result of implementing the water system's WUE program. Estimates of water use savings should be calculated for ADD and MDD for consecutive years up to ten years, or each year up to the plan approval period if less than ten years, and for 20 years into the future. This section satisfies the requirements of WAC 246-290-100(4)(c) and WAC 246-290-100(4)(d).

Projected water use savings cannot be used in the water system capacity analysis. Once the savings have been achieved and documented, submit a WSP amendment to DOH for approval, or capacity analysis prepared by a licensed professional engineer justifying an increase in capacity based on WUE savings achieved.

Include a summary of the water savings available in consecutive years. See Table 4-1 for an example of such a summary.

Table 4-1

Demand Forecast with and without Projected WUE Savings

Year	ADD		MDD	
	W/O WUE	W/ WUE	W/O WUE	W/ WUE
1				
2				
3 …				
10				
20				

We recommend water systems translate the reduction in water supply requirement into tangible benefits when these reductions are realized, such as:

- Extension of time before new sources must be developed or purchased.
- Approximate number of additional ERUs that could be served by the water system without any new infrastructure.
- Annual cost savings for power and water treatment.

Relationship with water rates. Water rates and water demand are related. Policies and investments intended to reduce water production requirements but not reduce demand (e.g., leak detection) will result in certain costs (finding and fixing leaks) and benefits (reducing power and treatment costs, deferring capital costs for new source and transmission facilities). Similarly, policies and investments intended to reduce consumer demand have their own costs and benefits.

Expectations about future water production requirements and consumer demand should be run through the water system's rate model to predict future revenue. Changes to the rate structure will itself drive a change in water demand, the extent of which is highly dependent on local factors.

Include an evaluation of the existing rate structure and proposed rate structure changes in the WSP *Financial Program* chapter. See Chapter 9. Implementation of a conservation rate structure, such as an inclining block rate or seasonal block rate, may count as a WUE measure in the WUE program.

For systems serving 1,000 or more connections. If any WUE measures identified in this chapter were evaluated and found to be cost-effective *but not implemented*, provide a third demand forecast scenario (WAC 246-290-100(4)(d)). In other words, by choosing not to implement all cost-effective WUE measures evaluated to meet WUE goals a water system triggers the requirement to complete an additional demand forecast. This additional demand forecast must project what water savings would look like if all of those measures were in fact implemented. The consecutive-year forecast should extend up to plan approval period and also include the 20-year planning period.

Publications Reference List

American Water Works Association Water Audit methodology

DOH Water System Design Manual DOH 331-123

Water Use Efficiency Guidebook DOH 331-375

CHAPTER 5 SOURCE WATER PROTECTION

Objective

This chapter's objective is to develop a program to protect and improve source water used by public water systems. An effective source water protection program is multifaceted and involves multiple partners working together to preserve a community's drinking water supply. Source water protection for Group A systems is required under WAC 246-290-135, -668, -690 and -691.

Source water protection programs for groundwater and surface water supplies differ. Water systems **must** develop and implement a Wellhead Protection Program (WHPP) for each groundwater source (WAC 246-290-135(3)) and a Watershed Control Program (WCP) for each surface water supply (WAC 246-290-135(4)).

Groundwater sources include wells, wellfield springs, Ranney wells, and infiltration galleries. Certain groundwater sources may be under the direct influence of surface water ("groundwater under the influence" or GWI), such as a shallow well located near surface water. Water systems operating a GWI source must develop and implement both WCPs and WHPPs.

Some water systems have previously submitted WHPPs and/or WCPs for DOH review. Since these documents can become outdated, water systems must address source water protection in each WSP update. Documentation that is unchanged since the previous plan approval may be appended to the WSP update. The plan itself can focus on WHPP and WCP implementation status and compliance with source water protection requirements.

All costs associated with the WHPP and WCP should be included in the water system budget. See Chapter 9 of this guidebook.

Plan Content

This chapter addresses the following topics.

5.1 Sanitary Control Area
5.2 Wellhead Protection Program
5.3 Watershed Control Program

5.1 Sanitary Control Area

5.1.1 Introduction

All Group A water systems **must** establish a Sanitary Control Area (SCA) around each well or spring source (WAC 246-290-135(2). This is intended to be a front-line protection against contamination. For wells, the SCA must have a minimum radius of 100 feet from the well head; for springs, 200 feet. DOH can approve smaller or larger SCAs or mitigation to adequately

protect the source. The SCA must be under the water purveyor's control, either directly (on purveyor's own property) or by legal arrangement if it overlays property not owned by the purveyor.

5.1.2 Required Content

As specified in WAC 246-290-135, for the purveyor's own land, the purveyor **must** submit a copy of legal documentation, such as a recorded declaration of covenant, restricting the use of the land. It **must** state that:

- Construction, storage, disposal, or application of any source of contamination is prohibited without the purveyor's permission; and,
- For any change in ownership of the system or the land where the SCA is located, all affected parties must be informed of these requirements.

The purveyor **must** submit a copy of an enduring restrictive covenant agreement with the property owner(s) of any other land within the SCA, which similarly restricts the use of the portion of land not under the purveyor's direct control.

Submit this information with an initial WSP, but you do not need to resubmit it as part of updates, unless you have not previously carried it out.

5.1.3 Recommended Content

It is prudent for the water purveyor to ensure that legal access exists to sources. As part of any negotiations with neighboring land owners relating to covenant agreements for SCAs, it's useful to memorialize any agreement relating to access or maintenance across neighboring property.

5.2 Wellhead Protection Program

5.2.1 Introduction

All Group A public water systems supplied by one or more wells or springs, excluding systems using only purchased water, **must** develop and implement a WHPP. The summary below includes the basic WHPP information that **must** be included in a WSP (WAC 246-290-100(4)(g) and WAC 246-290-135(3)). Refer to the DOH publications listed at the end of this chapter for more information.

5.2.2 Required Content

In general, a WHPP's scope will coincide with the complexity and size of a system and its sources. Because each water system's land use, hydrologic setting, source mix and system characteristics differ, no two WHPPs will be alike; they cannot simply be copied from system to system. Each WHPP **must** be tailored to address, at a minimum, each of the following elements (WAC 246-290-135(3)(c)).

Overview. Describe the history of the water system's WHPP and information on the cost, level of effort and program successes during the plan approval period.

Susceptibility Assessment. Provide a complete susceptibility assessment for each source (WAC 246-290-135(3)(c)(i)). If one has already been submitted to ODW, review the assessment for accuracy and append a copy to the WSP for reference. For more information about susceptibility assessment criteria, see *Washington Source Water Assessment Program* DOH 331-148 and *Source Monitoring Waiver Process* DOH 331-359.

Wellhead Protection Area Delineation. Delineate and graphically present on a scaled map the wellhead protection area for each well, wellfield, or spring, including emergency wells (WAC 246-290-135(3)(c)(ii)). Provide an explanation of how the six-month and one-, five-, and ten-year time-of-travel zones were calculated.

> **Planning Tip**
>
> See our SWAP database at fortress.wa.gov/doh/swap/index. Turn on the appropriate layers, check the information for accuracy, and incorporate any changes or corrections into the map included in the WSP. In addition to the map included in the plan, you can provide digital files of protection areas using the formats outlined in DOH 331-391.

The minimum requirement for the wellhead protection area delineation is using the Calculated Fixed Radius (CFR) method. See page 23 and Appendix F in *Wellhead Protection Program Guidance Document* DOH 331-018 for guidance on using CFR method.

While CFR is the minimum requirement, we recommend using modeled approaches for calculating the wellhead protection area delineation, such as analytical models, hydrogeologic mapping, and numerical flow/transport models, that provide more accurate, useful, and reliable maps for your water system. Modeled approaches factor in aquifer characteristics, such as hydraulic conductivity, groundwater flow direction; sources of recharge; and other nearby points of withdrawal to determine time-of-travel zones; and as a benefit, the delineation will target the potential contaminants in a focused area and decrease research efforts in areas of no impact. See DOH 331-634, DOH 331-635, and DOH 331-636.

Contaminant Source Inventory. Provide a current contaminant source inventory (WAC 246-290-135(3)(c)(iii)). Sort potential contaminant sources by source for each time-of-travel zone. Include existing or proposed aquifer recharge projects involving direct or indirect potable reuse and injection wells covered by EPA's Underground Injection Control (UIC) regulations (40 CFR 144.3).

Provide a copy of the most recent letter template used to notify landowners with potential contaminant sources of the contaminant source inventory findings and the date the letter was sent (WAC 246-290-135(3)(c)(iv)). Include in the letter a discussion of the system's susceptibility ranking, meaning of that determination, and number of persons served by the system. The contaminant survey and inventory, and notification to landowners, **must** be updated at least every two years (WAC 246-290-135(3)(c)(iii)).

Notification of Findings. Provide a copy of the most recent template used to notify state and local agencies of findings. Include the list of addressees and date the letter was sent. Water

systems **must** notify state and local agencies of the WHPP's contaminant source inventory findings and the wellhead protection area boundaries (WAC 246-290-135(3)(c)(v)). It is expected that the agencies will use this information to:

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

Contingency Plan. Prepare a contingency plan (WAC 246-290-135(3)(c)(vi)) that addresses how the water system will provide consumers with an adequate supply of potable water in case one or more existing drinking water sources is temporarily or permanently lost due to contamination. We recommend the contingency plan identify expected range of costs if a source is contaminated and must be treated or replaced. The contingency plan should be consistent with the contingency planning efforts described in Chapter 6.

Notify Emergency Responders. Provide a copy of the notification sent to emergency responders (WAC 246-290-135(3)(c)(vii)). Water systems must notify state and local emergency responders (e.g., police, fire, and health jurisdictions) of the wellhead protection area boundaries, results of susceptibility assessment, inventory findings and contingency plan.

5.2.3 Recommended Content

The following elements, although not required by WAC, should also be considered when developing a WHPP.

Regional Implementation Efforts. Describe how your water system works with other water systems to implement a regional WHPP. Submit the regional wellhead protection program documentation as the core of your wellhead protection. Add detail as needed to document individual water system compliance with planning requirements and other unique efforts undertaken to protect your groundwater supplies from contamination.

Education. Describe efforts made to educate the community about your WHPP. Public education is a very important part of managing wellhead protection areas. The goal is to help the community to understand the risks, costs, and how their individual decisions and activities might adversely affect the water they drink. This better understanding will result in greater cooperation and support for the water system's source water protection efforts.

Public Engagement Strategies. Describe your strategy to engage the energy and interests of the community. One way to involve the public is to form a local wellhead and/or watershed protection committee. Members of the committee can include representatives of jurisdictions with land-use control over the wellhead protection area; water system managers; members of industrial, commercial and agricultural organizations or businesses; citizen action groups; tribal representatives and regulatory agency personnel. The WHPP is more likely to become an effective, implementable program by involving members of affected groups from the beginning.

Local Government Engagement Strategies. Describe your strategy to engage with local government. Permitting decisions made by local governments can protect or put at risk groundwater supplies. Recent experiences reveal gaps in the regulatory framework intended to protect groundwater and surface water. Engaging with local planning, public works, and permitting staff can improve local source water protection.

5.3 Watershed Control Program

5.3.1 Introduction

Watershed refers to the hydrologic drainage upstream of a water system's surface water intake. The watershed affects the physical, chemical, and microbiological quality of the source. Understanding and managing risks within a watershed is integral to a water system's efforts to protect public health. All Group A public water systems supplied by one or more surface water or GWI sources, excluding systems using only purchased water, must develop and implement a watershed control program (WCP).

Planning Tip

Look beyond your community when evaluating risk.

10,000 gallons of a toxic industrial chemical leaked into the Elk River upstream from a drinking water intake, resulting in a "do not use" order for 300,000 people in West Virginia.

Elevated levels of a cyanotoxin contaminated a portion of Lake Erie, leading to a "do not drink" advisory for 500,000 customers in Ohio.

The WCP components that must be included in a WSP are summarized below (WAC 246-290-100(4)(g) and -135(4)). Refer to the DOH publications listed as references at the end of this chapter for more information.

5.3.2 General guidelines

Below are general guidelines for developing a new or evaluating an existing WCP. The WCP format is up to the water system. Determine scope and level of detail during the preplanning conference. Additional information specific to unfiltered system WCPs is included at the end of Section 5.2.

- If there are multiple surface water sources in the same watershed, develop one WCP.
- If there are multiple surface water sources in different watersheds, develop a separate WCP for each watershed.
- For each GWI source, develop a hybrid of watershed control and wellhead protection programs tailored to the source type and construction.

5.3.3 Required Content

The WCP **must** address each of the following elements (WAC 246-290-135(4)(c) and WAC 246-290-668).

Overview. Describe the history of the water system's WCP and information on the cost, level of effort and successful outcomes during the previous plan approval period.

Watershed Description. Identify or describe the following.

- Geographical location/boundaries of the watershed and physical features of the watershed, including size and ranges of elevation (include a topographical map delineating the watershed). Topographic map(s) such as the U.S. Geological Survey's 7 1/2 series maps may serve as the base map.
- WRIA(s) in which the source intake(s) are located.
- Watershed hydrology including historical precipitation data; annual precipitation patterns; streamflow characteristics (including maximum, average, and minimum flows); sediment loading as related to rainfall intensity; terrain/geologic features; vegetation and soil type and any other characteristics detrimental to water quality such as areas subject to erosion or landslides.
- Naturally occurring changes observed over time.
- Critical areas (as defined in RCW 36.70A.030(5)). Explain how they relate to the watershed. Information on critical areas should already be completed by and available from the local jurisdiction (city, town, or county).
- Areas of human or animal activity that could degrade water quality at the intake and need additional protection and/or control.
- Map of intakes, reservoirs and other major components and a description of the physical condition of the intake and protection provided at the intake.
- Land ownership map and a table of land use (refer to detrimental land use list below) and acreage, expressed as a percentage of watershed size.
- History of wildfire and current wildfire control measures.
- Map of public access points and a narrative on the magnitude and nature of public use.
- Raw water quality information, monitoring locations, and a narrative on any correlation between raw water quality and changes in the watershed over time.

Identification of Activities and Land Uses Detrimental to Water Quality. Identify all activities and land uses within the watershed that currently impact or could adversely affect source water quality. Prioritize activities in terms of their potential to degrade source quality.

Impacts to source water quality may result from physical (turbidity), microbiological (including sources of *Giardia*, *Cryptosporidium,* and viruses), and chemical sources of contamination. Provide a map, table, and narrative description to identify and locate such activities and land uses occurring within the watershed and describe their potential impact on source water quality. Include a brief history of watershed activities and development.

Identify or describe, as applicable, the following land uses within the watershed.

- On-site wastewater treatment (septic) systems and waterfront properties where lawn care practices impact water quality.
- Agricultural land uses, soil erosion potential and chemical usage (refer to U.S. Department of Agriculture information).
- Concentrated animal feeding operations.

- Grazing operations.
- If the watershed includes commercial forest land, describe how the water system can access the Department of Natural Resources (DNR) Forest Practices Application Review System (FPARS) and the importance of using this forest management resource.
- Timber management, including logging, thinning, spraying, culvert and road construction/repair and fire prevention/control.
- Municipal/commercial land uses including wastewater treatment plant discharges and sewer lines.
- Biosolids application sites.
- Industrial land uses, including industrial discharges.
- Recreation (e.g., fishing, boating, swimming, hunting, off-road vehicles).
- Fish and wildlife populations.
- Transportation routes.
- Hydroelectric power generation.
- Flood control.
- Mining.
- Research and education.
- Proposed land use changes that could adversely impact water quality.

Watershed Management and Control Measures. Detail how the system monitors and controls activities and land uses described above to minimize or eliminate adverse source water quality impacts. Include an evaluation of existing watershed control measures and their effectiveness. Note any deficiencies in current control measures.

In addition, discuss the feasibility of implementing new strategies and specific measures for improving watershed control. Prioritize measures that improve watershed control and are implementable by the water system. List measures by their expected degree of impact, and provide an implementation schedule.

Some water systems are able to employ strict watershed controls through direct ownership or written agreements with landowners. Identify efforts taken or planned to secure land ownership or control within the watershed, particularly areas providing access to water system facilities. Such efforts may include resources devoted to land purchases or arrangements with non-utility landowners for land swapping. In addition, document written agreements to control human activities on non-utility owned land and included in the program.

Water systems may be able to exert some control over watershed activities and land uses through the standard governmental planning process. The WCP should describe the water system's involvement in local and regional government planning. Describe the level of watershed control achieved or expected through governmental planning efforts.

Most water systems will use a combination of measures to achieve watershed control. Identify the control measures implemented or planned for implementation, such as:

- Land Ownership/Written Agreements.
  - Complete watershed ownership.
  - Ownership of vulnerable areas and control of access points.
  - Formal, written agreements with landowners.
  - Informal agreements with landowners.
- Land-Use Restrictions.
  - Prohibit certain land uses or activities.
  - Post signs at the watershed boundary and imposing watershed entry restrictions.
  - Restrict reservoir use.
  - Require stream and/or reservoir buffer strips.
  - Impose land use restrictions including official, specific use and development regulations enforced by local or state agencies.
- Regulation of Agriculture, Timber Harvesting and Construction Practices.
  - Require use of best management practices by farmers and foresters.
  - Place controls on the location and amount of fertilizers, herbicides and pesticides.
  - Regulate construction practices to minimize adverse impacts on source water quality.
- Inspection, Surveillance, and Monitoring Programs.
  - Monitor activities such as timber harvesting or road construction occurring.
  - Use DNR's FPARS (see above).
  - Patrol for trespassers at headworks, reservoirs, and other water system facilities.
  - Monitor water quality of tributaries, primary supply, and reservoirs.
  - Design monitoring to identify changes in source water quality and their relationship with natural or man-made changes in the watershed.
- Contamination Source Controls.
  - Manage forest health to reduce the potential for catastrophic fires.
  - Participate in planning, construction, maintenance and deconstruction of roads.
  - Participate in the permitting process for industrial/municipal discharge and stormwater discharge to the fullest extent allowed by law.
  - Require septic tank inspection and permitting programs.
  - Monitor and controlling wildlife access near the intake.
  - Stabilize areas prone to erosion and/or slides and rehabilitating stream banks and slide areas.
  - Improve riparian areas and flood plains to manage high-velocity storm events.
- Public Education.
  - Conduct educational outreach programs.

- Form a local watershed control committee.

Current Watershed Evaluation. Filtered surface water systems **must** conduct periodic comprehensive evaluations of their watersheds and use the results to update their WCPs (WAC 246-290-668(2)). Perform comprehensive evaluations at least every five years and whenever there are significant changes in the watershed. Include a summary report of the water system's most recent evaluation.

5.3.4 Recommended Content

The following elements, although not required by WAC, should also be considered when developing a WCP:

Monitoring Program. Provide a detailed description of the program to monitor adverse water quality impacts from activities occurring within the watershed. Identify ongoing activities of concern (e.g., logging, farming, road construction, hunting, grazing, wastewater treatment plant discharge, stormwater discharge, algal blooms) and extraordinary circumstances (e.g., landslides, wildfires, floods, chemical spills). Describe the parameters monitored, frequency of sampling and specific sampling locations associated with each activity.

System Operations. Evaluate the capacity of existing treatment facilities and system operations to continuously produce finished drinking water that meets all primary and secondary drinking water standards in the event of significant water quality changes. Describe treatment system design and operational flexibility and limitations to adjust to changes in source water quality or watershed emergencies.

Local Partnerships. Participate with other ongoing efforts to protect the watershed. Within many watersheds, projects are underway that improve water quality for other users (fish, recreation, etc.). Engagement with these projects can provide multiple benefits including education, enhanced water quality, and improved community engagement. Investigate efforts of local water conservation groups or restoration practitioners to identify projects that could improve watershed control and public health protection.

Emergency Response. Evaluate the effectiveness of early warning systems/alarms for detection of watershed emergencies. Appropriate responses to various watershed emergencies may take the form of modifications to treatment plant operations to address higher than normal turbidity levels and/or provide increased levels of disinfection.

Identify emergency response operational protocols for various watershed emergencies, including who is responsible for emergency response decision making, modifications to treatment plant operations (e.g., coagulant dose, disinfection dose, filter loading rate, shutdown), interagency coordination, and public notification. Ensure this information is consistent with the emergency response plan described in the WSP. See Chapter 6 for guidance on emergency response planning.

Alternative Supplies. Systems that consider treatment plant shutdown and reliance on an alternate source(s) during a watershed emergency should provide:

- Evidence that Ecology has granted water rights for the alternate source(s).
  - Information to show that the alternate source(s) has or have the capacity to meet system needs until the primary surface source can be put back online.
  - Start-up procedures for the emergency source, including water quality sampling and notification to DOH.
  - Procedures for returning to normal supply following the shutdown.

5.3.5 Watershed Control Plans for Unfiltered Surface Water Supplies

Watershed management and control is critically important to water systems supplied by an unfiltered surface water supply. The regulatory standards for water supplied from a watershed to an unfiltered surface water treatment plant are quite strict (ownership and control, turbidity, *E. coli*, *Cryptosporidium*). Watershed control must, in effect, compensate for the loss of the public health protection barrier afforded by filtration. In these settings active management and contamination prevention are the primary protections of water users' health. WCPs for unfiltered systems need to be dynamic and progressive documents and should not be tied to the water system planning cycle. WCPs for unfiltered systems should be standalone documents that can be easily modified in response to changing conditions.

Regulatory requirements for WCPs for unfiltered surface supplies are found in WAC 246-290-690(3)(e) and -691(3)(b). Guidance for unfiltered WCPs is available through our regional offices. Contact your regional planner for more information.

Publications Reference List

Sanitary Control Area Protection DOH 331-453

Source Water Protection Requirements DOH 331-106

Source Monitoring Waiver Process DOH 331-359

Wellhead Protection Areas: Protecting Drinking Water DOH 331-634

Wellhead Protection Areas: Delineating Wellfields DOH 331-635

Wellhead Protection Areas: Assessment of Your Wellhead Protection Delineation Method DOH 331-636

Washington Source Water Assessment Program DOH 331-148

Wellhead Protection Program Guidance Document DOH 331-018

Websites

DOH source water protection web page
doh.wa.gov/CommunityandEnvironment/DrinkingWater/SourceWater/SourceWaterProtection

CHAPTER 6 OPERATION AND MAINTENANCE PROGRAM

Objective

This chapter's objective is to ensure satisfactory management of water system operations. It satisfies requirements of WAC 246-290-100(h), WAC 246-290-415, and WAC 246-290-654(5).

Appropriate and efficient Operation and Maintenance (O&M) doesn't happen by itself. It is a result of deliberately assessing the water system's unique assets and staffing, technical and financial capacity, and strategic priorities. Implementation of a sound maintenance and operation program enables the water system to minimize asset life-cycle costs; maintain consistently reliable, high quality water service; and maximize public health protection.

The O&M program works within an asset management program framework , enabling water systems to invest the right amount of money to provide the chosen level of service at the lowest life-cycle cost. O&M staff input is essential to identifying and prioritizing O&M and Capital Improvement Program (CIP) projects, including spending decisions based on asset management principles as discussed in Chapter 3. An asset management program helps make risk-based decisions by choosing the right project, at the right time, for the right reason.

The operation and maintenance program should:

- Clearly outline roles and responsibilities.
- Serve as an institutional memory for water system O&M.
- Be easy to edit in the event circumstances change.
- Be easily accessible.
- Support asset management goals.
- Form the basis for all O&M expenses included in the water system budget (see Chapter 9).

Planning Tip

Consult with water system operations staff. Managers and front-line staff are a valuable source of information for this chapter.

Include a discussion of the current status of operations for each program element listed below, give a description of planned improvements, and provide an implementation schedule. Include a committed list of specific activities and decisions, plus a list of suggested actions if resources become available. It is beneficial to consult our *Water System Design Manual* DOH 331-123 for additional information on O&M of treatment and distribution systems.

Coordinate with the water system operators to develop the O&M Chapter of the WSP. The certified operator is "in responsible charge" to make decisions that directly impact water quality, water quantity, or public health protection of the water system; and daily operational activities, process control, or system integrity of a water treatment plant or distribution system. The

operators are tasked with day-to-day management of the system; use this section to detail that program and add additional tools or functions that will better serve the water system. Utilize the O&M Chapter to appropriately fund day to day operations.

Plan Content

This chapter addresses the following topics.

6.1 Water System Management and Personnel
6.2 Operations and Preventive Maintenance
6.3 Comprehensive Water Quality Monitoring
6.4 Emergency Preparedness and Response
6.5 Cross-Connection Control
6.6 Sanitary Survey Findings
6.7 Recordkeeping, Reporting, and Customer Complaint Program
6.8 Surface Water Treatment—If Applicable
6.9 Summary of O&M Deficiencies

6.1 Water System Management and Personnel

Purpose. This section satisfies the requirements of WAC 246-290-415(2)(a) and:

- Describes the water system's organization structure.
- Confirms water system operator position responsibilities align with their qualification.
- Assesses the adequacy of the water system's staff resources to fulfill all routine and emergency functions necessary to maintain a safe and reliable water system.

Organizational Structure. At a minimum, provide a description of the decision-making "chain of command." Larger water systems working inside departments of local government should provide an organizational chart depicting the managerial, operational, and oversight structure. List major responsibilities for each position shown on the organizational chart separately from the chain of command or organizational structure graphic.

Alignment of Job Responsibilities with Qualifications. Document the position and certification, licensing, or other qualification responsible for the following functions.

- Day-to-day operation and maintenance of the distribution system.
- Day-to-day operation and maintenance of each water treatment plant (WTP).
  - List the WTP rating classification for each WTP.
- Water quality monitoring for:
  - Source sampling.
  - Water treatment sampling, data verification, and reporting to DOH.
  - Distribution system sampling, data verification, and reporting to DOH.
- Capital improvement project management.
  - Water system internal plan and engineering design review.

    - Asset management and facility inspection.
    - Construction management.
- Sanitary survey preparation, participation, and response.
- Preventative maintenance.
- Emergency response.
    - Designated media contact.
    - Issuing a health advisory as part of a Tier 1 public notice.
- Cross-connection control.
- Ensuring operational staff get needed training and continuing education.
- Budgeting.
- Complaint response.
- Disseminating public information.
- Meter reading and billing.
- Documentation and records retention.

It is important to note which activities must be performed by specifically qualified and licensed or certified personnel to assure compliance. Include in the WSP verification documents, such as the certification number or copies of the operators' certification validation cards, . For some water systems, minimum staff qualifications are set by WAC 246-292. In other cases, the water system may have other (more stringent) requirements. If so, describe these requirements.

Adequacy of Staffing. Inadequate staffing places the safety and reliability of drinking water at risk. Ensuring personnel with the right qualifications and experience perform the above functions protects public health, builds consumer trust, and minimizes costs. Without adequate and backup staff, critical functions and continuity of operations are at risk during emergency events. The WSP should demonstrate that the water system has the distribution, treatment, and management oversight necessary to maintain compliance with regulations, water system standard operating procedures, and appropriate emergency response protocols.

- See Chapter 11 in the *Water System Design Guidebook* DOH 331-123 (WSDM) for water treatment plan staffing guidance.
- See WAC 246-292-032 for duties of the certified operator(s) in responsible charge, including availability and response timeframe.
- See WAC 246-292-033 for cross connection control specialist duties.

The American Water Works Association predicts that 30 to 50 percent of the current water system operator work force will reach retirement age in the next five to ten years (as of 2019). This loss represents a significant reduction in expertise and experience. Describe the water system's succession planning strategy, including anticipated retirements and the processes in place to ensure the water system undergoes a smooth transition when personnel changes occur in certified positions.

6.2 Operations and Preventative Maintenance

Purpose. Identifies and describes how to properly operate and maintain the water system's assets and satisfies the requirements of WAC 246-290-415(2)(f).

It is important to document how the water system operates and the steps the water system takes to effectively manage its assets. This element includes:

- Identification of major system components.
- Routine system operation.
- Preventative maintenance program and its impact on asset life cycle costs.
- Equipment, supplies, and chemical listing.

Identification of major system components. Identify each major system component on a map (i.e., source, treatment plant, reservoir, and booster pump station), describe the normal operation of the component and settings, describe the component's relationship with other system components under normal operating conditions, and describe possible alternate operation modes and circumstances under which they would be used. This information should be included in earlier chapters of the WSP. Refer to those sections rather than repeat the information.

Preventative maintenance program. Preventative maintenance improves system reliability, reduces life-cycle asset costs, and may increase asset life. For each major system component, describe the preventive maintenance tasks (if any) that are performed. Include the type of preventative maintenance or inspection required; the frequency of maintenance or inspection; and, any extraordinary changes to operations that would occur when a facility is off-line or otherwise unavailable, (e.g. reservoir off-line for cleaning or recoating). See *Preventative Maintenance Program Guide* DOH 331-351.

> **Planning Tip**
>
> Water systems planning to apply for a drinking water state revolving fund loan should consult our current construction loan guidelines regarding expectations for asset management.

Equipment, supplies, and chemical listing. Water systems should maintain up–to-date equipment, supplies, and chemical lists. Include the following items:

- All equipment, supplies, and chemicals used by the water system.
- Service representatives for major water system components and chemical suppliers.

- Manufacturers' technical specifications for major system components and chemicals used (these may be referenced).
- Equipment suppliers' operations and maintenance guidebooks (these may be referenced).Stock of supplies and chemicals needed to assure continuous operation of the water system

Include a summary of the water system's personnel and outside contractors, actions, and frequency in routine operations and maintenance. See Table 6-1 for an example. Attach or reference supporting standard operating procedures, vendor-supplied O&M manuals and guidebooks, and other internal guidance in the WSP appendix.

Planning Tip

Interviewing operators and managers can identify other necessary O&M expenses, such as:

- Reservoir, pump, and well rehabilitation.
- Additional staff and software needed to implement cross connection control.
- Prioritizing asset management tasks.
- Contracting for data base fixes.
- Increasing water use efficiency consumer outreach.

6.3 Comprehensive Water Quality Monitoring

Purpose. Describes the water system's water quality monitoring and reporting program and water quality sampling procedures, and satisfies some of the requirements of WAC 246-290-415(2)(c).

Water systems are required to sample their system's sources and to sample at representative locations within their distribution system to ensure health-based drinking water standards are met. For systems that seek to optimize treatment and distribution system operations, water quality monitoring is used to continuously refine operations and reach beyond minimum regulatory standards. We recommend water systems establish baseline distribution system water quality parameters such as pH, chlorine residual, and turbidity to help identify and respond to contamination events quicker.

In general, monitoring requirements are established in federal rule and adopted by the State Board of Health. The rules define the parameters which must be monitored, the generalized description of sample site locations, and the schedule for initial and routine sampling. Sampling requirements are based on the population served by the water system, the type of source(s) and treatment, and past monitoring results.

The WSP **must** address all water quality monitoring required under current state and federal regulations (WAC 246-290-415(2)(c)). Additionally, the WSP **must** include the following contaminant monitoring plans (WAC 246-290-300)):

- Coliform monitoring plan (all systems); including chlorine residual monitoring as required by DOH.
- Lead and copper monitoring plan (all systems).

- Disinfection byproducts monitoring plan (for all systems adding a chemical disinfectant to any source **for any reason**; and for consecutive systems purchasing water treated with a chemical disinfectant).
- Treatment-specific monitoring, including frequency, analytical method, and reporting requirements (as applicable – See Section 6.3.2).

If the water system participates in a regional sampling program, include the regional sampling plan and accompanying agreement describing the roles and responsibilities of each participating water system. These plans and agreements must be approved by DOH (WAC 246-290-300(2)(c)).

Water Quality Monitoring Schedule. We developed the water quality monitoring schedule (WQMS) to help water systems identify their specific water quality monitoring requirements. It is available online through Sentry Internet. Find directions for accessing and using the WQMS on our web site at doh.wa.gov/portals/1/documents/4200/wqmsdirections. Include it in the WSP.

The WQMS does not include monitoring required to measure the effectiveness of treatment, special investigations, or special operation and maintenance circumstances. Be sure to include these additional monitoring requirements in the WSP.

Mapping. The disinfection byproducts rule (DBPR), the lead and copper rule (LCR), and the revised total coliform rule (RTCR) require sampling within the distribution system. Indicate on a legible map of the distribution system the locations where the water system takes its samples.

6.3.1 Coliform Monitoring Plan

Purpose. This section demonstrates how the system complies with microbiological monitoring and reporting requirements and satisfies the requirements of WAC 246-290-300(3)(b).

All Group A water systems must collect samples for coliform bacteria analysis (WAC 246-290-300)). Distribution system monitoring requirements are included in the RTCR. Groundwater source monitoring requirements are included in the groundwater rule (GWR). Surface water source monitoring requirements are included in the surface water treatment rule (SWTR). Whichever rules apply to the water system, a coliform monitoring plan (CMP) demonstrates how the water system complies with its applicable sampling and reporting requirements. Provide a map of coliform sampling locations and purpose of coliform sample type (i.e., routine, repeat, triggered source, other).

Groundwater systems. Systems that withdraw groundwater are subject to the GWR. GWR guidance is in *Groundwater Rule* DOH 331-447. This guidance addresses who is affected, monitoring requirements, and public notification.

Each Group A public water system must develop a written coliform monitoring plan. Coliform monitoring plan guidance is in *Preparing a Coliform Monitoring Plan* DOH 331-036. DOH developed guidance to help develop a coliform monitoring plan that complies with the requirements of the RTCR and GWR. The template in the guidance is available in Word format at doh.wa.gov/Documents/Pubs/331-036_template.

Wholesaling and consecutive systems have different requirements. These differences are explained in *Preparing a Coliform Monitoring Plan: Exceptions to triggered source monitoring for wholesale or consecutive systems* DOH 331-475.

6.3.2 Water Treatment Monitoring

Most water systems provide treatment to at least one source. The most common treatment is disinfection with chlorine. Treatment processes span a broad spectrum, from chemical addition (e.g., adding chlorine for disinfection, or a passivating agent for corrosion control), to ion exchange and ion adsorption (e.g., nitrate, arsenic, or uranium removal), to complex multi-stage surface water treatment (e.g., sedimentation, clarification, disinfection, coagulation, flocculation, filtration, disinfection).

Each treatment process is installed and operated to achieve one or more treatment objectives. In order to demonstrate these objectives are met, each treatment process requires some amount of data collection, validation, reporting, and record-keeping. Data may include physical parameters, such as flow and tank level, volume of treatment chemicals used, time, location, media depth, temperature, and pH; and water quality parameters such as disinfectant residual, raw and finished chemical and microbiological water quality, and turbidity.

Monitoring Surface Water Treatment Processes DOH 331-620 was written for water systems operating surface water treatment plants. However, since it covers many general topics such as evaluating sample locations, sample collection methods, instrument calibration, validating and verifying results, and SCADA-data processing, many elements of the document can be applied to any water treatment process. Experienced water treatment plant operators and water system managers know that treatment plant data generated and reported to DOH and the public is only as good as the care that goes into ensuring information is collected from the proper location, at the proper time, with the proper instruments, and properly integrated with other data. Documenting the system's treatment sampling plan in the WSP will help ensure water system staff have the direction they need to succeed.

6.3.3 Distribution System Optimization

Optimization is a voluntary program whose goals go beyond regulatory compliance. It does not seek greater investment in personnel or infrastructure. It seeks to apply the resources—people and facilities—currently available to the water system so that all processes are performed at their highest level. The program is data driven and 100 percent developed, directed, and managed by the water system.

The Water Research Foundation and the Partnership for Safe Water published *Criteria for Optimized Distribution Systems* in 2010. This publication is available through AWWA. The document places over 20 optimization activities into one of three optimization goals/outcomes:

- Water Quality Integrity.
- Hydraulic Integrity.
- Infrastructure Integrity.

Planning Tip

Distribution system optimization results in:

- Greater public health protection.
- Demonstrable excellence in distribution system operations.
- Enhanced security.
- Improved water quality.
- Greater customer satisfaction.

Water systems use this self-assessment tool to determine optimization status and to identify areas for improvement. By establishing a commitment to optimization and setting out metrics for success, water systems can begin engaging in the self-assessment process to identify opportunities for improvement and to advance their optimization status.

6.4 Emergency Preparedness and Response

Purpose. Demonstrates that the water system has a plan with procedures in place to prevent, mitigate, respond, address, and recover from abnormal conditions such as storms, wildfires, drought, floods, earthquakes, pandemic, and cybersecurity attack, and satisfies the requirements of WAC 246-290-415(2)(d).

This section addresses:

- Emergency mitigation, preparedness, response, and recovery. Include a water system risk and resiliency assessment, and steps taken or to be taken to reduce the risk or impact of emergency conditions.
- Actions to be taken by the water system to return to normal operations after an emergency; for example a backflow incident response plan.
- Water shortage plan, describing,
  - Legal authority to implement the plan.
  - Supply triggers and water supply-water demand monitoring protocols.
  - Actions taken when water supply is inadequate to meet demand.
  - Communication protocols.
  - Financial implications, including cost recovery associated with plan implementation.

Planning Tip

Through America's Water Infrastructure Act of 2018 (AWIA), EPA requires community water systems serving 3,300 or more persons to conduct a risk and resilience assessment and develop an emergency response plan. EPA requires certification of completion from water systems directly. For more information see the EPA AWIA website.

Emergency program. *Emergency Response Planning Guide for Public Drinking Water System* DOH 331-211 assists water systems to prepare an emergency response plan. When deciding

what portion of the emergency response plan to include in the WSP, be aware WSPs are considered public documents and DOH records retention requires that we maintain approved WSPs on file for 75 years. Carefully consider which elements of the water system's risk and resiliency assessment to include in the WSP. Where exclusions are made, please insert a signed document that states that the vulnerability analysis has been performed and its findings are addressed.

In planning a response to a threat against a water system, refer to the guidance in *Responding to a Threat against a Water System* DOH 331-183. Document emergency response relationships with adjacent water systems, regional water system organizations, and mutual aid organizations (e.g., WAWARN).

Planning Tip

Whenever possible, develop interagency agreements before an emergency strikes. Conduct periodic table top exercises and activate your interagency response team during a routine abnormal event (e.g., power outage, water main break) to identify opportunities for improved coordination and communication in preparation for a much larger emergency. Consider joining WAWARN. Visit wawarn.org for more information.

Water shortage response plan. As part of emergency response planning, water systems must develop a water shortage response plan detailing actions that will be taken during various levels of a potable water shortage (WAC 246-290-100(4)(f)(iii)). A water shortage response plan also has connection with wellhead protection contingency planning (see Chapter 5 in this guidebook). *Preparing Water Shortage Response Plans* DOH 331-301 provides guidance on how to develop a water shortage plan. We recommend small systems refer to *Truck Transportation: Emergency Water Supply for Public Use* DOH 331-063.

The severity of water shortages fall along a spectrum, from minor inconvenience to full-blown mandatory rationing with potential for loss of pressure and a boil water advisory. During minor water shortages, public information and voluntary conservation measures may be the only steps necessary to sustain minimum pressure throughout the distribution system, and maintaining adequate reserve water storage for public safety. During extreme shortages, mandatory curtailment and strict rationing may be required. Make certain your plan to implement mandatory measures are supported by the appropriate legal authority.

The risk of a water shortage depends on many factors, including climate, hydrogeologic setting of its supply sources, redundancy, and general facility condition. The combination of risk and severity establishes the basis for the water shortage response planning effort.

The plan should describe the process for assessing severity, triggered actions, decision-making, and other specific roles and responsibilities for each level of shortage.

The success or failure of a water shortage response plan rests on robust communication between the water system and its customers, and the readiness of consumers to change behavior. Successful plan implementation depends on building consumer trust.

- Prior efforts to take consumer interests into account during plan development.
- Effective communication with consumers leading up to and during a shortage.
- Communicating early and frequently with customers to help them know what they can and should do to reduce their water usage and what to expect if the shortage becomes more severe.
- Determining the cause of each shortage and sharing that information with the community.
- Engaging with the community post-shortage on lessons-learned, and options to avoid or reduce the severity of the next shortage.

Planning Tip

Include in your water shortage response plan this important step:

Notify DOH when you intend to move from a voluntary to a non-voluntary response posture.

For example, let us know when you are about to increase your response from recommending your customers stop outdoor watering to requiring them to cease outdoor watering.

6.5 Cross-Connection Control Program

Purpose. Demonstrates that the water system has implemented an effective cross-connection control (CCC) program and satisfies the requirements of WAC 246-290-415(2)(e). Surveys by the Centers for Disease Control and Prevention have identified cross-connections as a major cause of waterborne disease outbreaks in the United States. Providing safe and reliable drinking water is not possible without assuring that cross connections are identified and controlled or eliminated.

The task of eliminating all cross connections is enormous. However, all water systems can implement CCC programs that reasonably reduce the risk of contamination to their systems. For a drinking water (potable water) supply to become contaminated via a cross connection, three things need to happen simultaneously.

- The potable water supply piping must be unprotected (or improperly protected) from a cross connection.
- A physical cross connection has to be made between the potable water supply piping and a contaminant source.
- Backflow conditions need to occur.

WAC 246-290-490 requires a water system's cross connection program include ten elements (see list below), representing initial and ongoing tasks. We suggest separating the tasks into three categories.

1. CCC program development:
   a. Retain qualified personnel (Element 4).
   b. Establish legal authority (Element 1).
   c. Establish administrative and technical procedures (Elements 2).

2. CCC program initial implementation:

a. Develop record keeping and reporting systems (Elements 7 and 9).
b. Conduct initial hazard evaluations (Elements 3 and 10).
c. Ensure assembly installation (Elements 3 and 10).

3. 3. CCC program ongoing implementation:
   a. Ensure annual assembly testing (Elements 5 and 6).
   b. Educate customers (Element 8).
   c. Re-evaluate existing and new service connections (Elements 3 and 10).

Here are some tips.

- Developing a CCC program may feel overwhelming. Employ or contract with a cross connection control specialist (CCS) to help. Visit the DOH CCC web page for guidance and further information. If the water system doesn't have a CCC program, focus on the steps in Category 1 (above). Take these steps before requiring any customers to install backflow prevention assemblies.
- Establish legal authority and program policies and procedures before implementing a CCC program.
- Public education plays a key role in implementing a successful CCC program. Customers may be more willing to comply with CCC policies when they understand their roles and the water system's responsibility to prevent and control cross connections.

Water systems **must** document the status of each of the following CCC program elements in their WSP (WAC 246-290-100(4)(h) and WAC 246-290-415(2)(e)).

Step 1: CCC Program Development

Step 1A

Retain a CCS as required. Your CCS can help draft the legal authority document, develop CCC program policies and procedures, conduct initial hazard assessments, and lead CCC program implementation tasks. Contracting for CCS services may be cost-effective for systems that don't directly employ a CCS. For guidance on hiring a contract CCS, see Section 7.1.3 *Cross-Connection Control for Small Water Systems* DOH 331-234. We have a public list of CCS on our website.

Step 1B

Establish the legal authority to implement a CCC program. Adopt an ordinance, resolution, by-law, or other legal document that:

1. Establishes CCC program legal authority.
2. Describes the CCC program operating policies and technical provisions.
3. Describes the CCC program enforcement authority available to ensure CCC customer compliance.

Include a copy of the legal document in this section. See a sample legal document in Appendix A of *Cross-Connection Control for Small Water Systems* DOH 331-234.

Step 1C

Establish administrative and technical procedures. The legal document in Step 2 should include general CCC program policies and procedures. After the legal document is adopted, the CCS must develop a CCC program plan that includes detailed technical and administrative policies and procedures (WAC 246-290-490(3)), including record-keeping, list of approved devices, and responding to backflow incidents. Be sure to have the governing body approve the completed CCC program plan before implementing.

Step 2: CCC Program Initial Implementation

Step 2A

Develop a record-keeping and reporting system. Develop a CCC record-keeping system to track the following:

1. Hazard evaluation results (by connection).
2. Inventory information for backflow preventers that protect the water system.
3. Test report information for backflow preventers that protect the water system.
4. See a sample completed CCC program in Appendix A of *Cross-Connection Control for Small Water Systems* DOH 331-234.

All water systems must complete Annual Summary Report (ASR) forms (available on our website) and submit them to us upon request (WAC 246-290-490(8)). The ASR is an effective tool to evaluate and document the status of the water system's CCC program and to determine appropriate next steps. If a backflow incident occurs, submit a completed *Backflow Incident Report Form* DOH 331-457 to us (WAC 246-290-490(8)).

Step 2B

Conduct initial hazard evaluations:

1. Mail a water use questionnaire to customers.
2. Evaluate each service connection for cross-connection hazards.
3. Determine the type of protection needed (if any).
4. Notify customers of the results of the evaluations.
5. Be sure to install approved backflow assemblies (if needed).
6. Ensure that assemblies are tested annually.
7. Keep required CCC records.
8. Review billing records for potential high-hazard connections.
9. Evaluate premises that use reclaimed water (if applicable)

Use the results to identify connections with specialized plumbing or onsite activities that could pose a risk to the water system. Ask the CCS to conduct hazard evaluations starting with the highest priority (e.g., significant high health hazard premises listed in WAC 246-290-490). The CCS must make the final hazard assessment for each connection (WAC 246-292-033)) and determine the appropriate backflow device. See a sample water use questionnaire in Appendix D of *Cross-Connection Control for Small Water Systems* DOH 331-234.

Step 3: CCC Program Ongoing Implementation

Step 3A

Ensure annual assembly testing. Ensure that a certified backflow assembly tester (BAT) inspects and tests backflow preventers.

1. Upon installation, repair, or relocation.
2. After a backflow incident.
3. Annually thereafter.

Develop an assembly testing quality assurance and quality control (QA/QC) program. It should include documentation of BAT certification and field test kit calibration. See a list of DOH-certified backflow assembly testers willing to provide services to the public.

Step 3B

Educate customers. Briefly describe how the water system will educate customers about cross-connection health hazards and how to control or eliminate them. Periodically send water bill inserts or brochures on CCC or include information in the Consumer Confidence Report. We have sample CCC education brochures on our web page.

Step 3C

Re-evaluate existing connections and review new service requests. Periodically re-evaluate existing connections (without RPBAs) and review any changes in water use, particularly if there has been an ownership change for the service connection. Evaluate new service requests and ensure that the appropriate backflow protection is installed (if needed) before serving water to the connection. The CCS should help with these tasks because the CCS must make the final hazard assessment for each connection.

Water systems that regularly submit WSP updates demonstrate compliance with each of the above elements. For these water systems, we recommend including several of your most recent CCC Annual Summary Reports in the WSP appendix and reference them when describing current CCC program status, changes since the last WSP update, and CCC program improvements for the plan approval period. Ask the CCS who completed the most recent ASR to access the water system's ASR history in the DOH data base.

6.6 Sanitary Survey Findings

Purpose. Identify and include managerial and operational changes that have been or will be implemented to prevent deficiencies that require corrective action or notification of non-compliance with WAC 246-290 or WAC 246-292. We list related guidance publications in the references at the end of this chapter.

Identify the significant deficiencies, significant findings, and observations documented in the most recent sanitary survey, and the actions taken to address them. If any deficiency or finding remains unaddressed, include the action plan and budget in the WSP CIP and financial program.

6.7 Recordkeeping, Reporting, and Customer Complaint Program

Purpose. Identify recordkeeping and reporting responsibilities, responsible individual and applicable timeframes, and any noteworthy method by which the water system will:

- Keep required records (refer to WAC 246-290-480 and -485).
- Report information to DOH, including monthly water treatment operational reports, treatment failures, emergency conditions, required assessments, public notice certifications, and WFI updates.
- Respond to, log, and track trends in customer complaints, including reports of illness, low pressure, and aesthetic concerns (color, taste, odor).

6.8 Surface Water Treatment (if applicable)

Purpose. Applies only to systems using filtration technology to treat surface water or GWI source of supply satisfies the requirements of WAC 246-290-654(5). Systems that are supplied by an unfiltered surface water supply or purchase all their water are excluded from these requirements. The purpose of the section is to describe operational measures taken by the water system to ensure optimal filtered water quality at all times the water treatment facility produces water.

Describe the following.

- Technology and processes used to treat surface water. If this information is already included in an earlier chapter of the WSP, refer to it rather than repeat it here.
- Procedures used to determine chemical dose rates.
- Unit process operational and equipment maintenance protocols.
- Performance monitoring.
- Data integrity/quality assurance program (see section 6.3.2)
- Reliability features.
- Response plans for critical water treatment unit process failures.
- Reference to watershed control plan emergency response planning (see Chapter 5 in this guidebook).

The following elements, although not required by the rules governing WSPs, should also be included in the WSP chapter "Operations and Maintenance."

6.9 Summary of O&M Deficiencies

Purpose. Summarize the O&M information in this chapter. See Table 6-2 for an example of such a summary. Include all O&M projects that identified as requiring capital spending, such as service meter replacement, lead gooseneck and service line replacement, annual pipeline replacement, pump replacement, filter media replacement, instrumentation and SCADA upgrade/replacement, reservoir re-painting, and identified costs for redundancy and resiliency.

Table 6-1

Routine O&M Tasks

Task	Individual or Position	Frequency	Applicable SOPs, O&M Manuals, or Other Internal Guidance

Table 6-2

Summary of O&M Deficiencies, Expenses, and Needed Action

O&M Deficiency	Action to be Taken	Year	Cost (if any)	Source of funding

Publications Reference List

Backflow Incident Report Form DOH 331-457

Criteria for Optimized Distribution Systems AWWA 2010

Cross-Connection Control for Small Water Systems DOH 331-234

DOH Water System Design Guidebook DOH 331-123

Emergency Response Planning Guide for Public Drinking Water System DOH 331-211

Field Guide DOH 331-486

Groundwater Rule DOH 331-447

Monitoring Surface Water Treatment Processes DOH 331-620

Preparing a Coliform Monitoring Plan DOH 331-036

Preparing a Coliform Monitoring Plan: Exceptions to triggered source monitoring for wholesale or consecutive systems DOH 331-475

Preparing Water Shortage Response Plans DOH 331-301

Preventative Maintenance Program Guide DOH 331-351

Responding to a Threat against a Water System DOH 331-183

Sanitary Survey Checklist DOH 331-487-F

Sanitary Surveys of Drinking Water Systems DOH 331-197

Truck Transportation: Emergency Water Supply for Public Use DOH 331-063

Websites

AWWA website resources

EPA's Water Sector website for emergency response.

- epa.gov/waterresilience
- epa.gov/emergency-response
- Risk and resilience assessments and Emergency Response Plans factsheet
- *Incident Action Checklist—Wildfire Impacts on Water and Wastewater Utilities* EPA Publication 817-F-15-010

FEMA National Incident Management System (NIMS) training guides related to water.

- Strategic Overview of Disaster Management for Water and Wastewater Utilities
- Disaster Management for Water and Wastewater Utilities

Washington Water and Wastewater Response Network (WAWARN)

WaterISAC (A cooperative of leading national water-sector associations and research foundations in coordination with the U.S. Environmental Protection Agency.)

Drinking Water system Risk Assessments and Emergency Response Plans Required AWIA

CHAPTER 7 DISTRIBUTION FACILITIES DESIGN AND CONSTRUCTION STANDARDS

Objective

This chapter provides guidance for the inclusion of water system distribution facilities design and construction standards into each water system's WSP. Such standards are not a required element in a WSP. This chapter describes the WSP content required when a water system intends to opt for the project report and construction document submittal exception under WAC 246-290-125.

There are two types of projects that may be exempt from our review and approval process:

1. **Distribution mains**. The submittal exemption for *water distribution main projects* is commonly pursued by water systems that anticipate distribution main expansions for new development or ongoing water main replacements that don't meet the definition of a "replacement-in-kind" under WAC 246-290-125(1)(c).
2. **Other distribution-related projects**. The submittal exemption for *other distribution-related projects* are rarely pursued by water systems due to the site-specific attributes of new reservoirs and pump stations. Typically, water systems limit their information to standards such as replacement reservoir coatings.

Distribution Mains. Water systems may elect not to submit project reports or construction documents for new distribution mains or replacement mains if the water system satisfies the following conditions (WAC 246-290-125(2)):

1. The water system has a currently approved WSP that includes standard construction specifications for distribution mains and an analysis of the hydraulic capacity of the basic transmission and distribution main configuration for the water system.
2. The water system maintains a completed *Construction Completion Report for Distribution Main Projects* DOH 331-147 on file for each such project.

Other Distribution-Related Projects. Water systems may elect not to submit project reports or construction documents for other distribution-related projects such as booster pump stations, storage tanks, and tank (interior) coating projects provided that the water system satisfies each element of WAC 246-290-125(3).

1. Has a currently approved WSP, and the project must be included in the WSP's capital improvement program.

2. Has a green operating permit.
3. Makes an initial written request to DOH on the *Water System Plan Submittal Form* DOH 331-397. A water system intending to apply for this submittal exemption should discuss the desired scope of the project report and construction document exemption during their pre-plan conference with the regional planner and engineer.
4. Employs or contracts with a licensed professional engineer responsible for design review. The design engineer and review engineer cannot be the same individual. Submit a completed *Engineering Design Review Report for Distribution-Related Project Submittal Exceptions* DOH 331-122 prior to construction of the project.
5. Submits to DOH an updated water facilities inventory upon project completion and a completed *Construction Completion Report for Distribution Main Projects* DOH 331-147 upon completion of the project.
6. Maintains a project summary file for each project, available for DOH review by request, satisfying all of the requirements in WAC 246-290-125(3)(e).

There is no submittal exception for source of supply projects such as new or redeveloped wells or springs, refurbished wells, surface water intakes, interties, or water treatment projects such as chlorination, corrosion control, filtration, iron and manganese removal, UV, and ozonation.

See chapter 2 of the *Water System Design Manual* DOH 331-123 for additional guidance on the design submittal exception criteria and process.

Plan Content

This portion of the WSP should address the following elements.

7.1 Project Review Procedures
7.2 Policies and Requirements for Outside Parties
7.3 Construction and Design Standards
7.4 Construction Certification

7.1 Project Review Procedures

Purpose. Satisfies the requirements of WAC 246-290-100(5). Water systems opting for the document submittal exception need to have the authority, processes, and human resources in place to ensure the project report and construction documents meet minimum regulatory and industry standards, and the project end result satisfies the water system's goals and long-term interests.

Identify the water system's internal process used for review of project reports and construction documents. Review procedures must be consistent with state drinking water regulations, local ordinances, and any other applicable requirements. Emphasize review procedures for distribution-related projects which will not be reviewed and approved by DOH.

Note: In order to be eligible for the submittal exception, this request must be made in the WSP review application. See *Water System Plan Submittal Form* DOH 331-397.

7.2 Policies and Requirements for Outside Parties

Purpose. Satisfies requirements of WAC 246-290-100(5). Water systems opting for the document submittal exception need to have the authority and standards in place to ensure the project report and construction documents meet minimum regulatory and industry standards, and the project end result satisfies the water system's goals and long-term interests.

Include policies and other requirements applicable to outside parties, such as developers, including right-of-way or pipe looping requirements or any other local or regional requirements. In particular, this section of the WSP should address minimum fire flow requirements, CWSPs, and level of service standards pursuant to GMA, as applicable.

Often a water system will assemble a separate document that discusses all requirements for developer extensions. These documents generally include application forms, general conditions, provisions for special circumstances, design standards, developer charges, and performance bonding. If the water system uses such a document include it in the WSP appendix.

7.3 Construction and Design Standards

Purpose. Satisfies requirements of WAC 246-290-100(5).

Include performance standards and sizing criteria that must be applied in designing each distribution project. Performance standards are locally adopted criteria describing level of service and reliability intended to satisfy reasonable customer expectations and comply with applicable regulations. Sizing criteria is typically system-specific and must be sufficient to ensure compliance with the minimum performance standards established in Chapter 246-290 WAC.

Performance standards should address both normal and emergency level of service. Performance standards and sizing criteria should include such elements as minimum pipe diameters, maximum pipe velocity, needed fire flow, and minimum/maximum distribution system pressures. See the WSDM for additional design guidance:

- WSDM Chapter 6 and Appendix A.3.3 for water main design.
- WSDM Chapter 7 and Appendix A.3.5 for reservoir design.
- WSDM Chapter 8 and Appendix A.3.6 for booster pump station design.

7.3.1 Construction and Design Standards for Water Mains

Include the following design standards whenever intending to request a submittal exception for water main installation.

1. Specifications for:
   a. Pipe material and pipe class. ANSI/NSF Standard 61 certified materials required for all pipes.

   b. Disinfection procedures (include dechlorination or chlorinated water disposal specifications).
   c. Pipe bedding and installed depth of bury.
   d. Bacteriological testing.
   e. Pressure and leakage testing.
   f. Separation from sewer mains, nonpotable conveyance systems, and other buried utilities.
   g. Valve spacing.

2. Established construction drawings standards:
   a. Plan and profile views drawn to a particular scale—we recommend no more than 100-feet to the inch for plan view and 10-feet to the inch for profile view.
   b. Easement locations and dimensions.

3. Appurtenant design standard drawings:
   a. Pipeline trench cross-section, including pipe bedding, backfill, compaction, and road restoration standard details.
   b. Hydrants (for fire, flushing).
   c. Valves.
   d. Service meters.
   e. Service lines and service connection to main.
   f. Air relief, vacuum relief, and combination air-vacuum relief valve and valve vault.
   g. Pressure reducing valve stations.
   h. Thrust blocking.
   i. Backflow prevention assemblies.
   j. Blow-offs.

4. Special Conditions (if appropriate):
   a. Pipeline corrosion mitigation measures.
   b. Potable/non-potable pipeline crossing construction details.
   c. Stream-crossing construction details.
   d. Individual service booster pumps.
   e. Temporary water service (i.e., employed during water main replacement or emergency repair).

7.3.2 Design and Construction Standards for Reservoirs and Booster Pump Stations

To qualify for the Submittal Exception, the water system **must** include design and construction standards for distribution-related projects in an approved WSP (WAC 246-290-100(5)(b)).

Include the following items in the WSP narrative.

1. Reservoirs:
   a. General location of tank sites.

b. Overflow and base elevations.
c. Map of service area indicating elevations of service connections.
d. Basis for sizing the storage volumes needed.
e. Hydraulic analysis of the water system or individual pressure zones used in evaluating the storage improvements.
f. Level control, alarms, and SCADA.
g. Residence time and reservoir water quality monitoring program.
h. Use in water treatment (if any).

2. Booster Pump Stations (BPS):
   a. General location of BPS site(s).
   b. Sizing basis for BPS capacity (flow and head) needed.
   c. Hydraulic analysis of the water system or pressure zones evaluating the effect of BPS operation.
   d. Flow, pressure, and process control.
   e. Alarms and SCADA.

Include the following items in the WSP standard specifications. Include this information in the WSP appendix.

1. Reservoirs:
   a. Standard tank details, including level controls facilities, high and low level alarm, external level indicator, access hatch, vent, drain, overflow (include sizing criteria) and outfall, screens, and access ladder.
   b. Material specifications to be used for tank construction together with construction specifications (concrete, steel, other). ANSI/NSF Standard 61 certified materials for all surfaces in substantial contact with the water.
   c. Specifications for all coatings, including application, curing, and ANSI/NSF 61 compliance. Water quality testing needed before activating tanks, such as volatile organic chemicals, if applicable.
   d. Leakage testing and disinfection procedures per AWWA C652 (include dechlorination or chlorinated water disposal specifications).
   e. Site piping plans (generic). Also include isolation valving, sample taps (type and location), provision to improve circulation in tanks (reduce stagnation), and piping material specifications for pipes under the foundation slab, in the tank or in the yard.
   f. Geotechnical considerations to be addressed, such as bearing strength and seismic considerations.
   g. Water system-specific water quality concerns affecting treatment, such as coliform testing, chlorine residuals, pH, disinfection byproducts, and contact time requirements.
   h. Security elements.

2. Booster Pump Stations:
   a. Performance specifications for booster pumps, overload capacity, and minimum shutoff heads.
   b. Electrical specifications, control strategies, and mechanisms.
   c. Pipe material, construction standards, and specifications for internal BPS piping.
   d. Specifications or standards for meters, control valves, and other appurtenances.
   e. General structural and construction specifications and standards for BPS housing.

7.4 Construction Certification

Purpose. Satisfies requirements of WAC 246-290-100(5). For accountability and record-keeping purposes, provide a description assuring all of the following are satisfied.

1. Projects are constructed in accordance with the water system's construction standards.
2. Construction inspection procedures, including pressure test procedures, if applicable, as well as disinfection procedures, and water quality sampling requirements have been properly performed.
3. The procedures for preparation and retention of design and construction record drawings.

There are three construction completion report forms. Each form is used for a specific circumstance.

1. *Construction Completion Report Form* DOH 331-121. Use this form in the normal process of submitting documentation for a project that underwent our design review and approval and was constructed in accordance with the DOH-approved design. It is the form referenced in WAC 246-290-120(5).
2. *Construction Completion Report for Distribution Main Projects* DOH 331-147. Use this form only for distribution main projects not requiring prior written approval from us. The water system does not have to submit this form to us following construction completion. However, the water system must maintain a completed form on file and make it available to us upon request. This form is referenced in the submittal exception process (see WAC 246-290-125(2)).
3. *Construction Completion Report Form for Submittal Exception Process* DOH 331-146. Use this form only for distribution-related projects not requiring prior written approval from us. Distribution-related projects include booster pump stations, storage tanks, internal tank coatings, and transmission mains. The water system must submit this report to us after constructing new storage tanks or booster pump stations, but only maintain a completed form on file for other distribution-related projects (WAC 246-290-125(3)(f)). This form is used in the submittal exception process (see WAC 246-290-125(3)).

If completion of the project changes any information on the Water Facilities Inventory (WFI), the water system is responsible for submitting an updated WFI with the signed construction completion report.

Publications Reference List

Construction Completion Report for Distribution Main Projects DOH 331-147

Construction Completion Report Form DOH 331-121

Construction Completion Report Form for Submittal Exception Process DOH 331-146

Water System Design Manual DOH 331-123

Engineering Design Review Report for Distribution-Related Project Submittal Exceptions DOH 331-122

Water System Plan Submittal Form DOH 331-397

CHAPTER 8 CAPITAL IMPROVEMENT PROGRAM

Objective

This chapter's objective is to develop a capital improvement program (CIP) by summarizing and prioritizing the system needs identified in previous WSP chapters. Water systems preparing a WSP must include a CIP and schedule. Identify capital improvements scheduled during each year of the plan approval period, plus capital improvements planned outside the plan approval period but within the (minimum) 20-year planning period (WAC 246-290-100(4)(i)).

This chapter joins the project solutions list from "System Inventory and Analysis" and the needed action list from "Operations and Maintenance" into a comprehensive, prioritized summary. Table 8-1 is an example of such a summary. This summary represents the water system's decisions to allocate technical, managerial, and financial resources to plan, design, implement, operate, and maintain its physical infrastructure and workforce.

Plan Content

This chapter addresses the following topics.

8.1 Prioritization
8.2 Capital improvement program summary and schedule
8.3 Additional resources

8.1 Prioritization

Satisfies requirements of WAC 246-290-100(4)(i)). Prioritizing the expenditure of financial capital and workforce needs is essential in a world of limited resources.

Prioritization. Prioritize projects and solutions that address public health or a DOH regulatory enforcement action in the water system's CIP. Identify the criteria used to prioritize corrective action in the WSP. See our Drinking Water State Revolving Loan Fund web page for how we prioritize improvement projects for funding. We consider this prioritization scheme an appropriate reference for water systems, as it accounts for public health protection and compliance when prioritizing loan and grant funding. If the WSP does not give top priority to a deficiency threatening public health or a project needed to achieve compliance, explain why.

Water systems may consider additional prioritization factors alongside public health, such as asset management, integrated capital planning, full-street rehabilitation, developer-financing availability, and growth. Growth-driven projects typically include new source, increase in storage, and completion of a transmission grid. Clearly describe if growth is used as a scheduling tool,

and outline the relationship between projects and project growth triggers. Rank priority of these projects according to their dependence on each other. Estimate the year to implement each growth-related project.

If the combined proposed improvements appear to be economically infeasible, the planning document should include a re-evaluation or re-prioritization of the proposed improvements. This exercise should result in a realistic program to address existing and anticipated deficiencies for both the plan approval period and 20-year planning horizons. Dependence on grant-funding should be limited to grants already awarded, or based on evidence the grant will be awarded. Affordability issues are addressed in Chapter 9.

Project Assessment. Assess and prioritize the solutions and their costs identified above. The following prompts are offered to help with the assessment process. This list is not comprehensive.

- **Health standards**. Is the improvement needed to comply with all applicable health standards?
- **Fire flow**. Is the improvement needed to provide adequate fire flow?
- **Quantity**. Is the improvement needed to provide a reliable and adequate supply?
- **Implementation**. Is there the technical capacity to design, construct, finance, and operate the new infrastructure?
- **Land use**. Does the improvement comply with adopted land use plans and policies?
- **Reliability**. Does the improvement increase system reliability?
- **Remaining useful life**. When is the improvement needed to avoid running the infrastructure to the point of failure? Will the improvement extend the useful life of the infrastructure?
- **Criticality analysis**. What is the probability and consequence of failure?
- **Cost**. What are the initial, annual, and life-cycle costs? Is there financial capacity to cover these costs? What type of financing will be used? Is there a leverage opportunity to work with other utilities and agencies? See Section 8.3 for a list of additional resources.
- **Other benefits**. To what degree will the improvement fulfill regional goals and community needs? Take into account regional water system needs and other multi-purpose benefits, such as full-street rehabilitation.
- **Flexibility**. How well can the improvement respond to changes in land use patterns, water demand projections, and resource management decisions? Can it be phased in?
- **Environmental impact**. Are there negative environmental impacts and if so can they be mitigated? See SEPA discussion in Chapter 10.

Value Planning. In 2017 the Washington state Legislature directed state agencies to identify, implement, and report on improvements to the water/wastewater/storm water funding programs to maximize their value (HB 1677). The Public Works Board and the departments of Commerce, Ecology, and Health are synchronizing their efforts to create a more efficient structure for infrastructure financing programs. Together they developed a *Value Planning Guide*, available through the Department of Commerce website.

The *Value Planning Guide* presents value planning as a tool; build the right project for the right reasons at the time, using the right scale and complexity for the community. The guide stresses the importance of beginning the value planning process early in considering solutions to problems, focusing on outcomes and including diverse, broad stakeholder involvement.

8.2 Capital Improvement Program Summary and Schedule

Purpose. Satisfies requirements of WAC 246-290-100(4)(i)) by creating a single prioritized table of capital projects to facilitate financial planning. See Chapter 9 of this guidebook.

In summarizing project solutions, consider the following factors.

- **Ongoing programs**. Includes ongoing programs, such as annual water main replacement, pump motor replacement, service meter replacement, lead gooseneck/service line replacement, and support for regional wellhead protection efforts. In some cases, ongoing programs may need to be interrupted or reduced in order to accommodate a higher priority improvement in order to stay within the financial capacity of the water system.
- **Fixed dates**. Provides knowledge of improvements required for the planning period identified in the WSP. With fixed date scheduling, costs may be easier to predict and a more definite financial program can be established. Typical improvements based on fixed dates include:
  - Improvements mandated by regulation (e.g., subject to an enforcement action).
  - Facilities that need to be replaced, as identified in an asset management plan
  - Implementation of water use efficiency measures
  - Studies (such as a ground water monitoring program, watershed control activities, rate studies, water audit, asset management).
- **Variable dates.** Provides flexibility on timing a project. With variable date scheduling, costs may be more difficult to predict and require managers and elected officials to accept the inherent uncertainties about scope, timing, cost, and impact.
  - **Financial capacity**. Improvements implemented only when enough revenue has been generated are based on financial priority. Financial priority scheduling provides water system

managers with knowledge of improvements to be implemented as funds become available. Do not apply financial priority scheduling principles to projects needed to meet health requirements or future water demands.

- **Availability of outside funding**. If a selected alternative is contingent upon receiving a loan discuss alternative funding options or contingency plans. Dependence on grant-funding should be limited to grants already awarded, or based on evidence the grant will be awarded.

Discuss project tracking and re-scheduling

The best laid plans often run into unexpected obstacles and challenges. Sometimes these contingencies require the water system to alter its plan. The WSP should include the following topics.

- **Milestones**. For significant, multi-year projects identify implementation milestones, such as feasibility study, funding application, funding approval, project design, government approval, bidding, construction, and start-up. Milestone identification will help establish when activities must start in order to achieve the desired project outcome and completion date.
- **Multiple competing needs.** Local governments needing extensive improvements across a range of public utilities and services, and possessing a variety of potential funding sources, may find it difficult to be certain of the most appropriate funding source when planning years into the future. List water system projects and actions with a fixed date. Provide information about how decisions will be made on all other water system projects. Identify how and when the improvement schedule will be updated to reflect their funding sources and schedules.
- **Improvement projects completed, delayed or eliminated since last WSP.** Provide a summary list of projects completed since the last WSP. For those projects that were not completed or are delayed, indicate whether they will be carried forward to the current CIP. Provide a brief justification for each eliminated project.

- **Locally-adopted plans.** For water systems planning under Growth Management Act (GMA), the improvement schedule in the WSP must satisfy the capital facilities planning requirement of six years and 20 years under GMA (Chapter 36.70A RCW). Describe how GMA obligations concerning urban and rural development, and water system level of service standards may impact the improvement program. For water systems located within a Coordination Act planning area, include each project necessary to satisfy the local Coordinated Water System Plan.

> **Planning Tip**
>
> The WSP should note the requirement to prepare and submit to DOH a WSP amendment when a project requiring project report and construction document approval is not included in the approved WSP.
>
> These unanticipated projects may include construction of an emergency intertie, consolidation with a nearby water system, need for water treatment due to a contamination event, and drought mitigation.

- **Improvement planning outside the WSP process.** Many utilities engage in continuous capital improvement planning in an effort to synchronize water system efforts with those of other local and regional utilities and services (e.g., sewer, water, roads) and land use decisions. Describe considerations made in assessing needs and adjusting the CIP during the WSP approval period. The water system should not extend the schedule to implement projects needed to meet health requirements or address enforcement actions.

8.3 Additional Resources

A host of excellent water system capital improvement planning resources are available. Listed below are recommended references.

Environmental Finance Center (EFC). EFC is a nationally-recognized non-profit working to promote financially resilient drinking water systems. The EFC website resources include:

- Training videos.
- Blogs hosted by subject matter experts.
- Financial dashboard.

American Water Works Association (AWWA). AWWA is an international non-profit industry-led organization dedicated to supporting effective water system management. Recommended publications by AWWA include:

- AWWA Manual M1, Principles of Water Rates, Fees, and Charges.
- AWWA Manual M5, Water Utility Management.
- AWWA Manual M29, Water Utility Capital Financing.
- AWWA Manual M54, Developing Rates for Small Systems.

Rural Community Assistance Partnership (RCAP). RCAP is a non-profit working to provide training and resources to support rural communities across the country. Recommended publications by RCAP include:

- *Sustainable Infrastructure for Small System Public Services—A Planning and Resource Guide*.

Washington Department of Commerce.

- Introductory Guide to Value Planning.

Table 8-1

Capital Improvement Program Summary and Schedule

Project	Project Type[1]	Year	Total project cost[2]	Anticipated source of funding[3]	Classification of deficiency[4]

1. *Select from among, all that apply: Source, treatment, storage, distribution, transmission, pumping, operations, maintenance, equipment, land purchases, etc.*
2. *Include total project costs, including engineering design, financing, state taxes, contingency, and construction. State whether the cost is in current dollars or inflated dollars. Describe all assumptions about costs.*
3. *If "grant", include in the appendix a copy of the grant application and grant award.*
   Select from among, all that apply: Enforcement, water quality, water quantity, end of useful life (replacement), pressure, reliability, resiliency, growth, public safety/fire flow, energy efficiency, and other.

CHAPTER 9 FINANCIAL PROGRAM

Objective

This chapter's objective is to identify the total cost of providing water service, ensure that the capital improvement program will be implemented, assist in establishing adequate fees for service, and demonstrate financial capacity. The plan must demonstrate that the water system will be financially secure through the end of the plan approval period. The financial program chapter satisfies requirements of WAC 246-290-100(4)(j).

Plan Content

The Financial Program addresses the following topics.

9.1 Financial viability
9.2 Past income and expenses
9.3 Balanced operational budget
9.4 Reserve funds
9.5 Debt financed capital improvements
9.6 Water rate evaluation
9.7 Utilities and Transportation Commission
9.8 Washington State Auditor's Office
9.9 Additional resources

9.1 Financial Viability

Purpose. This section documents the water system's commitment to:

- Identify the full cost of service.
- Recover the full cost of service through rates and fees.
- Maintain sufficient reserve funds.

Financial viability is synonymous with financial capacity. Establishing and maintaining financial viability is one of the most important responsibilities of a water system. Without financial capacity, technical and managerial capacity elements are difficult to leverage in assuring safe and reliable drinking water. A comprehensive financial program must be established to successfully implement the WSP.

Planning Tip

Financial viability is defined in WAC 246-290 as "the capability of a water system to obtain sufficient funds to construct, operate, maintain, and manage a public water system, on a continuing basis, in full compliance with federal, state, and local requirements.

In order to develop a complete financial assessment, the total cost of providing water service must be identified through operation and maintenance; repair and replacement of existing

infrastructure, recurring capital expenditures; major infrastructure improvements and additions; debt obligations; and reserve funding. It takes the input of operators, managers, equipment and material suppliers, and consultants to completely assess the full cost of providing water service. Deferring maintenance might balance the budget, but only weakens the long-term financial sustainability of the water system. The WSP should include a complete funding program that clearly indicates the water system will be financially viable for the entire plan approval period (i.e., up to ten years).

Each water system must have the ability to obtain sufficient funds to develop, construct, operate, maintain, and manage its system on a continuing basis in full compliance with federal, state, and local requirements. A sound financial program assures the water system's decision makers, managers, and consumers that all operational requirements and identified improvements, including repair and replacement costs, can be implemented and adequate reserves are maintained. A sound financial program makes the difference between a "wish list" and an implementable plan. In addition, a complete financial program can assist the water system in establishing water rates and other charges that fairly apportion costs and recover the **full cost** of providing service.

Detailed financial arrangements, such as lending institution requirements or specific rate design information are not expected in the WSP. Coordinate the financial program with the improvement program summarized in the WSP "Improvement Program" chapter. See Chapter 8.

9.2 Past Income and Expenses

Purpose. Documents the water system's recent financial experience to serve as a reference point for future-year budget projections and satisfies requirements of WAC 246-290-100(4)(j)(i).

Identifying recent expenses. Total cost to operate and maintain a water system includes annual operating, personnel, and maintenance expenses; debt service; professional services; capital improvement expenditures; and contributions to various reserve funds. The water system **must** provide a balanced financial plan for the planning period that identifies revenue and funding sources that will cover the total cost of operating the water system (WAC 246-290-100(4)(j)). We recommend the WSP include several past fiscal year expense reports. Taken together with other cost and expense information, the number of past expense reports should be sufficient to support creating and validating projections for future expenses.

Identifying recent income. Total water system income is the sum of paid rates, fees, capital facilities charges, interest earned on savings, other investment income, and loan funds/bond proceeds received. We recommend the WSP include several past fiscal year income reports. Taken together with other cost and expense information, the number of past income reports should be sufficient to support creating and validating projections for future income.

9.3 Balanced Operational Budget

Purpose. Develops balanced operational budgets for the plan approval period and satisfies requirements of WAC 246-290-100(4)(j)(ii) including a:

- Summary of past income and expenses.
- Balanced operational budget for the plan approval period.
- Plan for collecting the revenue necessary to maintain cash flow stability and to fund the capital improvement program and emergency improvements.

Begin with a review of past operating and maintenance expenses and income. Add or subtract spending and revenue items when documenting future budgets. Line items demonstrating financial viability:

- All four reserve funds at their current and projected levels (see Section 9.4).
- Rate financed CIP costs for each year in the plan approval period.
- If the most recent three-year average distribution system leakage is greater than 10 percent, a separate budget line item to fund your water loss control action. See Chapter 4 and WAC 246-290-820.

Planning Tip

If the current water rate structure is not designed to keep pace with inflation, your water system can easily get behind. As part of your next rate study, seek acceptance for an annual inflation rate factor to go into effect automatically.

Next, adjust line-item spending and revenue to reflect estimated water consumption, a new or modified rate and fee schedule, debt payments, and O&M projects consistent with information summarized in the Capital Improvement Program. See Chapter 8.

9.4 Capital Improvement Funding Plan

Purpose. Develops a revenue plan that funds the capital improvement program and satisfies requirements of WAC 246-290-100(4)(i)(iii). Water systems may self-fund a capital improvement program from rates and fees that replaces or compliments use of debt to fund capital improvements. When using debt, identify the borrowing costs and annual debt service for each project. Include this expense in the balanced budget. Because of their high cost and potential impact to rates, thoroughly evaluate the financial plan for major facility improvements. Major improvements include new sources, storage, transmission lines, and treatment. Development of financial arrangements for joint-use projects require complex negotiations between parties. The details of such financial arrangements are not expected in the WSP.

9.5 Reserves

Purpose. Develops a revenue plan that maintains cash flow stability, funds capital improvements, funds emergency improvements, and satisfies the requirements of WAC 246-290-100(4)(j)(iii). Water systems should have dedicated reserve funds for funding:

- Operating cash reserves.
- Emergency reserves.
- Debt reserves.
- Capital improvement and replacement reserves.

Operating cash reserve. Establish the operating cash reserve fund goal by identifying the period the water system can be fully funded from an operating cash reserve. AWWA recommends 90 days. Identify the timeframe in which management wants to fully fund this reserve if it's not now fully funded. Identify the annual contribution needed to fully fund this reserve account. Include this expense in the balanced budget documents.

Planning Tip

By established financial reserve policies, elected officials provide managers needed structure to create, reach, and maintain target reserve fund balances.

Maintaining strong reserve funds requires financial discipline. The result is financial resilience and the capacity to keep a safe and adequate water supply flowing when the unexpected occurs.

Emergency cash reserve. Establish an emergency reserve fund goal by assessing and identifying the water system's most critical and vulnerable component(s). The most commonly identified vulnerable asset is source pump and treatment equipment, transmission line between source and distribution, and electrical components. Identify the timeframe in which management wants to fully fund this reserve if it's not now fully funded. Identify the annual contribution needed to fully fund this reserve account. Include this expense in the balanced budget documents.

If the water system considers the availability of a commercial line of credit (LOC) to satisfy the objective or a self-funded emergency reserve, document the LOC terms and all tasks and expenses associated with maintaining immediate access to the LOC.

Bond or debt coverage reserve. Funding agencies and commercial lenders typically require their loan recipients to establish and maintain a restricted pool of funds that is available for the life of the debt. For each loan identify the required coverage and when the year in which the coverage fund will be created and, as appropriate, retired. Include this expense in the balanced budget documents.

Capital improvement and replacement reserve. Water systems may self-fund a capital reserve account from rates and fees that replace or compliment use of debt to fund capital improvements. Commonly, a water system collects connection fees, system development charges, and other current revenue to future improvements demanded by growth and paid by those who benefit from that growth. This is one way to shield ratepayers from funding the cost of added system facilities such as source, treatment, storage, and transmission driven by the addition of new customers.

More generally, water systems may decide it is more advantageous to implement and fund on-going replacement and rehabilitation programs (such as old or undersized water mains, service

meters, tank recoating, and pump replacement) out of rates and other annual revenue, enabling the water system to physically and financially keep pace with asset depreciation and life-expectancy rundown. Ensure consistency between the annual budget allocations to these replacement and rehabilitation programs with information presented in the WSP "Improvement Program" chapter. See Chapter 8. Include this expense in the balanced budget documents.

9.6 Water Rate Evaluation

Purpose. Considers the affordability and feasibility of adopting and implementing a rate structure that encourages water demand efficiency, and satisfies the requirements of WAC 246-290-100(4)(j)(iv).

Planning Tip

Dependence on grant-funding should be limited. Building a sound financial program based on assumptions of being awarded scarce grants is no longer viable.

Access to low interest loans is also difficult. We recommend the WSP provide robust justification, including a clear problem statement and description of the solution, for each loan-funded project. Refer to the criteria described in Sections 3.4 and 3.5.

9.6.1 Affordability

Community affordability

Community affordability is a metric for the relative financial impact water rates have on a community as a whole. The EPA considers 2.5 percent of a community's Median Household Income (MHI) as the upper threshold for affordable water service. The Drinking Water State Revolving Fund, our drinking water loan program, uses affordability metrics to establish eligibility for principal forgiveness and grants.

EPA and DOH recognize the limitations of using a percent of MHI as a measure of affordability to the community, and work is being done to evaluate better alternatives. At the moment it remains a tool in establishing a community's relative burden, and what regulatory agencies consider a benchmark for reasonable financial support toward full service cost recovery. The WSP **must** compare the current and future/proposed water rate for a typical single family home with an affordability metric of the community served, or the appropriate geographical area (WAC 246-290-100(4)(j)). The following are sources of information on community MHI:

- The Office of Financial Management (OFM) collects data on median household income by county.
- American Fact-Finder (U.S. Census data) collects MHI data for a variety of geographical areas, including census tract, census block, zip code, and city.
- Community-specific income survey.

Consumer affordability

Consumer affordability refers to whether the rate payers and other water system users can individually afford water service. This informs the water system of the scope of consumer affordability issues within their water system service area and whether the creation or expansion

of a customer assistance program would be advantageous. Like community affordability, consumer affordability doesn't have a universally accepted standardized metric to assess need. Some common metrics water systems track are the frequency of water shut offs, percentage of accounts in arrearages, and number of households receiving food assistance or other assistance program. Addressing consumer affordability issues will help lead to long term revenue stability for the water system, decrease hours spent tracking shut offs and bill collection, and improve public health and safety. Customer assistance programs (CAPs) are one way to address consumer affordability. Some examples of CAPs include:

- One time crisis assistance or temporary assistance.
- Financial assistance for water use efficiency measures like low flow toilets and shower heads.
- Bill discounts.
- Bill leveling, payment installments, bill frequency modifications.
- Lifeline rates for non-discretionary water consumption.
- Connecting customers to community resource and public assistance programs.

9.6.2 Rates in support of water use efficiency (conservation rates)

We believe water systems employing a rate structure other than an inclining and/or seasonal block rate are missing an opportunity to achieve three important goals.

- Reduction in inefficient use of water, thereby preserving the state's water resources.
- Collection of additional revenue—through rates and fees—thereby enhancing water systems' financial resources, promoting financial capacity, and reducing pressure on water system and state financial resources.
- Conserve capital, by forestalling the expansion of infrastructure capacity, thereby conserving water systems' financial resources.

WAC 246-290-810(j) requires water systems to evaluate the feasibility of adopting and implementing a rate structure that encourages water demand efficiency. To this end, we recommend water systems adopt and implement an inclining and/or seasonal block rate; one that charges more for each unit of water through progressively higher cost tiers. Studies in consumer behavior indicate doing so will result in decreased water consumption and increased revenue. Water demand studies over the past three decades conclude that price elasticity for residential water demand is typically between -0.2 and -0.4. With an elasticity of -0.3, for example, a 10 percent increase in the price of water is associated with a 3 percent reduction in the quantity demanded. So, a 10 percent increase in the price of water would result in a 6.7 percent increase in revenue (110 percent of price multiplied by 97 percent of the quantity demanded or 1.10 x 0.97= 1.067). See EPA's *Water and Wastewater Pricing* EPA 832-F-03-027.

9.7 Utilities and Transportation Commission

The Washington State Utilities and Transportation Commission (UTC) has jurisdiction over certain water systems. As of 2018 UTC:

- Regulates investor-owned for-profit water companies that serve 100 or more connections or if the water system charges more than $557 a year per customer.
- Regulates 60 water companies operating 510 water systems, serving approximately 56,578 customers, which generate approximately $30 million in annual revenues.

See UTC's web page for more information on regulated water systems and UTC authority.

> **Planning Tip**
>
> UTC Publications Contain Valuable information for Non-UTC regulated entities. It is advantageous for all water systems to review the water system management, financing and rate setting publications available on the UTC website.

UTC will help DOH determine if the water system is financially viable and feasible. Financial viability is the ability of an investor-owned utility to reliably obtain sufficient funds to cover the total cost of developing, constructing, operating, and maintaining a company in compliance with federal, state, and local requirements. Financial feasibility reflects a company's ability to continuously provide a sufficient quantity and quality of water service for the planning period.

A WSP submitted by a water system subject to UTC regulation should include relevant financial information. DOH will forward a copy of the WSP submitted for approval to UTC for their review and comment. UTC staff will apply their criteria for evaluating financial viability and feasibility. DOH expects water systems to address UTC concerns in their WSP.

9.8 Washington State Auditor's Office

The Washington State Auditor's Office provides citizens with independent and transparent examinations of how local governments use public funds, and develops strategies to make government more efficient and effective in order to increase trust in government.

All local governments are required by RCW 43.09.230 to submit an annual financial report to the Auditor's Office within 150 days of the end of their fiscal year.

A local government is required to receive an audit of its financial statements if it:

- Receives over $2 million in annual revenues; or,
- Spends more than $750,000 in federal financial assistance; or,
- Is specified in financing arrangements, such as bonds, loans or grant agreements.

The Auditor's Office can be a valuable resource for municipal governments and special purpose districts by providing tools, best practices to encourage financial transparency, provide outside

oversight and input, and access to other documents. Municipal public water systems can request State Auditor services.

9.9 Additional Resources

A host of excellent water system rate-setting resources are available. Listed below are recommended references.

Environmental Finance Center (EFC). EFC is a nationally-recognized non-profit working to promote financially resilient drinking water systems. The EFC website resources include:

- Training videos.
- Blogs hosted by subject matter experts.
- Financial dashboard.

American Water Works Association (AWWA). AWWA is an international non-profit industry-led organization dedicated to supporting effective water system management. Recommended publications by AWWA include:

- AWWA Manual M1, *Principles of Water Rates, Fees, and Charges*.
- AWWA Manual M54, *Developing Rates for Small Systems*.

Rural Community Assistance Partnership (RCAP). RCAP is a non-profit working to provide training and resources to support rural communities across the country. Recommended publications by RCAP include:

- *Formulate Great Rates: A Self-Guided Training to Setting Rates*.

Publications Reference List

Water and Wastewater Pricing EPA 832-F-03-027

Water Rates: Paying for Drinking Water DOH 331-327

CHAPTER 10 MISCELLANEOUS DOCUMENTS

Objective

This chapter's objective is to provide documentation on WSP compliance with the requirements of the State Environmental Policy Act (Chapter 43.21 RCW); agreements referenced in the WSP; and correspondence and associated comments from federal, state, and local government entities, adjacent water systems, and the governing board of the water system (owner).

Plan Content

Include the following categories of miscellaneous documents.

10.1 State Environmental Policy Act
10.2 Agreements
10.3 Correspondence
10.4 Appendices

10.1 State Environmental Policy Act

Purpose. Ensures all applicable State Environmental Policy Act (SEPA) requirements are met through inclusion of all applicable SEPA documents and satisfies requirements of WAC 246-290-100(4)(k)(i).

Water systems must comply with all applicable SEPA requirements. A determination must be made at the start of the planning process of the "lead agency" responsible for certain SEPA processes. If the water system is a municipality or special purpose district, then the water system may act as lead agency. If the system is not owned by a municipality or a special purpose district, DOH will generally act as lead agency. However, DOH is willing to defer lead agency status to the local government if so requested.

Lead agencies are responsible for complying with SEPA and issuing the Determination of Non-Significance (DNS), mitigated DNS or final Environmental Impact Statement (EIS). To accomplish this requirement, these entities have their own SEPA procedures and regulations. The water system should refer to these procedures for specific directions in complying with SEPA.

The SEPA checklist, SEPA determination (either a DNS, a mitigated DNS, non-project action form, a final EIS), and SEPA register documentation **must** be included in the WSP (WAC 246-290-100(4)(k)). All projects required to eliminate or mitigate environmental impacts noted in the SEPA checklist or EIS must be included in the WSP's CIP and Financial Program.

Before construction, SEPA is required for certain types of projects. The project SEPA lead agency makes the threshold determination to have an environmental impact statement, a SEPA determination of non-significance, mitigated DNS, or a document explaining why SEPA does not apply to the project (see WAC 246-03-030(3) and Policy A.03).

SEPA requirements for construction projects apply to:

- All surface water source development.
- All water system storage facilities greater than 0.5 million gallons.
- New transmission lines longer than 1,000 feet and more than 12 inches in diameter located in a new right of way.
- Major extensions to existing water distribution systems that will use pipes more than 12 inches in diameter and increase the existing service area by more than one square mile.
- Others, as established in chapter 197-11 WAC. Please review for a full list of applicable water system projects and actions subject to SEPA review.

10.2 Agreements

Purpose. Provides DOH and other reviewing agencies the full content of each agreement referenced in the WSP agreements and satisfies the requirements of WAC 246-290-100(4)(k)(ii).

Such agreements include:

- Wholesale water agreements and contracts.
- Emergency supply agreements.
- Wheeling agreements.
- Joint-use agreements.
- Mutual aid agreements.
- Regional emergency preparedness and response agreements.
- Service area agreements.
- Regional watershed or wellhead planning participation agreements.
- Regional sampling program agreements.
- Financial agreements with lenders or cost-sharing agreements with other water systems.
- Inter-local agreements of any kind pertaining to drinking water, such as governing construction coordination and UGA in unincorporated county areas.
- Satellite Management Agency contract, if applicable.

Planning Tip

In addition to executed agreements, include proposed agreements that will soon be completed . List the WSP agreements that need to be developed and/or implemented within the plan approved period covered by the WSP.

10.3 Correspondence

Purpose. Satisfies requirements of WAC 246-290-100(4)(k)(iii), and provides DOH and other reviewing agencies the correspondence or comments from entities with an interest in the WSP, such as:

- Local governments.
- Local fire authority.
- State agencies such as Departments of Ecology, Commerce, and Transportation; UTC.
- Watershed or regional wellhead planning entities.
- Water system governing board, including passed resolution approving and adopting the WSP.
- Tribal governments.

10.4 Appendices

There are various documents that support a WSP. The following are not exclusive lists.

10.4.1 Recommended supporting documents

- Standard construction specifications and construction design details.
- Standard operating procedures.
- Hydraulic modeling information.
- Water quality monitoring results.
- Water quality monitoring summary.
- Water right documents (a completed water right self-assessment form is required).
- Most recent rate study.
- Recent expense and income annual reports.
- Easement and land ownership documents.
- Latest cross connection control annual summary reports(s).
- Latest water use efficiency report(s).
- Recent facility inspection reports.
- Latest consumer confidence report.
- Recent consumer alerts or public notices issued.
- Monthly water treatment plant operational reports, if applicable.
- Current Water Quality Monitoring Summary.
- Documentation of unmetered authorized water use.
- Operator certification documentation.

10.4.1 Required supporting documents

The following documents are required in a WSP and usually included in one or more appendices to a WSP.

- Water facilities inventory (WAC 246-290-480(2)(e)).
- Consumer informational meeting notification and minutes (WAC 246-290-100(8)(a)).
- Notice sent to adjacent utilities WSP is available for review (WAC 246-290-100(7)).
- Monthly annual water production and consumption totals (WAC 246-290-100(4)(b)(ii)(A)).
- Susceptibility assessment (WAC 246-290-135(3)(c)(i)).
- Contaminant survey and inventory, and notification to land owners (wellhead protection) (WAC 246-290-135(3)(c)(iv)).
- Notification of findings to state and local agencies, and emergency responders, of the wellhead protection program source inventory findings, wellhead protection boundaries, and contingency plan (WAC 246-290-135(3)(c)(v)).