KITTITAS COUNTY WATER DISTRICT NO. 7

2016 WATER SYSTEM PLAN

PROJECT CERTIFICATION

The technical material and data contained in this report was prepared by PACE Engineers, Inc., under the supervision of the below listed individuals. Those responsible staff members who are registered professional engineers are licensed in the State of Washington.

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Senior Planner

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EXECUTIVE SUMMARY

This Water System Plan update for Kittitas County Water District No. 7 has been prepared in accordance with the requirements of the Washington State Department of Health (DOH) pursuant to WAC 246-290-100, Water System Plan, for water system planning, design, and engineering. This Plan represents the District's first update to the 2003, Water System Plan. Kittitas County Water District No. 7, as a provider of public domestic water and fire protection service, is classified as a Group A public water utility. The District is, therefore, required under WAC 246-290-100 to prepare a written water system plan and update thereto every six years. This plan updates and supersedes the 2003 Water System Plan for the District and will remain in effect for ten years following the date of written approval.

The primary objectives in developing this document were to determine the adequacy of the existing water system to meet the current and projected needs of the customers of Kittitas County Water District No. 7 in accordance with all applicable federal, state and local regulations governing the provision of domestic water service and fire flows, and to develop a Capital Facilities Plan to serve as a guideline for future improvements and development within the District. In addition to the analysis of the water system and associated recommended improvements, this Plan outlines the District's conservation, operations and maintenance program, and emergency response program and identifies a financial plan for the District to implement the Capital Facilities Plan put forth herein.

Kittitas County Water District No. 7's service area consists of approximately 150 acres of land located in central Kittitas County, near Interstate Highway 90. The service area consists of the private development of Sunlight Waters. Land use within the District is all residential except for the Sunlight Waters Country Club. There are about 294 total lots within the service area, and the District currently serves approximately 213 customers.

From 2011 to 2015, water use within the District averaged 112 gallons per connection per day. The total amount of water produced in 2011, 2012, and 2013 was approximately 8.3, 9.5, and 8.4 million gallons, respectively.

The District's primary source of supply is Well #5, located in the southeastern portion of the District. Well #1 is maintained as an emergency backup source. Storage for the District is provided by a 200,000 gallon reservoir constructed in 2007, which is located at the high point in the District. The District's transmission and distribution system consists of a network of PVC pipes ranging from 2 inches to 8 inches in size. The entire water system is gravity operated.

Proposed improvements to the District's system include replacement of the distribution system to remove the original PVC pipe network and replace it with appropriately sized and higher quality pipe capable of delivering fire flow to the entire system. Given the high prairie nature of the service area and the history of wildfires in the immediate vicinity of the District, this is a high priority project. Unfortunately, with few connections and a fairly large pipe network, this presents a significant financial challenge to the District and its ratepayers. The complete system analysis, recommended improvements, and Capital Facilities Plan are located in Section 5 of this document. Section 6 presents a financial plan. As noted therein, the nearly $3.8 million in

required improvements will clearly require some type of loan, grant, or bond financing for the small community of Sunlight Waters. Alternatives for financial assistance are outlined in Section 6.

KITTITAS COUNTY WATER DISTRICT NO. 7

2016 WATER SYSTEM PLAN

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GLOSSARY AND TERMS

ACRONYMS

ADD	Average daily demand
AWWA	American Water Works Association
ccf	One hundred cubic feet
CCR	Customer Confidence Report
cfs	Cubic Feet per second
CFP	Capital Facilities Plan
DOE	Washington State Department of Ecology
DOH	Washington State Department of Health
WSDOT/APWA	Washington State Department of Transportation and the American Public Works Association, Standard Specifications for Road, Bridge, and Municipal Construction, 2000 Edition
EPA	United States Environmental Protection Agency
ERU	Equivalent Residential Unit
ESA	Endangered Species Act
GFC	General Facility Charge
gpcd	Gallons per capita per day
gpd	Gallons per day
gpm	Gallons per minute
LFC	Local Facility Charge
MDD	Maximum Daily Demand
MG	Million Gallons
MGD	Million gallons per day
MID	Maximum Instantaneous Demand
MWL	Municipal Water Law
OFM	State Office of Financial Management
PHD	Peak Hourly Demand
PVC	Polyvinyl Chloride

PRV	Pressure Reducing Valve
psi	Pounds per square inch
PWTF	Public Works Trust Fund
RCW	Revised Code of Washington
SSMP	Small Water System Management Plan
SDWA	Safe Drinking Water Act
ULID	Utility Local Improvement District
USGS	United States Geological Survey
UWIC	Urban-Wildland Interface Code
WAC	Washington Administrative Code
WFI	Water Facilities Inventory
WUE	Water Use Efficiency
WUI	Wildland-Urban Interface

TERMS

Annual Demand	Total water system demand for one calendar year, expressed in millions of gallons (MG), including all uses and unaccounted-for water.
Average Daily Demand (ADD)	The annual demand divided by the number of days per year, expressed in million gallons per day (MGD).
Cross-Connection	A physical arrangement connecting a public water system, directly or indirectly, with anything other than another potable water system, and capable of contaminating the public water system.
Dead Storage	The volume of stored water not available to all customers at the minimum design pressure in accordance with WAC 246-290-230(5) and (6).
Equalizing Storage	The volume of water required to meet hourly variations in demand in excess of the available rate of supply.
Fire Flow	The rate of water flow, in gpm, required to fight fires under WAC 246-293-640 or adopted city or county standards.
Fire Storage	The volume of water required to accommodate fire demand.
Franchise Area	A designated area within which the utility system is permitted, by franchise, to own, operate and maintain facilities within public rights-of-way.
Legal Boundary	The corporate boundary established for the District. Extension of service beyond the District's legal boundary requires annexation or specific agreement for the provision of such service.
Maximum Contaminant Level (MCL)	The maximum permissible level of a contaminant in water the purveyor delivers to any public water system user.
Maximum Daily Demand (MDD)	The highest water demand anticipated for any given day, expressed in MGD.
Operational Storage	The volume of the reservoir that is devoted to supplying the water system while, under normal operating conditions, the source(s) of supply are in "off" status.
Peak Day Demand	Same as Maximum Daily Demand.
Peak Hourly Demand	The maximum rate of water use, excluding fire flow, which has occurred or is expected to occur within a defined service area over a one hour period of time.
Potable Water	Water suitable for drinking by the public.

Pressure Zone	A water supply or distribution subsystem operating at a uniform hydraulic gradient.
Service Area	The recognized area within which Kittitas County Water District No. 7 intends to provide water service.
Standby Storage	The volume of water required to augment the available supply of water during a period of partially or fully restricted flow from the supply source, due to such things as pipeline or pump failure or power outages.

SECTION 1

INTRODUCTION

1.1 INTRODUCTION

This Water System Plan for Kittitas County Water District No. 7 has been prepared by PACE Engineers, Inc., pursuant to the guidelines and standards required by the Washington State Department of Health (DOH), including WAC 246-290-100 for water system planning, design, and engineering. This plan updates and supersedes the District's 2003 Water System Plan and provides the District with guidelines for operation, management, improvement, and future development of the water system. It has been funded through a Community Development Block Grant administered via the State of Washington Department of Commerce and Kittitas County.

In accordance with the State Department of Health and Kittitas County requirements, this Plan identifies and describes the District's existing and future service area in relation to population and land uses and the capability of the existing water system to meet existing and future needs. It also establishes minimum design criteria for the water system and puts forth a complete capital facilities plan, including proposed schedules and potential methods of financing. The District's water use efficiency and conservation programs and wellhead protection plans are also addressed in this document. In addition, operation and maintenance of the water system, including water quality monitoring in accordance with federal, state, and local requirements, is addressed.

1.2 AUTHORIZATION

Recognizing the need for an update to its previous water system plan, Kittitas County Water District No. 7 authorized PACE Engineers, Inc., to update their Plan to meet the day-to-day and long-range planning requirements, and to comply with all applicable requirements, regulations, and standards.

1.3 PURPOSE OF THE PLAN

The purpose of this Plan is to provide Kittitas County Water District No. 7 (KCWD 7) with a guideline for improvements to and the future development of its water system. The Plan is based on 2013 to 2015 conditions and Kittitas County land use plans, and addresses the projected needs of the District through the year 2025 and beyond. The Plan is in compliance with all applicable requirements of the Washington State Department of Health, Kittitas County, and District policies and procedures. The Plan incorporates the basic planning elements of a Small Water System Management Plan (SSMP), but expands on certain elements to provide a more comprehensive document which addresses specific issues facing the District.

1.4 OBJECTIVES

The overall objective of this study is to establish a plan for providing safe and reliable water service to the existing and future population of the District. Specific objectives of this Plan are as follows:

- Review and analyze historical data and reports regarding the existing water system and characteristics of the water system.
- Consider all applicable Federal, State, and County requirements for public water systems.
- Develop projected population, growth, and water consumption trends in accordance with Kittitas County land use plans and State requirements for demand projections.
- Update existing water system facility mapping.
- Confirm minimum design criteria for the water system for the purpose of evaluating the existing system and developing recommendations for system improvements.
- Develop improvement alternatives and analyze the costs and benefits associated with various alternatives for future system improvements.
- Analyze the financial capabilities of the District and the ability to finance recommended system improvements.
- Develop a capital facilities plan for system improvements, including proposed scheduling and potential methods of financing.
- Compile all required supporting documentation and required information, including water rights and quality documentation, operation and maintenance procedures, a water conservation plan, a wellhead protection plan, etc.

1.5 LOCATION

Kittitas County Water District No. 7 is located in Thorp Prairie, Washington, approximately 10 miles southeast of Cle Elum, Washington and approximately 15 miles northwest of Ellensburg, Washington, at the Elk Heights Exit (Exit 93) from Interstate 90 (see Figure 1-1). The District's service area consists of the Sunlight Waters Country Club development and includes approximately 150 acres of land located just 90 miles east of the greater Seattle area.

1.6 AUTHORITY, MANAGEMENT, AND CONDUCT OF BUSINESS

The District is authorized to operate as a public water system under Chapter 246-290 of the Washington Administrative Code and is also authorized by the State of Washington under the Revised Code of Washington (RCW) Title 57 to operate and maintain a public utility system. The District operates under a commissioner system whereby three commissioners make and establish District policies that govern the operation of the District. Engineering and legal counsel for the District is accomplished by outside consultants selected by the Board of Commissioners. These consultants report to and coordinate with the Commissioners to advise them on engineering and legal matters. The District's ownership and management form is summarized in Table 1-1.

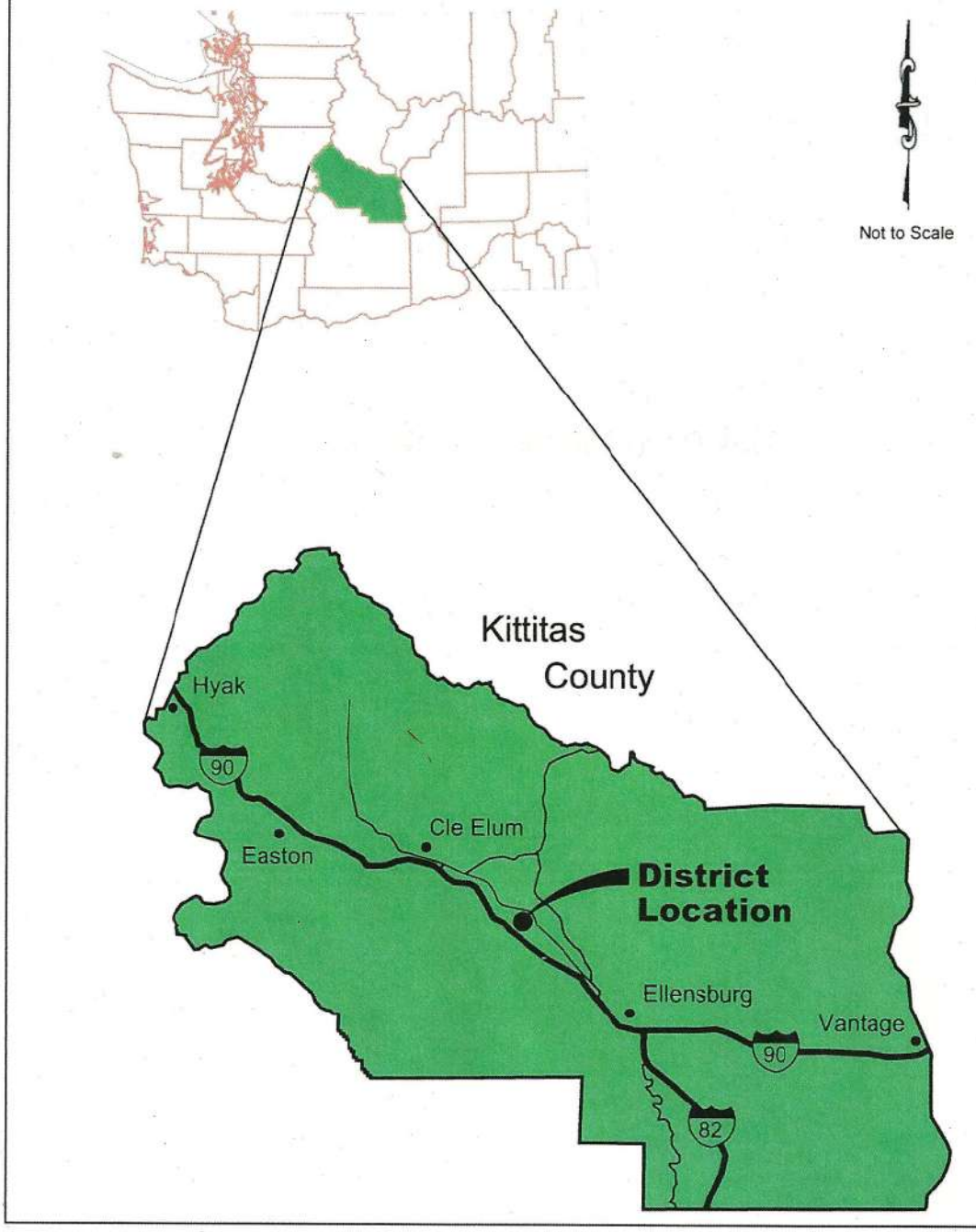

FIGURE 1-1
VICINITY MAP
Kittitas County Water District No. 7

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Table 1-1: System Operation and Management	
Water System	Kittitas County Water District No. 7; PO Box 161, Thorp, WA 98946
DOH Classification	Public Water System, Group A
DOH System ID	85295Q
District Contacts	Carl Nelson, Commissioner and System Operator. Phone 206-790-5175 Letha Irhke, Commissioner. Phone: 509-304-5465 Howard Briggs. Phone 509-656-4084
Utility System Insurance	The District maintains the following insurance limits: Each occurrence: $1,000,000 Damage to rented premises: $1,000,000 Medical expense (Any one person): $5,000 Personal and ADV injury: $100,000 General aggregate: $3,000,000
Decision Making	Elected 3 Member Board of Commissioners serve six-year terms. District finances are handled by the Kittitas County Treasurer and accomplished via Board approval of vouchers for payment at regularly scheduled Board meetings. The System Operator is, however, authorized to make required purchases for day-to-day operations and emergencies requiring attention prior to Board approval when necessary.
Public Meetings	Monthly Board of Commissioners meetings are open to the public and held at the Community Clubhouse at 7 p.m. on the second Wednesday of each month. In addition, the Board holds at least one general public information meeting each year to provide an update on the water system, address matters of interest to the public, and for regulatory requirements. Typical agendas include rate adjustments, financial position, water use efficiency policies and progress, and upcoming system improvement projects. Opportunity for questions and comments is provided for general discussion items and formal public hearings are held as appropriate or required.
Public Notification	Sunlight Waters community bulletin board and website. Notices (including the annual District public meeting) are mailed or included in billings.
System Employees	Carl Nelson, Certified Water System Operator 1. Accounting is provided by a part-time District employee. Additional assistance is obtained from outside sources as required.
Engineering Assistance	Engineering assistance for this Water System Plan and other periodic issues or projects has been provided by PACE Engineers, Inc., of Kirkland, Washington. Other Engineers and specialists are retained from time to time and selected in accordance with Washington State laws governing the selection of consultants for professional services.
Customer Complaint Process	Requests for service and customer complaints are responded to in a timely manner. Water service and water quality complaints are responded to immediately to ensure safe and reliable water service to all connections. Billings and other complaints are addressed in a timely manner, typically by phone call and/or letter from the Board of Commissioners.

1.7 HISTORY OF THE DISTRICT

Sunlight Waters Country Club was originally formed as a private, nonprofit organization to manage the utilities and recreational facilities built as part of the Sunlight Waters development. In the late 1960s the original plat and water system was designed for Seamount Properties. Sunlight Waters was constructed as a 294-lot development for a mixture of full time and seasonal residents. In 1975 the landowners, Sunrise Properties and Western Cascadia Development Company, granted the reservoir site, well sites, and 10-foot-wide easements to accommodate distribution pipes to serve Sunlight Waters. On October 9, 2000, the customers of the private water company voted for the formation of a special purpose District. Kittitas County Water District No. 7 was formed under the authority of the Revised Code of Washington Title 57. All water system connections are residential except one, the Sunlight Waters Community Club and pool.

The original Sunlight Waters development consisted of 332 lots platted in the 1960s. Just 90 miles from the greater Seattle area via I-90, the area offered mostly part-time residents a unique recreational community. Since then, the community has changed, with a shift from seasonal users in manufactured housing to more property owners shifting to full-time residency and constructing traditional homes. Lot line adjustments to accommodate full-time residences has resulted in the current configuration of 294 lots. Service is currently provided to approximately 98 full-time residents and 114 part-time residents and the clubhouse, for a total of 213 connections. A copy of the current Water Facilities Inventory Form (WFI) is included in Appendix A.

1.8 WATER SYSTEM INVENTORY

Table 1-2 provides a summarized inventory of key components of the existing water system. A complete description of the water system is provided in Section 3 of this Plan.

Table 1-2: Water System Inventory

Component	Description
Source of Supply	Well 1 (DOH SO1): Backup Supply. Metered; 12-inch diameter; approx. 500 feet deep. Approximate current capacity 30 gpm. Condition: Good
	Well 5 (DOH SO2): Primary Supply. Metered. 8-inch diameter and approx. 700 feet deep. Approximate capacity: 120 gpm. Condition: Good
Treatment	Excellent water quality. Chlorination is only treatment required and is injected at Well 5 pump house. Contact time provided in storage reservoir. Condition: Good
Storage	200,000 gallon reinforced concrete storage tank constructed in 2007. Ground elevation at 2,328 feet. Overflow elevation at 2,365 feet (37 feet high). Condition: Excellent.
Pressure Zones	The High and Low Zones are separated by a Pressure Reducing Valve located south of Highline Canal and piping attached to a bridge Condition: Vault, valve & piping replacement required. Last serviced in 2014

Component	Description
Distribution System	6- and 8-inch transmission/distribution lines to network of 2-, 3-, and 4-inch PVC distribution pipes and fire hydrants, were installed as part of the original system in the late 1960s. All roads are private. Original service line crossings generally constructed of small diameter galvanized steel. In 2015, a total of 213 connections exist in the District and all connections (residential and non-residential) are metered. Condition: Varied – Recent increase in system leakage rate suggests failing system components, including glued PVC pipe joints. Service crossings are corroded. Customer service meters are suspect and scheduled for replacement.

1.9 RULES AND REGULATIONS

Kittitas County Water District No. 7 operates under a variety of rules and regulations which are listed below. More detailed discussions of the specific regulations which affect various facets of the District's water system operation can be found in the appropriate sections of this Plan.

1.9.1 Federal Requirements

Public Law 93-523, the Safe Drinking Water Act (SDWA), directs the U.S. Environmental Protection Agency (EPA) to establish minimum national drinking water standards limiting the amount of various substances which may be present in drinking water sources. These limits are regulated by the State of Washington Department of Health and adhered to by Kittitas County Water District No. 7. Section 4 (Minimum Design Criteria) and Section 7 (Operations and Maintenance) demonstrate the District's water quality monitoring program. In addition, the District reports water quality to its customers annually in the Consumer Confidence Report prepared in accordance with the requirements of the U.S. Environmental Protection Agency. Because of the listing of the Puget Sound Chinook Salmon and Bull Trout as a "threatened species," and the District's location along the Yakima River, rules and regulations under the authority of the Endangered Species Act (ESA) may impact water system operations. The District follows accepted industry practices and all applicable regulations and guidelines for protecting endangered species and environmental resources in conducting water system operations.

1.9.2 State of Washington Requirements

The rules and regulations regarding public water supplies are a part of the Washington Administrative Code (WAC) and were adopted pursuant to the provisions in the Revised Code of Washington (RCW) 43.20.050 for the protection of public health. The rules and regulations are summarized in the DOH *Water System Design Manual* (December 2009) and provide the minimum standards for design, construction, operation, and maintenance of public water systems in accordance with the Safe Drinking Water Act of 1974 and all subsequent amendments thereto.

RCW Title 57 governs the operation of Water and Sewer Districts within the State of Washington and provides the authority for the District to operate a public water system. Title 57 specifies a variety of planning and operational characteristics such as establishment of boundaries, annexations, consolidations, mergers, formation of utility local improvement districts, comprehensive planning, officer elections, contracts, system extensions, etc.

Kittitas County Water District No. 7 acknowledges Washington State Municipal Water Law (MWL), and the provisions therein requiring a municipal water supplier's duty to provide service to all new connections within established Retail Water Service Area Boundaries. As referenced in the DOH publication 331-366, there are four threshold factors that all water system plans must describe and meet for service requests within their Retail Water Service Area. These four threshold factors as published by DOH are as follows:

1. **Capacity:** Municipal water suppliers must include a capacity determination in their Water System Plan. Capacity determinations incorporate a water system's physical capacity (source and storage) and water right limitations. Kittitas County Water District No. 7 has demonstrated sufficient water rights (and water rights applications) and source and storage capacity to serve the anticipated population of the District in the analysis performed and described under Section 3 of this Water System Plan. System improvements may, however, be required by developing properties to extend service and/or provide fire flows required by the Kittitas County Fire Marshal prior to connection to the system.

2. **Consistency:** Consistency applies to locally adopted comprehensive plans, land use plans, development regulations, and utility service extension ordinances. Consistency with Kittitas County planning and zoning is discussed in Section 3 of this Plan and demonstrated in the consistency statement included in Appendix G.

3. **Water Rights**: The Department of Ecology is responsible for water right sufficiency determinations and water purveyors are required to demonstrate sufficiency of water rights and supply facilities to meet existing and projected customers. Appendix B contains the District's current water rights self-assessment form.

4. **Timely and Reasonable:** Municipal water suppliers must demonstrate their program for providing timely and reasonable service within the established Retail Service Area. Timely and reasonable service to new connections within Kittitas Water District No. 7's Retail Service Area is ensured through prompt action on new requests for water service and the District's commitment to serve all properties within the Sunlight Waters development. Consideration of extension of service to areas outside the established Retail Water Service Area will be accomplished on a case-by-case basis.

The Growth Management Act (RCW 36.70A) has a direct impact on utility system planning by requiring a complete inventory of existing system facilities and a comprehensive effort toward determining the capability of utility systems to support anticipated growth. Although the majority of growth management activities are the responsibility of counties and cities, data and information from special purpose districts are required in order to make decisions on future growth potential and corresponding levels of service. This Plan, together with system mapping and other information, assists Kittitas County in their ongoing GMA planning efforts. It also ensures the District's mutual understanding and cooperation with the County and other planning groups that may be established from time to time for specific planning purposes. Examples of cooperative planning between agencies that might occur outside of GMA planning are groundwater management planning and emergency response planning.

Groundwater management is an issue of increasing importance throughout Washington – especially in the central and eastern portions of the State. In response to concern regarding the sustainability of water resources in rural Kittitas County, the Washington State Department of Ecology initiated the Upper Kittitas Ground Water Rule, Chapter 173-539A WAC, which became effective on January 22, 2011. A summary of the Rule is provided on Ecology's website at the following address: http://www.ecy.wa.gov/programs/wr/cro/kittitas_wp.html. "Chapter 173-539A WAC withdraws from appropriation all groundwater in Upper Kittitas County with the exception of uses for structures for which a building permit has been granted and vested prior to July 16, 2009, and uses which are determined to be water budget neutral. The rule establishes a pathway for developers, contractors, and/or individuals to construct water budget neutral projects by identifying water rights that can be placed into the trust water right program to offset their consumptive use of groundwater."[1] Although the Rule does not directly impact the existing water rights held under Groundwater Application G4-31724 (Amended Temporary Permit) and Ground Water Certificate 7531-A, copies of which are included in Appendix B, the need for continued monitoring, perfection of water rights, and long-term protection of groundwater quality and quantity are noted.

1.10 DISTRICT POLICIES

Kittitas County Water District No. 7 consists of the 294-Lot Sunlight Waters Development that includes approximately 150 acres of land platted for single family development. The District maintains a variety of policies and procedures used by the Board of Commissioners to ensure fair and equitable service to all existing and future system connections. The District is currently updating and confirming the variety of policies used for day to day system operation and maintenance and to ensure high quality service to the Sunlight Waters community. The District boundary and Retail Water Service Area are identical and shown on Figure 3-1. No change or annexation to the service area shown is planned or contemplated in this Water System Plan.

[1] Washington State Department of Ecology, "Upper Kittitas Ground Water Rule – Chapter 173-539A WAC," <www.ecy.wa.gov/programs/wr/cro/kittitas_wp.html>, accessed on September 12, 2016.

More information regarding the District's service area can be found in Section 2 of the Plan. The following are the District's current policies regarding the Retail Water Service Area.

- The District acknowledges its "duty to serve" the properties within the established Retail Water Service Area that coincides with the boundary on record with Kittitas County.
- Consideration of annexation or extension of service beyond that area is not considered at this time. Any requests to provide service outside the service area will require an amendment to the Water System Plan.
- Newly connecting properties are required to pay all costs associated with extension of service.

The District has developed policies that specify the conditions under which service will be made available, how billing and collection of fees will occur, and termination of service. A copy of the District policy is provided in Appendix B.

1.11 RELATED PLANS

The following documents were considered in the development of this Plan.

- Project Report for Water Source Improvements – Sunlight Waters Country Club, May 1994, Richard C. Bain, Jr., Consulting Engineer.
- Interim Capital Facilities Plan – Kittitas County Water District No. 7, September 2000, PACE Engineers, Inc.
- Kittitas County Comprehensive Plan, June 2014, Adopted by Ordinance No. 2014-005 – Effective Date: June 2, 2014.

SECTION 2

PLANNING CONSIDERATIONS

2.1 INTRODUCTION

This section of the Kittitas County Water District No. 7 Water System Plan is intended to give a general overview of the District's service area, including geographic location and characteristics, population and land use characteristics and projections, and an overview of historical and projected water demands.

2.2 SERVICE AREA

Sunlight Waters is a small development, of approximately 150-acres with 294 residential lots, established in the late 1960s. Kittitas County Water District No. 7 serves only the Sunlight Waters development and does not currently sell or provide water service outside of the development area. Therefore, the District's boundary/retail water service area is the same as their service area. The Sunlight Waters development is located in the Thorp Prairie subarea, approximately 10 miles southeast of Cle Elum, Washington. Figure 3-1: Existing System Map, provided in Section 3, shows the District retail water service area boundary and the District service boundary. The District Service Area is generally bounded on the north by Twin Lakes Road, to the east by High Loop Road, to the south by the Sunlight Waters Club House and to the west by Horlick Road and Thorp Prairie Road. The District wells are located on easement property, off of Sunlight Drive, north of Thorp Prairie Road, at the south end of the service area.

2.3 ADJACENT WATER PURVEYORS

Kittitas County is a relatively rural county located in eastern Washington. Developments tend to be sparse and separated by many miles. The District, for example, is located approximately 15 miles from Ellensburg and approximately 10 miles from Cle Elum, the closest sizable cities. As such, there are no adjacent water purveyors to the District. Water is provided to neighboring properties by small community and individual wells.

2.4 PHYSICAL FEATURES OF THE SERVICE AREA

The District's physical features are generally described in the following paragraphs.

2.4.1 Topography

Topography in the District, shown on Figure 3-1: Existing Water System map, generally slopes from the prairies in the south to the Yakima River Valley north of the District. An elevation difference of approximately 210 feet exists between the highest point in the

District, the water tank location, and the lowest point in the northern part of the District. The ground elevation at the District's water tank is 2,320 feet and the lowest elevation is approximately 2,110 feet above sea level. The Highline Canal, which is owned and operated by the Kittitas Reclamation District, runs through the northern portion of the District and is used for irrigation.

2.4.2 Geology and Soils

Soils in the area are generally classified as H2 and Yw. H2 soil is typically dry with drainage-impeding hardpans that have loess in the upper part. These soils are formed on the flanks of hills on ancient eroded land surfaces. The Yw soil is typically dark, well-drained to excessively-drained, and forms under grassland vegetation. More specifically, recent soil mapping in the area indicates that the land is underlain by glacial till composed of diverse rock types that form massive morained embankments at Thorp Prairie. The deposits at Thorp Prairie are capped with a thin, discontinuous layer of loess. District well logs show layers of clay, basalt and sandstone under the ground's surface.

2.4.3 Surface and Groundwater Resources

The mean annual precipitation in the vicinity of the District (records from Cle Elum, 1931-2000) is approximately 22.25 inches, and the mean snowfall is 80.9 inches. The heaviest precipitation is generally in December with the heaviest snowfalls occurring in January.

The major surface water feature in the area is the Yakima River, which is located north of the District. There are two small lakes within the District, and the Highline Canal also runs through the northern part of the District.

The District's two groundwater wells draw from an aquifer located on the Kittitas Valley syncline. Aquifer material consists of fractured Miocene basaltic rock of the Columbia Plateau Regional Aquifer System, and more specifically, the Grande Rhonde Basalt Flows. According to Washington State Department of Ecology records, there are ten additional groundwater wells located within an approximately one-mile radius of the District wells. These wells range in depth from 80 feet to 560 feet, implying that the District's primary well, at 700 feet deep, is drawing from a different aquifer. The ten nearby wells have yields ranging from 12 gallons per minute to 150 gallons per minute. In response to concern regarding the sustainability of water resources in rural Kittitas County, the Washington State Department of Ecology initiated the Upper Kittitas Ground Water Rule, Chapter 173-539A WAC, which became effective on January 22, 2011. A summary of the Rule is provided on Ecology's website at http://www.ecy.wa.gov/programs/wr/cro/kittitas_wp.html. "Chapter 173-539A WAC withdraws from appropriation all groundwater in Upper Kittitas County with the exception of uses for structures for which a building permit has been granted and vested prior to July 16, 2009, and uses which are determined to be water budget neutral. The rule establishes a pathway for developers, contractors, and/or individuals to construct water budget neutral projects by identifying water rights that can be placed into the trust water right program to

offset their consumptive use of groundwater."[2] Although the Rule does not directly impact the existing water rights permit held by the District, the need for continued monitoring of water resources and the long-term need to protect groundwater quality and quantity are noted. The District is currently pursuing determination of compliance requirements that may be associated with budget neutral consumptive water mitigation programs.

2.4.4 Climate

The average annual temperature in the vicinity of the District is 47°F. Lowest temperatures average 20°F in January and the highs average 81°F in July. There are typically 16 days a year when temperatures exceed 90°F and 24 days a year below 32°F.

2.5 LAND USE

According to the Kittitas County Zoning Map dated October 23, 2012, the land within the Kittitas County Water District No. 7 is zoned Forest and Range. Development in this zone is limited as "natural resource management is the highest priority." In addition, the area is considered high risk for wildfires and, as such, the District remains cognizant of its past experience with and potential future role in firefighting in the vicinity for protection of both life and property. Land use in the District is residential, with the only non-residential establishment being the Sunlight Waters Country Club clubhouse. The Sunlight Waters plat consists of 294 residential lots. Service to these lots is the District's highest priority and annexation of neighboring properties is not being considered at this time.

2.6 POPULATION

Kittitas County's population as estimated by the State of Washington's Office of Financial Management (OFM) was 20,467 in 1960 and 24,877 in 1980. In 2003 and 2013, OFM estimated the County's population had grown to 35,200 and 41,900 respectively. The County's current population (2013) has doubled from its 1960 level and increased approximately 19% in population from 2003, to 2013.

OFM population projections indicate that Kittitas County is projected to grow to 42,592 persons in the year 2015, 45,255 in the year 2020, 47,949 in the year 2025, and 50,567 in the year 2030.

Unfortunately, OFM projections are limited to countywide projections and do not provide the level of detail required for projecting future growth within a small area such as Kittitas County Water District No. 7. The population projections in this Plan, therefore, are based on specific information pertaining to the service area. Although the exact timing of growth in the area is not known, system improvements are based on the ultimate projected population, which provides a sound basis for system improvements and expansions to the water system.

[2] Washington State Department of Ecology, "Upper Kittitas Ground Water Rule – Chapter 173-539A WAC," <www.ecy.wa.gov/programs/wr/cro/kittitas_wp.html>, accessed on September 12, 2016.

The District serves residential customers; the only exception being the clubhouse and is limited to the 294 residential lots in the existing plat. Although all the residential customers are considered single-family dwellings, there are two distinct types of residential connections: full-time residential and part-time residential. The full-time residential customers are those that live in the District 180 days or more per year. The part-time residents have permanent homes in the District but occupy them less than 180 days per year.

Table 2-1 shows the estimated current and projected number of connections, ERUs and population within the District. Although there are full-time and part time connections, all connections are considered an ERU. The Ultimate Connection projections are conservative in that they assume all lots within the District will be served, although some lots may not be buildable.

Table 2-1 also shows ultimate connections of 295 because there are 294 residential lots and one non-residential (clubhouse) in the District. This exceeds the DOH approved connections of 225. However, the District intends to have an adequate supply of water to provide water to all the existing parcels in the District. The District has an application in to the Department of Ecology for additional water rights to supply all the District's lots. The Department of Ecology has requested a DOH approved Water System Plan prior to issuance of additional water rights.

TABLE 2-1: EXISTING AND ULTIMATE CONNECTIONS (ERUS) AND POPULATION							
Connection Classification	**2015 Connections/ ERUs**	**2016 Connections /ERUs**	**2017 Connections/ ERUs**	**2018 Connections/ ERUs**	**2019 Connections/ ERUs**	**2020 Connections/ ERUs**	**Ultimate Connections**
Full-Time Residential	98	99	100	101	102	103	219
Part-Time Residential	114	115	116	117	118	119	75
Non-Residential	1	1	1	1	1	1	1
Total ERUs	213	215	217	219	221	223	295
Population Classification	**2015 Population**	**2016 Population**	**2017 Population**	**2018 Population**	**2019 Population**	**2020 Population**	**Ultimate Population**
Full-Time Residential	196	198	200	202	203	205	438
Part-Time Residential	228	230	232	234	237	239	150
Total	424	428	432	436	440	444	588

Notes:
Population estimates assume an average household size of 2.
Part-Time Residential Connections are assumed at 100% of an ERU.
Ultimate number of connections based on potential build out.

2.7 WATER USE

Starting in 2002, the District began installing meters on all sources and customer connections, and as of 2007, all connections to the water system have been metered. The impact of requiring home meters has been significant, reducing average day demands significantly, from over 350 gallons/day/ERU to less than 115 gallons/ERU/Day gal/ERU/Day in 2015. The District's rate structure is based on monthly water use and commodity charges based on consumption. However, meter reading is precluded during the winter months due to weather conditions combined with the high number of summer only residents. The first meter reading cycle of spring provides a summary of water use over winter months. This necessitates interpolation of meter read information to average total water use over dormant months. Water source records assist in this effort.

Historical water supply information (source data) and demands (billing data) are presented in Table 2-2. The water demands shown in Table 2-2 are based on well production data and, therefore, include non-revenue water. Non-revenue water includes water used for system operations or firefighting, as well as water that is lost to breaks, leaks, or unauthorized water use.

Table 2-2 demonstrates that average day demands vary greatly from the summer months to the winter months. The variance can be attributed to the number of users throughout the year, the extreme temperature variance throughout the year, the amount of irrigation during the summer months, and the use of the clubhouse pool during the summer months. It should be noted that wildfires in 2012 and a drought year in 2015 had a significant impact on water use in the area and could account for the increase in production in those years.

Table 2-3 presents the historical five-year average for water use (2011 through 2015) and the projected water demands for ultimate development conditions. Ultimate development conditions assume water service to all lots within the District. Note that Average Day Demands are presented for the purpose of general water system planning and revenue projections. The average day demand used for planning purposes is 112 gallons per ERU per day which is the total usage (averaged over 5 years) divided by the total ERUs in 2015. Table 2-3 shows values for ADD and MDD per connection decreasing by approximately 0.5% until ADD reduces to 100 gallons per day. This is due to increased efficiencies in households and plumbing fixtures. In addition, the District has solidified a WUE goal of 1% reduction in use per year.

2.7.1 Max Day Demand

Maximum Day Demands are estimated from daily water production records and used for source of supply, reservoir and pipe sizing. Maximum Day Demands, with fire flow requirements, should be used for future system planning and water rights acquisition. The MDD values for this plan were derived from averaging the 5 highest days of the year from 2011 to 2015 and dividing by the average day shown in Table 2-3.

TABLE 2-2: HISTORICAL MONTHLY WATER SUPPLY (GALLONS)						
	2011	2012	2013	2014	2015	Five Year Average
January	577,000	559,000	488,000	408,000	362,000	478,800
February	540,000	556,000	442,000	394,000	335,000	453,400
March	593,000	603,000	471,000	423,000	399,000	497,800
April	634,000	629,000	473,000	515,001	516,000	553,400
May	579,000	710,000	683,020	829,000	1,017,000	763,604
June	775,000	771,000	902,000	1,110,000	1,435,000	998,600
July	1,109,000	1,311,000	1,435,000	1,396,000	1,526,000	1,355,400
August	1,147,000	1,929,000	1,341,000	1,223,000	1,285,000	1,385,000
September	897,000	922,000	691,000	649,000	735,000	778,800
October	523,000	584,000	465,000	363,000	517,000	490,400
November	488,000	460,000	458,000	342,000	698,000	489,200
December	528,000	465,000	549,000	373,000	458,000	474,600
Annual Total	8,390,000	9,499,000	8,398,020	8,025,001	9,283,000	8,719,004
Average	699,167	791,583	699,835	668,750	773,583	726,584
Average Day Demand	22,986	26,025	23,008	21,986	25,433	23,888
Peaking Factor	2.56	7.38	3.11	3.26	4.93	4.25
ADD Per Conn*	108	122	108	103	119	112

NOTES:
Average Month numbers for 2012 and 2015 show increased production possibly due to fire and drought in those years
Peaking factor was calculated by averaging the demand of the 5 highest days of the year (2011-2015) and dividing this by the average day demand
* ADD Per Conn is calculated by dividing Average Day Demand by 213 connections for each year.

ADD Per Connection = Average Day Demand / Total Connections
Example Year 2011
=699,167 gallons / 213 connections
= 108 gallons per day per connection

TABLE 2-3: MAX DAY DEMAND								
	Five Highest Day Water Use (Gallons)					Five Year Average	Average Day Demand	Peaking Factor
2011	64,000	56,000	60,000	56,000	58,000	58,800	22,986	2.56
2012	117,000	235,000	408,000	105,000	90,000	191,000	26,036	7.34
2013	84,000	62,000	65,000	73,000	74,000	71,600	23,121	3.10
2014	66,000	74,000	80,000	67,000	69,000	71,200	21,986	3.24
2015	78,000	193,000	86,000	168,000	99,000	124,800	25,447	4.90
							Average Peaking Factor	4.23
Notes: Average Day Demand = Annual Total Demand divided by 365								

TABLE 2-4: HISTORICAL AND PROJECTED DEMANDS									
	5-Year Historical Average	2016	2017	2018	2019	2020	2021	2022	Ultimate
Total Supply (million gallons)	8.729	8.767	8.804	8.841	8.877	8.913	8.868	8.824	10.731
Connections (ERUs)	213	215	217	219	221	223	223	223	294
Avg Day Demand (gal/day)	23,915	24,019	24,121	24,222	24,321	24,418	24,296	24,175	29,400
Avg Day Demand (gal/conn-ERU/day)	112	111.7	111.2	110.6	110.0	109.5	109.0	108.4	100.0
Max Day Demand (gal/day)	101,083	101,522	101,954	102,379	102,798	103,209	102,693	102,180	124,266
Max Day Demand (gal/conn-ERU/day)	475	472	470	467	465	463	461	458	423

NOTES:
Historical Demand Data is based on the five-year average data from 2011 through 2015 as shown in Table 2-2.
Maximum Day Demands are based on a historical Peaking Factor of 4.23.
All Demands include non-revenue water and are based on historical water production data.

Calculations

Max Day Demand = Average Day Demand * Peaking Factor
(For 2016)
= 24,019 * 4.23
= 101,522 Gallons / Day

Total Supply = (Connections * ADD/connection * 365)/1,000,000
For 2016
=215 * 111.7 * 365 / 1,000,000
=8.767 MG

2.8 WATER USE EFFICIENCY

The requirements established under the Municipal Water Law's Water Use Efficiency (WUE) Rule are summarized in Table 2-5. The table provides a status of progress toward meeting the requirements. Because of its size, and in accordance with WAC 246-290-810, the District is only required to evaluate and implement a minimum of one conservation measure. The District maintains its commitment to reduce water use overall and to concentrate on the Distribution System Leakage rates that it has experienced in recent years. The goal and regulatory process for reduced consumption per customer was set at the 2016 public meeting. A copy of the meeting minutes is provided in Appendix D. The District offers ongoing assistance to help customers identify leaks, breaks, and other issues on the customer side of meters. Information is distributed annually to assist and support this effort.

TABLE 2-5: WATER USE EFFICIENCY REQUIREMENTS

Component (WAC #)	Requirements	Status / Recommendations for Compliance
Data Collection (246-290-100)	Provide monthly and annual data for water production and/or purchases and consumption by class. Evaluate reclaimed water opportunities. Consider water use efficiency rate structures. Provide "seasonal variations" consumption by class.	The District records annual and monthly consumption of its customers and currently maintains a conservation pricing scheme. The District also maintains records for tracking water used in treatment operations and other types of authorized consumption.
Demand Forecasting (246-290-100)	Provide demand forecasts with and without conservation measures. Describe savings from efficiency program. Describe forecasting including all cost effective measures evaluated.	The District will continue to monitor and record savings resulting from the WUE Program.
Metering (246-290-496)	Meter all sources and service connections. If not currently fully metered, water purveyors must implement a plan for full installation.	All connections to the water system are metered. A meter testing and replacement program is currently under consideration.
Efficiency Program (246-290-810)	Describe conservation goal and WUE program, including how consumers will be educated on WUE practices. Implement or evaluate one measure that support the District's goal. Estimate projected water savings resulting from program for a 6-year period. Describe program's evaluation process, schedule, and funding mechanism. Evaluate water system leakage.	The WUE program is designed to support the District's efforts of maintaining water savings at current levels through continuing to seek out and repair system leaks to reduce Distribution System Leakage. In addition, the District educates customers on conservation through water saving fixtures, repair of running toilets, and inspection of residential lines.

Component (WAC #)	Requirements	Status / Recommendations for Compliance
Distribution System Leakage (246-290-820)	Calculate and report annually the volume and percent of leakage volume. Develop water loss control action plan if leakage is over 10% for 3-year average.	The District's average distribution system leakage (DSL) rate was 9.7% from 2013 to 2015. Although within standards, efforts to decrease distribution system leakage include: public educational information/ newsletters, insulating meters, and the development of a rapid response team to both detect and repair leaks.
Goals (246-290-830)	Establish a measurable goal for a 6-year period that will reduce demand for consumption. Use the public process to adopt the goal.	The District has adopted a goal for conservation that is described in Section 2.8.5
Performance Reports (246-290-840)	Develop annual report that discusses the conservation goal and the current programs that support the goal. Submit annually to DOH and make available to the public.	The District will submit their annual performance report to DOH in July of each year
Notes: [1]CCR = Consumer Confidence Report		

2.8.1 Data Collection

Data collection efforts have improved over the past several years, and the District has recently started collecting additional data concerning water consumed during operations and other authorized consumptive use. Currently, meters are being read monthly for all accounts.

2.8.2 Metering

All source and service connections in the water system are metered. The District installed meters on service connections starting in 2002 to help account for water consumed. This aids the District in its efforts to better account for authorized consumption and track distribution system leakage. Meter installation has significantly reduced water consumption. The District calibrates the meters regularly and is developing a funding mechanism for a meter replacement program, however, at this point, no replacement is currently needed.

Temporary service and metering is available, and all customers are subject to costs incurred at the time of connection and disconnection. Hydrant meters are required for tracking water used for construction purposes.

2.8.3 Water Use Efficiency (WUE) Program

Building on past conservation efforts, a Water Use Efficiency Program has been developed that meets the requirements provided in WAC 246-290-810. For a water system of its size, the District is required to evaluate or implement a minimum of one

measure as part of its program. The measure contains both behavioral measures and low flow devices for distribution upon request. A copy of the District's WUE plan is provided in Appendix E.

2.8.4 Water Use Efficiency (WUE) Goal

Kittitas Water District No. 7 recognizes water use efficiency as an important aspect of resource protection and financial management. The District's Water Use Efficiency Goal for 2016 through 2022 is: ***Reduce water consumption by 1% per year over the six-year period.*** Measures for obtaining water efficiency were discussed at a recent public notice meeting held December 1, 2018. A copy of the meeting minutes from the December 2018 meeting is provided in Appendix E. A copy of the District's current rates is also provided.

Potential Measures for achieving the recommended goal are:

1. Provide Customer Assistance in identifying leaks. One way this is achieved is by the District providing a "Home Checklist" to all customers to help them identify potential leaks and water wasting.
2. Quick response to repair of identified leaks or breaks.
3. Meticulous tracking of water used for system operations.
4. Zero Tolerance on unauthorized system withdrawals.
5. Test and calibrate or replace meters.
6. Perform a Leak Detection Study.
7. Water System Replacement.

Additional conservation and water use efficiency measures are identified in Table 2-6. Table 2-7 provides information on projected average day demands with and without WUE measures.

The District will evaluate the effectiveness of the WUE plan by tracking water sales annually to ensure that water consumption reduction goals have been met.

TABLE 2-6: WATER USE EFFICIENCY PROGRAM 2014–2020			
Measure	**Description**	**Cost / Unit**	**Savings / Unit**
Public Education	Informational brochures and newsletters are made available to customers requesting information through direct mailing or placement on Sunlight Waters Clubhouse's website that advertise ideas for saving water at one's home.	Minimal Labor Costs	Difficult to quantify – savings vary by customer
Conservation Pricing	The current water rate structure encourages water savings by charging for each cubic foot of water consumed by customers	None	Savings vary by customer
Show Consumption History on Bills	The current billing system shows historic consumption, so customers can compare with past consumption and track savings from conservation efforts. Provides an added incentive to participate in other measures.	None	Savings vary by customer
Winterization Education Program	Program to educate customers who are not year-round residents to winterize their homes to prevent pipes from freezing and breaking.	Minimal Staff Time	Savings will vary
Home Inspection Checklist	A checklist is sent to all customers annually encouraging residents to inspect their homes and property every year to identify water leaks. Customers are asked to complete and return the annual checklist form for District records.	Minimal staff time	Savings will vary

TABLE 2-7: WATER USE EFFICIENCY							
	2016	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Avg Day Demand (gal/conn-ERU /day)	111.6	111.0	110.5	109.9	109.4	108.8	108.3
Avg Day Demand (gal/conn-ERU /day) With WUE	111.0	109.9	108.8	107.7	106.7	105.6	104.5

2.8.5 Distribution System Leakage

Non-revenue water lost through system leaks and unauthorized or unmetered water use, also referred to as distribution system leakage, is something the District seeks to minimize. Currently, the District is not measuring their authorized consumption, which typically includes maintenance flushing, street cleaning, and fire-fighting (common in the District). The District will began enforcing metering of their authorized consumption in 2007. The District has averaged approximately 9.6% of total non-revenue water loss from 2011-2015, which does not account for authorized consumption by District operations, therefore

Distribution System Leakage could be much lower. Table 2-8 provides a summary of DSL between 2011 and 2015.

TABLE 2-8: DISTRIBUTION SYSTEM LEAKAGE

	2011	2012	2013	2014	2015	5-Year Avg (%DSL)
Total Pumped Water	8,390,000	9,499,000	8,097,720	8,025,001	9,288,000	-
Total Water Sold	7,620,685	8,494,880	7,213,869	7,475,255	8,297,932	-
Non-revenue water	769,315	1,004,120	883,851	549,746	990,068	-
% DSL	9.17%	10.57%	10.91%	6.85%	10.66%	9.63%

If the District is to determine that the Distribution System Leakage is over 10% for a 3-year annual average, then the District will to complete a Water Loss Control Action Plan, as required by WAC 246-290-820(4)(a) through (e).

2.8.6 Source of Supply Analysis

The District serves only the Sunlight Waters Development. The main water source, Well No. 5 as described in Section 5, currently exceeds the average daily demand for the service area. Expanding the system to serve areas outside of the development and existing service area is not considered at this time. Any requests to provide service outside the service area will require an amendment to the Water System Plan.

The water system's supply is from two wells; the main well #5 and the back up well #1, which currently provides water service to 98 full time residences, 114 part-time residences, and the pool house. The system is approved by DOH for 224 connections. Continued use of the wells is not expected to affect the quality or quantity of the source long term.

A detailed source analysis is provided in Section 5.3 of this water system plan.

2.8.7 Water Supply Reliability

All purveyors utilizing groundwater wells are required to monitor well levels from ground level to the static water level on a seasonal basis, including low demand and high demand periods, to document the continuing availability of the source to meet projected, long-term demands. Purveyors are required to maintain this data and provide it to DOH upon request.

The District does not currently monitor well levels on a seasonal basis. However, the District is actively seeking a consultant to help them develop a program to monitor the wells and issue annual well reports when requested by DOH.

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SECTION 3

EXISTING WATER SYSTEM

3.1 INTRODUCTION

This Section of the Plan includes information regarding the existing Kittitas County Water District No. 7 water system including the source, pumping, storage, and distribution facilities. Analysis of the system's capability to meet the needs of the current and future customers of the District is presented in Section 5. The existing water system and the District's service area are shown on Figure 3-1: Existing Water System. The District's Water Facility Inventory can be found in Appendix A. As noted previously, the District currently (2016) serves approximately 98 full-time residents, 114 part-time residents, and the Sunlight Waters Golf Club clubhouse, for a total of 213 active connections.

3.2 SOURCE FACILITIES

Since 1969, five wells have been drilled to supply the service area, although only two of the source wells, Well No. 1 (SO1) and Well No. 5 (SO2) are currently in operation. As discussed in Section 5 and demonstrated in the Wellhead Protection Plan included in Appendix D, protection of existing groundwater wells and associated aquifers is of paramount importance to the District. Protection includes monitoring the wells and reviewing any proposed land use or development proposals in the vicinity of the wells that might impact or influence existing source wells.

3.2.1 Well No. 1

Well No. 1, also referred to as Well SO1 in DOH records, was constructed by the Sunlight Waters Development Company in 1969 and is currently used as an emergency backup supply only. The well is authorized under Washington State Department of Ecology Application Number 10144 and Ground Water Permit Number 9321 and is located in the northeast quarter of the northwest quarter of Section 25, Township 19 North, Range 16 West. Well No. 1 is 12 inches in diameter and is approximately 500 feet deep. It was the District's primary supply source from its construction to 1977 and again from 1988 to 1991. The well's initial capacity was approximately 75 gallons per minute. Currently, the well is considered a backup source and can produce a maximum of approximately 30 gallons per minute with disinfection provided by chlorination. A meter in the pump house monitors flows. The well and pump have the capability to be connected to the system in such a way that the pump would run automatically if and when Well No. 5 could not meet the water system supply demands.

3.2.2 Well No. 2

Well No. 2 was a 480-foot well with a capacity of approximately 45 gallons per minute. This well was drilled in 1974 and was connected to the community water system in 1977. The well was used as the primary supply source until 1988. After this, the well was used intermittently with Well No. 1 until the development of Well No. 5 (SO2). Well No. 2 has since been abandoned.

3.2.3 Well Nos. 3 and 4

In 1990 the District attempted to construct Wells No. 3 and No. 4 near the water reservoir site. Problems were encountered during drilling and the projects were abandoned before completion.

3.2.4 Well No. 5

Well No. 5 (DOH SO2) was constructed by the Sunlight Waters Development Company in 1991 and is currently the primary source of supply for the District. The well is authorized under Washington State Department of Ecology Start Card (Notice of Intent) Number 033418 and Amended Temporary Ground Water Permit Number G4-31724 (confirmed by Certificate Number 7532-A), and is located in the northeast quarter of the northwest quarter of Section 25, Township 19 North, Range 16 West. The 8-inch diameter well is approximately 700 feet deep. The pump house facility contains relevant piping, drains, vents, valves, and operating equipment including a flow meter, chlorine feed unit, pump protection, and automated float control valves linked to the reservoir. The pump in the pump house was replaced in 1998 and had a pumping capacity of 75 gpm. That pump was removed in March 2002 and maintenance tasks were performed. The pump was reinstalled and is currently pumping at 120 gpm.

3.3 WATER RIGHTS

Ground Water Certificate Number 7532-A (priority date April 17, 1969) allows the District to withdraw 40 gallons per minute and a total of 50 acre-feet per year for community domestic supply, commercial uses, and fire protection. DOH has approved the system for 224 connections based on this water right. A Temporary Ground Water Permit, Number G4-31724 (priority date January 18, 1972) increases the District's instantaneous withdrawal limit to 250 gallons per minute. The District understands that the Temporary Permit does not guarantee or imply that a final permit will be issued pursuant to the subject application (Number G4-31724). The annual groundwater limit has been exceeded from time to time in the past, although demands have been significantly reduced since the installation of meters on all customer accounts. The District applied for additional water rights in 1993 and that application remains on file with the Washington State Department of Ecology (Yakima office). Documentation for the District's existing and temporary water rights can be found in Appendix B.

3.4 STORAGE

In 2007, a new reservoir was constructed in accordance with the recommendations of the 2003 Water System Plan to replace the previous wood reservoir. The new 200,000 gallon reservoir is a reinforced concrete facility approximately 30 feet in diameter by 40 feet in height. It is situated on a concrete base at an elevation of approximately 2,328 feet above sea level and has an overflow elevation of 2,365 feet. The reservoir is gravity-fed from the District's Well #5 and pump house through more than 1,500 linear feet of 4-inch, 6-inch, and 8-inch watermains. Water from Well #5 is also sent to the distribution system simultaneously through 4-inch watermains. See Figure 3-1 for the locations of the wells, reservoir, and watermains. The reservoir has 2 back up lines that feed the system for redundancy. There are a series of shut off valves that allow system isolation if needed for repair or leak testing and there is a shut off valve, main shut off, treatment and pump at Well #5; chlorination occurs at the point of withdrawal at Well #5.

3.5 WATER DISTRIBUTION FACILITIES

Water from the reservoir flows through a piping network consisting of approximately 24,600 linear feet of PVC water main ranging in size from 2 inches to 8 inches. A summary of the distribution system inventory is presented below in Table 3-1.

TABLE 3-1: WATER DISTRIBUTION SYSTEM INVENTORY

Pipe Size	Total Linear Feet	% of Distribution System
2-inch	2,800	11%
3-inch	7,500	31%
4-inch	9,200	37%
6-inch	3,700	15%
8-inch	1,800	7%

Note: Approximate lengths from District system map.

Two pressure zones are required to deliver acceptable pressures to all areas of the District. A single pressure-reducing valve (PRV) located at the south side of the Highline Canal separates the Low Zone from the High Zone. The High Zone includes the uplands north of the Canal and the Low Zone extends from the canal to the Yakima River along the northern District boundary. The High Zone operates by gravity flow from the wells or reservoir at a hydraulic elevation of approximately 2,345 feet while the Low Zone operates at a hydraulic elevation of approximately 2,100 feet. The PRV separating the two zones was last serviced in 2014.

Stated in Section 5.2, an analysis of the existing water system, future demand scenarios and recommended improvements, for the Kittitas County Water District No. 7 water system was modeled to analyze the existing distribution system under different scenarios and parameters. The hydraulic model was updated for this Water System Plan update to add the new 200,000 gallon reservoir, constructed in 2007. Section 5 provides additional information on the water system analysis.

The majority of the distribution system was constructed in the 1960s in easements or public access areas. The water service crossings across the streets are galvanized steel, and customer service lines are PVC. The Highline Canal crossing is located under the bridge and is constructed of 4-inch PVC pipe. All connections to the water system are metered.

Water distributed to the system comes simultaneously directly from the main well and from the reservoir located south of the service area. Water distributed into the system is treated with chlorine at the point of withdrawal at Well #5.

SECTION 4

MINIMUM DESIGN CRITERIA

4.1 INTRODUCTION

It is paramount to establish realistic design criteria in order to evaluate the existing water system's adequacy and to plan for future water system improvements. Minimum design criteria for the Kittitas County Water District No. 7 system must be in accordance with the standards and requirements put forth by the U.S. Environmental Protection Agency (EPA), the Washington State Department of Health, and Kittitas County. Minimum design criteria addressed in this section include water supply requirements, storage volume, distribution system and transmission main capacity, and water quality standards. These criteria will be utilized to determine existing deficiencies in the water system and projected water system requirements for the planning area.

The Washington State Department of Health's (DOH) Water System Design Manual (December 2009) is the primary document governing the sizing and design of public water systems in the State of Washington. This publication sets forth the minimum system planning and reliability considerations. Criteria for distribution system design, water storage, and daily supply requirements are summarized in this section.

4.2 REFERENCE DATUM

The reference datum for planning of facilities in this Plan and for District design work is based on the United States Geological Survey (USGS).

4.3 DESIGN PERIOD

In planning water facilities, it is necessary to design them to be adequate over a specified period of time. The period of design for this study is approximately 20 years. The facilities proposed in this study may have reached their maximum supply capacity 20 years from the date of this Plan, assuming that the population projections are reached. Many components of water systems, however, have much longer useful lives than 20 years and will continue to serve the community far beyond the design period.

4.4 PLANNING CONSIDERATIONS

- Initial system construction and additions must conform to the comprehensive land use plans of agencies having jurisdiction (Kittitas County) for projected (retail) service area.
- Public water systems should be designed to provide firefighting capability in accordance with the requirements of the jurisdiction within which the utility operates. The fire flow requirements for the District are established by the Kittitas County Fire Marshal and

adopted fire code. Unincorporated Kittitas County and the area in and around the Sunlight Waters community served by the District is designated as a wildland-urban interface area or WUI. As noted previously, Kittitas County code establishes and emphasizes the importance of fire protection service in these areas. Past history of fires in and around the District emphasizes community concern regarding protection. For planning purposes, a minimum fire flow of 1,000 gallons per minute for a minimum duration of one hour is established. It is noted however, that single-family residences greater than 3,600 square feet in size require a minimum fire flow of 1,500 gallons per minute for a two-hour minimum duration.

4.5 RELIABILITY CONSIDERATIONS

- Multiple water sources are recommended in combination with adequate emergency reserve in gravity storage to allow for interruption of supply at one point, while still maintaining water supply to the system at the design rate.
- Although the District currently has no pump stations, any future pumping stations are to contain multiple booster pumps of sufficient capacity to meet one-half of peak day demands with the largest pump out of service.
- Hookups for a large generator were completed in 2015 for Well No.5. It is the District's policy to require auxiliary power where adequate gravity storage is not provided.

4.6 WATER SUPPLY REQUIREMENTS

- A source capacity that meets the maximum day demand while replenishing the standby storage volume within 72 hours of its depletion is recommended, in accordance with the 2009 DOH Water System Design Manual.

4.7 WATER PRESSURE

- Water systems shall be designed to provide an adequate quantity of water at a positive pressure of at least 30 psi under peak hourly demand flow conditions, measured at the customer's connection to the water main.
- For fire flow, the distribution system shall be designed to provide the required fire flow at a residual pressure of 20 psi throughout the system under maximum day demand flow conditions.

4.8 PIPE SIZING AND MATERIALS

- Water main sizes shall be adequate to deliver required fire flows and the maximum day demand while maintaining minimum system pressures of 20 psi.
- Distribution systems are to be sized to provide peak hourly demand flow.
- Maximum velocity in distribution pipelines is not to exceed 8 feet per second under peak hour demand conditions.

- Minimum pipe diameter is 8-inches nominal inside diameter, except for looped mains and dead-end mains beyond hydrants, and all pipelines shall be designed and constructed to ultimate domestic and fire flow conditions as determined by the District.
- Dead-end mains are generally not accepted by the District, except in phased development projects or where no potential for future interconnection of facilities exists.
- New water mains shall be constructed of PVC pipe or cement lined, Class 52, ductile iron pipe.
- All water system pipelines shall be constructed of "lead-free" materials (less than 8% lead content).
- Water systems must specifically address how a new source will affect compliance with the Lead and Copper Rule (40 CFR 141.90).
- Minimum cover over pipes shall be three feet.
- If possible, transmission and distribution pipelines shall be at least 10 horizontal feet from any existing or proposed waste disposal facilities. At least 18 inches of vertical separation shall be maintained between the top of a sewer main and the bottom of a water line.
- Water source pumping facilities and storage facilities must be designed so that, in combination, they can supply the peak hour demand at any time in all parts of the system.
- Polyethylene encasing or cathodic protection shall be utilized in areas of corrosive soil conditions which may affect the life of pipelines, as determined by the District.

4.9 VALVES

- Valving shall be installed in a configuration which permits isolation of lines.
- Valves should be installed at intersections with normal maximum spacing of 600 feet for distribution mains and one-quarter mile for transmission mains. Additional isolation valving may be required by the District and will be determined on a case-by-case basis.
- Air entrainment, air, or combined air-vacuum relief valves are to be installed at appropriate points of high elevation in the system.
- Zone isolation valves shall be installed at zone boundaries to permit future pressure zone realignment without the need for pipe realignment.
- A blow-off assembly or fire hydrant shall be installed on all dead-end runs and at designated points of low elevation to provide a means for adequate flushing of the system. The blow-off assembly shall be installed in a utility right-of-way, except where a written access and construction easement is provided to the water utility. In no case shall the location be such that a possibility of back-siphonage into the distribution system exists. The blow-off assembly shall be sized to achieve a minimum flow velocity of 2½ feet per second in the main.

4.10 FIRE HYDRANTS

Fire hydrants shall comply with the minimum standards and requirements established by the State of Washington's adopted Water System Coordination Act (WAC 246-293) and the International Fire Code (WAC 51-54A). On June 4, 2013, Kittitas County Board of County Commissioners passed Ordinance No. 2013-006 which adopted the 2012 edition of the International Fire Code (IFC). According to Appendix "C" of the IFC, the minimum spacing between hydrants requiring a fire flow of 1,750 gallons per minute or less is 500 feet with the maximum distance from any point on a street or road frontage to a hydrant being 250 feet.

4.11 CROSS-CONNECTION CONTROL

Where the possibility of contamination of potable water exists, water services shall be equipped with appropriate cross-connection control assemblies in accordance with State requirements and the District's Resolution on Cross-Connection Control and the Cross-Connection Control Manual, Accepted Procedure and Practice, published by the American Water Works Association. The need, size, and location of cross-connection assemblies shall be determined by the District. Information on the District's current Cross-Connection Control Program can be found in Appendix C.

It is understood that the current Cross-Connection Control Program for the District is many years old and in need of updating. It was approved by the District's board in 2002. The District intends to update the Cross-Connection Control Program within the next two years to have an updated program moving forward.

4.12 STORAGE

Storage requirements are based on five components: operational storage, equalizing storage, standby storage, fire suppression storage, and dead storage. The different storage components are described below.

The minimum requirements for each of the components of the total storage requirement are summarized below. The minimum amount of storage required shall be adequate to provide for equalizing storage plus the larger of standby or fire suppression storage.

The recommended storage volume is equal to the sum of the equalizing, standby, and fire suppression storage components. Section 5 of this document includes a complete analysis of the District's water storage requirements and existing capacities.

4.12.1 Operational Storage

The following definition and brief explanation is presented as reference information. As defined previously, the operational storage is the volume of water available to supply the system under normal operating conditions while the source is considered "off." This volume varies according to the sensitivity of the water level sensors controlling the source pumps and the configuration of the tanks designed to provide the required volume while

preventing excessive cycling of the pump motor(s). The sum of the equalizing, standby, and fire suppression storage (recommended storage) is equal to the operational storage.

4.12.2 Equalizing Storage

The volume of equalizing storage must be sufficient to meet hourly water system demands in excess of the rate of supply and must be at an elevation sufficient to meet these demands at a minimum delivery pressure of 30 psi. The amount of required equalizing storage is to be calculated in accordance with the DOH Water System Design Manual.

4.12.3 Standby Storage

Standby storage is required in order to augment the available supply of water during a period of restricted flow from the supply source. Restriction of flow may be caused by a pumping equipment failure, supply line failure, maintenance or repair, or other condition which causes interruption in supply. For single source systems, standby storage requirements are twice the average day demand for a system, deliverable at 20 psi. It is recommended that standby storage not be less than 200 gallons per connection.

4.12.4 Fire Suppression Storage

Fire suppression storage must be equal to the amount of water required to accommodate fire demand while maintaining a minimum system pressure of 20 psi. Fire flow requirements are determined by the Fire Marshal having jurisdiction based upon criteria set forth in the fire code.

4.12.5 Dead Storage

Dead storage is the amount of water which is below the elevation required to deliver water to all customers at the minimum design pressure. Dead storage is not considered when determining volumes to provide operational, equalizing, standby, or fire suppression storage.

4.13 GENERAL FACILITY PLACEMENT

All piping, pumping, source, storage, and other facilities shall be located in public rights-of-way, dedicated utility easements, or on District-owned property. Utility easements must be a minimum of 10 feet in width, and piping shall be installed no less than 5 feet from the edge of the easement. Any exceptions to this minimum easement will be at the discretion of the District. Unrestricted access shall be provided to all public water system lines and their appropriate appurtenances and all public fire hydrants.

The location of utilities shall be in accordance with the standards and guidelines established by Kittitas County criteria. Where existing utilities or storm drains are in place, new facilities shall conform to these standards as nearly as practicable and yet be compatible with the existing

installations. Where practical, there shall be at least 10 feet of horizontal separation from any existing or proposed waste disposal facility and 5 feet horizontal separation from other utilities. Eighteen inches of vertical separation is required between the top of a sewer facility and the bottom of a water facility.

4.14 WATER QUALITY STANDARDS

Kittitas County Water District No. 7 has historically accomplished water quality monitoring with assistance from a certified water quality specialist and in accordance with all applicable requirements. Current District water quality monitoring requirements and information is provided in Appendix C of this Plan.

SECTION 5

SYSTEM ANALYSIS AND

RECOMMENDED IMPROVEMENTS

5.1 INTRODUCTION

This section of the Plan includes analysis of the existing water system components to determine compliance with the established minimum design criteria presented in Section 4 and the ability of the existing water system to meet the future demands presented in Section 2. Recommended improvements, cost estimates, and proposed scheduling of improvements are included in the Capital Facilities Plan portion of this section.

5.2 HYDRAULIC ANALYSIS

In order to perform an analysis of the existing water system and future demand scenarios and recommended improvements, the Kittitas County Water District No. 7 water system was modeled for the previous (2003) Water System Plan using H_2ONet, a hydraulic modeling program developed by MW Soft, Inc., of Pasadena, California. Using this analytical tool, the existing distribution system was analyzed under different scenarios and parameters. Proposed improvements were also modeled to confirm future improvement recommendations. The hydraulic model was updated for this Water System Plan update to add the 200,000 gallon reservoir constructed in 2007. Along with the model, the system analysis provides a spreadsheet evaluation of source and storage data combined with practical knowledge and institutional knowledge of the system and ongoing or projected operational issues. The following summary of hydraulic modeling is provided to document the hydraulic model on file with PACE Engineers, Inc., for use in the event of a substantial development proposal or situation that justifies use of the hydraulic model.

An analysis was performed on the PRV between the two pressure zones. The size of the PRV is 4" and is manufactured by Cla Valve (model number 90G-01AB). The analysis investigated the flow capacity across this PRV under all the scenarios. It was also important to understand the demands in both the upper and lower zone under each scenario and therefore an analysis was conducted where Max Day Demand flows and fire flows were applied to the lower zone to determine if there were sufficient flows in the upper zone. An analysis was then conducted where the Max Day Demand and Fire Flows were allocated to the upper zone to determine if there were sufficient flows in the lower zone. For the analysis, the tank levels were set to the height where the equalization storage is depleted.

TABLE 5-1: PRV OUTPUT UNDER VARIOUS DEMAND CONDITIONS				
Demand Scenario	**Upstream Pressure (psi)**	**Downstream Pressure (psi)**	**Flow (gpm)**	**Velocity (ft/s)**
ADD	84.91	50.43	5.26	0.13
MDD	84.74	50.42	23.68	0.6
MDD + FF (fire in low zone)	-42.11	-71.50	1,023.68	26.14
MDD + FF (fire in high zone)	-1.21	-0.37	23.68	0.6
PHD	84.21	50.37	48.96	1.25

5.2.1 Peak Hour Demand

The hydraulic model of the system includes an evaluation under peak hour demand conditions to determine if the minimum design pressure of 30 psi could be maintained throughout the system. Under high flow conditions, there is considerable head loss through smaller diameter pipes which reduces pressures to the areas served by those pipes. The scenario was conducted with the District's reservoir set with equalization storage being depleted. The hydraulic modelling identified areas of the District that might experience pressures below 30 psi under peak hour conditions. These areas include the southeastern portion of the District (Block I) and the higher elevations adjacent to the reservoir.

5.2.2 Fire Flows

The system was modeled using a fire flow requirement of 1,000 gallons per minute for one hour under maximum day demand conditions. A minimum system pressure of 20 psi was imposed throughout the system during fire flow simulations. It was assumed that the water level in the reservoir was approximately 6 feet below the overflow elevation. It is noted that the fire flows may be in excess of what is required by the Kittitas County Fire Marshal. However, the District is located in an area designated as Range and is within a wildland-urban interface area as designated by the County. The importance of fire protection in Kittitas County was illustrated during wildfires in the area (2012) that relied heavily on the

resources of KCWD #7 for firefighting and further demonstrated in the following policy statement from the Kittitas County Comprehensive Plan:

GPO 2.11 Kittitas County recognizes the need to provide adequate and efficient fire services to all areas of the County. The following strategies should be utilized:

- *Adopt and implement the most current version of the International Fire Code including the Urban-Wildland Interface Code (UWIC)*
- *Participate in the Community Fire Wise Programs*
- *Develop Community Fire Wise Plans*
- *Coordination with and between Fire Districts*
- *Coordination with Washington State Department of Natural Resources (DNR)*

This policy, coupled with community concern for protection from wildfires, supports the recommendation for fire flows of 1,000 gpm for one hour. Although this is greater than the 1,000 gpm for 45 minutes required by the County, the District may wish to consider increasing this based on coordination with DNR and Fire Districts. Consideration of water quality issues associated with standing water in tanks, especially during winter months, should be considered prior to adding storage.

The model was run for MDD and fire flows for both the lower zone and upper zone. In both cases it was found the existing distribution system was not capable of delivering the required fire flows throughout most of the District. Available fire flows throughout the District average approximately 550 gallons per minute with some areas experiencing flows less than that. The recommended improvements necessary for the provision of 1,000 gallons per minute fire flows throughout the District include replacement of key pipelines throughout the system with looped lines of 6-inch diameter or greater. Short connecting lines between blocks may be exempted from this requirement. Additional detail is provided in the Distribution System portion of this Section.

The model was also run to consider the effect of different depths in storage. For the Fire Flow (MDD + FF) we made the water surface elevation at the "bottom of the FSS component", per the Water System Design Manual. This concluded that the tank would be 17 feet below the overflow elevation. The results of this lead to similar conclusions as other runs – pipe sizes are too small under fire flow conditions. The critical pressures were located in the east side of the District on the north end of Highline Loop road where pipe diameters are four and three inches. Under the peak hour demand conditions, under static state, pressures within the system at lower tank depths meet minimum pressure criteria.

The model was also run to consider the effect of a higher overflow elevation on the decreased output of the pump (due to "moving up" its pump curve). Due to Well No. 5 being approximately 700 feet deep, the fluctuating depths of the tank became more insignificant due to the already high head required by the pump. At the max tank elevation (37 feet), the flow into the tank was 102 gpm while at the tank elevation of 10 feet, the flow into the tank was 109 gpm. Considering the max output flow from the pump is 120 gpm

and at the tank level of 10 feet and the flow was 102 gpm at the tank, no problems were encountered in this scenario.

5.3 SOURCE

The minimum source capacity requirement for the District has been determined using the District's historical demand records, as documented in Section 2 of this Plan. The average day demand for the District was estimated using the average total demands for the years 2011 through 2015. The maximum day demand was estimated by averaging the highest demand days for the years 2011 through 2015. The peaking factor between the maximum day demand and average day demand is estimated to be approximately 4.23. The average day demand per ERU is estimated to be approximately 112 gallons per day, down from the average of 321 gallons per day put forth in the previous plan, prior to installation of customer meters. It is noted that the significant reduction is due to the installation of meters on all connections and changes in District billing practices. As residents were forced to pay for metered water use, demand dropped dramatically. Using a peaking factor of 4.23, maximum day demand is estimated at 475 gallons per ERU per day, down from approximately 846 gallons per day in the previous planning document.

Kittitas County Water District No. 7 currently maintains a water right of 50 acre-feet per year together with a temporary water right, applied for in 1993, for a maximum instantaneous withdrawal rate of 250 gallons per minute. As mentioned in Section 3, the District currently utilizes Well No. 5 as its primary source of supply, with Well No. 1 providing backup supply only. Well No. 5 was constructed in 1991, and at that time was capable of producing up to 175 gallons per minute. Currently the District is pumping approximately 120 gallons per minute. The backup well (Well No. 1) is used very infrequently and currently has a capacity of approximately 30 gallons per minute. The use of this well has decreased significantly in recent years due to increased drawdown and recovery times.

The water supply analyses presented in Tables 5-2 and 5-3 below are based on the assumption that water supply requirements will decline as system replacements are accomplished and water leakage rates decrease. The assumptions used for both evaluations are:

Average Day Demand (gallons/Conn-ERU/Day)	112
Maximum Day Demand (gallons/Conn-ERU/Day	475
Peaking Factor	4.23
Fire flow requirement:	1,000 gallons per minute for 1 hour

TABLE 5-2: SOURCE ANALYSIS – WATER RIGHTS

						SOURCE (gpm)		
	ERUs	ADD (gpd)	MDD (gpd)	MDD (gpm)	FSS (gpm)	Required	Existing	Surplus (Deficit)
Historical	213	23,915	101,083	70	14	84	120	36
Ultimate	294	29,400	124,266	86	14	100	120	20

Annual (Ultimate) Gallons	**10,731,000**	**45,357,090**					

Per Ground Water Application No. G4-31724 and Temporary Permit, 3/4/98
Required Ultimate Source is still less than 120 gpm capacity of Well 5, with Well 1 providing additional source if needed

TABLE 5-3: SOURCE ANALYSIS – AVAILABLE SUPPLY

						SOURCE (gpm)		
	ERUs	**ADD (gpd)**	**MDD (gpd)**	**MDD (gpm)**	**FSS (gpm)**	**Required**	**Existing**	**Surplus (Deficit)**
Historical	213	23,915	101,083	70	14	84	120	36
Ultimate	294	29,400	124,266	86	14	100	120	20
Annual (Ultimate) Gallons		**10,731,000**	**45,357,090**					

Notes:
Existing Source equals pumping capacity of Well #5. Ultimate Number of ERUs is based on development of all lots and assumes some transient population will remain.
Required Ultimate Source is still less than 120 gpm capacity of Well 5, with Well 1 providing additional source if needed

For reliability reasons, the Washington State Department of Health recommends developing source capacity sufficient to replenish depleted fire suppression storage within a 72-hour period while concurrently supplying the maximum day demand of the system. Well #5 provides 120 gpm to the system. In the event that fire suppression storage is depleted, the system is equipped to automatically draw from the well to replenish the required fire suppression storage of 60,000 gallons at a rate of 14 gpm, which would replenish the system within 72 hours, while still supplying MDD to the system.

Reduction in water use has significantly improved the District's ability to meet the minimum source requirements established by DOH criteria, and from a functional standpoint the wells are performing well and without significant drawdown. Acknowledging that the Upper Kittitas Ground Water Rule (Chapter 173-539A WAC) became effective in January 2011 and that implementation of the rule is intended to prevent further depletion of groundwater resources, the District should continue to manage water resources responsibly to benefit the Upper Kittitas region. The following actions are suggested for the District as opportunities for maintaining sufficient water rights and protecting source water quantity:

1. Continue to monitor water use and pursue permanent water rights to formalize the temporary permit currently on file with DOH under Ground Water Application No. G4-31724-Amended Temporary Permit, 3/4/1998.
2. Encourage water use efficiency and customer conservation. Another way to realize an increase in source quantity is to decrease current demands on the system, which can be achieved through reduced water demands and conservation efforts. The District is committed to implementation of its water use efficiency programs in accordance with Municipal Water Law requirements. This includes a water saving and conservation program, monitoring and reporting the annual water leakage rate, and reducing water loss.

3. Continue to be proactive stewards of regional water resources. As the Upper Kittitas Ground Water Rule is implemented, the District may have an opportunity to share its water supply management strategies with other small systems in the area. As noted earlier in this section, the District has had tremendous success in reducing water use and water loss in recent years and has effectively cut per capita water use in half. Average water use on a per household basis has been reduced from 327 gallons per day to 138 gallons per day and is significantly less than countywide standards being discussed as this Water System Plan is being developed.
4. Maintain source facilities in good working order – exercising wells, valves, and controls as recommended by manufacturers and maintaining facilities to extend their useful life.
5. Monitoring depth to groundwater on a routine basis – Consistent monitoring of the well depth to provide reliable source data.

5.4 WATER QUALITY AND TREATMENT

The District is required to comply with the water quality monitoring requirements established in WAC 246-290-300. Review of the District's most recent water quality test results indicates that water from the District's primary supply well met all required water quality standards. The District does provide treatment to the water in the form of chlorination at the pump house. Documentation of the recent water quality testing and the District's Consumer Confidence Report is included in Appendix C.

5.5 STORAGE

As described in Section 4, there are five storage components: operational, equalizing, standby, fire suppression, and dead storage. Each of these storage components must be considered to determine the amount of usable storage within the District's system. Table 5-4 shows the different storage components under historical and ultimate development conditions.

As indicated in Table 5-4, the new 200,000 gallon storage reservoir meets recommended storage volumes and provides excess capacity to supplement the source of supply and assist with meeting peak day demands.

TABLE 5-4: STORAGE ANALYSIS

			COMPONENT REQUIREMENTS						TOTAL RECOMMENDED	
	ERUs	Existing Storage	Equal-ization	Standby	Fire Suppres-sion Storage*	Oper-ational	Dead Storage	Total Effective	Total Recom-mended	Surplus (Deficit)
Existing	213	195,531	16,217	47,830	60,000	31,708	10,569	184,962	124,047	60,915
Ultimate	294	195,531	20,253	58,800	60,000	31,708	10,569	184,962	139,053	45,908

* This table includes Fire Storage at 1,000 gpm for 60 minutes. Fire storage for 120 minutes is available if Standby Storage is also considered.

Existing storage was calculated by determining the volume of the reservoir; tank diameter of 30 feet and height of 37 feet. The volume was then converted to gallons. The recommended storage was calculated by adding the Equalization, Standby, and Fire Suppression Storage values.

5.6 PUMPING FACILITIES

The District operates as a gravity system. Water is pumped from the well(s) to the storage reservoir before gravity-feed to the distribution system. No issues have been identified with the well pumps and they meet all criteria and standards for their intended purpose. Other than continued operation and maintenance to preserve facilities in good working order and extend the useful life of the system, no improvements are recommended.

5.7 DISTRIBUTION SYSTEM

The District's current distribution system consists of PVC pipes ranging in size from 2 inches to 8 inches. Most of the pipes do not meet the minimum design criteria presented in Section 4 of this Plan. The most significant deficiency is that looped mains under 6 inches in size and dead-end mains under 8 inches in size are not adequately sized for fire protection, and fire hydrants cannot be located on these mains. It is recommended that the District replace the main lines throughout the water system as shown on Figure 5-1: Proposed Improvements. The majority of the system should be replaced with 6-inch looped mains, although a few 8-inch dead-end mains and an 8-inch crossing of the Highline Canal will be required. Figure 5-1 provides a system map showing the recommended improvements and is included at the end of this section.

The pressure reducing valve (PRV) located on the south side of the Highline Canal regulates pressure to customers at lower elevations north of the canal and separates the High and Low Pressure Zones. The PRV was serviced in the summer of 2014 and is operating properly. However, replacement of the PRV should be included in water line improvements to the Low Pressure Zone.

5.8 WELLHEAD PROTECTION

The District's Wellhead Protection Plan is included in Appendix D of this Plan. Implementation of the Plan by educating and reminding property owners within established Wellhead Protection Areas is required periodically. In addition, coordination with Kittitas County is needed to ensure that established wellhead protection areas are considered in land use and building permit decision-making. In 2015, the District was notified of an error in the SEPA process associated with a proposed gravel pit within the established wellhead protection area noted in Appendix D and on file with DOH and DOE. To ensure that the proposed development and associated activities will not pose a threat to groundwater wells or supply, the District has since retained legal counsel to pursue reopening of the SEPA process. Reconsideration under SEPA will provide opportunity to review proposed and potential activities and evaluation of any potential impacts to

groundwater supply in the area. Appendix D provides additional information on groundwater protection via the Wellhead Protection Plan.

5.9 CAPITAL IMPROVEMENT PLAN RECOMMENDATIONS

The Kittitas County Water District No. 7 system deficiencies that have been documented and described above are summarized on the following pages and listed in Table 5-5. As noted throughout this analysis, the source and storage components of the system are in excellent condition, are well-maintained, and are in good working order. Although source and storage are adequate in capacity, water distribution mains are inadequate for delivering required fire flows, and distribution pipelines are the limiting factor associated with the water system. Although the following recommendations are inherent to successful implementation of this Water System Plan, it is recognized that financial constraints are significant for a system of this size and limited economic ability. Potential funding for the distribution system replacements is discuss in Section 6 of this Plan.

- Water Use Efficiency: Water loss for 2014 is estimated to be approximately 9%. Careful monitoring of water production and sales data continues, and the District is diligent in its quest to eliminate non-revenue water use that is not essential to water system operations. Annual reporting to DOH will confirm water loss reduction measures and be the basis for future water loss reduction strategies. A leak detection study is included in the CIP for consideration if water loss is not reduced through ongoing and planned efforts. Although, as noted previously, water loss has been greatly reduced in recent years, calibration of source-of-supply meters may be warranted in the future.
- Distribution System Replacement: It is recommended that the District replace nearly all of its 19,000 linear feet of water system distribution main in order to meet fire flow and pressure requirements throughout the system.
- There may be opportunities to meet replacement goals by eliminating short stretches of pipe between blocks that may no longer be required for looping and to achieve fire flows. CIP Project 1 is to complete replacement of the system, without likely pipes that could be eliminated based on previous system modelling and current analyses.
- The overall project has been divided into multiple projects to provide flexibility in the event that financing becomes available for smaller project segments. Combinations of projects or further division based on funding should consider system performance and maintenance records. Similarly, new development provides incentives for replacing pipeline segments. As repairs or extensions are made, consideration of upsizing pipe segments may help reduce the overall expense of complete system replacement.
- Water service meters and water service stubs from the main line crossing streets to reach customer meters has been identified as a high potential for system leaks. As road repairs and other maintenance activities are performed within the Sunlight Waters development, consideration of replacing these lines may be appropriate. Although replacement of all components of the system in a given area is preferred, replacement of stubs and meters may be an affordable option if field crews identify evidence of significant leaks or meter failures.


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Yakima River
HIGHLINE FALLS RD
TWIN LAKES RD
Upper Lake
Lower Lake
Highline Canal
MORRISON CANYON LN
RIDGE LOOP RD
SUNLIGHT DR
SUNLIGHT DR
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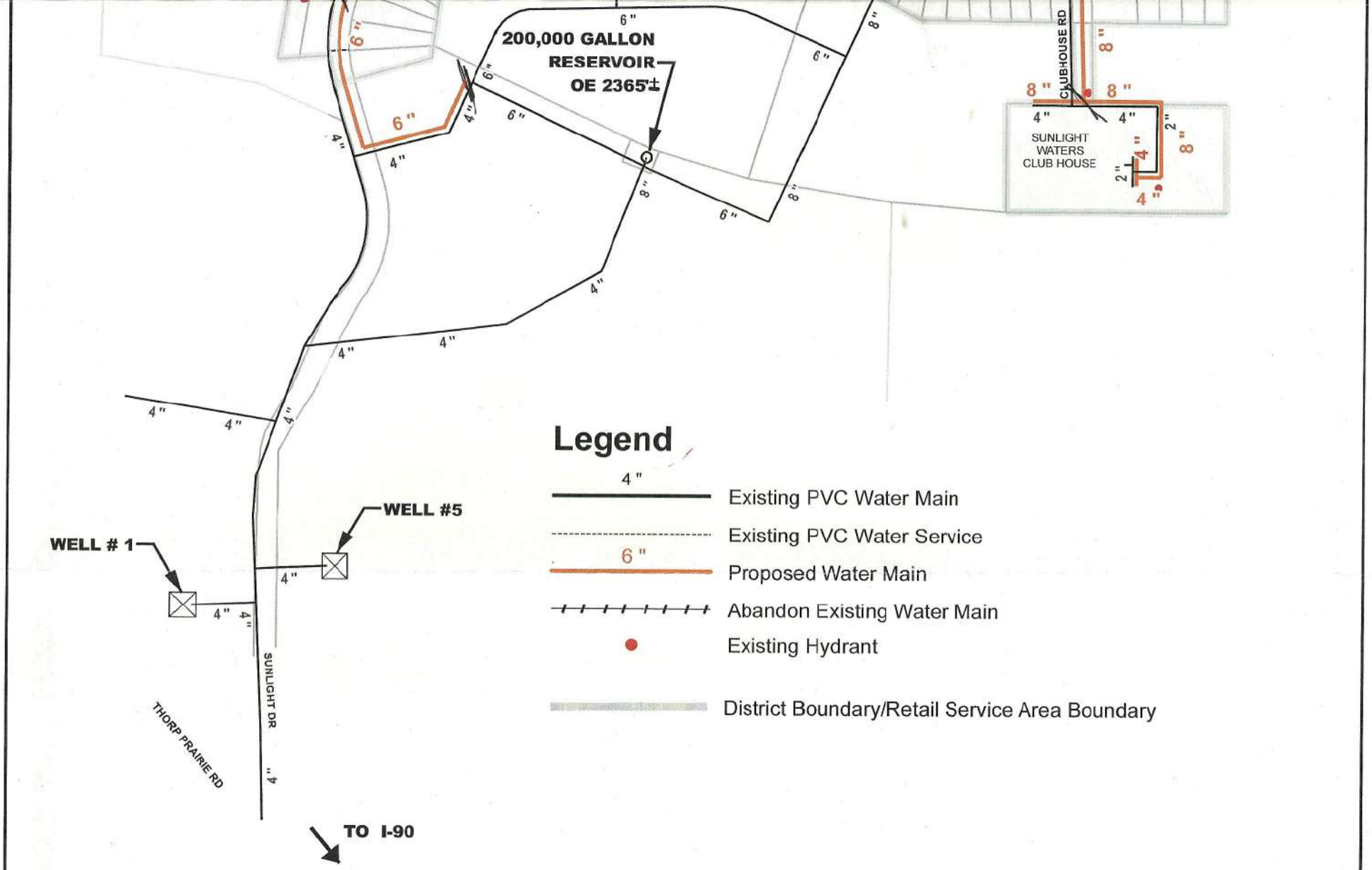

PACE

Figure 5-1

PROPOSED IMPROVEMENTS

Kittitas County Water District No.7

- Consider reducing redundant pipes in the upper plateau of the District. Multiple distribution lines are located cross-country in the vicinity of the storage reservoir. After system replacements are accomplished, some of these redundant pipelines may warrant valve closures, especially during the winter months when water use is down and the possibility of stagnant water increases.
- An additional PRV would increase reliability to the Low Pressure Zone.
- As noted in Section 6, a rate review is recommended to evaluate summer and winter rates and base rates vs. commodity charges and to ensure that all customers are paying their fair share. Implementation of base rates that cover basic system costs will help ensure sufficient revenue regardless of water use and weather patterns. Although the District's customer base appears to be trending toward more year-round use, the recreational nature of the community continues to result in significantly higher water use during hot, dry summers. Unfortunately, most system costs in an independent water system are irrespective of the amount of water use. System operation, maintenance, flushing, water quality testing, and administrative functions are all expenses that should be included in base rates.
- In conjunction with the rate review and also as noted in Section 6, review of connection charges is recommended to ensure that they are appropriate in accordance with Washington State law. This review will ensure that all costs associated with the recent storage reservoir project and future system replacement costs benefitting all customers of the system are equitably shared with new connections. Cursory review is recommended given the limited opportunity for new connections.

TABLE 5-5: CAPITAL IMPROVEMENT PLAN

Project	Name	Description				Estimated Cost (each)	Schedule	Funding
1	**Leak Detection**	Leak detection as required to maintain less than 10% water loss.				$10,000	2016-2017	Rates
2	**New PRV**	Replace PRV at south side of Highline Canal. Critical facility regulates pressure from High to Low Zone. Last serviced in 2014.				$30,000	2018-2021	Rates
3	**Rate Review**	Review Rates to ensure equitable distribution between base rates and commodity charges.				$7,500	2022	Rates
4	**Connection Charge Update**	Review of connection charges to ensure equitable distribution of costs between existing customers and new connections.				$6,500	2023	Rates
5	**Water System Plan Update**	Update Water System Plan				$40,000	2024	Rates
6	**Watermain Replacement**	***From***	***Along***	***To***	***Approx. Length (LF)***	***Est. Cost @ ($200/LF)***		
6.1	Sunlight Entrance Road	Source	Sunlight Drive	Segment 2	2,980	596,000		
6.2	Sunlight Rd to Lower Lakes	Segment 1	Sunlight Drive	Segment 6	1,510	302,000		
6.3	East System Area	Segment 1	Highline Loop And Clubhouse Drive	Segment 1	3,990	798,000		
6.4	Ridge Loop Road	Segment 1	Ridge Loop Road	Segment 1	1,380	276,000		
6.5	Easement (if Needed)	Segment 1	Easement	Segment 6	435	87,000		
6.6	Morrison Canyon	Segment 1	Morrison Canyon Road	Segment 7	2,810	562,000		
6.7	Low Zone	Segment 2	Twin Lakes and Lower Lake area easements	Segment 2	5,575	1,115,000		
Watermain Replacement Project					18,680	$3,736,000	2017-2030	Loan or Grant
				Total Estimated CIP		**$3,831,000**		

All Costs Based on 2015 Cost Estimates
System replacement cost include engineering, design, construction and construction administration. Significant restoration is not anticipated for pipelines located in the unimproved shoulder of private roadways. If significant roadway improvements are contemplated, costs will increase accordingly. Coordination with the Sunlight Waters Homeowners Association is recommendation to explore opportunities for funding or cost sharing. It is also noted that certain types of funding will increase costs associated with application and administration.

5.9.1 Capacity Limitations

The capacity of various water system components has been determined for the current state of the existing system and demands, and the maximum available capacity of each component. The capacities for the source, water rights, equalizing and standby storage are all presented in Table 5-6. The capacities are all presented in terms of the number of ERU's that each system component can serve. The current limiting component is the formally approved water right instantaneous rate (Qi) of 40 gpm. However, this is supplemented with an open application in which Ecology has authorized the District for withdrawal of up to 250 gpm. Calculations for these capacity limitations is provided in Appendix E, and is available in electronic format upon request.

TABLE 5-6: WATER SYSTEM USE & LIMITATIONS

Water System Component	Current Maximum Capacity	Existing Use in ERUs	Capacity in ERUs	Notes
Source, ADD	50 ac.-ft./yr	399	399	Current approved Qa water right
Source, MDD	120.0 gpm	213	362	Based on Source pump capacity
	40.0 gpm	213	121	Approved Qi water right
Equalizing Storage	20,412 gallons	281	322	
Standby Storage	58,800 gallons	217	267	

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SECTION 6

FINANCING AND IMPLEMENTATION

6.1 INTRODUCTION

The purpose of this Section is to present a strategy for implementation of Kittitas County Water District No. 7's Water System Plan. The implementation strategy requires the subsequent discussion of financial considerations, developer extension policies, the District's construction standards, service area agreements, and legal considerations.

6.2 FINANCING CONSIDERATIONS

Financial recommendations are made based on estimates of future expenses, operating experience, and plans for future projects. The major financial considerations in estimating expenses are as follows:

- Administration, operation, maintenance, and the day-to-day expenses of operating and maintaining the water system, including the production cost of water.
- Financing capital improvements which are necessary to provide adequate service and extensions within the identified water service area boundary.
- Replacement and updating of existing facilities that require renewal because they are either obsolete or no longer serviceable.
- Debt service requirements to provide for repayment of interest and principal for all outstanding bonds for previous system improvements.

6.3 FUNDING SOURCES

In order to better understand the methods available to finance capital water system improvements, a brief summary of the types of system facilities follows:

General Facilities – General Facilities include storage reservoirs, wells, transmission mains, pump stations, oversized pipes to serve large areas, etc.

Local Facilities – Local Facilities include the water main along all the various streets, pressure reducing stations, fire hydrants, valves, etc.

Individual Service Lines – The Individual Service Line is that line which runs from the meter to the building being served.

Each of these types of improvements is financed by a different method. A full description of each of the improvements and the various methods of financing them is presented below.

6.3.1 General Facilities

The most difficult to finance are the General Facilities. This is because the General Facilities (reservoirs, transmission mains, pump stations, and water sources) are needed before an area can be served water and often before customers are available to assist in financing. These facilities are usually quite costly and properly planned facilities benefit large areas. In newly developing areas, General Facilities are typically financed by one of the following methods:

- Passing a General Obligation Bond insured and approved by the voters.
- Forming a Utility Local Improvement District (ULID) and assessing the benefitted properties equitably.
- Requiring the initial developers to pay for the improvements with a payback arrangement (Latecomer Agreement) as the area develops.
- Funding the improvements and assessing a General Facility Charge to each property within the benefitted area as development occurs. This charge must cover all costs incurred including interest on money and an allowance at a rate that will amortize the investment.
- Obtaining grants or low interest loans to assist in construction of these types of facilities.

In older established service areas, financing General Facilities improvements or replacement of facilities presents a different type of problem. The General Facilities were paid for when the system was built and their costs assessed against the property owners. As the system expands and new customers are connected, an area charge assessment can be levied against these properties or a connection fee imposed. This money, in addition to monthly rate funds for renewal and replacement, is often adequate to finance General Facility improvements. Theoretically, if the facilities charges and rates are adequate, sufficient funds will be available to make the needed General Facility improvements.

6.3.2 Local Facilities

Local Facilities such as water distribution lines and appurtenances benefit a smaller area than General Facilities. The costs of these improvements can be directly attributable to the properties within an identified area that receive direct benefit from the improvements. Generally, Local Facilities are identified as the water line in front of a property, but may include other specific facilities required to provide service. Typical financing methods for Local Facilities are as follows:

- Formation of a ULID.
- Developer Extension Agreements.
- Latecomer or Reimbursement Agreement.
- Grants, low interest loans or outside assistance, including District participation, to reduce local costs.

6.3.3 Individual Service Lines

Individual Service Lines begin at the customer side of the water meter and the property owner is responsible for all construction costs of the service line, the connection fees, inspection fees, and all other costs associated with the installation.

Exceptions to this might be if the District were to relocate service meters as part of a pipeline replacement project. In this case it might be appropriate to include the costs associated with relocation of service pipe beyond the meter in overall project costs.

6.4 FINANCIAL POLICIES

A policy discussion regarding methods of financing the needed system improvements follows.

6.4.1 General Obligation or Revenue Bonds

Major distribution lines, transmission mains, reservoirs, pump stations, source improvements, and other major improvements may be accomplished by the sale of general obligation or revenue bonds. General Obligation Bonds must have the support of the majority of the voters. These bonds become assessments against the various properties and are paid for by assessments or other funds available to the Water District. Revenue Bonds, on the other hand, may be paid for by whatever funds are available for the payment of the debt service. A major source of these funds is from the sale of water to the District's customers or from ULID assessments. However, all funds, such as general fees or latecomer charges, may be used for the debt service for revenue bonds.

6.4.2 Developer Financing

New facilities constructed in the District for the benefit of new development should be financed by developers of presently unimproved property or property that redevelops. Developer financed projects are not anticipated in the District at this time.

6.4.3 Combination Financing by the District and Developers

It may be necessary in some cases to require a developer to construct a large diameter line that is required by the current development in order to provide for the comprehensive development of the water system. The District may enter into an agreement with the developer for reimbursement of extra costs for increasing the size of the line over that required to serve the property under development. Oversizing should be considered when it is necessary to construct any pipe over 6 inches in diameter in single-family residential areas to comply with the Water System Plan. At this time, developer-financed projects are not expected in the District.

6.4.4 Grant and Loan Funds

The State and Federal authorities have previously provided funds under the various grant programs for the engineering and construction of major improvements to water systems. However, at this time there are very limited opportunities to obtain grant money.

6.4.4.1 Public Works Trust Fund Loans

Low interest Public Works Trust Funds (PWTF) have historically been a favorable source of funding for public water systems, allowing utilities to spread the costs of projects over a period of 20 or more years to minimize sharp increases in rates. They are competitively awarded by the Washington State Public Works Board on the basis of need and District-wide management effort. Unfortunately, the program has suffered from statewide budget cuts and has not been funded in recent years. Kittitas County Water District No. 7 may wish to track the program and join other public utilities in lobbying for future funding cycles.

6.4.4.2 State Revolving Fund

The State Revolving Fund (SRF) is a program that is similar to the PWTF program and administered by the Department of Commerce in cooperation with representatives from DOH. SRF funding is a likely potential source of funding for the large watermain replacement project that the District is faced with. It is recommended that future applications for SRF be developed. To be most successful for this competitive source of financing, the District should carefully track operation and maintenance needs, expenditures, and health and safety issues that may occur or become evident in day to day operation and maintenance. Water quality issues, repeated or significant breaks, and system failures or other events that may pose a threat to health and safety should be documented and reported to DOH representatives to develop historical and background information that would support a successful application. Loan interest rates are similar to PWTF rates, and historically there have been limited situations where SRF funding included "forgiveness of Principal" (as opposed to grant funding). It is noted, however, that SRF funding can be more expensive to administer than previous PWTF funding was, and loan fees and administrative costs should be considered as applications are developed and cost estimates are finalized.

6.4.4.3 Rural Development Direct Loans and Grants

The Rural Development division of the United States Department of Agriculture, through the Rural Utility Service, is authorized to provide financial assistance for water and waste disposal facilities in rural areas and towns of up to 10,000 people. Interest rates are set quarterly and are based on current market yields for municipal obligations. The terms on the loans can vary, with a maximum being 40 years of the useful life of the improvement or facilities to be financed, whichever is less. Rural Development Loans are federally financed, and as such, federal rules and regulations apply. These funds are awarded based on not only project need,

but also on income levels and the amount being paid in water rates. It may be appropriate to consider this as a funding source for the required future improvements, although the cost of administration of this type of funding must be carefully considered in relation to overall project costs. Consideration of a joint loan with Sunlight Waters Homeowners Association may be warranted if the community desired to provide a total corridor improvement approach that included water mains, road improvements, and stormwater improvements. Similarly, the District may wish to work with the Homeowners Association to determine if there are opportunities to work together on other grants and loans available for road and stormwater water system improvements.

6.4.4.4 Local Improvement District (LID) Financing

Local Improvement District (LID) is a means by which improvements can be financed by those property owners directly benefiting from the improvements. This method of financing is typically accomplished by the majority of benefited property owners signing a petition for the improvements. LID financing is generally used for local facility improvements and initial financing is typically by bond sales or loans. The costs of improvements are typically allocated and assessed against properties within an LID area, although revenue from rates can also be used to repay the bonds required to finance an LID improvement.

6.4.4.5 Bond Financing

Bond financing is another method of financing water system improvements and can be achieved by the sale of either general obligation or revenue bonds. General obligation bonds must have the support of the majority of the voters in the jurisdiction and are paid through assessments against properties within the District. Revenue bonds, however, do not require voter approval and may be financed by whatever funds are available to the District for the payment of debt service. This might include revenues from water sales, general fees, latecomer charges, or other funds. Bond financing does carry the burden of expenses associated with applications and legal fees that are typically avoided under grant and other loan programs. However, bond rates have been quite low and attractive in recent years.

6.4.4.6 Grant Financing

Grant financing has become increasingly scarce for utility systems in recent years but is still available for some specific circumstances. Current grant programs for water system facilities include the State of Washington Centennial Clean Water Fund and the State Revolving Fund for Water Pollution Control. These programs are aimed at eliminating pollution sources and/or correcting documented existing pollution problems. They are, therefore, not appropriate for ongoing rehabilitation and replacement projects. They may be considered, however, in the event that particular health hazards have been identified and documented, and it is determined that improvements will provide a solution to the existing pollution

problems. Like the SRF financing discussed above, grant financing is typically very competitive and requires significant documentation of historical problems or potential issues to be successful.

6.4.5 Water Rates

Those costs that are not paid, either when the initial system was constructed or by assessment or General Facility fees, must be paid by the water rates. The rates must be adequate to cover the costs associated with the revenue rate base.

The revenue rate base is that amount of revenue which must be recovered by a utility through charges for service provided. The determination of those elements of cost which must be recovered from rates or from other sources of income are itemized below:

- Operation and Maintenance expenses
- Water production costs
- Customer accounting and collection expenses
- Administrative and general expenses
- Taxes
- Debt service requirements
- Renewal and replacement

Once each year, the District should completely review its revenues and expenses to determine the adequacy of the existing rates. A budget should be drawn up for the following year's expenses and projected revenues. Adjustments to the water rates should be made based on the budget review. The District's present water rates, before taxes, are indicated in Table 6-1. Review of all rates and charges is recommended as a follow-up to this Comprehensive Plan in order to ensure that revenues are sufficient to cover anticipated costs of system operation and capital improvements.

TABLE 6-1: 2015 MONTHLY WATER RATES

Base Rate: $38.00 + $1.00 (flat) = $39.00	
0 – 5,000 gallons	$1.00 Flat
5,001 – 10,000 gallons	$3.00 per 1.000 gallons
10,001 – 20,000 gallons	$5.00 per 1,000 gallons
20,001-30,000 gallons	$8.00 per 1,000 gallons
30,001 - 50,000 gallons	$12.00 per 1,000 gallons
Notes: Excise (sales) tax will be added to all water service bills	

6.5 PROJECTED REVENUE AND EXPENDITURES

The District's projected budget for the next six years is provided in Table 6-2 and shows the projected increase in revenue and expenditures. Revenue increases, needed to meet the increasing cost of system operation and maintenance, are projected to occur annually through water rate increases, which are given as an estimate based on the best available information at the time of plan development. Projected expenditures include all costs associated with operation of the system, including water quality monitoring, as well as estimated project costs for completing the improvements required for the District's existing service area. Improvements required for new development are not included in this budget because it is anticipated that they will be paid for by the developers of new properties requiring service. Capital improvement costs are further discussed in Section 6.6 below.

TABLE 6-2: PROJECTED BUDGET

	2015 (Actual)	2016	2017	2018	2019	2020	2021	2022
REVENUE								
Water Sales	$119,254	$115,000	$116,000	$122,000	$128,000	$134,400	$141,000	$148,000
New Service Connection Fees	$6,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000
Other	$1,725							
Revenue Total	**$126,979**	**$115,000**	**$120,000**	**$126,000**	**$132,000**	**$138,400**	**$145,000**	**$152,000**
EXPENSES								
Admin/Payroll/ Claims	$56,382	$54,000	$56,700	$59,500	$62,000	$64,600	$67,750	$71,100
PWTF Loan Payment	$25,517	$25,300	$25,300	$25,300	$25,300	$25,300	$25,300	$25,300
Operation & Maintenance	$21,172	$30,000	$31,500	$34,000	$36,000	$38,000	$40,000	$42,000
Emergency Fund		$700	$735	$1,200	$1,700	$2,500	$2,700	$2,800
Capital Improvements		$5,000	$5,765	$6,000	$7,000	$8,000	$9,250	$10,700
Expense Total	**$103,070**	**$115,000**	**$120,000**	**$126,000**	**$132,000**	**$138,400**	**$145,000**	**$151,900**

Projected budget information based on past economic performance and Commissioner input.

6.6 FINANCING RECOMMENDED IMPROVEMENTS

The Capital Facilities Plan shown in Table 5-5 identifies approximately $3.8 million in water system improvements. Potential financing methods for each project are also indicated. As noted, the majority of the expense is associated with replacement of the water distribution system. Clearly, some type of loan, grant, or bond financing would be required for the small community of Sunlight Waters to achieve the required improvements.

6.7 DEVELOPER EXTENSION POLICY

The District, as a municipal corporation, has a responsibility to the public to ensure that water mains installed in public streets and easements are constructed in accordance with currently accepted standards for public works. Therefore, when the need arises, the District will develop and maintain developer extension regulations that will set forth construction standards for extensions to the District's system.

6.8 GENERAL FACILITY POLICIES

General Facilities, for the most part, are constructed by the District as major capital improvements projects. If these improvements are financed by assessments against the properties within the District, or are paid for by only a portion of the area, then a charge is imposed for customers or developers seeking service from the District to cover their fair share of these costs.

6.9 LOCAL FACILITY POLICIES

Property owners or developers requesting water service from the District must pay for all costs associated with the design and construction of the local mains and extensions from the existing system. The normal method for this to occur is by signing an Agreement for Constructing Extensions to the Water System. This document establishes the procedures and requirements in constructing an extension to the District's facilities. Other acceptable methods of financing these improvements are the formation of a U.L.I.D. or low interest loans or grants that may come available from time to time. The District may wish to allow a latecomer agreement for costly extensions to the water system. Such agreements allow a person or developer, who initially installed and paid for a facility, to be reimbursed by benefitting property owners who subsequently connect to the facility.

6.10 INDIVIDUAL SERVICE LINE POLICIES

Financing for individual service lines is probably the least difficult to handle since the property owner must pay for the construction of the service line, connection fee, District inspection fee, and all other costs associated with the installation. The cost of a residential water service connection depends on whether a full water service is required or if only a new meter is to be installed on an existing service. It also depends on the construction difficulties encountered during installation. It is recommended that only approved contractors or the District's own maintenance personnel be allowed to connect to the District's facilities. The cost for a water service must cover the following expenses:

- The cost of labor, materials, and equipment required for installation
- The cost for inspection
- Billing set-up costs
- Permit costs
- The costs of labor and the associated fringe benefits

6.11 STANDARD DETAILS AND SPECIFICATIONS

Kittitas County Water District No. 7's Standard Details and Construction Specifications are provided as Appendix G of this Plan.

6.12 AGENCY REVIEW AND COORDINATION

In accordance with Washington State Department of Health requirements, copies of this Plan have been circulated to the Washington State Department of Health, Washington State Department of Ecology, Kittitas County, and other interested parties for review and comment. Copies of approval documentation are included in Appendix H.

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SECTION 7

OPERATIONS AND MAINTENANCE

7.1 GENERAL

The purpose of a water system operations plan is to facilitate the proper and efficient operation and maintenance of a water system. Implementation of a water system operations plan should enable the District to consistently provide a reliable, high quality level of service to its customers. An operation and maintenance program is comprised of the following major elements: Service Policies; Financial Policies; Physical Facilities; Operations; Inspection and Maintenance; Emergency Response; and Records and Reports. This Section of the Comprehensive Plan provides a discussion of each of these aspects of operation and maintenance of the Kittitas County Water District No. 7. Additional information regarding operation of each specific component of the system is maintained with the District commissioners. The information includes detailed specifications for pumps, valves, and other equipment; manufacturers' recommendations for maintenance and operations; and parts lists.

7.2 STATE IDENTIFICATION NUMBER

Washington State Department of Health Identification Number:

85295 Q, Group A – Community

Washington State Department of Health Contact Person

Regional Engineer
Washington State Department of Health
River View Corporate Center
16201 East Indiana Avenue, Suite 1500
Spokane Valley, Washington 99216
(509) 329-2100

7.3 MANAGEMENT AND PERSONNEL

7.3.1 District Address and Telephone Number

Kittitas County Water District No. 7
Carl Nelson, Commissioner, Operator
P.O. Box 161
Thorp, Washington 98946
(206) 790-5175

7.3.2 System Responsibility and Authority

A prerequisite for the delivery of efficient, reliable service to all customers is a competent staff organization responsible for the day-to-day technical operations as well as budget and planning responsibilities. The following represents the various levels of responsibility in the District.

- **Board of Commissioners (3 elected members)** – Overall responsibility for the District's operation, management and legislation lies with the District's three Commissioners. The District holds regular public meetings on the second Wednesday of each month at Sunlight Waters Country Club, 150 Club House Road, Cle Elum, WA 98922

- **Certified Operator** – A certified operator as outlined in WAC 248-54 is required to maintain the system, oversee preventive maintenance and the installation of new services, etc. The District contracts this work to:

  Carl B. Nelson, Water Operator & Commissioner
  Kittitas County Water District #7
  1710 Sunlight Drive
  Cle Elum, WA 98922
  Telephone Number: 206-790-5175

- **Outside Consultants** – Legal and engineering counsel to the District is provided by outside consultants on an as needed basis.

  Current legal counsel for the District is provided by:

  Jonson & Jonson, P.S.
  2701 First Avenue, Suite 350
  Seattle, Washington 98121
  (206) 624-2521

  Engineering counsel for the District is provided by:

  PACE Engineers, Inc.
  11255 Kirkland Way, Suite 300
  Kirkland, Washington 98033
  (425) 827-2014

- **Other Assistance** – Other assistance, such as contractors and special consultants, is hired by the District in accordance with all applicable requirements of the laws governing such actions.

7.4 SYSTEM OPERATIONS AND CONTROL

The District relies on the District Commissioners and outside contractors for the routine operation and recordkeeping needs of the water system. This enables the District to minimize operations

staff and to concentrate on preventive maintenance, equipment repair, and other specialized needs of the District while increasing system efficiency and reliability.

7.5 WATER QUALITY MONITORING

The Washington State Department of Health has adopted regulations which specify sampling frequencies for physical, bacteriological, and chemical (organic and inorganic) constituents, and radionuclides. The sampling requirements depend on the number of customers, source type, and other factors. Additional water quality monitoring information is located in Appendix C.

7.6 EMERGENCY OPERATIONS

The District's Emergency Response Plan is as follows:

System Information		
Basic description and location of system facilities:	Kittitas County Water District No. 7 is supplied by two wells (Well 5 and Well 1). Well 5 is the District's primary source of water. Well 1 serves as an emergency back-up. Disinfection of the well water is provided by chlorination at Well 5. Water storage is provided by a 200,000 gallon reservoir.	
Population served and number of service connections:	People: 212 residences + 1 nonresidential	Connections: 225
Person(s) responsible for maintaining and implementing the emergency plan:	Name: Carl Nelson, Operator & District Commissioner Howard Briggs, Commissioner Letha Ihrke, Commissioner	Phone Number: 206-790-5175 509-674-7229 509-674-5465

Chain of Command		
Name and title:	**Responsibilities during an emergency:**	**Contact numbers:**
Carl Nelson, Operator	District Commissioner, Site Operator, ERP Manager, System User Notification, System Facilities and Operation Assessment, Making or Scheduling of Repairs.	206-790-5175
Howard Briggs, Commissioner		509-674-7229
Letha Ihrke, Commissioner		509-674-5465
DOH Regional Engineer	Washington State Department of Health Notification	509-329-2116

Emergency Reference List			
Emergency contact:	**Phone Number(s):**	**Emergency contact:**	**Phone number(s):**
Fire/Police/Medical	911	Certified operator(s)	Carl Nelson 206-790-5175
County emergency services	911	System engineer or engineering consultant	PACE Engineers 425-827-2014
County local health contact Kittitas County Public Works	509-962-7580 509-962-7523	Electrician	Laurmar Electric 509-929-2666
Washington State Department of Ecology spill response	DOE Regional Office 509-575-2490	Electric utility	PSE 888-225-5773
Water testing laboratory	Valley Environmental Laboratory 509-575-3999	Pump service	Irrigation Sales & Service 509-925-6141
DOH water quality contact	509-329-2100	Excavation contractor	Beedle Excavation 509-674-1426
DOH regional engineer	Russell Mau 509-329-2116	Call before you dig	811
DOH emergency after hours contact	1-877-481-4901	Equipment rental	United Rentals 509-925-6126
Sunlight Waters Country Club	509-674-7303	Neighboring water system	None

Emergency Notification	
The system notifies its customers as follows:	Door to door notifications – in person or by hanging notices on door. Notifications on roadside neighborhood billboard. Billing Inserts. **and/or** Sunlight Waters Country Club's website http://www.sunlightwaterscountryclub.com/

Emergency Notification (Priority Customers) Does the system serve priority customers? Check all that apply. Include names and addresses.	
☒ Hospitals and Clinics (Not customers, Notification only)	Kittitas Valley Healthcare Hospital, 509-962-9841 Kittitas Valley Healthcare Family Medicine, 509-674-5331
☒ Schools (Not customers, Notification only)	Thorpe School District, 509-964-2107
☐ Other	

Responses to Specific Events

Power Outage:

Step 1: Assess the situation to determine the severity and the damage that has been done.
Determine if people or animals have been injured and make appropriate calls for help.

- 911
- Sheriff
- County Emergency

Step 2: Decide immediate actions that need to be taken.

- Contact Power Company.
- If electricians cannot respond for an extended period of time or if they will not be able to restore electricity for an extended period of time, put generator into service.
- Notify users if water will be shut-off until repairs have been made.

Step 3: Return system to normal operation.
If system was turned off, notify users that water is back in service.

Electrical Problem:

Step 1: Assess the situation to determine the severity and the damage that has been done.
Determine if people or animals have been injured and make appropriate calls for help.

- 911
- Sheriff
- County Emergency

Step 2: Decide immediate actions that need to be taken.

- Contact electricians.

Run alternate equipment if available.

- Notify users if water will be shut-off until repairs have been made.

Step 3: Return system to normal operation.
If system was turned off, notify users that water is back in service.

Transmission or Line Break:

Step 1: Assess the situation to determine the severity and the damage that has been done.
Determine if people or animals have been injured and make appropriate calls for help.

- 911
- Sheriff
- County Emergency

Step 2: Decide immediate actions that need to be taken.

- Repair leak or replace piping as required.
- Contact contractors as necessary to replace pipes. Check backhoe availability.
- Disinfect any new pieces of pipe prior to installation.
- Notify users if water will be shut-off until repairs have been made.

Step 3: After repairs are made, purge the system and chlorinate the water.
Step 4: Return system to normal operation.
If system was turned off, notify users that water is back in service.

Chlorine Treatment Failure:

Step 1: Assess the situation to determine the severity and the damage that has been done.
Determine if people or animals have been injured and make appropriate calls for help.

- 911
- Sheriff
- County Emergency

Step 2: Decide immediate actions that need to be taken.

- Determine if both chemical feed pumps failed. If only one failed, place the working pump and well into source. Keep the well associated with the broken chemical feed pump off until repair has been made.
- Check for chlorine residual at the reservoir. If residual is present, continue supplying system with reservoir water. If no residual is present, issue boil water notice or bring in secondary supply.
- Contact service representative to repair broken pumps.
- Notify users if water will be shut-off until repairs have been made.

Step 3: After repairs are made, purge the system and chlorinate the water if system was off-line.
Step 4: Return system to normal operation.
If system was turned off, notify users that water is back in service.

Well Pump Failure:

Step 1: Assess the situation to determine the severity and the damage that has been done.
Determine if people or animals have been injured and make appropriate calls for help.

- 911
- Sheriff
- County Emergency

Step 2: Decide immediate actions that need to be taken.

- Determine if both well pump(s) failed. If only one failed, place the working well into source. Keep the broken well offline until repair has been made.
- Contact pump representative to repair pump.
- Continue to feed system with reservoir water. If no residual is present, issue boil water notice or bring in secondary supply.
- Notify users if water will be shut-off until repairs have been made.

Step 3: After repairs are made, purge the system and chlorinate the water if system was off-line.
Step 4: Return system to normal operation.
If system was turned off, notify users that water is back in service.

Coliform MCL Violation:

Step 1: Assess the situation to determine the severity and the damage that has been done. Determine if people or animals have been injured and make appropriate calls for help.

- 911
- Sheriff
- County Emergency

Step 2: Decide immediate actions that need to be taken.

- Notify DOH
- Notify Country Health
- Notify residents
- Notify local hospital /clinic
- Place notice on Sunlight Waters Country Club's website

Step 3: Make corrective actions.

- Collect repeat and triggered samples.
- Increase chlorine dose.
- Check backflow assemblies.
- Inspect reservoir.
- Inspect transmission mains for leaks.
- Issue boil water notice if necessary.
- After repairs are made, purge the system, chlorinate the water, and test to confirm residual is present throughout system.

Step 4: Return system to normal operation.

Notify users that water is back in service.

Backflow Incident:

Step 1: Assess the situation to determine the severity and the damage that has been done. Determine if people or animals have been injured and make appropriate calls for help.

- 911
- Sheriff
- County Emergency

Step 2: Decide immediate actions that need to be taken.

- Notify DOH
- Notify Country Health
- Notify residents
- Notify local hospital /clinic
- Place notice on Sunlight Waters Country Club's website.

Step 3: Make corrective actions.

- Check backflow assemblies.
- Identify source of contaminants.
- Isolate source of contamination and the affected area.
- Provide alternative supply to residents.
- After repairs are made, purge the system, chlorinate the water, and test to confirm residual is present throughout system.
- Make corrective actions as necessary to prevent future occurrences.

Step 4: Return system to normal operation.

Notify users that water is back in service.

Other Emergencies:
In the event of an earthquake, flood, other natural disaster, or event listed here, assess the situation as though it is a backflow incident.

7.7 PREVENTATIVE MAINTENANCE

Preventive and normal maintenance of all District equipment and facilities is critical for providing a safe and reliable water system. In order for the system operator to properly maintain the system, an accurate basemap is maintained, as well as forms to record daily work. The system operator also maintains detailed manufacturers' operating instructions, troubleshooting advice, parts lists, and maintenance and repair information on each of the primary system components. This ensures that the preventive maintenance performed is accomplished in an efficient and orderly manner. Maintenance schedules that meet or exceed manufacturer's recommendations are maintained for all critical components in the water system. The following is typical of the scheduled maintenance for facilities within the District's system.

7.7.1 Source

The District maintains complete operation instructions for the well pump, and other District facilities are maintained at the Well #5 pump house and at the District office. General maintenance procedures for source facilities are identified below.

Weekly: Check and test security system. Observe and record motor current draw (three phases); log and record volume delivered and pump motor hours; check motor oil level (if applicable); measure and record static or pumping water level; check motor noise, temperature, vibration.

Semiannually: Change motor oil (if applicable).

As Needed: Paint structures and piping; maintain electrical and hydraulic controls.

7.7.2 Storage

General maintenance procedures for typical reservoirs are identified below.

Weekly: Check and test security system and for any problems associated with the reservoirs.

Annually: Check operation of level controls. Clean reservoirs and verify interior condition, vents, hatches, etc.

As Needed: Refinish interior and exterior as needed on reservoir (estimated 10 to 15 year frequency).

7.7.3 Distribution System

General maintenance procedures for the distribution system are identified below.

Monthly: Check PRV Valve; Clean inlet and outlet screens.

Annually: *Mains* – Flush dead-end lines and others as required.

Valves – Operate full open and closed; clean out valve boxes, repair as necessary.

Hydrants – Operate; check drain rate; lubricate as necessary; measure pressure; paint as necessary.

As Needed: Calibrate meters and, if necessary, dismantle, clean, and inspect all parts; replace worn or defective meter parts; retest meters for accuracy. Inspect all new hookups prior to covering (videotape if possible).

7.8 STAFFING

The preventive maintenance procedures and normal, as well as emergency, operations for the District are described in the previous paragraphs. The staff levels required to effectively carry out the work of these ongoing maintenance and operations schedules, as well as design and planning activities, are the basis used by the commissioners for determining the staffing levels within the District.

7.8.1 Qualifications and Training

Qualifications and training requirements for obtaining and maintaining certification are stipulated by the Washington State Department of Health.

7.8.2 Records

Provision of time for keeping and maintaining accurate records should be an integral consideration in determining the time to be allotted to any District task. Adequate records are an essential tool in utility management and operation, providing the supporting data for operation assessment, and long-term planning, while saving time and difficulty when trouble arises.

The District has the need for several types of records: Operational records (flow and level recordings), chlorination records, main disinfection records, personnel records, customer contact records, meter records, inventory records, and mandatory water quality sampling records. These and other documents should be legible, clear in format, permanent, accurate, and accessible.

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