

E	 Executive Summary	E-1
	PURPOSE OF THE WATER SYSTEM PLAN	E-1
	SUMMARY OF KEY ELEMENTS	E-1
	Water Service Area.....	E-1
	Existing Water System.....	E-2
	Past Water Usage	E-3
	Future Water Demands and Water Supply	E-4
	Water Source and Quality	E-5
	Operations and Maintenance.....	E-5
	Water System Evaluation	E-5
	Proposed Water System Improvements and Financing Plan	E-6
1	 Introduction	1-1
	WATER SYSTEM OWNERSHIP AND MANAGEMENT	1-1
	OVERVIEW OF EXISTING SYSTEM	1-1
	AUTHORIZATION AND PURPOSE	1-2
	SUMMARY OF WSP CONTENTS	1-3
	DEFINITION OF TERMS.....	1-3
	LIST OF ABBREVIATIONS	1-5
2	 Water System Description	2-1
	INTRODUCTION	2-1
	WATER SERVICE AREA	2-1
	History	2-1
	Existing Retail Water Service Area	2-2
	Water Service Area.....	2-2
	Topography	2-2
	Geology.....	2-3
	INVENTORY OF EXISTING WATER FACILITIES.....	2-4
	Pressure Zones	2-4
	Supply Facilities	2-4
	Pump Station Facilities	2-6
	Storage Facilities.....	2-7
	Distribution and Transmission System	2-8
	Master Meters.....	2-9
	Water System Operation and Control.....	2-9
	Telemetry and Supervisory Control System	2-9
	Water System Interties.....	2-9
	WATER SERVICE AGREEMENTS.....	2-10
	Clark Public Utilities Water Service Agreement	2-10
	SATELLITE SYSTEM MANAGEMENT	2-10

City of Woodland Water System Plan
 Table of Contents

ADJACENT WATER SYSTEMS.....2-10

- Bridge Road Water System.....2-11
- Clark Public Utilities.....2-11
- Peterson Farms.....2-11
- Columbia Riverfront RV Park.....2-11
- Woodland MHC LLC.....2-11
- Paradise Point State Park2-11
- Lewis River RV Park2-12
- Lewis River Golf Course.....2-12
- High Ridge.....2-12

3 | Land Use and Population 3-1

INTRODUCTION3-1

COMPATABILITY WITH OTHER PLANS AND POLICIES.....3-1

- Growth Management Act.....3-1
- 2016-2036 Woodland Comprehensive Plan.....3-2
- 2015-2035 Clark County Comprehensive Plan.....3-3
- Cowlitz County Comprehensive Plan, 2017 Update.....3-4
- Clark County Coordinated Water System Plan.....3-4

LAND USE.....3-5

POPULATION.....3-5

- Household Trends3-5
- Historical and Future City Population3-6
- Water System Population.....3-8

4 | Water Demands 4-1

INTRODUCTION4-1

- Certificate of Water Availability4-1

CURRENT POPULATION AND SERVICE CONNECTIONS4-2

- Water Use Classifications4-2
- Residential Population Served4-2

EXISTING WATER DEMANDS.....4-2

- Water Consumption4-2
- Water Supply4-5
- Distribution System Leakage4-7
- Per Capita Demands4-8
- Peak Demands.....4-8
- Existing Equivalent Residential Units4-10
- Fire Flow Demand4-13

FUTURE WATER DEMANDS4-13

- Basis for Projecting Demands.....4-13

Demand Forecasts and Water Use Efficiency	4-14
5 Policies and Design Criteria.....	5-1
INTRODUCTION	5-1
SUPPLY POLICIES.....	5-2
Quality Protection	5-2
Cross-Connection Control	5-2
Quantity.....	5-2
Fire Flow	5-2
Water Use Efficiency	5-3
Regional Participation	5-3
CUSTOMER SERVICE POLICIES	5-3
Duty to Serve	5-3
Water Service and Connection.....	5-4
Annexations.....	5-5
Temporary Services	5-5
Emergency Service	5-5
Planning Boundaries.....	5-5
Satellite System Management	5-6
FACILITY POLICIES	5-6
Minimum Standards.....	5-6
Pressure.....	5-6
Velocities	5-6
Storage	5-6
Transmission and Distribution	5-7
Supply and Booster Pump Stations	5-9
Pressure Reducing Stations	5-10
Supervisory Control.....	5-10
Maintenance	5-10
Reliability.....	5-11
Vulnerability	5-11
FINANCIAL POLICIES.....	5-12
General.....	5-12
Connection Charges	5-13
ORGANIZATIONAL POLICIES	5-13
Staffing	5-13
Relationship with Other Departments	5-14
6 Water Source and Quality.....	6-1
INTRODUCTION	6-1
EXISTING WATER SOURCES AND TREATMENT	6-1
Water Sources	6-1

City of Woodland Water System Plan

Table of Contents

Water Treatment.....	6-1
WATER RIGHTS AND INTERTIES.....	6-2
Overview	6-2
Existing Water Rights and interties	6-2
Pending Water Right Application	6-4
WATER SUPPLY EVALUATION	6-4
WATER SUPPLY PLANNING	6-6
Existing Water Supply.....	6-6
LONG-TERM WATER SUPPLY PLANNING	6-6
Feasibility of Obtaining New Water Rights	6-6
Feasibility of Transferring Existing Water Rights.....	6-6
DRINKING WATER REGULATIONS.....	6-7
Overview	6-7
Existing Regulations.....	6-7
Future Regulations	6-15
SOURCE WATER QUALITY	6-16
Drinking Water Standards	6-16
Source Monitoring Requirements and Waivers.....	6-16
Source Monitoring Results	6-17
DISTRIBUTION SYSTEM WATER QUALITY	6-17
Monitoring Requirements and Results	6-17
7 Water System Analysis	7-1
INTRODUCTION	7-1
PRESSURE ZONES.....	7-1
SOURCE CAPACITY EVALUATION	7-1
Analysis Criteria.....	7-2
Source Capacity Analysis Results.....	7-2
Facility Deficiencies	7-3
WATER SUPPLY FACILITIES EVALUATION	7-3
Analysis Criteria.....	7-3
Supply Analysis Results.....	7-3
STORAGE FACILITIES	7-6
Analysis Criteria.....	7-6
Storage Analysis Results.....	7-8
DISTRIBUTION AND TRANSMISSION SYSTEM.....	7-10
Analysis Criteria.....	7-10
Hydraulic Model	7-10
Hydraulic Analysis Results	7-12
Deficiencies	7-13

SYSTEM CAPACITY	7-14
Analysis Criteria.....	7-14
Capacity Analysis Results.....	7-14
8 Operations and Maintenance	8-1
INTRODUCTION	8-1
NORMAL OPERATIONS	8-1
City Personnel.....	8-1
Personnel Responsibilities.....	8-2
Certification of Personnel.....	8-3
Available Chemicals and Equipment	8-4
Routine Operations	8-5
Continuity of Service	8-6
Routine Water Quality Sampling.....	8-6
Cross-Connection Control	8-6
Recordkeeping and Reporting.....	8-6
Operations and Maintenance Records.....	8-8
Safety Procedures and Equipment.....	8-9
EMERGENCY OPERATIONS.....	8-11
Capabilities	8-11
Risk and Resilience Assessment and Emergency Response Plan	8-13
Public Notification	8-13
PREVENTIVE MAINTENANCE	8-13
Ranney Well Collector and Bryant Pump Station.....	8-14
Transmission Line: Ranney Well to WTP	8-14
Water Treatment Plant	8-14
Reservoir No. 2	8-15
Reservoir No. 3	8-15
Scott Hill Booster Station (Future; Estimated Online by December 2020)	8-15
Other Components of Distribution System	8-16
Meters	8-16
STAFFING	8-16
Current Staff	8-16
Recommended Staff Level.....	8-17
ASSET MANAGEMENT	8-19
9 Water System Improvements	9-1
INTRODUCTION	9-1
DESCRIPTION OF IMPROVEMENTS.....	9-1
Recent Water System Improvements	9-1
Water Main Improvements.....	9-2
Facility Improvements.....	9-4

City of Woodland Water System Plan

Table of Contents

Miscellaneous Improvements	9-6
ESTIMATING COSTS OF IMPROVEMENTS	9-6
PRIORITIZING IMPROVEMENTS	9-7
Water Main Improvements	9-7
Other Improvements	9-10
SCHEDULE OF IMPROVEMENTS	9-10
Future Project Cost Adjustments	9-10
10 Financial Analysis	10-1
INTRODUCTION	10-1
FINANCIAL HISTORY	10-1
FINANCIAL PLAN	10-3
Financial Policies	10-3
Revenue Requirement	10-11
Rate Affordability	10-13
CONCLUSION	10-13

TABLES

Table ES-1 Supply Facilities Summary	E-2
Table ES-2 Storage Facilities Summary	E-3
Table ES-3 Booster Pump Station Facilities Summary	E-3
Table ES-4 Water Main Diameter Inventory	E-3
Table ES-5 Historical Water Supply and System Demand	E-4
Table 1-1 Water System Ownership and Management	1-1
Table 1-2 2018 Water System Data	1-2
Table 1-3 Abbreviations	1-6
Table 2-1 Supply Facility Summary	2-5
Table 2-2 Booster Pump Station Facilities Summary	2-6
Table 2-3 Storage Facilities Summary	2-7
Table 2-4 Water Main Diameter Inventory	2-8
Table 2-5 Water Main Material Inventory	2-9
Table 3-1 Land Use Inside Water Service Area	3-5
Table 3-2 Population Trends within the City Limits	3-6
Table 3-3 Population Projections	3-7
Table 4-1 Average Annual Metered Consumption and Service Connections	4-3
Table 4-2 Multi-Family Units	4-5
Table 4-3 2018 Largest Water Users	4-6
Table 4-4 Historical Water Supply	4-7
Table 4-5 Distribution System Leakage	4-9
Table 4-6 Existing Residential Population Per Capital Demand	4-9
Table 4-7 Demands and Peaking Factors	4-11
Table 4-8A Equivalent Residential Units – Consumption Basis	4-13
Table 4-8B Equivalent Residential Units – Consumption Basis	4-14
Table 4-9 General Planning-Level Fire Flow Requirements	4-15

Table 4-10 Future Water Demand Projections	4-16
Table 4-11 Future ERU Projections	4-17
Table 5-1 Regulatory Agencies	5-1
Table 6-1 Existing Water Rights	6-3
Table 6-2 Existing Water Rights Evaluation	6-5
Table 6-3 Future Water Rights Evaluation	6-5
Table 7-1 Minimum and Maximum Distribution System Static Pressures	7-1
Table 7-2 Water Source Capacity Evaluation	7-2
Table 7-3 179 Zone Supply Capacity Evaluation	7-4
Table 7-4 261 Zone Supply Capacity Evaluation	7-5
Table 7-5 Storage Capacity Evaluation with No Additional Storage	7-8
Table 7-6 Storage Capacity Evaluation with Additional Storage.....	7-9
Table 7-7 Hydraulic Analyses Operational Conditions	7-11
Table 7-8 System Capacity Analysis with No Additional Storage.....	7-15
Table 7-9 System Capacity Analysis with Additional Storage	7-17
Table 8-1 Woodland Water Personnel Certification.....	8-4
Table 8-2 Woodland Water Treatment Plant Chemicals	8-5
Table 8-3 Chemical Supply Vendors List	8-5
Table 8-4 Annual Available Hours per Person.....	8-17
Table 8-5 Preventive Maintenance Staff Needed	8-18
Table 8-6 Operations Staff Needed.....	8-18
Table 8-7 Total Staffing Recommendation	8-19
Table 9-1 Improvements Completed Since 2012 WSP	9-2
Table 9-2 Water Main Unit Costs.....	9-7
Table 9-3 Water Main Improvements Priority Ranking Criteria	9-8
Table 9-4 Prioritized Annual Water Main Replacement Projects (Sorted by Number)	9-9
Table 9-5 High Priority Annual Water Main Replacement Projects (Sorted by Number).....	9-10
Table 9-6 Proposed Improvements Implementation Schedule	9-11
Table 10-1 Historical Financial Performance (2010 – 2019, \$000s).....	10-2
Table 10-2 Assessment Charge Calculation	10-9
Table 10-3 Capital Improvement Program in Escalated Dollars (2019 – 2030) (\$000s).....	10-10
Table 10-4 Summary of Projected Capital Funding Strategy (2019 – 2030) (\$000s).....	10-10
Table 10-5 Projected Financial Performance and Revenue Requirements (2019 – 2030) (\$000s)	10-12
Table 10-6 Affordability Evaluation (2019 – 2030)	10-13

CHARTS

Chart ES-1 Maximum Day Demand and ERU Projections	E-4
Chart 3-1 Population Projections.....	3-8
Chart 4-1 2018 Water Connections by Customer Class	4-4
Chart 4-2 2018 Water Consumption by Customer Class	4-5
Chart 4-3 Historical Monthly Water Supply	4-8
Chart 4-4 Maximum Day Demand and ERU Projections (Demand Basis).....	4-17
Chart 7-1 System Capacity Analysis	7-18

City of Woodland Water System Plan

Table of Contents

FIGURES

Figure 2-1	Existing Water System
Figure 2-2	Existing System Hydraulic Profile
Figure 3-1	Land Use Map
Figure 6-1	Regional Supply Area
Figure 7-1	Existing High and Low Pressure Areas
Figure 7-2	Existing Available Fire Flow
Figure 7-3	20-Year PHD Pressure
Figure 7-4	20-Year Fire Flow
Figure 8-1	Organization Chart
Figure 9-1	Proposed Water System Improvements
Figure 9-2	Proposed Improvements Hydraulic Profile
Appendix M	Hydraulic Model Node Diagram

APPENDICES

Appendix A	Water Facilities Inventory (WFI) Form
Appendix B	DOH Sanitary Survey
Appendix C	Water Service Agreements
Appendix D	Consistency Statement Checklists
Appendix E	SEPA Checklist
Appendix F	Water Use Efficiency Program
Appendix G	Cross-Connection Control Program
Appendix H	Water System Construction Standards
Appendix I	Water Rights Information
Appendix J	Water Quality Monitoring Plan, Coliform and E. coli, and IDSE
Appendix K	Watershed Control Program
Appendix L	Consumer Confidence Report
Appendix M	Hydraulic Model Node Diagram
Appendix N	Agency Review Comments