



VADER – ENCHANTED VALLEY WATER SYSTEM PLAN

NOVEMBER 2015

Lewis County Public Works
2025 NE Kresky Ave.
Chehalis, WA 98532

BOARD OF COUNTY COMMISSIONERS

Edna J. Fund, District No. 1
P.W. Schulte, District No. 2
Gary Stamper, District No. 3

Table of Contents

LIST OF TABLES	8
LIST OF TABLES (continued)	9
LIST OF FIGURES	10
LIST OF APPENDICES	11
ABBREVIATIONS AND ACRONYMS	13
CERTIFICATE OF ENGINEER	15
1. INTRODUCTION	17
1.1 OBJECTIVES	17
1.2 OWNERSHIP AND MANAGEMENT	17
1.3 RETAIL SERVICE AREA	18
1.4 POLICIES	18
1.4.1 Duty to Serve	19
1.5 RELATED PLANS AND REFERENCES	19
1.6 REVIEWS AND RESPONSES	20
2. DESCRIPTION	21
2.1 NATURAL FEATURES	21
2.1.1 Geography	21
2.1.2 Climate and Precipitation	21
2.1.3 Soils and Geology	22
2.2 HISTORY OF THE SYSTEM	22
2.3 SYSTEM FACILITIES	25
2.3.1 Supply Source	26
2.3.2 Intake Facilities	26
2.3.3 Water Treatment Plant	27
2.3.4 Storage	28
2.3.5 Distribution System	28
2.3.6 Service Meters	29
2.3.7 Pressure Zones	29
3. PLANNING DATA AND DEMAND	31
3.1 GROWTH MANAGEMENT ACT	31
3.2 SERVICE AREA	31
3.3 LAND USE AND ZONING	31
3.4 POPULATION	32

3.4.1	Historical Population	32
3.4.2	Projected Population	34
3.5	WATER USE CHARACTERISTICS.....	35
3.5.1	Production and Peaking Factor	35
3.5.2	Customer Categories, Connections and Consumption.....	36
3.5.3	Water Balance and Leakage.....	37
3.5.4	Water Use Factors and Equivalent Residential Units (ERU)	39
3.6	WATER DEMAND FORECAST.....	40
3.6.1	Demand Forecast Methodology.....	40
3.6.2	Water Demand Projections	41
4.	SYSTEM ANALYSIS	43
4.1	WATER RIGHTS ANALYSIS	43
4.2	SOURCE CAPACITY	47
4.3	STORAGE CAPACITY	47
Existing Effective Storage		47
Equalizing Storage		48
Standby Storage		49
Fire Suppression Storage		49
Storage Capacity Analysis		49
4.4	DISTRIBUTION SYSTEM ANALYSIS	50
4.4.1	Hydraulic Modeling.....	50
4.4.2	Demand Allocation	50
4.4.3	Model Calibration	51
4.4.4	Model Scenarios.....	52
4.4.5	Peak Hour Demand Results	52
4.4.6	Fire Flow Analysis Results	53
4.5	SUMMARY OF SYSTEM CAPACITIES	54
5.	WATER USE EFFICIENCY PROGRAM.....	55
5.1	WATER USE EFFICIENCY PROGRAM	55
5.2	COMPLIANCE WITH WUE REQUIREMENTS	55
5.3	CURRENT CONSERVATION PROGRAM	57
5.4	CONSERVATION PROGRAM FOR 2014 - 2020.....	58
5.5	WATER LOSS CONTROL ACTION PLAN	58
6.	WATER QUALITY.....	59

6.1	SYSTEM OVERVIEW AND COMPLIANCE RESPONSIBILITY	59
6.2	SAFE DRINKING WATER ACT AND WAC 246-290.....	59
6.3	REGULATIONS AND COMPLIANCE	60
6.3.1	TREATMENT REGULATION.....	61
	Surface Water Treatment Rules	61
	Filter Backwash Recycling Rule.....	62
6.3.2	FINISHED WATER REGULATIONS	63
	Chemical Contaminant Rules	63
	Unregulated Contaminant Monitoring Rule	63
	Unregulated Contaminant Monitoring Rule 2	63
6.3.3	DISTRIBUTION SYSTEM REGULATIONS.....	63
	Total Coliform Rule.....	63
	Lead and Copper Rule	64
	Stage 1 and Stage 2 Disinfectant and Disinfection By-Products Rule	65
6.3.4	NOTIFICATION REGULATIONS	65
	Consumer Confidence Report Rule	65
	Public Notification Rule	65
6.3.5	Sentry Internet.....	66
6.4	CUSTOMER INQUIRIES AND COMPLAINTS.....	66
6.5	LABORATORIES	66
6.6	SUMMARY OF REGULATORY STATUS AND MONITORING REQUIREMENTS	
	66	
7.	SOURCE WATER PROTECTION.....	69
7.1	REGULATORY REQUIREMENTS.....	69
	Source Protection	69
	Watershed Control	69
	Reliability.....	69
7.2	WATERSHED CONTROL PROGRAM	69
7.2.1	Watershed Description and Characteristics	69
7.2.2	Identification of Activities and Land Uses Affecting Water Quality	70
7.2.3	Watershed Management and Control Measures	71
7.2.4	Monitoring Program.....	72
7.2.5	System Operations	72
7.2.6	Future Watershed Protection Efforts	72
8.	OPERATION AND MAINTENANCE PROGRAM.....	75

8.1	MANAGEMENT AND PERSONNEL	75
8.1.1	Organizational Structure	75
8.1.2	Public Works.....	75
	Operations	75
	Engineering	76
	Administration	76
	Fiscal	76
8.2	CERTIFICATION.....	76
8.3	DAILY OPERATIONS AND PREVENTIVE MAINTENANCE	77
8.3.1	Standard Operating Procedures Manual	77
8.3.2	Supply Source	79
8.3.3	Treatment Plant.....	79
8.3.4	Storage	79
8.3.5	Distribution System	79
8.3.6	Service Meters	80
8.4	EMERGENCY RESPONSE PROGRAM	80
8.4.1	Contingency Plan	80
	Emergency Roster	80
	Inventory of Materials.....	82
	General Field Response	82
	Severity of Emergencies	82
8.4.2	Vulnerability Assessment	83
	Dam Failure	84
	Debris Flow.....	85
	Drought	85
	Earthquake	85
	Extreme Heat	85
	Flooding	85
	Hailstorm.....	85
	Ice/Snow Storm.....	86
	Severe Windstorm.....	86
	Volcanic Eruption	86
	Wildfire	86
	Contamination of Water Supply	86

Water Main Break.....	86
Vandalism	87
8.4.3 Public Notification.....	87
8.5 CROSS CONNECTION CONTROL PROGRAM	87
8.5.1 Purpose.....	87
8.5.2 Guidance	88
8.5.3 Program Elements.....	88
Element 1: Legal Authority	88
Element 2: Hazard Assessment.....	88
Element 3: Control.....	89
Element 4: CCS Personnel.....	89
Element 5: Inspection	89
Element 6: Quality Control Testing Program	89
Element 7: Backflow Incident Response.....	89
Element 8: Public Education.....	90
Element 9: Records.....	91
Element 10: Reclaimed Water Requirements.....	91
8.6 RECORD KEEPING AND REPORTING	91
8.7 WATER SHORTAGE RESPONSE PLANNING.....	93
9. DESIGN AND CONSTRUCTION STANDARDS	95
9.1 PROCEDURES.....	95
9.2 CONSTRUCTION STANDARDS	97
10. IMPROVEMENT PROGRAM	99
10.1 DEVELOPMENT.....	99
10.2 CAPITAL IMPROVEMENTS.....	101
ST-1 Reservoir Life Extension	101
ST-2 Additional Reservoir.....	102
D-1 SR 506 West of Olequa Creek Water Main Replacement.....	102
D-2 Firgrove Road, Enchanted Valley Drive South and Horseshoe Bend Water Main Replacements	102
D-3 Enchanted Valley Water Main Replacements	102
D-4 8 th Street Water Main Replacement.....	102
D-5 7 th Street Water Main Replacement.....	103
D-6 9 th Street and C Street Water Main Replacements	103
D-7 Annonen Road Water Main Replacement	103

D-8	D and E Streets Loop.....	103
D-9	Customer Shutoff Valves.....	103
D-10	SR 506 Bridge Deck Pipe Support Replacement.....	103
D-11	Pressure Reducing Valves.....	103
	Treatment Efficiency Improvements	103
TR-1	Turbidimeters.....	104
TR-2	Chartless Recorders	104
TR-3	Comprehensive Electrical Survey.....	104
TR-4	On-line Analyzer.....	104
TR-5	SCADA System Improvements	104
TR-6	Leak Detection Survey.....	104
TR-7	Energy Audits	104
11.	FINANCIAL PROGRAM	105
11.1	PAST FINANCIAL HISTORY.....	105
11.2	RATES.....	106
11.3	DEVELOPMENT OF THE FINANCIAL PLAN.....	107
	Revenues	107
	Expenses	107
11.4	FINANCIAL PROJECTIONS	107
11.5	FUNDING SOURCES	108
	Capital Facility Charges.....	108
	Community Development Block Grant (CDBG)	108
	Drinking Water State Revolving Fund (DWSRF).....	108
	Public Works Trust Fund (PWTF).....	111
	Section 319 Grants.....	111
	Revenue Bonds	111
	Utility Local Improvement Districts/Special Assessment Districts.....	111
	Developer Contributions.....	111
	Infrastructure Assistance Coordinating Council (IACC).....	111
11.6	SUMMARY.....	112

LIST OF TABLES

No.	Description	Page
1.1	List of Information and References	19
2.1	Raw Water Pump Station Design Criteria	26
2.2	Treatment Plant Design Criteria	27
2.3	Distribution System Pipe Inventory	29
3.1	Land Use Distribution	31
3.2	Historical Population	33
3.3	Customer Population	34
3.4	Projected Population	34
3.5	Annual Water Production	35
3.6	2011 to 2014 Monthly Production	36
3.7	Peaking Factor of Maximum Day to Average Day	36
3.8	Consumption by Customer Classification	36
3.9	Number of Connections	37
3.10	2014 Water Balance	37
3.11	Non-Revenue Water Loss	39
3.12	ERU Analysis	39
3.13	ERU by Customer Classification	40
3.14	Water Demand Forecast	42
4.1	Water Rights Summary	43
4.2	Water Rights Assessment-Existing Water Right Status	44
4.3	Water Rights Assessment-Forecasted 6-Year Water Right Status	45
4.4	Water Rights Assessment-Forecasted 20-Year Water Right Status	46
4.5	18 Hour Source Production Capacity Analysis	47
4.6	Reservoir Characteristics	47
4.7	Projected Storage Capacity Requirements	50
4.8	Hydrant Test Readings	51
4.9	Model Calibration Results	52
4.10	Modeling Scenarios	52
4.11	Available Fire Flows	53
4.12	Water Facility Capacities	54
4.13	Water Demand with No Conservation	54
5.1	Compliance with Water Efficiency Rule Requirements	56
6.1	Applicable Safe Water Drinking Act (SWDA) Regulations	60
6.2	Regulatory Levels and Monitoring Results	67
7.1	WRIA 26 Land Cover	70
8.1	Required Personnel Certifications	77
8.2	Recommended Maintenance Schedule	77
8.3	Emergency Roster	81
8.4	Potential Disaster Effects	84
8.5	Retention of Records	92
10.1	Past CIP Projects	99
10.2	CIP Program	101

LIST OF TABLES (continued)

No.	Description	Page
11.1	Summary of Five-Year Financial History	105
11.2	Monthly Water Rates	106
11.3	Projected Six-Year Financial Plan	110

LIST OF FIGURES

No.	Description	After Page
1.1	Retail Service Area Map	20
2.1	Water System	30
3.1	Service Area Zoning Map	42
7.1	Watershed Boundaries	74
7.2	Land Types in Watershed	74
7.3	Land use and Land Cover in WRIA 26	74
10.1	CIP Project Map	104

LIST OF APPENDICES

No.	Description
A	Water Facilities Inventory Form
B	WSP Review and Approval Documents (Consistency Review Approvals, DOH Meeting documentation, draft WSP Comments & Responses, Meeting Notes, Lewis County Resolutions and Approvals
C	Water Rights Certificates
D	Hydraulic Analyses
E	Water Loss Action Plan
F	Coliform Monitoring Plan
G	Stage 2 DBPR Compliance Monitoring Plan
H	Title 13 Lewis County Code and Resolution of Approved Utility Rates
I	Water Shortage Response Plan
J	Design and Construction Standards
K	CIP Cost Estimates