2010 WATER SYSTEM MASTER PLAN

Final January 2011

Westech Engineering, Inc.
3841 Fairview Industrial Drive SE, Suite 100
Salem, OR 97302

2010 WATER SYSTEM MASTER PLAN

DAYTON, OREGON

Final January 2011

Prepared for

City of Dayton, Oregon

PO Box 339

416 Ferry Street

Dayton, OR 97114 8

RENEWS: 6/30/2012

Prepared By

Westech Engineering, Inc.

3841 Fairview Industrial Drive SE, Suite 100

Salem, OR 97302

(503) 585-2474

2609.4050.0

PUBLIC HEALTH DIVISION
Office of Environmental Public Health, Drinking Water Program
John A. Kitzhaber, MD, Governor

Oregon Health Authority
800 NE Oregon St.
Portland, Oregon 97232-2162
Voice (971) 673-0405
FAX or TTY (971) 673-0694

February 8, 2011

WESTECH
FEB 11 2011
RECEIVED

Christy Ellis
Dayton City Manager
P.O. Box 339
Dayton, OR 97114

Re: City of Dayton Water Master Plan - (PR #223-2010)
Concurrence with Findings

Dear Ms. Ellis:

The Drinking Water Program (DWP) received a copy of the *City of Dayton 2010 Water System Master Plan, Final January 2010* on February 7, 2010, submitted by Denny Muchmore, P.E. of Westech Engineering, Inc. DWP had previously granted *conceptual approval* of a draft of this document in a letter dated January 25, 2011.

At this time, DWP has completed our final review of the plan to ensure compliance with OAR 333-061-060(5) as follows:

- Minimum twenty year planning period
- Detailed information regarding the existing water system
- Water quality and service goals
- Projections of future population growth and water demand
- Engineering evalution of the ability of current system to meet water quality and service goals
- Description and cost estimate for recommeded projects
- Description of alternatives to finance proposed improvements
- Recommended Improvement Plan (aka CIP)

Overall, DWP concurs with the findings and approves the Master Plan.

If you have any questions, please contact me at 971.673.0406, or via email at fred.n.kalish@state.or.us.

Sincerely,

Fred Kalish, P.E.
Regional Engineer

Cc: Marsha Fox, DWP Portland
Denny Muchmore, P.E., Westech Engineering, Inc., 3841 Fairview Industrial Drive, S.E., Suite 100, Salem, OR 97302

TABLE OF CONTENTS

Chapter **Page**

Chapter **Page**

Chapter **Page**

Chapter **Page**

Chapter **Page**

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

APPENDIX A

Existing Water System Maps (town, watershed, wellfield)

APPENDIX B

Drinking Water Standards Summary

APPENDIX C

Water Rate Resolution & Water Ordinance

APPENDIX D

City of Dayton Coordinated Population

- 9/28/2008 Yamhill County Coordinated Number Letter
- 6/1/2008 City of Dayton - Population Projection Letter

APPENDIX E

Water Rights Certificates (C), Permits (P), Applications (A), Orders (O) & Well Logs (WL)

- Watershed West (Lower) Springs (C, Order)
- Watershed East (Upper) Springs (C, A)
- McDougal Well 1 (C, A, WL)
- McDougal Well 2 (C, A, WL)
- Post Office Well (C, A, WL)
- Flower Lane Well (Transfer Order, WL)
- 11th Street Well (C, A, WL)
- Dayton-Lafayette Well 1 to 5 (P, Extension)
- Wellfield Well 1 (WL)
- Wellfield Well 2 (WL)
- Wellfield Well 3 (WL)
- Wellfield Well 4 (WL)
- Wellfield Well 5 (WL)

APPENDIX F

Watershed Deeds, Lease Agreements, Easements

- Main Watershed Area, Deed
- East (Upper) Springs Area, Deed
- West (Lower) Springs & Waterline Area, Lease Agreements
- Easement from Breyman Orchards Road

APPENDIX G

Dayton-Lafayette Joint Water System

- Dayton-Lafayette IGA (2/09)
- Settlement Agreement for Joint Wellfield Wells

APPENDIX H

Dayton-Dayton Wellfield, Land Use Approvals & Orders

- 3/13/99 Yamhill County Planning Director Approval (SDR-01-99)
- 7/8/99 Yamhill County Commissioners affirmation of Planning Director Approval (Board Order 99-522, SDR-01-99)
- 5/11/00 LUBA Final Opinion & Order (approving wells) (LUBA No. 99-123)
- 9/27/00 Court of Appeals Opinion (approving wells) (CA A110515)

APPENDIX I

Dayton-Lafayette Wellfield, Well Sites & Easements

- Well 1
- Well 2, 3, 4 & 5

APPENDIX J

Reports & Correspondence on Watershed Sources

- GSI Water Solutions Reports
- ODWP Correspondence
- Watershed Springs, City Corrective Action Plan

APPENDIX K

Ferry Street Pedestrian Bridge

- Bridge Life Expectancy Memo (OBEC)
- Estimates for New Pedestrian Bridge (OBEC)

APPENDIX L

Summary of Preliminary Cost Estimates

APPENDIX M

Water System Budget, Fiscal Year 2009-10

FOREWORD

USING THIS REPORT

This report will be used by many people whose needs for information will differ widely. Accordingly, an Executive Summary appears at the beginning of this report. The summary provides an overview of the report and presents the main conclusions. Readers may gain a good general understanding of the report and its contents by reading the summary. Additional detailed information is presented in the body of the report.

LIST OF ABBREVIATIONS

ADD	average day demand
ASR	aquifer storage & recovery
AWWA	American Water Works Association
ATS	automatic transfer switch
cfs	cubic feet per second
CIP	capital improvement plan
COBU	claim of beneficial use
CT	CT value refers to chlorine Concentration x contact Time
DBP	disinfection by-product
DHS	Oregon Department of Human Services
DOC	Oregon State Department of Corrections
EDU	equivalent dwelling unit
EPA	US Environmental Protection Agency
FEMA	Federal Emergency Management Agency
fps	feet per second
gpd	gallons per day
gpm	gallon per minute
GWR	Ground Water Rule
GWUDI	Ground Water Under the Direct Influence (of surface water)
HAA5	five haloacetic acids regulated by the EPA.
HP	horsepower
IGA	intergovernmental agreement
LCR	Lead and Copper Rule
MDD	maximum day demand
MMD	maximum month demand
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
MG	million gallons
MGD	million gallons per day
OAR	Oregon Administrative Rule
ODOT	Oregon Department of Transportation
ODWP	Oregon Department of Human Services, Drinking Water Program
OPSC	Oregon Plumbing Specialty Code
ORS	Oregon Revised Statutes
OWRD	Oregon Water Resources Department
PHD	peak hour demand
PLC	programmable logic controller
PRV	pressure reducing valve
psi	pounds per square inch
PWDS	Public Works Design Standards
RFP	request for proposals
SCADA	Supervisory Control and Data Acquisition (telemetry) system
SDC	system development charge
SMCL	secondary maximum contaminant level
UGB	urban growth boundary
USGS	United States Geological Survey
VFD	Variable Frequency Drive
WMCP	water management & conservation plan
WTP	water treatment plant

EXECUTIVE SUMMARY

Summary Outline

Introduction

Project Objectives

Basis for Master Planning

Study Area and Planning Considerations

Regulatory Requirements

Existing Water System Inventory

Present and Future Water Demands

Water Supply Evaluation

Water Treatment Evaluation

Distribution System Evaluation

Water Storage Evaluation

Instrumentation and Control Evaluation

Recommended Capital Improvement Plan

EXECUTIVE SUMMARY

INTRODUCTION

The purpose of this study is to provide a comprehensive evaluation of the City's water system with respect to its existing and future needs, identify improvements and associated costs necessary to meet those needs, and provide the City with a framework for the provision of water service through the year 2030.

This executive summary has been prepared to provide a concise overview of the evaluations and recommendations from each chapter of the study. A summary of the capital improvement program costs appears at the end of this section (as well as in Chapter 12).

PROJECT OBJECTIVES

This master plan has been developed to provide the City with a guide for short term and long term water system improvements and has been prepared as a reference document to assist the City as it evaluates the impacts of proposed development and land use on the water system.

This master plan accomplishes the following specific objectives:

- Establishes water system design and planning criteria
- Provides an inventory of the existing water system infrastructure
- Identifies current and future water system deficiencies on a prioritized basis
- Provides specific recommendations to the community and City Council for action
- Provides the City with a water system master plan that addresses the needs of both the City and regulating agencies

BASIS FOR MASTER PLANNING

The City's previous water master plan was completed in 1994. The previous water master plan outlined recommended improvements to the water system components including the distribution, storage, and transmission systems. A number of the major improvements recommended in the previous water master plan have been addressed, although in different locations and under different configurations than was anticipated. The previous document also indicated the need to secure additional water supply of 1.0 MGD (±700 gpm) by the year 2014 (the City has not yet been able to reach that goal). The life and planning horizon for a water master planning document is 20 years, with updates typically recommended on 10 year intervals. Accordingly, a new master plan was needed to address water system issues.

STUDY AREA AND PLANNING CONSIDERATIONS

The City's Comprehensive Plan was developed in the 1980's and established a large urban growth boundary (UGB) encompassing roughly 824 acres, approximately 306 acres of which are

outside the current City limits. It is assumed that all areas inside the UGB will eventually be annexed into the City Limits and will be served by the City's utility systems.

The study period for this investigation is from year 2010 to 2030 and utilizes the UGB as the boundary for municipal development across this period. The City currently provides water service to a population of 2,500. It is anticipated that municipal growth across the planning period will increase substantially, resulting in a 2030 population of roughly 4,060.

The improvements recommended in this plan are based on the development of land within the UGB in its present location, and the current zoning designations for these areas. This report evaluates the anticipated water supply, treatment, pumping, and storage needs for the 20 year planning period. Implementation of the improvements will provide an adequate and dependable water system for the City's existing and future customers. Significant expansions of the UGB, or changes to the existing zoning areas could change the recommendations of this plan. An update or reevaluation of key planning assumptions should be performed should such changes occur.

REGULATORY REQUIREMENTS

The US Environmental Protection Agency (EPA) and the State of Oregon Department of Human Services, Drinking Water Program (ODWP) currently enforce drinking water standards for 91 primary contaminants and 15 secondary contaminants. Primary standards regulate contaminants that pose a serious risk to public health, whereas secondary standards cover aesthetic considerations. Public water systems must sample for primary contaminants routinely to ensure that standards are met and must report the results of such sampling to the regulating agency.

The City's water system operates in compliance with the current regulatory requirements. Regulatory compliance is achieved as a function of the basic water system design, the operational modes selected by the City's licensed operators, as well as the current regulatory structure. Future compliance in light of near-term regulatory changes combined with increasing water demands will require modifications to the design and operation of the City's water system.

Beginning on January 1, 2010, all public water systems will be regulated by the Ground Water Rule (GWR). This rule will require new monitoring standards and will potentially require additional treatment of groundwater sources. The GWR was promulgated to address bacterial and viral contamination at groundwater sources, as a complimentary approach to the distribution system monitoring currently required by the Total Coliform Rule.

In summary, the long-term success of the City's water system requires an improvement plan that suitably addresses anticipated regulatory needs over the planning period.

EXISTING WATER SYSTEM INVENTORY

The City operates and maintains the existing water system and delivers water to its consumer base utilizing 2 spring areas, 9 active groundwater wells, one ground storage reservoir, two elevated storage reservoirs (elevated on the hillside in the watershed area), and a network of distribution pipes. Fire protection is provided by the 1.5 million-gallon (MG) ground storage reservoir and fire pump at the WTP, as well as some flows from the watershed reservoirs.

Based on City records, Dayton's original water system was constructed in about 1904. The watershed springs were originally developed and piped into town with wood and steel pipe. In 1922 the City completed the construction of a 175,000 gallon reservoir next to the watershed springs. Later in the 1930s much of the original piping from the watershed was replaced with steel piping. As demand grew, Dayton began to seek alternate groundwater sources. In the 1940's and 1950's Dayton developed the McDougal Well # 1 (1949) and the Post Office Well (1953) to supplement production. Later in the 1960's and 1970s, McDougal Well # 2 (1970) and the 11th Street Well (1977) were constructed, along with another 165,000 gallon reservoir (1974) in the watershed. From the 1980's to early 1990's the City constructed another 600,000 gallon reservoir in the watershed and developed the Flower Lane Well (1990) to increase water supply and storage. Finally, Dayton teamed up with Lafayette and developed the Dayton-Lafayette Wellfield (1996 to 2009), the Dayton-Lafayette Water Treatment Plant (WTP, 2004) and 1.5 million gallon (MG) ground storage reservoir next to the WTP (2004).

The City's water distribution system is predominantly a looped network and is constructed largely in the public road rights-of-way, as well as transmission lines from the wellfield area and from the City watershed area. The distribution system consists of approximately 11.8 miles of pipe, of which almost 41% of the total pipe length is pipe 6-inches in diameter or smaller. The transmission system consists of approximately 5.82 miles of pipe, of which almost a third of the total pipe length consists of old steel pipelines (dipped & wrapped steel).

Water storage totals three reservoirs, with a total volume of 2.265 MG. The existing storage reservoirs do not meet current seismic code.

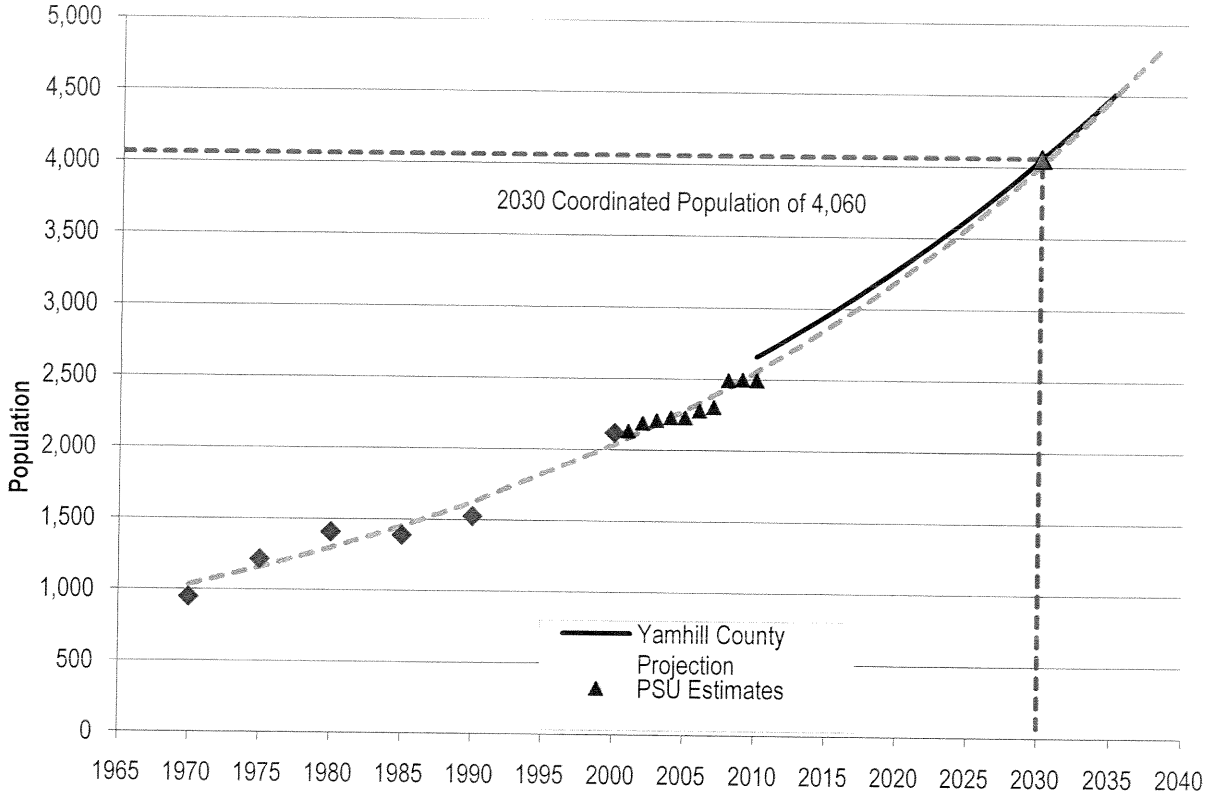
The City currently has a supervisory control and data acquisition (SCADA) system (located at the WTP) that allows for centralized monitoring and control of the system by the system operators from a centralized location (for those system components connected to the SCADA system). The City has a radio telemetry system that communicates between the WTP and the various well sites, the watershed reservoir and the PRV station. The radio telemetry system is based on a licensed radio frequency.

PRESENT AND FUTURE WATER DEMANDS

At the most fundamental level, future water demands are a product of per capita water use patterns applied over the anticipated population growth. The per capita use factors utilized in this report are based on typical historical use rates and do not consider the effects of future conservation programs. The development of a conservation program is encouraged and will provide additional operating margins with regard to supply and capacity.

Historical populations were reviewed and future populations were projected based on conventional municipal growth patterns and the County coordinated population allocation. This report assumes a 2030 population of 4,060. This is based on the coordinated population estimates provided by Yamhill County. **Figure ES5-1** on the following page depicts the historical and projected populations based on this analysis.

Figure ES5-1 Municipal Population Projections



Water demand is defined as the sum of all water produced and delivered to the City distribution system. It includes water consumed in all use categories and also includes water loss and unaccounted-for water. Water demand varies across seasonal periods, days of the week, and hours of the day. The establishment of an average day demand rate serves as the baseline against which other more intensified demands are measured. Based on recent repairs completed in the watershed area, a historical base ADD of 147 gcpd was used in this report. For the purpose of developing water demand projections into the future, this report uses an ADD of 100 gpcd for additional users due to population growth. Table ES5-2 summarizes the peaking factors used in this report.

Table ES5-2 Peaking Factor Summary

Population Group	ADD [1] (gpcd)	ADD:MMD [1] Peaking Factor	ADD:MDD [1] Peaking Factor	ADD:PHD [2] Peaking Factor
Municipal	147	1.30	2.02	5.00

[1] Calculated peaking factor based on measured system demands, corrected to account for water loss reductions following recent repairs in the watershed.
[2] Assumed peaking factor based on typical small system values. This ADD:PHD peaking factor applies only to the consumption portion of the system demand, and not to the leakage portion (leakage is assumed to remain relatively constant over time).

Future water demand for the municipal population is calculated by adding the current demand to the product of the per-capita demand values times the projected additional population for the

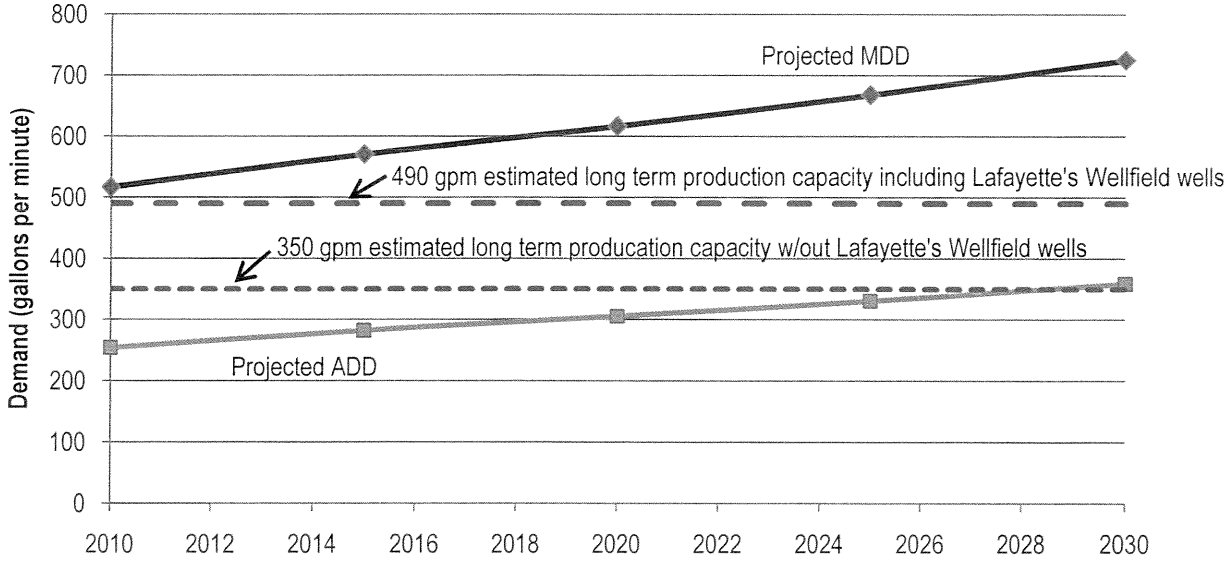
planning year in question. These results are summarized in **Table ES5-4** and illustrated in **Figure ES5-5** below.

Table ES5-4 Summary of Projected Water Demands

Year	2010	2015	2020	2025	2030	Buildout
Population	2550	2958	3287	3653	4060	6,964
Avg. Day Demand (ADD) (1)						
MGD	0.366	0.407	0.440	0.476	0.517	0.807
(gpm)	254	282	305	331	359	487
Max. Month Demand (MMD) (2)						
MGD	0.476	0.529	0.571	0.619	0.672	1.049
(gpm)	330	367	397	430	467	729
Max. Day Demand (MDD) (3)						
MGD	0.744	0.821	0.888	0.962	1.044	1.631
(gpm)	517	570	617	668	725	1132
Peak Hour Demand (PHD) (4)						
MGD	1.103	1.307	1.471	1.654	1.858	3.310
(gpm)	766	907	1022	1149	1290	2298

(1) - 2010 based on measured ADD. Projection based on 2010 ADD plus 100 gpcd x population growth.
(2) - ADD x 1.30 PF
(3) - ADD x 2.02 PF
(4) - 2010 based on leakage plus 5 X Average Day Consumption. Projection based on 2010 PHD plus 100 gpcd x pop. Growth x 5.

Figure ES5-5 Projected Average Day Demand and Maximum Day Demand



WATER SUPPLY EVALUATION

In Oregon, all water is publicly owned. The Oregon Water Resources Department (OWRD) regulates the use of both surface and groundwater throughout the state. Over the years as greater demands have been placed on limited water resources, OWRD has exercised increasing control over water use. Water rights establish a hierarchy utilized by OWRD to adjudicate water in times of water shortages. Accordingly, it is paramount that the City secure and maintain suitable water rights to meet long term municipal needs.

In the Willamette Basin and Yamhill sub-basin, all groundwater is over-appropriated, and it is expected that no new ground water rights permits will be approved by OWRD in the foreseeable future. Therefore, the City will need to maximize the use of their existing water rights certificates and/or permits, in addition to pursuing other water source options.

Table ES6-1 lists the permitted/certificated flowrates from each of the City's water sources, along with the estimated long-term production rates, and the excess water rights that the City currently has (but for which water is not physically available at the approved withdrawal rates).

Table ES6-1 Water Right Permit/Certificate Rates vs. Estimated Long Term Production Rates

Source & Priority Date	Certificate Rate [1] (gpm)	Permit Rate [1] (gpm)	Estimated Long Term Production Rate [2] (gpm)	Difference gpm
West (Lower) Springs, Dayton Watershed (1904)	50	-	50[3] (20 summer)	0
East (Upper) Springs, Dayton Watershed (1960)	63	-	63[3] (25 summer)	0
McDougal Well #1 (1960)	300	-	30	270
McDougal Well #2 (1972)	76	-	65	-4
Post Office Well[4] (1960)	76	-	-[4]	-
Flower Lane Well (1960)	224	-	25	199
11th Street Well (1978)	100	-	25	75
Wellfield Well 1 (1996)	-	300	40	260
Wellfield Well 2 (1996)	-	300	40 (Lafayette)	260
Wellfield Well 3 (1996)	-	300	90	210
Wellfield Well 4 (1996)	-	300	70 (Lafayette)	230
Wellfield Well 5 (1996)	-	300	60 (50% Lafayette)	240
Totals	889	1,500	490 summer 350 w/out Laf owned wells)	1,740

[1] See Table 4-1

[2] See Table 4-3

[3] Combined long term production rate from both watershed spring sources is estimated at 45 gpm during the summer (113 gpm during the winter).

[4] Estimates of irrigation flows for parks from Post Office Well is beyond the scope of this Water Master Plan, and will need to be evaluated separately by the City.

The City has certificated water rights totaling 889 gpm (watershed springs & wells, in-town wells), and permitted water rights totaling 1,500 gpm (wellfield wells), for a total of 2,389 gpm for all sources. The difference shown represents the difference between the amount of water the City is authorized to utilize and the amount that is currently counted as available from the City's existing water sources for planning purposes.

As previously noted, new groundwater rights are generally no longer available in Western Oregon. However, existing water-rights can be purchased (with or without purchasing the land to which the water-right is attached), and an application submitted to the WRD to modify the type of use allowed (ie. from agricultural to municipal), and to modify the approved point of use to match the City's current water use area.

The watershed springs require significant work to bring them into conformance with ODWP requirements for spring sources, and to comply with requirements of the Groundwater Rule. Failure to comply with these requirements will likely result in the springs being determined to be groundwater under the direct influence (GWUDI) of surface water, which will result in these sources being unavailable to the City without treatment meeting surface water treatment standards. A detailed evaluation of the improvement requirements for the watershed springs is discussed in Chapter 7.

The following table is a summary of the various water source improvement recommendations developed by this master plan. For more details on particular projects, refer to the discussions in the body of the study.

Table ES6–2: Recommended Water Supply Improvements & Projects

Project Code	Project
S-1	Replace steel transmission & distribution lines to increase volume of source water available for consumption (see recommended improvements in Chapter 8)
S-2	Water Rights Permits (Wellfield Wells), investigation study for potential new well sites for water rights transfers
S-3	Water Rights Certificates (In-Town & McDougal Wells), investigation study for potential new well sites for water rights transfers
S-4	If Watershed Springs cannot be upgraded to meet State standards, investigation study on potential for transfer of spring water rights to wells drilled at same site
S-5	Investigate purchase of existing water rights. Investigation study to develop map of all property around City & wellfield with existing senior water rights, contact property owners to determine interest in selling water rights. Purchase property with senior water rights as it becomes available for sale.
S-6	Water Management & Conservation Plan update when required by WRD.
S-7	Update City's emergency water restriction ordinances & resolutions.
S-8	Watershed Springs upgrades (see Chapter 7)
S-9	Watershed long-term lease, exclusive easements and/or property purchase/acquisition.
S-10	Hazardous tree removal at watershed springs/sand filter sites
S-11	Install on-site auxiliary power generators & automatic transfer switches at all City wells (9 wells, excluding the Post Office Well).

Table ES6–2: Recommended Water Supply Improvements & Projects

Project Code	Project
S-12	Production testing and evaluation of all City wells by hydrogeologist to verify long term production estimates and determine recommended schedule for rehabilitation at each well (every 5 years).
S-13	McDougal Wells, replace any existing steel discharge lines between wells & watershed transmission main (±300')
S-14	McDougal Wells, chlorination system upgrades (after completion of watershed spring improvements)
S-15	Wellfield wells, rotating rehabilitation program, one well per year (to address production losses due to iron bacteria bio-fouling)
S-16	Wellfield Well 1, VFD control upgrades
S-17	Wellfield Well 3, VFD control upgrades
S-18	Resolution of support for concept of further investigation of regional water source and/or treatment options
S-19	Contact McMinnville to initiate discussions regarding potential inter-tie to McMinnville water system to allow Dayton to purchase supplemental water during period of shortage.

WATER TREATMENT EVALUATION

As overall municipal demand increases, the City will be required to develop new water sources, and depending on the source water quality, different levels of treatment will be required.

Improvements to the existing WTP and associated supply wells will also be required to meet projected demands or to address system reliability issues. These improvements include provisions for auxiliary power at the WTP raw water supply wells (discussed above), as well as addition of a raw water clearwell to ensure consistent flowrates for filter backwashing (ie. clearwell is necessary when all wells are not on-line). Improvements also include the addition of a third Dayton distribution pump during the study period. Upgrades to the watershed spring sources will be required to address treatment requirements under the Groundwater Rule.

The following table is a summary of the various water treatment recommendations developed by this master plan. For more details on particular projects, refer to the body of the study.

Table ES7-3 Recommended Water Treatment Improvements & Projects

Project Code	Project
WT-1	Replace steel transmission & distribution lines to increase volume of source water available for consumption (see recommended improvements in Chapter 8)
WT-2	Install clearwell and influent pump station at WTP to ensure adequate backwash flowrates
WT-3A	Add third Dayton distribution pump at WTP
WT-3B	WTP Finish Water Pump Improvements
WT-4	Watershed Spring improvements & chlorination to address potential GWUDI issues (Alternative 1B, Section 7.4.1)
WT-5	Alternative 1C Watershed Spring improvements (only if Alternative 1B is not successful)
WT-6	Adopt resolution of support for regional WTP option adjacent to Dayton.

DISTRIBUTION SYSTEM EVALUATION

The primary purpose of a water distribution system is to deliver the full range of consumer demands and fire flows at pressures suited for the particular use. To accomplish this, the distribution system utilizes a combination of large transmission mains and networks of smaller distribution mains.

The existing transmission and distribution system was evaluated and existing or anticipated deficiencies were identified.

In general, distribution system deficiencies fall into several general categories, although some elements of the water system may be experiencing more than one of these problems at the same time. These include the general categories of (1) lack of capacity, (2) lack of facility, and (3) end of useful life.

Improvements to the transmission and distribution system will be required to meet projected demands or to address system reliability issues. The following table is a summary of the various water transmission & distribution recommendations developed by this master plan. For more details on particular projects, refer to the discussions in the body of the study.

Table ES8–1 Recommended Transmission/Distribution Improvements & Projects

Project Code	Location	Extg φ (inch)	New φ (inch)	Length (feet)
	Transmission System(*generally listed east to west*)			
T-1	Watershed springs transmission main (springs to watershed reservoirs)	8 Stl	8	800
T-2	Watershed transmission main (watershed reservoirs to McDougal Rd)	8 Stl	12	4,200
T-3	Watershed transmission main (McDougal Rd @ wells to PRV station)	8 Stl/DI	12	6,800
T-4	Watershed transmission main (PRV Station to 1st/Ferry). Install new main under Yamhill River by directional drilling	8 Stl	12	1,500
T-5	4th Street transmission main (4th/Ferry to 4th/Mill)	4 Stl	10	700
T-6	Mill Street transmission main (4th/Mill to 3rd/Mill)	8 PVC	10	450
T-7	Hwy 221 Palmer Creek bridge transmission main (Mill Str to Neck Rd)	6/8 PVC	12	1,650
T-8	Fletcher Road/Foster Road transmission main	1½ GI, 0	10	8,200
T-9	Ash Street transmission main (Flower/Church to Ash/9th)	6 PVC	10	2,100
T-10	WTP secondary transmission main (WTP to Church & Flower)	0	12	1,100
	Distribution System (*generally listed west to east*)			
D-1	9th Street (Ash to Church)	4 Stl	8	750
D-2	Church Street (9th toward Laurel)	6 Stl	8	600
D-3	Main Street (8th to 7th)	2 GI	8	600
D-4	Warmscombe Drive	0	8	200
D-5	5th Street (Oak to Church)	6 PVC	8	350
D-6	Main Street Replacement (2nd to 3rd)	6 Stl	8	390
D-7	Main Street Replacement (3rd to 4th)	0	8	360

Table ES8–1 Recommended Transmission/Distribution Improvements & Projects

Project Code	Location	Extg φ (inch)	New φ (inch)	Length (feet)
D-8	3rd Street (Church to Main)	4 Stl	10	350
D-9	3rd Street (Main to Ferry)	2 GI	8	350
D-10	Church Street (west of 2nd)	1¼ PVC	8	350
D-11	Alder Street (4th to 3rd)	2 GI	8	400
D-12	Palmer Creek crossing (Option 1: Palmer Ln to 1st)	4 Stl	8	800
D-13	Palmer Creek crossing (Option 2: Palmer Ln to Water Str, directional drill)	0	8	1150
D-14	Neck Road (Hwy 221 to Water Street)	0	10	1100
D-15	McDougal Road rural waterline	2 PVC/GI	2	3,800
D-16	Thompson Road rural waterline	1½, 1 GI	8, 2	2,500
D-17	Fletcher Road rural waterline (interim repair till annexation)	1¼ GI	2	3,000
D-18	East Dayton Industrial Area waterline	0	12	4,200
D-19	Over-length service modifications (Foster Rd, Watershed, McDougal Rd)	-	-	-
D-20	Master meters on rural waterlines (Fletcher Rd, McDougal Rd, Thompson)	-	-	-
D-21	Commercial services at McDougal Corner	-	-	-

WATER STORAGE EVALUATION

In most municipal distribution systems, the water system service pressure is determined by the elevation of the free water surface in the storage reservoirs serving the system. This is the case for the watershed service level, while the main town service level is served by a ground storage reservoir and pumps which keep the distribution system pressurized. Service pressures begin with available static pressure created by elevated reservoirs (or service pumps) and are reduced en-route to the consumer by friction losses in the pipe network.

The primary function of water storage is to provide a reserve of water to equalize daily variations between supply and consumer demand, to serve fire-fighting needs, and to meet system demands during an emergency interruption of supply. The overall storage within a system can be divided into the several storage categories, including operational storage, equalization storage, standby (emergency) storage, fire suppression storage and dead storage.

As discussed in detail in the body of the report, the total volume of a reservoir often does not equal the effective volume available to the water system. The effective storage volume is defined as the reservoir volume below the bottom of the operational storage level, minus any dead storage. In the case of Dayton, a significant percentage of the WTP storage reservoir is currently classified as dead storage (due to the suction head required to avoid cavitation on the WTP distribution pumps, which are mounted higher than the floor of the adjacent ground storage reservoir).

The total recommended storage in the system is the sum of equalization, fire and emergency storage (while discounting any dead storage and operational storage). Discounting the operational storage and dead storage as noted above, the effective volume of the existing Dayton reservoirs is as listed in **Table ES9-2** below.

Table ES9–2 Effective Storage Volume, Existing Reservoirs

Existing Reservoir	Total Storage (gallons)	Operational Storage [1] (gallons)	Dead Storage (gallons)	Effective Storage (gallons)	% of Total Storage Available
WTP Steel Reservoir	1,500,000	±104,000	±415,000	981,000	65.4%
Watershed Concrete Reservoir	165,000	±54,000	0	111,000	67.3%
Watershed Steel Reservoir	600,000	±36,000	±22,600	541,400	90.2%
Totals	2,265,000	194,000	437,600	1,576,400	69.6%

[1] Assumes normal operating range of reservoirs (pump start & stop calls) consists of the upper 2 feet of each reservoir.

As can be seen, the "dead storage" issue with the WTP steel reservoir results in a very major and significant loss in the effective storage available.

Another major factor in the storage evaluation is the concept of "source credits". In summary, sources which are classified as *continuously available to the system* can be counted as a credit against the standby (or emergency) storage. The five criteria which a source must meet in order to be classified as *continuously available to the system* are summarized in Section 9.2.1.3.

For water systems with multiple sources, standby storage is often set as the difference between 48 hours at ADD and the capacity of the supply sources which are "*continuously available to the system*" with the largest single source out of service (ie. "2 times ADD" minus "2 times daily capacity of all *continuously available* sources except the largest source").

Currently, NONE of the City's water sources can be counted toward source credits. Since the springs are the only source classified as *continuously available*, they are also the largest single source so classified (and thus must be considered as if it were out of service). Therefore, source credits are currently not available to offset the 2 day ADD standby storage requirement.

Based on the design year ADD of 0.517 MGD (**Table ES5-4**), the required standby storage volume is projected to be 1.034 MG at the end of the planning period (prior to applying any source credits). As shown in **Table ES9-1** below, adding generators at the wells in order to utilize them as a source credit (for storage calculations) makes a tremendous difference on the overall storage requirements (see also tables under Section 9.3.2).

Table ES9-1 Effect of Source Credit on Standby Storage Requirements

Storage Scenario	Total Standby Storage Required (2 x ADD at end of planning period) (MG)	Source Credit [1] (2 days production with largest single source out of service) MG (gpm)	Standby Storage Required with Source Credit (MG)
1. Current Conditions, springs available	1.034	0	1.034
2. Current Conditions, springs not available	1.034	0	1.034
3. Auxiliary power at Wellfield & McDougal Wells, springs available	1.034	0.544 (210)	0.490
4. Auxiliary power at Wellfield & McDougal Wells, springs not available	1.034	0.428 (165)	0.606
5. Auxiliary power at all wells, springs available	1.034	0.674 (260)	0.360
6. Auxiliary power at all wells, springs available, new finish water PS	1.034	0.674 (260)	0.360

[1] Assumes flowrates from all wells as noted on Table 6-1, excluding flows from Lafayette wells (Wells 2, 4 & 50% of 5), with watershed springs at summer flowrates of 45 gpm, and largest single source (Well 3 @ 90 gpm) out of service. Assumes sources operate 90% of time over 2 day period.

Improvements to the storage system will be required to meet projected demands or to address system reliability issues. The following table is a brief summary of the various water storage recommendations developed by this master plan. For more details on particular projects, refer to the discussions in the body of the study.

Table ES9–9: Recommended Water Storage Improvements & Projects

Project Code	Project
R-1	Replace steel transmission & distribution lines to decrease volume required for equalization storage and standby storage (see recommended improvements in Chapter 8)
R-2	Install on-site auxiliary power generators & automatic transfer switches at all City wells to allow wells to provide standby storage credit to system (9 wells, excluding the Post Office Well, see Chapter 6)
R-3	Hazardous tree removal at watershed reservoir site
R-4	Recoating existing 600,000 gallon steel watershed reservoir
R-5	New finish water pump station at WTP site (anticipated at or after end of planning period), dead storage conversion

INSTRUMENTATION AND CONTROL EVALUATION

Daily, and sometimes hourly, observations of water system operating parameters are required to ensure that the system is performing within regulatory standards and meeting operational goals. Immediate notification of critical alarm conditions is paramount to ensuring a continuous supply of water to the public and is often necessary to protect the City's infrastructure.

In mid 2010, the City issued an RFP to select a SCADA/Telemetry/Control System consultant to evaluate the City's existing instrumentation, control and SCADA system, and provide the City

with recommendations for needed system improvements. Through this competitive process, the City selected Portland Engineering, Inc. (PEI) as the City's SCADA/Telemetry/Control System consultant of record. PEI will be working with the City directly to develop specific recommendations for the control system upgrades.

Therefore, the recommendations in this report are limited to general suggestions on locations where telemetry improvements are anticipated. A detailed evaluation is beyond the scope of this master plan. Also, the City anticipates adding the sewer pump stations and wastewater treatment plant to the SCADA system at some point in the future, so any upgrades to the existing system should be expandable to accommodate this approach.

RECOMMENDED CAPITAL IMPROVEMENT PLAN

As summarized in the previous sections, the water system has a number of deficiencies, which inhibit the City's ability to provide an adequate level of water service throughout the physical system throughout the years of the planning period. Some of these deficiencies are more critical than others. Some deficiencies present an immediate effect on the ability to provide adequate service, while other deficiencies will manifest as the City expands and the existing system continues to age.

A prioritizing process was developed to rank the improvement projects since the scope of the proposed improvements is large. Factors utilized in the prioritizing process included several measures of criticality (such as public health concerns, end of useful life, inadequate capacity, and City priority), as well as the cost and benefit of each project.

Priority 1A and 1B are targeted to problem areas needing immediate attention. They have been developed to resolve existing or near term system deficiencies, resolve regulatory compliance issues or to serve known near term developments. To aid in the development of a water system capital improvement program (CIP), each improvement project was examined and assigned to one of the priority classes described above.

Table ES12-1 below summarizes the priority category totals presented in **Table ES12-2**.

Table 12-1 Capital Improvement Plan Cost Summary

Priority Group	Total Estimated Project Cost
Priority 1A	$5,136,000
Priority 1B	$4,198,000
Priority 2	$185,000
Priority 3	$2,718,000
TOTAL	**$12,237,000**

Table ES12-2 is a comprehensive listing of the recommended water system improvement projects. The general location of many of the prioritized improvements is shown on **Figure 12-1** and **Figure 12-2** (in the body of the report). It should be noted that the project listing within a priority class is also ranked in general order of recommended priority (although Public Works and

the City Council will set the final project prioritization). The reader is referred to the body of this report for more detailed descriptions of the individual projects.

To the extent feasible, it is recommended that the City implement as many of the Priority 1A improvements under a single funding package if possible, and under as few funding packages as possible otherwise. Work on the Priority 1A and 1B improvements should begin as soon as feasible after agency approval and City adoption of this master plan. It is anticipated that Priority 2 projects will be required within the planning period; however, these projects can begin as finances become available and as the need arises.

Table 12-2 Recommended Capital Improvement Priorities (Dayton)

Project Code[1]	Project	Priority	Total Estimated Project Cost[2]
S-16	Wellfield Well 1, VFD control upgrades	1A	$73,000
R-3	Hazardous tree removal at watershed reservoir site	1A	$8,000
S-10	Hazardous tree removal at watershed springs/sand filter sites	1A	$18,000
T-1	Watershed springs transmission main (springs to watershed reservoirs) (8")	1A	$95,000
T-5	4th Street transmission main (4th/Ferry to 4th/Mill) (10")	1A	$139,000
S-8, WT-4A	Watershed Spring improvements & chlorination to address potential GWUDI issues (Alternative 1B, Section 7.4.1), Lower Spring area	1A	$450,000
S-12	Production testing and evaluation of all City wells by hydrogeologist to verify long term production estimates and determine recommended schedule for rehabilitation at each well (every 5 years).	1A	$10,000
D-12	Palmer Creek crossing (Option 1: Palmer Ln to 1st Str, bore under creek) (8")	1A	$273,000
S-5	Senior water rights purchase potential. Develop map of all property around City & wellfield with existing senior water rights, contact property owners to determine interest in selling water rights. Purchase property with senior water rights as it becomes available for sale.	1A	$15,000
S-9	Watershed long-term lease, exclusive easements and/or property purchase/acquisition.	1A	TBD
S-11, R-2	Install on-site auxiliary power generators & automatic transfer switches at all City wells (9 wells, excluding the Post Office Well).	1A	$529,000
S-17	Wellfield Well 3, VFD control upgrades	1A	$73,000
S-8, WT-4B	Watershed Spring improvements & chlorination to address potential GWUDI issues (Alternative 1B, Section 7.4.1), Upper Spring area	1A	$278,000
WT-2	Install clearwell and influent pump station at WTP to ensure adequate backwash flowrates	1A	$435,000
T-2	Watershed transmission main (watershed reservoirs to McDougal Rd) (12")	1A	$847,000
T-4	Watershed transmission main (PRV Station to 1st/Ferry). Install new main under Yamhill River by directional drilling (12")	1A	$1,079,000
D-19	Over-length service modifications (Foster Rd, Watershed, McDougal Rd)	1A	$20,000
D-20	Master meter on rural waterline (Fletcher Rd)	1A	$7,000

Table 12-2 Recommended Capital Improvement Priorities (Dayton)

Project Code[1]	Project	Priority	Total Estimated Project Cost[2]
D-20	Master meters on rural waterline (McDougal Rd)	1A	$7,000
D-6	Main Street Replacement (2nd to 3rd) (8")	1A	$104,000
D-8	3rd Street (Church to Main) (10")	1A	$110,000
S-7	Update City's emergency water restriction ordinances & resolutions.	1A	TBD
D-1	9th Street (Ash to Church) (8")	1A	$107,000
D-2	Church Street (9th toward Laurel) (8")	1A	$92,000
D-9	3rd Street (Main to Ferry) (8")	1A	$101,000
D-11	Alder Street (4th to 3rd) (8")	1A	$109,000
D-20	Master meters on rural waterline (Thompson)	1A	$7,000
D-3	Main Street (8th to 7th) (8")	1A	$92,000
D-7	Main Street Replacement (3rd to 4th) (8")	1A	$58,000
	Subtotal Priority 1A		**$5,136,000**
T-3	Watershed transmission main (McDougal Rd @ wells to PRV station) (12")	1B	$1,538,000
S-13	McDougal Wells, replace any existing steel discharge lines between wells & watershed transmission main (±300')	1B	$29,000
S-14	McDougal Wells, chlorination system upgrades (after completion of watershed spring improvements)	1B	$29,000
WT-3A	Add third Dayton distribution pump at WTP	1B	$109,000
WT-3B	WTP Fire Pump improvements	1B	$73,000
T-10	WTP secondary transmission main (WTP to Church & Flower) (12")	1B	$240,000
T-9	Ash Street transmission main (Flower/Church to Ash/9th) (10")	1B	$384,000
D-16	Thompson Road rural waterline (8" & 2")	1B	$231,000
S-2	Water Rights Permits (Wellfield Wells), investigation study for potential new well sites for water rights transfers	1B	$12,000
S-3	Water Rights Certificates (In-Town & McDougal Wells), investigation study for potential new well sites for water rights transfers	1B	$10,000
T-6	Mill Street transmission main (4th/Mill to 3rd/Mill) (10")	1B	$135,000
R-4	Recoating existing 600,000 gallon steel watershed reservoir	1B	$296,000
D-21	Commercial services at McDougal Corner	1B	$8,000
S-4	If Watershed Springs cannot be upgraded to meet State standards, investigation study on potential for transfer of spring water rights to wells drilled at same site	1B	$8,000
S-19	Contact McMinnville to initiate discussions regarding potential inter-tie to McMinnville water system to allow Dayton to purchase supplemental water during period of shortage.	1B	TBD

Table 12-2 Recommended Capital Improvement Priorities (Dayton)

Project Code[1]	Project	Priority	Total Estimated Project Cost[2]
T-7	Hwy 221 Palmer Creek bridge transmission main (Mill Str to Neck Rd) (12")	1B	$698,000
D-15	McDougal Road rural waterline (2")	1B	$187,000
D-17	Fletcher Road rural waterline (interim repair till annexation) (2")	1B	$211,000
	Subtotal Priority 1B		**$4,198,000**
S-18, WT-6	Resolution of support for concept of further investigation of regional water source and/or treatment options	2	TBD
D-10	Church Street (west of 2nd) (8")	2	$58,000
S-6	Water Management & Conservation Plan update when required by WRD.	2	$25,000
G-1	Water Master Plan Update (±2020)	2	$45,000
D-5	5th Street (Oak to Church) (8")	2	$57,000
R-5	New finish water pump station at WTP site (anticipated at or after end of planning period), dead storage conversion	2	TBD
	Subtotal Priority 2		**$185,000**
T-8	Fletcher Road/Foster Road transmission main (10")	3	$1,590,000
D-4	Warmscombe Drive (8")	3	$34,000
D-14	Neck Road (Hwy 221 to Water Street) (10")	3	$243,000
D-18	East Dayton Industrial Area waterline (12")	3	$851,000
	Subtotal Priority 3		**$2,718,000**
	Recurring Annual Programs		
S-15	Wellfield wells, rotating rehabilitation program, one well per year (to address production losses due to iron bacteria bio-fouling)	1A	$30,000
	Subtotal, Recurring Annual Programs		**$30,000**

[1] Project Code Legend:
S = Water Source/Supply WT = Water Treatment
T = Transmission D = Distribution
R = Reservoir/Storage

[2] See Section 12.3 for basis of project cost estimates, October 2010 ENR 20 City Construction Cost Index of 8921

The City does not currently have the resources nor is the City's existing user fee structure sufficient to fund all of the recommended improvements; therefore, alternative funding sources must be pursued. Several potential funding sources are identified and discussed in the last portion of Chapter 12 of the master plan. All funding options will likely require an increase of the user rate and SDCs.

FOSTER RD (CR 89)

DAYTON BYPASS (OSH 18)

FERRY ST (HWY 233)

KREDER RD (CR 87)

YAMHILL RIVER

RAIL

WTP IMPROVEMENTS

WATER TREATMENT PLANT

1.5 MG RESERVOIR

PUMP STATION & INTERTIE

4" DI FROM WELLS (SOUTH)

14" DI TO LAFAYETTE (NORTH)

14" DI TO DAYTON (CENTER)

WELLFIELD WELLS (5)

SWEENY STR

JOEL PALMER WAY

WEST FORK PALMER CREEK

PALMER CREEK

SIZE & ALIGNMENT DEPENDENT ON DEVELOPMENT

LAGOON 1

LAGOON 2

LAGOON 3

12" PRV STATION

POLISHING POND

DIRECTIONAL DRILL 12" W/L UNDER RIVER

BORE CASING UNDER PALMER CREEK

GRAPHIC SCALE

0 200 400 800

(IN FEET)

1 inch = 400 ft.

VERIFY GRAPHIC SCALE, MAPS MAY NOT BE PLOTTED TO SCALE SHOWN.

LEGEND

8" C.I. — SIZE, MATERIAL, WATERLINE

VALVE

BLOW-OFF

FIRE HYDRANT

MUNICIPAL WELL

AIR RELIEF VALVE

A.C. – ASBESTOS CEMENT
C.I. – CAST IRON
D.I. – DUCTILE IRON
STL. – STEEL
PV.C. – POLYVINYL CHLORIDE
GALV. – GALVANIZED IRON

PRIORITY #1A
PRIORITY #1B
PRIORITY #2
PRIORITY #3

AUXILIARY POWER IMPROVEMENTS

NEW WATER LINE

NOTE:
THESE MAPS ARE SCHEMATIC UTILITY MAPS ONLY & DO NOT SHOW EXACT LOCATIONS OF UTILITIES. FIELD VERIFY ALL LOCATIONS PRIOR TO DESIGN OR CONSTRUCTION.

NO.	DATE	DESCRIPTION REVISIONS	BY
1			

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET ADJUST SCALES ACCORDINGLY
0 1"

DSN. JW
DRN. LS
CKD. JW
DATE: OCT 10

WESTECH ENGINEERING, INC.
CONSULTING ENGINEERS AND PLANNERS
3841 Fairview Industrial Dr. S.E., Suite 100, Salem, OR 97302
Phone: (503) 585-2474 Fax: (503) 585-3986
E-mail: westech@westech-eng.com

CITY OF DAYTON, OREGON

RECOMMENDED WATER SYSTEM PRIORITIES

SHEET
FIG. 12-1

JOB NUMBER
2609.4050.0

GRAPHIC SCALE

0 200 400 800

(IN FEET)

1 inch = 400 ft.

VERIFY GRAPHIC SCALE, MAPS MAY NOT BE PLOTTED TO SCALE SHOWN.

STOLLER ROAD (CR 84)

STOLLER ROAD (CR 87)

KREDER RD (CR 87)

HWY 99W

RAILROAD

MCDOUGAL ROAD (CR 83)

DAYTON BYPASS (OSH 18)

165,000 GAL RESERVOIR (Top Elev = ±398')

600,000 GAL RESERVOIR

LOWER SPRINGS & CHLORINATION IMPROVEMENTS

UPPER SPRINGS IMPROVEMENTS

SPRINGS & SAND FILTER

BREYMAN

ARCHERY

SUMMIT RD (82)

BREYMAN ORCHARDS RD (CR 82)

WATERSHED/RESERVOIR ACCESS RD 20' easement (FV 38 Pg 427)

MCDOUGAL WELL 2

MCDOUGAL WELL 1

WELL ACCESS

NEW 24" CASING

NEW 24" CASING

RIVERWOOD ROAD (CR 80)

SIZE & ALIGNMENT DEPENDENT ON DEVELOPMENT

LAGOON

NOTE:
THESE MAPS ARE SCHEMATIC UTILITY MAPS ONLY & DO NOT SHOW EXACT LOCATIONS OF UTILITIES. FIELD VERIFY ALL LOCATIONS PRIOR TO DESIGN OR CONSTRUCTION.

LEGEND

- SIZE / MATERIAL — 8" C.I. WATERLINE
- VALVE
- BLOW-OFF
- FIRE HYDRANT
- MUNICIPAL WELL
- AIR RELIEF VALVE

A.C. – ASBESTOS CEMENT
C.I. – CAST IRON
D.I. – DUCTILE IRON
STL. – STEEL
PV.C. – POLYVINYL CHLORIDE
GALV. – GALVANIZED IRON

PRIORITY #1A
PRIORITY #1B
PRIORITY #2
PRIORITY #3

AUXILIARY POWER IMPROVEMENTS

NEW WATER LINE

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

DSN. JW
DRN. LS
CKD. JW
DATE: OCT 10

NO.	DATE	DESCRIPTION	BY
1		REVISIONS	

WESTECH ENGINEERING, INC.
CONSULTING ENGINEERS AND PLANNERS
3841 Fairview Industrial Dr. S.E., Suite 100, Salem, OR 97302
Phone: (503) 585-2474 Fax: (503) 585-3986
E-mail: westech@westech-eng.com

CITY OF DAYTON, OREGON

RECOMMENDED WATER SYSTEM PRIORITIES

SHEET
FIG. 12-2

JOB NUMBER
2609.1006.0

Dec 22, 2010 - 9:43am
R:\Dwg\Dayton City of\Water Master Plan 2009\Figure 8.1&2, 12.1&2.dwg (Fig 12-2 tab)

CHAPTER 1
INTRODUCTION

Chapter Outline

INTRODUCTION

CHAPTER 1

1.1 GENERAL OVERVIEW

The City of Dayton is located in Yamhill County, Oregon just off Highway 18, approximately 2 miles east of the McMinnville airport and 7½ miles south west of Newberg. The current population of Dayton is approximately 2,500. Dayton was founded in 1850 by General Joel Palmer and Andrew Smith, the original town plat was recorded in 1865, and the city was incorporated in 1880.

Dayton has historically been primarily an agricultural and residential community with no major industries other than an aggregate and pavement supplier. Based on its proximity to McMinnville and current zoning, it appears that non-residential development in Dayton will be limited to commercial and diversified light industries. Significant residential growth has occurred in recent years, although the recent economic slowdown is currently limiting growth. Many of the residents of Dayton work in Portland, McMinnville and other nearby communities. Due to the City's close proximity to these other economic centers and relatively low cost of living, the possibility for rapid residential growth exists in the future.

The City owns and operates the public drinking water system and serves the municipal population, as well as a number of customers outside the city limits. The City's water source is comprised entirely of groundwater from three general areas (wells within the City, wells in the joint Dayton-Lafayette wellfield (near the McMinnville airport), and wells/springs in the City watershed area located north of McDougal Corner (Hwy 99W/Hwy 18 intersection).

Until about 2004, the City historically relied on the watershed (consisting of springs and the McDougal wells) as its primary water source. However, water production from these springs and wells generally decreases in the summer months, and was not adequate to meet demand. As a result, the City expanded the water system to include wells in a wellfield located just west of the McMinnville airport (as the secondary source) to meet water supply demands. The water from the wellfield wells (as well as the in-town wells) passes through a water treatment plant (for iron & manganese removal) prior to distribution. The wellfield and water treatment plant (WTP) is jointly owned by Dayton and Lafayette.

Water from the Dayton watershed flows to town by gravity via a transmission line, and passes through a pressure reducing valve prior to entering the City distribution system.

Water storage consists of two reservoirs in the watershed (600,000 gallon steel and 165,000 gallon concrete tank), and one reservoir in town adjacent to the water treatment plant (1.5 million gallon steel tank).

The City's distribution system contains a variety of pipe types. Since the mid-1990's, the City has standardized on PVC pipe as the material of choice for water mainlines.

1.2 NEED

The City adopted their previous water master plan in 1994. The previous water master plan outlined recommended improvements to the water system components including the distribution, storage, and transmission systems. A number of the major improvements recommended in the previous water master plan have been addressed, although in different locations and under different configurations than was

anticipated. The previous document also indicated the need to secure additional water supply of 1.0 million gallons per day (MGD) by the year 2014 (the City has not yet been able to reach that goal).

Some of the reasons for the preparation of a new master plan at this time include the following:

- The existing Water System Analysis is now almost 17 years old. The life and planning horizon for a water master planning document is 20 years, with updates typically recommended on 10 year maximum intervals. Also, the City water demand has exceeded the original water master plan projections.
- The design year population in the 1994 document was 3,396 in the year 2012. The community is nearing the design year of the previous water master plan. Although the current population (±2,500) has not reached the projected 3,396 population, the existing water system demand is nearing the system production limits. Planning for the future is prudent.
- Construction, operation and replacement costs for water system components have increased very significantly since 1994 when some of the improvements were recommended. It is appropriate to have a current master planning document that lists recommended improvements together with updated estimates of construction and/or implementation costs. The recommended projects and their associated cost projections can then be included in a capital improvement plan that the City can utilize to help determine if the current water rates and system development charges (SDC) are appropriate.
- The City's current development standards require findings that adequate capacity is available in the utility systems prior to development occurring. Without a current water system master plan that identifies improvements required with a schedule guiding their construction, implementation of these policies is difficult.

1.3 AUTHORIZATION

In October 2008, the City of Dayton authorized Westech Engineering to begin preparation a new Water Master Plan.

1.4 PURPOSE

The purpose of this plan is to provide a comprehensive evaluation of the City's water system with respect to its existing and future needs, identify improvements and associated costs necessary to meet those needs, and provide the City with a framework for the provision of water service through the year 2030.

This master plan will assist the City in the planning and implementation of capital improvements, and will assist the development community as the water system is expanded for future growth. The plan will benefit the current and future residents of the City by enhancing the quality of life through improved water quality, planned growth, scheduled improvements, and an equitable distribution of improvement costs.

1.5 SCOPE OF WORK

The scope of work for this project was to update the City's previous master plan with respect to its existing and future needs, identify improvements and associated costs necessary to meet those needs, and

to provide the City with a planning document to guide future water system expansion. This plan accomplishes the following specific objectives:

- Establish water system design and planning criteria
- Describe existing and anticipated federal and state drinking water regulatory requirements
- Provide an inventory of the existing water system infrastructure
- Establish water demand projections based on historic and anticipated population
- Evaluate water supply quality and adequacy
- Evaluate the need for modifications to the water treatment facility
- Develop and calibrate a computerized hydraulic model of the City's water distribution system
- Evaluate the existing distribution system to determine required improvements
- Evaluate existing storage reservoirs and perform a system-wide storage analysis
- Evaluate the existing instrumentation and control system
- Develop recommendations for system-wide improvements to enhance reliability
- Develop recommendation for a prioritized Capital Improvement Plan (based on the above evaluations) to correct existing deficiencies and to serve future growth.
- Provide the City with a water system master plan that addresses the concerns of both the City and regulating agencies.

The updated water master plan can be used to develop specific recommendations to the community and City Council for action. This report does not include a wetland inventory or delineation(s), topographic or aerial surveys, on-site environmental investigations or geotechnical investigations.

1.6 COMPLIANCE

1.6.1 Master Plan Requirements

The Oregon Drinking Water Program (ODWP) requires community water systems with 300 or more service connections to maintain a current water master plan. This plan has been prepared to satisfy the requirements of the ODWP as stipulated in OAR 333-061-0060(5).

1.6.2 Future Master Plan Updates

It should be recognized that projections into the future are subject to many variables and assumptions, some of which may prove inaccurate. Accordingly, it is recommended that the City review its water system and this master plan at five-year intervals and update the report as appropriate. Updates at 10 year maximum intervals in recommended.

1.7 PREVIOUS STUDIES AND REPORTS

The following reports and studies were referenced in the preparation of this study:

- *Newberg Dundee Bypass, Tier 2 Draft Environmental Impact Statement, FHWA-OR-EIS-10-01-D*, USDOT FHWA & ODOT. June 2010.
- *Flood Insurance Study, Yamhill County, Oregon*. Federal Emergency Management Agency. March 2010.
- *Yamhill County Water Supply Analysis*. Yamhill County Task Force, by HDR Inc., April 7, 2008.
- *Water Level Update*. GSI Water Solutions, Inc. March, 2007.
- *Geological Evaluation of the Dayton-Dayton Joint Wellfield, Memorandum*. Groundwater Solutions, Inc. August 23, 2006.
- *City of Dayton Springs and Well Evaluation. Technical Memorandum*. Groundwater Solutions, Inc., May 11, 2006.
- *Source Water Assessment Report*. Oregon Department of Human Services, Drinking Water Program (ODWP). September 2004.
- *Intertie for Municipalities in Yamhill County Study*. Economic and Engineering Services, Inc. December 3, 1998.
- *Water System Master Plan, Dayton, Oregon*. EAS Consulting Engineers with CH2MHILL. January 1994.
- *Dayton Comprehensive Plan*. Dayton, Oregon. 1986.
- *Water for Dayton, Engineering Study & Report on Water Supply Sources, Transmission and Storage Requirements*. Clark & Groff Engineers. November 1967.