CHAPTER 2

STUDY AREA AND PLANNING CONSIDERATIONS

Chapter Outline

STUDY AREA AND PLANNING CONSIDERATIONS

CHAPTER 2

2.1 STUDY AREA

The Dayton water system is currently designed to provide water service to all areas within the City limits (other than a few residential water customers outside of the UGB). The study area for this water master plan is the entire area within the UGB, although the extent of the water system expansion during the study period is not anticipated to extend to the current UGB. The location of the UGB, City limits and land use zoning designations are shown on the figures at the end of this chapter.

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 improvements recommended in this plan are based on the development of land within the UGB, as well as the existing land use zoning for these areas. It is assumed that no significant development will occur within the study area that will require major changes to the existing zoning, and that there will be no significant expansions of the UGB within the study period. Changes in any of these assumptions could change the recommendations contained in this master plan. Should significant changes in any of the above occur, this plan should be updated accordingly.

2.2 STUDY PERIOD

Choosing a "reasonable" design period for which a utility system should be designed is a somewhat arbitrary decision. If the design period is too short, the public faces the prospect of demands exceeding capacity, requiring the system to be continually upgraded or replaced.

On the other hand, choosing a design period that is too long can lead to facilities with excess capacity that may never be needed if population growth does not occur at the projected rates. Such facilities can place an economic burden on the present population and may become obsolete before being fully utilized.

The Oregon Department of Human Services, Drinking Water Program (ODWP) has established 20 years as a proper planning period for water system improvements. This report will evaluate the anticipated water supply, treatment, distribution and storage needs for the 20 year planning period. Major transmission pipes are by their nature unsuited for incremental expansion without extensive capital outlays. For this reason, these facilities will be designed for the ultimate development of land within the UGB based on current land use designations. For other facilities such as treatment and storage facilities, a staged approach to expansion may be acceptable.

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 at five-year intervals and update this report at 10 year maximum intervals (or more frequently if necessary).

2.3 PHYSICAL ENVIRONMENT

2.3.1 Climate and Rainfall Patterns

The study area is located in the Willamette Valley along the eastern foothills of the coast range. Since there is no National Weather Service recording station in Dayton, rainfall and temperature data were examined from several weather stations including McMinnville, Hillsboro, Beaverton, and the OSU North Willamette Experimental Station near Wilsonville. Overall these stations exhibit similar climate patterns, and with Dayton being in the center of the group, a reasonable approximation for Dayton's climate can be developed.

The climate in Dayton is relatively mild throughout the year, characterized by cool, wet winters and warm, dry summers. The study area has a predominant winter rainfall climate. Typical distribution of precipitation includes about 50 percent of the annual total from December through February, lesser amounts in the spring and fall, and very little during summer. Rainfall tends to vary inversely with temperatures -- the cooler months are the wettest, the warm summer months the driest.

The study area receives an average of approximately 40 inches of precipitation annually, with the majority of the rainfall occurring during the winter months. Precipitation extremes are somewhat difficult to verify because rainfall records are not always complete. The referenced stations have been in operation for differing periods of time: McMinnville (1928-present), Hillsboro (1930-2003), Beaverton (1972-present), and Wilsonville (1963-present). The wettest year recorded for these stations was 1996 with the following accumulations: McMinnville (64.17 inches), Hillsboro (61.03 inches), Beaverton (66.49 inches), and Wilsonville (74.10 inches). The referenced stations have experienced their driest years at different times: McMinnville (1929, 24.52 inches), Hillsboro (1930, 24.47 inches), Beaverton (1976, 27.52 inches), and Wilsonville (1985, 27.15 inches). Approximately 2/3 of the annual precipitation occurs between November 1 and April 30. July and August are typically the driest months with an average rainfall for the month of less than one inch.

Extreme temperatures in the study area are rare. Days with maximum temperature above 90°F occur only 5-15 times per year on average, and below 0°F temperatures occur only about once every 25 years on average. Mean high temperatures range from the low 80s in the summer to about 40°F in the coldest months, while average lows are generally in the low 50s in summer and low 30s in winter.

Although snow falls nearly every year, amounts are generally quite low. Willamette Valley floor locations average 5-10 inches per year, mostly during December through February. High winds occur several times per year in association with major weather systems.

Relative humidity is highest during early morning hours. During the afternoon, humidity is generally lowest, ranging from 70-80 percent during January to 30-50 percent during summer. Annual pan evaporation is about 35 inches, mostly occurring during the period April through October.

Winters are likely to be cloudy. Average cloud cover during the coldest months exceeds 80 percent, with an average of about 26 cloudy days in January (in addition to 3 partly cloudy and 2 clear days). During summer, however, sunshine is much more abundant, with average cloud cover less than 40 percent; more than half of the days in July are clear.

2.3.2 Topography

Dayton is located on the western edge of the Willamette Valley, approximately 5 river miles upstream of the point where the Yamhill River enters the Willamette River. The City center is located on the first bench west and south of the Yamhill River. The natural surface drainage across the study area flows into the Yamhill River.

The topography within the City Limits generally is gently sloping and undulating within the main section of town. The topography within the study area ranges from relatively flat from Flower Lane east to 3rd Street and from Ash Street south to Rodeo Drive and Mill Street. The topography begins to drop down to the north and east of town along the Yamhill River and south of town along Palmer Creek. The elevation within the study area ranges from approximately 100 feet along the Yamhill River to a high point of over 165 feet at the north central portion of the City. The majority of the land within the UGB is at or below an elevation of 170 feet, with the City center having an elevation of approximately 160 to 170 feet.

2.3.3 Soils

Although a detailed analysis of the soils and geology is outside the scope of this report, one soil characteristic evaluated by the Soil Conservation Service was the drainage capacity of the soils. The major soil association within the study area is the Woodburn-Willamette association, and the predominate soil type in the Dayton area are alluvial deposits of Woodburn silt loam. This soil typically is moderately permeable to water in the upper layers, and slowly permeable in the lower layers. This discussion on soil types are based from the Soil Survey of Yamhill County, Oregon (January 1974) prepared by the Soil Conservation Service (now the Natural Resource Conservation Service) showing the approximate locations of the Yamhill County soil types. The reader is referred to the Yamhill County Soil Survey for detailed definitions and descriptions of the individual soil designations.

2.3.4 Water Resources

There are two classes of water resources within the study area, namely surface water and groundwater. Surface water includes all drainage channels that convey storm and surface runoff. This includes the Willamette River, the Yamhill River, Palmer Creek and tributaries. Groundwater is limited resource in the Willamette Valley. The Oregon Department of Water Resources regulates the use of both surface and groundwater resources.

Drinking water for Dayton is currently comprised entirely of groundwater sources. The City owns municipal wells (in addition to springs) and currently operates the wells for municipal water production. Groundwater in the area is characterized by moderate to elevated levels of dissolved mineral content that is primarily comprised of iron and manganese. An in-depth discussion of the City's groundwater sources and water rights is presented in Chapter 4.

2.3.5 Geologic Hazards

Known geologic hazards within the study area include localized steep slopes, high seasonal groundwater, flooding, and seismic concerns.

2.3.5.1 Seismic

The current building code (Oregon Structural Specialty Code) drives seismic structural design criteria based on longitude and latitude of the proposed building site. If the alternative(s) selected by the City include the construction of buildings or other significant structures, a detailed geotechnical report will be required prior to design. Therefore, a more detailed review of local geology and faulting, as well as seismic and settlement considerations specific to the site selected, may be deferred until any required predesign reports.

2.3.5.2 Flooding

The Yamhill River is the primary stream within the study area, with Palmer Creek being the only significant tributary within the study area. Dayton is located along the Yamhill River approximately 5 river miles upstream from the Willamette River. The Yamhill River extends west to its headwaters in the coast range. Palmer Creek enters the Yamhill River between river mile 4.9 and 5.0 (approximate). The Yamhill River has a streamflow pattern similar to other Willamette Valley streams. It is typified by high flows during the winter and low flows during the summer months.

The Federal Emergency Management Agency (FEMA) has established a 100-year floodplain designation and insurance ratings for the study area. While sometimes referred to as the "100 year flood", it is more accurate to consider it the flood having a 1 percent chance of occurrence in any year, or a 10 percent chance of occurrence during any 10 year period.

During a 100-year flood (as defined by FEMA), the Yamhill River and Palmer Creek rise out of their normal channels creating a floodplain. Flood profiles and maps for those portions of the aforementioned river and creeks are included in the Flood Insurance Study prepared for the Yamhill County and include City of Dayton. The current FEMA maps were issued with an effective date of March 2010, and are illustrated in **Figure 2-1** and **Figure 2-2**.

<u>2010 FEMA Maps</u>

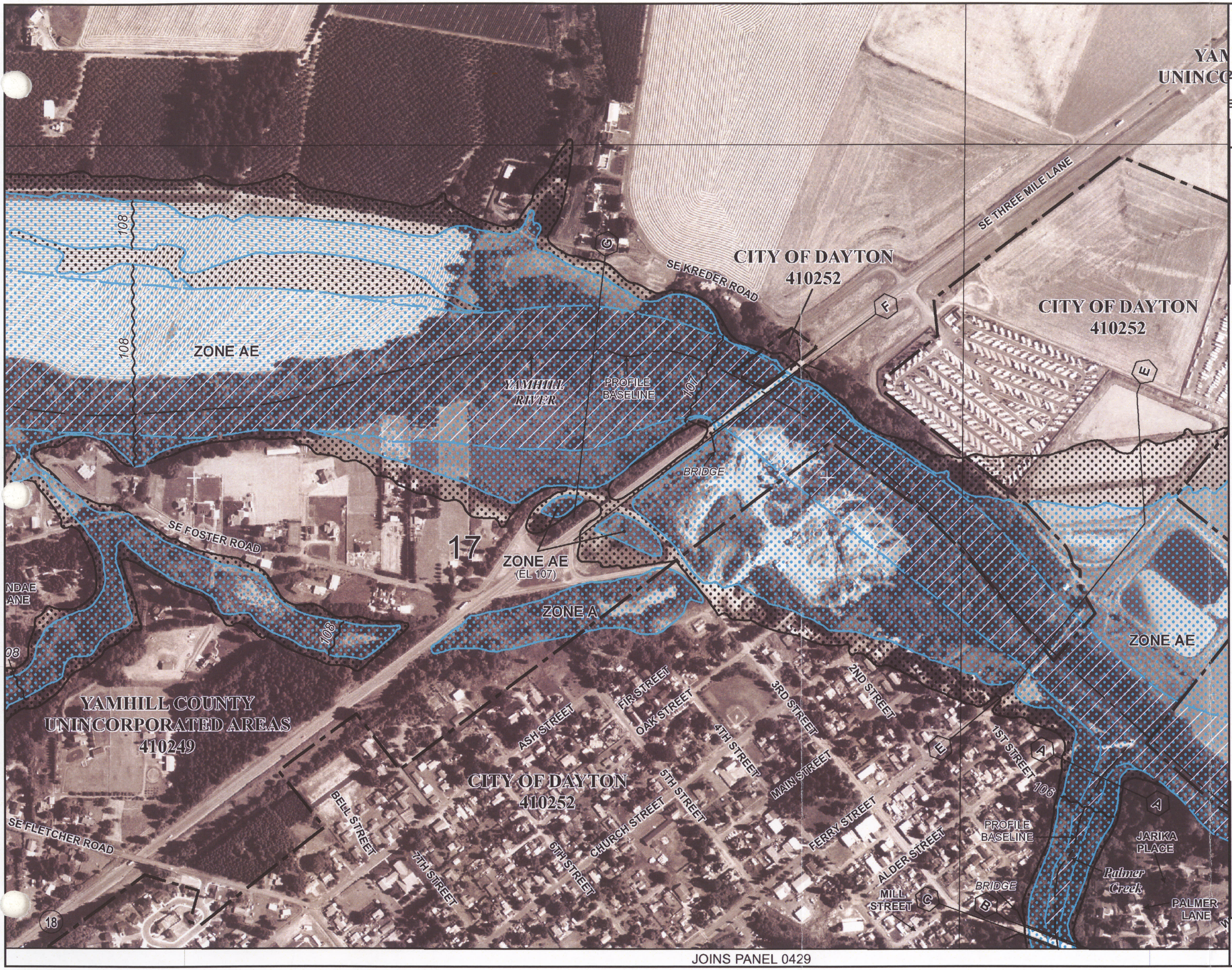
- FIRM panel 41071C0427D, March 2010
- FIRM panel 41071C0429D, March 2010.

It should be noted that the Floodplain and Floodway boundaries shown on the FEMA flood maps are based on flood elevations, and as such the actual boundaries may vary slightly from the location shown. Final determinations of whether property is within the floodway or floodplain must be determined based on a topographic survey of the property in question. Due to the topography of Dayton, most of the land within the City limits is out of the flood plain except for a few locations that are very close to the Yamhill River and Palmer Creeks.

It should also be noted that the elevations shown on the new FEMA flood maps are based on the NAVD 1988 vertical datum, whereas the old FEMA maps were based on the NVGD 1929 vertical datum. There are significant differences between the elevations derived from these two elevation datums (up to 3½ feet in some areas of Oregon).

However, the <u>actual</u> flood elevations shown on the new FEMA flood maps are essentially the same as shown on the old maps. Therefore, while the flood elevations listed on the new FEMA maps are about 3.35 feet higher than those shown on the old maps, this is due to the datum change and not to changes in the actual flood elevations.

The City's Public Works Design Standards (PWDS) were recently updated to require that public infrastructure designs be based on the newer 1988 vertical datum, in order to match with the FEMA flood elevations. However, most of the old design drawings prepared prior to March 2010 are based on the 1929 vertical datum, and elevation conversions are required when comparing these drawings against current FEMA flood elevations.



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METERS

NATIONAL FLOOD INSURANCE PROGRAM

NFIP

PANEL 0427D

FIRM

FLOOD INSURANCE RATE MAP

YAMHILL COUNTY, OREGON

AND INCORPORATED AREAS

PANEL 427 OF 675

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DAYTON, CITY OF	410252	0427	D
YAMHILL COUNTY	410249	0427	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

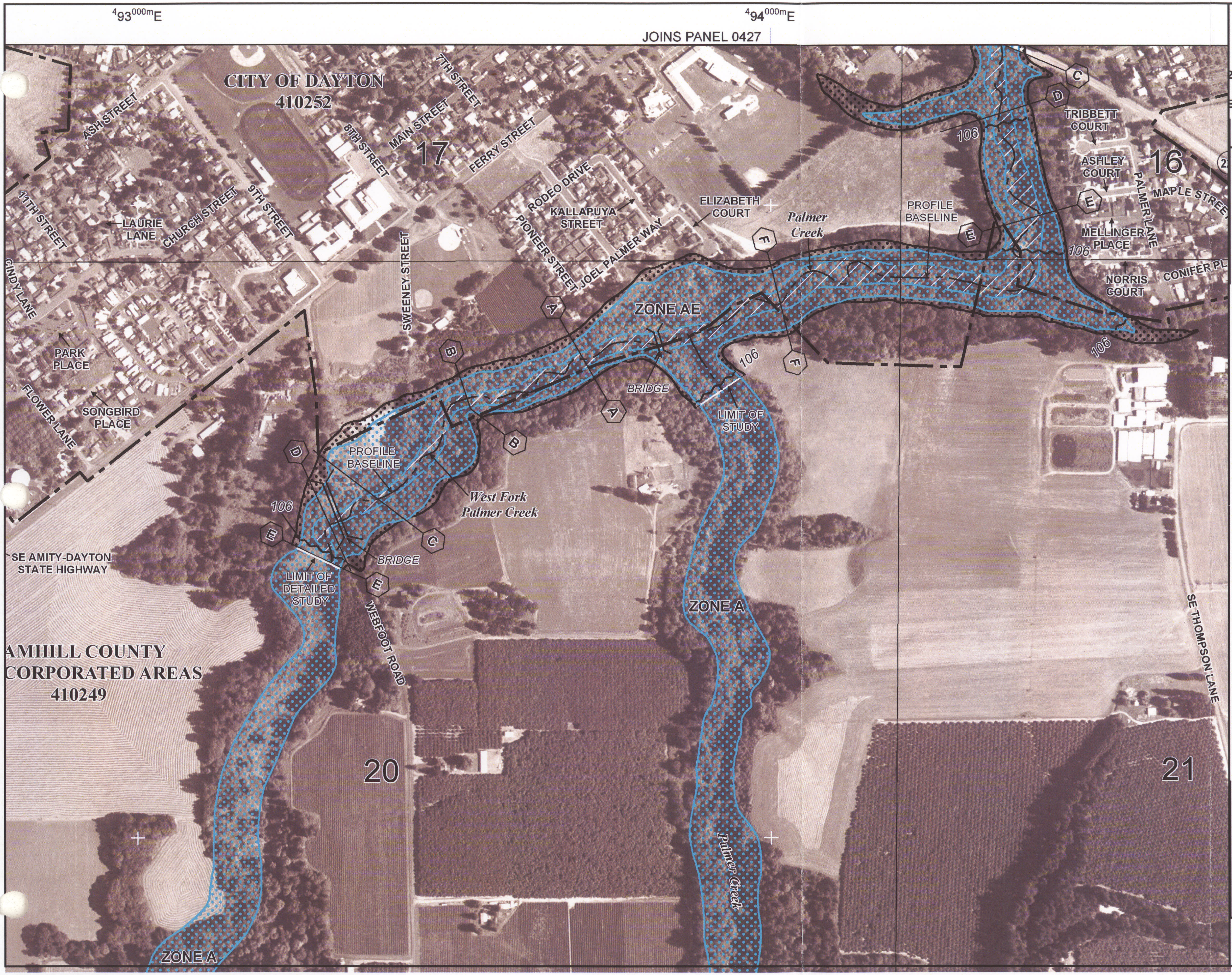
MAP NUMBER
41071C0427D

EFFECTIVE DATE
MARCH 2, 2010

Federal Emergency Management Agency

Figure 2-1

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METERS

NATIONAL FLOOD INSURANCE PROGRAM

NFIP

PANEL 0429D

FIRM

FLOOD INSURANCE RATE MAP

YAMHILL COUNTY, OREGON

AND INCORPORATED AREAS

PANEL 429 OF 675

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DAYTON, CITY OF	410252	0429	D
YAMHILL COUNTY	410249	0429	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
41071C0429D

EFFECTIVE DATE
MARCH 2, 2010

Federal Emergency Management Agency

Figure 2-2

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

2.3.5.3 High Groundwater.

Seasonal high groundwater is a common occurrence within the study area. The high groundwater levels are caused primarily by perched water tables due to soil saturation and lack of local drainage.

2.3.5.4 Steep/Unstable Slopes

The only areas of potential slope stability concerns within the study area are the steep slopes near Yamhill River and Palmer Creek on the north, south and east sides of town. Steep slopes can have the potential for either mass movement or slope erosion. Mass movement results from shifting of rock or soil material in response to gravity, such as landslides and rock slides. These mass movements are often precipitated or aggravated by excessive groundwater. Slope erosion is the removal of soils or rock that occurs as a result of sheet flow, resulting in surface erosion or gully erosion. This is primarily caused by private land use practices (mainly land clearing and road construction) that can exacerbate slope erosion.

Although this area shows no signs of recent movement, the steep slopes around Yamhill River and Palmer Creek can be considered a geologically sensitive area for siting critical facilities, such as pump stations, reservoirs, or treatment plants.

2.3.5.5 Stream Erosion

As is common with most valley bottom streams, the Yamhill River and Palmer Creek channels are continuously eroding and re-depositing bank material. This is especially prevalent on the outer bends of the river where undercutting and caving of the banks is common within the study area. The potential for stream bank erosion is an important design issue that must be carefully considered for facilities sited near the Yamhill River and Palmer Creek.

2.3.6 Public Health Hazards

Discussions with City staff have not revealed any known or documented chronic public health hazards within the study area.

2.3.7 Air Quality and Noise

2.3.7.1 Air Quality

The existing air quality in the study area is generally good. Agricultural, slash and field burning can be significant intermittent air pollution sources, primarily during July and August. During cold periods with stagnant air, residential wood heating may impact local air quality. There are no known air quality monitoring stations located within the study area.

2.3.7.2 Noise

There are no significant generators or sources of noise in the Dayton study area. Noise levels are low and do not exceed DEQ standards. Noise sources within the study area are largely limited to vehicular traffic. None of the alternatives evaluated herein are expected to generate significant noise.

2.3.8 Environmentally Sensitive Areas

2.3.8.1 Riparian Zone

Riparian zones include the riparian zone adjacent to the Yamhill River and creeks, as well as incidental riparian zones that are a part of the intermittent drainage channels found throughout the study area. Riparian zones are considered sensitive due to the variety of vegetative and wildlife species that utilize these areas as habitat. Riparian zones provide erosion control, drainage and runoff water quality management, wildlife habitat, and shading for surface waters.

2.3.8.2 Wetlands

Wetlands are considered to be one of the most biologically productive components of the environment. Their functions and value include primary production, fish and wildlife habitat, flood control, water quality improvement and erosion control and point of entry for groundwater recharge. Detailed wetland surveys or delineations are not included in the scope of this study.

The methodology for determining wetland areas is based on the Army Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory, 1987), used by the U.S. Army Corps of Engineers and the Oregon Division of State Lands (DSL). The regulatory definition of wetlands in the 1987 Manual requires that, under normal circumstances, positive indicators of wetland hydrology, hydric soil, and hydrophytic vegetation are present. Wetlands are defined as areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas, but also include seasonal wet meadows, farmed wetlands and other areas that may not appear "wet" all the time. Wetland determinations consist of documenting three criteria: hydrophytic (water-tolerant) vegetation, hydric (wet) soils, and wetland hydrology.

The Oregon Division of State Lands (DSL) is responsible for developing and maintaining the Statewide Wetlands Inventory (SWI). The inventory consists of two types of inventories - the National Wetlands Inventory (NWI) developed by the U.S. Fish and Wildlife Service and Local Wetlands Inventories (LWI) developed by cities according to standards set by the DSL.

The National Wetlands Inventory (NWI) was developed by the U.S. Fish and Wildlife Service (FWS) and is available statewide. Wetlands and deepwater habitats (streams, lakes, estuaries, etc.) are mapped on a USGS quad map base; most are at a scale of 1:24,000. Only those wetlands and other waters that are visible on high altitude aerial photographs are mapped, and most maps date to the mid-1980s. There are 1,865 maps for Oregon. These maps are available from the Oregon Division of State Lands (DSL). The NWI completed in 1994 for Dayton (Dayton quad) delineates wetlands along the Yamhill River and some small portions of land located outside of town

Local Wetlands Inventories (LWIs) are comprehensive maps and information about wetlands throughout a city. They supplement the National Wetlands Inventory in urban areas. However, at this time Dayton has not completed a local wetland inventory map for the City.

Wetlands can affect the master planning effort if the land within the UGB contains a substantial amount of wetlands. Dayton has very little wetland area mapped within the UGB, and areas that do have wetlands nearby are typically near steep slopes or in the flood plain, and are therefore mostly undevelopable. Construction work that impacts wetland areas is subject to additional permit requirements.

2.3.8.3 Historical and Archaeological Sites.

Founded in 1850 by General Joel Palmer and Andrew Smith, Dayton has a rich history as one of the first settlements in the Willamette Valley. Later in 1865 the original town plat was recorded and in 1880 Dayton was incorporated. A number of buildings and structures throughout town are included on the

National Register of Historic Places. The selected alternative will likely not have any known impact on historical sites.

The mid-Willamette Valley was inhabited with the Calapooia people when the first western settlers arrived in the mid 1840's. It is also likely that prehistoric people inhabited the study area at one time. Remains of these cultures will likely be located adjacent to the Yamhill River and its tributaries. Therefore, an archaeological assessment may be required during the predesign phase, especially in areas adjacent to the river.

2.4 FLORA AND FAUNA

2.4.1 Flora

The natural vegetation within the study area has been largely replaced by rural residential or agricultural (pasture or seed grass) uses. The area is capable of supporting lowland meadows or forests but to a large extent these have been replaced. Typical native vegetation along lowland areas include such tree species as Douglas fir, Western Red Cedar, Big leaf maple, Vine Maple, California black cottonwood, Pacific yew, ash, Oregon oak, and Hawthorn. Shrubs that can be found are Snowberry, Indian plum and Western hazel. Willows and various grasses are also found in this habitat.

2.4.2 Fauna

A variety of wildlife species are found within the study area. The only big game species found in the study area is the black-tailed deer. Several species of birds and small animals are found in and around the study area. Included in this group are ring-necked pheasant, turkeys, grouse, quail, waterfowl, doves, pigeons, and several varieties of song birds.

Forest Cover and riparian areas provide the habitat necessary for most big-game, bird, and small animal species. The agricultural areas within the study area provide feeding and cover for a variety of waterfowl and song birds.

The Yamhill River and many of its tributaries are important habitat for a variety of fish. Common fish species found include largemouth bass, rainbow trout, coastal cutthroat trout, dace and sculpin as well as anadromous salmonids, including coho salmon, chinook salmon and steelhead.

2.4.3 Threatened or Endangered Species.

A comprehensive inventory for threatened or endangered species in the study area has not been completed. Significant discussion and interest in anadromous salmonids exists in the Willamette Basin including the Yamhill River. The National Marine Fisheries Service (NMFS) is responsible for evaluating the "health" of different species and individual runs under the terms of the Endangered Species Act (ESA). The NMFS has defined the Upper Willamette Evolutionarily Significant Unit (ESU) as the Willamette basin upstream of Willamette Falls (Oregon City). This unit includes the Yamhill River.

On March 24, 1999, the NMFS listed as threatened all naturally spawned populations of spring chinook salmon in the Upper Willamette ESU. This listing impacts that reach of the Yamhill River adjacent to the study area which has been classified by the Oregon Department of Fish and Wildlife (ODFW) as providing rearing and migration habitat for spring chinook.

On March 25, 1999, the NMFS listed as threatened all naturally spawned populations of winter run steelhead in the Upper Willamette ESU. This listing also impacts that reach of the Yamhill River adjacent to the study area which has been classified by the ODFW as providing rearing and migration habitat for winter steelhead.

The NMFS issued the proposed 4(d) rules in December 1999 and the final rules in July 2000. The 4(d) rules are the mechanism under the ESA for protecting threatened as opposed to endangered species. How the listings of steelhead and salmon will impact projects, including public water projects, is not fully known at this time. A general consensus is that work that impacts riparian vegetation or work within the stream channels proper will come under increasing scrutiny. To the extent feasible, alternatives that either do not impact or minimize impacts to riparian zones should be considered.

No other threatened or endangered species are known to reside in the study area. However, a biological inventory has not been completed. If the actual alternative constructed differs from the proposed alternative and results in construction at land sites not considered under this report, it will be necessary to perform both historical/archaeological and biological surveys to assure that impacts to threatened or endangered species do not occur.

2.5 ENERGY PRODUCTION & CONSUMPTION

The proposed water system will not produce any electricity or other energy sources. With regards to energy consumption, the major energy consumers in a water treatment and distribution system are the electric motors required to drive pumps and other equipment. It is recommended that these components be specified as having high or premium efficiency motors, which will reduce the operating costs over the life of the project. Depending on the current programs in place with the electric utility providing service, there may be rebates available if high/premium efficiency electrical motors are specified, which will tend to offset the slightly higher capital construction cost.

2.6 SOCIO-ECONOMIC ENVIRONMENT

Growth within the study area will depend on socio-economic conditions within the City. The following section contains a general discussion of economic conditions, trends, population, land use, and public facilities relating to both the study area and the City.

2.6.1 Economic Conditions and Trends

Population growth and the resultant water demands within the study area are linked to the economic conditions and trends of the City and the Portland metropolitan area. Dayton is an attractive town with a rural atmosphere that offers more affordable housing options than Portland. Dayton is to some extent evolving into a bedroom community for persons employed in Portland and McMinnville. With limited significant industrial or commercial growth expected in the near future, this characterization is likely to remain valid throughout the planning period.

Dayton has experienced rapid levels of development during the past few years before the recession hit. Due to the poor economy development is anticipated to be slow in the immediate future and slowly increase in the future. Currently, the City believes most of the future residential development within in the current City Limits will be infill development. The majority of developable land outside the City Limits and within the UGB is located in the northeast section of town.

2.6.2 Population & Growth Projections

2.6.2.1 Municipal Population Base

Based on US Census data, Dayton's population in the year 2000 was 2,119 people. Based on population estimates prepared by the PSU Population Research Center, the population had increased to approximately 2,500 by the beginning of 2010. The municipal population is expected to grow to 4,060 by the year 2030. A more in-depth discussion of population projections is presented in Section 5.3.

2.6.3 Land Use Regulations

2.6.3.1 Comprehensive Plan

All of the land within the planning area is within the Dayton UGB. The City's Comprehensive Plan was adopted in 1979, and was most recently revised in 2009.

2.6.3.2 Land Use Zoning

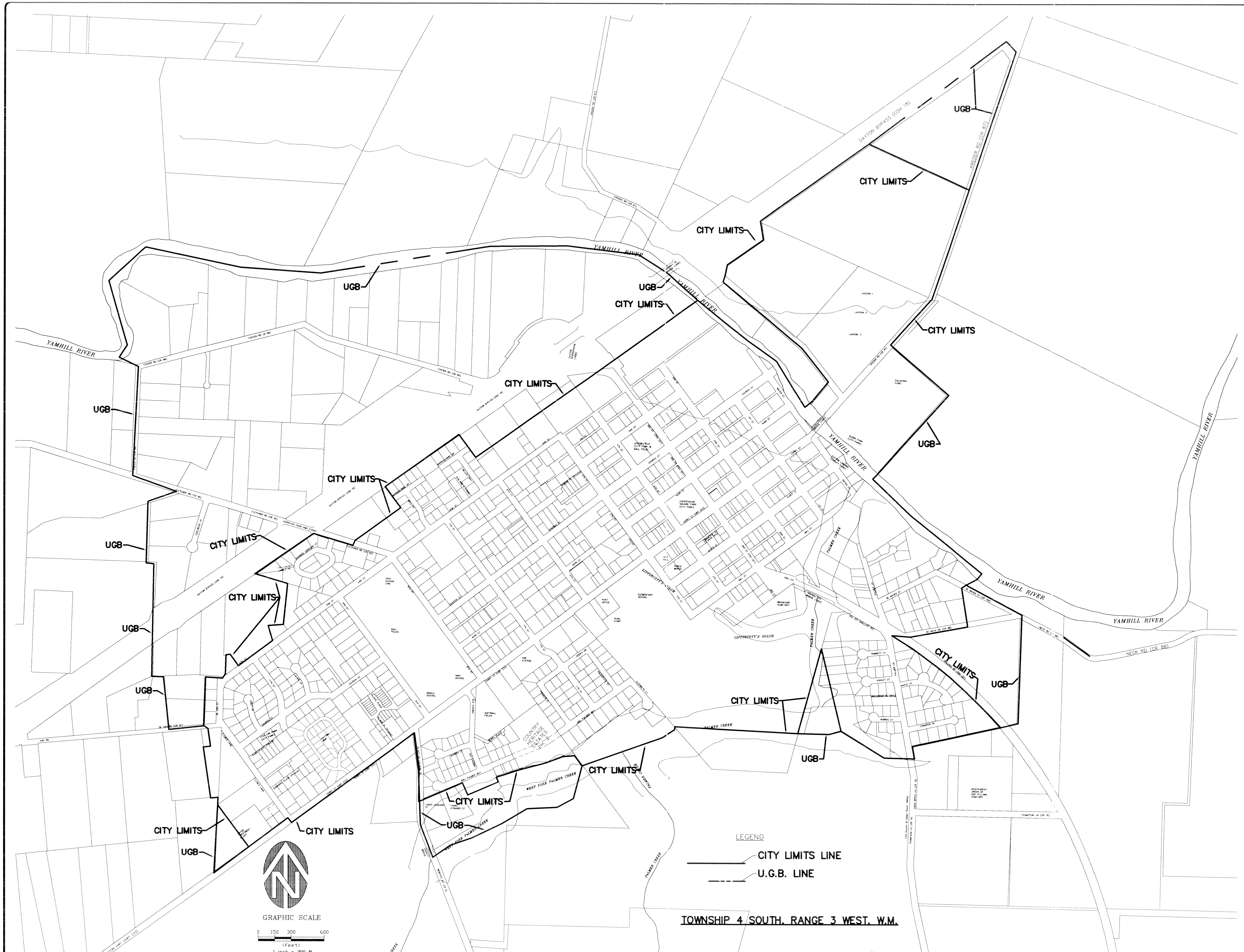
Eventually the entire area within the UGB will be served by the City's utility systems. Land use zoning in the City is comprised primarily of residential uses, although there is a relatively large undeveloped area for industrial development in the east corner of town (approximately 27.5 acres). Lesser amounts of land are designated for commercial and public uses.

The location of the UGB and City limits are shown in **Figure 2-3**, while **Figure 2-4** also shows the land use zoning designations within the City.

The total areas contained under each zoning designation are listed in **Table 2–1**. There are small areas of residential land within the City Limits, which are currently undeveloped. It is anticipated that most of the development within the current City Limits will be infill development.

Table 2-1 Approximate Areas by Land Use Zone

Land Use Category	Area (Acres)
Single Family Residential (R-1) (7,000 S.F. Min., 9000 S.F. Duplex)	150
Limited Density Residential (R-2) (6,000 S.F. Min., 7,000 S.F. Duplex)	154
Medium Density Residential (R-3) (6,000 S.F. Min.)	7
Commercial Residential (CR)	15
Commercial (C)	36
Public, Semi-Public (P)	112
Industrial (I)	44
Total Area w/in City Limits	**± 518**
Area Outside City Limits w/in UGB	**± 306**
TOTAL Area w/in UGB	**± 824**



MAP UPDATED: 11-9-07

WESTECH ENGINEERING, INC.
CONSULTING ENGINEERS AND PLANNERS

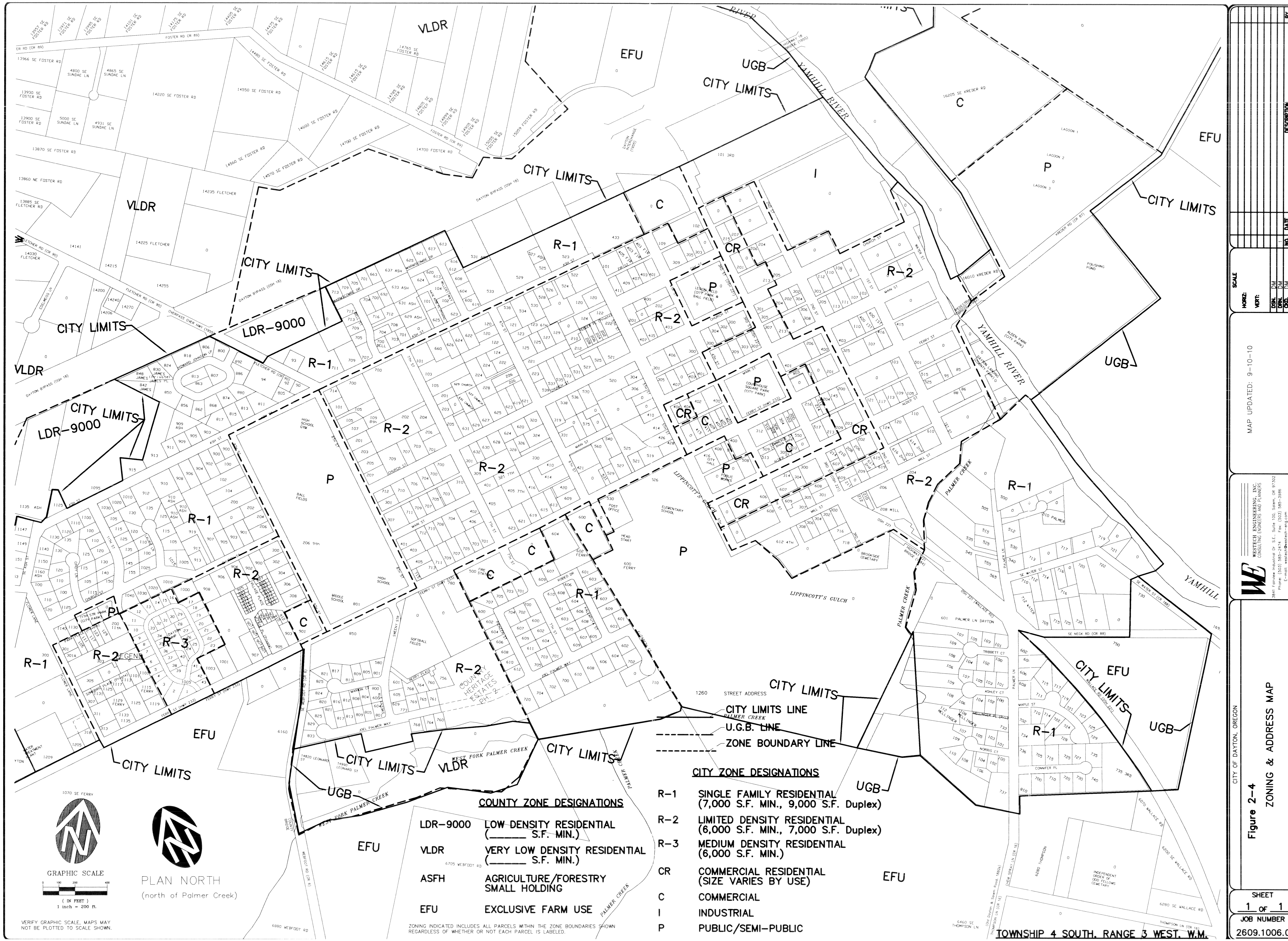
CITY OF DAYTON, OREGON

Figure 2-3
CITY LIMITS & UGB MAP

DATE: AUG 2006

SHEET 1 OF 1

JOB NUMBER 2609.1006.0


CITY LIMITS LINE
U.G.B. LINE
ZONE BOUNDARY LINE
COUNTY ZONE DESIGNATIONS
LDR-9000 LOW DENSITY RESIDENTIAL (______ S.F. MIN.)
VLDR VERY LOW DENSITY RESIDENTIAL (______ S.F. MIN.)
ASFH AGRICULTURE/FORESTRY SMALL HOLDING
EFU EXCLUSIVE FARM USE
ZONING INDICATED INCLUDES ALL PARCELS WITHIN THE ZONE BOUNDARIES SHOWN REGARDLESS OF WHETHER OR NOT EACH PARCEL IS LABELED.
CITY ZONE DESIGNATIONS
R-1 SINGLE FAMILY RESIDENTIAL (7,000 S.F. MIN., 9,000 S.F. Duplex)
R-2 LIMITED DENSITY RESIDENTIAL (6,000 S.F. MIN., 7,000 S.F. Duplex)
R-3 MEDIUM DENSITY RESIDENTIAL (6,000 S.F. MIN.)
CR COMMERCIAL RESIDENTIAL (SIZE VARIES BY USE)
C COMMERCIAL
I INDUSTRIAL
P PUBLIC/SEMI-PUBLIC
1260 STREET ADDRESS
GRAPHIC SCALE
(IN FEET)
1 inch = 200 ft.
VERIFY GRAPHIC SCALE. MAPS MAY NOT BE PLOTTED TO SCALE SHOWN.
PLAN NORTH
(north of Palmer Creek)
TOWNSHIP 4 SOUTH, RANGE 3 WEST, W.M.
MAP UPDATED: 9-10-10
WESTECH ENGINEERING, INC.
CONSULTING ENGINEERS AND PLANNERS
CITY OF DAYTON, OREGON
Figure 2-4
ZONING & ADDRESS MAP
DSN. DM
DRN. DM
CKD. DM
DATE AUG 2006
SHEET 1 OF 1
JOB NUMBER 2609.1006.0
YAMHILL RIVER
PALMER CREEK
LIPPINCOTT'S GULCH
WEST FORK PALMER CREEK

3

CHAPTER 3

REGULATORY REQUIREMENTS

Chapter Outline

REGULATORY REQUIREMENTS

3.1 INTRODUCTION

This chapter provides a summary of the key regulatory requirements and standards that govern the operation of the City's water system, and which form the basis of the master planning effort. These regulations include both water quality and water use standards. This overview is for general reference only and may not include all requirements.

3.2 REGULATING AGENCIES

The State of Oregon Department of Human Services, Drinking Water Program (ODWP) is the primary regulating agency for water quality standards related to public drinking water systems.

Water rights and water use regulations are administered by the Oregon Water Resources Department (OWRD).

3.3 EXISTING WATER QUALITY REGULATIONS

Congress passed the original Title XIV of the Public Health Service Act, commonly known as the Safe Drinking Water Act (SDWA), in 1974. The SDWA and subsequent amendments are federal water quality regulations affecting all public water purveyors. Regulations under the SDWA at the federal level are promulgated by the US Environmental Protection Agency (USEPA). The requirements of the SDWA and amendments are implemented by the State of Oregon under the Oregon Drinking Water Quality Act of 1981 (ORS 448 as amended). This legislation allowed the State to gain primacy for enforcing the federal rule requirements and the responsibility of maintaining and enforcing a drinking water program.

The ODWP periodically publishes an overview of drinking water quality standards. The most current version of this overview is published in Volume 21, Issue 4, Fall 2006 of the Pipeline newsletter and is included in **Appendix A**. The newsletter provides a listing of contaminant MCLs, treatment techniques, and a detailed account of regulatory history.

The USEPA and 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 report results of that sampling to the regulating agency.

Primary contaminants can be grouped into the following general groups. A discussion of each will be presented in this section.

- Microbial contaminants
- Disinfectants and disinfection byproducts
- Inorganic chemicals
- Organic chemicals
- Radiologic contaminants

Control of each contaminant is administered through a proscribed list of standards or limits that take several forms.

- *Maximum Contaminant Level Goal (MCLG)* — The level of a contaminant in drinking water below which there is no known or expected risk to health, allowing for a margin of safety. All regulated contaminants have an MCLG, although the MCLG is not enforceable.
- *Maximum Contaminant Level (MCL)* — The highest level of a contaminant allowed in drinking water, set as close to the MCLG as feasible using the best available treatment technologies.
- *Treatment Technique (TT)* — A required treatment process intended to reduce the level of a contaminant in drinking water. Contaminants for which testing or monitoring is not economically or technically feasible are regulated by the establishment of a treatment technique. Treatment techniques represent a requirement to install and operate a treatment process that has a proven efficacy for contaminant reduction. Performance standards (PS) are used to determine whether or not a water system is meeting a specific treatment technique requirement and consist of measurements of water quality parameters such as turbidity, disinfectant residual, pH, or alkalinity.
- *Action Level (AL)* — The concentration of a contaminant, which when exceeded, triggers treatment or other requirements that a water supplier must follow.

Water systems that use groundwater sources are governed by a different set of water quality regulations than those that use surface water sources. A third category of source water, regulated under the same standards as surface water, is groundwater under the direct influence of surface water (GWUDI). The ODWP defines GWUDI as "any water beneath the surface of the ground with significant occurrences of insects or other macro-organisms, algae or other large-diameter pathogens such as *Giardia lamblia* or *Cryptosporidium*, or significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity or pH which closely correlate to climatological or surface water conditions". An evaluation of surface water influence can involve geological assessments or water quality analysis, depending on the determination of the ODWP. Such investigations or re-evaluations can be made at any time based on changing conditions. If sources that are determined to be potentially GWUDI cannot be upgraded to preclude surface water influence, the City will be regulated by GWUDI water quality standards. To this end, the discussions in this chapter include an overview of regulatory requirements for GWUDI sources.

3.3.1 Microbial Contaminants

Pathogenic microorganisms in drinking water can be divided into three groups: bacteria, protozoa, and viruses. Pathogenic microorganisms have a number of specific properties which distinguish them from chemical contaminants; they are living organisms and are not dissolved in water, although they will coagulate or attach to colloids and solids in water.

Regulatory inactivation or removal of these three groups of microorganisms is predominantly determined by the nature of the water source. In general, municipalities using surface water or GWUDI sources are required to inactivate or remove all three sources, while those using groundwater are required to provide for inactivation of viruses.

Bacteria

Coliforms are a broad class of bacteria which live in the digestive tracts of humans and many animals. Although many types of coliform bacteria are harmless, some cause gastroenteritis, a general category of health problems that includes diarrhea, cramps, nausea, and vomiting. Gastroenteritis is not usually serious for a healthy person, but can cause serious problems for people with weakened immune systems such as the very young, elderly, or immune-compromised. Outside the colon, coliforms only survive for approximately 48 hours. Common bacteriological pathogens responsible for waterborne disease include *Escherichia coli (E. coli), Legionella, Salmonella typhi, Shigella*, and *Vibro cholerae*.

Protozoa

Protozoa are single-cell organisms. They have a complex metabolism and feed on solid nutrients, algae, and bacteria present in multiple-cell organisms, such as humans and animals. To survive harsh environmental conditions, some species can secrete a protective covering and form a resting stage called a cyst, a condition that can protect some protozoa from conventional chlorine disinfection. Common examples of parasitic protozoa are *Giardia lamblia* and *Cryptosporidium*.

Viruses

Unlike bacteria and parasitic protozoa, viruses can only replicate in living host cells and are inactive for periods outside of the host organism. Due to their small size, viruses can pass through conventional filtration processes and are accordingly typically inactivated with chlorine. Common examples of waterborne viruses include hepatitis A, rotavirus and Norwalk virus.

3.3.1.1 Regulatory Monitoring

Bacterial Coliforms

Initially published in 1989 the Total Coliform Rule (TCR) applies to all public water systems and establishes health goals—in the form of maximum contaminant level goals (MCLGs), and legal limits—in the form of maximum contaminant levels (MCLs) for total coliform levels in drinking water. It requires systems to sample for coliform bacteria which are used as an indicator of whether a water system is vulnerable to pathogens. Coliforms were also selected because they are easily detected in water.

In promulgating the TCR, the EPA set the maximum contaminant health goal (MCLG) for total coliforms at zero. The ODWP stipulates the total number of water samples a PWS must test each month and limits the number of "coliform-present" samples within this routine collection set. The number of routine samples is dependent on population. The City is currently very close to the population threshold that will trigger additional sampling.

Based on a current population of 2500, the City is currently required to collect two (w) monthly samples. However, once the population reaches or exceeds 2501, the number of monthly samples will increase to three (3). Samples must be taken from an approved set of locations throughout the distribution grid, and the number of "coliform-present" results is limited to a single sample.

If a sample tests positive for coliforms, the system must collect a set of repeat samples within 24 hours. A "coliform-present" test result on either a routine or repeat sample constitutes a non-acute violation and requires additional testing for fecal coliforms and *E. coli*. A positive result for either fecal coliform or *E. coli* constitutes an acute MCL violation. Public notification is conducted in accordance with OAR 333-061-0042, which outlines a tiered approach commensurate with the proscribed risk level of a given violation.

Protozoa and Viruses

The control of protozoa and viruses is accomplished with treatment techniques (such as turbidity reduction and disinfection) in lieu of MCLs.

Treatment techniques for groundwater include the provision of continuous chlorination where water from each sources enters the system, maintaining a disinfectant residual in the distribution system, protecting the source water area, proper well construction, maintaining distribution system pressure and controlling or eliminating cross-connections within the distribution system.

Public water systems utilizing surface water or GWUDI are required to install and properly operate a water treatment process that reliably achieves 3-log (99.9%) removal and/or inactivation of *Giardia lamblia*, 4-log (99.99%) removal of viruses, and 2-log (99%) removal of *Cryptosporidium*.

3.3.1.2 Municipal Compliance

Bacterial Coliforms

Compliance for the TCR is based on a monthly cycle measured on two levels: submitting the proscribed number of samples, as well as successful test results for the absence of total coliforms in a given test cycle. As of 10/1/10, the only recorded violation of the coliform MCL on record with ODWP over the past three years was one sample in August 2010, for which the repeat samples tested negative for coliforms.

Protozoa and Viruses

Since the City has historically operated as a groundwater system, it is currently exempt from the surface water or GWUDI treatment technique requirements. The City is currently classified as in compliance with the source water and distribution system disinfection requirements, and other groundwater treatment technique requirements.

Two potential developments could require the City to construct treatment facilities in order to comply with surface water treatment standards for the removal and/or inactivation of *Giardia* and *Cryptosporidium*. First, should any of the existing groundwater sources be reclassified as GWUDI, and second, if the City is unable to meet the turbidity standard of 5.0 nephelometric turbidity units (NTU) for any of their groundwater sources. The City has not historically monitored for turbidity in the raw or finished water.

3.3.2 Disinfectants and Disinfection Byproducts Rule

Disinfection of drinking water can readily be identified as one of the major public health advances of the 20th century. While disinfectants are effective in controlling many microorganisms, they react with natural organic and inorganic matter in water to form disinfection byproducts (DBPs) which have been shown to be carcinogenic in laboratory animals. While it is important to strengthen protection against microbial contaminants, it is also important to reduce the potential health risks of DBPs.

The Federal Total Trihalomethane Rule was published in the Federal Register in November 1979 and established a MCL for total trihalomethanes (TTHMs) for community water systems serving 10,000 people or more. The Stage 1 Disinfectants and Disinfection Byproducts Rule (Stage 1 DBPR) promulgated in December of 1998 built on the TTHM Rule by lowering the existing MCL and widening the range of affected systems to include all public water systems that add a disinfectant to their drinking water. The rule specifically established:

- a maximum residual disinfectant level goal (MRDLG) for chlorine at 4.0 mg/L
- a maximum residual disinfectant level (MRDL) of 4.0 mg/L for chlorine
- a total trihalomethane MCL of 80 µg/L, regulating the sum of four trihalomethanes
- a haloacetic acid (HAA5) MCL of 40 µg/L, regulating the sum of five haloacetic acids

The rule also established removal limits of total organic carbon (TOC) as a DBP precursor. Other portions of the rule that do not apply to the City water system have been omitted from this discussion.

The Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR) was finalized on January 4, 2006 and applies to water systems that use groundwater, GWUDI, and surface water. The rule retains the MCLs for TTHMs and HAA5s established in the Stage 1 DBPR and augments the rule by providing more consistent protection from DBPs across the entire distribution system and by focusing on the reduction of DBP peaks.

The Stage 2 DBPR requires community water systems to conduct initial distribution system evaluations (IDSEs) to identify and select new compliance monitoring sites that more accurately reflect sites representing high TTHM and HAA5 levels. These new 'worst-case' monitoring sites are selected based on the results of the Stage 1 DBPR compliance monitoring. The rule also redefines the method of calculating MCLs. Compliance with each MCL will be based on a locational running annual average (LRAA) instead of the running annual average (RAA) method used under the Stage 1 DBPR.

3.3.2.1 Regulatory Monitoring

Community water systems can fulfill the IDSE requirements by applying for 40/30 Certification, a process whereby a community water system certifies that all individual TTHM and HAA5 monitoring results for compliance with the Stage 1 DBPR are less than or equal to 40 µg/L for TTHM and 30 µg/L for HAA5 during a prescribed 2-year period. In addition the system must not have had any Stage 1 DBPR monitoring violations for TTHM and HAA5 during the same period. At the state's discretion, a system meeting all of the requirements for 40/30 certification may still be required to conduct standard monitoring. Systems that qualify for reduced monitoring may remain on reduced monitoring as long as their quarterly LRAAs for TTHMS and HAA5 remain no more than 40 µg/L for TTHM and 30 µg/L for HAA5, respectively (for systems with quarterly reduced monitoring) or their TTHM and HAA5 samples are no higher than 60 µg/L and 45µg/L, respectively (for systems with annual or less frequent monitoring).

Table 3-1 summarizes the anticipated sampling requirements under the Stage 2 DBPR based on population and source water type.

Table 3-1 Stage 2 DBPR Compliance Monitoring Requirements

Source Water Type	CWS Population	Monitoring Frequency [1]	Total Distribution System Monitoring Locations
Groundwater	500 – 9,999	per year [2]	2
	10,000 – 99,999	per quarter [3]	4
GWUDI	3,301 – 9,999	per quarter [3]	2
	10,000 – 49,999	per quarter [3]	4

(1) Standard monitoring frequencies. All systems must monitor during the month of highest DBP concentration.

(2) Systems on annual monitoring are required to take individual TTHM and HAA5 samples (instead of a dual sample set) at the locations with the highest TTHM and HAA5 concentrations respectively. Only one location with a dual sample set is required if the highest TTHM and HAA5 concentrations occur at the same location and month.

(3) Systems on quarterly monitoring must take a dual sample set (a TTHM and an HAA5 sample) at each monitoring location during each monitoring period.

3.3.2.2 Municipal Compliance

The City has submitted samples for DBP testing from two locations (Dayton RV Park & Palmer Lane Hydrant). TTHM and HAA5 data reported to ODWP for 2006 through 2009 have been below the MCL with the exception of samples submitted in September 2008, when the TTHM level was slightly above the MCL. There is no indication that the City will have problems complying with current or future anticipated MCLs.

3.3.3 Lead and Copper Rule

Lead or copper in Oregon tap water is primarily due to corrosion of plumbing system components within buildings. Consumers commonly describe the presence of copper as metallic, bitter or rusty. The ability to detect copper in tap water is thought to be controlled by individual sensitivity; however, water chemistry also plays a part since the flavor of copper is more noticeable at lower pH levels.

The control of lead and copper concentrations in drinking water began with the Oregon lead solder ban of 1985, which prohibited the use of lead pipe and set lead content limits for plumbing solder and brass fixtures. In 1991 the EPA promulgated the Lead and Copper Rule (LCR) to further regulate lead and copper concentrations in drinking water. The LCR was uniformly adopted by Oregon on December 7, 1992 and applies to community and non-transient, non-community public water systems. The rule is unique in that compliance is measured by water sampled from the consumer's tap instead of from sampling points at the water treatment plant or within the public distribution system. Failure to meet the regulatory limits requires the water utility to implement a corrosion control treatment process designed to reduce the corrosivity of the water.

3.3.3.1 Regulatory Monitoring

The LCR establishes action levels of 15 µg/L for lead and 1.3 mg/L for copper. It also sets a secondary maximum contaminate level (SMCL) for copper at 1 mg/L. The LCR stipulates that sampling be conducted at "high-risk" homes, further defined as homes constructed prior to 1985 that utilize copper piping and lead-based solder. One-liter samples of standing water (first draw after a minimum 6-hours of non-use) are collected from homes identified in the water system sampling plan. In each round of sampling 90% of the samples must have lead levels less than or equal to the action level. The number of samples is determined by the municipal population and equates to 20 initial samples for the City system. Two rounds of initial sampling were required and were collected at six-month intervals (1993 & 1994). Subsequently, three annual samples were required and were conducted with a reduced sample set (10 samples) if the initial sampling confirms compliance. Demonstration of compliance after this stage decreases the sampling frequency to once every three years (with the reduced sample set of 10).

Water systems that cannot meet the action levels must install corrosion control treatment, and submit water sampling data to ODWP at proscribed frequencies. In the event the lead action level cannot be met with these measures in place a public education program, adjustments to the corrosion control program and follow-up sampling is required.

3.3.3.2 Municipal Compliance

The initial and follow up monitoring results from 1993 to 2009 showed the system to be in compliance. Based on the City's successful compliance with corrosion control, the sampling frequency required by ODWP is every three years.

3.3.4 Inorganic Contaminants

The USEPA regulates most chemical contaminants (inorganic and organic contaminants) through the rules known as Phase I, II, IIb, and V. The agency has issued the four rules over a five-year period after gathering, updating, and analyzing information on each contaminant's presence in drinking water supplies and its health effects.

Inorganic contaminants (IOCs) most commonly originate in the source of water supply, but can also enter the water from contact with materials used for pipes, plumbing fixtures and storage tanks. For most IOCs adverse health effects result after long-term (lifetime) exposure to the compounds. Water systems in Oregon rarely violate maximum levels for inorganic contaminants from source waters, but these contaminants are routinely detected in drinking water systems at levels more than one-half the maximum level. The most commonly detected inorganics in Oregon drinking water systems are nitrate, arsenic, nitrite, cadmium, and mercury.

The Oregon Drinking Water Act currently regulates 16 inorganic compounds (Antimony, Arsenic, Asbestos, Barium, Beryllium, Cadmium, Chromium, Cyanide, Fluoride, Mercury, Nickel, Nitrate, Nitrite, Selenium, Sodium and Thallium). Oregon law recognizes the acute health effects of nitrate, particularly for young children, and accordingly requires more stringent testing for nitrate. As previously noted a full listing of the inorganic MCL's appear in **Appendix B** at the end of this report.

3.3.4.1 Regulatory Monitoring

Monitoring for IOCs is conventionally required once every three years, and yearly for Nitrate. For the watershed system (McDougal Wells & springs), the City has qualified for a 9-year reduced monitoring cycle for IOCs, with the exception of nitrate which is required annually, and arsenic which is required every three years.

For the wellfield system (Dayton-Lafayette wellfield, WTP), the City is currently under a 3-year reduced monitoring cycle for IOCs, with annual testing for nitrate.

3.3.4.2 Municipal Compliance

The City has been in compliance for IOC testing with the exception of high levels of sodium in the Dayton wellfield water (the sodium limit is an advisory limit only).

3.3.5 Organic Contaminants

Current drinking water standards regulate a total of 56 organic contaminants frequently classified into two sub-groups, Volatile Organic Chemicals (VOCs) and Synthetic Organic Chemicals (SOCs). Organic contaminants are man-made chemicals and commonly include industrial and commercial solvents and chemicals as well as herbicides and pesticides used in agriculture and landscaping. A full list of the contaminants appears in **Appendix B**.

3.3.5.1 Regulatory Monitoring

Public water systems are required to test for each contaminant from each water source during every 3-year compliance period. Public water systems with a population greater than 3,300 must test twice during each three-year compliance period for SOCs (this is expected to apply to Dayton midway through the planning period). Public water systems using surface water or GWUDI must test for VOCs at the entry point annually. Quarterly follow up testing is required for any contaminants that are detected. The exceptions are dioxin and acrylamide/epichlorohydrin. Only those systems determined by ODWP to be at risk of contamination must monitor for dioxin. Sampling may be reduced to a 6-year cycle if the system has a certified Drinking Water Protection Plan. Systems that cannot meet the MCLs must install or modify treatment systems or develop alternate sources.

3.3.5.2 Municipal Compliance

All SOC and VOC test results have been in compliance. Historic results predict that the City will be able to comply with this rule in the future.

3.3.6 Radiologic Contaminants

The purpose of this rule is to limit exposure to radioactive contaminants in drinking water. Most drinking water sources have very low levels of radioactive contaminants, most of which are naturally occurring as trace elements in rocks and soils. Most radioactive contaminants are at levels that are low enough to not be considered a public health concern. At higher levels, long-term exposure to radionuclides in drinking water may cause cancer. Radon, another decay product of radioactive material, is regulated independently under the Radon Rule in later in this chapter.

3.3.6.1 Regulatory Monitoring

Initial testing required by this rule began in 2005 and required all public water systems to test each source quarterly for one year, with test results required for gross alpha, radium-226/228 and uranium. Currently, test frequency has been reduced to every 9 years for gross alpha and radium-226/228, and every 6 years for uranium. Testing is required to resume on a quarterly basis if the MCL is exceeded.

3.3.6.2 Municipal Compliance

All radiologic test results have been in compliance. Historic results predict that the City will be able to comply with this rule in the future.

3.3.7 Arsenic Rule

On January 22, 2001 EPA adopted a new standard for arsenic in drinking water at 10 micrograms per liter (μg/L or ppb), replacing the old standard of 50 μg/L. Oregon adopted the rule and the new limit went into effect on October 21, 2004.

Arsenic is a naturally occurring chemical found in the earth's crust, but can be dangerous to humans when released into drinking water supplies as rocks, minerals, and soils erode. Studies have linked long-term exposure to arsenic contamination with cancer and cardiovascular, pulmonary, immunological, neurological, and endocrine effects.

3.3.7.1 Regulatory Monitoring

Systems with groundwater sources must sample every three years whereas systems with surface water sources must sample annually. Water systems that exceed the MCL must monitor quarterly and meet the MCL as a running annual average. Public water systems that cannot meet the MCL must either install water treatment systems or develop alternate sources of water.

3.3.7.2 Municipal Compliance

All arsenic test results have been in compliance. Historic results predict that the City will be able to comply with this rule in the future.

3.3.8 Secondary Contaminants

The EPA has established National Secondary Drinking Water Regulations that set non-mandatory secondary maximum contaminant level (SMCL) water quality standards for 15 contaminants. The EPA does not enforce these SMCLs as they are not considered to present a risk to human health at the listed levels. They are established only as guidelines to assist public water systems in managing their drinking water for aesthetic considerations. **Table 3-2** presents these contaminants.

Table 3-2 Secondary Maximum Contaminant Levels

Contaminant	Secondary MCL	Noticeable Effects above the Secondary SMCL
Aluminum	0.05 – 2.0 mg/L	Colored water
Chloride	250 mg/L	Salty taste
Color	15 color units	Visible tint
Copper	1.0 mg/L	Metallic taste, blue-green staining
Corrosivity	Non-corrosive	Metallic taste, corroded pipes/fixture staining
Fluoride	2.0 mg/L	Tooth discoloration
Foaming Agents	0.5 mg/L	Frothy, cloudy, bitter taste, odor
Iron	0.3 mg/L	Rusty color; sediment, metallic taste, reddish or orange staining
Manganese	0.05 mg/L	Black to brown color, black staining, bitter metallic taste
Odor	3 TON (1)	Musty, "rotten-egg" or chemical smell
pH	6.5 – 8.5	Low pH: bitter metallic taste, corrosion High pH: slippery feel, soda taste, deposits
Silver	0.1 mg/L	Skin discoloration, graying of the white part of the eye
Sulfate	250 mg/L	Salty taste
Total Dissolved Solids	500 mg/L	Hardness, deposits, colored water, staining, salty taste
Zinc	5 mg/L	Metallic taste

(1) Threshold Odor Number

3.3.8.1 Regulatory Monitoring

Secondary maximum contaminant levels are non-mandatory regulations and therefore do not have a monitoring requirement.

3.3.9 Groundwater Rule

On November 8, 2006 the USEPA promulgated the final Ground Water Rule (GWR) to reduce the risk of exposure to fecal contamination that may be present in public water systems that use groundwater sources. The GWR builds upon the Total Coliform Rule (TCR) and addresses bacterial and viral contamination at the source, as a complimentary approach to the distribution monitoring currently required by the TCR.

The GWR establishes a risk-targeted approach to identify groundwater systems that are susceptible to fecal contamination. Indications of risk may come from total coliform monitoring, hydrogeologic sensitivity analyses, or other system-specific data and information. The GWR specifically targets viral pathogens as a category of fecal contaminants.

The rule applies to all public water systems served by groundwater sources that are not treated to Surface Water Treatment Rule (SWTR) standards. Although federal guidance on key aspects of the rule is still in development it is clear that GWR implementation will be state-specific. Oregon has adopted the regulations and received interim primacy for the SWTR until full primacy is approved by EPA.

3.3.9.1 Regulatory Monitoring

For systems that elect to achieve 4-log (99.99%) inactivation of viruses by disinfection for all sources, compliance monitoring is required to ensure the reliability of the treatment process (ie. compliance monitoring includes <u>continuous</u> monitoring of chlorine residual at the entry point to distribution system). This 4-log virus inactivation disinfection requirement is based on CT values between the water source(s) and the first water user. The concept of "CT" is used to verify the level of treatment or inactivation. CT is achieved by providing enough time for chlorine to inactivate potentially harmful organisms in drinking water before it is consumed. CT represents an abbreviation of chlorine **C**oncentration (measured at the first user of the drinking water) multiplied by the contact **T**ime (the water's time of travel between the point of chlorine addition to the first user). The CT required for 4-log inactivation of viruses depends on the water temperature and the free chlorine residual concentration in the water. In general, the colder the water temperature (or the higher the pH), the less effective chlorine inactivation is, and greater the CT values that are required (ie. longer contact time for a given chlorine concentration).

For systems that do NOT achieve 4-log (99.99%) inactivation of viruses by disinfection for all sources, the following requirements of the GWR apply:

- Triggered source water monitoring (effective December 1, 2009)
- Hydrogeologic sensitivity assessments for aquifers
- Assessment monitoring for all sources

The triggered source water monitoring provisions of the GWR are more detailed than any other provision of the final rule and can only be avoided by providing the required 4-log virus inactivation and/or removal prior the first customer.

For a groundwater system without 4-log virus treatment, a single positive routine Total Coliform Rule (TCR) compliance sample will initiate triggered monitoring. A single source water sample must be taken within 24 hours from each groundwater source in production at the time of the positive TCR sample. Testing is performed to detect the presence of *Escherichia coli* (*E.coli*). Systems with an initial positive source water sample must take five more source water samples. The rule anticipates the use of 100-mL samples from wells or springs. The switch from the current requirement of fecal coliform testing after identifying a total coliform sample to *E.coli* testing has been made because *E. coli* is currently understood to be a better indicator of the presence of pathogens.

A hydrogeologic sensitivity assessment (HSA) may be required for all groundwater systems that do not provide 4-log virus inactivation/removal. However, the rule does not require that the HSA provision be used on any system's supply, nor does it specify what approach states should use to identify systems that should be targeted for HSAs. The GWR is not explicit on the consequences of an HSA that finds a source to be sensitive, but draft guidance reads, "*Source water assessment monitoring is recommended as necessary and wells located in sensitive aquifers should be targeted for assessment monitoring using a hydrogeologic sensitivity assessment*".

Assessment monitoring occurs at the state's discretion. The GWR suggests that assessment monitoring should include 12 groundwater source samples that represent each month the system provides groundwater to the public. The consequences of a positive sample from assessment monitoring are not specified in the GWR. There appears to be latitude for the state to determine that any positive sample obtained during assessment monitoring triggers the treatment technique provisions.

Under the existing Total Coliform Rule (TCR) sanitary surveys are to be performed on a 5-year interval. The GWR sanitary survey requirement has been structured to provide more frequent and complete sanitary surveys with more stringent penalties for non-compliance. Surveys are to be performed every 3-years with some discretion granted for water systems that have consistently demonstrated outstanding performance. Failure to correct deficiencies and comply with the required corrective action plan or schedule will result in a treatment technique violation for the water system. States are required to conduct these surveys and identify significant deficiencies requiring corrective action by December 31, 2012 for community water systems with less than 4 log inactivation/removal and by December 31, 2014 for community water systems with 4-log inactivation/removal.

3.3.9.2 Municipal Compliance

A discussion of the City's status in complying with the 4-log virus inactivation requirement in contained in Section 4.6.6.

If the watershed springs are determined to be GWUDI sources, the City will need to provide a treatment system to comply with the surface water treatment requirements. Specific discussions of the treatment process to achieve compliance to surface water treatment requirements at the springs are discussed in Chapter 7.

3.4 CONSUMER CONFIDENCE REPORT RULE

The EPA published the Consumer Confidence Report Rule in the Federal Register on August 19, 1998. The CCR Rule requires community water systems to provide an annual report to their customers detailing information on water quality delivered by the system and documenting water quality monitoring results.

The report must be distributed by July 1 of each year, must contain an explanation of data collected during or prior to the previous calendar year, and must provide the telephone number of the owner, operator or designee of the community water system as a source of additional information concerning the report. This information is typically sent out with water bills; however, systems must make a good faith effort to reach consumers who do not get water bills (typically renters). Water systems must certify to the ODWP that the CCR was sent to customers and that the information it contained was correct and consistent with the compliance monitoring data previously submitted to the ODWP. Complete details of the rule requirements can be found in OAR 333-061-0043.

3.5 CROSS-CONNECTION CONTROL PROGRAM

Plumbing cross-connections, defined as actual or potential connections between a potable and non-potable water supply, constitute a serious health hazard. There are numerous well documented cases where cross-connections have been responsible for the contamination of drinking water and have resulted in poisonings or the spread of disease.

Oregon Administrative Rules 333-061-0070 through 0074 detail the requirements for a cross-connection control program. The City is required to establish a cross-connection ordinance and must submit an annual report to ODWP. Systems with more than 300 service connections are required to provide a certified tester.

The City's cross-connection control standards are contained in Chapter 8.3 of the Dayton Municipal Code. The City currently employs one certified cross connection control specialist who is responsible for inspecting new devices and installations, monitoring annual inspections, terminating water service in cases of non-compliance and compiling submitting the annual inspection report to ODWP.

3.6 SANITARY SURVEY

The ODWP conducts a sanitary survey of each public water system on a regular basis. Sanitary surveys are a critical component of the State's drinking water regulatory program. Under Oregon statute, sanitary survey is "*an on-site review of the source, facilities, equipment, operation and maintenance of a water system, including related land uses, for the purpose of evaluating the capability of that water system to produce and distribute safe drinking water.*"

The sanitary survey (conducted by ODWP or contract County health department staff) results in a report that includes, as a minimum, "*the following components of a water system: source of supply; treatment; distribution system; finished water storage; pumps, pump facilities and controls; monitoring, reporting and data verification; system management and operations; and operator certification compliance.*" The sanitary survey report indentifies any significant deficiency prescribed in OAR 333-061-0076, or any violation of drinking water regulations, discovered during the on-site visit.

Under the recently implemented Groundwater Rule, beginning on December 1, 2009, water systems that use only groundwater sources must consult with ODWP within 30 days of receiving written notice of a significant deficiency or a violation of a drinking water regulation identified during the sanitary survey. Public water systems must have completed corrective action of any significant deficiencies within 120 days of receiving written notice, or be in compliance with an ODWP approved "corrective action plan" within 120 days of receiving written notice of a significant deficiency.

3.7 FUTURE WATER QUALITY REGULATIONS

The following include both existing regulations which may not apply to the City at present, but which it may become subject to in the future, as well as anticipated future rules that are currently in the regulatory pipeline.

The EPA is required to review existing national primary drinking water regulations every six years in order to identify current health risk assessments, changes in technology, and other factors that provide a health or technological basis to support regulatory revisions to maintain or improve public health protection.

3.7.1 Long Term 2 Enhanced Surface Water Treatment Rule

This is an existing regulation that the City may become subject to in the future, if the City chooses to utilize a surface water source, or if a groundwater sources is determined to be GWUDI and must undergo this level of treatment. The Enhanced Surface Water Treatment Rule (ESWTR) was promulgated by the

USEPA to improve control of microbial pathogens in all public water systems that use surface waters or GWUDI. Two subsequent phases of the rule are the Long Term 1 ESWTR (LT1) and Long Term 2 ESWTR (LT2). The latter rule, published in the Federal Register on 1/5/06 has been established to provide increased consumer protection against the protozoan *Cryptosporidium*.

Cryptosporidium is a significant concern in drinking water because it contaminates most surface water sources, it is resistant to chlorine and other disinfectants, and it has caused waterborne disease outbreaks. Consuming water with *Cryptosporidium* can cause gastrointestinal illness, which may be severe and sometimes fatal for people with weakened immune systems (which may include infants, the elderly, and people who have AIDS). *Cryptosporidium* oocysts present specific challenges to water treatment since they are highly resistant to disinfectants such as chlorine. Current regulations require filtered water systems to reduce source water *Cryptosporidium* levels by 99 percent (2-log). Recent studies of *Cryptosporidium* in drinking water indicate that this treatment is sufficient for most systems, but additional treatment is necessary for systems with high levels of *Cryptosporidium* in their water sources and all unfiltered water systems, which do not treat for *Cryptosporidium*.

Oregon has adopted the regulations and received interim primacy for the LT2 until full primacy is approved by EPA.

3.7.1.1 Regulatory Monitoring

The LT2 requires all surface water and GWUDI systems to monitor for *Cryptosporidium* at the source. Public water systems serving less than 10,000 people are given the option of performing source water testing for *E.coli* and are only triggered into *Cryptosporidium* monitoring if the counts for *E.coli* are high. A public water system is assigned a "Bin" based on the demonstrated level of *Cryptosporidium* in the source water. Treatment requirements for each system depend in part on a system's existing treatment equipment and removal capabilities with consideration given to the concentration of protozoa present in the source. Additional treatment processes for the inactivation or removal of *Cryptosporidium* are selected from a regulatory list of options.

3.7.1.2 Municipal Compliance

None of the wells or springs in the City system have been formally classified as GWUDI, so the City is exempt from regulation under this rule as long as all the sources remain classified as groundwater sources. Although the watershed springs have been determined to be at risk of surface water influence, the final determination will not be made until after the City has performed necessary upgrades (if the City chooses to do so).

If re-classification of the watershed springs to GWUDI status occurs, the City will come under full regulation of the ESWTR including the provisions of the LT2. As previously stated, this will require 2.0 log removal/inactivation under the requirements of the ESWTR, as well as source water testing required by the LT2 to establish *Cryptosporidium* levels in a system's source water. LT2 requires additional removal/inactivation measures based on the demonstrated level of *Cryptosporidium* in the source water.

In accordance with the requirements of the LT2, the draft OAR language proposed includes new requirements for *Cryptosporidium* inactivation/removal in all public water systems utilizing GWUDI. Three primary disinfectants, ozone, chlorine dioxide, and ultraviolet light (UV) have been listed for effective inactivation of this protozoa. Several filtration methods are eligible for removal credit.

3.7.2 Filter Backwash Recycling Rule

This is an existing regulation that the City may become subject to in the future. The Filter Backwash Recycling Rule (FBRR) was published in the Federal Register on April 10, 2000 and was adopted by the State of Oregon in June of 2004. The FBRR complements existing surface water and GWUDI treatment rules by reducing the potential for microbial pathogens, particularly *Cryptosporidium* oocysts, to pass through the filters into the finished water. The FBRR requires all recycled waste streams (e.g., spent filter backwash, thickener supernatant, or liquids from dewatering processes) to be returned to the head of the plant and passed through the entire treatment process, unless properly disposed of otherwise.

3.7.2.1 Municipal Compliance

The City's filtration system is for removal of iron and manganese, and is not designed for surface water treatment. Therefore, this regulation is not applicable to the City's groundwater system. Regardless, the City currently discharges the backwash water from the WTP to the sanitary sewer system, they are in compliance with this regulation. If the City implements treatment and filtering of surface water or GWUDI groundwater in the future, they will need to comply with this rule.

3.7.3 Vulnerability Assessment

This is an existing regulation that the City may become subject to in the future. The events of Sept. 11, 2001, reinforced the need to enhance the security of the United States. Congress responded by passing the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (the Bioterrorism Act), which was signed into law June 12, 2002. The Act amends the Safe Drinking Water Act, requires every community water system that serves a population greater than 3,300 persons to conduct a vulnerability assessment, and specifies actions that community water systems and the USEPA must take to improve the security of the nation's drinking water infrastructure.

Complete details of the requirements for Oregon water systems can be found in OAR 333-061-0064. The City should be prepared to complete this vulnerability assessment when they reach the regulatory population threshold. The City should review its vulnerability assessment periodically to account for changing threats or additions to the system to ensure that security objectives are being met.

3.7.4 Unregulated Contaminant Monitoring Rule

This is an existing regulation that the City may become subject to in the future, if the population limits in the rule are modified, or if the ODWP decides to include the City in this program. The Unregulated Contaminant Monitoring Rule (UCMR) is used to collect data for contaminants suspected to be present in drinking water, but that do not have health-based standards set under the Safe Drinking Water Act. The UCMR is closely coordinated with EPA's Contaminant Candidate List. The EPA uses both of these programs to identify drinking water contaminants that are not currently regulated in order to identify future health risks and problems with drinking water.

To date, the program has been implemented in three stages, UCM Rounds 1 & 2, UCMR1 and UCMR2 on a 5-year cycle. The first stage was managed by the state primacy agencies and consisted screening and assessment monitoring tests. The UCMR1 promulgated on September 17, 1999 utilized a tiered monitoring approach that required all large public water systems and a nationally representative sample of small public water systems serving less than 10,000 people to monitor for selected sets of contaminants.

The UCMR2 promulgated on January 4, 2007, is being managed by the EPA and requires monitoring for a new set of unregulated contaminants.

3.7.4.1 Regulatory Monitoring

UCMR2 requires monitoring for several pesticides and pesticide degradates, five flame retardants, a group of nitrosamines and two munitions (TNT and RDX). All public water systems serving more than 10,000 people, and a representative sample of 800 public water systems serving 10,000 or fewer people, are required to conduct assessment monitoring for 10 chemicals (List 1) during a 12-month period between January 2008 and December 2010. All public water systems serving more than 100,000 people, as well as a group of public water systems selected by the EPA are required to conduct the Screening Survey (List 2) for 15 contaminants during the same 2008-2010 testing period.

3.7.4.2 Municipal Compliance

The City is currently exempt from the program based on population of less than 10,000.

3.7.5 Revised Total Coliform Rule

This is an anticipated new regulation that will modify the existing Total Coliform Rule. The Total Coliform Rule was last revised in 1989 and as previously discussed, established health goals and legal limits for the presence of total coliforms, fecal coliforms and *E.coli* in drinking water. Under the 1996 Safe Drinking Water Act Amendments, the USEPA is required to review, and revise as appropriate, each Primary Drinking Water Regulation. In September 2008, the USEPA Total Coliform Rule/Distribution Systems Advisory Committee signed an Agreement in Principle, making recommendations for revisions to the Total Coliform Rule. Significant improvements were made during the revision process, including the creation of new treatment techniques, assessment triggers, response actions and violations, as well as revisions to the type and frequency of testing that water systems must undertake.

The proposed rule will establish an MCLG and an MCL of zero (0) for *E. coli*, and eliminate the MCLG and MCL of zero for total coliform, replacing it will a treatment technique for coliform that requires assessment and corrective action. *E. coli* is a more specific indicator of fecal contamination and potential harmful pathogens than total coliform (many of the organism detected by total coliform methods are not of fecal origin and do not have any direct public health implications).

Under the proposed treatment technique for coliform, total coliform serves as an indicator of a potential pathway of contamination into the distribution system. A public water system that exceeds a specified frequency of total coliform occurrence must conduct an assessment to determine if any sanitary defects exist and, if found, correct them. In addition, a water system that incurs an *E. coli* MCL must conduct an assessment and correct any sanitary defects found.

The revised TCR will apply to all public water systems. It is estimated that the USEPA will propose the revised rule in late 2010 for finalization in 2012. Compliance will be required in 2015.

3.7.6 Radon

This is an anticipated new regulation. Radon is a naturally occurring gas formed from the decay of uranium-238. Radon in drinking water can contribute to indoor air radon levels from washing and showering. Inhalation or ingestion of radon can result in lung or stomach cancer. The USEPA has proposed preliminary guidelines for the regulation of radon; however, the final form of the rule has yet to be promulgated.

We are not aware of radon testing performed to date on any of the City source water.

3.8 City Public Works Design Standards

The City presently has detailed design criteria for water system improvements under City jurisdiction. These Public Works Design Standards (PWDS) provide a uniform set of standards for use by engineers in the design of public water distribution improvements. The intent of these standards is to provide guidelines for the design of public facilities that will provide an adequate service level for the present development as well as for future development. The PWDS cannot provide for all situations. They are intended to assist but not to substitute for competent work by design professionals.

The intent of the PWDS is to:

- be consistent with current City Ordinances.
- provide design guidance criteria to the private sector for the design of public improvements within the City of Dayton.
- have sufficient structural strength to withstand all external loads that may be imposed;
- be of materials resistant to both corrosion and erosion with a minimum design life of 75 years;
- be economical and safe to build and maintain;
- meet all design requirements of the Oregon Drinking Water Program (ODWP).

3.9 Standards for Municipal Wells & Springs

Construction standards for wells and springs utilized as municipal water sources are controlled by the ODWP rules (OAR 333-061-0050.2a & b).

3.9.1 Municipal Wells

Oregon's well construction standards are designed to protect the ground water resource and the public. They help prevent contamination of the well or aquifer by surface and subsurface leakage which may carry harmful chemicals or bacteria, and they help prevent physical injury and waste of water. The following is a summary of some of the design & construction standards for these sources, although this list is not all inclusive.

- *Area of Control.* For wells located within municipalities with community gravity sewer systems, the City must own or control the area within 50 feet of the wellhead. For wells outside of the City, the area of control is based on a 100 foot radius.
- *Flood Protection.* Wells typically are not to be located in flood prone areas, unless the area around the well is mounded and the casing is extended a minimum of 2 feet above the 100 year flood level.
- *Well Drilling Standards.* Wells shall be drilled and developed in accordance with standards by the WRD (OAR 690-200 thru 220).
- *Water Quality Standards.* Prior to placing the well in service, water must be tested to verify that it conforms with drinking water quality standards.

- *Well Pump, Piping & Well House Standards*. Well & pump standards include seals at the top of the well, a casing vent, provisions for water level measurement, sample tap, flow measurement, concrete slab around the well (except when a pitless adapter is used) with well casing 12-inches minimum above the slab, site graded away from well, well house to be insulated & heated with lights, and constructed to allow pump removal.

3.9.2 Municipal Springs

Oregon's construction standards for springs are similar to those for wells, with some additional requirements. They help prevent contamination of the springs by surface water which may carry harmful chemicals or bacteria, and they help prevent physical injury and waste of water. The following is a summary of some of the additional design & construction standards for spring sources, although this list is not all inclusive.

- *Well Standards Apply*. All applicable provisions under the well construction standards also apply to springs.
- *Surface Water Drainage*. Provide an intercepting ditch above the spring to divert surface water away from spring.
- *Fencing*. Fencing to be installed around the spring area unless provisions are made to effectively prevent access by animals and unauthorized persons.
- *Springbox*. The springbox to be concrete or other impervious material, installed to exclude surface water. Springbox to be provided with screened overflow which discharges to daylight, an outlet pipe provided with a shutoff valve, a bottom drain, an access manhole with a tightly fitting cover, and a curb around the manhole.

3.10 Water Use Regulations (Water Rights)

The Oregon Water Resources Department (OWRD) regulates the use of both surface and groundwater throughout the state of Oregon. On February 24, 1909, the State of Oregon enacted the Water Rights Act, a comprehensive surface water code. This act made "prior appropriation" the sole method of acquiring water rights in Oregon. The system is basically one of first come, first served. Each water right includes a priority date. Prior appropriation utilizes the priority date of a water right to establish the order in which water rights are satisfied in times of shortage. A senior water right is entitled to full delivery of all water under their right before any junior rights are served. Oregon adopted a parallel groundwater code on August 3, 1955. Together, these codes establish a regulatory scheme under which the OWRD exercises jurisdiction over the right to use the State's waters.

In Oregon, all water is publicly owned. Landowners with water flowing past or under their property do not automatically have the right to divert the water without a permit. Over the years as greater demands are placed on limited water resources, OWRD has been exercising greater control over this water use. Water rights have long been used to control the withdrawal of surface or ground water for municipal or agricultural use. Water rights are issued only for beneficial use, without waste. Each water right includes a designated type of "use" and is limited to that purpose. General categories of beneficial use include, but are not limited to irrigation, municipal, industrial, commercial and domestic. Since 1987, the law has specifically included instream flow protection as a beneficial use. A water right holder is entitled to use as much water as is necessary, up to the maximum amount shown on the water right, to accomplish the stated beneficial use. Water rights issued after the adoption of the 1955 groundwater code are issued in two stages: the issuance of an initial water right *permit*, and upon full development, the issuance of a final water right *certificate*.

The first stage is a water right permit, which serves as the initial authorization for a water user to develop the source and begin making beneficial use of the water. The permit typically describes the source, the source location, the priority date, the amount of water that can be used, and documents any water use conditions. Water right permits were typically issued for a five year period. If the water use had not been developed to the full intended extent within the five-year period, an extension could be requested. In evaluating extension requests, the OWRD considers whether or not the applicant has shown diligence in the development of the water right. Failure to develop a permitted source during the permit period could subject the permit to cancellation by the State.

Until several years ago, permit extensions were routinely granted by the OWRD, largely because there was little or no opposition to the extension requests. In the early 1990s, however, in the face of new Endangered Species Listings and growing attention by environmental groups, the OWRD was advised by the State Attorney General that the past practice of routine permit extensions was not legally sufficient. As a result, the OWRD made substantial changes to the permit extension process. The new rules require a more extensive analysis of the level of diligence shown by the permit holder in developing the water right, as well as consideration of other competing needs for the water. The process also includes a careful review of potential impacts on listed species, or flows necessary for Scenic Waterway purposes. If a permit extension is approved, new conditions may be added to address public interest concerns raised during the review process.

In 2005, House Bill 3038 was passed by the Oregon legislature. The Bill gives municipal water developers 20 years to develop their water rights and validates old extensions. Development of the water rights must proceed with a reasonable level of diligence. However, OWRD may order or allow an extension of time to complete construction or to perfect a water right beyond the time specified in the permit under the following conditions.

- If the holder shows good cause and if other governmental requirements relating to the project have significantly delayed completion of construction or perfection of a water right;
- The extension of time is conditioned to provide that the municipality may divert water beyond the maximum rate diverted for beneficial use before the extension only upon approval by OWRD of a water management and conservation plan; and
- For the first extension issued after the effective date of the Bill but prior to November 2, 1998, undeveloped portions of the permit is required to maintain the fish listed as sensitive, threatened or endangered, within the waterway affected by the permit.

The second stage involves the issuance of a water right certificate, issued after the source is fully developed and put to use. At such time a Certificate of Beneficial Use (COBU), prepared and submitted by the permit holder, is filed with OWRD. Approval of this document results in the issuance of a water right certificate. Once issued, the final certificate serves as evidence of a fully vested water right. At this stage the water right is treated as a property right held by the water user. A certificated right remains valid indefinitely unless it is unused for a period of five or more years, in which case the user may forfeit the water right. The forfeiture process is not automatic. Oregon law has historically protected municipal water supplies by preventing forfeiture for non-use.

3.11 AQUIFER STORAGE & RECOVERY (ASR)

With the increasing prevalence of decline in groundwater levels across the state in recent years, interest in aquifer recharge, or aquifer storage and recovery has increased. Aquifer Storage and Recovery (ASR) basically involves injecting water into an aquifer, and then pumping it out when needed, with the existing aquifer functioning as a storage reservoir or a water bank. Water is typically injected during in times of surplus (such as during the rainy season), and withdrawals occur when traditional water sources fall short of demand.

Some recognized benefits of Aquifer Storage and Recovery include the following.

- Depending on the type of aquifer, substantial amounts of water may be able to be stored deep underground, which may reduce the need to construct large and expensive surface water storage reservoirs.
- ASR systems are considered to be more environmentally friendly than surface water storage reservoirs, and they also offer more protection from tampering, as well as from intentional or unintentional contamination.
- ASR may be able to restore the function of an aquifer that has experienced long-term groundwater declines due to heavy pumping that was necessary to meet urban or agricultural water needs.

With new surface water storage options in Oregon being scarce (geological, societal, and environmental constraints limit new large scale dams), ASR is becoming an option that should be considered in evaluating water system improvements. In Oregon, the statutes allowing Aquifer Storage and Recovery (ASR) were enacted in 1995 through the passage of HB 3183 (implemented by ORS 537.531-534 & OAR 690.350.010-030), and is under the primary jurisdiction of the Water Resources Department (WRD). Water quality issues are addressed through coordination with the OWDP and DEQ. Under the ASR statutes, water users with existing water rights may be allowed to store water in an aquifer under a two stage approval process. A key point is that users must have an existing water right that allows them to divert the water that is proposed to be stored.

Initially, a "limited license" must be obtained for an ASR testing program. The purpose of the testing program is to determine if it is feasible to recover the water that is injected into a specific aquifer. Under the limited license, all water recovered from the aquifer must be used for the same purposes as the water right under which the water was originally diverted. A limited license is issued for a defined test period duration (up to 5 years, with the option to extend the test period if approved by WRD). Next (after successful completion of the limited license testing program), the water user may apply for a permit to continue storage and recovery of water under the ASR. An ASR permit will limit the allowable ASR storage injection rate to the maximum diversion rate under the water user's existing water right(s), or the rate may be limited by other factors such as water treatment or conveyance capabilities. Because the injected water must meet primary drinking water quality standards (prior to injection), extensive treatment of the water pumped from an ASR project is typically not required (unless treatment is required to address secondary contaminants such as iron, manganese, etc).

In determining whether to issue limited licenses and permits for ASR projects, WRD evaluates the potential effect of injection on ground water quality, whether the injected water can be recovered without injuring existing users of the aquifer, and other potential injurious effects of the project. If injurious effects are identified after the ASR project is in operation, the ASR limited license or permit may be modified or revoked by WRD.

At present, there are relatively few sites in Oregon currently licensed for ASR, and include municipalities such as Beaverton, Lafayette, Tigard, Pendleton, Portland and Salem, as well as Tualatin Valley Water District and Clackamas River Water. Lafayette received license #16 in May 2010 for a test program in their watershed area, and plans to begin the test injection program this winter & spring of 2010/11.

3.12 WATER MANAGEMENT AND CONSERVATION PLAN

In addition to regulating water rights, the OWRD has regulatory authority over Water Management and Conservation Plans (WMCP) for public water systems. A WMCP is a plan developed by a water supplier that describes the water system and its needs, identifies it sources of water, and explains how the water supplier will manage and conserve those supplies to meet present and future needs. The requirement for completing such plans is tied to the revised rules surrounding water right permit extensions as described under OAR 690-315. These rules call for all suppliers serving over 1,000 people to complete a WMCP in association with water permit extensions. OAR 690-086 details the requirements of WMCPs.

4

CHAPTER 4

EXISTING WATER SYSTEM

Chapter Outline

EXISTING WATER SYSTEM

4.1 INTRODUCTION

The City of Dayton operates and maintains the water system that provides potable water service to customers within the city limits. The City's municipal water system utilizes a series of groundwater wells and springs to supply water that serves two pressure zones, consisting of one pressure zone within the City and a second pressure zone serving the area toward the watershed (west of the Yamhill River). The City system is classified as a "community" water system and has been assigned Public Water System (PWS) Identification Number OR41-00252.

This chapter provides an inventory of the existing water system components (sources of supply, water treatment, distribution system, storage reservoirs, and instrumentation and control). The evaluation of these specific systems and the development of improvement alternatives is contained in other chapters of this study.

4.2 WATER SYSTEM OVERVIEW

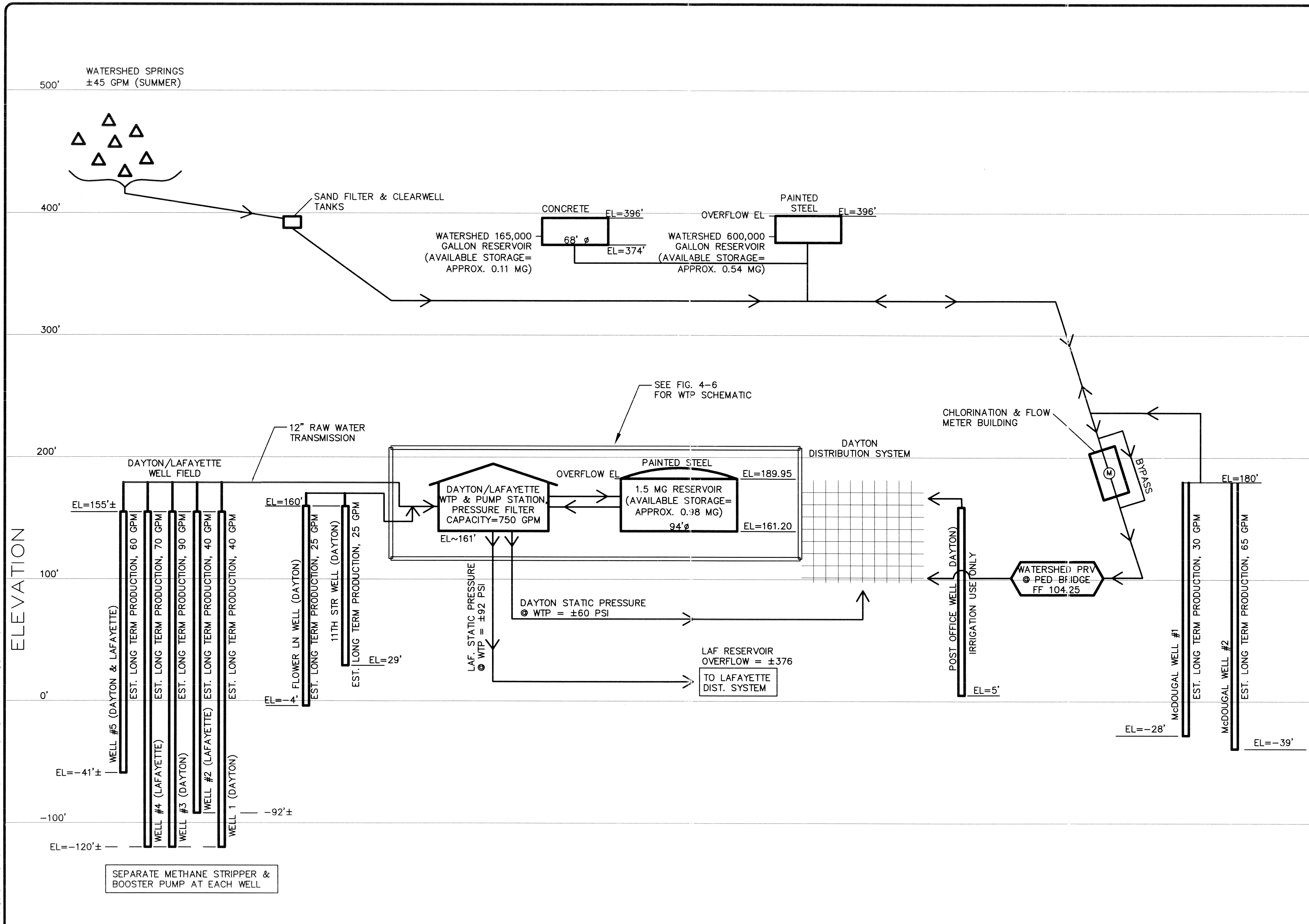
Based on City records, Dayton's original water system was constructed in about 1904. The watershed springs were originally developed and piped into town with wood and steel pipe. In 1922 the City completed the construction of a 175,000 gallon reservoir next to the watershed springs. Later in the 1930s 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).

As required by water rights conditions, the watershed springs and wells (and the in-town wells) serve as the City's primary water source and the Dayton-Lafayette well field is used as a backup (supplemental) water source (this is discussed further in Section 4.2.2 and 4.3.1.1).

4.2.1 Water System Schematic & Maps

A schematic representation of the water system is presented in **Figure 4-1**. (see Section 4.4.4 for a schematic of the Dayton-Lafayette WTP).

The major components of the water system within town are shown in **Figure 4-2**, while the watershed area is illustrated in **Figure 4-3**, the Dayton-Lafayette Wellfield area in **Figure 4-4**, and the Dayton-Lafayette intertie in **Figure 4-5**. Full size water system maps are included in **Appendix A**.



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REVISIONS

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CITY OF DAYTON, OREGON

WATER SYSTEM SCHEMATIC

FIGURE
4-1

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