CITY OF OTHELLO

ADAMS COUNTY **WASHINGTON**

WATER SYSTEM PLAN

G&O #10002
JUNE 2011

Gray & Osborne, Inc.
CONSULTING ENGINEERS

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ADAMS COUNTY **WASHINGTON**

WATER SYSTEM PLAN

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G&O #10002
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EXECUTIVE SUMMARY

The objectives of this Water System Plan are to evaluate the performance and adequacy of the City of Othello's existing water supply and distribution system, and to describe what steps the City must take to meet the demands of its six and twenty-year planning periods. This Plan has been written to comply with WAC 246-290-100, the Washington State Department of Health's rules for developing a water system plan.

PLANNING

The City's population is estimated at 6,595 in 2009, and is projected to grow at a rate of 2.5 percent until 2030. The City also serves Adams County Water District No.1, Eagle Estates, and Kameron Estates outside of the City limits, which had an estimated population of 1,084 in 2009. These service areas are projected to grow at a rate of 2.0 percent until 2030. The projected total service area population for 2030 is therefore 11,870 people. This growth will have a proportionate effect on the City's water demands. The City's average day demand is expected to increase from 4,089,000 gallons per day in 2009 to 5,056,600 gallons per day in 2030. Its maximum day requirement is expected to increase from 4,540 gpm in 2009 to 6,420 gpm in 2030.

CAPITAL IMPROVEMENTS

Improvements to meet these demands are summarized below.

Source

The City plans to abandon Well No. 1 since it has not been used in many years and abandonment will prevent the well from being a source of contamination to the water system.

The last two wells developed by the City are capable of producing 720 gpm and 725 gpm; therefore it is assumed that any new wells will also be capable of pumping approximately 750 gpm. The City's water rights allow for new Wells No. 9 and 10 to be developed, but the City does not wish to develop wells in the locations identified in its water rights. Therefore, a change application to Ecology will be necessary to allow the wells to be developed in different locations.

The City has modified Well No. 6 in an attempt to seal off the zones of contribution which are higher in fluoride. The fluoride content has decreased to 4.3 mg/L, which is still above the maximum contaminant level (MCL) for fluoride. Modification of Well No. 6 has decreased the well output to 2,000 gpm. The hydrogeologist (GSI) has theories explaining the lack of fluoride reduction and believes that the fluoride levels in Well No. 6 will decline over time, although this has not been confirmed. The City intends to monitor the well to see if the fluoride level continues to drop. If the fluoride levels do not drop sufficiently, the City intends to work with DOH to determine a suitable course of

action to allow the well to be removed from emergency status. One potential solution would be to blend the well with water from Well No. 2. Blending 1,500 gpm at 4.3 mg/L fluoride from Well No. 6 with 275 gpm at 2.0 mg/L fluoride level water from Well No. 2 will produce a fluoride level of 3.94 mg/L. It will be assumed that if source blending is utilized, Well No. 6 will be required to be throttled to 1,500 gpm.

Storage

To address low pressure in the northeastern portion of the water system and increase the storage capacity of the system, a new 1.6 million gallon reservoir will be constructed in the northern part of the City.

To address projected low pressures in the distribution system during peak hour flows and during extended fire events in the future, a booster pump station will be constructed for Reservoir No. 3. The booster station will be placed into operation automatically, and once started, will operate on system pressure. When system flows drop, the pump will be taken offline and Reservoir No. 3 will be re-filled.

Treatment

No treatment improvements are required for the six-year planning period.

Telemetry

The City will update its telemetry system to include power monitoring equipment, water level monitoring, and associated appurtenances at each well site. These updates will allow the City to better diagnose well problems, helping to prevent costly and inconvenient well repairs.

The City will replace the remaining water meters currently being read manually with radio-read units.

Transmission

Well No. 9 is projected to be constructed to the east of the City. A 2-mile transmission main will be required to connect the future well to the distribution system. Although the location of Well No. 10 has not been identified yet, it is likely that due to the need for Well No. 9 to be drilled two miles from the water system, Well No. 10 will need a similar transmission main.

Distribution

The City has identified several distribution system improvements needed to meet fire flow requirements on existing 4- and 6-inch lines, and to improve pressure and looping characteristics on other lines. These improvements are shown on Figure 4-1.

Operation and Maintenance

Several O&M projects have been identified that the City plans to either complete within the planning period or start doing on an ongoing basis. These include painting Reservoirs No. 1 and 2, performing a seismic retrofit on Reservoir No. 1, calibrating its source meters, updating its wellhead protection plan, replacing fire hydrants, replacing aging pipes in the system, and equipping Well No. 8 with a VFD to prevent the lowering of the water table and subsequent well problems.

Water Use Efficiency Program

The City's Water Use Efficiency Program will not require any capital improvements.

A summary of the 2010 costs for each of the improvements is provided in Table ES-1.

FINANCING

The City raises its water rates each year to offset inflation and build reserves for future projects. 2010 was the last year of a planned rate increase, and the City Council is anticipated to approve a planned rate increase in 2011. Preliminary discussions with City financial staff have indicated that four percent is the rate being discussed at this time since future well projects will be required, and grant/loan funding programs are currently a significant unknown across the State. If an annual rate increase of four percent is approved, it is projected that the City's revenues will continue to surpass expenditures and allow the City to complete the majority of its capital improvement projects without seeking outside funding. It is projected that the SR 24 Industrial Area Infrastructure project and Well No. 9 drilling, equipping, and transmission main will require outside funding, however.

TABLE ES-1
Capital Improvement Plan

	Project	2010 Cost [1]	'11	'12	'13	'14	'15	'16	'17-'30
SOURCE									
1	Well No. 1 Abandonment	$25,000	X						
2	Well No. 9	$1,000,000	X						
3	Well No. 10	$1,000,000			X				
4	Blending of Well No. 2 and 6	$250,000			X [2]				
STORAGE									
4	Reservoir No. 4	$2,256,000							X
5	Reservoir No. 3 Booster Pump Station	$500,000							X
WATER RIGHTS									
6	Change Application	$7,000	X						
TRANSMISSION									
7	Well No. 9 Transmission Main	$1,700,000		X					
8	Well No. 10 Transmission Main	$1,700,000				X			
TELEMETRY									
9	Telemetry Upgrade	$200,000							X
10	Water Meter Replacement	$100,000	X	X	X	X			
OPERATION & MAINTENANCE									
11	Fire Hydrant Replacement	$70,000							X
12	Distribution System Replacement Program	$60,000	X						X
13	Reservoir No. 1 Recoating	$377,000							X
14	Reservoir No. 1 Seismic Retrofit	$200,000							X
15	Reservoir No. 2 Recoating	$345,000							X
16	Well No. 8 VFD	$82,000							X
17	Water System Plan Update	$60,000							X
DISTRIBUTION									
18	SR 24 Industrial Area Infrastructure Improvements	$1,750,000	X	X					
19	Oak Street Water Main Replacement	$217,000							X
20	North Industrial Area Water Main Replacement	$465,000							X
21	4th Avenue Water Main Replacement Phase I	$332,000		X	X				
22	4th Avenue Water Main Replacement Phase II	$294,000							X
23	Larch Street Water Main Replacement Phase I	$101,000							X
24	Larch Street Water Main Replacement Phase II	$391,000	X	X					
25	13th and 14th Avenue Water Main Extension	$105,000							X
COST IN MILLIONS (2010 Dollars) [3]			**2.19**	**2.96**	**1.44**	**1.73**	**0**	**0**	
COST OF 6-YEAR PROJECTS (2010 Dollars)			**8.32**						
COST OF 7-20 YEAR PROJECTS (2010 Dollars)			**5.33**						

(1) Engineering News Record (ENR) Seattle Construction Cost Index October 2010 = 8705X
(2) If required if the fluoride levels do not decrease naturally.
(3) Multi-year project cost distributed across life of project.

DOH COMMENT RESPONSE FORM

	DOH Comment	Response	Response Page #
1	Please address the comments from Loren Wiltse, Adams County Planning Director, (letter dated November 15, 2010, to Dave Van Cleve, PE). The City must resolve the issues identified in the letter, as a Local Government Consistency Statement from the County is required in the plan.	All references to the Urban Growth Area have been removed from the Plan. Also see response to Comment No. 3	1-9 2-11 Fig 1-4
2	Identify and locate any other water systems within the City's service area that are not a part of the City's system, on the service area map.	Five additional water users that are located within the City's retail service area have been added to Figure 1-4.	Fig 1-4
3	Please take into account the county zoning densities when projecting future growth in the county, refer to the county zoning map provided.	As per the City's Comprehensive Plan, new water service outside of the City limits will require annexation except in special circumstances at the sole discretion of City Council. As per the City's Comprehensive Plan, the City's population is expected to grow at 2.5 percent per year. The City expects that the City limits will enlarge over the next twenty years to provide for growth of the City population. As the City annexes new areas the City expects to provide new zoning designations. The City currently serves several areas outside of the City limits, (Adams County Water District No. 1, Kameron Estates and Eagle Estates). These existing water service areas outside of the City limits will not grow in size but could grow in population due to infill. The population growth rate for these areas is estimated to be 2.0 percent per year. The projected future water service population is the summation of the growth in City population and the	2-11

		county population growth in areas already serviced with water by the City.	
4	Update the total number of connections and source information on the Water Facility Inventory (WFI). The number of connections listed in Table 2-1 and source capacities on Table 1-2 do not match the numbers on the WFI.	The City's updated WFI is included in Appendix A.	Appdx A
5	On Page 2-3, the plan states the City has 19 service meters remaining to be replaced, and in other sections, the plan states the City is completely metered. Please clarify which statement is correct.	The City is completely metered. However, the City has not completely replaced its manual-read meters with radio-read meters. Once 19 existing manual-read meters are replaced with radio-read, then the City will be completely metered with radio-read meters.	2-3
6	On Page 2-9, please explain the negative Distribution System Leakage (DSL) numbers on Table 2-7. The plan reports in three of the last five years the City's record-keeping has more water being consumed than produced. In addition, did the City begin the meter replacement program for the large water users, beginning late in 2007 or early 2008? We consider it a high priority for the City to include a meter calibration and maintenance program in this water system plan.	The DSL numbers are explained on Page 2-8. The City believes that the replacement of meters resulted in accurate consumption data for 2008 and 2009. The DSL for 2008 and 2009 is 4.3%. As explained on page 2-8, the DSL numbers for 2005 thru 2007 are disregarded. A meter calibration/replacement program has been recommended in the Plan.	2-8 3-23 G-6
7	Discuss the potential impacts to the City with respect to fluoride treatment, if EPA reduces the Maximum Contaminant Level to 0.7 mg/L or 1.0 mg/L. EPA and the Department of Health and Human Services announced a new scientific assessment recommending reduced fluoride levels in drinking water. If possible, include an additional column on Table 3-2 showing the total number of detections that exceeded the new proposed levels.	Table 3-2 has been modified, and a discussion of the potential for a future MCL change has been added.	3-5

8	Recalculate the City's hydraulic analysis to show just the use of the existing facilities, including only the capacities for the City's active and permanent sources. The capacity analysis indicates the use of the McCain wells and Well #6 (S05), as integral components of the water system.	The hydraulic analysis has been revised to include only active and permanent sources. The resubmitted Plan includes scenarios where McCain Foods adds a demand of 800 gpm to the system, and no McCain Foods sources are included in the scenarios. Well No. 6 is not included in the analysis, and it is recommended that efforts to rehabilitate Well No. 6 be continued to allow it to be removed from emergency status in the future.	2-13 Chapter 3
8a	Clarify the statements on the use of the McCain wells. Our records show no approvals for the water system or sources for the McCain wells. The City must not allow these wells to discharge directly into their distribution system.	The McCain Foods wells will not discharge into the Othello distribution system at any time. The City has an approved backflow connection device between McCain Foods and the City's water system. The discussion and analysis of how water is supplied to McCain Foods has been revised.	2-13
8b	The WFI shows S05 as an emergency source. DOH does not require routine sampling of emergency sources, and systems cannot use them in the capacity analysis, to show their ability to meet existing or future demands. DOH understands the City has used S05 in an emergency.	The Plan has been revised to remove Well No. 6 from the City's available source capacity. It is recommended that efforts to rehabilitate Well No. 6 be continued to allow it to be removed from emergency status in the future.	3-4 through 3-7 Chapter 4
8c	The City should show how the proposed improvements would increase the total number of Equivalent Residential Units.	This information is summarized on Page 3-23.	N/A

9	Please include in the Water Use Efficiency (WUE) Chapter:		
9a	The minutes from the November 22, 2010, meeting discussed in Appendix J.	The minutes from the November 22, 2010 meeting have been included in this submittal.	Appdx J
9b	Water Demand Forecasting for 6 and 20 years in the WUE chapter.	The water demands of Table 2-13 were referenced in the Water Use Efficiency Chapter as a baseline for projected water use. Table J-6 shows a revised projection of water use with conservation Figure J-2 graphically shows the savings.	Table J-6 Figure J-2
9c	An estimate for the total amount of water lost through Distribution System Leakage in the WUE chapter.	Distribution System Leakage was included in Table 2-7 and referenced in the WUE Chapter on Page J-10. The 2008-2009 average annual DSL was 4.3 percent (65,825,500 gallons).	J-10
10	Include a completed wellhead protection plan (WHPP), in the second draft. DOH does not consider the WHPP plan included in the first draft complete.	The WHPP included in the Plan is an update of the DOH-approved WHPP from 2003. A description of how the WHPP meets the WAC is included in Appendix H. The WHPP from 2003 is included at the end of the Appendix.	Appdx H

Water System Plan Submittal Form

This form is required to be submitted along with the Water System Plan (WSP). It will serve to expedite review and approval of your WSP. WSPs will not be reviewed until submittal form and checklist are completed.

City of Othello	64850	City of Othello
1. Water System Name	2. PWS ID# or Owner ID#	3. System Owner Name
Ehman Sheldon	509-488-5686	City Administrator
4. Contact Name for Utility	Phone Number	Title
500 East Main Street	Othello	WA 99344
Contact Address	City	State Zip
David Van Cleve, PE	509-453-4833	Project Manager
5. Project Engineer	Phone Number	Title
107 S. Third Street	Yakima	WA 98901
Project Engineer Address	City	State Zip
6. Billing Contact Name (required if not the same as #4)	Billing Phone Number	Billing Fax Number
Billing Address	City	State Zip

6. How many services are presently connected to the system? 2,572
7. Is the system expanding? (seeking to extend service area or increase number of approved connections) ☒ Yes ☐ No
8. If number of services is expected to increase, how many new connections are proposed in the next six years? 481
9. If the system is private-for-profit, is it regulated by the State Utilities and Transportation Commission? ☐ Yes ☒ No
10. Is the system located in a Critical Water Supply Service Area (i.e., have a Coordinated Water System Plan)? ☐ Yes ☒ No
11. Is the system a customer of a wholesale water purveyor? ☐ Yes ☒ No
12. Will the system be pursuing additional water rights from the State Department of Ecology in the next twenty years? ☐ Yes ☒ No
13. Is the system proposing a new intertie? ☐ Yes ☒ No
14. Do you have projects currently under review by the Department of Health? ☐ Yes ☒ No
15. Are you requesting distribution main project report and construction document submittal exception, and if so, does the WSP contain standard construction specifications for distribution mains? ☒ Yes ☐ No
16. Are you requesting distribution related project report and construction document submittal exception, and if so, does the WSP contain distribution facilities design and construction standards, including internal engineering review procedures? ☐ Yes ☒ No
17. Have you sent copies of the draft WSP or notice to adjacent purveyors for their review? ☒ Yes ☐ No
18. Have you sent copies of the draft WSP to local governments with jurisdiction within your service area for their review? ☒ Yes ☐ No
19. Are you proposing a change in the place of use of your water right? ☒ Yes ☐ No

If answer to questions 17 and 18 is yes, list adjacent utilities/entities that have received a copy of the draft WSP: Department of Health, City of Othello, Adams County Water District No. 1, Adams County Planning

Is this plan: ☐ an Initial Submittal ☒ a Revised Submittal

Please enclose the following number of copies of the WSP:

2 copies for Department of Health
1 copy for Department of Ecology
1 additional copy if you answered "yes" to question 9

3 Total copies attached

Please return completed form to the Office of Drinking Water regional office checked below.

☐ **Northwest Drinking Water Office**
Department of Health
20435 72nd Ave S, Suite 200
Kent, WA 98032-2358
Phone: (253) 395-6750
Fax: (253) 395-6760

☐ **Southwest Drinking Water Office**
Department of Health
PO Box 47823
Olympia, WA 98504-7823
Phone: (360) 236-3030
Fax: (360) 664-8058

☒ **Eastern Drinking Water Office**
Department of Health
16201 E Indiana Ave, Suite 1500
Spokane Valley, WA 99216
Phone: (509) 329-2100
Fax: (509) 329-2104

If you need this publication in an alternate format, call (800) 525-0127. For TTY/TDD call (800) 833-6388.

Department of Health, Office of Drinking Water
Eastern Regional Office
Pre-Plan Agreement

Pre-Plan Date:	April 7 2010
Water System Name:	City of Othello
PWS #:	64850
Existing WSP expiration date:	8-9-2010
Operating Permit Color:	Yellow
WSP Submittal Due Date:	11-30-2010

WAC 246-290-100 requires purveyors of any new water systems, a system in a water coordination act area, a system serving 1,000 or more service connections, or a system that is expanding or experiencing problems to submit a Water System Plan (WSP) and update their WSP every six (6) years. The purpose of this preplan meeting is to determine the scope and level of detail of the WSP or update and establish a schedule for submittal of the document. This agreement is valid until the WSP submittal due date above. After this date, the agreement will need to be renegotiated. The operating permit color will change to yellow if the WSP is not received by the WSP submittal due date noted above.

Pre-Plan Attendees:

Chris Collins, DOH	Jay Van Ness, City	
Andy Cervantes, P.E., DOH	David Van Cleve, P.E., G&O	
Bryony Stasney	Rob Scott, P.E., G&O	

Water System Plan (WSP) Checklist for Municipal Systems (DRAFT)

√ Required	Content Description	WSP Page #
(√)	**Water System Plan Submittal Form**	
Chapter 1	**Description of Water System**	
(√)	Ownership and management (updated/current WFI)	p. 1-1 App A
(√)	System history and background	p. 1-2 p. 1-3
(√)	Brief inventory of existing facilities	p. 1-3 to 1-8
(√)	Description of and discussion about related plans: CWSP, ground water management, basin and City/County land use plans & zoning. Include land use maps for 6 & 20-years	p. 1-8, 1-9, Fig 1-4 thru 1-6
(√)	Service area characteristics, agreements, & policies including conditions of service and how new service will be provided in the retail service area. Include maps for water rights service area & for existing, future & retail service areas	p. 1-8 to p.1-11 Fig 1-4 Thru 1-6
(√)	Duty to serve statement for the retail service area	p. 1-9
( )	Satellite Management Agency information	NA
(√)	Local Government Consistency from planning agencies	App M
(√)	ODW will obtain a "not-inconsistent" statement from Ecology for Water Resource Inventory Area #36.	NA

Chapter 2	**Basic Planning Data**	
(√)	**Current data:** population, service connections & ERUs	p. 2-2, 2-3, 2-10
(√)	**Data Collection:** Monthly and annual production totals per source including purchased water Annual usage by customer class Annual usage for water supplied to other systems ≥ 1000 connections – description of seasonal variations in use by customer class	Fig 2-2 p. 2-3, 2-7
(√)	**6 & 20 year service area projections for:** Land use Zoning Population, service connections & ERUs Water demand - use WAC 246-290-221 and include demands with and without expected efficiency savings	Fig 1-4 thru 1-6 p. 2-11 thru 2-14 and J-9
(√)	DSL percentage and volume (provide discussion in Chapter 4)	p. 2-8 and 2-9
(√)	≥ 1000 connections - include demand forecast if all measures deemed cost-effective were implemented	J-9
Chapter 3	**System Analysis**	
(√)	System design standards (fire flow, system pressures, etc.)	p. 3-1 thru 3-4
(√)	System inventory, description and analysis	
(√)	Source	p. 3-6 thru 3-22
(√)	Storage	
(√)	Distribution system/hydraulics (with equalization & FFS depleted)	
(√)	Add pressure zones	
(√)	Treatment	
(√)	Written legal & physical system capacity analysis & DOH Capacity & ERU Determinations (WSDM 6-1) forms	p. 3-22, WSDM 6-1
(√)	Water quality analysis	p. 3-4 thru 3-6
(√)	Summary of system deficiencies	p. 3-23
(√)	Analysis of possible improvement projects	Ch 4
Chapter 4	**Water Resource Analysis & Water Use Efficiency (WUE)**	
(√)	**Metering Program** • Description of all source meters (existing and new sources) • Description of service meter program included how all meters are operated and maintained, if not fully metered submit installation schedule & include in the budget • Description of permanent & seasonal intertie meter program, if not fully metered submit meter installation schedule & include in the budget • Describe activities to minimize leakage if not fully service & intertie metered	p. J-3 NA

(√)	**Water Use Efficiency Program (WUE)** A WUE program should be designed to achieve the WUE goal by implementing cost effective measures per WAC 246-290-810	
	• Describe the current conservation (WUE) program	p. J-3
	• Describe WUE goal & document public adoption process	p. J-3
	• Describe measures that will be implemented to achieve the goal & include schedule & costs in the budget	p. J-4 NA
	• Describe process used to evaluate the WUE measures you did not implement	p. J-3 p. J-9
	• Describe yearly consumer education	p. J-7
	• Estimate projected water savings from selected measures	
	• Describe process that will be used to determine effectiveness of the program	
(√)	≥ 1000 Connections	J-7
	• Estimate water saved from efficiency measures over the past 6 years	
	• Quantitative evaluation of measures to determine if they are cost-effective, include marginal costs of water production	
	• Evaluate measures for cost-effectiveness if shared with other systems	
	• Quantitative or qualitative evaluation of measures to determine if they are cost-effective from the societal perspective	
(√)	**Distribution System Leakage (DSL)** Evaluate and report DSL - WAC 246-290-820(2)	p. J-10
( )	**Water loss control action plan (WLCAP)** Submit the WLCAP as required by WAC 246-290-820(4)	NA
(√)	**Source of supply analysis:**	Tables 3-5 thru 3-7
	• Evaluate water supply alternatives if additional water rights will be pursued within 20 years	
	• Describe water supply characteristics & discuss any foreseeable impact (quantity & quality) to the resource (WAC 246-290-100 (4)(f) (ii) (B))	p. J-10
(√)	**Water rights self-assessment: Consult with Ecology regarding water rights prior to plan submittal.** Put all water right information together in Chapter 4.	Tables 3-5 thru 3-7
	1) Water right self-assessment forms: existing, 6 & 20 year	p. J-10
	2) Description of water right status	
	3) Legal description from water right	App C
	4) Copies of water right certificate(s)	
	5) Well log & USGS map with point of withdrawal/diversion & place of use	Fig 1-4
(√)	Water supply reliability analysis	p. 3-6 thru 3-10
(√)	Interties – descriptions and agreements	p. 1-10 App E
(√)	≥ 1000 connections - explore reclaimed water opportunities	J-5
Chapter 5	**Source Water Protection (Check One or Both)**	
(√)	Wellhead protection program or 2 year update (updated inventory, letters, and	App H
( )	Watershed control program (surface water systems)	NA
Chapter 6	**Operation and Maintenance Program**	
(√)	Water system management and personnel	p. G-1
(√)	Operator certification	p. G-1
(√)	Routine operating procedures and preventive maintenance	p. G-3, G-4
(√)	Water quality sampling procedures & program	App K
(√)	Coliform monitoring plan and map	App K

	(√)	Emergency program, service reliability requirements & water shortage plan per WAC 246-290-420	App F
	(√)	Address sanitary survey findings	NA
	(√)	Cross-connection control program (> 1000 connections provide copies of annual	App I
	(√)	Recordkeeping, reporting, and customer complaint program	p. G-5 and G-6
	(√)	Summary of O&M deficiencies, include cost in budget	p. G-6
Chapter 7		**Distribution Facilities Design and Construction Standards**	
	(√)	Standard construction specifications for distribution mains	App D
	( )	Design and construction standards for distribution-related projects	App D
Chapter 8		**Improvement Program**	
	(√)	Capital improvement program including 6-year CIP schedule	p. 4-3
Chapter 9		**Financial Program (See Financial Viability Manual)**	
		A financial program to demonstrate financial viability:	Ch 5
	(√)	Summary of past income and expenses	p. 5-3
	( )	≥ 1000 connections – Balanced 1-year operational budget	
	(√)	< 1000 connections – Balanced 6-year operational budget including a financial viability test	p. 5-4 and 5-5
	(√)	Plan for collecting the revenue necessary to maintain cash flow stability and to fund capital and emergency improvements	p. 5-5
	(√)	Rate structure evaluation that considers: • Affordability of water rates • Feasibility of implementing rate structure that encourages water demand efficiency	p. 5-2 thru 5-5 J-3
Chapter 10		**Miscellaneous Documents**	
	(√)	Informational meeting for the consumers, include notification and minutes	App J
	(√)	Attach notice to adjacent utilities that WSP is available for review & comment.	App M
	(√)	>1000 connections - completed SEPA process with signed Determination	App N
	(√)	Agreements: franchise, wheeling, mutual aid, inter-local and other agreements	App E
	( )	Satellite Management Contract and Water User Agreement	
	(√)	When DOH is ready to approve the final WSP, the plan must be adopted by the governing body; include meeting minutes	Noted

***All maps should be a minimum of 11"x17"**
***If requesting source approval with WSP include all source documents in a separate section**

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CHAPTER 3 – SYSTEM ANALYSIS - continued

CHAPTER 4 – CAPITAL IMPROVEMENT PROGRAM

CHAPTER 5 – CAPITAL IMPROVEMENT FINANCING

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CHAPTER 1

DESCRIPTION OF THE WATER SYSTEM

CHAPTER 1

DESCRIPTION OF THE WATER SYSTEM

This chapter presents information on ownership and management of the system, system background data, the existing system facilities inventory, related planning documents, existing and future service areas and characteristics, and service area agreements and policies.

OWNERSHIP AND MANAGEMENT

A Mayor and City Council govern the City of Othello. The water system is owned by the City and operated and maintained by City employees. The City Administrator is Ehman Sheldon, the Maintenance Lead is Terry Clements, and the City Clerk is Debbie Kudrna. The City's current mailing address and main telephone number are:

City of Othello
500 E. Main Street
Othello, WA 99344
(509) 488-5686

The system's Washington State Department of Health water system identification number is 64850. A copy of the City's Water Facilities Inventory Form (WFI) and operating permit are included in Appendix A.

The City's water system is operated by Dan Quick, who maintains a certification as Water Distribution Manager (WDM) 2. Normal operation and control of the water system is by a telemetry system at the Public Works building. It controls the City's wells and has alarm functions for loss of pumps, power and high/low reservoir levels.

The ownership is municipal with a council decision making process. The City Council sets the budget for the water department. The City Administrator runs the day to day operation of the City. The City's Maintenance Lead has discretionary control of the water system budget to make purchases and to have work performed. For situations where large expenses are required or long term decisions are needed, the Maintenance Lead works in conjunction with the City Administrator, Mayor and City Council to determine a course of action and method of funding. The Maintenance Lead consults the City's most recent planning documents to determine the number of connections the system can serve, and uses these documents to guide planning efforts and to plan short-term project phasing. Finally, the Maintenance Lead works with the City Engineer when large projects are necessary, when the City is seeking funding for a project, or if a developer requires above average fire flow.

WATER SYSTEM HISTORY

The City of Othello's water system has evolved over the years through expansions to meet growing demand, repairs, modifications, and rehabilitation. The first wells in the area were drilled by the Northern Pacific Railroad starting in 1907. The original distribution system was built by the railroad around the two railroad wells and City Wells No. 1 and 2 in the vicinity of Broadway and Fourth Avenue.

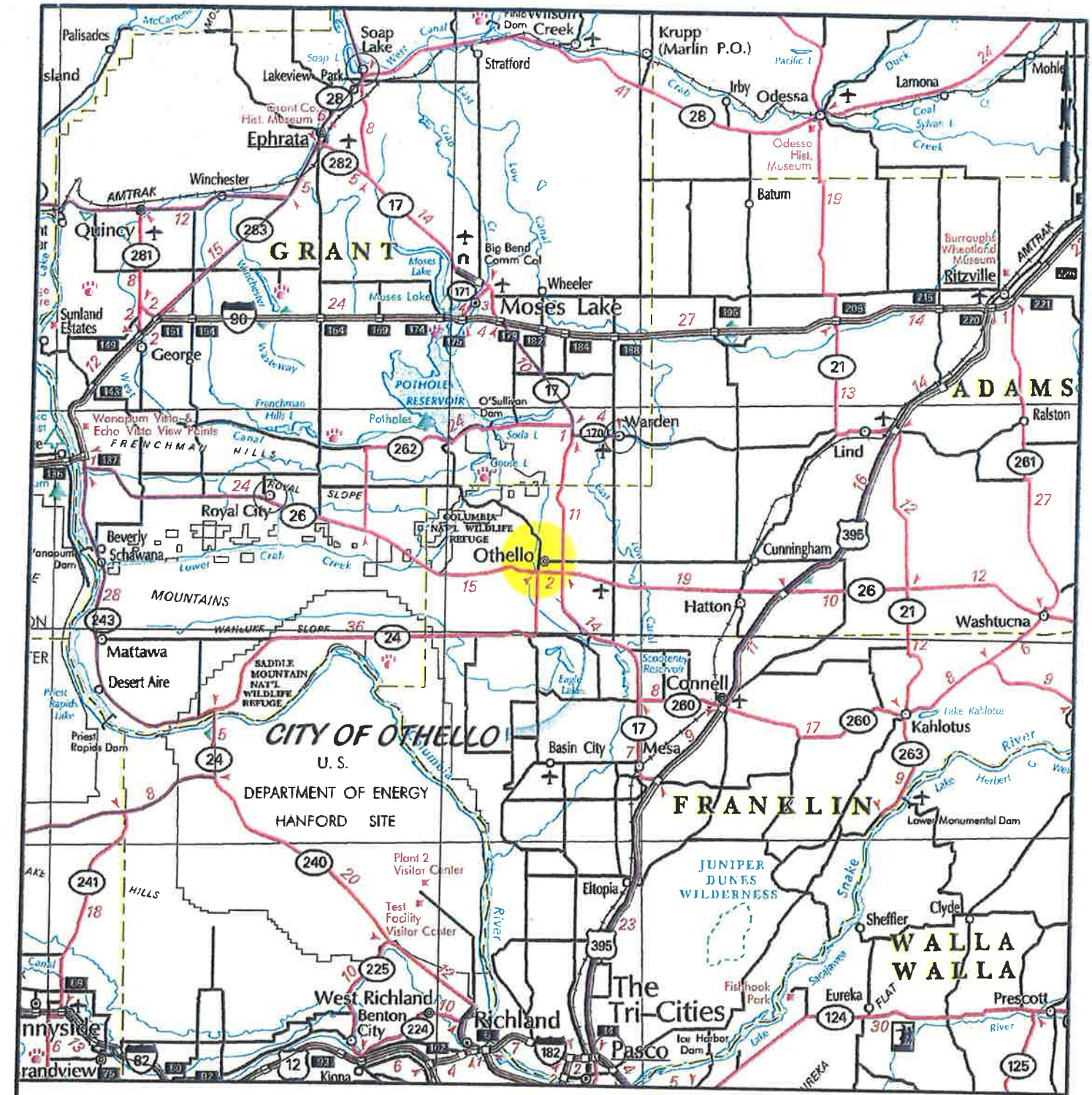
The completion of Grand Coulee Dam in 1942 allowed for irrigation of the Othello area and construction workers started moving to the area. Irrigation water arrived in Othello in 1952, and by 1960 the City's population had increased from 526 to 2,699. Expansion of the water system occurred throughout this time period to meet the needs of a growing population, resulting in a system composed primarily of 4 and 6-inch diameter pipelines. In 1957, Reservoir No. 1 was constructed in Lions Park. The last railroad involvement was drilling of the processing plant well in 1962. Reservoir No. 2 was constructed in 1967 near Scootney Springs School. Reservoir No. 3 was added in 1996 adjacent to Reservoir No. 1.

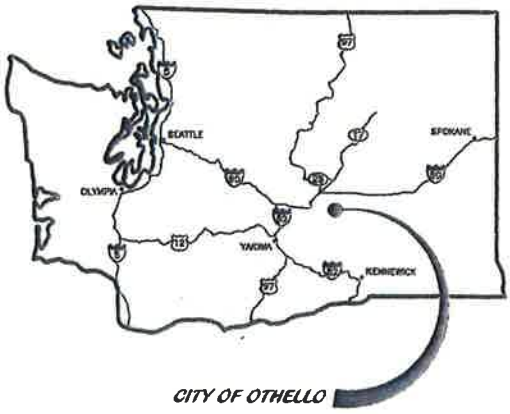
For the past 100 years, one of the most critical elements in the City's ability to grow has been the availability of potable water. The City has analyzed the potential for developing water sources other than the Wanapum Aquifer, but it appears that for the foreseeable future, the Wanapum Aquifer is still the best and most economical source of potable water. However, experience with the City's existing water sources has confirmed that the Wanapum Aquifer's water level has been decreasing for years.

In the 1970s, deep water wells were being drilled in the Lind/Odessa/Cunningham areas to irrigate dry land that was not included in the first phase of the Columbia Basin Irrigation project. The initial plan was to drill the wells to get the farms in production so that they could better finance the East High Canal which would irrigate another half million acres. This has not come to fruition, leaving these wells dependent on deep wells, which are depleting the aquifer. These wells also pose a possible threat of contamination to the aquifer through unintentional backflows and uncontrolled leakage of poor quality water into the Wanapum Aquifer.

In the 1990s, the Department of Ecology acknowledged that the East High Canal was not going to be built any time soon and that the Wanapum Aquifer had become over-permitted for withdrawal as a result. At that time, the Department of Ecology began to require all deep wells to seal off the Wanapum Aquifer from other aquifers. However, many of the irrigation wells northeast of Othello are still not sealed, therefore intermixing and down-flowing water from the Wanapum Aquifer, causing continual depletion of the water table during non-irrigation months.

In 2007, the City retained the services of GSI Water Solutions to characterize the groundwater production and fluoride concentrations by water-bearing zone in Well No. 6. The purpose of GSI's efforts was to determine how to remediate the well without





CITY OF OTHELLO
WATER SYSTEM PLAN UPDATE
FIGURE 1-1
VICINITY MAP

Gray & Osborne, Inc.
CONSULTING ENGINEERS

M:\OTHELLO\10002-WSP\FIGURES\FIG 1-1

significantly decreasing the production of the well. GSI's report determined that while fluoride levels are in excess of 4 mg/L in the deepest zones of Well No. 6, the highest concentrations of fluoride come from an interval between approximately 915 to 930 feet below ground surface (exceeding 8 mg/L, and possibly exceeding 15 mg/L). GSI determined that the City could seal off the interflow zones responsible for the higher fluoride levels. The GSI Report is included in Appendix B. The City performed this work in 2010, and the capacity of Well No. 6 was reduced to approximately 2,000 gpm in the process. The fluoride level is still approximately 4.3 mg/L.

The water system has a recurring problem with its wells. Over the last five years, at least one well a year has had mechanical or electrical problems such that the well pump or motor has to be repaired or replaced. Since 2005, the City has experienced ten well outages due to mechanical or electrical breakage. Appendix P provides a recent history of the well problems.

GEOGRAPHY

The City of Othello is located at the intersection of State Route 24 and State Route 26 in Adams County as shown on Figure 1-1. The City is approximately 70 miles east of Ellensburg and 25 miles south of Moses Lake.

EXISTING FACILITIES

Othello's existing water system facilities consists of seven groundwater wells, chlorination facilities at six of the wells, three storage reservoirs, and approximately 49 miles of distribution mains. The City's water system has one pressure zone.

A description of the facilities currently owned and operated by the City is provided in the following sections. Figure 1-2 shows a map of the City's Water System. Figure 1-3 shows a schematic of the City's wells and the hydraulic grade line of the system.

WATER RIGHTS

The City's current water rights certificates are listed in Table 1-1. A summary of the City's water rights can be found in Appendix C.

Table 1-1
City of Othello Water Rights

Water Right	Name	Priority Date	Instantaneous Quantity (gpm)	Annual Quantity (acre-ft/yr)
		Certificates		
182-D	Town of Othello	6/1/1909	200	34
183-D	Town of Othello	4/1/1940	200	148
3390-A	City of Othello	9/15/1958	1,130	624
5338-A	City of Othello	3/25/1964	900	1,440
G3-20368P	City of Othello	9/18/1972	2,000	778 (1)
G3-25032P	City of Othello	10/20/1976	2,250	2,600 (2)
G3-25033P	City of Othello	10/20/1976	870	1,476 (3)
G3-25933P	City of Othello	4/7/1978	2,000	0 (4)
		Total	**9,550**	**7,100**

(1) Q(a) is 3,024 af/yr, but Report of Examination of August 24, 2001 stipulates that only 778 af/yr is additive
(2) Q(a) is 3,000 af/yr, but Report of Examination of August 24, 2001 stipulates that only 2,600 af/yr is additive
(3) Q(a) is 2,500 af/yr, but Report of Examination of August 24, 2001 stipulates that only 1,476 af/yr is additive
(4) Q(a) is 3,000 af/yr, but Report of Examination of August 24, 2001 stipulates that 0 af/yr is additive

SOURCE OF SUPPLY

The City utilizes groundwater exclusively for its sources of supply. The City's sources are summarized in Table 1-2.

1" = 1500'

WELL NO. 8

RESERVOIR NO. 1 & 3

RESERVOIR NO. 2

WELL NO. 4

WELL NO. 3

WELL NO. 5

WELL NO. 2

WELL NO. 1 & 6

WELL NO. 7

14TH AVE

7TH AVE

MAIN ST

LEE ST

STATE ROUTE 26

STATE ROUTE 24

BROADWAY

TO ADAMS COUNTY FAIR & RODEO GROUNDS

TO YAKIMA

TO:
1. COLUMBIA NATIONAL WILDLIFE REFUGE
2. DRUMHELLER ICE AGE CHANNELS
3. O'SULLIVAN DAM POTHOLES RESERVOIR AND STATE PARK
4. ROYAL SLOPE, QUINCY AND FRENCHMAN HILLS

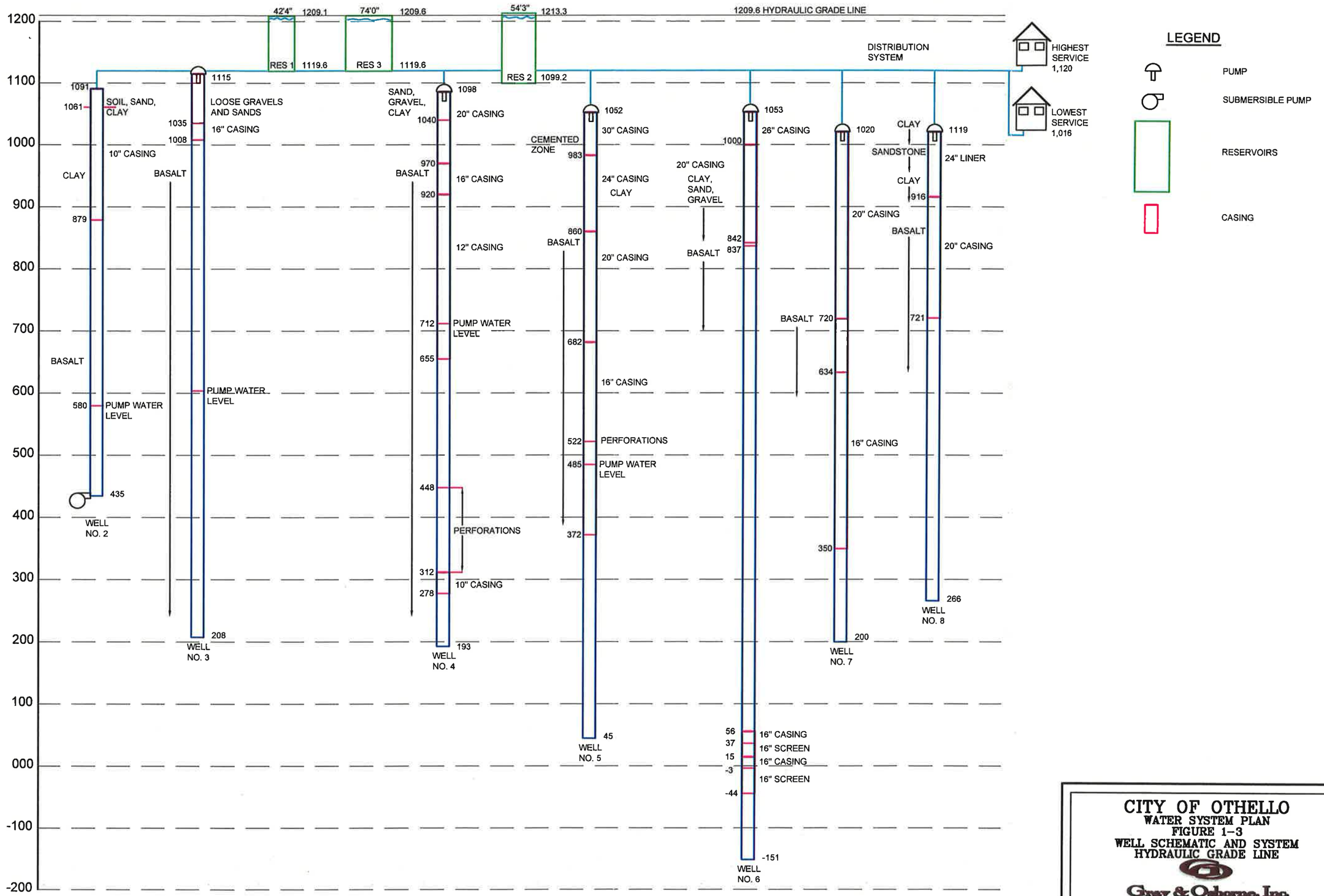
LEGEND

- 4-INCH AND SMALLER WATER LINE
- 6-INCH WATER LINE
- 8-INCH WATER LINE
- 10-INCH WATER LINE
- 12-INCH WATER LINE
- 16-INCH WATER LINE
- CITY LIMITS
- WELL
- HYDRANT
- RESERVOIR
- ADAMS COUNTY WATER DISTRICT NO. 1

CITY OF OTHELLO
WATER SYSTEM PLAN
FIGURE 1-2
WATER SYSTEM MAP

Gray & Osborne, Inc.
CONSULTING ENGINEERS

M:\OTHELLO\10002-WSP\FIGURES\FIG 1-2



CITY OF OTHELLO
WATER SYSTEM PLAN
FIGURE 1-3
WELL SCHEMATIC AND SYSTEM HYDRAULIC GRADE LINE

Gray & Osborne, Inc.
CONSULTING ENGINEERS

M:\OTHELLO\10002-WSP\FIGURES\FIG 1-3

Table 1-2
Existing Water Sources

Source Name	DOH ID No.	Current Pumping Capacity (gpm)	Location	Date Drilled	Depth	Wellhead Elevation	Screen/ Casing	Type And Model	HP
Well No. 2	01	275	Pioneer Park	1940	693/656	1,091	No	Submersible L273	75
Well No. 3	02	1,300	Lions Park	1957	907	1,115	No	Line Shaft CHC	300
Well No. 4	06	600	McFarland Junior High School	1965	905	1,098	No	Line Shaft H75	150
Well No. 5	07	1,300	SR 26 and 7th Ave.	1973	1,007	1,052	No	Peerless HXB	350
Well No. 6	05	2,000	Railroad Ave. and Larch St.	1978	1,204	1,053	Yes	Vertpline FHM	900
Well No. 7	08	725	SR 24 and Bench Rd.	1998	820	1,020	Yes	CMC	600
Well No. 8	09	720	14th Ave. and Lee St.	2002	853	1,119	No	Vertical Turbine	250

TREATMENT

The City chlorinates all of its sources except for Well No. 2. The disinfection methods for the remaining sources are summarized in Table 1-3. The City targets a chlorine residual of 0.5 ppm in most parts of the distribution system with a minimum allowable residual of 0.1 ppm.

Table 1-3
Source Chlorination

Source Name	Disinfection	Comments
Well No. 2	N/A	Not treated.
Well No. 3	Sodium Hypochlorite	Storage tank outside well house. Metering pump on top of tank.
Well No. 4	Sodium Hypochlorite	Storage tank outside well house. Metering pump mounted near ceiling inside well house.
Well No. 5	Sodium Hypochlorite	Storage tank outside well house. Metering pump on top of tank.
Well No. 6	Chlorine Gas	Chlorination equipment housed in separate chlorine room.
Well No. 7	Sodium Hypochlorite	Storage tank outside well house. Metering pump on top of tank.
Well No. 8	Chlorine Gas	Chlorination equipment housed in separate chlorine room.

STORAGE

The City of Othello has three water storage reservoirs. Reservoir No. 1 is a one million gallon steel reservoir located at Lions Park, Reservoir No. 2 is a two million gallon steel reservoir located on Ash Street, and Reservoir No. 3 is a three million gallon reservoir located adjacent to Reservoir No. 1 in Lions Park. All three reservoirs serve the City's single pressure zone. The reservoir design criteria are shown in Table 1-4.

Table 1-4
Reservoir Design Criteria

Characteristic	Reservoir No. 1	Reservoir No. 2	Reservoir No. 3
Status	Active	Active	Active
Construction Date	1957	1967	1996
Construction	Welded Steel with Concrete Base	Welded Steel with Concrete Base	Welded Steel with Concrete Base
Diameter	42 feet, 4 inches	54 feet, 3 inches	74 feet, 0 inches
Height	96 feet	116 feet	98 feet
Tank Base Elevation	1,119.6	1,099.2	1119.6
Operating Elevation	1,209.1	1,209.1	1,209.1
Usable Capacity (gal)	422,800	694,300	1,291,000

Reservoir No. 1 was recoated in 1976. In the mid-1990s, the tank was drained and inspected. It was determined at that time that the coating was nearing the end of its expected design life. Furthermore, the tank was constructed prior to adoption of current seismic regulations and is therefore not equipped with appropriate seismic restraint.

Reservoir No. 2 was inspected, and the interior was recoated in 2000. The exterior of the reservoir is starting to show some wear, but is generally in good condition. The City is planning to recoat the exterior of the reservoir in the 20-year planning period.

Reservoir No. 3 was constructed in 1996 and is in good condition.

Telemetry System

Othello's water system is controlled via a Remote Telemetry Unit (RTU)-based telemetry system. The telemetry system controls the water level in Reservoir No. 1. The telemetry system also monitors the water levels in Reservoirs No. 2 and No. 3. All well pumps are controllable by the Human Machine Interface (HMI) at the public works office. The on/off set points for each well pump are adjustable through the HMI and these settings are modified as water demands change throughout the year.

An alarm dialer is incorporated into the telemetry system in case of a power outage, low water levels, well pump failure, or other alarm conditions. The system is programmable and automatically dials the specified personnel in the City. The dialing sequence is progressive. If the first number dialed does not answer, then the second number is dialed. The dialer continues until the alarm condition is acknowledged.

TRANSMISSION AND DISTRIBUTION SYSTEM

Pressure Zones

The City of Othello's water customers are served by a single pressure zone. Service connections range in elevation from 1,021 to 1,117 feet mean sea level (msl). The hydraulic grade line is set by the Reservoir No. 1 overflow elevation of 1,209.1 feet msl. There is a pressure-reducing valve (PRV) on Cunningham Road that reduces the pressure for the wholesale contract sales to Adams County Water District No. 1, which is served by the City. The minimum peak hour operating pressures throughout the water system range from 30-32 psi in the northeast corner of the City, to 65-67 psi in the southwest corner of the City.

Pipe Inventory

The City's distribution system includes pipes ranging in size from 4-inches to 16-inches in diameter. Different pipe materials, including ductile iron, cast iron, galvanized steel, steel, asbestos concrete, and PVC make up the distribution system. Table 1-5 summarizes the pipe lengths and sizes in the City's distribution system.

Table 1-5
System Pipe Inventory

Pipe Size	Pipe Length, ft
4-inch	24,500
6-inch	47,300
8-inch	97,700
10-inch	29,300
12-inch	38,100
16-inch	21,600
Total Pipe Length	**258,500**

PLANNING AND POLICIES

The following sections describe the City's current water system planning efforts and water service policies. Adams County is not required to plan for the Growth Management Act, so there is no planning data from the County. However, the City of Othello has engaged in planning efforts despite the lack of requirement.

RELATED PLANNING DOCUMENTS

The following planning documents were used in preparing this plan.

- City of Othello, Water System Plan, 2003.
- City of Othello, Comprehensive Plan, 2010. This plan is not complete and is expected to be complete in 2011.

The City of Othello is located in WRIA 36, and there is not a watershed plan for this area.

EXISTING

The City's existing service area is shown on Figure 1-4. The existing service area is the area of the City limits that is served by the existing water mains.

FUTURE/RETAIL SERVICE AREA

The City's future service area and retail service area is as delineated in the City's Comprehensive Plan. The City's retail service area, as defined by the 2003 revisions to the Water Code (i.e. the Municipal Water Law), is the delineation of the water rights place of use. The retail service area is identical to its future service area.

Othello is located in Adams County, which is not required to plan per the Growth Management Act. In the City's Comprehensive Plan the City has designated a future growth area for the City. However, Adams County is not a Growth Management Act, planning county, thus this growth area is under the authority of Adams County, yet subject to annexation by the city in accordance with its comprehensive plans future land use map.

Figure 1-4 shows the City limits, retail service area, future service area, and water rights place of use. Figure 1-5 shows the City's zoning designation including future annexation areas within Adams County.

Department of Health requires that the county zoning be included in the Water System Plan and Figure 1-6 shows the Adams County zoning for the area around the City. A significant portion of the of the future service area per Adams County zoning is at densities (20-60 acre lot sizes) that will not support extension of the City's water system. Other areas currently in Adams County require lot sizes of 1.25 acres which may not support the extension of the water system. It is City policy that annexation is required for water service outside of the City limits except in special circumstances which requires City Council approval. Therefore any extension of the water system outside its existing water service area will in most cases require annexation. When the area is annexed, the City will rezone the area in accordance with the City's Comprehensive Plan.

Although the City anticipates that rezoning will result in population densities that do not match the existing County densities, the resulting overall change in population density for

the 20-year future service area and 50-year future service area is not projected to be significant. Initial discussions with Adams County specifically regarding the area west and northwest of the City have confirmed this. Existing county zoning for sections 31, 32, and 33 is 20-acre lots. Existing zoning for sections4, 5, 6, and 7 is 1.25-acre lots. A weighted average of the area results in an existing density of approximately 2.7 people/acre. Therefore, as the City annexes property, significant density changes will not occur when considering the area collectively.

Currently there are five other water providers within the Retail Service area. The City is currently serving Adams County Water District No. 1 with water as a single customer. The City does not have any plans to serve the other purveyors with water. See Figure 1-4 for locations of the water purveyors.

DUTY TO SERVE

Per RCW 43.20.260, the City has a duty to serve within its retail service area if a potential user approaches the City with a request for connection and the following threshold factors apply:

- The City has sufficient capacity to serve water in a safe and reliable manner.
- The service request is consistent with adopted local plans and development regulations.
- The City has sufficient water rights to provide service.
- The City can provide service in a timely and reasonable manner.

The City Administrator, planning department, building department and public works determines whether the request meets the above criteria, and make recommendations to the Planning Commission and the City Council.

INTERTIES

The City of Othello provides water to Adams County Water District No. 1 (a small suburban development approximately ¾ of a mile west of the City), with approximately 200 connections. This is a "one way" intertie since the District does not have any other source of water. Othello serves water to subdivisions (Kameron Estates and Eagle Estates) on the other side of the District; the water is wheeled through the District.

SERVICE AREA POLICIES

Table 1-6 summarizes the service area policies and definitions recommended by DOH and those adopted by the City in the Othello Municipal Code (OMC).

1" = 3000'

14TH AVE

7TH AVE

LEE ST

STATE ROUTE 26

STATE ROUTE 24

BROADWAY

BIRD DOG FAMILY, LTD.

ADAMS COUNTY WATER DISTRICT No.1

SUNSET ACRES WATER ASSOCIATION

Golf Course

MEADOW LANE WATER ASSOCIATION

SUMMERSET WEST WATER ASSOCIATION

WESTSIDE MOBILE COURT

LEGEND

- CITY LIMITS
- EXISTING SERVICE AREA
- 20 YEAR RETAIL SERVICE AREA, 20 YEAR FUTURE SERVICE AREA, 20 YEAR WATER RIGHTS PLACE OF USE
- 50 YEAR RETAIL SERVICE AREA, 50 YEAR FUTURE SERVICE AREA, 50 YEAR WATER RIGHTS PLACE OF USE
- PRIVATE WATER USER'S
- ADAMS COUNTY WATER DISTRICT NO. 1

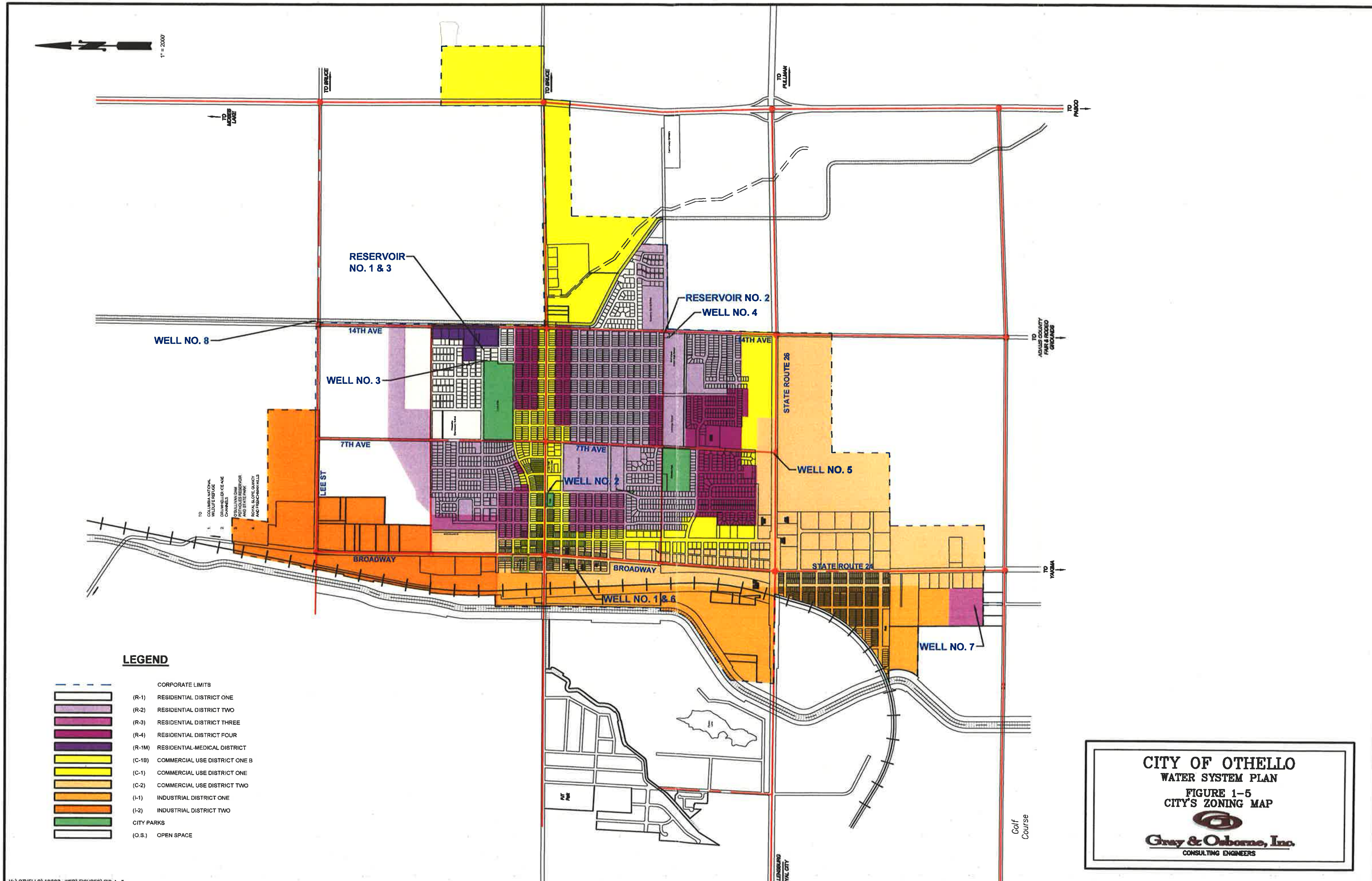
CITY OF OTHELLO

WATER SYSTEM PLAN

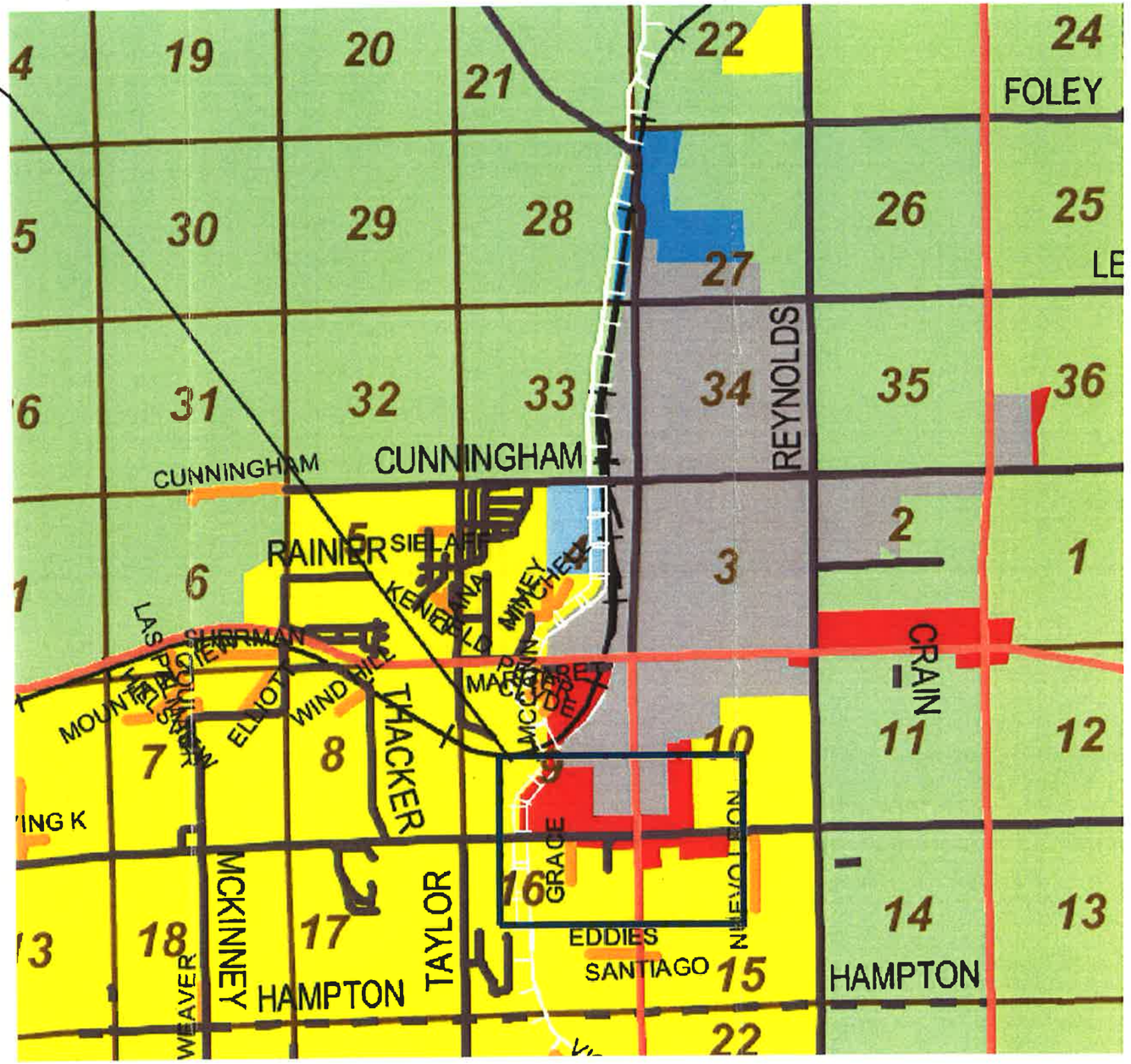
FIGURE 1-4
SERVICE AREA MAP

Gray & Osborne, Inc.
CONSULTING ENGINEERS

M:\OTHELLO\10002-WSP\FIGURES\FIG 1-4



CITY OF OTHELLO
WATER SYSTEM PLAN
FIGURE 1-5
CITY'S ZONING MAP
Gray & Osborne, Inc.
CONSULTING ENGINEERS



Legend

Zoning District

- Commercial
- General Agriculture
- Heavy Industrial
- Light Industrial
- Prime Agriculture
- Rural Residential
- R-1 Residential (currently not designated)
- Rural Settlement
- Airport (Obstruction) Overlay

County Road — Paved / Graveled / Unimproved

- Federal Highway
- State Highway
- Private Lane
- Railroad
- Canal
- City
- Section

CITY OF OTHELLO
WATER SYSTEM PLAN
FIGURE 1-6
ADAMS COUNTY ZONING

Gray & Osborne, Inc.
CONSULTING ENGINEERS

M:\OTHELLO\10002-WSP\FIGURES\FIG 1-6

Table 1-6
CITY OF OTHELLO SERVICE AREA POLICIES

Policy Name	Policy Description	City Policy	Source
Wholesaling of Water	Will the purveyor provide water to other utilities on a wholesale basis?	Yes. Adams County Water District No. 1 is served by the City.	N/A
Wheeling of Water	Will the purveyor allow the system's mains to be used to wheel water to another water system?	Not Applicable. Other water utilities are not close.	N/A
Annexation Policy	Is annexation required in order to obtain water service?	Annexation is not required, but is at sole discretion of City Council.	Water System Policy 06-01 Appendix Q
Direct Connection and Remote System	Whether new developments directly connect to existing water system or if satellite systems will be allowed.	No other purveyor of water service is allowed in City limits. All water mains outside of city limits shall be installed, owned, and maintained by the customers.	OMC 12.16.005, 12.20.010
Design and Performance Standards	Minimum design and performance standards for new development.	Design Standards are included in Appendix D. Minimum water main size 8 inches or as required by fire code requirements.	OMC 16.29.320 Design Standards
Surcharge for Outside Customers	Surcharge for customers outside city limits.	Outside customers are charged a higher rate.	OMC 12.16.130
Formation of LID outside of Legal Boundaries	Will the City work with property owners to develop a financial strategy that will facilitate construction of water facilities?	All water mains outside of City limits shall be installed, owned, and maintained by the customers.	OMC 12.20.010
UGA	Requirements for extending water service to the UGA and what level of service will be provided.	All water mains outside of City limits shall be installed, owned, and maintained by the customers.	OMC 12.20.010
Late-Comer Agreements	Policies on allowing latecomer agreements for those whom propose to extend the water system, and provisions of payback.	City allows Late-Comer Agreements	Water System Policy 11-03 Appendix Q
Over-sizing Policy	City provides funds to install larger than needed facilities to allow for future development, if necessary.	City will require oversized mains and reimburse developer.	OMC 16.33.030
Cross-Connection Control Program	Policy on regulations of cross-connections, including steps taken if a cross-connection is discovered.	Cross connections are not allowed. The City is authorized to test backflow devices and bills owner for cost of testing.	OMC 12.22.020
Extension Policy	Policy regarding extension of the system, including identity of responsible party. Design standards and payment included in conditions of service.	Developer is responsible for all new subdivisions. All water mains outside of City limits shall be installed, owned, and maintained by the customers.	OMC 16.11.030 16.17.030 12.20.010

CHAPTER 2

BASIC PLANNING DATA

CHAPTER 2

BASIC PLANNING DATA

This chapter presents the basic planning data used to estimate Othello's future water demands. Water demand projections are used in Chapter 3 to evaluate the adequacy of the City's existing water system.

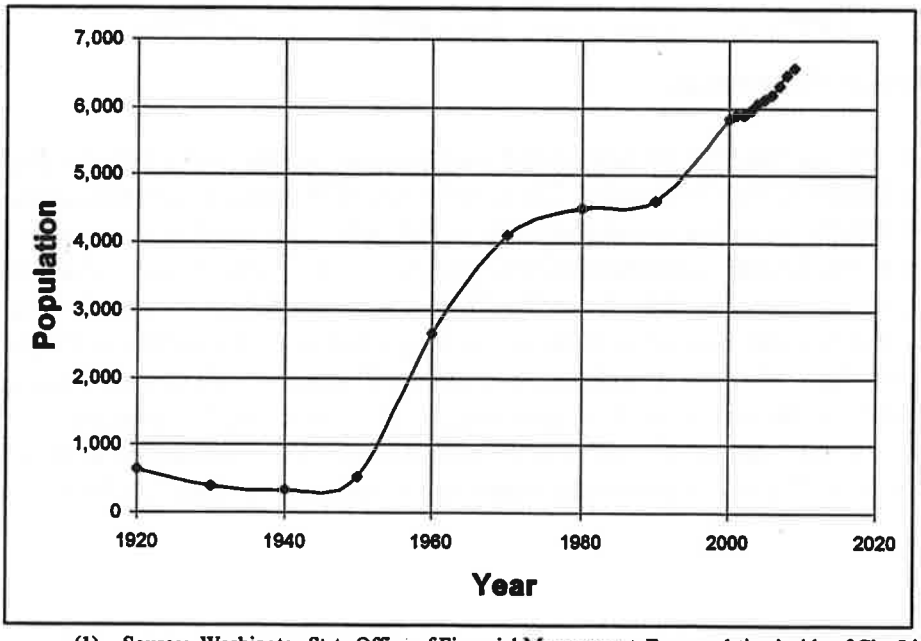
HISTORICAL DATA

In this section historical population trends, number of services, water production, and consumption data are presented.

HISTORICAL POPULATION

As shown in Figure 2-1, the population of Othello has risen steadily since irrigation water arrived in Othello in the 1950s. Population data were obtained from the Washington State Office of Financial Management (OFM).

Figure 2-1
Historical Population
City of Othello



(1) Source: Washington State Office of Financial Management. For population inside of City Limits.

SERVICE METER CONNECTIONS

The number of service meter connections for 2009 is summarized in Table 2-1. The City classifies its service connections by 14 different classes, as shown below.

Table 2-1
2009 Service Meters

Customer Class	Number of Service Meters	% of Total Service Meters
Residential	1,450	72.4
Multi-Residential	119	5.9
Residential Irrigation	19	0.9
Outside Residential	83	4.1
Motel	4	0.2
Industrial	12	0.6
Commercial	186	9.3
Multi-Commercial	32	1.6
Hospital	6	0.3
Commercial Lawn	17	0.9
Church	19	0.9
Fire Sprinkler	25	1.3
School	13	0.7
City Meters	18	0.9
Total	**2,003**	**100%**

Water Service Population

As noted above, the City has 83 residential connections outside and 1,450 residential connections inside of the City limits. There were also 119 multi-residential connections. In 2009, the City's corporate population was 6,595, which means there was an average of 4.2 people per residential connection (6,595 people / 1,569 connections). The City's water service population outside of the City limits consists of Adams County Water District No. 1 (District), Kameron Estates, and Eagle Estates. According to Department of Health records, the District is estimated to have 740 people. Wholesale water to the District is metered through a single connection, so the remaining 82 "Outside Residential" connections (in Kameron and Eagle Estates) are estimated to have 344 people (4.2 x 82). Table 2-2 shows the water service area population for 2005 to 2009.

Table 2-2
2005-2009 Service Area Populations

Year	OFM City Pop.	Estimated Adams County Water District Population	Residential Developments	Water Service Area Population
2005	6,120	740	344	7,204
2006	6,205	740	344	7,289
2007	6,340	740	344	7,424
2008	6,495	740	344	7,579
2009	6,595	740	344	7,679

WATER PRODUCTION AND CONSUMPTION

Water production data is collected from source meters by the City's telemetry system. Several years ago the City started replacing manual read service meters with radio read meters. The City has approximately 19 existing manual read service meters remaining to be replaced by radio read meters.

Average Day Demand (ADD)

Table 2-3 lists water production between 2005 and 2009. Annual production, or demand, is commonly reduced to a daily value, and is referred to as the average daily demand (ADD). The ADD is useful in determining the adequacy of the City's annual withdrawal quantity water rights. The average ADD of 4,019,600 gallons per day is used to determine future demands.

Table 2-3
2005-2009 Average Daily Demand (ADD)

Year	Service Area Population [1]	Total Annual Production (gal)	ADD (gpd)	ADD (ac-ft/yr)
2005	7,204	1,404,152,000	3,847,000	4,309
2006	7,289	1,427,595,000	3,911,000	4,381
2007	7,424	1,440,678,000	3,947,000	4,421
2008	7,579	1,570,972,000	4,304,000	4,821
2009	7,679	1,492,605,000	4,089,000	4,581
		2005-2009 Average	**4,019,600**	**4,503**

(1) Source: Table 2-2.

As required by DOH's Water Use Efficiency Rule, a monthly distribution of the City's water demands is shown on Figure 2-2. The chart shows lower winter production in 2005 and lower summer production during 2007. Figure 2-3 shows the well production per well for the years 2005 to 2009. Wells No. 3, 5 and 7 have consistently been the City's largest water producers.

Figure 2-2
2005-2009 Monthly Water Production

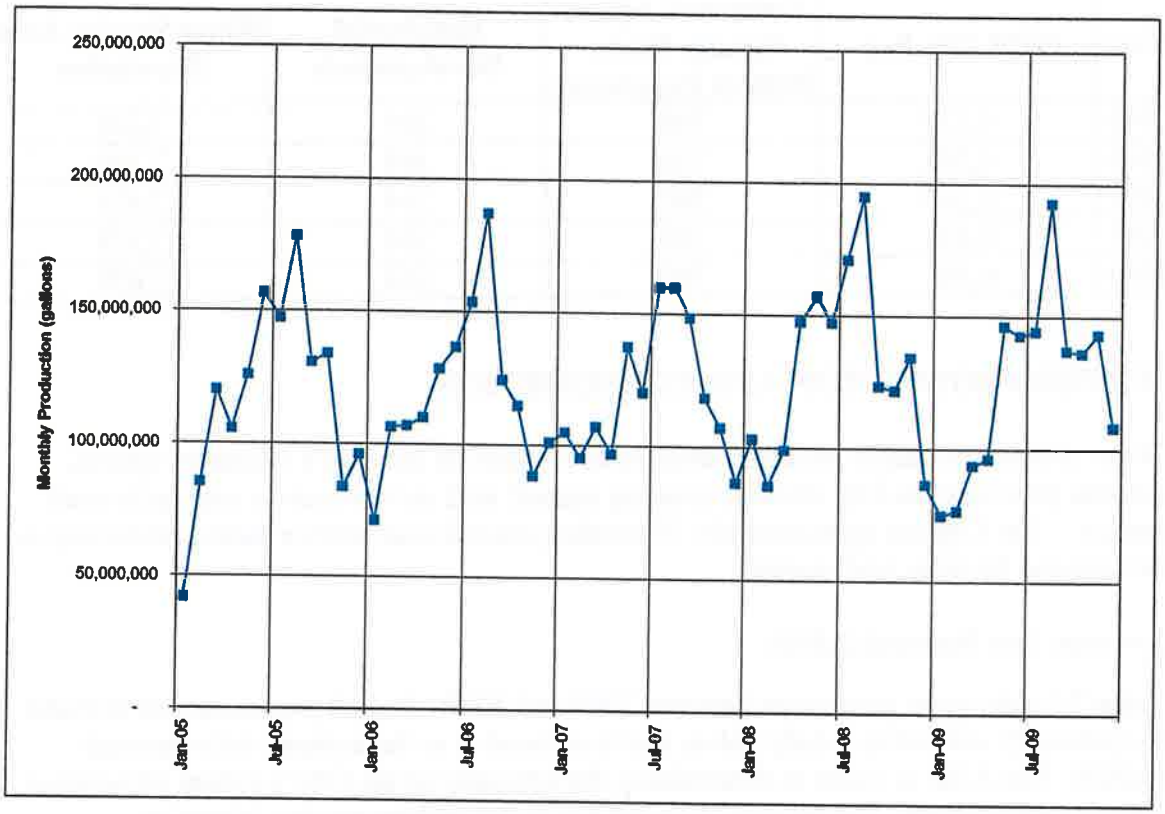
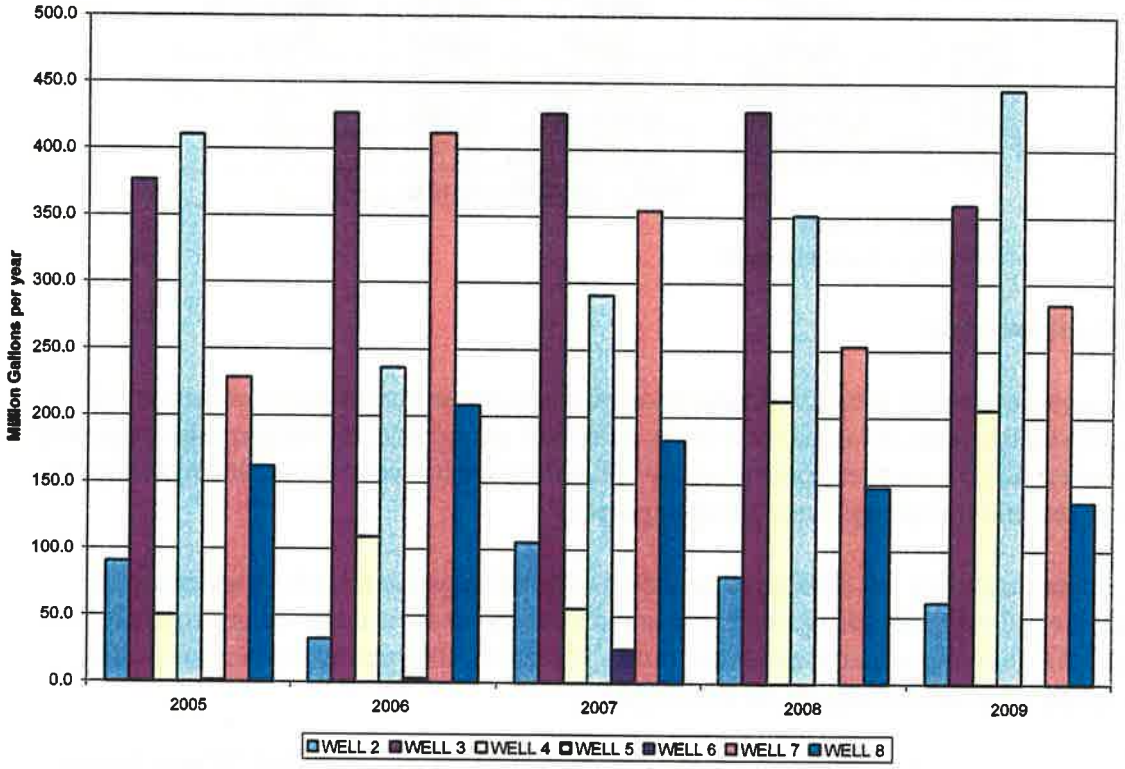


Figure 2-2
2005-2009 Annual Water Production



Maximum Day Demand

The maximum amount of water pumped from the City's wells in a 24-hour period is called the maximum day demand (MDD). MDD values are important in determining whether the water system source capacity is sufficient to meet current and future production demands, and are indicative of the requirements for instantaneous water rights. MDD values presented in Table 2-4 are based on data collected by the City between 2007 and 2009. The data show that while the ADD and MDD have both varied significantly since 2007, the MDD/ADD ratio has remained reasonably constant. Consequently, the three-year maximum for MDD/ADD ratio is used for projecting the MDD beyond 2010. The three year maximum MDD/ADD ratio of 1.6 is similar to the MDD/ADD ratio from the 2003 Water System Plan of 1.65. It is not uncommon for MDD/ADD ratios to decline over time as a larger population dampens the effect of water usage patterns, and as such, the 1.6 ratio is used for projecting future use.

Table 2-4
2007-2009 Maximum Day Demand (MDD)

Year	ADD[1] (gpd)	MDD [2] (gpd)	MDD (gpm)	MDD/ADD Ratio
2007	3,947,000	5,428,000	3,770	1.4
2008	4,304,000	6,606,000	4,590	1.5
2009	4,089,000	6,531,700	4,540	1.6
2007 – 2009 Maximum				**1.6**

(1) From Table 2-2.
(2) City pumping records.

Peak Hour Demand

The maximum amount of water produced in a one-hour period during a maximum day is the peak hour demand (PHD). PHD is an important parameter in determining the amount of reservoir storage needed to make up the difference between the peak hour production requirement and the system's pumping capacity.

Discussions with City staff have indicated that during periods of high water use in the summer, all of the wells are operated and the reservoir levels remain approximately constant for a significant amount of time. Therefore, the peak hour demand would be equal to the total source output, or 8,020 gpm.

An alternate method for estimating PHD is provided by DOH in its 2009 Water System Design Manual (WSDM). Equation 5-3 from the WSDM is as follows:

$$PHD = MDD \times [(C)(N) + F] + 18$$

where PHD is in gpm, MDD is in gpm/ERUs, N is the number of ERUs (see discussion below), and C and F are coefficients based on N from the WSDM. For 2009,

$$PHD = \left(\frac{4,540}{7,627}\right) \times [(1.6)(7,627) + 225] + 18$$
$$= 7,416\ gpm$$

Calculations for years 2005 to 2008 produce similar results. Since the City's experience with hot weather indicates a more conservative PHD value, the larger value is used. These results in a PHD to MDD ratio for 2009 of 1.8 (8,020 / 4,540). This value is used to project future PHD requirements.

Consumption History

Table 2-5 shows the City's water consumption history for 2005-2009.

Table 2-5
Total Water Consumption

Category	2005	2006	2007	2008	2009
Residential	265,565,000	260,774,000	268,030,000	273,476,000	274,569,000
Multi-Residential	69,016,000	73,404,000	71,126,000	72,770,000	72,991,000
Residential Irrigation	10,864,000	9,586,000	8,871,000	8,571,000	8,396,000
Outside Residential	51,665,000	47,137,000	48,927,000	49,004,000	52,387,000
Motel	5,106,000	3,682,000	4,216,000	3,682,000	3,290,000
Industrial	929,929,000	974,280,000	981,213,000	964,839,000	914,084,000
Commercial	55,418,000	62,697,000	51,327,000	55,717,000	56,330,000
Multi-Commercial	6,517,000	5,906,000	5,238,000	6,055,000	5,641,000
Hospital	6,789,000	6,713,000	7,338,000	7,609,000	8,244,000
Commercial Lawn	20,055,000	18,781,000	18,900,000	21,424,000	23,792,000
Church	9,964,000	10,651,000	11,017,000	10,123,000	8,799,000
Fire Sprinkler	0	0	0	0	0
School	8,310,000	7,803,000	8,876,000	7,590,000	8,411,000
City Meters	6,140,000	8,114,000	7,922,000	6,920,000	7,212,000
Total	**1,445,338,000**	**1,489,528,000**	**1,493,001,000**	**1,487,780,000**	**1,444,146,000**

The City's residential consumption, consisting of Residential, Multi-Residential, Residential Irrigation, and Outside Residential categories, is summarized in Table 2-6. The City's average residential per capita consumption is not excessive, considering that this amount includes irrigation.

Table 2-6
Residential Water Consumption

Year	Service Area Population	Residential Consumption [1] (gal/yr)	Average Day Residential Consumption (gpd)	Per Capita Residential Consumption [2] (gal/capita/day)
2005	7,204	397,110,000	1,088,000	151
2006	7,289	428,452,000	1,174,000	161
2007	7,424	396,954,000	1,088,000	147
2008	7,579	403,821,000	1,106,000	146
2009	7,679	408,343,000	1,119,000	146
			Average	**150**

(1) Residential Consumption = Residential + Multi-Residential + Residential Irrigation + Outside Residential from Table 2-5.
(2) Per Capita Residential Consumption = (Average Day Residential Consumption) / (Service Area Population).

The City's average per capita residential consumption of 150 gpd per person includes residential irrigation. With 4.20 persons per household this is equal to 630 gpd per household. It is worth noting that the WSDM provides Equation 5-1 to estimate the ADD for a typical residential connection.

$$ADD = \frac{8000}{AAR} + 200,$$

where ADD is in gpd per ERU and AAR is the average annual rainfall in inches. The AAR in the Othello area is about 8 inches per year. The equation produces an estimate of 1,200 gpd per household. The City's actual consumption rate of 519 gpd per ERU (calculated below) is significantly less than this amount.

Distribution System Leakage

Section 8 of WAC 246-290 requires municipal water suppliers to meet a state distribution leakage system standard of no more than 10 percent. Leakage must be reported as a volume and as a percentage of total production.

As shown in Table 2-7, in some years the City's water production is less than consumption, which results in a negative leakage rate for the City.

The City understands that consumption is not greater than production. The City determined that the consumption and production data presented is the most accurate available for the following reasons:

- The 2003 Water System Plan average estimated leakage was -1.7% and ranged from 1.0% to -3.6%.
- The data has been consistent for the last ten years without any large deviations from year to year.
- Consumption data by customer class is consistent from 2005 to 2009 without any large deviations from year to year for each customer class.
- Sixty percent of the City's water flows through a total of 12 industrial water meters; any variance in those meters is anticipated to have a significant effect on the City's consumption data. The City has started a program to replace all large customer meters and source meters with magnetic meters to improve the accuracy.
- The City started to replace small customer meters with new radio read meters in 2007. The City has 19 manual read meters to replace with radio read meters.
- Estimated production from power records or well run times was not utilized because of the variables that must be estimated to calculate production. These methods are less accurate than utilization of meter records.

Because meters have been replaced, the City will assume that the last two years of leakage data is the most accurate and will use the average leakage for the last two years of 4.3 percent.

Table 2-7
2005-2009 Estimated Distribution System Leakage

Year	Annual Production [1] (gal)	Annual Consumption [2] (gal)	Estimated Leakage [3] (gal)	Percent of Total Production [4] (%)
2005	1,404,152,000	1,445,338,000	-41,186,000	-2.9%
2006	1,427,595,000	1,489,528,000	-61,933,000	-4.3%
2007	1,440,678,000	1,493,001,000	-52,323,000	-3.6%
2008	1,570,972,000	1,487,780,000	83,192,000	5.3%
2009	1,492,605,000	1,444,146,000	48,459,000	3.2%
			2008-2009 Average	**4.3%**

(1) Table 2-2.
(2) From City records.
(3) Estimated Leakage = (Annual Production) – (Annual Consumption).
(4) Percent of Total Production = (Estimated Leakage) / (Annual Production).

Equivalent Residential Units

Equivalent residential units (ERUs) are a way to express water use by non-residential customers as an equivalent number of residential customers. The ERUs for each customer class in 2009 are listed in Table 2-8. The average consumption per single-family customer for 2007 was 519 gpd/ERU (274,569,000/yr ÷365 days/yr ÷ 1,450 residential connections). This number has been divided into the annual consumption for each customer class to arrive at the number of ERUs for that class.

Table 2-8
2009 Equivalent Residential Units

Classification	Metered Consumption [1] (gal)	Annual Number of Connections [2]	ERUs [3]	ERUs / Connection	Percent of Total ERUs
Residential	274,569,000	1,450	1,450	1.0	18.4%
Multi-Residential	72,991,000	119	385	3.2	4.9%
Residential Irrigation	8,396,000	19	44	2.3	0.6%
Outside Residential	52,387,000	83	277	3.3	3.5%
Motel	3,290,000	4	17	4.3	0.2%
Industrial	914,084,000	12	4,827	402.3	61.2%
Commercial	56,330,000	186	297	1.6	3.8%
Multi-Commercial	5,641,000	32	30	0.9	0.4%
Hospital	8,244,000	6	44	7.3	0.6%
Commercial Lawn	23,792,000	17	126	7.4	1.6%
Church	8,799,000	19	46	2.4	0.6%
Fire Sprinkler	0	25	0	0.0	0.0%
School	8,411,000	13	44	3.4	0.6%
City Meters	7,212,000	18	38	2.1	0.5%
Distribution System Leakage [4]	48,459,000	NA	256	NA	3.2%
Total	**1,444,146,000**	**2,003**	**7,882**	-	**100%**

(1) From City billing records.
(2) Table 2-1.
(3) Metered Consumption4365 days 4519 gpd/ERU.
(4) From Table 2-7.

LARGEST WATER USERS

The City's fifteen largest water users and their 2009 metered consumption are shown in Table 2-9. The largest water users account for approximately 69 percent of the total water consumed in 2009. Simplot is a food processor that accounts for more than half of the City's water use, and therefore it is critical to understand how Simplot's water use may change in the future to accurately project system water demands in the future. Discussions with Simplot management have resulted in the City's understanding that Simplot is not intending to grow significantly in the planning period. The City has an agreement with Simplot to transition to standard industrial rates for water use. A copy of that agreement is included in Appendix E.

McCain Foods has two private wells, but relies upon the City for backup water. Therefore the City's planning includes supplying water to McCain Foods for only two month of the year. McCain Foods' water use in 2009 was approximately equal to one sixth of their total use, so the City's annual billing data is representative of this arrangement.

Table 2-9
2009 Largest Water Users

Customer	2009 Usage (gallons)	Percent of Total Consumption [1]
Simplot	787,154,800	54.5%
McCain Foods [2]	80,915,600	5.6%
SVZ	35,598,800	2.5%
Adams County Water District #1	30,194,500	2.1%
Hiawatha Elementary School	13,974,100	1.0%
Columbia Colstor	9,917,000	0.7%
Harvest Fresh Produce	7,045,400	0.5%
Modern Trailer Court	6,999,800	0.5%
Avalon	5,257,700	0.4%
Doug Smith Apartments	4,305,500	0.3%
OHA/Desert Haven	3,996,600	0.3%
Washington Square Apartments	3,590,400	0.2%
Othello Trailer Court	3,297,200	0.2%
OHA/Lions Park Apartments	3,247,100	0.2%
Othello Community Hospital	2,366,700	0.2%
Total	**997,861,200**	**69.2%**

(1) Total consumption for 2009 = 1,444,146,000 gallons, see Table 2-8.
(2) Water usage for approximately two months of the year.

PROJECTED LAND USE, FUTURE POPULATION, AND WATER DEMANDS

This section provides population and water use projections based on the historical data presented in the previous sections.

PROJECTED POPULATION AND ERUs

The City is in the process of updating its Comprehensive Plan and anticipates a future growth rate of 2.5 percent per year. This growth rate will be utilized for all classes of ERUs except industrial connections to determine future ERUs and population. The 2003 Water System Plan projected no growth in industrial consumption, and the same assumption is made in this Plan.

Growth for Adams County Water District No. 1, Eagle Estates, and Kameron Estates is determined by utilizing the Adams County growth rate. However, since Adams County is not a Growth Management Act county, there is no known planning document that projects growth rates for Adams County. Othello's City Planner is updating the City's Comprehensive Plan with the assumption that the County will grow at an annual growth rate of 2.0 percent per year, so that value is used in this Plan.

As per the City's Comprehensive Plan, new water service outside of the City limits will require annexation except in special circumstances at the sole discretion of City Council. As per the City's Comprehensive Plan, the City's population is expected to grow at 2.5 percent per year. The City expects that the City limits will enlarge over the next twenty years to provide for growth of the City population. The City's growth rate is not dependent on the existing County Zoning because as the City annexes new areas the City will provide new zoning designations.

The City currently serves several areas outside of the City limits, (Adams County Water District No. 1, Kameron Estates and Eagle Estates). These existing water service areas outside of the City limits will not grow in size but could grow in population due to infill. The population growth rate for these areas is estimated to be 2.0 percent per year.

The projected future water service population is the summation of the growth in City population and the county population growth in area already serviced with water by the City. The projected service area population for the 20-year planning period is summarized in Table 2-10. The projected quantity of ERUs is summarized in Table 2-11.

Table 2-10
Projected Service Area Population

Year	City [1]	Adams County Water District No. 1[2]	County Residential Developments [3]	Total
2010	6,760	755	351	7,866
2011	6,929	770	358	8,057
2012	7,102	785	365	8,252
2013	7,280	801	372	8,453
2014	7,462	817	379	8,658
2015	7,649	833	387	8,869
2016	7,840	850	395	9,085
2030	10,345	1,122	403	11,870

(1) From Table 2-3. Assumed to grow at 2.5 percent per year.
(2) From Table 2-3. Assumed to grow at 2.0 percent per year.
(3) From Table 2-3. Assumed to grow at 2.0 percent per year.

Table 2-11
Projected ERUs

Year	Service Area Population (1)	ERUs				
		City (2)	Industrial (3)	Adam County Water District No. 1 (4)	Residential Developments (5)	Total
2010	7,866	2,779	4,827	189	88	7,882
2011	8,057	2,848	4,827	193	90	7,958
2012	8,252	2,919	4,827	197	92	8,035
2013	8,453	2,992	4,827	201	94	8,114
2014	8,658	3,067	4,827	205	96	8,195
2015	8,869	3,144	4,827	209	98	8,278
2016	9,085	3,223	4,827	213	100	8,363
2030	11,870	3,304	4,827	217	102	8,450

(1) From Table 2-10.
(2) "City" is all connection classes, with the exception of Class 4 (Outside Residential) and Class 7 (Industrial). Assumed to grow at 2.5 percent per year from Table 2-8 values. Includes distribution system leakage.
(3) "Industrial" is Class 7 water use. Assumed to have no growth from Table 2-8 value.
(4) "Adams County Water District No. 1" is 66.5% of the Class 4 water use, based on a population of 740 in the District compared to 373 people in the Residential Development (Table 2-2). Assumed to grow at 2.0 percent per year from Table 2-8 values.
(5) "Residential Development" is 31.7% of the Class 4 water use, based on a 2009 population of 344 people in the Residential Development compared to 740 in the District (Table 2-2). Assumed to grow at 2.0 percent per year from Table 2-8 values.

PROJECTED ADD, MDD, AND PHD

Table 2-12 summarizes the ADD, MDD, and PHD projections for the next 20 years. These projections are used in the system analysis presented in Chapter 3. The average ADD from Table 2-3 is used as the starting point for these projections. A conservative assumption has been made that the City's MDD and PHF will occur during the one month of the year that McCain Foods is served by the City's water system. Because of this, MDD and PHD are not determined entirely through the use of the MDD peaking factor and PHD peaking factor calculated above.

The City provides McCain Foods with a backup water supply. Typically the City only provides water to McCain Foods for two months a year when a McCain Foods well is taken offline. Also, every two weeks during cleanup of the McCain Foods facility, the City provides approximately 100,000 gallons of water to McCain Foods because the McCain Foods wells cannot meet demand during cleanup. This Plan uses the following assumptions to project water demands:

- For ADD and annual production, the City will provide water to McCain Foods similar to 2009 (approximately 2 months per year).
- McCain Foods will be utilizing City water when MDD and PHD occur.

- McCain Foods two wells pump 1,300 gpm during the summer. McCain Foods MDD is 1,300 gpm internal to the production facility, which equals their well capacity in the summer. However, the demand McCain Foods has on the City's water system is 800 gpm, which is the demand required when McCain Foods' largest source is out of service.
- The peaking factor for MDD to PHD is 1.8, similar to Simplot and the rest of the City.
- According to the contract with McCain Foods, the City will only supply water to McCain Foods if the City has sufficient water available.

Table 2-12
Projected ADD, MDD, and PHD with McCain Foods

Year	Service Area Pop. (1)	ERUs (2)	ADD (gpd) (3)	Annual Prod. (af/yr) (4)	MDD (5) (gpd)	MDD (gpm)	PHD (6) (gpm)
2010	7,866	7,958	4,058,100	4,546	7,645,000	5,310	9,560
2011	8,057	8,035	4,097,400	4,590	7,707,800	5,350	9,630
2012	8,252	8,114	4,137,700	4,635	7,772,300	5,400	9,720
2013	8,453	8,195	4,179,000	4,681	7,838,400	5,440	9,790
2014	8,658	8,278	4,221,300	4,728	7,906,100	5,490	9,880
2015	8,869	8,363	4,264,600	4,777	7,975,400	5,540	9,970
2016	9,085	8,450	4,309,000	4,827	8,046,400	5,590	10,060
2030	11,870	9,916	5,056,600	5,664	9,242,600	6,420	11,560

(1) From Table 2-10.
(2) From Table 2-11.
(3) ADD was assumed to increase at the same rate as ERUs. See Tables 2-8 and 2-11 for calculation of ERUs. The average ADD between 2005 and 2009 was used for 2008, see Table 2-3.
(4) Annual Production = ADD * 365 ÷ 43,560 cf/af ÷ 7.48 gal/cf (rounded to the nearest 10 acre-feet).
(5) MDD = ADD times 1.6 plus 800 gpm for McCain Foods.
(6) PHD/MDD peaking factor = 1.8.

The City anticipates that including McCain Foods as a water demand during the City's highest use periods may require additional capital improvements. To determine the result of this assumption, Table 2-13 shows the projections for ADD, MDD, and PHD assuming McCain Foods is not utilizing water during MDD and PHD periods. The facility analyses in Chapter 3 compare both methods to determine the extent to which providing McCain Foods a backup water supply is reducing available capacity.

Table 2-13
Projected ADD, MDD, and PHD without McCain Foods

Year	Service Area Pop. [1]	ERUs [2]	ADD [3] (gpd)	Annual Prod. (af/yr) [4]	MDD [5] (gpd)	MDD (gpm)	PHD [6] (gpm)
2010	7,866	7,958	4,058,100	4,546	6,492,960	4,510	8,120
2011	8,057	8,035	4,097,400	4,590	6,555,840	4,550	8,190
2012	8,252	8,114	4,137,700	4,635	6,620,320	4,600	8,280
2013	8,453	8,195	4,179,000	4,681	6,686,400	4,640	8,350
2014	8,658	8,278	4,221,300	4,728	6,754,080	4,690	8,440
2015	8,869	8,363	4,264,600	4,777	6,823,360	4,740	8,530
2016	9,085	8,450	4,309,000	4,827	6,894,400	4,790	8,620
2030	11,870	9,916	5,056,600	5,664	8,090,560	5,620	10,120

(1) From Table 2-12.
(2) From Table 2-12.
(3) From Table 2-12.
(4) From Table 2-12.
(5) MDD = ADD * 1.6 (Table 2-4).
(6) PHD = MDD *1.8.

CHAPTER 3

SYSTEM ANALYSIS

CHAPTER 3

SYSTEM ANALYSIS

This chapter determines the ability of the City's existing water system to meet current and future water quality and quantity requirements. The major sections of this chapter are:

- System Design Standards
- Water Quality Analysis
- Facility Analysis
- Water System Physical Capacity Analysis
- System Deficiencies

SYSTEM DESIGN STANDARDS

Water systems are regulated by federal, state, and local design and construction standards. Standards that affect Othello's water system are summarized in the sections below.

GENERAL FACILITY STANDARDS

WAC 246-290 is the primary drinking water regulation used by DOH to assess capacity, water quality, and compliance with drinking water standards. The 2001 Water System Design Manual (WSDM) serves as guidance for the preparation of plans and specifications for Group A public water systems in compliance with WAC 246-290. The WSDM also references the following codes and guidelines:

- Uniform Building Code (the International Building Code was adopted by all state and local agencies in 2004)
- Uniform Plumbing Code
- Recommended Standards for Water Works, Ten State Standards
- Local codes
- American Water Works Association (AWWA) Standards
- American Society of Civil Engineers (ASCE) Standards
- American Public Works Association (APWA) Standards

Table 3-1 lists the suggested WSDM guidance and the City's policies with regard to each standard for general facility requirements. The design standards for the following subjects are discussed in the order shown below:

TABLE 3-1
General Facility Requirements

STANDARD	DEPARTMENT OF HEALTH WATER SYSTEM DESIGN MANUAL	City of Othello Standards
Average Day and Maximum Day Demand	Average Day Demand (ADD) should be determined from metered water use data. Maximum Day Demand (MDD) is estimated at approximately two times the ADD if metered data is not available.	ADD = Metered production MDD = 1.6 * ADD based on historical values and an assumption that McCain Foods will be using City water during maximum day.
Peak Hour Demand	Peak hour demand (PHD) is determined using the following equation: $PHD = (MDD/1440)(CN + F) + 18$, where MDD is in gpd/ERU, and C and F are coefficients based on N, the number of ERUs. See Eq. 5-3, WSDM	PHD = 1.8 * MDD based on experience with summer water use.
Source Capacity	Capacity must be sufficient to meet MDD and replenish fire suppression storage within 72 hours.	Same as WSDM, Chapter 7.
Storage Requirements	The sum of: Operational Storage Volume sufficient to prevent pump recycling. Equalizing Storage $V_{ES} = (Q_{PH} - Q_S) * 150$ Standby Storage $V_{SB} = 200 * ERUs$ Fire Suppression Storage $V_{FSS} = NFF * T$ ADD = average day demand, gpd/ERU N = number of ERU's Q_{PH} = peak hour demand, gpm Q_S = capacity of all sources, excluding emergency sources, gpm Q_L = capacity of largest source, gpm t_m = daily pump source run time, min (1440) NFF = needed fire flow, gpm T = fire flow duration, min	Same as WSDM, using the formulas provided in the manual, Chapter 3.
Minimum System Pressure	The system should be designed to maintain a minimum of 30 psi in the distribution system under peak hour demand and 20 psi under fire flow conditions during MDD.	Same as WSDM, Chapter 8.
Fire Flow Rate & Duration	The minimum fire flow shall be determined by the local fire authority or WAC 246-293 for systems within a critical water supply service area (CWSSA).	Fire flow requirements are based on the International Fire Code standards.
Minimum Pipe Size	The diameter of a transmission line shall be determined by hydraulic analysis. The minimum size distribution system line shall not be less than 6-inches in diameter.	Same as WSDM, Chapter 8. Additionally, the City requires a minimum of 8-inch pipe if extension is longer than 60 feet. Furthermore, 6-inch pipe is only allowed for fire hydrant mains.

TABLE 3-1 (cont.)
General Facility Requirements

STANDARD	DEPARTMENT OF HEALTH WATER SYSTEM DESIGN MANUAL	City of Othello Standards
Reliability Recommendations	• Sources capable of supplying MDD within an 18-hour period • Sources meet ADD with largest source out of service • Back-up power equipment for pump stations unless there are two independent public power sources • Provision of multiple storage tanks • Standby storage equivalent to ADD x 2, with a minimum of 200 gpd/ERU • Low and high level storage alarms • Looping of distribution mains when feasible • Pipeline velocities not > 8 fps at PHD • Flushing velocities of 2.5 fps for all pipelines	Same as WSDM, Chapter 5.
Valve and Hydrant Spacing	Sufficient valving should be placed to keep a minimum of customers out of service when water is turned off for maintenance, repair, replacement or addition. As a general rule, valves on distribution mains 12-inches and smaller should be provided at least every 1,000 feet. Fire hydrants on laterals should be provided with their own auxiliary gate valve.	Valve and hydrant standards are outlined in the City's Developer Standards. Valve spacing is a maximum of 1,000 feet.
Water Quality Standards	The primary drinking water regulation utilized by Health to assess capacity, water quality, and overall compliance with drinking water standards.	WAC 246-290.

CONSTRUCTION STANDARDS

The City has prepared a set of standards for developers and the City to follow when constructing water system facilities. These standards are included in Appendix C so they can be approved by DOH as part of this plan. Such approval will allow the City to construct distribution mains and distribution-related projects without submittal to DOH of project reports in accordance with WAC 246-290-110 and construction documents in accordance with WAC 246-290-020.

FIRE FLOW DEMANDS AND MINIMUM PRESSURE

The City uses the International Fire Code (IFC) as a guide in establishing its fire flow requirements, with modifications identified for specific buildings and locations. The current fire flow requirements for the City are:

- Hiawatha Elementary School – 3,750 gpm for 4 hours
- Lutacaga Elementary School – 3,750 gpm for 4 hours
- Scootney Springs Elementary School – 3,750 gpm for 4 hours

- McFarland Junior High School – 3,750 gpm for 4 hours
- Fuel Storage Depot (Columbia Street and Broadway) – 5,000 gpm for 4 hours
- McCain Foods Processing Plant – 6,250 gpm for 4 hours
- Simplot Processing Plant – 6,250 gpm for 4 hours
- Residential Hydrant – 1,000 gpm for 1 hour
- All others per the International Fire Code.

Consistent with WAC 246-290-230, the City requires a minimum pressure of 30 psi under PHD conditions and 20 psi during concurrent fire flow and MDD conditions.

WATER QUALITY ANALYSIS

Group A public community water systems must comply with the drinking water standards of the federal Safe Drinking Water Act and its amendments. The Washington State Department of Health adopted these federal standards under WAC 246-290. To enable Group A water systems to comply with the regulations, DOH issues each system a Water Quality Monitoring Report (WQMR) listing that system's reporting requirements. The following lists the appendices containing the City's water quality monitoring and reporting information:

- Coliform Monitoring Plan — Appendix K
- Disinfection Byproduct Monitoring Plan — Appendix L
- Consumer Confidence Report — Appendix R

FLUORIDE

The primary water quality issue facing the City is the elevated fluoride levels in its wells, particularly Well No. 6. Federal regulations have established a Maximum Contaminant Level (MCL) of 4.0 mg/L and a secondary MCL of 2.0 mg/L. Water quality regulations in the State of Washington require public notification if the fluoride concentration in the public drinking water exceeds the secondary MCL, and the City currently includes the required language in its Consumer Confidence Report due to elevated fluoride levels in the distribution system. Sampling results from May 2009 show a fluoride level of 2.24 mg/L.

The City does not operate Well No. 6 except when sources are out of service during periods of high demand due to the elevated fluoride levels in that well. The DOH sentry database lists 13 fluoride samples for this source since 2000, ranging from 1.32 mg/L to 4.83 mg/L. The concentration of fluoride exceeded the MCL as recently as April 2010.

The City has modified the well in an attempt to seal off the zones of contribution which are higher in fluoride. The fluoride content has decreased to 4.3 mg/L, which is still above the MCL, and the well output decreased to 2,000 gpm. The hydrogeologist (GSI) has theories explaining the lack of fluoride reduction and believes that the fluoride levels

in Well No. 6 will decline over time, although this has not been confirmed. The City intends to monitor the well to see if the fluoride level continues to drop. If the fluoride levels do not drop sufficiently, the City intends to work with DOH to determine a suitable course of action to allow the well to be removed from emergency status. One potential solution would be to blend the well with water from Well No. 2. Blending 1,500 gpm at 4.3 mg/L fluoride from Well No. 6 with 275 gpm at 2.0 mg/L fluoride level water from Well No. 2 will produce a fluoride level of 3.94 mg/L. It will be assumed that if source blending is utilized, Well No. 6 will be required to be throttled to 1,500 gpm.

The City's other wells all operate above the secondary MCL, but below the primary MCL. Table 3-2 summarizes the fluoride content of the City's water sources.

TABLE 3-2
Source Fluoride Content

Source	Number of DOH Sentry Results since 2000	Range (mg/L)	Number of Samples above Secondary MCL	Number of Samples above MCL	Number of Samples above Potential MCL (1)
Well No. 2	27	1.2 – 3.3	11	0	27
Well No. 3	21	0.5 – 3.4	15	0	20
Well No. 4	15	1.5 – 3.5	11	0	15
Well No. 5	19	1.0 – 2.9	11	0	18
Well No. 6	13	1.3 – 4.8	9	3	13
Well No. 7	18	1.4 – 2.8	11	0	18
Well No. 8	17	1.2 – 2.6	12	0	17

(1) Assumes MCL is reduced to 1.0 mg/L in the future.

The EPA has discussed the possibility of reducing the fluoride MCL to 0.7 mg/L or 1.0 mg/L in the future. If this occurs, it is likely that the City will not have any wells capable of meeting the MCL, as illustrated in Table 3-2. Therefore, if the City is required to reduce fluoride levels in the future, it is likely that treatment of all seven City wells will be required, since the wells are located throughout the City and a centralized water treatment plant would most likely not be a reasonable option. Distillation, reverse osmosis, and media filtration are all technologies that could be considered to reduce the fluoride concentration of the City's water. The best available treatment technologies will be evaluated in a project report meeting the requirements of WAC 246-290-110 if treatment becomes necessary.

COLIFORM

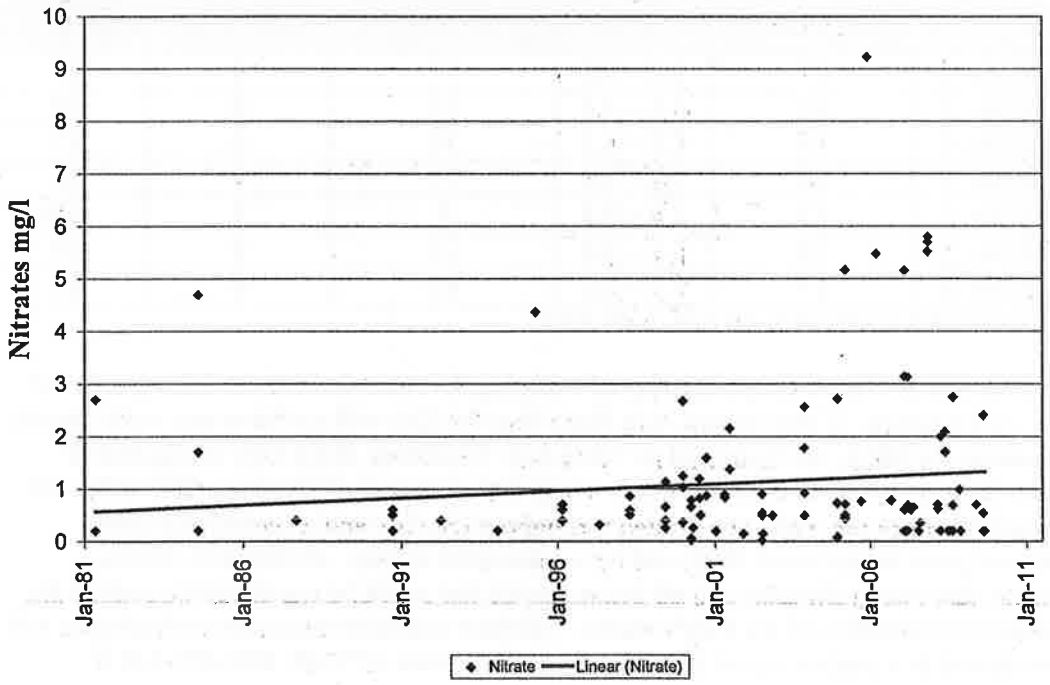
In December 2008, one coliform sample tested positive for coliforms, although the repeat samples were negative. The City has had no other unsatisfactory bacteriological or water

quality tests since the 2003 Water System Plan. The City is currently in compliance with all other State and federal water quality requirements.

NITRATE

Although the City is in compliance with the various water quality requirements, a rise in nitrate levels in its wells has been noted by City staff. To date, the highest recorded nitrate concentration has been 9.23 mg/L in December of 2005. However, this data point is not representative of historical trends in nitrate levels. The majority of nitrate samples in the last 10 years have been 3 mg/L or less. The MCL for nitrate is 10 mg/L. At the current rate of increase in nitrate levels, it is not projected that the nitrate levels will rise to this level for the foreseeable future. As a result, nitrates are not considered a water quality problem at this time. Figure 3-1 presents the nitrate sampling results for the City's wells.

FIGURE 3-1
Well Nitrate Levels



FACILITY ANALYSIS

Figure 1-2 shows a map of the City's existing water system. The City is served by one pressure zone.

Source Capacity and Reliability

WAC 246-290-222 (4) requires source capacity to be sufficient to provide a reliable supply of water equal to or exceeding the MDD at all times. Table 3-3 compares the City's source production capacity with projected MDD requirements through the year 2030. The City has seven wells. The City has modified Well No. 6 to seal off portions of the boring and attempt to reduce the resulting fluoride levels. The fluoride level in Well No. 6 has dropped to approximately 4.3 mg/L, which is still above the maximum containment level (MCL) of 4.0 mg/L. The hydrogeologist (GS) has theories explaining the lack of fluoride reduction and believes that the fluoride levels in Well No. 6 will decline over time, although this has not been confirmed. The City intends to monitor the well to see if the fluoride level continues to drop. If the fluoride levels do not drop sufficiently, the City intends to work with DOH to determine a suitable course of action to allow the well to be removed from emergency status. Until the fluoride level is below the MCL, Well No. 6 is considered an emergency well and is not utilized in the analysis. The output for Well No. 6 is 2,000 gpm. The combined output of the remaining wells is 4,920 gpm.

Table 3-3 shows that the City has sufficient source capacity when McCain Foods supplies its own water until approximately 2020. Without Well No. 6, the City does not have sufficient source capacity with McCain Foods utilizing City water.

The last two wells developed by the City are capable of producing 720 gpm and 725 gpm, therefore it is assumed that any new well will also be capable of pumping approximately 750 gpm. The City intends to drill a new 750 gpm well in 2011 to meet the source requirements of the City without McCain Foods by 2030. The City intends to monitor the fluoride levels in Well No. 6 and work with DOH to develop a plan for making Well No. 6 a permanent source to meet additional demands by McCain Foods.

TABLE 3-3
Source Production Capacity Analysis

Year	MDD (gpm) (1)	Source Capacity (gpm) (2)	Surplus (+) / Deficit (-) (gpm)
Without McCain Foods			
2010	4,510	4,920	410
2016	4,790	4,920	130
2030	5,620	4,920	-700
With McCain Foods			
2010	5,310	4,920	-390
2016	5,590	4,920	-670
2030	6,420	4,920	-1,500

(1) From Table 2-12 and Table 2-13.
(2) Sum of all capacities from Table 1-2.

In addition to the requirements of WAC 246-290-222 (4), the WSDM recommends that systems wishing to provide a high level of reliability to their customers consider the following source criteria for emergency conditions:

1. Provide sufficient source capacity to meet the MDD and replenish fire suppression storage within 72 hours. The largest fire suppression storage requirement is 1,500,000 gallons (6,250 gpm for 4 hours).
2. Meet the MDD with 18 (rather than 24) hours of pumping.
3. Meet the ADD with the largest source out of service.
4. Meet MDD with largest source off line according to WAC 246-293-660.
5. Provide two independent power feeds, or portable or in-place backup power unless the power grid meets the following minimum reliability criteria:
    - Outage frequency averages three or less per year based on data for the three previous years with no more than six outages in a single year. A power outage is considered a loss of power for 30 minutes or longer.
    - Outage duration averages less than four hours based on data for the three previous years with not more than one outage during the three previous year period exceeding eight hours.

Table 3-4 summarizes the City's water system capacity with respect to the first four of these recommendations by the end of the 20-year planning period. Table 3-4 shows that the City cannot meet the reliability requirements without Well No. 6. The City will complete the following improvements to increase system reliability.

- A new 750 gpm well in 2011.
- A new 750 gpm well in the twenty year planning period.
- Monitor the fluoride levels in Well No. 6 and work with DOH to develop a plan for using Well No. 6 as a permanent source. One plan will be to blend the output from Well No. 6 with Well No. 2, which will require throttling Well No. 6's output to 1,500 gpm.

These improvements will add 3,000 gpm of source capacity to the system, which will address all of the reliability issues, except for meeting MDD demands in 2030 with 18 hours of pumping. According to the contract with McCain Foods, the City will only supply water to McCain Foods if the City has sufficient water available. Therefore, since the City is not required to supply McCain Foods with water, the City meets its reliability requirements.

This analysis is dependent upon a known source capacity for each scenario. However, the City has been noticing a reduction in the static groundwater table in the Wanapum Aquifer. This change in the elevation of the groundwater table appears to be progressive. If the groundwater table continues to drop, it will eventually affect the ability of the well pumps to produce the required volume of water. The City is concerned since many of the wells currently produce less flow than when they were evaluated in the 2003 Water System Plan. These analyses assume that the wells will continue to produce their current

capacities for the 20-year planning period, but that may not occur if the Wanapum Aquifer level continues to drop. If source capacity continues to drop, another well will likely be required in the 20-year planning period.

TABLE 3-4
Source Production Capacity Analysis
(Well No. 6 not include in analysis)

Criteria	Q (req'd) (gpm)	Q (avail) (gpm)	Surplus (+) / Deficit (-) (gpm)
Without McCain Foods			
2010			
1. Meet MDD & Replenish FSS w/i 72 hrs [1]	4,857	4,920	63
2. Meet MDD w/ 18 hrs Pumping [2]	4,510	3,690	-820
3. Meet ADD w/o Largest Source [3]	2,818	3,620	802
4. Meet MDD w/o Largest Source [3]	4,510	3,620	-890
2016			
1. Meet MDD & Replenish FSS w/i 72 hrs [1]	5,137	4,920	-217
2. Meet MDD w/ 18 hrs Pumping [2]	4,790	3,690	-1,100
3. Meet ADD w/o Largest Source [3]	2,992	3,620	628
4. Meet MDD w/o Largest Source [3]	4,790	3,620	-1,170
2030			
1. Meet MDD & Replenish FSS w/i 72 hrs [1]	5,967	4,920	-1,047
2. Meet MDD w/ 18 hrs Pumping [2]	5,620	3,690	-1,930
3. Meet ADD w/o Largest Source [3]	3,512	3,620	108
4. Meet MDD w/o Largest Source [3]	5,620	3,620	-2,000
With McCain Foods			
2010			
1. Meet MDD & Replenish FSS w/i 72 hrs [1]	5,657	4,920	-737
2. Meet MDD w/ 18 hrs Pumping [2]	5,310	3,690	-1,620
3. Meet ADD w/o Largest Source [3]	2,818	3,620	802
4. Meet MDD w/o Largest Source [3]	5,310	3,620	-1,690
2016			
1. Meet MDD & Replenish FSS w/i 72 hrs [1]	5,937	4,920	-1,017
2. Meet MDD w/ 18 hrs Pumping [2]	5,590	3,690	-1,900
3. Meet ADD w/o Largest Source [3]	2,992	3,620	628
4. Meet MDD w/o Largest Source [3]	5,590	3,620	-1,970
2030			
1. Meet MDD & Replenish FSS w/i 72 hrs [1]	6,767	4,920	-1,847
2. Meet MDD w/ 18 hrs Pumping [2]	6,420	3,690	-2,730
3. Meet ADD w/o Largest Source [3]	3,512	3,620	108
4. Meet MDD w/o Largest Source [3]	6,420	3,620	-2,800

(1) FSS = 1,500,000 gal. Q (req'd) = MDD per Table 2-12 + 1,500,000 / 72 / 60 = MDD + 347 gpm.
(2) Q (avail) = Q (avail) * 18 / 24.
(3) Q (req'd) = ADD per Table 2-12 / 24 / 60. MDD per Table 2-12

Power System Reliability

The pumps for the water system are all electrically powered. Historically, the provision of electric power to the City has been very reliable. Wells No. 2-6 receive power from Avista, and Wells No. 7 and 8 are powered from Big Bend Electric Cooperative, Inc. Through a General Transfer Agreement, Wells No. 7 and 8 can be provided power from two different systems operated by two different entities. In an emergency, Well s No. 2-6 can also receive power from the Broadway Avista substation or the Taylor Avista substation, and Avista has the capability of transferring power from other sources to southern Othello if normal sources in northeastern Othello fail.

The normal source of power is from the Avista substation at Lee and Reynolds Roads, adjacent to Well No. 8. The transmission system serving the substation has recently been enhanced and has an excellent operation history. The average outage time per member per year for the Avista substation is seven minutes.

The alternative Big Bend source is from Bonneville Power Administration's Eagle Lake substation, approximately ten miles south of the Avista substation. Big Bend Cooperative has sufficient capacity in the power lines between the two substations to provide ample backup capability. This backup capability has been used several times to perform maintenance work at the Avista substation while minimizing the impact to the service to members. The average outage time per member per year for the new Eagle Lake substation is 43 minutes.

Avista has indicated that a power outage for the City, caused by a substation failure, would take approximately four hours to reroute to another substation. Avista has assured the City that the processing plants would not have full power service for more than six hours without the City having power service. During an extended regional power outage, it is possible that the two wells served by Big Bend (Bonneville) could have power and the wells served by Avista (and the two plants) would not. This Plan assumes that if the industries have power, so will Wells No. 2, 3, 4, 5 and 6 within a few hours.

Source Protection

Source water protection is covered under WAC 246-290-135. Pertinent sections of this rule for Othello include a section on the sanitary control area (SCA) and a section on wellhead protection.

The SCA consists of the area within a 100-foot radius around each well that must be kept free from "construction, storage, disposal, or application of any source of contamination". Because the City does not own all of the property within its SCAs, it plans to approach property owners within its SCAs for restrictive covenants per WAC 246-290-135(2)(g).

The City's 2010 Wellhead Protection Plan is provided in Appendix H.

Water Rights

In August 2001, the City received Ecology's approval to integrate all water rights, claims, permits, and certificates into one unified water allocation. It states "The total amount of water authorized for withdrawal under Ground Water Certificate Nos. 182-D, 183-D, 3390-A, 5338-A, and Ground Water Permit Nos. G3-20368P, G3-25032P, G3-25033P, and G3-25933P shall be limited to 9,550 gallons per minute; 7,100 acre-feet per year, continuously, for municipal supply." In this process, all eight water rights/claims/permits were integrated so that the City could withdraw the total amount of allocated water from any combination of deep wells within their service area and any consumers within their service area can use the water.

The instantaneous flow water rights analysis assumes all wells are operating because the City typically operates all wells during peak hour demands. The well capacity for each year is as follows:

- 2010 - All existing wells in operation.
- 2016 - Well No 6 rehabilitated and its output reduced to 2,000 gpm assuming the fluoride level is reduced naturally and blending does not occur, two new 750 gpm wells.
- 2030 – Same as 2016.

Tables 3-5 through 3-7 present the City's water right self assessment for the current, 6-year and 20-year planning period. The City has adequate water rights for the 20-year planning period.

The existing water rights allow the City to drill two new wells as additional points of withdrawal. The existing water rights locate the new wells northwest and south of the City. The City intends to drill the first new well east of the City. The City will modify its existing water right to allow for drilling the new well east of the City.

When the City supplies water to McCain Foods, the water used by McCain Foods comes from the City's water rights allocation. The City will investigate how it can modify its or McCain Foods water rights so that water used by McCain Foods is allocated McCain Foods water rights.

Table 3-5
Water Rights Self Assessment 2010

Permit Certificate or Claim #	Name of Right holder or Claimant	Priority Date	Source Name/Number	Additive (A) or Non-Additive (NA)	Existing Water Rights		Forecasted Water Use From Sources (Current Demand)		Forecasted Water Right Status (Excess Deficiency 2010 Demand in Water Right)	
					Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)
Permit / Certificates					**gpm**	**ac-feet**	**gpm**	**ac-feet**	**gpm**	**ac-feet**
182-D	Town of Othello	6/1/09	Well No. 1	(1)	**9,550**	**7,100**	**8,020** (2)	**4,546** (3)	**+1,530**	**+2,554**
183-D	Town of Othello	4/1/40	Well No. 2							
3390-A	City of Othello	9/15/58	Well No. 3							
5338-A	City of Othello	3/25/64	Well No. 4							
G3-20368P	City of Othello	9/18/72	Well No. 5							
G3-25032P	City of Othello	10/20/76	Well No. 6							
G3-25033P	City of Othello	10/20/76	Well No. 3							
G3-25933P	City of Othello	4/7/78	Well No. 6							
Claims	None									
TOTAL	**********	*********	**********	**********	**9,550**	**7,100**	**7,430**	**4,544**	**+2,120**	**+2,556**

Pending Water Right Application	Name on Permit	Date Submitted	Additive	Pending Water Rights	
				Maximum Instantaneous Flow Rate (Qi) REQUESTED	Maximum Annual Volume (Qa) REQUESTED
None					

(1) In August 2001, Department of Ecology approved the integration of all water rights, claims, permits, and certificates into one unified water allocation. It states "The total amount of water authorized for withdrawal under Ground Water Certificates Nos. 182-D, 183-D, 3390-A, 5338-A, and Ground Water Permit Nos. G3-20368P, G3-25032P, G3-25033P, and G3-25933P shall be limited to 9,550 gallons per minute, 7,100 acre-feet per year, continuously, for municipal supply."

(2) Equals the total output of all existing wells before the rehabilitation of Well No. 6.

(3) From Table 2-12.

Table 3-6
Water Rights Self Assessment 2016

Permit Certificate or Claim #	Name of Right holder or Claimant	Priority Date	Source Name/Number	Additive (A) or Non-Additive (NA)	Existing Water Rights		Forecasted Water Use From Sources (Current Demand)		Forecasted Water Right Status (Excess Deficiency 2016 Demand in Water Right)	
					Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)
Permit / Certificates					**gpm**	**ac-feet**	**gpm**	**ac-feet**	**gpm**	**ac-feet**
182-D	Town of Othello	6/1/09	Well No. 1	(1)	**9,550**	**7,100**	**8420** [2]	**4,827** [3]	**+1,130**	**+2,273**
183-D	Town of Othello	4/1/40	Well No. 2							
3390-A	City of Othello	9/15/58	Well No. 3							
5338-A	City of Othello	3/25/64	Well No. 4							
G3-20368P	City of Othello	9/18/72	Well No. 5							
G3-25032P	City of Othello	10/20/76	Well No. 6							
G3-25033P	City of Othello	10/20/76	Well No. 3							
G3-25933P	City of Othello	4/7/78	Well No. 6							
Claims	None									
TOTAL	**********	*********	**********	**********	**9,550**	**7,100**	**7,690**	**4,809**	**+1,860**	**+2,291**

Pending Water Right Application	Name on Permit	Date Submitted	Additive	Pending Water Rights	
				Maximum Instantaneous Flow Rate (Qi) REQUESTED	Maximum Annual Volume (Qa) REQUESTED
None					

(1) In August 2001, Department of Ecology approved the integration of all water rights, claims, permits, and certificates into one unified water allocation. It states "The total amount of water authorized for withdrawal under Ground Water Certificates Nos. 182-D, 183-D, 3390-A, 5338-A, and Ground Water Permit Nos. G3-20368P, G3-25032P, G3-25033P, and G3-25933P shall be limited to 9,550 gallons per minute, 7,100 acre-feet per year, continuously, for municipal supply."

(2) Once Well No. 6 is rehabilitated to reduce fluoride levels, it is estimated that the City will only have a source capacity of 6,920 gpm with existing wells. By 2016 the City will drill an additional well of 750 gpm. Therefore the new well will be an additional point of withdrawal to the existing wells.

(3) From Table 2-12.

Table 3-7
Water Rights Self Assessment 2030

Permit Certificate or Claim #	Name of Right holder or Claimant	Priority Date	Source Name/Number	Additive (A) or Non-Additive (NA)	Existing Water Rights		Forecasted Water Use From Sources (Current Demand)		Forecasted Water Right Status (Excess Deficiency 2030 Demand in Water Right)	
					Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)	Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa)
Permit / Certificates					**gpm**	**ac-feet**	**gpm**	**ac-feet**	**gpm**	**ac-feet**
182-D	Town of Othello	6/1/09	Well No. 1	(1)	**9,550**	**7,100**	**8,420** [2]	**5,664** [3]	**+1,130**	**+1,436**
183-D	Town of Othello	4/1/40	Well No. 2							
3390-A	City of Othello	9/15/58	Well No. 3							
5338-A	City of Othello	3/25/64	Well No. 4							
G3-20368P	City of Othello	9/18/72	Well No. 5							
G3-25032P	City of Othello	10/20/76	Well No. 6							
G3-25033P	City of Othello	10/20/76	Well No. 3							
G3-25933P	City of Othello	4/7/78	Well No. 6							
Claims	None									
TOTAL	**********	*********	**********	**********	**9,550**	**7,100**	**8,460**	**4,544**	**+1,090**	**+2,556**

Pending Water Right Application	Name on Permit	Date Submitted	Additive	Pending Water Rights	
				Maximum Instantaneous Flow Rate (Qi) REQUESTED	Maximum Annual Volume (Qa) REQUESTED
None					

(1) In August 2001, Department of Ecology approved the integration of all water rights, claims, permits, and certificates into one unified water allocation. It states "The total amount of water authorized for withdrawal under Ground Water Certificates Nos. 182-D, 183-D, 3390-A, 5338-A, and Ground Water Permit Nos. G3-20368P, G3-25032P, G3-25033P, and G3-25933P shall be limited to 9,550 gallons per minute, 7,100 acre-feet per year, continuously, for municipal supply."

(2) Once Well No. 6 is rehabilitated to reduce fluoride levels, it is estimated that the City will only have a source capacity of 6,920 gpm with existing wells. By 2030 the City will drill two additional wells of 750 gpm each. Therefore the new wells will be an additional point of withdrawal to the existing wells.

(3) From Table 2-12.

The City and Ecology agree that the City currently has 7,100 acre-feet and 9,550 gpm of water allocation and this Plan is based on that figure. However, there are several topics under discussion that may ultimately change that allocation, as indicated in the City's 2003 Water System Plan. They are as follows:

- Two original railroad wells were drilled to serve the railroad and the City's early citizens. They later were combined into the City system and the City has requested the water rights be transferred to the City's allocation (164 af/yr).

- The City has historically supplied water to areas which have discontinued pumping from permitted and/or exempt wells. In providing services, the City will claim the water right or equivalent water for an exempt well as these wells are decommissioned (100 af/yr).

When the City modifies the existing water rights for the new well, the City will also work to transfer the railroad water rights to the City.

Each time the City supplies water to a property with an exempt well or water right, the City will seek to have the water right transferred to the City.

STORAGE

WAC 246-290 and the WSDM define the following storage volumes for reservoirs.

- *Operational Storage (OS).* Operational storage is the volume at the top of the reservoir that is used to control when the wells are called on and off. The operational storage changes seasonally, but the normal setting is equal to a 4.0 foot band at the top of each reservoir or 240,000 gallons overall.

- *Equalizing Storage (ES).* This storage component consists of the amount of storage that is needed to make up the difference between the PHD and the system's source capacity. The WSDM requires sufficient ES to make up this difference for 150 minutes, i.e.,

  $$ES = (PHD - Q_S)(150 \text{ min})$$

  where Q_S is the sum of all well production.

- *Standby Storage (SB).* The purpose of standby storage is to provide a measure of reliability when sources fail, power outages occur, or another emergency places the burden of water system supply solely on storage. With the approval of the local fire authority, WAC 246-290-235 allows fire flow and standby storage to be nested, with the larger of the two volumes being the minimum recommended.

Section 9.0.4 of the WSDM indicates that SB should provide for two days of ADD assuming the largest water source is out of service, i.e.,

$$SB = (2\ days)(ADD) - t_m(Q_S - Q_L)$$

Where Q_L = the capacity of the largest source or 1,500 gpm, which is the capacity of Well No. 6, and t_m is the time that the largest source is out of service during the two-day outage. The WSDM suggests using t_m=1,440 minutes, or one day of pumping.

Alternatively, the WSDM recommends that SB be no less than 200 gallons times the number of ERUs being served by the reservoir.

- *Fire Suppression Storage (FSS)*. Fire suppression storage is the amount of storage required to fight a fire. WAC 246-290-230 (6) requires a minimum pressure of 20 psi when the system is simultaneously providing MDD plus the required fire flow. The required FSS is determined to be the amount of required fire flow multiplied by the fire flow duration. For the City's system, the largest fire flow requirement is 6,250 gpm for 4 hours, or 1,500,000 gallons.

- *Dead Storage (DS)*. Dead storage is water below the minimum design pressure of 20 psi during an emergency event. Hydraulic modeling has determined that the minimum allowable hydraulic gradient is 1,169. Since the bottom of the City's reservoirs elevations are below 1,169 the existing reservoirs have dead storage. The existing reservoirs have 2,386,000 gallons of effective storage and 3,332,445 gallons of dead storage.

WAC 246-290-235(4) allows fire suppression storage and standby volumes to be combined or "nested", provided the local fire protection authority does not require them to be additive. The 2003 Water System Plan allowed nesting. The fire chief has indicated that he would prefer that the City increase its storage so that nesting is not required. A letter from the City's fire chief allowing nesting, provided that the City eliminates the need for nesting in the future by adding storage to the system, is provided in Appendix S. The City plans to construct additional storage that will remove the requirement for nesting once its sources and distribution system are sufficient.

Table 3-8 presents the City's storage requirements for the six and twenty year planning period.

TABLE 3-8
Storage Volumes
With Two New 750 GPM Well by 2016
Well No. 6 A Permanent Source by 2030 (1,500 gpm)

	Volume in Gallons					
Year	OS	ES (1)	FSS (2)	SB (3)	Total Required Without Nesting (4)	Total Required With Nesting (5)
Without McCain Foods						
2010	240,000	480,000	1,500,000	1,592,000	3,812,000	2,312,000
2016	240,000	218,000	1,500,000	1,690,000	3,648,000	2,148,000
2030	240,000	330,000	1,500,000	1,983,000	4,053,000	2,553,000
With McCain Foods						
2010	240,000	696,000	1,500,000	1,592,000	4,028,000	2,528,000
2016	240,000	434,000	1,500,000	1,690,000	3,864,000	2,364,000
2030	240,000	546,000	1,500,000	1,983,000	4,269,000	2,769,000

(1) ES = 150 * (PHD – Q_S). Q_S = 4,920 gpm 2010, 6,420 gpm 2016 and 7,920 gpm 2030.
(2) FSS = 6,250 gpm for 4 hours.
(3) SB using larger of two methods, which equal to 200 gallons times No. of ERUs.
(4) Total Required = OS + ES + FSS + SB.
(5) Total Required = OS + ES + the greater of FSS and SB.

Table 3-9 presents the elevation in each reservoir for each type of storage.

TABLE 3-9
2030 Storage Conditions Elevations

Component	2010 Reservoir Elevation	2016 Reservoir Elevation	2030 Reservoir Elevation
Without McCain Foods			
Overflow	1,209	1,209	1,209
Operational (OS)	1,205	1,205	1,205
Equalization (ES)	1,197	1,199	1,199
Fire Suppression (FSS)	1,172	1,174	1,174
Standby (SB)	1,145	1,146	1,141
With McCain Food			
Overflow	1,209	1,209	1,209
Operational (OS)	1,205	1,205	1,205
Equalization (ES)	1,193	1,198	1,196
Fire Suppression (FSS)	1,168	1,173	1,171
Standby (SB)	1,142	1,145	1,138

Hydraulic Modeling has determined the following elevations are required in the system.

- During PHD, equalization storage levels must be above 1,195 to maintain system pressure above 30 psi at the highest elevation (1,120 feet) in the service area.
- During MDD with fire flow, fire suppression storage must be above 1,180 feet in elevation to provide 20 psi to all connections.
- During ADD, standby storage must be above 1,169 to provide 20 psi to all connections.

The City will continue to nest standby and fire suppression storage with approval of the Fire Marshal (See Appendix S). The City's goal is to not nest the standby and the fire suppression storage. Based on the hydraulic modeling, the following improvements are require to not nest fire suppression and standby storage:

- A new reservoir near the intersection of 7th Ave and Lee St. in the northern part of the City will be constructed to maintain equalization storage above 1,195.
- The bottom of the existing fire storage is below the required fire suppression storage of 1,180 feet. The City has 800,000 gallons of fire suppression storage above 1,180 feet. The City requires an additional 700,000 gallons above 1,180 feet to meet the required fire flow requirements of 6,250 gpm for four hours. The City will install a booster pump with generator at Reservoir No. 1 and No. 3 to allow the City to utilize the 1,600,000 million gallons of

dead storage in Reservoir No. 3. The required booster pump size is 2,920 gpm (700,000 gallon / 4 hours / 60 min/hour).

- The existing 800,000 gallons of fire suppression storage will provide 3,300 gpm of fire flow for 4 hours. This is sufficient fire flow for all but the largest existing structures in the City. The largest existing structures include the industrial food processors and the schools.
- The City has 2,386,000 gallons of effective storage above 1,169 feet in elevation. Once the booster station is constructed,the 1,600,000 gallons of dead storage in Reservoir No. 3 will become effective storage and the City will have a total of 3,986,000 gallons of effective storage. According to Table 3-8, the City needs 4,269,000 gallons of effective storage without nesting. The minimum required effective storage is 283,000 gallons (4,412,000 – 3,986,000). The new reservoir should have at least 400,000 gallons of effective storage, which will require a total reservoir capacity of 1.6 million gallons.

TREATMENT

A description of the City's chlorine disinfection is provided in Chapter 1. The systems are in good working order and should continue to function adequately throughout the 20-year planning period with routine maintenance.

TELEMETRY

The City has a history of operation problems with its wells. In the last five years, the City has had a well out of service for an extended period due to mechanical or electrical problems ten times. The City will add monitoring equipment to each of its wells to track well status. The monitoring equipment will include the following:

- Vibration monitoring.
- Voltage and phase monitoring
- Water level monitoring.

The addition of the new monitoring equipment will require the City to improve or replace portions of its existing telemetry system.

The City has also determined that telemetry improvements should be made to increase the reliability of its system during emergency situations. The telemetry system will be modified to allow Wells No. 3, 5, and 6 to operate independently of the existing telemetry system if no signal is available from the HMI. The system will also be modified to provide an independent low water level alarm to the police station, since the police station has personnel available to call public works staff at all times.

Finally, the City does not currently have the McCain Foods wells integrated into the telemetry system. Since the status of McCain Foods has a large impact on the City's water use, the water use at McCain Foods will be added to the telemetry system.

TRANSMISSION AND DISTRIBUTION

This section provides a discussion of the hydraulic model calibration and results, and the improvements resulting from the modeling.

Hydraulic Capacity Analysis – Modeling

A hydraulic model has been developed for the City's water system by creating an H_2ONet database of the distribution system, reservoirs, and wells. H_2ONet uses a graphical interface loaded into AutoCAD to develop the water system grid and components. A linked computer model performs hydraulic calculations and returns output flows and pressures. Field fire flow testing was conducted by City staff in May of 2009 to obtain data necessary for calibration of the model. During this testing, fire hydrants throughout the City were opened and flows were recorded by a pitot gauge on the hydrant. Pressures at nearby locations were recorded before, during, and after the testing. These values were used to adjust parameters in the H_2ONet model until its output closely matched the results obtained through hydrant testing. Once the model is calibrated, the City's water system is simulated in various scenarios. As required by WAC 246-290-320(5) and (6), the scenario used to evaluate the need for improvements is when both equalization and fire suppression storage are depleted.

The PHD models were run at the following conditions:

- Reservoir elevation at 1,195 feet which indicates the worst case scenario of operational and equalization storage is empty.
- All wells in operation.
- The system at PHD.
- Two new 750 gpm wells by 2016.
- Conversion of Well No. 6 into a permanent source.

The MDD with fire flow models were run at the following conditions:

- Reservoir elevation at 1,180 feet which indicates the worst case scenario of operational, equalization and fire suppression storage is empty.
- Largest well out of service.
- The system at MDD with fire flow requirements. The fire flow requirements utilized are 1,000 gpm for residential areas, 2,500 gpm for commercial areas and fire flow requirements for the existing large buildings as determined by the fire chief.
- Two new 750 gpm wells by 2016.

1" = 1500'

RESERVOIR NO. 1 & 3

RESERVOIR NO. 2

WELL NO. 4

WELL NO. 3

WELL NO. 5

WELL NO. 2

WELL NO. 1 & 6

WELL NO. 7

14TH AVE

7TH AVE

BROADWAY

MAIN ST

LEE ST

STATE ROUTE 26

STATE ROUTE 24

TO ADAMS COUNTY FAIR & RODEO GROUNDS

TO YAKIMA

TO:
1. COLUMBIA NATIONAL WILDLIFE REFUGE
2. DRUMHELLER ICE AGE CHANNELS
3. O'SULLIVAN DAM POTHOLES RESERVOIR AND STATE PARK
4. ROYAL SLOPE, QUINCY AND FRENCHMAN HILLS

LEGEND

DEFICIENT FLOW

CITY OF OTHELLO
WATER SYSTEM PLAN
FIGURE 3-2
FIREFLOW DEFICIENCIES

Gray & Osborne, Inc.
CONSULTING ENGINEERS

M:\OTHELLO\10002-WSP\FIGURES\FIG 3-2

- A new 2,920 gpm Reservoir No. 3 booster pump station to maintain elevations above 1,180 feet during fires.

In general, the model indicates that the majority of the City's distribution system will meet the City's fire flow requirements while supplying the MDD and providing minimum or better pressures. There are, however, several 4- and 6-inch lines that do not meet these requirements, as well as some large structures which do not meet the IFC required fire flows while maintaining the necessary system pressure of 20 psi. The identified deficiencies are shown in Figure 3-2.

As identified in the 2003 Water System Plan, the City has pressure problems in the water system during extreme fire conditions. Specifically, the City has many large structures such as schools, Simplot, and McCain Foods that require fire flows above 3,000 gpm. The 2003 Water System Plan determined that deficient fire flows occurred at these locations and this Plan confirms that evaluation.

The City's distribution system is able to meet the 2030 PHD condition with OS and ES depleted as long as equalization storage remains above 1,195 feet in elevation. The previous section discusses storage improvements required to maintain this elevation.

Fire Flow Deficiencies

As indicated above, there are several 4- and 6-inch lines with hydrants that are unable to deliver the City's required fire flow of 1,000 gpm. The model indicates that if these lines are upsized to 8-inch they will meet the City's fire flow standard. Table 3-10 summarizes these improvements and their locations are shown on Figure 4-1.

TABLE 3-10
Fire Flow Improvements

Location	Improve-ment	Length (ft)	Fire Flow (gpm)		Pressure (psi)	
			Before	After	Before	After
Oak Street Water Main Replacement	4" to 8"	1,500	400	2,560	<1	33
North Industrial Area Water Main Replacement	10" to 16"	1,275	3,600	6,750	<1	23

To address the fire flow deficiencies for the larger structures in the City, the City will construct a pump station at the base of Reservoirs No. 1 and No. 3. The system has been modeled using a pump with a capacity of 2,920 gpm, and the modeling results indicate that a pump of this size, in conjunction with the fire flow improvements presented in Table 3-10, would provide sufficient fire flow to the deficient structures while maintaining a system pressure above 20 psi. The pump would be placed into operation automatically based on reservoir levels, and once started, would operate on reservoir levels. When the emergency condition is over, the pump would be taken offline and Reservoir No. 3 would be refilled and placed back into operation.

Other Improvements

Besides fire flow improvements, the City plans to include the following improvements in its 20-year capital improvement plan. Figure 4-1 shows the locations of these improvements.

- SR 24 Industrial Area Infrastructure Improvements. The City plans to install over 14,000 feet of 8- and 12-inch pipe. This project is located in the industrial area in the southwest corner of the system.
- 4th Avenue Water Main Replacement Phase I. The City plans to replace 1,800 feet of 6-inch steel pipe with 8-inch pipe. This project is located on 4th Avenue from Main Street to Elm Street.
- 4th Avenue Water Main Replacement Phase II. The City plans to replace 1,700 feet of 6-inch steel pipe with 8-inch pipe. This project is located on 4th Avenue from Elm Street to Scootney Street.
- Larch Street Water Main Replacement Phase I. The City plans to replace 500 feet of 6-inch AC pipe with 8-inch pipe. This project is located on Larch Street between Broadway Avenue and First Avenue.
- Larch Street Water Main Replacement Phase II. The City plans to replace 2,700 feet of 4-inch pipe with 8-inch pipe. This project is located on Larch Street between 7th Avenue and 10th Avenue.
- 13th and 14th Avenue Water Main Extension. The City plans to extend the 8-inch water main in the alley north of Main Street from west of 13th Avenue to 14th Avenue. The project includes 600 feet of 8-inch pipe.

OPERATION AND MAINTENANCE

Appendix G indicates that the following operation and maintenance improvements are required:

- The City is replacing source meters and the McCain Foods meters with magnetic meters.
- The City will finish replacing service meters with radio read meters.
- The City will begin a meter calibration program.
- The City's wellhead protection plan must be updated every two years.
- Fire Hydrant Replacement.
- Distribution System Replacement Program.
- Reservoir No. 1 Recoating
- Reservoir No. 1 Seismic Retrofit
- Reservoir No. 2 Recoating.
- Well No. 8 will be equipped with a VFD
- The City is required to update this Water System Plan every six years to maintain its green operating permit.

WATER USE EFFICIENCY PROGRAM

The City's WUE program, which is described in Appendix J is not deficient and no improvements are necessary.

WATER SYSTEM PHYSICAL CAPACITY ANALYSIS

Department of Health's Worksheet 6-1 is included at the end of this chapter. The worksheet determines that the limiting system component is standby storage which has a capacity of 8,549 ERUs. This is sufficient capacity for the 2015 projected ERU of 8,363.

The following presents the capacity of the system, as determined by the Department of Health Worksheet 6-1, when the following improvements are constructed.

- The new 750 gpm well will increase the Source/Treatment ERU capacity to 12,459 and the equalization storage ERU storage capacity limits to 9,741.
- The new 750 gpm well will increase the source/treatment ERU capacity to 13,762.
- The Reservoir No. 3 Booster Pump Station will increase the standby storage ERU capacity to 16,394 ERUs.
- The new Reservoir No.4 will increase the equalization storage ERU capacity to 12,061 and the standby storage capacity limit to 18,669.

When all improvements to the system are constructed the system will have an ERU capacity limit of 12,061 and fire suppression storage will not be nested.

Capacity information is also provided in Table 3-11.

TABLE 3-11
Source Capacity Table (1)

	ERUs	Annual Source Prod. (mg/yr)	ADD (gpd)	MDD (gpm)	PHD (gpm)	Source Capacity (gpd)	Source Capacity (gpm) (1)	Water Rights Q_i (gpm)	Water Rights Q_a (mg/yr)
2010	7,958	1,481	4,058,100	5,310	9,560	7,084,800	4,920	9,550	2,314
2016	8,450	1,573	4,309,000	5,590	10,060	11,044,800	7,670	9,550	2,314
2030	9,916	1,846	5,056,600	6,420	11,560	12,124,800	8,420	9,550	2,314

(1) Data from Table 2-12 and 3-5, 3-6, and 3-7 with appropriate conversion factors.
(2) Assumes that the City drill two new 750 gpm wells and convert Well No. 6 into a permanent source.

The City will have sufficient capacity for the twenty-year planning period because:

- Annual water rights are greater than annual source production.
- Instantaneous water rights are greater than source capacity.
- Source capacity is greater than MDD and ADD.

SYSTEM DEFICIENCIES

Table 3-12 summarizes the deficiencies identified in this chapter and the improvements the City plans to implement. A schedule for the improvements planned within the next twenty years is presented in Chapter 4. Preliminary cost estimates are also provided in Chapter 4.

TABLE 3-12
Summary of Deficiencies

Category	Deficiency
Source	Water Rights. The new well must be added as an additional point of withdrawal for the existing rights. The City will determine how to allocate water used by McCain Foods to McCain Foods water rights.
	Source Development. Two new wells needed.
	Well No. 6 is an emergency source.
Storage	Construct a 1.6 million gallon reservoir.
Treatment	No deficiencies identified.
Telemetry	Update/Replace the existing telemetry system and add additional monitoring equipment to the wells.
Transmission	No deficiencies identified.
Distribution	Oak Street is deficient in fire flow in some areas.
	Simplot deficient in fire flow.
	Several 4- and 6-inch lines throughout City reduce available fire flows.
	North of Olympia Street, system cannot meet 30 psi during projected peak hour flows.
O&M	Replace source meters and McCain Foods meters with magnetic flow meters
	The City's meters are not calibrated regularly.
	The wellhead protection plan must be updated every two years.
	The City has fire hydrants throughout the system that require replacement.
	Several 4- and 6-inch lines throughout City are aging.
	Reservoirs No. 1 and 2 will require painting in the next 10 years.
	Reservoir No. 1 requires a seismic retrofit
	Well No. 8 draws down the water table too far
	The City's Water System Plan must be updated regularly.
Water Use Efficiency Program	No deficiencies identified.

WORKSHEET 6-1: ERU Determinations

City of Othello Water System Physical capacity Documentation based on MDD

Note: *Capacity determinations are only for existing facilities that are operational for the water system.*

Specific Single-Family Residential Connection Criteria (measured or estimated demands) (see Chapter 2):

Average Day Demand (ADD): 519 gpd/ERU (p. 2-8)

Max. Day Demand (MDD): 829 gpd/ERU (MDD = ADD × MDD/ADD = 519 × 1.6)

Water System Service Connections Correlated to ERUs			
Service Classification	**Total MDD for the Classification, gpd**	**Total # Connections in the Classification**	**ERUs**
Residential			
Single-family	1,202,000	1,450	1,450
Multi-family	319,400	119	385
Residential Irrigation	36,700	19	44
Outside Residential	229,300	83	277
Nonresidential			
Motel	14,000	4	17
Industrial	4,000,000	12	4,827
Commercial	246,500	186	297
Multi-Commercial	24,700	32	30
Hospital	36,100	6	44
Commercial Lawn	104,100	17	126
Church	38,500	19	46
Fire Sprinkler	0	25	0
School	36,800	13	44
City Meters	31,600	18	38
DSL	239,000	N/A	288
Other (identify)	---	---	---
Total existing ERUs =			**7,882**

Physical Capacity as ERUs				
Water System Component	**Calculated Capacity (ERUs)**	**2010 [2] (ERUs)**	**2010 (+/-) ERUs**	**Comment**
Source(s)	8,549	7,882	+667	
Treatment	8,549	7,882	+667	
Equalizing Storage	8,621	7,882	+739	
Standby Storage	9,291	7,882	+1,409	nested storage
Distribution	N/A			
Transmission	N/A			
Other (Qi)	16,595	7,882	+8,713	
Other (Qa)	12,186	7,882	+4,304	
Water System Physical Capacity (ERUs) = (based on the limiting water system component shown above)		**8,549**		

CHAPTER 4

CAPITAL IMPROVEMENT PROGRAM

CHAPTER 4

CAPITAL IMPROVEMENT PROGRAM

Various improvement projects were identified in Chapter 3. A brief description of each project selected for the 6-year and 20-year planning horizons is presented in the following sections. A map showing the location of each project is presented on Figure 4-1. Detailed cost estimates are provided in Appendix O. A schedule for implementing these improvements is provided in Table 4-1 at the end of this chapter. Financing for improvements planned for the next six years is discussed in Chapter 5.

SOURCE IMPROVEMENTS

The City plans to abandon Well No. 1 since it has not been used in many years and abandonment will prevent the well from being a source of contamination to the water system.

The City has rehabilitated Well No. 6. The City has modified the well in an attempt to seal off the zones of contribution which are higher in fluoride. The fluoride content has decreased to 4.3 mg/L which is still above the MCL and the well output decreased to 2,000 gpm. The hydrogeologist (GSI) has theories explaining the lack of fluoride reduction and believes that the fluoride levels in Well No. 6 will decline over time, although this has not been confirmed. The City intends to monitor the well to see if the fluoride level continues to drop.

If the fluoride levels do not drop sufficiently, the City intends to work with DOH to determine a suitable course of action to allow the well to be removed from emergency status. One potential solution would be to blend the well with water from Well No. 2. Blending 1,500 gpm at 4.3 mg/L fluoride from Well No. 6 with 275 gpm at 2.0 mg/L fluoride level water from Well No. 2 will produce a fluoride level of 3.94 mg/L. It will be assumed that if source blending is utilized, Well No. 6 will be required to be throttled to 1,500 gpm. The blending will require a 6-inch transmission line from Well No. 2 to Well No. 6.

The last two wells developed by the City are capable of producing 720 gpm and 725 gpm, therefore it is assumed that the new wells will also be capable of pumping approximately 750 gpm. The City's water rights allow for new Wells No. 9 and 10 to be developed, but the City does not wish to develop wells in the locations identified in its water rights. Therefore, a change application to Ecology will be necessary to allow the wells to be developed in different locations.

STORAGE

To address low pressure in the northeastern portion of the water system and increase the storage capacity of the system, a new 1.6 million gallon reservoir will be constructed near Well No. 8.

To address projected low pressures in the distribution system during extended fire events, a booster pump station is recommended for Reservoir No. 3. The booster station will also increase the standby storage capacity of the reservoirs. The booster station will be placed into operation by the telemetry system, and once started, would operate on system pressure. When system flows drop, the pump will be taken offline and Reservoir No. 3 will be placed back into operation.

TREATMENT

No treatment improvements are required for the six-year planning period.

TELEMETRY

The City will update its telemetry system to include power monitoring equipment, water level monitoring, and associated appurtenances at each well site. These updates will allow the City to better diagnose well problems, helping to prevent costly and inconvenient well repairs.

The City will replace the remaining water meters currently being read manually with radio-read units.

TRANSMISSION

Well No. 9 is projected to be constructed to the east of the City. A 2-mile transmission main will be required to connect the future well to the distribution system. Although the location of Well No. 10 has not been identified yet, it is likely that due to the need for Well No. 9 to be drilled two miles from the water system, Well No. 10 will need a similar transmission main.

DISTRIBUTION

The City has identified several distribution system improvements needed to meet fire flow requirements on existing 4- and 6-inch lines, and to improve pressure and looping characteristics on other lines. These improvements are shown on Figure 4-1.

OPERATION AND MAINTENANCE

Several O&M projects have been identified that the City plans to either complete within the planning period or start doing on an ongoing basis. These include painting Reservoirs No. 1 and 2, replacing source meters with magnetic flow meters, updating its wellhead protection and water system plans, replacing fire hydrants, replacing aging pipes in the system, and equipping Well No. 8 with a VFD to prevent the lowering of the water table and subsequent well problems.

WATER USE EFFICIENCY PROGRAM

The City's Water Use Efficiency Program will not result in any capital improvements.

SCHEDULE

A schedule for the City's planned capital improvements is provided in Table 4-1. An approach to financing these projects is presented in Chapter 5.

TABLE 4-1
Capital Improvement Plan

	Project	2010 Cost [1]	'11	'12	'13	'14	'15	'16	'17-'30
SOURCE									
1	Well No. 1 Abandonment	$25,000	X						
2	Well No. 9	$1,000,000	X						
3	Well No. 10	$1,000,000			X				
4	Blending of Well No. 2 and 6	$250,000			X [2]				
STORAGE									
4	Reservoir No. 4	$2,256,000							X
5	Reservoir No. 3 Booster Pump Station	$500,000							X
WATER RIGHTS									
6	Change Application	$7,000	X						
TRANSMISSION									
7	Well No. 9 Transmission Main$	1,700,000		X					
8	Well No. 10 Transmission Main	$1,700,000				X			
TELEMETRY									
9	Telemetry Upgrade	$200,000							X
10	Water Meter Replacement	$100,000	X	X	X	X			
OPERATION & MAINTENANCE									
11	Fire Hydrant Replacement	$70,000							X
12	Distribution System Replacement Program	$60,000	X						X
13	Reservoir No. 1 Recoating	$377,000							X
14	Reservoir No. 1 Seismic Retrofit	$200,000							X
15	Reservoir No. 2 Recoating	$345,000							X
16	Well No. 8 VFD	$82,000							X
17	Water System Plan Update	$60,000							X
DISTRIBUTION									
18	SR 24 Industrial Area Infrastructure Improvements	$1,750,000	X	X					
19	Oak Street Water Main Replacement	$217,000							X
20	North Industrial Area Water Main Replacement	$465,000							X
21	4th Avenue Water Main Replacement Phase I	$332,000		X	X				
22	4th Avenue Water Main Replacement Phase II	$294,000							X
23	Larch Street Water Main Replacement Phase I	$101,000							X
24	Larch Street Water Main Replacement Phase II	$391,000	X	X					
25	13th and 14th Avenue Water Main Extension	$105,000							X
COST IN MILLIONS (2010 Dollars) [3]			2.19	2.96	1.44	1.73	0	0	
COST OF 6-YEAR PROJECTS (2010 Dollars)			8.32						
COST OF 7-20 YEAR PROJECTS (2010 Dollars)			5.33						

(1) Engineering News Record (ENR) Seattle Construction Cost Index October 2010 = 8705
(2) If required if the fluoride levels do not decrease naturally.
(3) Multi-year project cost distributed across life of project

1" = 1500'

WELL NO. 8

RESERVOIR NO. 1 & 3

RESERVOIR NO. 2

WELL NO. 4

WELL NO. 3

WELL NO. 5

WELL NO. 2

WELL NO. 1 & 6

WELL NO. 7

14TH AVE

7TH AVE

BROADWAY

MAIN ST

LEE ST

STATE ROUTE 26

STATE ROUTE 24

TO ADAMS COUNTY FAIR & RODEO GROUNDS

TO YAKIMA

TO:
1. COLUMBIA NATIONAL WILDLIFE REFUGE
2. DRUMHELLER ICE AGE CHANNELS
3. O'SULLIVAN DAM POTHOLES RESERVOIR AND STATE PARK
4. ROYAL SLOPE, QUINCY AND FRENCHMAN HILLS

1. WELL NO. 1 ABANDONMENT
2. WELL NO. 9
3. WELL N0. 10
4. RESERVOIR NO. 4
5. RESERVOIR NO. 3 BOOSTER PUMP STATION
6. CHANGE APPLICATION (NOT SHOWN)
7. WELL NO. 9 TRANSMISSION MAIN
8. WELL NO. 10 TRANSMISSION MAIN
9. TELEMETRY SYSTEM
10. WATER METER REPLACEMENT (NOT SHOWN)
11. FIRE HYDRANT REPLACEMENT (NOT SHOWN)
12. DISTRIBUTION SYSTEM REPLACEMENT PROGRAM (NOT SHOWN)
13. RESERVOIR NO. 1 RECOATING
14. RESERVOIR NO. 1 SEISMIC RETROFIT
15. RESERVOIR NO. 2 RECOATING
16. WELL NO. 8 VFD
17. WATER SYSTEM PLAN UPDATE (NOT SHOWN)
18. SR 24 INDUSTRIAL AREA INFRASTRUCTURE IMPROVEMENTS
19. OAK STREET WATER MAIN REPLACEMENT
20. NORTH INDUSTRIAL AREA WATER MAIN REPLACEMENT
21. 4th AVENUE WATER MAIN REPLACEMENT PHASE I
22. 4th AVENUE WATER MAIN REPLACEMENT PHASE II
23. LARCH STREET WATER MAIN REPLACEMENT PHASE I
24. LARCH STREET WATER MAIN REPLACEMENT PHASE II
25. 13th AND 14th AVENUE WATER MAIN EXTENSION

CITY OF OTHELLO
WATER SYSTEM PLAN
FIGURE 4-1
WATER SYSTEM IMPROVEMENTS

Gray & Osborne, Inc.
CONSULTING ENGINEERS

M:\OTHELLO\10002-WSP\FIGURES\FIG 4-1

CHAPTER 5

CAPITAL IMPROVEMENT FINANCING

CHAPTER 5

CAPITAL IMPROVEMENT FINANCING

EXISTING RATES AND CHARGES

Water service rates are established by Chapter 12.16 of the City of Othello's Municipal Code. Meters are read and customers are billed on a monthly basis, according to the block rate schedule shown in Table 5-1. Connections outside of the City limits are charged 150% of the in-City rate. Each connection is charged a minimum monthly service charge, which includes the price per unit volume of water consumed based on 1 unit equal to 100 ft^3 multiplied by a multiplication factor associated with the meter size. Each connection is allotted a volume of water dependent upon meter size with the minimum monthly service charge.

For billing periods where the residential meter is unable to be read due to weather or other disruptions and more than one billing cycle is included in the reading, the residential customer is billed the first block rate for water used during the period.

TABLE 5-1
Water Service Base Rates (1)

Meter Size (Inch)	Minimum Monthly Service Charge	Minimum Volume (ft^3)	Block 2 Volumetric Charge (2)	Block 3 Volumetric Charge (2)	Industrial Volumetric Charge (3)
1 or less	$25.49	800	$0.54 for the next 2000 ft^3	$0.62 for total used beyond 2,800 ft^3	$0.48 Per 100 ft^3
1-1/2	$84.88	2600	$0.54 for the next 6,600 ft^3	$0.62 for total used beyond 9,200 ft^3	
2	$135.86	4200	$0.54 for the next 10,600 ft^3	$0.62 for total used beyond 14,800 ft^3	
3	$254.90	8000	$0.54 for the next 20,000 ft^3	$0.62 for total used beyond 28,000 ft^3	
4	$424.68	1,300	$0.54 for the next 33,300 ft^3	$0.62 for total used beyond 46,600 ft^3	
6	$849.61	16,600	$0.54 for the next 66,600 ft^3	$0.62 for total used beyond 93,200 ft^3	
8	$1,359.42	42,600	$0.54 for the next 106,600 ft^3	$0.62 for total used beyond 149,200 ft^3	
10	$1,954.12	61,300	$0.54 for the next 153,300 ft^3	$0.62 for total used beyond 214,600 ft^3	

(1) Each block rate per unit volume of water delivered outside City limits for residential, commercial and Industrial customers are 50% more than what is shown in Table 5.1.
(2) Inclining block rates two (2) and three (3) are discussed in the City's Ordinance, Chapter 12.16.
(3) This $0.48 charge will raise to $0.52 by 2012

Site facilities charges are also defined by resolution, and are summarized in Table 5-2. These are charges for physically connecting to the system.

TABLE 5-2
Site Facilities Charges (1)

Meter Size	Installation of water connections performed by City	If service line is provided, and City installs meter box, meter and performs inspection of connection to main line	Owner provides all labor, material, and restoration costs associated with installation, and City provides and installs meter and performs inspection of connection to main line
1 Inch or less	$1,200	$700	$400
1-1/2 Inch or larger	All labor, equipment, material, and restoration costs associated with installation plus 15% for administration.		

(1) Water utility charge for single-family residential, multiple-family residential, single unit commercial, and multiple unit commercial connections, including all commercial single and multiple occupancy buildings and businesses, motels, inns, institutions, and schools.

The City does not currently charge a General Facility Charge for new connections. A General Facility Charge is an additional fee that is paid to connect to the system, and pays for the capacity of the system that is already in place. Through the use of General Facility Charges, the cost of new improvements to add capacity can be partially offset by the new connections which require the City to increase its system capacity.

HISTORICAL FINANCIAL STATUS

Revenues and expenditures over the last five years for the City's water system are shown in Table 5-3. The table shows that the City's revenues have exceeded expenditures for the past five years, and the City's Water Fund Balance was in good health at the end of 2009.

Data tabulated by AWWA indicate that the median operating cost for a water utility of Othello's size is estimated to be approximately $2,488 per million gallons distributed. The 25th percentile for a City of Othello's size is estimated to be approximately $1,376 per million gallons distributed. However, in 2009, the City's operating cost was $263 per million gallons distributed ($1,057,300 / 4,020 MG). This shows that Othello operates their system in a cost effective manner, and since the City operates the system without losing money, its rates are lower than other systems of its size as well.

TABLE 5-3
Water Utility Historical Revenue and Expenditures

REVENUES	2005	2006	2007	2008	2009
Charges for Goods and Services	$1,466,900	$1,555,600	$1,718,300	$1,759,700	$1,869,200
Fines and Forfeits	$21,600	$0	$11,800	$12,400	$16,000
Miscellaneous	$36,300	$68,900	$72,000	$30,100	$14,100
Capital Contributions	$0	$0	$0	$0	$34,900
Other Financing Sources	$0	$105,000	$100,000	$102,500	$0
Total Revenues	**$1,524,800**	**$1,729,500**	**$1,902,100**	**$1,904,700**	**$1,934,200**
EXPENSES					
Physical Environment	$963,100	$1,010,900	$1,083,100	$1,066,300	$601,400
Debt Service	$46,000	$42,200	$38,400	$34,500	$30,700
Capital Outlay	$246,300	$156,100	$469,800	$372,000	$115,800
Other Financing Uses	$158,300	$167,700	$76,300	$411,200	$437,300
Total Expenses	**$1,413,700**	**$1,376,900**	**$1,667,600**	**$1,884,000**	**$1,185,200**
Non Expenditures	($127,900)	($127,900)	($127,900)	($127,900)	($127,900)
Total Expenses and Non-Expenditures	**$1,285,800**	**$1,249,000**	**$1,539,700**	**$1,756,100**	**$1,057,300**
INDICATORS					
Beginning Balance	$309,700	$325,500	$547,000	$653,600	$546,400
Rev. minus Exp.	$239,000	$480,500	$362,400	$148,600	$876,900
Ending Balance	**$548,700**	**$806,000**	**$909,400**	**$802,200**	**$1,423,300**

SIX-YEAR FINANCING PLAN

Table 5-4 summarizes the City's 6-year financing plan. For purposes of projecting revenues and expenses, a 2010 value is determined based upon historical trends in each category. The various line items for 2010 are determined as follows:

- **Charges for Goods and Services**: This category has increased steadily since 2005, and is projected to increase to $1,900,000 in 2010.
- **Fines and Forfeits**: The average of the previous five years is used.
- **Miscellaneous**: The average of the previous five years is used.
- **Capital Contributions**: This represented a one-time insurance payment to the City. This is not projected to occur in the future.
- **Other Financing Sources**: This represented one-time fund transfers which are not projected to increase in the future.
- **Physical Environment**: In 2009, the City modified how it accounted for overhead and personnel costs, shifting a portion of this line item to Other Financing Uses. Therefore, the 2009 value is representative of future accounting and will be used for 2010.
- **Debt Service:** This category is declining at $3,800 per year. Therefore, this is projected to be $26,900 in 2010.
- **Capital Outlay:** The average of the previous five years is used.

- **Other Financing Uses:** In 2008, the City modified how it accounted for overhead and personnel costs, shifting a portion of this line item to Other Financing Uses. Therefore, the 2008 and 2009 value are representative of future accounting and will be averaged for 2010.
- **Non Expenditures:** This value is equal to -$127,900.

All expenses, except for debt service, will be projected to increase at 3 percent per year starting from the projected 2010 value. Capital improvement costs are projected to increase by 5 percent per year due to inflation.

TABLE 5-4
Six-Year Financing Plan

CAPITAL IMPROVEMENTS [1]	2011	2012	2013	2014	2015	2016
Well No. 1 Abandonment	$26,300					
Well No. 9	$1,050,000					
Well No. 10			$1,157,600			
Water Rights Change Application	$7,400					
Well No. 9 Transmission Main		$1,874,300				
Well No. 10 Transmission Main				$2,066,400		
Water Meter Replacement	$25,000	$25,000	$25,000	$25,000		
Distribution System Replacement Program			$60,000			
SR 24 Industrial Area Infrastructure Improvements	$875,000	$875,000				
4th Avenue Water Main Replacement Phase I		$150,000	$140,000			
Larch Street Water Main Replacement Phase II	$50,000	$210,000				
Total Capital Improvements	**$2,034,000**	**$3,134,000**	**$1,383,000**	**$2,091,000**	**$0**	**$0**

TABLE 5-4 (cont'd)

REVENUES	2011	2012	2013	2014	2015	2016
Charges for Goods and Services [2]	$1,918,400	$1,937,300	$1,956,600	$1,976,400	$1,996,700	$2,017,500
Fines and Forfeits	$12,500	$12,600	$12,700	$12,800	$12,900	$13,000
Miscellaneous	$44,700	$45,100	$45,600	$46,100	$46,600	$47,100
Subtotal Revenues	**$1,975,600**	**$1,995,000**	**$2,014,900**	**$2,035,300**	**$2,056,200**	**$2,077,600**
Revenue from Increased Rates [3]	$76,700	$158,100	$244,300	$335,700	$432,600	$535,300
Total Revenues	**$2,052,300**	**$2,153,100**	**$2,259,200**	**$2,371,000**	**$2,488,800**	**$2,612,900**
EXPENSES						
Physical Environment [4]	$619,400	$638,000	$657,100	$676,800	$697,100	$718,000
Existing Debt Service [5]	$23,100	$19,300	$15,500	$11,700	$7,900	$4,100
Capital Outlay [4]	$280,200	$288,600	$297,300	$306,200	$315,400	$324,900
Other Financing Uses [4]	$437,000	$450,100	$463,600	$477,500	$491,800	$506,600
New Debt Service [6]	$0	$62,400	$170,900	$170,900	$170,900	$170,900
Total Expenses	**$1,359,700**	**$1,458,400**	**$1,604,400**	**$1,643,100**	**$1,683,100**	**$1,724,500**
Non Expenditures	($127,900)	($127,900)	($127,900)	($127,900)	($127,900)	($127,900)
Total Expenses and Non-Expenditures	**$1,231,800**	**$1,330,500**	**$1,476,500**	**$1,515,200**	**$1,555,200**	**$1,596,600**
INDICATORS						
Beginning Balance	$2,183,350	$2,694,850	$2,932,750	$2,332,450	$1,097,250	$2,030,850
Rev. minus Exp.	$820,500	$822,600	$782,700	$855,800	$933,600	$1,016,300
Grant/Loan Income	$1,725,000	$2,549,300				
Capital Improvements	$2,034,000	$3,134,000	$1,383,000	$2,091,000	$0	$0
Ending Balance [7]	**$2,694,850**	**$2,932,750**	**$2,332,450**	**$1,097,250**	**$2,030,850**	**$3,047,150**

(1) Prices for capital improvements are assumed to increase at 5 percent per year.
(2) Assumed to increase in proportion to the increase in ERUs. See Chapter 2 for ERU data.
(3) Rates projected to increase 4 percent per year.
(4) Inflated at 3 percent.
(5) Debt service decreases at $3,800 per year.
(6) DWSRF 1.5 percent loan at 20 year for Grant/Loan Income shown in Indicators section of table, except for $675,000 of grant in both 2011 and 2012.
(7) Beginning Balance + Revenue – Expenses + Grant/Loan Income – Capital Improvements.

Table 5-4 reflects a rate increase of four percent per year for the next six years. The City raises its water rates each year to offset inflation and build reserves for future projects. 2010 is the last year of a planned rate increase, and the City Council is anticipated to approve a planned rate increase in 2011. Preliminary discussions with City financial staff have indicated that four percent is the rate being discussed at this time since future well projects will be required, and grant/loan funding programs are currently a significant unknown across the State.

FUNDING SOURCES

The following section describes the several funding sources available to the City without reference to any specific project. The selected funding sources will depend on the status of the City's existing financial commitments, capital and cash flow requirements, funding source availability, and the impact on the service rates and connection charges. Potential funding sources are summarized in Table 5-5.

USDA RURAL DEVELOPMENT

USDA Rural Development (RD) has a loan program that is available to communities whose rates, as a result of projected RD debt payments, are expected to exceed the rates of "similar" communities. Under certain conditions, RD's funding options include a limited grant program. The loan program provides long-term 30- to 40-year loans at an interest rate usually between 2.75 and 4.5 percent. RD loans are issued as revenue bonds with a 1.1 debt coverage requirement.

DRINKING WATER STATE REVOLVING FUND

In 1997 the Washington State Department of Health began taking applications for a new loan program called the Drinking Water State Revolving Fund (DWSRF). The program was funded by Congress as part of the 1996 reauthorization of the Safe Drinking Water Act. The program provides low-interest loans to help publicly owned as well as privately owned not-for-profit and for-profit water systems make improvements to water systems for public health protection.

The program is primarily targeted toward projects that will improve public health and safety. Infrastructure improvement projects can also be considered, but are given a lower priority in the ranking. Project rankings and selection are made by the Department of Health; program financial administration is handled by the Public Works Board.

TABLE 5-5
Grant and Loan Programs

Agency	Program	Maximum Amount	Type	Application Cycle
USDA Rural Development	Community Assistance Grant and Loan Program	Variable	Loan and grant	Year-round
Washington State Department of Health	Drinking Water State Revolving Fund	$6,000,000	Loan	March (2010)
Washington State Department of Health	Water System Acquisition and Rehabilitation Program	$500,000	Grant	September
Washington State Public Works Board	Public Works Trust Fund Planning Loan	$100,000	Loan	Year-round
Washington State Public Works Board	Public Works Trust Fund Preconstruction Loan	Up to $1,000,000	Loan	Year-round
Washington State Public Works Board	Public Works Trust Fund Construction Loan	Up to $10,000,000	Loan	May (2010)
U.S. Congress	State and Tribal Assistance Grant	Variable	Grant w/. 45% match	Year-round
Wash. State Dept. of Commerce	Traditional and Rural County Program	Max $500k grant, $1 M Total	Grant & Loan	January
Wash. State Dept. of Commerce	Job Development Fund, Community Economic Revitalization Board	Max 33% grant, $10 M Total	Grant	January

WATER SYSTEM ACQUISITION AND REHABILITATION PROGRAM

The Water System Acquisition and Rehabilitation Program (WSARP) is a grant program headed by Health and administered by the Public Works Board. These grants are available to Group A systems seeking to acquire and, if necessary, rehabilitate other Group A water systems. Ineligible projects include Group B systems and individual water systems.

PUBLIC WORKS TRUST FUND

The Public Works Trust Fund (PWTF) is a revolving loan fund designed to help local governments finance needed public works projects through low-interest loans and technical assistance. The PWTF, established in 1985 by legislative action, offers loans substantially below market rates, payable over periods typically ranging up to 20 years, and in amounts up to $10,000,000.

Interest rates on construction loans are 0.5 percent, 1 percent, or 2 percent, with the lower interest rates providing an incentive for a higher local match. A minimum of 15 percent of project costs must be provided by the local community to qualify for a 0.5 percent loan. A 10 percent local share qualifies the applicant for a 1 percent interest rate, and a 15 percent local share qualifies for a 2 percent loan. This cycle, the Public Works Board

is also offering lower interest rates and longer terms for communities that are economically distressed, a classification that unfortunately does not include Othello. Adams County was considered distressed in 2009, but not in 2010.

To be eligible for the program, an applicant must be a local government such as a City, a County, or special purpose utility district, and have a long-term plan for financing its public work needs. If the applicant is a City or a County, it must adopt the 1/4 percent real estate excise tax dedicated to capital purposes. Eligible public works systems include streets and roads, bridges, storm sewers, sanitary sewers, and domestic water. Loans are presently offered for purposes of repair, replacement, rehabilitation, reconstruction or improvement of existing eligible public works systems, and can be sized to meet the needs of growth.

STATE AND TRIBAL ASSISTANCE GRANTS

State and Tribal Assistance Grants (STAG) are available through the federal government by petitioning the applicant's federal Representative or Senators. There is no formal application form, although legislators often have developed their own application form to describe the project and its need. The program requires a 45 percent match, using any type of funding other than funding derived from EPA (e.g. DWSRF). Funding is approved annually as a separate appropriation in the federal budget.

COMMUNITY ECONOMIC REVITALIZATION BOARD

Two programs are currently available through the Community Economic Revitalization Board (CERB).

Traditional and Rural County Program. The traditional program is based on "bird-in-the hand" projects where a business opportunity is contingent on receiving CERB funding. The rural program is based on "bird-in-the-bush" projects where communities demonstrate economic benefit would result from a project funded by CERB. Funding is limited to $1 million, with a per-project grant maximum of 80 percent of the total request or $300,000 (for the traditional program, $500,000 for the rural program), whichever is lesser. Loans are 6 to 10 percent interest, 20-year repayment period.

Job Development Fund (JDF). This is a new CERB program funded with money transferred from the Public Works Trust Fund program by the legislature. The JDF can fund either "bird-in-the hand" or "bird-in-the-bush" projects. The application requires demonstrating that the project will affect job creation or retention in one or more businesses in the affected area. This program can provide grant funding up to 1/3 of the total project cost. The maximum grant amount available under this program is $10 million. The program does not provide loan financing.