CONSOLIDATION FEASIBILITY STUDY

SEPTEMBER 2016

OTHELLO MANOR WATER SYSTEM

WSDOH System ID No. 64845

VARELA & ASSOCIATES, INC.
ENGINEERING AND MANAGEMENT
PLANNING • DESIGN • MANAGEMENT • INSPECTION

CONSOLIDATION FEASIBLITY STUDY

OTHELLO MANOR WATER SYSTEM
WSDOH System ID No. 64845

OWNER
Dwight & Janie Ballestrasse

CITY OF OTHELLO
WSDOH System ID No. 64850

MAYOR
Shawn Logan

CITY ADMINISTRATOR
Wade Farris

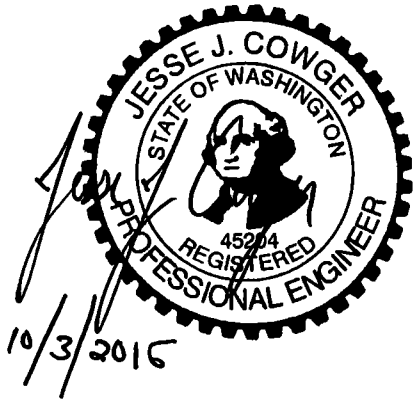
COMMUNITY DEVELOPMENT DIRECTOR
Travis Goddard

PUBLIC WORKS DIRECTOR
Terry Clements

FINANCE OFFICER
Spencer Williams

CITY CLERK
Debbie Kudrna, CMC

CITY COUNCIL
Genna Dorow, Position 1
John Lallas, Position 2
Corey Everett, Position 3
Eugene Bain, Position 4
Kenneth Johnson, Position 5
Mark Snyder, Position 6
Angel Garza Position 7



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CITY OF OTHELLO

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OTHELLO MANOR WATER SYSTEM

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APPENDICES

1.0 INTRODUCTION

1.1 Background

In 2015, the Drinking Water State Revolving Fund (DWSRF) awarded the City of Othello several grants to study the feasibility of consolidating small water systems into Othello's water system. The goal of these consolidation feasibility studies is to provide the City of Othello and each small water system owner a basis for considering integration of the small water system into the City of Othello's water system. The analysis and alternatives for each system will vary depending on the specific locations, conditions, and situations within the small system and its potential impact on the City of Othello's water supply and infrastructure. The need for subsequent financial or technical investigations may become evident as a result of the consolidation studies.

1.2 Scope

The project scope of work includes the following:

- Inventory of the small water system existing facilities (supply, treatment, storage, distribution, water rights)
- Assessment of the condition of the small water system existing facilities
- Estimate existing small water system demands
    - ADD: Average Day Demand
    - MDD: Maximum Day Demand
    - PHD: Peak Hour Demand
- Develop criteria for small water system supply, treatment (disinfection or other water quality), storage, distribution system, and water rights
- Estimate capacity of small water system existing facilities and identify deficiencies
- Estimate ongoing operation and maintenance cost of small system if not consolidated
- Identify small water system components that do not meet Othello's standards and estimate cost of bringing the small water system facilities up to Othello standards.
- Identify likely system consolidation options
- Identify infrastructure needed to physically connect the small water system(s) to Othello's water system and estimate construction costs
- Estimate impacts to Othello's water system facilities and long term water supply; estimate need for and feasibility of additional water supply facilities.
- Compare ongoing operation and maintenance costs of unconsolidated system to the cost of consolidation
- Comment on possible barriers to consolidation that become evident during the evaluation
- Identify next steps if Othello and the small water system desires to pursue consolidation

DWSRF awarded Othello grants to evaluate the feasibility of consolidating with the following small water systems (see **Figure 1**):

- Adams County Water District No.1 WSDOH System ID No.22525
- Basin View Water Association WSDOH System ID No.04530
- Bird Dog Family LTD Partnership II WSDOH System ID No.52172

- Highland Estates Water System WSDOH System ID No.32736
- Meadow Lane Water Association WSDOH System ID No.53190
- Othello Manor Water System WSDOH System ID No.64845
- Rainier Tracts Water Association WSDOH System ID No.70910
- Summerset West Water Association WSDOH System ID No.85080

1.3 Contact Information

The contact information for the Othello Manor Water System (OMWS) is shown on the WFI is as follows:

Primary Contact
Dwight Bellastrasse, Operator
Water Distribution Manager 1
Certification No. 012665

Address
5426 N Road 68, Suite D #139
Pasco, WA 99301

Phone
509.488.9690
509.498.4649

Owner Contact
Dwight & Janie Ballestrasse

Address
5426 N Road 68, Suite D #139
Pasco, WA 99301

Phone
509.488.9690
509.498.4649

2.0 EXISTING SYSTEM

2.1 Report Limitations

Several attempts were made by Varela and Associates and the City of Othello to contact Othello Manor Water System. Initial phone contact was made but the owners of the system did not provide direct information regarding the system nor did they provide access for a field visit to observe the existing system.

Existing system information, evaluation and analysis is therefore limited to the indirect information obtained through the following sources:

- WSDOH Water Facilities Inventory
- DOH Sentry website
- ECY Water Resources Explorer database
- Reports, records and verbal information provided by the WSDOH Eastern Regional Office personnel

2.2 System Information

Othello Manor Water System (OMWS) is located on the southeast corner of the Taylor Rd./Bench Rd. intersection, approximately 1 mile southwest of the City of Othello city limits, in Adams County in the southwest quarter corner of Section 16, Township 15 N, Range 29 E. (see **Figure 2**).

According to the Water Facility Inventory OMWS provides domestic water service to 152 residential connections. OMWS is a mobile home park with 152 active connections serving 152 mobile home spaces. The source is metered. Based on the WSDOH Water Use Efficiency Annual Performance Reports for 2010-2012 some of the individual spaces are metered.

Irrigation water is provided by the East Columbia Basin Irrigation District (ECBID).

2.3 Service Area

The OMWS service area is shown on **Figure 2**. The service area consists of one 38.8-acre parcel with a 152-unit residential mobile home park and a currently undeveloped 33.6-acre parcel.

Topography

The service area is generally flat and varies in elevation from approximately 985 to 991 amsl.

2.4 Inventory of Facilities

Based on the 2010 Sanitary Survey Report (SRR) the water system is a closed system with a well pump, source meter, chlorination system, buried storage reservoir, booster pump, cartridge filters for turbidity removal, and distribution pipe.

The DOH Water Facilities Inventory (WFI) form lists the OMWS system as a Group A Community system serving a residential community with a population of 400. The system is privately owned.

Supply

A well log was not available for the source supply. Per the WFI the supply consists of one permanent well (S01). There is an intertie with the Basin View Water Association (BVWA) which consists of two in-line valves isolating a section of pipe which connects the two systems. There is a hose bib connected to the isolated pipe section to enable flushing of the pipe section if the intertie is opened.

The system supply is summarized in the following table.

Table 2-1 Othello Manor Water System Source Inventory (1)

Source Number	Source Name	Use	Metered	Treatment	Current Pumping Rate (gpm)
SO1	AFL233 Well 1	Permanent	Yes	Chlorination, Filtration	300
SO2	Basin View Water Assoc.; Intertie System ID Number – 64845 3	Emergency	No	Chlorination	35
				Total:	335

(1) *Information obtained from the Water Facilities Inventory (last updated 4/15/2014 as of this writing)*

Storage

According to the WFI and the 2010 SSR the OMWS system is a closed system with one CIP concrete buried reservoir with a total reported volume of 14,400 gallons.

Distribution System

Information was not available as to the overall makeup and quality of the distribution system. Active connections are not metered. Based on the available correspondence between DOH and the OMWS the water system has a history of distribution system failure.

Fire Flow

The OMWS currently does not contain fire hydrants and does not provide fire flow.

Summary of Existing System

The following table summarizes the major components of the OMWS.

Table 2-2 Summary of Othello Manor Water System Components

System	Component	Description	
Supply	Well	ECY Well ID Tag:	AFL233
		Status:	Online
		Log available:	Yes
		Depth:	420' (per WFI)
		Casing:	Unknown
		Screen:	Unknown
		Date constructed:	01/01/1970 (per WFI)
		SWL:	Unknown
		Approx. wellhead elev.:	991'
		Present pumping rate:	300 gpm (well pump)
		Pump/motor:	Submersible, 20 HP
		Enclosure:	Pump house, unknown construction

System	Component	Description	
		Location:	815 S Taylor Rd, Othello, WA 99344, USA
	Booster Pump	Pump/motor: Present pumping rate: Discharge pressure:	Booster pump, continuous, unknown HP Unknown Unknown
Storage	Reservoir	Construction type: Approx. base elevation: Date constructed: Volume: Pressure zones served: Location:	Cast in place concrete (partially underground) 991' Unknown 14,400 gallons One 815 S Taylor Rd, Othello, WA 99344, USA
Distribution	Main materials	Unknown	
	Service Pressure	Unknown	

2.5 Assessment of the Condition of the Existing Facilities

An assessment of the condition of the existing facilities could not be adequately verified for OMWS. OMWS was unresponsive to repeated inquiries by Varela who were unable to perform a site assessment of the system.

2.6 Water Use, System Demands and Water Rights

2.6.1 Population/Connections

Existing

The system is reported to provide service to 152 multi-family housing units on one large parcel.

- Existing Connections: 152 (residential)

The WFI provided a population count for 2015 which is represented below.

- Existing Population: 400

Projected

The owners did mention during one of the brief phone calls the desire to expand the MH park by developing their second parcel.

This report will assume the projected growth consists of developing the 33.6-acre undeveloped parcel at a unit density equal to the existing Othello Manor residential unit density (3.92 MH/acre). Future connections are as follows:

- Projected Connections: 284 (residential units)

The future population is projected based on the average current population/connection (2.63 persons per residential connection) extrapolated on the assumption that the undeveloped parcel becomes developed at the unit density noted above.

- Projected Population: 747

2.6.2 Water Use

Historical water use data is limited to DOH provided 2010 – 2012 Water Use Efficiency Annual Performance Water use is believed to be domestic use only as it is reported the water system receives irrigation water from ECBID which is not represented in the water use data.

Table 2-3: Water Use Summary [(1)]

Description	Year					
	2010		2011		2012	
	(gal.)	(gpd)	(gal.)	(gpd)	(gal.)	(gpd)
Annual Total	17,224,000	47,200	16,293,000	44,600	11,895,000	32,600
Maximum Month	n/a	n/a	n/a	n/a	n/a	n/a
Average Month	1,435,000	47,200	1,358,000	44,700	991,000	32,600
Minimum Month	n/a	n/a	n/a	n/a	n/a	n/a

(1) *From DOH water use efficiency annual performance reports*

Since the above water use values represent domestic use only these values were checked against the ECY Orange Book (2008) Table G2-2. The table provides an expected flowrate of 300 gpd/MH assuming 3 persons/MH. Based on this value the expected annual flow for a 152 trailer court averaging 3 persons/MH is as follows:

- Expected Annual Water Use: 16,644,000 gallons (152 trailers)

Based on the calculated expected annual water use for OTWA it appears that Water Use Efficiency Annual Performance Reports volumes are consistent with the ECY Orange Book (2008) values.

Total water use is shown in the Water Use Efficiency Annual Performance Reports to have decreased by approximately 27% between 2011 and 2012. The Water Use Efficiency Annual Performance Reports state that OMWS continues to do customer education on water use and that the Water System has met its' WUE goals of reducing average daily household consumption by 15 gallons per day per household.

Leakage

Leakage could not be verified. Leakage was not reported in the Water Use Efficiency Annual Performance Reports. According to the reports service meters for individual MH spaces were scheduled to be installed by 2014. Meter installations began in 2010 but were discontinued in 2012 and only about 25 individual meters were noted to have been installed.

Neither source meter readings nor individual service meter readings were made available.

2.6.3 ERUs

An ERU is a unit of measure used to equate non-residential or multi-family residential water usage to a specific number of single-family residences.

This study will use ERU's to equate the OMWS water use to the City of Othello water use.

Table 2-4: ERUs

Description	Year		
	2010	2011	2012
Total annual water use (water use efficiency report) (1)	17,224,000	16,293,000	11,895,000
City of Othello gpd/ERU value (2)	453	453	453
Total System ERUs (3)	**104**	**99**	**72**

(1) *From DOH water use efficiency annual performance reports*
(2) *Based on most current water use data from 2013, 2014 and 2015*
(3) *Average daily water use (total annual divided by 365) divided by 453 gpd/ERU*

2.6.4 System Demands

Current

Water system demands were estimated based off the water use data and is as follows:

Table 2-5: Estimated Current Water System Demands

		ADD			MDD (1)			PHD (2)
Description	ERUs	gpd/ERU	(gpd)	(gpm)	gpd/ERU	(gpd)	(gpm)	(gpm)
2010	104	453	47,200	33	957	99,700	69	206
2011	99	453	44,600	31	957	94,300	65	198
2012	72	453	32,600	23	957	68,900	48	154

(1) *MDD = ADD x 2.11; based on MLWA, ACWD#1, BVWA, HEWS and SWWA average ADD:MDD ratio based on MDD = MMAD(1.3)*
(2) *PHD = (MDD/1440)(CN+F)+18, where C = 2.0 for ERU > 100, C = 2.5 for ERU > 50, N = ERUs, F = 75 for ERU > 100 and F = 25 for ERU > 50, DOH WSDM Eq. 5-1*

Future

Future water system demands are estimated assuming the undeveloped parcel becomes developed at the observed unit density per Section 2.5.1. Using the calculated ERUs from the highest water use year within the data period indicates there are approximately 1.46 connections per ERU. The 132 future connections are therefore equivalent to 90 ERUs (rounded). Estimated future system demands will add 90 ERUs to the peak 2010 water use with the resulting estimated future water demands shown on the following table.

Table 2-6: Estimated Future Water System Demands

	ADD			MDD (1)			PHD (2)	Annual	
ERUs	gpd/ERU	(gpd)	(gpm)	gpd/ERU	(gpd)	(gpm)	(gpm)	(gal.)	(acre-ft/yr)
194	453	87,900	61	957	185,700	129	326	32,084,000	98.5

(1) *MDD = ADD x 2.11; based on MLWA, ACWD#1, BVWA, HEWS and SWWA average ADD:MDD ratio based on MDD = MMAD(1.3)*
(2) *PHD = (MDD/1440)(CN+F)+18, where C = 2.0, N = ERUs and F = 75, DOH WSDM Eq. 5-1*

2.6.5 Water Rights

Water rights information was requested from the owner and the owners did not respond to the request.

Per the WFI the existing wellhead is ECY tagged AFL233. A search of the ECY Water Resources Explorer and Well Logs database did not yield a water rights permits, certificate or permit application associated with this well tag.

Since a water rights certificate, permit or application were not found it is assumed OMWS is operating a permit exempt well as described in RCW 90.44.050 with an allowed groundwater withdrawal rate not to exceed 5,000 gallons per day (gpd).

2.7 Evaluation Criteria

Each water utility must establish system design standards appropriate to meet its customers' needs and expectations. While a utility has some discretion in setting performance and design criteria, all criteria must meet the minimum standards set by the Washington State Department of Health (DOH) for public water supplies.

Washington Administrative Codes (WAC's) pertaining to public water systems administered by DOH and the Washington State Department of Ecology (ECY) comprise the regulatory criteria applicable to this water system (WAC 246-290).

The following standards are used as the basis for OMWS facilities evaluation and design.

- Washington State DOH Water System Design Manual (WSDM)
- Industry practice
- Engineering judgement

The Sections following define the system design standards used for this evaluation.

2.7.1 Supply

The WSDM states supply must be able to meet the water system's maximum day demand (MDD). This is based on the assumption the system has equalizing storage to meet peak hour demands (PHD). The WSDM recommends supply is able to replenish depleted fire suppression storage (FSS) within 72 hours while supplying MDD.

Based on the limited information provided the OMWS operates a "closed" system meaning the system is closed to the atmosphere with a two-part supply system consisting of a well supplying a partially buried storage reservoir and a booster pump supplying the distribution system from the storage tank. OMWS does not provide FSS. Each part of the supply system will be evaluated individually based on its own criteria.

Since the OMWS is a closed system with a two-part supply system and does not provide FSS, the criteria used to evaluate the OMWS well supply will be based on the criteria above and the distribution system supply will be based on the DOH WSDM criteria for closed system booster pump station, therefore the supply criteria is as follows:

Well Supply (well pump)

- Supply MDD with equalizing storage sufficient to supply PHD

Distribution Supply (booster pump)

- Supply PHD at no less than 30 psi to all service connections

2.7.2 Treatment

Per the WSDM all sources used for water service must meet water quality standards set by EPA and the State (WAC 246-290-310) and must treat sources as required to meet water quality standards.

This evaluation will compare the available water quality records to the currently mandated water quality standards per WAC 246-290-310.

2.7.3 Storage

OMWS is a closed system with equalizing storage and standby storage.

Underground Storage Reservoir

The partially buried storage reservoir provides equalizing storage and standby storage and will be evaluated based on the DOH WSDM Chapter 9 "Reservoir and Storage Volume"

- Equation 9-1: $ES = (PHD - Q_S)(150 \text{ min.})$, but in no case less than zero

Where:

ES	=	Equalizing storage component, in gallons
PHD	=	Peak hourly demand, in gpm, as defined in Chapter5 of the WSDM Manual
Q_S (1)	=	Sum of all active supply source capacities, except emergency supply, in gpm

(1) Q_S in this case is source of supply to the reservoir which is provided by the well pump

- Equation 9-2: $SB_{TSS} = (2 \text{ days})(ADD)(N)$

Where:

SB_{TSS}	=	Total standby storage for a single source water system, in gallons
ADD	=	Average day demand for the design year, in gpd/ERU
N	=	Number of ERUs

2.7.4 Fire Flow

OMWS does not provide fire flow or FSS and therefore will not be evaluated for fire flow. Consolidation options with the City of Othello will include an evaluation for fire flow.

2.7.5 Distribution System

Per the WSDM the distribution system shall maintain a minimum 30 psi during PHD and 20 psi during fire flow conditions during MDD with a maximum 8 fps in the system pipes.

2.7.6 Water Rights

The adequacy of the OMWS water rights shall be evaluated by comparing the available water use data to the systems water right.

2.8 Evaluation/Deficiencies

2.8.1 Supply

The OMWS supply consists of two parts:

1. Well pump which pumps groundwater to supply the partially buried reservoir
2. Booster pump which pumps from the partially buried reservoir to supply the distribution system

2.8.1.1 Supply (well pump)

Criteria

Supply MDD with equalizing storage sufficient to supply PHD (see section 2.7.3)

Required Capacity

Current MDD = 69 gpm (Table 2-5)

Future MDD = 129 gpm (Table 2-6)

Current Capacity

Current capacity = 300 gpm (Table 2-2)

Evaluation

The current well capacity of 300 gpm is adequate to meet the current MDD of 69 gpm.

The current well capacity of 300 gpm is adequate to provide the estimated future MDD of 129 gpm.

Deficiencies

None.

2.8.1.2 Supply (booster pump)

Information was not available to verify the booster pump capacity therefore an accurate evaluation of the booster pump cannot be made.

2.8.2 Treatment

Criteria

Per the WSDM all sources used for water service must meet water quality standards set by EPA or the state (WAC 246-290-310) and must treat sources as required to meet water quality standards.

Evaluation

The latest IOC test data was provided and is shown in Table 2-8.

Table 2-7: Water Quality Test Results - IOC

ANALYTE	RESULT (1) (10/6/09)	RESULT (1) (11/29/00)	UNITS	SRL (2)	MCL	Exceeds MCL (X if yes)
Arsenic	<	<	mg/l	0.0010	0.0104	
Barium	.0530	<	mg/l	0.4000	2.0000	
Cadmium	<	<	mg/l	0.0020	0.0050	
Chromium	<	<	mg/l	0.0200	0.1000	
Mercury	<	<	mg/l	0.0004	0.0020	
Selenium	<	<	mg/l	0.0100	0.0500	
Beryllium	<	<	mg/l	0.0008	0.0040	
Antimony	NA	NA	mg/l	0.0060	0.0060	
Thallium	<	NA	mg/l	0.0020	0.0020	
Cyanide	<	NA	mg/l	0.0100	0.2000	
Fluoride	0.6800	0.6800	mg/l	0.5000	4.0000	
Nitrite – N	<	NA	mg/l	0.2000	1.0000	
Nitrate – N	<	0.4800	mg/l	0.2000	10.0000	
Total Nitrate/Nitrite-N	<	0.4800	mg/l	0.5000		
Iron	.0190	<	mg/l	0.1000	0.3000	
Manganese	0.0097	0.0300	mg/l	0.0100	0.0500	
Silver	<	<	mg/l	0.1000	0.1000	
Chloride	13.0	6.35	mg/l	20.0	250.0	
Sulfate	35.3	30.2	mg/l	50.0	250.0	
Zinc	0.0160	<	mg/l	0.2000	5.0	
Sodium	58.2	53.46	mg/l	5.0		
Hardness	51.6	46.8	mg/l	10.0		
Conductivity	393.0	380.0	µmhos/cm	70.0	700.0	
Turbidity	0.9000	0.1700	NTU	0.1000		
Color	3.0	<	CU	15.0	15.0	
Total Dissolved Solids	178.0	307.0	mg/l	100.0	500.0	
Nickel	<	<	mg/l	0.1000	0.1000	
Lead	<	<	mg/l	0.0010		
Copper	0.0027	<	mg/l	0.0200		

(1) *"NA" indicates "not analyzed", "<" indicates "less than state reporting level"*
(2) *State Reporting Level*

The system chlorinates at the source prior to entering the cistern and filters for particulate (turbidity) at the booster pump.

The system tested positive for the presence of coliform 6 times since 2000 including 3 times in 2003.

A review of the WSDOH Sentry website indicates the system has no current water quality violations.

Based on a review of the available data it does not appear the system has ongoing water quality issues.

Deficiencies

None.

2.8.3 Storage

2.8.3.1 Underground Storage Reservoir

Criteria

- Equation 9-1: $ES = (PHD - Q_S)(150 \text{ min.})$, but in no case less than zero
- Equation 9-2: $SB_{TSS} = (2 \text{ days})(ADD)(N)$

Required Capacity

From Table 2-5 the current PHD is 196 gpm and from Table 2-2 the Q_S is 300 gpm.

$ES = (206-300)(150) = 0$ gallons

From Table 2-6 the estimated future PHD is 309 gpm and from Table 2-2 the Q_S is 300 gpm.

$ES = (326-300)(150) = 3{,}900$ gallons

From Table 2-5 the current/future ADD is 453 gpd/ERU and from Table 2-5 the current/future N is 104.

$SB_{TSS} = (2 \text{ days})(453)(104) = 94{,}224$ gallons

From Table 2-6 the current/future ADD is 453 gpd/ERU and from Table 2-5 the current/future N is 194.

$SB_{TSS} = (2 \text{ days})(453)(194) = 175{,}764$ gallons

The WSDOH WSDM provides for an alternate minimum SB storage capacity of no less than 200 gal./ERU. Based on this alternate SB storage calculation the following minimum required SB volumes are calculated:

SB = (ERU)(200 gal.)

Current:

SB = 104 ERUs x 200 gal/ERU = 20,800 gallons

Future:

SB = 194 ERUs x 200 gal/ERU = 38,800 gallons

Current Capacity

Per Table 2-2 the current storage capacity is 14,400 gallons.

Evaluation

The current storage capacity of 14,400 gallons is inadequate for current and future equalizing and standby storage needs.

Deficiencies

The total volume of the existing reservoir is deficient by 6,400 gallons for present equalizing and standby storage.

The total volume of the existing reservoir is deficient by 28,300 gallons for future equalizing and standby storage.

2.8.4 Fire Flow

The OMWS does not provide fire flow therefore fire flow is not evaluated.

2.8.5 Distribution System

Information was not available to verify the distribution system therefore an accurate evaluation of the distribution system cannot be made.

2.8.6 Water Rights

Criteria

The adequacy of the OMWS water rights shall be evaluated by comparing the available water use data to the systems water right.

Existing Water Right

From Section 2.5.5 OMWS appears to be withdrawing water based on a permit exempt well per RCW 90.44.050 with a maximum legal withdrawal rate of 5,000 gpd which equates to a maximum annual withdrawal amount of 1.825 MG (5.6 acre/ft).

Evaluation

The following table compares the estimated annual water use and calculated maximum day water use to the water right.

Table 2-8 Annual Water Use and Water Rights

Description	MDD [1] (gpd)	(Deficiency) (gal.)	Annual [1] (gal.)	Annual (acre-ft/yr)	(Deficiency) (acre-ft/yr)
Current	99,700	(94,700)	17,228,000	52.9	(47.3)
Future	185,700	(180,700)	32,084,000	98.5	(92.9)

(1) *From Table 2-5 and Table 2-6*

Based on the above table the water system is exceeding its water right, both daily and annually, in both the current and future scenarios.

Deficiencies

Under current estimated water use the water right is deficient by 94,700 gpd (MDD) and 47.3 ac-ft/yr annually.

Under future estimated water use the water right is deficient by 185,700 gpd (MDD) and 92.9 ac-ft/yr annually.

2.8.7 Summary of Deficiencies

The following table summarized the deficiencies.

Table 2-9 Summary of Deficiencies

System Component	Current System Capacity	Current Needs	Current Deficiency	Future Needs	Future Deficiency
Supply (well pump)	300 gpm	69 gpm	none	129 gpm	none
Supply (booster pump)	unknown	206 gpm	unknown	326 gpm	unknown
Treatment	No known issues		none		none
Storage (ES/SB)	14,400 gal.	20,800 gal.	(6,400 gal.)	42,700 gal.	(28,300 gal.)
Fire Flow	n/a	n/a	n/a	n/a	n/a
Distribution	unknown		unknown		unknown
Water Rights (daily) Water Rights (Qi) Water Rights (Qa)	5,000 gpd ~4 gpm [1] 5.6 ac-ft/yr	99,700 gpd 300 gpm [2] 52.9 ac-ft/yr	(94,700 gpd) (296 gpm) (47.3 ac-ft/yr)	185,700 gpd 300 gpm 98.5 ac-ft/yr	(180,700 gpd) (296 gpm) (92.9 ac-ft/yr)

(1) *The permit exemption specifies a maximum allowable daily withdrawal expressed in gpd. Qi is generally expressed in gpm. Qi calculated average allowable withdrawal rate by dividing the daily rate (gpd) by 1,440 min/day to result in gpm.*

(2) *Qi needs to equal the maximum withdrawal rate of the well pump*

2.9 System Finances

Water system expenses were not provided by OMWS. Therefore, the annual water system operation budget was estimated on the following table.

Table 2-10: Estimated Annual Operation Budget

Description	Amount
ESTIMATED EXPENSES	
Power (well pump, booster pump)	$1,500
Bookkeeping (assume 4 hrs/mo. @ $25/hr)	$1,200
Maintenance person (assume 6 hrs/mo. @ $30/hr)	$2,160
Testing Lab (WQ Testing)	$500
Certified Operator (assume $200/mo. to be counted toward system expenses)	$2,400
Total Estimated Annual Expenses	$7,760
RESERVES	
Well pump replacement (assume $35,000/10 yrs)	$3,500
Booster Pump replacement (assume $3k/3 yrs)	$1,000
Leak repair (assume $1000/yr)	$1,000
Other repairs (assume $500/yr)	$500
Total Estimated Annual Reserves	$6,000
Total Estimated Annual Operation Budget	$13,760
Total Estimated Annual Operation Budget/Units/mo. (152 units)	$7.54

3.0 CONSOLIDATION

3.1 Improvements required to meet City Standards

The following sections evaluate the Associations components using the City of Othello "Public Works Design Standards", dated November 2014.

3.1.1 Supply

The existing OMWS well, with a 300 gpm capacity (unverified), is likely inadequate for the City to utilize cost-effectively for supply. The well is also located on private property without public access for the City to operate and maintain effectively. Therefore this well would likely be required to be abandoned by the system as part of a consolidation.

3.1.2 Distribution

To be in compliance with the City of Othello "Public Works Design Standards", dated November 2014, the following distribution system improvements are required (**Figure 3**):

- Install new meter, backflow assembly and connection to Othello Manor development, meter large enough to serve the proposed expansion with a bypass sized to provide adequate fire flow.
    - Othello Manor Water System will be responsible for water mains/service connections on their property and will continue to own, operate and maintain the distribution system on their property.

3.1.3 Storage

The existing reservoir is incompatible with the City gravity storage and provides no benefit to the City, therefore the storage tanks will likely be required to be abandoned by the Water System as part of the consolidation.

3.1.4 Estimated Cost of Improvements to meet Othello's Standards

The table below contains a unit length cost breakdown for distribution system costs used in estimating OMWS improvements.

Table 3-1 Estimated Improvements Unit Cost – Water Mains, Services and Surface Restoration

Diameter (in.)	Estimated Cost per LF							
	Main & Install (1)	Valves, Fittings, Restraints		Fire Hydrants (4)	Service Connections		Surface Replacement	
		T-Main (2)	Dist. Main (3)		T-Main (5)	Dist. Main (6)	T-Main (7)	Dist. Main (8)
8	$28	$7	$13	$9	$2	$36	$2	$10
10	$32	$8	$15	$9	$2	$36	$2	$10

Diameter (in.)	Estimated Cost per LF							
	Main & Install (1)	Valves, Fittings, Restraints		Fire Hydrants (4)	Service Connections		Surface Replacement	
		T-Main (2)	Dist. Main (3)		T-Main (5)	Dist. Main (6)	T-Main (7)	Dist. Main (8)
12	$35	$10	$19	$9	$2	$36	$2	$10
14	$38	$15	$28	$9	$2	$36	$2	$10
16	$42	$20	$38	$9	$2	$36	$2	$10

(1) *Based on recent bid tabulations and pipe material costs – assumes PVC C900/905 mains*
(2) *Based on review of recent bid tabulations and one connection detail every 400 ft.*
(3) *Based on review of recent bid tabulations and one connection detail every 750 ft.*
(4) *Assume one hydrant every 500 ft.*
(5) *Assume one service every 1000 ft*
(6) *Assume one service every 50 ft*
(7) *Assume 6' wide restoration, 1 HMA patch for water/road crossing every 1,500 ft, cover crop hydroseed over remainder of ditch*
(8) *Assume 6' wide restoration, 1 HMA patch for water/road crossing every 100 ft, cover crop hydroseed over remainder of ditch*

Table 3-2 Estimated Improvements Unit Cost – Highway, Railroad and Canal Crossings

RAILROAD CROSSINGS / HIGHWAY CROSSINGS Bore and Jack					IRRIGATION CANAL CROSSINGS Horizontal Directional Drill				
Casing		Carrier Pipe		Est. Cost	Casing		Carrier Pipe		Est. Cost
Dia.	Material	Dia.	Material	$/lf	Dia.	Material	Dia.	Material	$/lf
36"	steel	14"/16"	DI	$ 900	36"	HDPE	14"/16"	PVC	$ 700
24"	steel	10"/12"	DI	$ 600	24"	HDPE	10"/12"	PVC	$ 500
16"	steel	8"	DI	$ 500	16"	HDPE	8"	PVC	$ 350

The cost to improve the OMWS to meet current City standards is estimated on the following table. Costs are estimated assuming public works bidding and state prevailing wage rates are required.

3-3 Estimated Improvements Cost

Description	Est. Quan.	Units	Unit Price	Amount
Meter vault (includes 6-inch meter for domestic use with 8-inch bypass for fire flow)	1	EA	$ 20,000	$ 20,000
Sampling Station	1	EA	$ 2,000	$ 2,000
			Subtotal	$ 20,000
			Mobilization 10%	$ 2,000
			Contingency 20%	$ 4,000
			Estimated construction cost	$ 26,000
			Environmental approvals allowance (assuming must meet DWSRF loan requirements)	$ 3,000
			Engineering 25% (design, construction management/inspection)	$ 7,000
			ESTIMATED PROJECT COST	$ 36,000

3.2 Infrastructure Required to Physically Connect to the City of Othello Water System

3.2.1 Transmission Main Routing

The nearest City water main is on Bench Rd., approximately 800 feet east of State Route 24 at Buena Vista. City water service can be extended to BVWA by constructing a transmission main from Bench Rd./Buena Vista west on Bench Rd. and south on Taylor Rd. approximately 4,400 feet and 2,200 feet respectfully.

Extending a City transmission main to the south of the OMWS would allow Basin View Water Association (BVWA) and Highland Estates Water System (HEWS) to extend this transmission main to connect to the City system and could provide a cost sharing partner to OMWS for the transmission main extension. OMWS should also consider discussing late comer fees with the City as another way to offset the long term cost of the extension.

See **Figure 3** for the proposed transmission main extension.

3.2.2 Transmission Main Sizing

Hydraulic Analysis Model

The transmission main was sized using a hydraulic model of the City of Othello water system created in Bentley WaterCAD V8i. The model was based on the hydraulic model used in the 2011 City of Othello Water System Plan. The hydraulic model was updated based on information provided by the City regarding water mains which have been either added or replaced after 2011.

Water system demands were updated using water use data provided by the City for the years 2013, 2014 and 2015.

Water reservoir levels used for the various demand scenarios were taken from the 2011 City of Othello Water System Plan.

Service to the City of Othello UGA

The OMWS is within the City of Othello UGA and it is presumed at some point in the future the City of Othello's water system will be extended to serve the UGA. Therefore the transmission main sizing will also be evaluated using growth figures and fire flows provided by the City.

Existing ERUs were determined via a count of existing houses as shown on the most recent aerial maps. Future ERUs within the UGA were provided by the City planner based on the recently completed City of Othello's 2015 Comprehensive Plan.

See **Appendix C** which contains the ERUs counts (existing and future) used to determine system demands and evaluate the transmission main size to serve the UGA along with the proposed transmission main routing.

Criteria

The Washington State DOH Water System Design Manual (WSDM) Chapter 5 states "Engineers must consider at least two demand scenarios when using a hydraulic analysis to size mains (WAC 246-290-230(5) and (6)).

- **PHD:** First, the water system must be able to deliver the peak hourly demand (PHD) at the required pressure of 30 psi at every existing and proposed service connection.
- **MDD/FF:** Second, if the water system provides fire flow, the distribution pipelines must be able to deliver the maximum day demand (MDD) rate, in addition to the fire flow, at the required pressure of 20 psi throughout the distribution system."

Fire flows as follows:

- Residential fire flow = 1,000 gpm (per the City of Othello 2011 Water System Plan)

In addition, the City of Othello water system design standards include the following standards for distribution system extensions:

- Minimum size for water lines shall be 8-inch diameter except for hydrant leads less than 60 feet long
- Permanent dead-end lines are not allowed
- Residential service pipe shall be one-inch copper
- Water services shall end within road right-of-way or easement
- One sampling station is required per 50 lots (no less than one per development)
- 2-inch blow off valves shall be installed on all dead-end water mains

Evaluation/Conclusion

The transmission main sizing was evaluated under both scenarios required in the WSDOH WSDM for both OMWS and City of Othello needs. The demand scenarios and resulting transmission main size are shown on the following table:

Table 3-4 Transmission Main Sizing

Description	ERUs	System Demands MDD (gpm)	PHD (gpm)	FF (gpm)	Scenario	Scenario Demand (gpm)	Pipe Size T-Main [3] Dia. (in.)
OMWS [1]	194	129	326	1000	PHD	326	8
City of Othello UGA Area 4 [2]	285	133	215	1000	PHD	215	8
OMWS [1]	194	129	326	1000	MDD/FF	1129	10
City of Othello UGA Area 4 [2]	285	133	215	1000	MDD/FF	1133	10

(1) *From Table 2-6*
(2) *See Appendix C*
(3) *Bench Rd. to Taylor Rd. to* OMWS

3.2.3 Estimated Cost to Connect to City of Othello Water System

The cost to physically connect to the City of Othello Water System is estimated on the following table.

Table 3-5 Estimated Cost to Connect to City of Othello Water System

Description	Est. Quantity	Unit	Unit Price	Amount
Main (10-inch PVC)	6,300	LF	$32	$ 201,600
Valves, fittings, restraints (10-inch)	6,300	LF	$8	$ 50,400
Fire hydrants	6,300	LF	$9	$ 56,700
Service connections	6,300	LF	$2	$ 12,600
Surface Replacement	6,300	LF	$2	$ 12,600
Irrigation Canal Crossing (24" casing, 10" carrier pipe)	200	LF	$500	$ 100,000
Sampling Station	1	EA	$2,000	$ 2,000
			Subtotal	$ 436,000
			Mobilization 10%	$ 44,000
			Contingency 20%	$ 87,000
			Estimated construction cost	$ 567,000
			Environmental approvals allowance (assuming must meet DWSRF loan requirements)	$ 16,000
			Engineering 25% (design, construction management/inspection)	$ 142,000
			ESTIMATED PROJECT COST	$ 725,000
			ESTIMATED PROJECT COST/LF	$ 112

3.3 Estimated Impact to City System

The impact of consolidating the OMWS into the City of Othello water system is evaluated below by system component including supply, distribution and storage. The evaluation will be based on the current City of Othello water system demands as shown on the following table and estimated existing and future OMWS system demands from Table 2-5 and 2-6.

Table 3-6 Current City of Othello Water System Demands

Year	ERUs (1)	ADD (gpm)	MDD (gpm)	PHD (gpm)	Annual (MG)	Annual (acre/ft)
2013		3,340	4,570	7,410	1,757	5,390
2014		3,420	5,070	8,250	1,796	5,510
2015		3,100	4,460	7,250	1,628	5,000
Average	10,490	3,300	4,700 (2)	7,600 (3)	1,700	5,300

(1) *Calculated based on ADD using 453 gpd/ERU*
(2) *Resulting ADD:MDD peaking factor 1.43*
(3) *Resulting MDD:PHD peaking factor 1.62*

3.3.1 Supply

Criteria

The WSDOH WSDM provides the following criteria for public water supply:

- Supply must meet MDD
- Supply should meet MDD and replenish Fire Suppression Storage within 72 hours while supplying MDD

Current Capacity

The City's water is supplied via eight groundwater wells. The current supply capacity of the City's wells is shown on the following table.

Table 3-7 Current City Supply

Well No.	DOH ID No.	Current Capacity (gpm)
2	01	-
3	02	800
4	06	430
5	07	900
6	05	2,500
7	08	630
8	09	395
9	10	1,500
Total Supply Capacity		7,155

Evaluation

The impact of consolidating the OMWS into the City of Othello water supply is evaluated in the following table.

Table 3-8 Supply Capacity Evaluation

Description	Scenario	MDD (gpm)	Replenish FSS [1] (gpm)	Total (gpm)	Current Supply Capacity [2] (gpm)	Excess / (Deficiency) (gpm)
City of Othello	Current [3]	4,700				
OMWS	Current [4]	69				
Total		4,769	347	5,116	7,155	2,039
City of Othello	Current [3]	4,700				
OMWS	Future [5]	129				
Total		4,829	347	5,176	7,155	1,979

(1) *Per City of Othello 2011 WSP Fire Suppression Storage = 6,250 gpm for 4 hours (1,500,000 gallons), Replenish FFS = 1,500,000/72 hrs/60 min*
(2) *From Table 3-7*
(3) *From Table 3-6*
(4) *From Table 2-5*

(5) *From Table 2-6*

Conclusion

The City has adequate supply capacity to serve OMWS with no improvements required.

See **Appendix D** for discussion related to long-term effects on City supply.

3.3.2 Distribution

Criteria

Per the WSDM the distribution system shall maintain a minimum 30 psi during PHD and 20 psi during FF/MDD.

Hydraulic Analysis Model

As described in Section 3.2.2.

Evaluation

The hydraulic model of the City of Othello's water system was run after adding the OMWS system demands. No deficiencies within the existing City of Othello water system were found.

The hydraulic model was then run adding the OMWS system demands and the demands estimated for the future UGA area. No deficiencies within the existing City of Othello water system were found.

Conclusion

The City has adequate distribution system capacity to serve OMWS and the future UGA with no improvements required.

3.3.3 Storage

Criteria

The WSDOH WSDM provides the following criteria for public water storage:

Operational Storage (OS): Storage volume devoted to supplying the water system when sources of supply are in the "off" status (volume between pump "on" and pump "off")

Equalizing Storage (ES): Storage volume required to meet peak system demands which exceed source capacity (min. system pressure 30 psi)

- ES = (PHD-Qs)(150 min.)

Where:

- PHD = peak hour demand in gpm
- Qs = sum of all source capacities in gpm

Standby Storage (SB): Storage volume to provide system reliability in cases where sources fail or during periods of unusually high demands

(min. system pressure 20 psi)

- SB = (2 days)[(ADD)(ERUs) – t_M (Q_S-Q_L)]

Where:

- ADD = gpd/ERU
- t_M = 1,440 minutes
- Q_S = Sum of all source capacity in gpm
- Q_L = Largest source capacity in gpm

Alternatively, the WSDM recommends the standby storage volume be no less than 200 gal/ERU

Fire Suppression Storage (FSS): Storage volume required to provide the maximum fire flow rate and duration (min. system pressure 20 psi)

- FSS = (FF)(duration)

Where:

- FF = 6,250 gpm (largest fire flow demand)
- Duration = 4 hours (longest fire flow duration)

Dead Storage (DS): Storage volume below the minimum required system pressure (unusable storage)

Current Capacity

The City of Othello has three reservoirs with a total nominal storage capacity of approximately 6,000,000 gallons. The useable volume available to the system varies from 1.3 MG to 2.8 MG depending on the residual system pressure for the storage component being analyzed, i.e. 20 psi for FF and SB; 30 psi for ES. The remaining volume is referred to as "dead storage".

Evaluation

Operational Storage

Extending service to OMWS will not change the pump setting or OS volume.

Equalizing Storage

Description	PHD (gpm)	Qs (gpm)	Duration (min.)	ES (gal.)
Othello	7,600	7,155	150	66,750
OMWS	326	7,155	150	0
Combined	7,926	7,155	150	115,615

Standby Storage

Description	Duration (days)	ADD (gpd/ERU)	ERUs	t_M	Q_S (gpm)	Q_L (gpm)	SB (Eq.9-3) (gal.)	SB (200 gpd/ERU) (gal.)
Othello	2	453	10,490	1440	7155	2500	<0	2,098,000
OMWS	2	453	194	1440	7155	2500	<0	38,800
Combined	2	453	10,546	1440	7155	2500	<0	2,136,800

Fire Suppression Storage

Description	Largest FF Demand (gpm)	Longest FF Duration (hrs)	FF Volume (gal.)
Othello	6,250	4	1,500,000
OMWS	1,000	2	120,000

Dead Storage

All service elevations in OMWS are at or below existing City of Othello service elevations so extending City of Othello water service to OMWS will not increase dead storage.

Storage Comparison

The City of Othello storage volumes with and without OMWS is shown in the following table:

Table 3-9 Storage Comparison

Description	CITY OF OTHELLO		OTHELLO/OMWS	
	Elevation (amsl)	Volume (gal.)	Elevation (amsl)	Volume (gal.)
Overflow (1)	1209.0		1209.0	
OS		239,825		239,825
Bottom of OS (1)	1205.0		1205.0	
ES		65,952		115,615
Bottom of ES (2)	1203.9		1203.1	
SB		2,098,013		2,136,800
Bottom of SB (3)	1168.9		1167.4	
FSS		1,500,000		1,500,000
Bottom of FSS (4)	1178.9		1178.1	
Base Elevation	1119.6		1119.6	

(1) *From 2011 Water System Plan*
(2) *Minimum elevation required to maintain 30 psi service pressure = 1195*
(3) *Minimum elevation required to maintain 20 psi service pressure = 1167*
(4) *Minimum elevation required to maintain 20 psi service pressure = 1170*
(5) *SB and FSS are nested per 2011 Water System Plan*

Conclusion

The City has adequate distribution system capacity to extend water service to OMWS with no improvements required.

3.3.4 Water Rights

Criteria

The criteria used to evaluate the adequacy of the City's water rights are as follows:

Maximum instantaneous flow (based on total source capacity) < Maximum instantaneous withdrawal (Qi)

Maximum annual water use (based on current water use data) < Maximum annual withdrawal (Qa)

Current Water Right

The City's water rights were consolidated into a unified water allocation. This unified allocation is as follows:

Qi = 9,550 gpm

Qa = 7,100 acre-ft/yr

Evaluation

The impact on the City's water rights of consolidating the OMWS into the City of Othello water system is evaluated in the following table.

Table 3-10 Water Rights Evaluation

Description	Qi Capacity of all sources (gpm)	Qa Annual water use (acre-ft/yr)
City of Othello	7,155	5,300 (1)
OMWS	300	98.5 (2)
Total	7,155	5,398.5
Water Right	9,550	7,100.0
Excess/(deficiency)	2,395	1,701.5
OMWS Water Rights Transfer	300 (3)	5.6 (4)
City of Othello Water Rights post Consolidation (5)	9,554	7,105.6

(1) *From Table 3-6*
(2) *Annual water use From Table 2-6 converted to acre-ft/yr*
(3) *Current well capacity*
(4) *5,000 gpd x 365 days*
(5) *Estimated amounts, actual amount would be determined by ECY*

Conclusion

The City of Othello has adequate water rights to provide service to OMWS.

Based on estimated future water use from Table 2-6, extending water service to OMWS will not affect Qi and will use 98.5 acre-ft/yr of the City's Qa. Consolidating with OMWS and acquiring the water right associated with OMWS's exempt well could potentially add 300 gpm (current OMWS well capacity) to the City's Qi and 5.6 acre-ft/yr (maximum convertible Qa for exempt well) to the City's Qa which would partially offset the OMWS annual water use impact to the City's Qa. Actual Qi/Qa amounts would be determined by ECY.

3.3.5 Summary of Impacts of Consolidation on City Water System

The following table summarizes the impacts to the City of Othello's water system components:

Table 3-11 Summary of Impacts to City of Othello Water System Components

Component	Deficiencies Identified	Impacts to City System (required improvements)
Supply	none	none
Distribution	none	none
Storage	none	none
Water Rights	none	none

3.4 Comparison of Costs – Unconsolidated vs Consolidated

3.4.1 Unconsolidated System

The capital cost for the improvements needed to correct the system deficiencies identified in Table 2-9 are estimated in the following table.

Table 3-12 Estimated Capital Improvements Cost

Description	Est. Amount
Replace existing 14,400 gallon storage tank with new 43,000 gallon underground storage tank (precast tank(s), piping, level controls, etc.)	$80,000
Replace existing distributions system [3] (est. 7,000 lf of 2"-3" pipe @ $20/fl for install, restoration, etc.)	$140,000
Increase water rights (purchase 93 acre-ft/yr @ $3,400 per acre-ft) [1][2]	$320,000
Estimated Cost of Capital Improvements	$540,000
Estimated Annual Debt Service (assuming 5% for 10 yrs)	($70,000)

(1) *Based on "Trends in water market activity and price in the western United States" by Thomas C. Brown, published 2006; median price for sales for municipal uses ($2120 per ML, 2003 dollars) converted to acre-ft and 2016 dollars.*
(2) *This value is acknowledged to have a high probability for a large variability based on unknown availability of a water rights holder willing to sell his/her water right*
(3) *Based on information from WSDOH regarding reported poor condition of the distribution system. This does not included extending the distribution system to serve the expanded MH park*

The ongoing operation and maintenance costs are estimated in the following table.

Table 3-13 Estimated Operation and Maintenance Cost

Description	Amount
Annual O&M [1]	$21,000
Estimated annual debt service on capital improvements [2]	$70,000
Total Estimated Annual System Cost	$91,000

(1) *Based on Table 2-10 multiplied by 1.5 (for future expanded system) and rounded to nearest $1,000*
(2) *From Table 3-12*

3.4.2 Consolidated System

Considered below are several consolidation scenarios that affect the cost impacts of the consolidation on OMWS. These scenarios include Basin View Water Association (BVWA) and/or Highland

Estates Water System (HEWS) consolidating with City of Othello Water System and sharing the costs of the transmission main extension with OMWS. See **Figure 4**.

Table 3-14 Estimated Cost Sharing with Basin View and Highland Estates

Description	Est. Quan.	Unit	Unit Price [3]	Amount		Othello Manor Only	Highland Estates Only	Both
Portion of shared consolidation transmission Main	6,500	LF	$112	$725,000		($362,500)	($362,500)	($486,000)
ESTIMATEDSHARED PROJECT COST				$725,000		($362,500)	($362,500)	($486,000)

The capital cost for the improvements needed to extend City of Othello water service to serve OMWS under the various consolidation scenarios are estimated in the following table.

Table 3-15 Estimated Improvements Cost and Annual Debt Service

Description	Consolidation Scenario			
	OMWS	OMWS and BVWA	OMWS and HEWS	OMWS, BVWA and HEWS
Estimated Cost to Improve BVWA [1]	$36,000	$36,000	$36,000	$36,000
Estimated Cost to extend service to BVWA [2] (does not include City portion to upsize t-main)	$725,000	$725,000	$725,000	$725,000
Cost sharing reduction [3]		($362,500)	($362,500)	($486,000)
Total Capital Cost	$761,000	$398,500	$398,500	$275,000
Annual Debt Service [4]				
DWSRF Loan (1% interest for 20 yrs) [5]	$42,200	$22,100	$22,100	$15,200
DWSRF Loan w/50% Loan Forgiveness (1% interest for 24 yrs) [6]	$17,900	$9,400	$9,400	$6,500

(1) *From Table 3-3*
(2) *From Table 3-5*
(3) *From Table 3-14*
(4) *Assume consolidation funded by City via. City application to WSDOH for DWSRF construction loan funds*
(5) *Assumes a not economically disadvantaged system with project completed within 24 months of contract execution.*
(6) *DWSRF will provide 50% principal forgiveness for eligible consolidation projects with repayment extended to 24 yrs. Consolidation of these water systems may qualify due to the water rights issue with* BVWA *and the ECY letter stating* BVWA *is to cease operations until adequate water rights are secured. This will have to be discussed with DWSRF prior to applying for funding.*

Estimated cost for water service post-consolidation is estimated for OMWS in the following table.

Table 3-16 Estimated Ongoing Water Service Cost

Scenario	Meter Size	Minimum Monthly Service Charge	Estimated Annual Water Use (gal.) (1)	Estimated Average Monthly Usage Charge	Total Estimated Monthly Water Charge	Total Estimated Annual Water Charge
Current Water Rates outside City Limits (50% surcharge)	6-inch	$1,707	32,084,000	$4,276	$5,984	$71,800

(1) *From Table 2-6*

3.4.3 Comparison of Costs

The estimated cost to remain a separate water system is compared with the estimated cost to consolidate with the City of Othello on the following table.

Table 3-17 Comparison of Costs

Description	BVWA remain separate system		Consolidation Scenario							
			OMWS		OMWS and BVWA		OMWS and HEWS		OMWS, BVWA and HEWS	
			DWSRF Loan	DWSRF Loan (w/50% forgiveness) (5)	DWSRF Loan	DWSRF Loan (w/50% forgiveness) (5)	DWSRF Loan	DWSRF Loan (w/50% forgiveness) (5)	DWSRF Loan	DWSRF Loan (w/50% forgiveness) (5)
Annual O&M (1)	$21,000									
Estimated Debt Service on Improvements (2)	$70,000									
Estimated Debt Service on Improvements (3)			$42,200	$17,900	$22,100	$9,400	$22,100	$9,400	$15,200	$6,500
Estimated Ongoing Water Service Cost (4)			$71,800	$71,800	$71,800	$71,800	$71,800	$71,800	$71,800	$71,800
Estimated Annual Cost	$91,000		$114,000	$89,700	$93,900	$81,200	$93,900	$81,200	$87,000	$78,300
Units (6)	284		284	284	284	284	284	284	284	284
Total Estimated cost per Unit/month	$27		$33	$26	$28	$24	$28	$24	$26	$23

(1) *From Table 3-13*
(2) *From Table 3-12*
(3) *From Table 3-15*
(4) *From Table 3-16*
(5) *DWSRF will provide 50% principal forgiveness for eligible consolidation projects. Eligibility will be determined by WSDOH and DWSRF.*
(6) *From Section 2.6.1*

Important notes about the above table:

- Estimated cost to operate and maintain the OMWS are rough estimates based on little existing data as OMWS did not provide maintenance costs for this study. It is recommended Othello Manor perform their own water system operation and maintenance estimates.

- All estimated improvements costs are based on current regional costs for PUBLIC WORKS construction which require competitive bidding, prevailing wage rates, more restrictive environmental investigations and requirements and generally higher overhead and administrative cost. It is recommended Othello Manor perform their own estimates for privately funded construction to compare with the estimated improvement costs contained herein.

- Estimated costs are based on conceptual improvements with many potential variables and is intended to establish a "ball park" estimate of costs only

- It is recommended OMWS make contact with Basin View and Highland Estates, possibly the golf course as well as others who may benefit from the City of Othello water main extension and discuss cost sharing opportunities which would likely reduce OMWS share of the above estimated costs.

- A critical element for OMWS to remain an independent water system is the ability to obtain additional water rights. No investigations were made as part of this report to identify viable water rights holders and sellers and determine the potential for obtaining additional water rights. The inability to obtain additional water rights would severely restrict OMWS's options for remaining an independent water system.

3.5 Barriers to Consolidation

Potential barriers to consolidation are identified as follows:

- Cost of transmission main to extend City service to OMWS
- Financing of improvements (private or City sponsored DWSRF application)
- Eligibility of system consolidation for DWSRF 50% loan forgiveness
- Guarantees of payment by Othello Manor if funded via City sponsored DWSRF funding
- Coordination between the City and Othello Manor for funding and construction of the improvements

4.0 NEXT STEPS/SCHEDULE

The project described in the feasibility study is not in the current Othello Water Department Water System Plan. For these projects to be eligible for DWSRF-funded construction the consolidation project(s) must be included by amendment into the existing WSP or included in the updated WSP which is scheduled to be completed in 2017. To be included by amendment the following tasks need to be completed along with the submission of a DWSRF construction funding application by the application deadline of September 30, 2016:

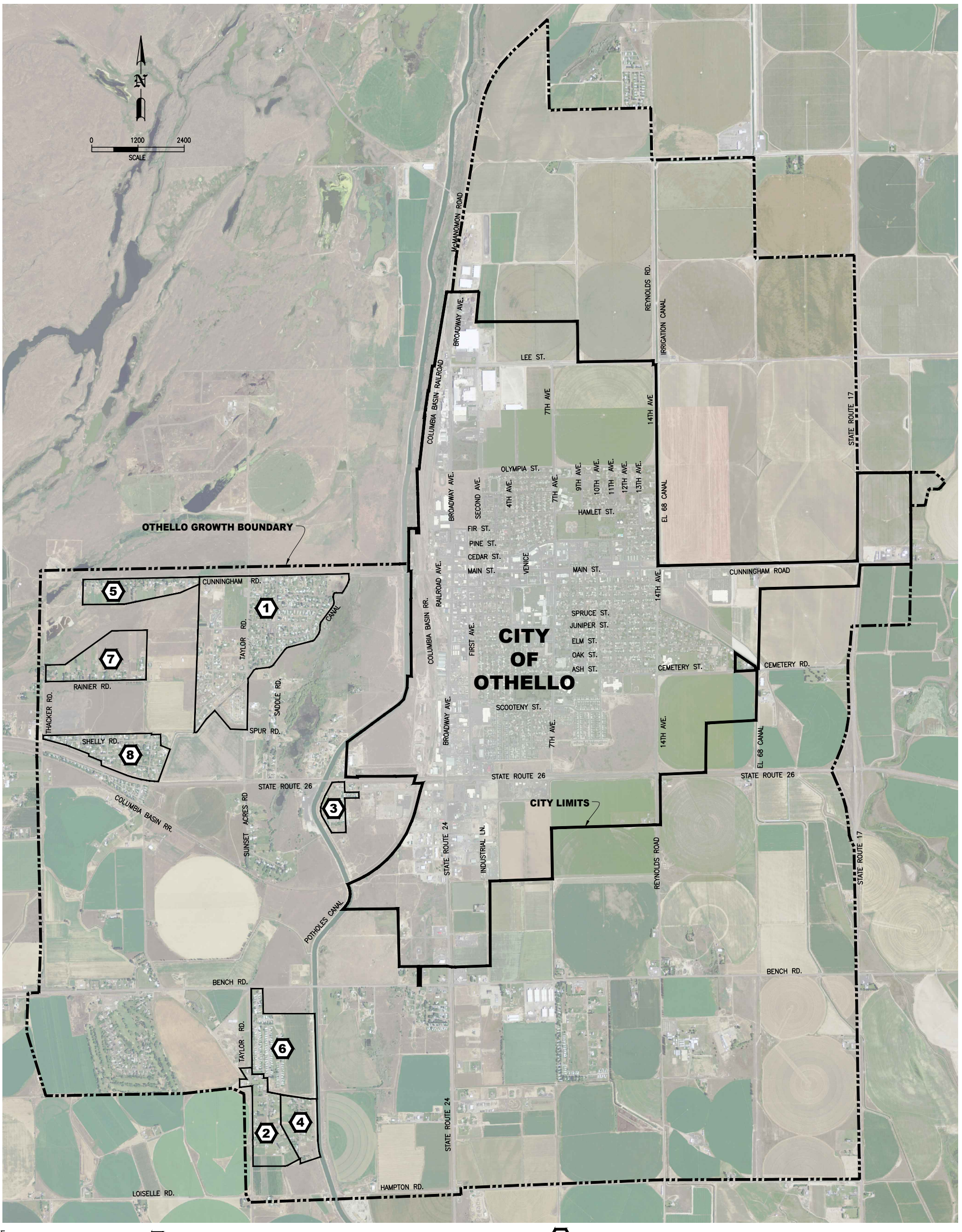
- The capital improvement program and projected budget must be updated to include the construction projects to be pursued in 2017.
- The systems contemplated for consolidation in 2017 must be included in the future service area.
- The amendment is subject to State Environmental Policy Act; the City is the lead agency.
- The amendment is also subject to the local government consistency requirement, with forms required from the City of Othello and Adams County Building and Planning.
- Amendment requires a public information meeting with appropriate public notice.
- The City must also make notice to adjacent water systems, in particular ones intended for consolidation. Their comments must be included in the WSP. (This would include the consent to be consolidated, which is required for the DWSRF application)
- The City Council must adopt the amendment
- WSDOH needs to review/approve the amendment prior to the submission of the application

At this time there is inadequate time remaining by the September 30, 2016 DWSRF application deadline to amend the existing WSP, per above, to include the consolidation project(s) and get WSDOH approval.

Therefore the following schedule reflects including system consolidation (if any) be included in the planned 2017 WSP update and submission of DWSRF application in the 2017 funding cycle.

The following steps and schedule are proposed:

Submit draft report to WSDOH for review/approval:	August 5, 2016
Submit final report to WSDOH/City of Othello for approval: *(revised per WSDOH comments)*	August 31, 2016
Submit to OMWS for review/consideration:	August 31, 2016
City/ OMWS schedule meeting to discuss report	September 2016
City schedule meeting with representatives from all 8 systems to discuss reports	October, 2016
Ongoing discussions/meetings between City and 8 systems to discuss report, negotiate consolidation options, etc.	November 2016 – February 2017
Deadline for City / 8 Systems to decide which (if any) systems are to be included for consolidation in the WSP update	March 1, 2017
City to complete WSP update (and all DWSRF funding application tasks/requirements noted above)	August 1, 2017
City submit DWSRF grant/loan application:	September 30, 2017
City/ OMWS negotiate consolidation/water service agreement:	October 1, 2017 – December 31, 2017
City negotiate grant/loan agreement with DWSRF:	January 1, 2018 – February 28, 2018
City sign grant/loan agreement with DWSRF:	March 1, 2018
City negotiate engineering agreement for design/construction management and inspection of improvements; environmental process and approval requirements:	March 1, 2018 – March 31, 2018
City execute engineering agreement:	April 1, 2018
Complete environmental approval process, design improvements	April 1, 2018 – June 30, 2018
WSDOH design review/approval DWSRF environmental review/approval	July 1, 2018 – July 31, 2018
Advertise for bids, bid period, award, process insurance/agreements, issue notice to proceed:	August 1, 2018 – September 15, 2018
Construct improvements:	September 15, 2018 – October 15, 2018
System(s) consolidation complete:	October 15, 2018



1. ADAMS COUNTY WATER DISTRICT #1 – SYSTEM ID: 22525 X
   - 341 CONNECTIONS
   - OTHELLO WATER SYSTEM INTERTIE – UNKNOWN CAPACITY
2. BASIN VIEW WATER ASSOCIATION – SYSTEM ID: 04530 N
   - 22 CONNECTIONS
   - OTHELLO MANOR WATER SYSTEM INTERTIE – 300 GPM
   - WELL #1 – 35 GPM
3. BIRD DOG FAMILY LTD PARTNERSHIP II – SYSTEM ID: 52172 8
   - 58 CONNECTIONS
   - WELL #1 – 33 GPM
4. HIGHLAND ESTATES WATER SYSTEM – SYSTEM ID: 32736 0
   - 16 CONNECTIONS
   - WELL #1 – 56 GPM
5. MEADOW LANE WATER ASSOCIATION – SYSTEM ID: 53190 T
   - 25 CONNECTIONS
   - WELL #1 – 70 GPM
6. OTHELLO MANOR WATER SYSTEM – SYSTEM ID: 64845 3
   - 152 CONNECTIONS
   - WELL #1 – 300 GPM
7. RAINIER TRACTS WATER ASSOCIATION – SYSTEM ID: 70910 M
   - 20 CONNECTIONS
   - WELL #1 – 45 GPM
8. SUMMERSET WEST WATER ASSOCIATION – SYSTEM ID: 85080 M
   - 72 CONNECTIONS
   - WELL #1 – 200 GPM

s:\autocad drawings\172 othello\172-08 system consolidation\17208-figure 1

SCALE:	AS SHOWN
DESIGNED:	–
DRAWN:	TVP
CHECKED:	
APPROVED:	
PROJ. NO.:	172-08
DATE:	8/26/16

VARELA AND ASSOCIATES, INC.
ENGINEERING AND MANAGEMENT

CITY OF OTHELLO, WASHINGTON
WATER SYSTEM CONSOLIDATION FEASIBILITY STUDIES

CONSOLIDATION FEASIBILITY STUDY SYSTEM

FIGURE
1

1720807 Manor Water System Exhibit

SCALE:	AS SHOWN
DESIGNED:	JSM
DRAWN:	TVS
CHECKED:	
APPROVED:	
PROJ. NO.:	172-08-03
DATE:	7/22/16

LEGEND

OMWA BOUNDARY

PARCEL LINE

0 200 400
SCALE

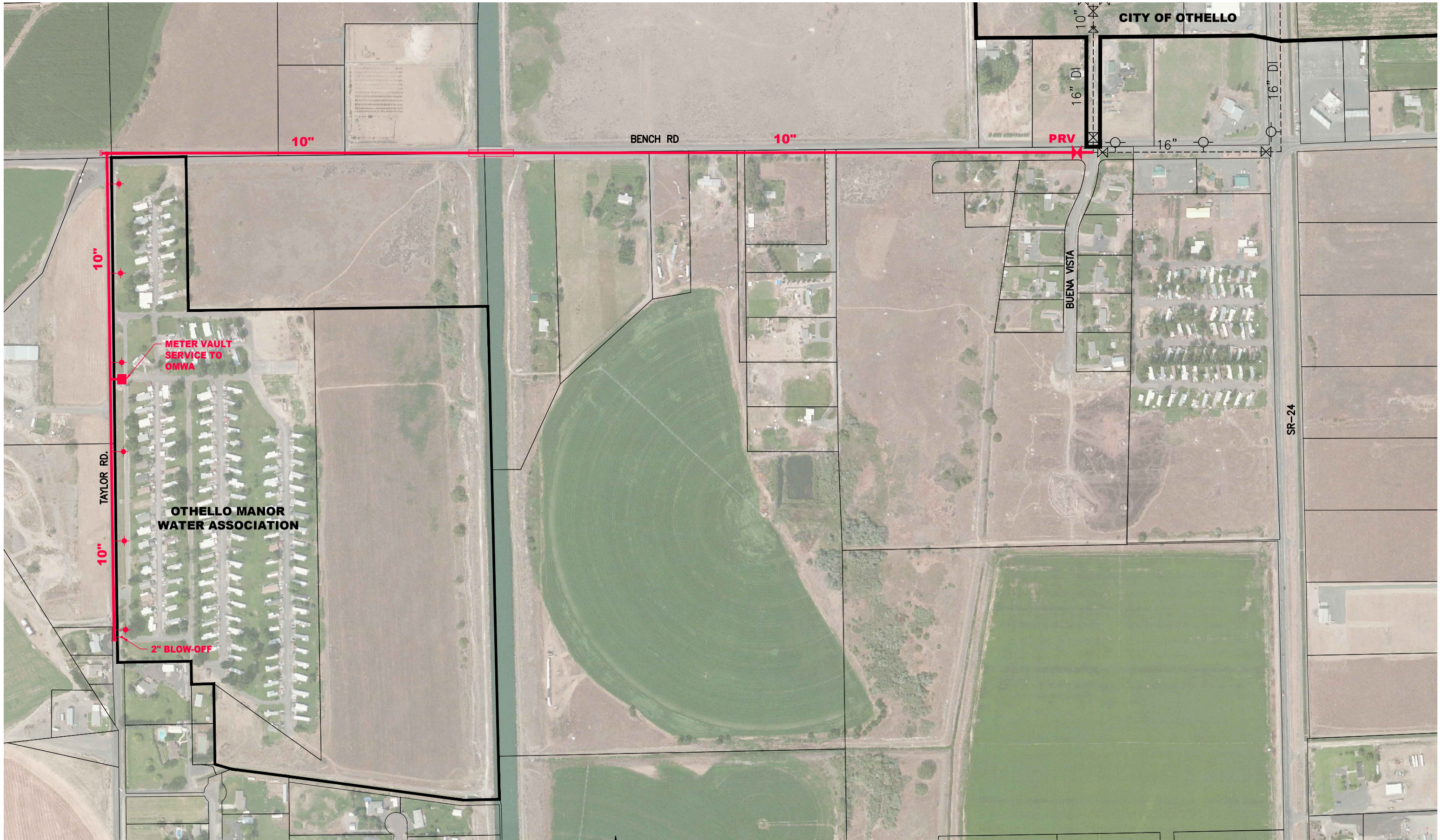
N

VARELA AND ASSOCIATES, INC.
ENGINEERING AND MANAGEMENT

CITY OF OTHELLO, WASHINGTON
WATER SYSTEM CONSOLIDATION FEASIBILITY STUDIES

OMWS EXISTING WATER SYSTEM BOUNDARY

FIGURE
2



1720807 Manor Water System Exhibit

SCALE: AS SHOWN
DESIGNED: JSM
DRAWN: TVS
CHECKED:
APPROVED:
PROJ. NO.: 172-08-03
DATE: 7/22/16

LEGEND

- OMWA BOUNDARY
- PARCEL LINE
- 8" PROPOSED WATER MAIN
- PRV PRESSURE RELIEF VALVE

0 200 400
SCALE

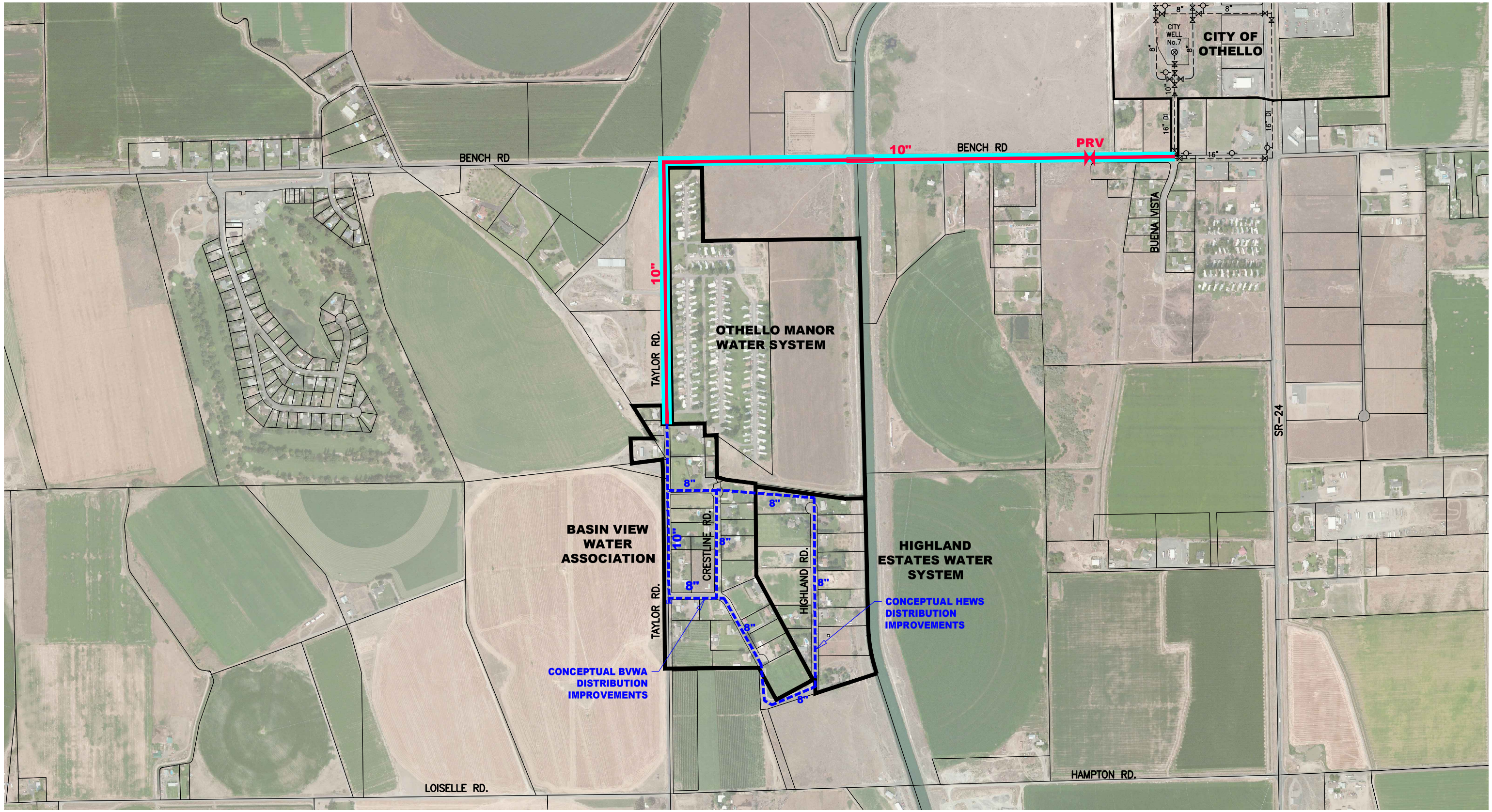
N

VARELA AND ASSOCIATES, INC.
ENGINEERING AND MANAGEMENT

CITY OF OTHELLO, WASHINGTON
WATER SYSTEM CONSOLIDATION FEASIBILITY STUDIES

CONSOLIDATION IMPROVEMENTS

FIGURE
3



LEGEND

- BOUNDARY
- PARCEL LINE
- 10" PROPOSED TRANSMISSION MAIN
- COST SHARING WITH HEWS & BVWA
- 8" HEWS & BVWA PROPOSED MAINS

0 400 800
SCALE

N

1720807 Manor Water System Exhibit

SCALE:	AS SHOWN
DESIGNED:	JSM/NVH
DRAWN:	TVP
CHECKED:	
APPROVED:	
PROJ. NO.:	172-08-03
DATE:	8/4/16

VARELA AND ASSOCIATES, INC.
ENGINEERING AND MANAGEMENT

CITY OF OTHELLO, WASHINGTON
WATER SYSTEM CONSOLIDATION FEASIBILITY STUDIES

COST SHARING WITH HEWS AND BVWA

FIGURE
4

APPENDIX A

WFI

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

WATER FACILITIES INVENTORY (WFI) FORM

ONE FORM PER SYSTEM

Quarter: 2
Updated: 04/15/2014
Printed: 6/30/2016
WFI Printed For: On-Demand
Submission Reason: Contact Update

RETURN TO: Central Services - WFI, PO Box 47822, Olympia, WA, 98504-7822

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
64845 3	OTHELLO MANOR WATER SYSTEM	ADAMS	A	Comm

6. PRIMARY CONTACT NAME & MAILING ADDRESS

DWIGHT & JANIE BALLESTRASSE [OWNERS]
5426 N ROAD 68 SUITE D #139
PASCO, WA 99301

7. OWNER NAME & MAILING ADDRESS

D & J VENTURES NW INC
DWIGHT & JANIE BALLESTRASSE OWNERS
DBA OTHELLO MOBILE MANOR
5426 N ROAD 68, SUITE D #139
PASCO, WA 99301

8. OWNER NUMBER: 034292

STREET ADDRESS IF DIFFERENT FROM ABOVE

ATTN
ADDRESS 815 S TAYLOR RD, OFFICE
CITY OTHELLO STATE WA ZIP 99344

STREET ADDRESS IF DIFFERENT FROM ABOVE

ATTN
ADDRESS
CITY STATE ZIP

9. 24 HOUR PRIMARY CONTACT INFORMATION

Primary Contact Daytime Phone: (509) 488-9690
Primary Contact Mobile/Cell Phone: (206) 498-4649
Primary Contact Evening Phone: (xxx)-xxx-xxxx
Fax:
E-mail: xxxxxxxxxxxxxxxxxxx

10. OWNER CONTACT INFORMATION

Owner Daytime Phone: (509) 488-9690
Owner Mobile/Cell Phone: (206) 498-4649
Owner Evening Phone: (xxx)-xxx-xxxx
Fax:
E-mail: xxxxxxxxxxxxxxxxxxx

WAC 246-290-420(9) requires that water systems provide 24-hour contact information for emergencies.

11. SATELLITE MANAGEMENT AGENCY - SMA (check only one)

- [x] Not applicable (Skip to #12)
- [ ] Owned and Managed
- [ ] Managed Only
- [ ] Owned Only

SMA NAME: _____ SMA Number:

12. WATER SYSTEM CHARACTERISTICS (mark all that apply)

- [ ] Agricultural
- [ ] Commercial / Business
- [ ] Day Care
- [ ] Food Service/Food Permit
- [ ] 1,000 or more person event for 2 or more days per year
- [ ] Hospital/Clinic
- [ ] Industrial
- [ ] Licensed Residential Facility
- [ ] Lodging
- [ ] Recreational / RV Park
- [x] Residential
- [ ] School
- [ ] Temporary Farm Worker
- [ ] Other (church, fire station, etc.): _____

13. WATER SYSTEM OWNERSHIP (mark only one)

- [ ] Association
- [ ] City / Town
- [ ] County
- [ ] Federal
- [ ] Investor
- [x] Private
- [ ] Special District
- [ ] State

14. STORAGE CAPACITY (gallons)

14,400

15	16	17	18 SOURCE CATEGORY										19 USE			20	21 TREATMENT						22	23	24 SOURCE LOCATION			
Source Number	SOURCE NAME LIST UTILITY'S NAME FOR SOURCE AND WELL TAG ID NUMBER. Example: WELL #1 XYZ456 IF SOURCE IS PURCHASED OR INTERTIED, LIST SELLER'S NAME Example: SEATTLE	INTERTIE SYSTEM ID NUMBER	WELL	WELL FIELD	WELL IN A WELL FIELD	SPRING	SPRING FIELD	SPRING IN SPRINGFIELD	SEA WATER	SURFACE WATER	RANNEY / INF. GALLERY	OTHER	PERMANENT	SEASONAL	EMERGENCY	SOURCE METERED	NONE	CHLORINATION	FILTRATION	FLUORIDATION	IRRADIATION (UV)	OTHER	DEPTH TO FIRST OPEN INTERVAL IN FEET	CAPACITY (GALLONS PER MINUTE)	1/4, 1/4 SECTION	SECTION NUMBER	TOWNSHIP	RANGE
S01	AFL233 WELL 1		X										X			Y		X	X				420	300	SE NW	16	15N	29E

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
64845 3	OTHELLO MANOR WATER SYSTEM	ADAMS	A	Comm

	ACTIVE SERVICE CONNECTIONS	DOH USE ONLY! CALCULATED ACTIVE CONNECTIONS	DOH USE ONLY! APPROVED CONNECTIONS
25. SINGLE FAMILY RESIDENCES (How many of the following do you have?)		152	152
A. Full Time Single Family Residences (Occupied 180 days or more per year)	152		
B. Part Time Single Family Residences (Occupied less than 180 days per year)	0		
26. MULTI-FAMILY RESIDENTIAL BUILDINGS (How many of the following do you have?)			
A. Apartment Buildings, condos, duplexes, barracks, dorms	0		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	0		
C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year	0		
27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)			
A. Recreational Services and/or Transient Accommodations (Campsites, RV sites, hotel/motel/overnight units)	0	0	0
B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.	0	0	0
28. TOTAL SERVICE CONNECTIONS		152	152

29. FULL-TIME RESIDENTIAL POPULATION

A. How many residents are served by this system 180 or more days per year? 400

30. PART-TIME RESIDENTIAL POPULATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many part-time residents are present each month?												
B. How many days per month are they present?												

31. TEMPORARY & TRANSIENT USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many total visitors, attendees, travelers, campers, patients or customers have access to the water system each month?												
B. How many days per month is water accessible to the public?												

32. REGULAR NON-RESIDENTIAL USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. If you have schools, daycares, or businesses connected to your water system, how many students daycare children and/or employees are present each month?												
B. How many days per month are they present?												

33. ROUTINE COLIFORM SCHEDULE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
* Requirement is exception from WAC 246-290	1	1	1	1	1	1	1	1	1	1	1	1

34. NITRATE SCHEDULE	QUARTERLY	ANNUALLY	ONCE EVERY 3 YEARS
(One Sample per source by time period)			

35. Reason for Submitting WFI:

☐ Update - Change ☐ Update - No Change ☐ Inactivate ☐ Re-Activate ☐ Name Change ☐ New System ☐ Other _____

36. I certify that the information stated on this WFI form is correct to the best of my knowledge.

SIGNATURE: _____ **DATE:** _____

PRINT NAME: _____ **TITLE:** _____

APPENDIX B

Water Use Efficiency Annual Performance Reports

2010 & 2013 Sanitary Survey Checklist

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

Date Submitted: 7/16/2013

Water Use Efficiency
Annual Performance Report - 2012

WS Name: OTHELLO MANOR WATER SYSTEM Water System ID# : 64845 WS County: ADAMS

Report submitted by: *Dwight Ballestrasse*

Meter Installation Information:

Estimate the percentage of metered connections: *Less Than 50%*

If not fully metered - Current status of meter installation:

Not planned as we are not required to install meters at this time.

Production, Authorized Consumption, and Distribution System Leakage Information:

12-Month WUE Reporting Period: *01/01/2012* To *12/31/2012*

Incomplete or missing data for the year? *No*

If yes, explain:

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*11,895,000* gallons
Authorized Consumption (AC) – Annual Volume	gallons
Distribution System Leakage – Annual Volume TP – AC	*11,895,000* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*0.0 %*
3-year annual average	*%*

Goal-Setting Information:

Date of Most Recent Public Forum: *09/17/2011* Has goal been changed since last performance report? *No*

Note: Customer goal must be re-established every 6 years through a public process

WUE Goals:

Customer Goal (Demand Side):

Within 5 years, reduce average daily household consumption by 15 gallons.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

We continue to do customer education. Average daily household consumption is down more than 15 gallons at this time.

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

Date Submitted: 6/30/2012

Water Use Efficiency
Annual Performance Report - 2011

WS Name: OTHELLO MANOR WATER SYSTEM Water System ID# : 64845 WS County: ADAMS

Report submitted by: *Janet Ballestrasse*

Meter Installation Information:

Estimate the percentage of metered connections: *Less Than 50%*

If not fully metered - Current status of meter installation:

Source meter installed. 25 Customer connections metered.

Production, Authorized Consumption, and Distribution System Leakage Information:

12-Month WUE Reporting Period: *01/01/2011* To *12/31/2011*

Incomplete or missing data for the year? *No*

If yes, explain:

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*16,292,900* gallons
Authorized Consumption (AC) – Annual Volume	gallons
Distribution System Leakage – Annual Volume TP – AC	*16,292,900* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*0.0 %*
3-year annual average	*%*

Goal-Setting Information:

Date of Most Recent Public Forum: *09/17/2011* Has goal been changed since last performance report? *No*

Note: Customer goal must be re-established every 6 years through a public process

WUE Goals:

Customer Goal (Demand Side):

Within 5 years, reduce average daily household consumption by 15 gallons.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

WUE measures currently being implemented:
1. After meter installations are complete, billing for water will commence. Rates will be structured to encourage conservation.
2. We do not allow use of drinking water for watering lawns/gardens, washing cars, only for inside - the-home uses.
3. We require agreement from tenants to maintain faucets and toilets leak free. We actively promote this responsibility to tenants.
4. We educate each incoming tenant on house drinking water usage and what's okay vs. not okay, water conservation, water safety, and cross connections.
5. We held a water-related public forum to be held on September 17, 2011.
This date was also posted on the DoH website.
Water savings levels are unknown at this time. This is the second year we have established TP.
We will not fully know AC until late 2014. We have established that the average monthly usage per connection was approximately 9,050 gallons per month in 2011.

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

Do not mail, fax, or email this report to DOH

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

Date Submitted: 6/25/2011

Water Use Efficiency
Annual Performance Report - 2010

WS Name: OTHELLO MANOR WATER SYSTEM Water System ID# : 64845 WS County: ADAMS

Report submitted by: *Dwight Ballestrasse*

Meter Installation Information:

Is your water system fully metered? *No*

If not fully metered - Current status of meter installation:

We have a source meter installed, as of May 2010. Our meter installation process will go as follows:
2011: 40 meters installed
2012: 40 meters installed
2013: 40 meters installed
2014: 32 meters installed, completing meter installations for the system.

Production, Authorized Consumption, and Distribution System Leakage Information:

12-Month WUE Reporting Period: *01/01/2010* To *12/31/2010*

Incomplete or missing data for the year? *Yes*

If yes, explain:

Our source meter was only installed in May of 2010, therefore we have used the well pumps hour meter log to closely estimate the volume of water pumped from the well.
Customer connection meters will not be fully installed until late 2014. AC will not be able to be quantified until that time.

Distribution System Leakage Summary:

Total Water Produced and Purchased (TP) – Annual Volume	*17,224,350* gallons
Authorized Consumption (AC) – Annual Volume	gallons
Distribution System Leakage – Annual Volume TP – AC	*17,224,350* gallons
Distribution System Leakage – Percent DSL = [(TP – AC) / TP] x 100	*0.0 %*
3-year annual average	*%*

Goal-Setting Information:

Date of Most Recent Public Forum: _____ Has goal been changed since last performance report? *No*

Note: Customer goal must be re-established every 6 years through a public process

WUE Goals:

Customer Goal (Demand Side):

Within 5 years, reduce average daily household consumption by 15 gallons.

Describe Progress in Reaching Goals:

Customer (Demand Side) Goal Progress:

WUE measures currently being implemented:
1. After meter installations are complete, billing for water will commence. Rates will be structured to encourage conservation. Customers have been notified of the above.
2. We do not allow use of drinking water for watering lawns/gardens, washing cars, only for inside-the-home uses.
3. We require agreement from tenants to maintain faucets and toilets leak free. We actively promote this responsibility to tenants.
4. We educate each incoming tenant on house drinking water usage and what's okay vs. not okay, water conservation, water safety, and cross connections.
5. We have notified all customers of a water-related public forum to be held on September 17, 2011. This is also posted on the DoH website.
Water savings levels are unknown at this time. We have established TP for the first time this year. We will not fully know AC until late 2014. We have established that the average monthly usage per connection was approximately 9,500 gallons per month in 2010.

Additional Information Regarding Supply and Demand Side WUE Efforts

Include any other information that describes how you and your customers use water efficiently:

Do not mail, fax, or email this report to DOH

STATE OF WASHINGTON
DEPARTMENT OF HEALTH
EASTERN DRINKING WATER REGIONAL OPERATIONS
16201 East Indiana Avenue, Suite 1500, Spokane Valley, Washington 99216-2830
TDD Relay 1-800-833-6388

October 12, 2010

Dwight & Janie Ballestrasse, Managers
Othello Manor Water System
815 S Taylor Rd
Othello, Washington 99344

Subject: Othello Manor Water System; PWS ID #648453; Adams County
Routine Sanitary Survey – September 12, 2010

Dear Mr. and Mrs. Ballestrasse:

Thank you for your time and help with the Department of Health (DOH) Routine Sanitary Survey on September 12, 2010. I documented our discussion and observations during the survey, in this letter. Please refer to the enclosed copy of the report and photographs for more information.

Findings:

We inspected the well (S01), booster station, and reservoir. The reservoir and the pump house share a common wall, and both the booster pump and S01 were located in the pump house. S01 is controlled by a switch and pumps directly into the reservoir. The booster pump operates continuously, and a small diameter recirculation line keeps water over the pump bowls from overheating.

During the survey, we observed the following Significant Deficiency. Please correct and provide a brief letter documenting how you corrected the deficiency by **November 30, 2010**.

1. Place a hood over the open face of the reservoir vent (overflow), shown on Photo-4 and Photo-5. The location of the vent, along with the surrounding ground surface makes the reservoir vulnerable to contamination from windblown particles. In addition you should consider:

   - Lowering the ground surface adjacent the vent, to make the vent opening harder to reach for small animals or rodents.
   - Constructing a drainage channel to minimize any possible damage a future overflow will cause. Cement or large rock may be necessary to keep any sustained overflow from eroding

Making sure water systems correct each Significant Deficiency discovered during a survey, is a high priority for the state's drinking water program. Please mail your brief letter and photographs to Danielle Finley at the address shown above. DOH logged the completion date and deficiency into our survey database. If necessary, our office will take enforcement action if we do not receive your letter by the deadline listed above.

Survey Fee:

Our office will schedule a water system's survey once every five years. WAC 246-290-990 (3)(c), authorizes a schedule of fees to be implemented to help recover the cost of conducting a sanitary survey.. The Department of Health's (DOH) total cost to complete this sanitary survey is $1836.00. The Office of Drinking Water has used state and federal funds to pay $918.00 of this amount. An invoice showing the remaining amount due of $918.00 is enclosed.

Other Findings:

During the course of the survey, we also observed some additional concerns. These concerns are listed below, followed by a brief explanation.

A. Complete a Small Water System Management Plan (SWSMP), per WAC 246-290-100. The enclosed guide booklet will help you complete the program. You will find the SWSMP is a powerful tool for keeping DOH paperwork and plans organized. The plan helps track and document compliance with major elements of the drinking water regulations. This is simpler when you place the elements in a 3-ring binder. Please do not submit the SWSMP to our office for review and approval, though it must be available for review upon request

B. Relocate the chlorine injector onto the discharge line from the source. The injector is currently located on the booster pump re-circulation line. This location increases the chances the chlorine will short circuit and not adequately mix and treat the stored water in the reservoir.

   * I've enclosed the original letters where our office required the Othello Manor Water System to chlorinate.

C. The Growth Management Act and Water System Operating Permit Program place an emphasis on knowing the ability for each water system to serve additional connections. Our office determined the maximum number of connections each system can adequately serve. Based on your current usage and the request received January 28, 2010, DOH increased your total number of approved connections to <u>152</u>.

   This presumes the new connections are residential or small commercial in nature. Water-intensive uses were not included in the calculation. If you find this number is unreasonable document recent water production, consumption, and service area data, and summarize this information in a water system plan.

WAC 246-290-100 Comprehensive Water System Plan (plan) must be completed, by all water systems meeting the criteria listed under sub-section (2).

The plan is a comprehensive evaluation of the water system past, present, and future. Local, state, and federal regulations, as well as, the city's own ordinances and policies establish the evaluation criteria. This provides a planning document for guiding future decisions, based on the physical, technical, managerial, financial, and operational capacity of the system.

If you have any questions about the water system planning process, or wish to meet with Drinking Water Program staff to discuss specific planning issues facing your community, please do not hesitate to give me a call

Do not hesitate to call me at (509) 329-2120, if you require additional information or assistance.

Sincerely,

Andres R. Cervantes, PE
Regional Engineer
Office of Drinking Water
Division of Environmental Health

Enclosures: Invoice
Sanitary Survey Report and Photos
SWSMP Guidance

cc: **Adams** County Health District
Danielle Finley, Survey Coordinator

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

Office of Drinking Water
INVOICE
Engineering, Planning, and Sanitary Survey Review Form

TO: DWIGHT & JANIE BALLESTRASSE
OTHELLO MANOR WATER SYSTEM
815 S TAYLOR RD
OTHELLO, WA 99344

Invoice Number	202901E
Invoice Da	OCTOBER 12, 2010
Billing Period	30 DAYS

DATE	DESCRIPTION	QUANTITY	COST	AMOUNT
09/12/10	SANITARY SURVEY OTHELLO MANOR WATER SYSTEM ADAMS COUNTY DATE OF SURVEY: SEPTEMBER 12, 2010 PWS ID #648453	1		$1,836.00
	DOH SHARE			- 918.00
	TOTAL			$ 918.00
	Payment due within 30 days. Interest shall accrue at 1% per month after 30 days.			

Make Checks Payable to Department of Health
Return Lower Portion to:
Department of Health
PO Box 1099
Olympia, WA 98507-1099

Office of Drinking Water
Engineering, Planning, and Sanitary Survey Review Form

NAME	OTHELLO MANOR WATER SYSTEM
INVOICE NUMBER	202901E
INVOICE DA	OCTOBER 12. 2010
AMOUNT	$918.00

Return to:
Department of Health
Revenue Section
PO Box 1099
Olympia, WA 98507-1099

DOH Form #331-332

For persons with disabilities, this document is available on request in other formats. To submit a request, please call 1-800-525-0127 (TTY 1-800-833-6388).

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

Sanitary Survey Data Report / Packet

As Of: 9/12/2010

Sentry DOH

Administrative Data

WS Id:	64845 3
WS Name:	OTHELLO MANOR WATER SYSTEM
DOH Region:	Eastern
County:	ADAMS
Group:	A
Type:	Community
Group Active Date:	01/01/1970
Delivery Address:	
Attention:	
Address:	
City:	
State:	
Zip:	

Primary Contact

Name:	Dwight & Janie Ballestrasse
Mailing Address:	
Attention:	
Address:	815 S Taylor Rd, A13
City:	Othello
State:	WA
Zip:	99344
Day / Office Phone:	(509) 488-9690
Mobile / Pager:	(206) 498-4649
Evening / Weekend:	(206) 498-8269
Fax:	
Alternate Day / Office:	
Alternate Evening / Wk:	

24 Hour / Emergency Number

Name:	
Day / Office Phone:	
Mobile / Pager:	
Evening / Weekend:	
Fax:	
Alternate Day / Office:	
Alternate Evening / Wk:	

Sanitary Survey Notes

Comment Focus	Comment Date	Author
General	*05/14/2002*	*DWAIN Conversion*

CvtDWPRO - # OF APPROVED SERVICES=130 PER JULIE DEWBERRY 6/2/93 # APPROVED SERVICES=151 PER A. CERVANTES 3/14/96

Comment Focus	Comment Date	Author
Approval	*03/24/2010*	*G.Simon*

Approved connects set at 152 up from 151 as per A. Cervantes.

Planning

Last Plan Date:
Next Plan Due Date:
Type of Plan:

Operator Certification

Number of Mandatory Positions for the WS Id: 1
Operator Compliance Status: In Compliance

Mandatory	Pos. Num.	Operator Name (Last, First, MI)	Min. Cert. Req'd	Certification Held	Operator Number	Evening / Weekend Phone Number	Has CCS
Yes	1	Ballestrasse, Dwight P	WDM 1				

Compliance

Action	Status	IssueDate	Penalty	Comply By	Completed
Violation Letter	Completed	07/31/2007	No		

Action	Status	IssueDate	Penalty	Comply By	Completed
Violation Letter	Completed	10/30/2007	No		

Action	Status	IssueDate	Penalty	Comply By	Completed
Violation Letter	Completed	02/27/2008	No		

Action	Status	IssueDate	Penalty	Comply By	Completed
Notice of Violation	Completed	04/17/2008	No	09/30/2008	07/10/2008

CompActionComments: HQ issued NOV for TTHM HAA5 monitoring JW
Milestones: Monitor for TTHM HAA5
PN

Action	Status	IssueDate	Penalty	Comply By	Completed
Violation Letter	Completed	08/27/2008	No		

Action	Status	IssueDate	Penalty	Comply By	Completed
Operator Certification Temporary	Active	02/25/2010	No	02/25/2011	

CompActionComments: T2--Dwight Ballestrase to achieve WDM 1.
Vio - 02/25/10 Operator Certification Requirements
Milestones: Dwight Ballestrase to achieve WDM 1

Source Information

Source Inventory

Src Num	Source Name	Status	Type	Use	Depth to First Open Interval	Capacity (GPM)	Source Metered	Well Tag ID
01	AFL233 WELL 1	Act	Well	P	420	300.0	Undefined	AFL233

Source Location

Src Num	Source Name	Qtr / Qtr	Sect	Township	Range	Lat / Long	SWTR
01	AFL233 WELL 1	SENW	16	15	29E	46.793776 / -119.194259	Does Not Apply

Source Ratings

Src Num	Source Name	Susceptibility	IOC Vuln	VOC Vuln	SOC Vuln	Micro Vuln	RAD Vuln
01	AFL233 WELL 1	High	High	High	Low	Unknown	Unknown

Water Treatment Plant

Source Treatment

Water Treatment Plant Id: 64845001

Water Treatment Plant Name: AFL233 WELL 1

Source Number	SrcName	SrcType	Source Status	Source Use
01	AFL233 WELL 1	Well	Act	Permanent

Treatment Purpose	Treatment Type	Applicable Rule	Appoval Status
DISINFECTION	CHLORINATION, HYPOCHLORITE	Total Coliform Rule	Appv
PARTICULATE (TURBIDITY) REMOVAL	FILTRATION, CARTRIDGE		Appv

Water Quality

COLIFORM SUMMARY

	9/10	8/10	7/10	6/10	5/10	4/10	3/10	2/10	1/10	12/09	11/09	10/09
Routine Sample												
SamReq	1	1	1	1	1	1	1	1	1	1	1	1
SamTaken	0	0	1	1	1	1	1	1	0	0	1	1
TC												
EC												
FC												
Repeat Sample												
SamReq												
SamTaken												
TC												
EC												
FC												
Incidents Actual												
Acute												
Non Acute												
MajorRep												
MajorMon									1	1		
Min Rep												
Min Mon												

	9/09	8/09	7/09	6/09	5/09	4/09	3/09	2/09	1/09	12/08	11/08	10/08
Routine Sample												
SamReq	1	1	1	1	1	1	1	1	1	1	1	1
SamTaken	1	1	1	1	1	1	1	1	1	1	1	1
TC												
EC												
FC												
Repeat Sample												
SamReq												
SamTaken												
TC												
EC												
FC												
Incidents Actual												
Acute												
Non Acute												
MajorRep												
MajorMon												
Min Rep												
Min Mon												

INORGANIC CHEMICALS (IOC)

History - IOC - Analyte Group

Src Num	Source Name	Source Type	Source Status	Source Use	Lab / Sample Num	Collect Date	Test Panel	Analytes Tested
01	AFL233 WELL 1	W	Act	P	046 33040	10/06/2009	IOC	7 of 43
01	AFL233 WELL 1	W	Act	P	109 14456	10/06/2009	IOC	22 of 43
01	AFL233 WELL 1	W	Act	P	109 50690	11/29/2000	IOC	29 of 43
01	AFL233 WELL 1	W	Act	P	081 44140	03/12/1997	IOC	27 of 43
01	AFL233 WELL 1	W	Act	P	051 13158	03/11/1991	ICHEM	20 of 19
01	AFL233 WELL 1	W	Act	P	051 09345	11/17/1986	ICHEM	18 of 19
01	AFL233 WELL 1	W	Act	P	071 49008	01/23/1984	ICHEM	17 of 19
01	AFL233 WELL 1	W	Act	P	051 04510	04/03/1981	ICHEM	17 of 19

Detail - IOC

Source 01

Source Status	Source Type	Test Panel	Lab Number	Sample Number	Collect Date	Sample Location
Act	Well	IOC	109	50690	11/29/2000	815 S TAYLOR RD 70

Analyte DOH #	Analyte Name	Result Range	Units	SRL	Result Qty	Trigger Ind	Trigger Value	MCL Ind	MCL Value
0004	ARSENIC	LT	mg/L	0.0030	0.0100	N	0.0103	N	0.0104
0005	BARIUM	LT	mg/L	0.4000	0.1000	N	1.9999	N	2.0000
0006	CADMIUM	LT	mg/L	0.0020	0.0020	N	0.0049	N	0.0050
0007	CHROMIUM	LT	mg/L	0.0200	0.0100	N	0.0999	N	0.1000
0011	MERCURY	LT	mg/L	0.0004	0.0005	N	0.0019	N	0.0020
0012	SELENIUM	LT	mg/L	0.0100	0.0050	N	0.0499	N	0.0500
0110	BERYLLIUM	LT	mg/L	0.0008	0.0030	N	0.0039	N	0.0040
0111	NICKEL	LT	mg/L	0.1000	0.0400	N	0.0999	N	0.1000
0112	ANTIMONY	LT	mg/L	0.0060	0.0050	N	0.0059	N	0.0060
0113	THALLIUM	LT	mg/L	0.0020	0.0020	N	0.0019	N	0.0020
0116	CYANIDE	LT	mg/L	0.0100	0.0500	N	0.1999	N	0.2000
0019	FLUORIDE	EQ	mg/L	0.5000	0.6800	N	1.9999	N	4.0000
0114	NITRITE-N	LT	mg/L	0.2000	0.5000	N	0.4999	N	1.0000
0020	NITRATE-N	EQ	mg/L	0.2000	0.4800	N	4.9990	N	10.0000
0161	TOTAL NITRATE/NITRITE	EQ	mg/L	0.5000	0.4800	N		N	
0008	IRON	LT	mg/L	0.1000	0.1000	N		N	
0010	MANGANESE	EQ	mg/L	0.0100	0.0300	N		N	
0013	SILVER	LT	mg/L	0.1000	0.0100	N		N	
0021	CHLORIDE	EQ	mg/L	20.0000	6.3500	N		N	
0022	SULFATE	EQ	mg/L	50.0000	30.2000	N		N	
0024	ZINC	LT	mg/L	0.2000	0.2000	N		N	
0014	SODIUM	EQ	mg/L	5.0000	53.4600	N		N	
0015	HARDNESS	EQ	mg/L	10.0000	46.8000	N		N	
0016	CONDUCTIVITY	EQ	Umhos/cm	70.0000	380.0000	N		N	
0017	TURBIDITY	EQ	NTU	0.1000	0.1700	N		N	
0018	COLOR	LT	CU	15.0000	5.0000	N		N	
0026	TDS-TOTAL DISSOLVED SOLIDS	EQ	mg/L	100.0000	307.0000	N		N	
0009	LEAD	LT	mg/L	0.0010	0.0020	N	9,999.0000	N	
0023	COPPER	LT	mg/L	0.0200	0.2000	N	9,999.0000	N	
0171	ORTHOPHOSPHATE	NA	mg/L	0.1000		N		N	
0172	SILICA	NA	mg/L	1.0000		N		N	
0402	ALUMINUM	NA	mg/L	0.0500		N		N	
0403	ALKALINITY-LAB	NA	mg/L	5.0000		N		N	
0404	MAGNESIUM	NA	mg/L	0.1000		N		N	
0405	CALCIUM	NA	mg/L	0.0500		N		N	
0406	AMMONIA	NA	mg/L	1.0000		N		N	
0407	CHLORINE DIOXIDE	NA	mg/L	0.8000		N		N	
0408	OZONE	NA	mg/L	0.2000		N		N	
0409	PH	NA	PH			N		N	
0410	CHLORAMINES	NA	mg/L			N		N	
0099	INACTIVATION RATIO	NA	None			N		N	
0100	RESIDUAL CHLORINE	NA	mg/L	0.2000		N		N	
0115	ASBESTOS	NA	MFL	1.4000		N	6.9990	N	7.0000

Result Range:
EQ - Equal To LT - Less Than GT - Greater Than NA - Not Analyzed ND – No Detect

NITRATE / NITRITE

History - IOC - Analyte Group

Src Num	Source Name	Source Type	Source Status	Source Use	Lab / Sample Num	Collect Date	Test Panel	Analytes Tested
01	AFL233 WELL 1	W	Act	P	109 18588	06/24/2010	NIT	1 of 3
01	AFL233 WELL 1	W	Act	P	109 14454	10/06/2009	NIT	1 of 3
01	AFL233 WELL 1	W	Act	P	109 14456	10/06/2009	IOC	22 of 43
01	AFL233 WELL 1	W	Act	P	109 98003	10/29/2008	NIT	1 of 3
01	AFL233 WELL 1	W	Act	P	109 82710	06/07/2006	NIT	1 of 3
01	AFL233 WELL 1	W	Act	P	109 74671	01/07/2005	NIT	1 of 3
01	AFL233 WELL 1	W	Act	P	109 63313	01/02/2003	NIT	1 of 3
01	AFL233 WELL 1	W	Act	P	109 57055	12/18/2001	NIT	1 of 3

Detail - NIT

Source 01 Source Status - Act Source Type - Well

Lab/Sample Number	Sample Collect Date	Analyte DOH #	Analyte Name	Result Range	Units	SRL	Result Qty	Trigger Ind	Trigger Value	MCL Ind	MCL Value
109 18588	06/24/2010	0020	NITRATE-N	LT	mg/L	0.2000	0.2000	N	4.9990	N	10.0000
109 14456	10/06/2009	0020	NITRATE-N	LT	mg/L	0.2000	0.2000	N	4.9990	N	10.0000
109 14456	10/06/2009	0114	NITRITE-N	LT	mg/L	0.2000	0.2000	N	0.4999	N	1.0000
109 14454	10/06/2009	0020	NITRATE-N	LT	mg/L	0.2000	0.2000	N	4.9990	N	10.0000
109 98003	10/29/2008	0020	NITRATE-N	EQ	mg/L	0.2000	0.1600	N	4.9990	N	10.0000

Result Range:
EQ - Equal To LT - Less Than GT - Greater Than NA - Not Analyzed ND – No Detect

ARSENIC

Detail - Arsenic

Source 01 Source Status - Act Source Type - Well

Lab/Sample Number	Sample Collect Date	Analyte DOH #	Analyte Name	Result Range	Units	SRL	Result Qty	Trigger Ind	Trigger Value	MCL Ind	MCL Value
046 33040	10/06/2009	0004	ARSENIC	LT	mg/L	0.0030	0.0030	N	0.0103	N	0.0104

No Samples with Arsenic being Analyzed were found.

Result Range:
EQ - Equal To LT - Less Than GT - Greater Than NA - Not Analyzed ND – No Detect

VOLATILE ORGANIC CHEMICALS (VOC)

History - VOC - Analyte Group

Src Num	Source Name	Source Type	Source Status	Source Use	Lab / Sample Num	Collect Date	Test Panel	Analytes Te
01	AFL233 WELL 1	W	Act	P	046 33049	10/06/2009	VOC1	61
01	AFL233 WELL 1	W	Act	P	046 14839	06/07/2006	VOC1	61 of 62
01	AFL233 WELL 1	W	Act	P	046 08194	07/24/2003	VOC1	59 of 62
01	AFL233 WELL 1	W	Act	P	046 09508	10/20/2000	VOC1	59 of 62
01	AFL233 WELL 1	W	Act	P	081 54698	06/09/1998	VOC1	61 of 62
01	AFL233 WELL 1	W	Act	P	081 42673	01/02/1997	VOC1	57 of 62
01	AFL233 WELL 1	W	Act	P	054 05144	11/18/1991	VOC1	57 of 62
01	AFL233 WELL 1	W	Act	P	054 03831	05/13/1991	VOC1	57 of 62

Detail - VOC

Source 01

Source Status	Source Type	Test Panel	Lab Number	Sample Number	Collect Date	Sample Location
Act	Well	VOC1	046	33049	10/06/2009	b-16

Analyte DOH #	Analyte Name	Result Range	Units	SRL	Result Qty	Trigger Ind	Trigger Value	MCL Ind	MCL Value
0052	1,4 DICHLOROBENZENE	EQ	ug/L	0.5000	0.4000	N	0.5000	N	75.0000
0030	BROMOFORM	EQ	ug/L	0.5000	2.4000	Y	0.5000	N	
0031	TOTAL TRIHALOMETHANE	EQ	ug/L		2.4000	N	9,999.0000	N	80.0000

Result Range:
EQ - Equal To LT - Less Than GT - Greater Than NA - Not Analyzed ND -- No Detect

SYNTHETIC ORGANIC CHEMICALS (SOC)

History - SOC - Analyte Group

Src Num	Source Name	Source Type	Source Status	Source Use	Lab / Sample Num	Collect Date	Test Panel	Analytes Tested
01	AFL233 WELL 1	W	Act	P	046 20282	06/24/2010	FUMIGANT	3 of 4
01	AFL233 WELL 1	W	Act	P	046 14838	06/07/2006	HERB1	16 of 18
01	AFL233 WELL 1	W	Act	P	046 14838	06/07/2006	INSECT1	10 of 10
01	AFL233 WELL 1	W	Act	P	046 14838	06/07/2006	PEST1	59 of 66
01	AFL233 WELL 1	W	Act	P	046 14840	06/07/2006	FUMIGANT	3 of 4
01	AFL233 WELL 1	W	Act	P	046 00669	01/29/2002	HERB1	14 of 18
01	AFL233 WELL 1	W	Act	P	046 00669	01/29/2002	INSECT1	10 of 10
01	AFL233 WELL 1	W	Act	P	046 00669	01/29/2002	PEST1	61 of 66
01	AFL233 WELL 1	W	Act	P	054 05861	04/14/1992	FUMIGANT	2 of 4

Detail - SOC

No Analytes Detected for Testpanel "HERB1" where 10 analytes were tested.
No Analytes Detected for Testpanel "PEST1" where 55 analytes were tested.
No Analytes Detected for Testpanel "INSECT1" where 8 analytes were tested.

Halo Acetic Acids (HAA5)

History - DBP - Analyte Group

Src Num	Source Name	Source Type	Source Status	Source Use	Lab / Sample Num	Collect Date	Test Panel	Analytes Tested
Dist					046 20336	07/10/2008	HAA5	7 of 8

Halo Acetic Acids (HAA5)

No Analytes Detected for Testpanel "HAA5"

Total Trihalomethane (THM)

History - DBP - Analyte Group

Src Num	Source Name	Source Type	Source Status	Source Use	Lab / Sample Num	Collect Date	Test Panel	Analytes Tested
Dist					046 20336	07/10/2008	THM	5 of 6

Total Trihalomethane (THM)

No Analytes Detected for Testpanel "THM" where 1 analytes were tested.

RADIONUECLIDES (RAD)

History - RAD - Analyte Group

Src Num	Source Name	Source Type	Source Status	Source Use	Lab / Sample Num	Collect Date	Test Panel	Analytes Tested
Dist					101 00330	01/12/1981	RAD	1 of 13
01	AFL233 WELL 1	W	Act	P	142 47001	10/06/2009	RAD	4 of 13
01	AFL233 WELL 1	W	Act	P	023 10019	04/30/2003	RAD	1 of 13

Detail - RAD

Source 01

Source Status	Source Type	Test Panel	Lab Number	Sample Number	Collect Date	Sample Location
Act	Well	RAD	142	47001	10/06/2009	815 s taylor rd b-16

Analyte DOH #	Analyte Name	Result Range	Units	SRL	Result Qty	Trigger Ind	Trigger Value	MCL Ind	MCL Value
0039	RADIUM 226	EQ	pCi/L	1.0000	0.0600	N	2.9999	N	3.0000
0040	RADIUM 226 + 228	EQ	pCi/L		0.0500	N	4.9999	N	5.0000
0165	GROSS ALPHA	EQ	pCi/L	3.0000	6.2000	N	14.9999	N	

Result Range:
EQ - Equal To LT - Less Than GT - Greater Than NA - Not Analyzed ND -- No Detect

LEAD AND COPPER (LCR)

Monitoring Level	Start	End	Pb 90th	Pb Hi	Cu 90th	Cu Hi	Sam Reqt	Sam Taken	AL Pb Inc	AL Cu Inc	M In
Base3Y	01/2009	12/2011					5	0			
Base3Y	01/2006	12/2008	.0012	.0013	.0200	.0200	5	5			
Base3Y	01/2005	12/2007					5	0			Mon
Base3Y	01/2004	12/2006					5	0			Mon
Base3Y	01/2001	12/2003	.0020	.0020	.0190	.0200	5	5			
Base3Y	01/2000	12/2002					5	0			
Second6Mo	01/1999	06/1999	.0020	.0020	.2000	.2000	5	5			
AnnualRed	01/1998	12/1998					5	0			
First6Mo	01/1996	06/1996	.0030	.0030	.0300	.0300	10	14			

Photographs: Sanitary Control Area – Reservoir | PWS ID # 64845 | Date: September 12, 2010 | Page # 1

Photo-1: Sanitary Control Area – Reservoir / Pumphouse
SCA – Clear
Reservoir / pumphouse
→ Share common wall

Photo-2: Sanitary Control Area – Reservoir / Pumphouse
SCA
→ Grassy area
→ Slopped ground covers reservoir sides

Photo-3: Sanitary Control Area – Reservoir / Pumphouse
Reservoir and pumphouse roofs
→ Access Hatch
→ Source access Hatch

Photo-4: Reservoir
Fenced Roof
→ Vent
⇉ Doubles as overflow
→ Buried reservoir

Required:
- Hood over vent

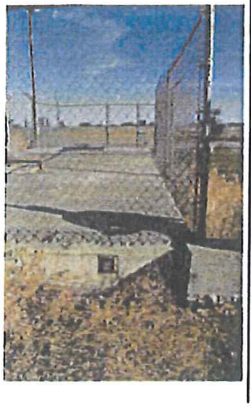


Photo-5: Reservoir
Vent
→ Screen

Required:
- Hood over vent

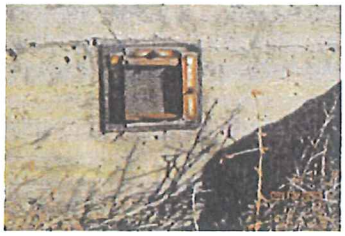


Photo-6: Reservoir
Hatch
→ Gasket

Photo-7: Reservoir
Hatch
→ Control tube

Photographs: S01 – Booster Pump – Treatment | PWS ID # 64845 | Date: September 12, 2010 | Page # 2

Photo-8: S01
DOE ID
→ AFL 233

Photo-9: Pumphouse
Supply lines to reservoir, distribution system, and recirculation line.

Photo-10: S01
Booster pump
→ Continuous operation
⇉ Cartridge filters

Photo-11: S01
S01
→ Discharge to system
→ Sandfilter

Photo-12: S01
S01
→ Wellhead
→ Vented

Photo-13: S01
Seametrics
→ Source Meter

Photo-14: S01
Source meter
→ Vertical

Photo-15: Treatment
Pulsatron
→ Chlorinator
→ Solution tank
⇉ 50-g
⇉ 5.25% Cl_2

Photo-16: Treatment
Pulsatron
→ Diaghram pump

Photo-17: Pulsatron
Specs
→ 12-gpd
→ 80-psi

WASHINGTON STATE DEPARTMENT OF HEALTH
ERO Group A Water System Sanitary Survey Checklist

System Name:	Othello Manor Water System			Survey Date:	09/ 05 / 2013
PWS ID#:	64845 3	County:	Adams	System Type:	A-COMM
Persons Attending Inspection:	Dwight Ballestrasse				
	Janie Ballestrasse				
Inspector's Name:	Andres R. Cervantes				

PART A: SUMMARY OF INSPECTION FINDINGS & RECOMMENDATIONS

Significant Deficiencies observed during this survey:

- **System:**
  - Single pressure zone, supplied by a single source, reservoir, and booster pump. System has an emergency intertie with adjacent water system. Currently not in use.

- **Source:**
  - **S.C.A.,** Lawn grassy area, blocked off from any heavy traffic.
  - **S01,** Located adjacent to reservoir, in room built into the North wall of the reservoir. Appears source pumps directly into the North wall, and within several feet, booster pump draws from the reservoir at the same depth from the reservoir.

Recommend: **Photo-15 (Page 5 of 6) – Fill gaps in seal with silicone to protect gasket from the elements.**

- **Reservoir:**
  - **Cement,** Partially buried reservoir. Roof is exposed and sealed. Recently opened and inspected the gasket. Cover is locked and overlaps .

- **Booster Station:**
  - **1 Pump,** Provides system pressure and demand.

- **Treatment System:**
  - **Disinfect,** Chlorination - Diaphragm pump, sodium hypo-chlorite with roughly 50-gallons solution tank..

PART B AND C: GENERAL WATER SYSTEM DESCRIPTION AND PLANNING/MANAGEMENT DISCUSSION

1. General description of the water system including facilities and operation, direction of flow (from source to distribution), how the controls function, storage, treatment if any, number of pressure zones and any significant changes.

See above

Optional Information: describe the general level of planning and management documents developed by this water system and any recommendations for additional development, including system management practices and processes, water rates, etc. Also describe any significant trends in water quality monitoring and results.

Partially completed SWSMP - will be providing newer version.

2. If the certified operator on record is not correct, who is the certified operator?	**Yes**
4. Has the system completed a Small Water System Management Program or Water System Plan?	☐Yes ☐No ☒Partial
11. Were water quality sample results and trends reviewed with the purveyor?	☒Yes ☐No

PART D: 1 SOURCE (This page may be reproduced to add more sources)

Describe and evaluate the source facilities including maintenance, operations, sanitary and security observations and any major change made to the source such as deepening or reconstruction:

See page 1. No changes to the source SCA planted with lawn.

17. DOH Source Number:				S01
18. Source Name from the WFI: (For example, North Well; Well #2; ABC334.)				Well #1
19. Dept of Ecology Well Tag Number: (Use Well tag ID#, None or Not readable)				AFL 233
20. Source Use:	P - Permanent	S - Seasonal	E - Emergency	P
21. If this is an emergency source, is it physically disconnected?				☐Yes ☒No
22. What is the physical location of the source? Use references -cross street, address, directions to locate in the field or GPS?				East of Taylor RD

	Yes	No
23. Is the source listed on the Water Facilities Inventory (WFI) report?	☒	☐
24. Is the source a potential GWI source?	☐	☒
25. Is the Sanitary Control Area (SCA) free of potential sources of contamination?	☒	☐
26. If the wellhead is located in a pit or vault, is it drained to daylight?	☐	☒
27. Does the top of the casing extend at least 6 inches above the floor or ground?	☒	☐
28. Is the source protected from any obvious risk of being submerged?	☒	☐
29. Is there a watertight, sealed well cap with no unprotected openings?	☒	☐
30. Is the well casing free of any unprotected openings?	☒	☐
31. Is there a vent on the well?	☒	☐
32. If yes, is the vent properly protected? (24 mesh screen or slots)	☒	☐
33. Are conduits and junction boxes sealed to prevent contaminant entry?	☒	☐
34. Is the well protected from physical damage by vehicles parked or driving nearby?	☒	☐
35. Is a raw water sample tap provided at the source?	☒	☐
36. Is the source metered?	☒	☐
37. If yes, is the source meter being read?	☒	☐
38. If yes, are the water production records maintained?	☒	☐
39. Is the well house properly constructed and maintained?	☒	☐
40. Is there evidence of rodent infestation?	☐	☒
41. Is the well house adequately protected from unauthorized access?	☒	☐
42. Is the source a spring?	☐	☒
43. Is the spring enclosure properly constructed?	☐	☐
44. Is the drain pipe on the collection box screened?	☐	☐
45. Is the overflow pipe on the collection box screened?	☐	☐
46. Is direct surface drainage diverted around or away from the spring?	☐	☐

PART E: TREATMENT	Yes	No
Describe and evaluate the facilities including any major change, maintenance, operations, sanitary, and security observations under the Additional Comments section. Source Treatment installed?	☒	☐
49. Are all types of active treatment noted on the WFI? *If no, explain below*	☒	☐
50. Has any treatment been discontinued since the last survey? *If yes explain below*	☐	☒
52. Are primary contaminant treatment facilities required by DOH present and operating?	☐	☐
56. If Chlorine Contact Time is required by DOH, are the minimum free chlorine residuals maintained?	☐	☐

Additional comments:

PART F: 1 WELL PUMPS, BOOSTER PUMPING FACILITIES and CONTROLS	- Pump 1	
Describe and evaluate the pump facilities and controls including maintenance, operations, sanitary and security observations:	Yes	No
65. Are there pumps present?	☒	☐
66. Are the pumps and pump controls in good working condition? *If no, explain below*	☒	☐
67. Does the pump cycle too frequently (i.e. more than once every 10 minutes?) *If yes, explain below*	☐	☒
68. Are pump controls adequate to prevent pump failure and system depressurization? *If no explain below.*	☒	☐
69. If there is a pump house/pump station, is it secure and in good condition? *If no, explain below*	☒	☐
Additional comments:		

PART H: WATER STORAGE FACILITY (Reproduce table if necessary)	- Resevoir 1 -
Describe and evaluate the finished water storage facilities including volume, maintenance, configuration of the inlet/outlet piping, operational, sanitary and security observations: **See Page 1**	**Buried Cement 14,400 G**
	Yes / No
75. Is the storage tank protected from unauthorized entry or vandalism? *If no, explain below*	☒ / ☐
76. Is the access hatch constructed and sealed to prevent the entry of contaminants? *If no, explain below*	☒ / ☐
77. Is there a dedicated air vent on the storage tank?	☒ / ☐
78. If yes, is the air vent constructed to prevent the entry of contaminants? *If no, explain below*	☒ / ☐
79. If unable to physically inspect the reservoir hatch or vent, select method used to document their condition:	
▪ Review and discussion of maintenance records with purveyor.	☐ / ☐
▪ Photos to be taken and mailed by purveyor later.	☐ / ☐
▪ Purveyor unable to document, additional follow-up required.	☐ / ☐
80. Is the overflow line protected to prevent contaminants from entering the tank?	☒ / ☐
84. If yes, is there an air gap or approved backflow preventer assembly?	☐ / ☐
85. Is there a separate drain line on the tank?	☐ / ☒
86. Is the drain line protected to prevent contaminants from entering or plugging the line?	☐ / ☐
87. When was the tank inspected last? *Explain below if necessary*	Routinely
Additional comments:	

PART I: DISTRIBUTION SYSTEM	Yes	No
93. Is an adequate map of the distribution system maintained?	☐	☒
94. Does the system provide adequate pressure throughout the distribution system? *If no, explain below*	☒	☐
96. Are proper procedures followed for disinfection of new construction or repairs?	☒	☐
101. Is the system protected from any cross connections observed during the survey? *If no, explain below*	☒	☐
102. Is the system protected from high health hazard cross connections? *If no, explain below*	☒	☐
Additional comments: **Map not available, but owners have good knowledge of existing system and repairs completed.**		

PART K: FIELD NOTES AND SAFETY CONCERNS
NOTES:

Photographs: SCA and Reservoir

Photo-8: SCA

Looking West

- → Entry into the booster pump / pumphouse room
  - ⇉ North wall of reservoir
- → New lawn for SCA

Photo-9: SCA

Looking Soutj

- → Entry into the booster pump / pumphouse room
  - ⇉ North wall of reservoir
- → Hatch up front, access for removing pump
- → Fencing goes around reservoir and protects from unwanted access.

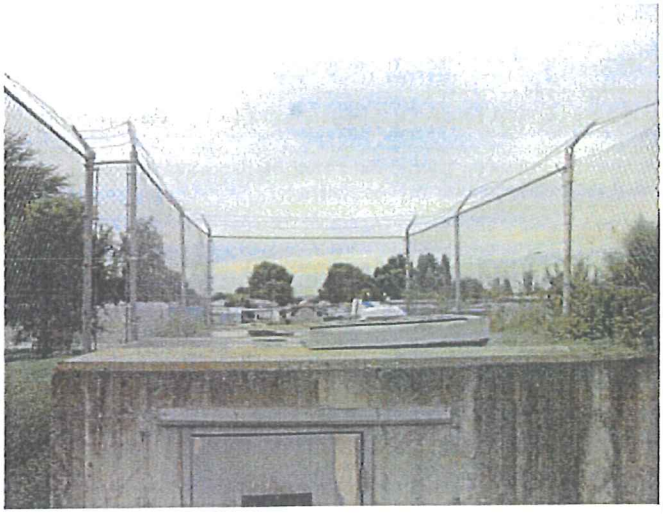


Photo-10: SCA

Looking South

- → Back half of reservoir
  - ⇉ West end of park, nearest mobile homes
  - ⇉ Access road for park

Photo-11: SCA

Looking Southeast

- → Power / Junction box

Photographs: Reservoir / Source

Photo-12: Reservoir

Vent

- → Doubles as an overflow
- → Screened

Photo-13: Treatment System

Chlorinator

- → Diaphragm pump
- → Solution tank

Sand filter

- Centrifuge – little use

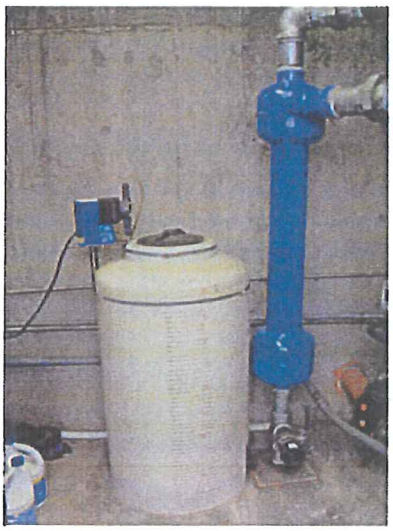


Photo-14: Source

Discharge system

- → Sand Filter
- → Meter

Photo-15: Close-up Source

Wellhead

- → Gasket appeared intact, just exposed

Recommend: Fill gaps with silicone, to protect gasket

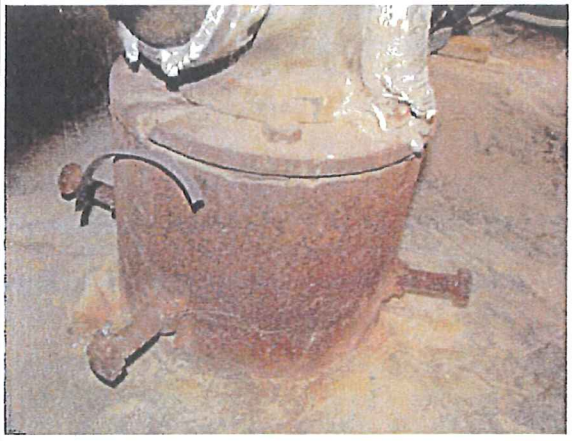


Photo-16: Source Discharge

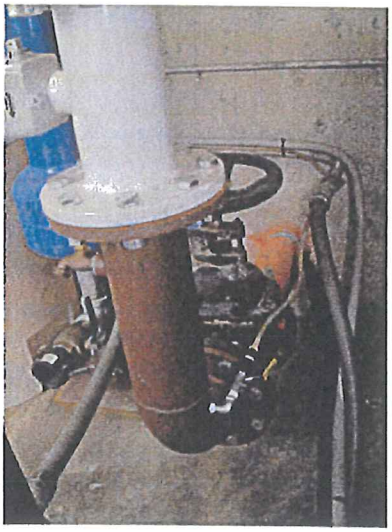
Post Filter

- → Source meter

Photo-17: Source Discharge

Post Filter

- → Source meter
- → Sample tap
- → Injector



Photographs: Booster pump and Treatment Unit

Photo-18: System Discharge

Post Filter

- → Supply to pump
- → Secondary line circulates water from pump to keep motor from overheating

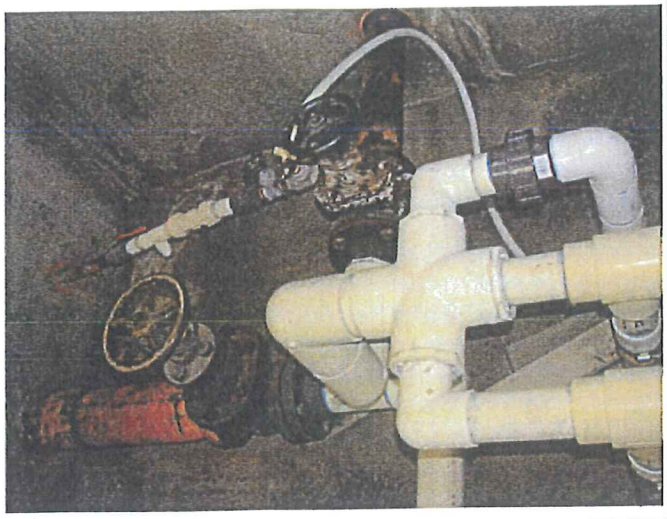


Photo-19: System Discharge

Post Filter

- → Booster pump

Photo-20: Treatment System

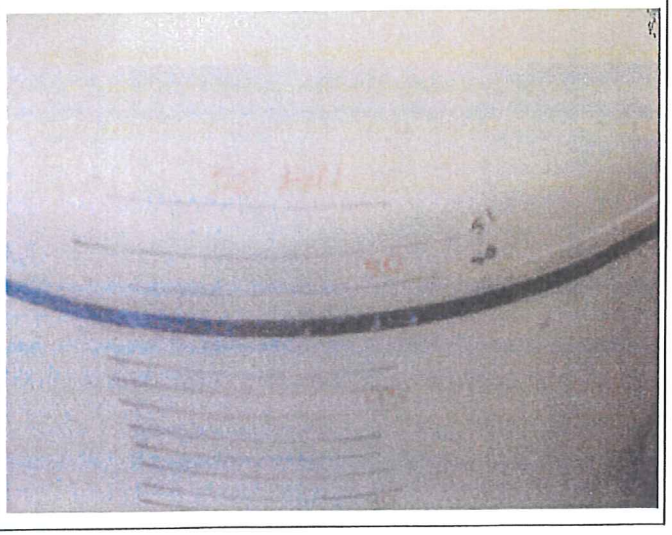
Pulsatron – Diaphragm pump

- → Max PSI
  - ⇉ 80
- → Max GPD
  - ⇉ 12

Photo-21: Treatment System

Solution tank

- → Graduated to simply mixing and provide information on solution use /



APPENDIX C

City of Othello Hydraulic Model Information

Conceptual Future UGA Service Extension, ERUs and Transmission Main Sizing

I. Steps taken to set up the City of Othello demand distribution map:

1. The City of Othello hydraulic model was created in Bentley WaterCAD V8i based on pipe sizes and lengths provided within the 2011 City of Othello Water System Plan and information provided by the City regarding water mains which have been either added or replaced after 2011. Elevations were based on Google Earth elevations at nodes.
2. Demands were assigned to nodes based on the City of Othello parcel map. Unweighted values were used to assign a demand value of 1 for each parcel.
3. The Parcel Count alternative was generated in WaterCad by inputting the demand distribution evaluated during step 3.
4. The high water user spreadsheet was provided by the City and shows a high user ERU of 6,562.
5. Several of the provided high user ERUs were adjusted based on City input. The high user adjusted ERU count was determined to be 5,759 for the 15 customers listed on the high user list for 2015.
6. High user ERUs were subtracted from the total ERU count for 2015 to produce the non-high user ERUs. Non-high user ERUs = total system ERUs (10,443) – high user ERUs (5,759) = 4,684
7. Adams County Water District #1 (ACWD1) demand was applied at the location of the meter vault node.
8. Using known locations for local businesses, Google Earth and school district resources medium demands were assigned to the Parcel Count (w/ medium users) alternative. This involved assigning higher demand than the parcel count method assigned during Step 3.
9. The model was run for the Parcel Count (w/ medium users) alternative which returned a total demand of 2,291.
10. The ERUs (w/o high user) alternative was generated by scaling the Parcel Count (w/ medium users) alternative using the known non-high user ERUs for 2015 and the calculated demand from Step 10 which resulted in a factor of 2.04 (2.04 = 4684/2291)
11. The ERUs (w/ high users) alternative was generated by applying point demands at individual nodes consistent with the high use spreadsheet to obtain the total 2015 ERU count of 10,443.
12. The ADD alternative was generated by scaling the ERUs (w/ high users) alternative using the provided average ADD of 3,290 gpm for the City system. The scaling factor used was 0.32 = 3290/10443.
13. The MDD alternative was generated by scaling the ERUs (w/ high users) alternative using the provided average MDD of 4,700 gpm for the City system. The scaling factor used was 0.45 = 4700/10443
14. PHD was calculated using Equation 5-1 of the DOH WSDM and the peaking factor calculated from the meter readings provided by the City of Othello. The calculated PHD was 7,640 gpm for the City system.
15. The PHD alternative was generated by scaling the ERUs (w/ high users) alternative using the calculated PHD of 7,640 from Step 15. The scaling factor used was 0.73 = 7640/10443.
16. Production values were input into each of the Demand alternatives (ADD, MDD, PHD) at each node associated with a City well. Values were based on the most current well production values provided by the City.

17. Reservoir elevations were input into the model for the three existing standpipe reservoirs based on the 2011 City of Othello WSP Table 3-9 for values without McCain Foods online. Reservoirs serve one pressure zone. Reservoir elevation were input based upon the following conditions per the DOH WSDM:
    - ADD: Reservoir elevation are at the lower elevation of operation storage (OS). Initial elevation is 1,205 ft.
    - MDD: Reservoir elevation are at the lower elevation of fire suppression storage (FSS). Initial elevation is 1,174 ft. Because MDD was used to evaluate fire flow, the MDD Demand alternative does not include the highest producing well (Well 6).
    - PHD: Reservoir elevation are at the lower elevation of equalizing storage (ES). Initial elevation is 1,199 ft.
18. The Othello WSP Fire Flow alternative was created by applying a universal fire flow distribution of 1,000 gpm throughout the system per the Othello WSP. Nodes were then targeted to apply concentrated fire flow per the WSP.

II. Steps taken to size the City of Othello CFS distribution mains:

1. Transmission mains were extended from the City of Othello distribution system in order to consolidate the CFS candidates with the City system. Consolidation of the CFS candidates are discussed in each of the City of Othello Consolidation Feasibility Studies.
2. Available water system meter readings were analyzed for each CFS candidates to evaluate ERU, ADD, MDD and PHD demands. See City of Othello Consolidation Feasibility Studies for demands.
3. Individual water system demands were applied at the extended transmission mains at the connection node.
4. Distribution mains were sized to satisfy each demand scenario. See **Exhibit X**.
    - Pipe Material: PVC
    - Hazen Williams C: 150

III. Steps taken to size the City of Othello CFS UGA distribution mains:

1. The Urban Growth Area (UGA) was provided by the City and is shown on **Exhibit X**
    - Total UGA area: 5,688 acres
2. The total planned future ERU's were provided by the City for the UGA:
    - Total planned future ERUs: 1,252 ERUs
3. Transmission mains were extended from the CFS distribution (see above) mains within the City of Othello hydraulic model to serve the CFS UGA. Location of mains were based on input from the City, the full City of Othello UGA, and locations of transmission mains proposed in the Consolidation Feasibility Studies (CFS). The proposed CFS UGA is shown on **Exhibit X**.
    - UGA area served by T-mains: 3,012 acres
4. The planned future ERUs associated with the CFS UGA were calculated based on the total number of planned ERUs.
    - Planned future CFS ERUs: 663
5. A total count of existing connections not associated with the CFS candidates was performed based on the most recent aerial maps.

- Existing connections: 314 connections (non-CFS candidates)

6. Based on the proposed distribution system the UGA was split into the 4 areas as shown on **Exhibit X**. The City indicated that 111 acres within Area 2 is proposed Commercial and will contain a new school facility
    - Area 1: ` 584 acres (residential)
    - Area 2: 1,022 acres (residential and commercial)
    - Area 3: 874 acres (residential)
    - Area 4: 643 acres (residential)
7. Existing CFS connections were combined with non-CFS connections. Existing Adams County Water District #1 (ACWD1) connections were not included in this total because ACWD1 demands were represented in the City of Othello Water System demands provided by the City.
    - Total existing connections: 671
8. Total existing and planned ERUs were combined. Each connection was considered a City ERU.
    - Total planned ERUs: 1,334
9. 50 ERUs were added to the total planned ERUs for the proposed school.
    - Total planned ERUs: 1,384
10. The total planned ERUs (existing and future) were distributed within Areas 1 – 4 equally based on residential area.
    - Area 1: 259 ERUs
    - Area 2: 403 ERUs
    - Area 3: 387 ERUs
    - Area 4: 285 ERUs
11. ADD was evaluated to be 453 gpd/ERU and is based on the most current City of Othello water demands.
    - CFS UGA ADD: 435 gpm
12. MDD was evaluated based on the City of Othello's observed peaking factor for MDD.
    - Peaking Factor: 1.43 (MDD)
    - CFS UGA MDD: 623 gpm
13. PHD was evaluated for the CFS UGA based on the City of Othello's observed peaking factor for PHD.
    - Peaking Factor: 1.62 (PHD)
    - CFS UGA PHD: 1,009 gpm
14. FF was applied for residential and commercial fire flows.
    - Residential FF: 1,000 gpm
    - Commercial FF: 3,000 gpm (school)

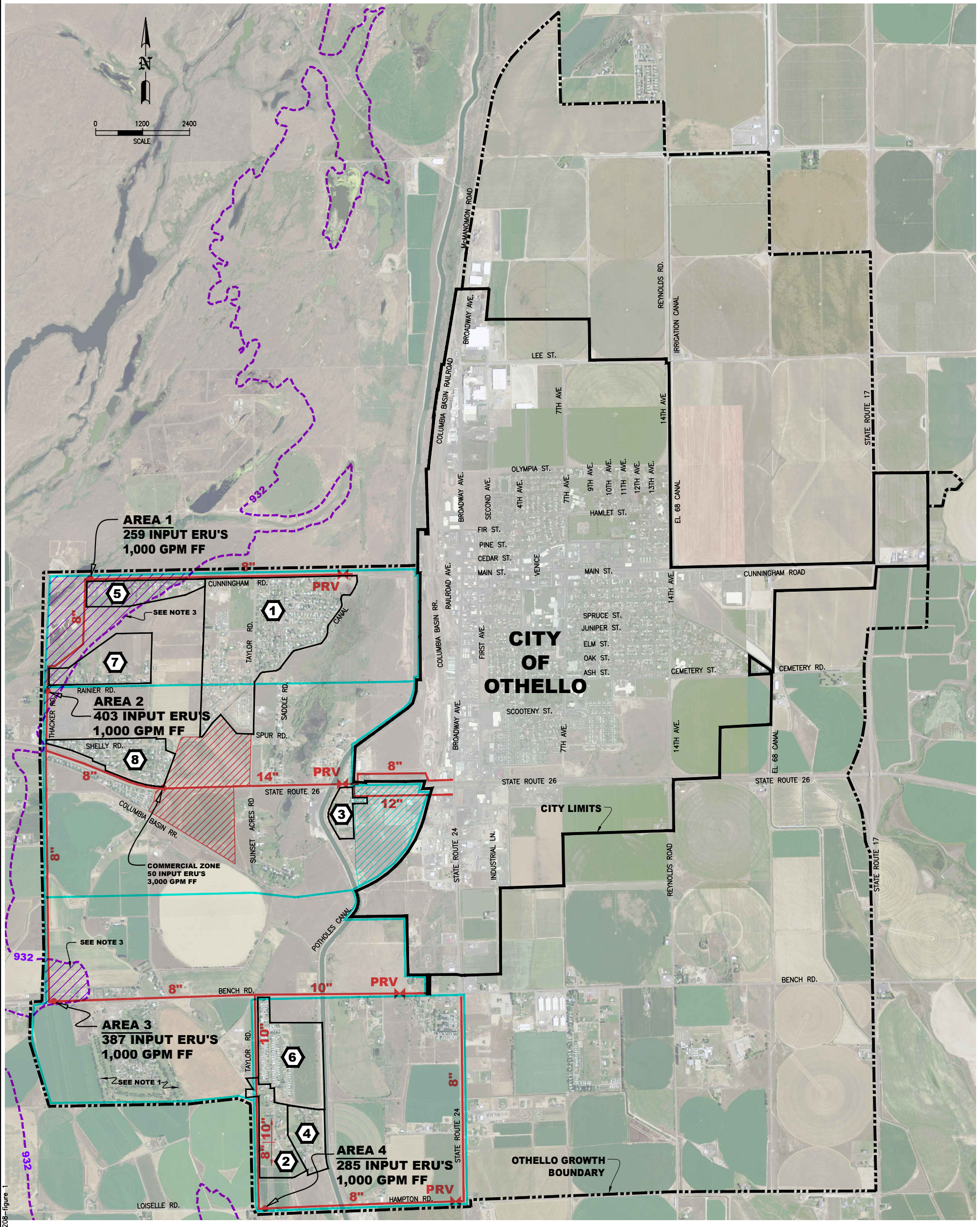
15. ADD, MDD, PHD and FF were evaluated based on the CFS UGA land area

CFS UGA	Residential Area	Total Conn.	ERUs	ERUs adj	ADD	MDD	PHD	MDD+FF
Area 1	584	259	259	259	84	121	196	1121
Area 2	911	403	403	453	132	188	305	3188
Area 3	874	387	387	387	126	181	293	1126
Area 4	643	285	285	285	93	133	215	1215
Total	3012	1334	1334	1384	435	623	1009	

16. Demands for each of the ADD, MDD and PHD scenarios were applied to the City of Othello UGA distribution model at the eastern most node within each of the 4 areas.
17. Distribution mains were sized to satisfy each of the demand scenarios. See **Exhibit X**.
    - Pipe Material: PVC
    - Hazen Williams C: 150

IV. Steps taken in order to establish pressure zones in the UGA

1. Once the City of Othello CFS UGA distribution mains were sized the "No Demand" scenario was run in the hydraulic model. High pressures associated with the elevation drop were observed to the south and west of the City.
2. 80 psi was determined to be highest desirable pressure in the UGA during the "No Demand" scenario (Reservoir levels = 1,209 ft)
3. The 80 psi elevation contour was found to be 1,024.2 ft. (1209 – [80*2.31])
4. PRVs were placed along Bench Rd and Hampton Rd at elevation = 1,024.2 ft and along State Route 26 at the intersection of the proposed 12-inch and 8-inch transmission mains (elevation = 1,005 ft).
5. The three proposed PRVs and existing ACWD#1 PRV were set to have a discharge pressure of 40 psi.
6. After the PRVs were input into the model, the "No Demand" scenario was run and pressures exceeding 80 psi were observed.
7. The 80 psi elevation contour for the new pressure zone was found to be 981.8 ft. (1024.2 – [40*2.31]). Services below this elevation require service PRVs to keep service pressures from exceeding 80 psi.
8. Demand scenarios were run to check that the addition of the PRVs in the hydraulic model did not affect supply. Main sizes were adjusted as necessary.



LEGEND

- CITY LIMITS
- OTHELLO GROWTH BOUNDARY
- WATER DISTRICT BOUNDARY
- AREA BOUNDARY
- 8" PROPOSED WATER MAIN
- PRV PRESSURE REDUCING VALVE
- COMMERCIAL ZONE
- LIGHT INDUSTRIAL ZONE
- 932 CONTOUR

NOTES

1. GOLF COURSE IRRIGATION TO BE PROVIDED BY IRRIGATION DISTRICT.
2. PRV TO BE SET AT 40 PSI.
3. SERVICE PRV'S REQUIRED AT ELEVATION LOWER THAN 932

1. ADAMS COUNTY WATER DISTRICT #1 – SYSTEM ID: 22525 X
   - 341 CONNECTIONS
   - OTHELLO WATER SYSTEM INTERTIE – UNKNOWN CAPACITY
2. BASIN VIEW WATER ASSOCIATION – SYSTEM ID: 04530 N
   - 22 CONNECTIONS
   - OTHELLO MANOR WATER SYSTEM INTERTIE – 300 GPM
   - WELL #1 – 35 GPM
3. BIRD DOG FAMILY LTD PARTNERSHIP II – SYSTEM ID: 52172 8
   - 58 CONNECTIONS
   - WELL #1 – 33 GPM
4. HIGHLAND ESTATES WATER SYSTEM – SYSTEM ID: 32736 0
   - 16 CONNECTIONS
   - WELL #1 – 56 GPM
5. MEADOW LANE WATER ASSOCIATION – SYSTEM ID: 53190 T
   - 25 CONNECTIONS
   - WELL #1 – 70 GPM
6. OTHELLO MANOR WATER SYSTEM – SYSTEM ID: 64845 3
   - 152 CONNECTIONS
   - WELL #1 – 300 GPM
7. RAINIER TRACTS WATER ASSOCIATION – SYSTEM ID: 70910 M
   - 20 CONNECTIONS
   - WELL #1 – 45 GPM
8. SUMMERSET WEST WATER ASSOCIATION – SYSTEM ID: 85080 M
   - 72 CONNECTIONS
   - WELL #1 – 200 GPM

s:\autocad drawings\172 othello\172-08 system consolidation\17208-figure 1

SCALE: AS SHOWN DESIGNED: NVH DRAWN: TVP CHECKED: APPROVED: PROJ. NO.: 172-08 DATE: 7/8/16	VARELA AND ASSOCIATES, INC. ENGINEERING AND MANAGEMENT	**CITY OF OTHELLO, WASHINGTON** WATER SYSTEM CONSOLIDATION FEASIBILITY STUDIES CONCEPTUAL FUTURE UGA SERVICE EXTENSION, ERUs AND TRANSMISSION MAIN SIZING	EXHIBIT **X**

APPENDIX D

Long-term water supply study excerpts

VARELA & ASSOCIATES, INC.
ENGINEERING AND MANAGEMENT

601-A W Mallon Avenue, Spokane, WA 99201 | P 509.328-6066 | F 509.328.1388 | www.varela-engr.com

TECHNICAL MEMO

TO: City of Othello, WA

FROM: Jesse Cowger, PE

DATE: August 24, 2016

RE: Water Supply Plan Summary

ATTACH: Water Supply Planning Recommendations – Aspect Consulting – Dec 10, 2014
Well Assessment – Aspect Consulting – Feb 12, 2016
Groundwater Supply Improvements – Aspect Consulting – Jun 21, 2016

Background

The City of Othello relies on wells drilled into the lower Wanapum Basalt aquifer as its sole source of drinking water. Over time the groundwater level in the lower Wanapum Basalt has declined and resulted in progressively lower pumping rates from existing wells. The Washington State Department of Ecology (Ecology) has identified and documented the regional decline of aquifer levels through a series of reports regarding the Columbia Basin Groundwater Management Area (GWMA). Othello recognized the looming threat to its water supply posed by declining aquifer levels and sought assistance from Varela & Associates and Aspect Consulting. The City tasked Varela and Aspect with developing a Water Supply Plan to secure the City's water supply for the future.

Othello received a Pre-Construction Grant from the Washington State Drinking Water State Revolving Fund (DWSRF) to partially fund the Water Supply Plan. The City utilized a combination of local funds and the grant from DWSRF to fund the Water Supply Plan.

Project Description and Scope

In addition to declining aquifer levels, interference between City and private wells exacerbates declining pumping rates in City wells. The City's Well 6 has fluoride (F) concentrations above the MCL and Well 7's capacity has declined possibly due to biofouling. The City also relies heavily on well pumping capacity to meet peak demands due to a lack of equalizing storage volume in reservoirs. Due to these factors, this Water Supply Plan scope includes the following:

- Systematic evaluation of existing wells
- Options for addressing fluoride level above MCL in Well 6
- Options for meeting present and future water demands

Systematic Evaluation of Existing Wells

Refer to attached Aspect Consulting memo dated February 12, 2016 for the full detailed analysis of City wells. The following summarizes the findings and recommendations related to the existing condition of the City's wells:

- The City is doing a good job of managing the effects of seasonal drawdown and well interference by selectively pumping certain wells to maximize yield.

- All City wells except Well 7 show stable well efficiency over time. Well 7 was constructed with a stainless steel screen (all other wells except Well 6 are completed primarily with open borehole in the water bearing zones. Rehabilitation of Well 7 might increase the existing pumping rate of 600 gpm to 900 gpm.

- The City operates a telemetry system collecting and recording water level and flow data from each of the active wells. Much of the historical telemetry data was reportedly corrupted and lost. Maintaining reliable, accurate water level and flow data is critical to managing and optimizing the City's pumping and limiting drawdown in the wells. We recommend that the City routinely archive telemetry data in a secure location to ensure data are available for future use.

- Wells 2, 6, and 8 may be subject to cascading water when pumping causes water levels to draw down below the elevation of uncased water bearing zones. Cascading water may entrain air and negatively affect pump performance. We recommend that the pump performance curves be compared to actual pump yields at operating total head to assess whether cascading water and air entrainment could be affecting pump performance.

- Water rights are not a constraint for the City in managing the well field. Withdrawals from recently constructed Well 9 are limited to 2,000 gpm, 3,000 ac-ft/year, as this well is only authorized under one City water right. We recommend that if and when future water changes are required that Well 9 be added to the right being changed.

- There is record in the files reviewed that proofs of appropriation or requests to extend the development schedules for City water rights were filed with Ecology. If this is the case, we recommend completing proofs of appropriation for five of the City's water rights that are ready for certification, while filing extensions to the development schedules for the remaining rights.

Options for Addressing Fluoride in Well 6

Well 6 has fluoride levels that generally exceed the MCL of 4.0 mg/L. The City attempted to modify the well in the past to decrease the fluoride concentration, but had little success. Due to the fluoride levels exceeding the MCL Othello currently designates Well 6 as an emergency well and only operates it if all other sources of supply cannot meet system demand. Well 6 is the City's largest producing source at 2,500 gpm. The City sees the following Options for future utilization of Well 6:

Option 1: Continue to Utilize Well 6 as an Emergency Source (Do Nothing)

The City can continue to utilize Well 6 on an emergency basis and rely on blending in the distribution system to dilute the fluoride level. The primary benefit of this alternative is no investment is required. This alternative has the disadvantage of lack of flexibility in when the City can utilize Well 6. It would also make it more likely the customers closest to Well 6 would consume water with fluoride levels that exceed the MCL. DOH may not allow the City to operate the well in the fashion indefinitely.

Option 2: Dedicate Well 6 to Supplying Industrial Users

More than half of the water pumped from Othello's wells goes to industrial users. The largest of these industrial users is Simplot, which utilizes roughly 70% of total industrial water supplied by Othello. If a significant portion of Othello's industrial users could utilize water from Well 6 without affecting their industrial processes, then devoting Well 6 to industrial use would effectively reduce the demand on Othello's other wells. The following considerations pertain to feasibility of implementing this option:

- DOH may have water quality requirements for the water used in the industrial processes that would preclude use of water with fluoride concentrations above 4.0 mg/L.
- Water produced from Well 6 has some aesthetic taste and odor issues that may make the water unappealing for some industrial customers.
- Dedicate use of Well 6 would require construction of a dedicated distribution system for industrial supply and would require industrial users to internally separate their potable uses from their industrial uses. This carries with it an increased risk of cross connection between the two systems.
- Well 6 does not currently have a VFD to allow modulation of pumping rate to match demand; however, the City has budgeted for purchase an installation of a VFD for Well 6.
- If the VFD does not provide sufficient range of flow for industrial users, then a dedicated reservoir would also be needed.
- Dedicating a single source to industrial use has potential for reliability issues if the single source breaks down. Installation of a one-way intertie with the City's potable water distribution system could potentially mitigate reliability concerns.

Additional discussions with the City's industrial users are needed to determine whether barriers exist that preclude implementation of this option. The City will investigate this option further and potentially combine discussions with industrial users while investigating the feasibility of industrial wastewater treatment and reuse.

Option 3: Construct Treatment System to Remove Fluoride from Well 6 Water

A Treatment system could remove fluoride from the water produced by Well 6. The following types of treatment methods could likely remove fluoride from Well 6 raw water to levels below the MCL:

- Granular Activated Alumina
- Reverse Osmosis (RO)
- Electrodialysis and Electrodialysis Reversal
- Bone Char

Additional investigation of the raw water properties and constituents is needed to determine which of the preceding treatment methods would make the most sense for Well 6 if implemented. A treatment system would require additional operator expertise and certification and would also have ongoing chemical and membrane/media expenses (depending on the treatment method).

Option 4: Blend Well 6 with other City Well(s)

Well 6 has the highest fluoride concentration of all Othello's wells. Most City wells have average fluoride concentrations around 2.0 mg/L; although some of the wells have occasional spikes up to 3.0 mg/L. Several factors affect the feasibility of blending Well 6 with another City well:

- Capacity: Well 6 is Othello's largest producing source with a current pumping rate of approximately 2,000 gpm. To reliably achieve a blended water fluoride concentration below the MCL the City may need to reduce the pumping rate of Well 6 to allow sufficient dilution of fluoride.
- Proximity of other wells to Well 6:
    - A dedicated main with no service connections is required to blend Well 6 with another well. The well closest to Well 6 is Well 2 which is approximately half a mile away. However, Well 2 has limited reliability; City Staff reports the well runs out of water after roughly 15 minutes of operation. The City has designated Well 2 "Emergency Only".
    - Due to Well 2's lack of capacity (historic pumping rate of approximately 300 gpm) compared to Well 6 and its lack of reliability for extended pumping, blending with Well 2 appears unfeasible.
    - Most City wells (other than Well 2) are 1-2 miles away from Well 6
- Reliability: in order to maintain blended fluoride concentration below the MCL operation of Well 6 becomes contingent upon the operability of the well(s) blended with it. If the blending well becomes inoperable due to mechanical failure, interference issues, capacity decline, or other issues then the City cannot operate Well 6 without supplying the system undiluted water with fluoride concentration likely exceeding the MCL.
- Monitoring: fluoride concentrations in City wells vary throughout the year so DOH would likely require routine monitoring (possibly daily) to demonstrate blended fluoride concentration meets regulatory requirements. The frequency and corresponding expense associated with monitoring blended water quality may affect the feasibility of this Option.

The cost associated with blending Well 6 with other City wells would be considerable due to the high capacity of Well 6 and its proximity to other wells. Blending also has the disadvantage of reduce reliability because Well 6 becomes dependent on the operation of other wells to achieve the desired blended fluoride concentration below the MCL.

Option 5: Use Well 6 as an Aquifer Storage and Recover (ASR) Injection Well

Othello has begun investigating the feasibility of developing a supplemental source of supply to augment its groundwater sources. The supplemental supply would likely include treatment of surface water and may utilize ASR (refer to later section of this memo for details pertaining to the City's plans for a future supplemental source of supply). If the City utilizes Well 6 as the injection well for ASR it may dilute the fluoride concentration in the vicinity of the well. If the City also continues to utilize Well 6 as a recovery well the fluoride concentration may drop below the MCL.

Well 6 is located near the western edge of Othello's system. Initial observations by the City's hydrogeology consultant indicate a well more centrally located betwixt Othello's other wells would be more ideal from an ASR standpoint. However, further analysis is needed to assess the options, combinations, advantages, and disadvantages associated with selecting the injection well(s) for an ASR system.

Utilizing Well 6 for ASR may have operational complexities that affect the well's availability for meeting system demand (e.g. when utilizing Well 6 as an injection well it cannot provide supply to the system). Some of the restrictions on availability could likely be overcome through operational coordination with the City's other wells and the new supplemental source (surface water or industrial). Presumably the City would not inject water during periods of high demand when the City might need Well 6 to meet peak demands.

Discussion of Options for Addressing Fluoride in Well 6

The following table summarizes advantages and disadvantages associated with the options for addressing fluoride in Well 6:

Option	Advantages	Disadvantages
1) Do Nothing	• Low cost	• Well 6 remains emergency source • Customers closest to Well 6 likely exposed to higher levels of fluoride when Well 6 operates
2) Dedicate Well 6 to Industrial Users	• Potentially puts capacity of Well 6 to use for existing industrial customers • Would likely reduce fluoride levels consumed by non-industrial customers	• Acceptability to regulators unknown • Would require dedicated distribution system and potentially storage facilities (significant cost to implement)
3) Treatment System to Remove Fluoride	• Reliable way to reduce fluoride from water produced by Well 6	• Likely significant first cost • Increased operational complexity • Ongoing chemical/media/membrane maintenance
4) Blend with other City Well(s)	• Could achieve blended fluoride levels that meet the MCL.	• Significant first cost associated with mains dedicated to blending • May required blending with multiple sources or reducing pumping rate of Well 6 • Reduces system reliability due to required functionality of blending wells to operate Well 6 • Increased monitoring to demonstrate blended water quality meets regulatory requirements

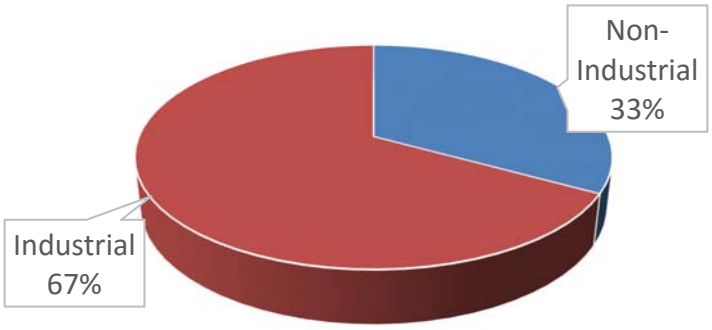
Option	Advantages	Disadvantages
5) Use Well 6 as ASR Injection Well	• May reduce concentration of fluoride in Well 6 to below MCL. • Would not require reducing the pumping rate of Well 6 • If ASR implemented, may slow the decline of the Wanapum aquifer • Supplemental source of supply would reduce the City's reliance on existing sole source aquifer	• Requires construction of supplemental source of supply (high first cost and ongoing operation and maintenance cost) • Non-central location of Well 6 in relation to Othello's other wells may not be ideal from an ASR standpoint • Greater operational complexity

As shown in the preceding table, each option has advantages and disadvantages. Additional investigation and cost estimates are needed to determine which option best serves the City's long-term interests. The results of the City's ASR feasibility study will affect the City's decision as will input from DOH on potentially devoting Well 6 to industrial use. Othello has begun the process of updating its Water System Plan and will further analyze the alternatives discussed herein when formulating the City's capital improvements plan.

Meeting Present and Future Water Demand

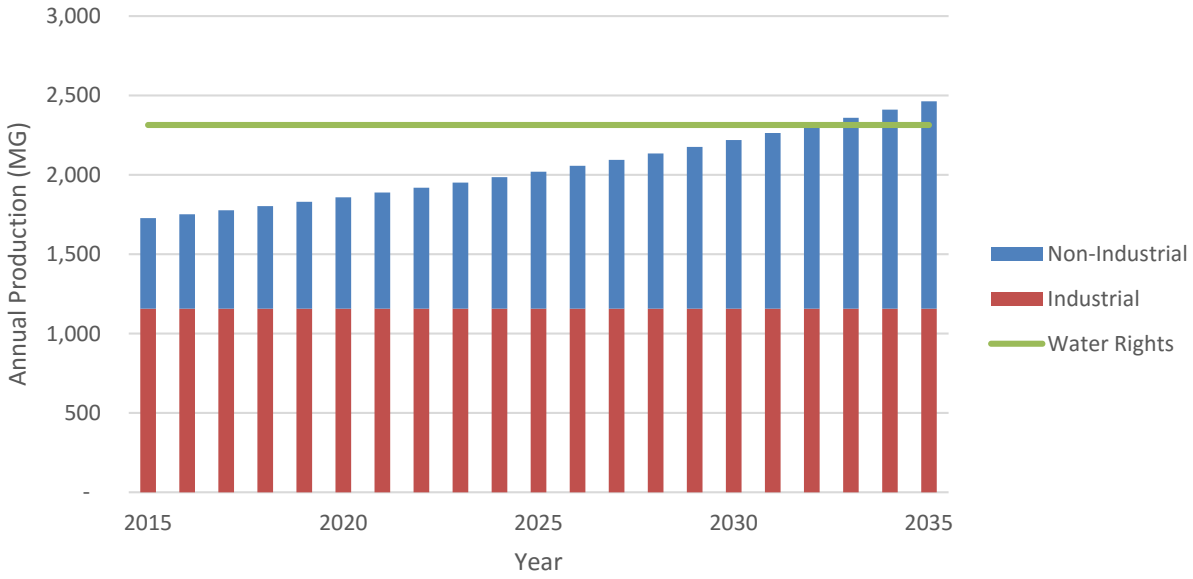
On March 28, 2016 Othello adopted its updated Comprehensive Plan (Comp Plan). The Comp Plan lays out an ambitious vision for growth in Othello which includes population growing from 7,780 in 2015 to 17,825 in 2035. The population growth projected in the Comp Plan equates to an annual rate of 4.23%. In many cases a water systems water demand will increase roughly proportionally to its population growth. However, Othello supplies several large industrial users which make up almost 2/3 of the City's annual demand. For this reason, projections for future demand can be broken into industrial and non-industrial segments.

Ratio of Industrial and Non-Industrial Water Use



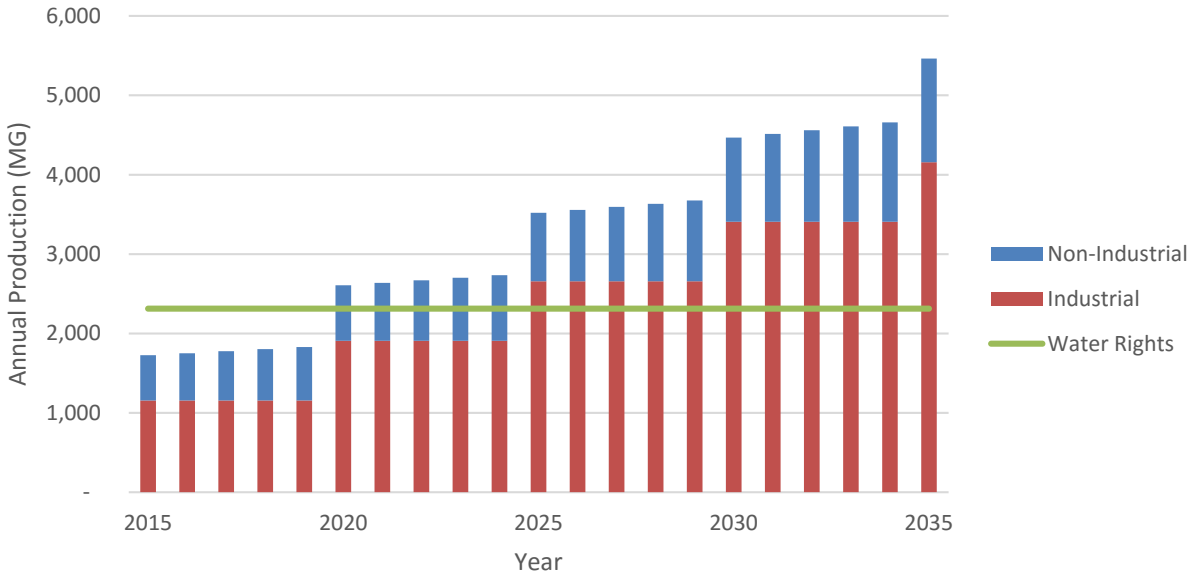
If non industrial water use increases proportionally with projected population growth and industrial demand remains static, the following demand curve results:

Projected Water Demand: No New Industrial Customers



Were Othello to attract additional industrial users to the City, water demand would experience incremental jumps as new industrial users come online. The City's largest industrial customer (Simplot) utilizes approximately 750 MG annually. If a new industrial user similar to Simplot located in Othello roughly every five years the following demand curve would result:

Projected Water Demand: New Industrial Customer Every Five Years



As shown in the preceding graphs, the time frame in which Othello has adequate water rights to meet system demand depends a great deal on whether the City attracts additional industrial users. If no new industrial users locate in the City then Othello's water rights could supply projected demand for the next 17-18 years. The City appears to have insufficient water rights to support addition of a new industrial user similar in size to Simplot at any point in the future. The City's

Comp Plan envisions growth of all sectors in Othello (residential, commercial, industrial, etc.); hence, the City plans the following steps to meet projected water demand and prevent availability of water supply from constraining growth in Othello:

Near Term: Continue to Maintain, Develop, and Rely on Groundwater

In the near term Othello must continue to rely on its groundwater sources and develop additional well(s) to keep up with regional declines in aquifer levels and corresponding declines in exiting well pumping rates. Refer to attached Aspect Consulting memo dated June 21, 2016 for the full detailed recommendations for improving Othello's groundwater supply. The following summarizes the findings and recommendations contained therein:

- Rehabilitate Well 7: it appears the efficiency of Well 7 has decreased over time. Rehabilitation of this well could recover 300 gpm of pumping capacity.
- Install new Wanapum Aquifer Well
- Explore Grande Ronde Aquifer

The City's existing wells tap the Wanapum basalt aquifer which has declined over time and decreased available drawdown and pumping rates of the City's wells. Rehabilitating Well 7 and developing a new Wanapum well will help the City maintain its existing supply capacity at least for the near term. Exploring the Grande Ronde basalt aquifer, which is deeper than the Wanapum basalt, will help the City determine the degree to which Othello may be able to rely on groundwater into the future. If the Grande Ronde has reasonable quality and quantity of water available it may extend the period of time Othello can continue to rely on groundwater supply.

Mid to Long-Term: Develop Supplemental Source of Supply

The available data and analyses to date document a regional decline in ground water levels in the Columbia Basin. The estimates vary on current rate of decline, but it appears Othello may not be able to continue to rely on groundwater indefinitely as its sole source of water supply. In recognition of the possibly finite nature of groundwater supply Othello plans to develop a supplemental source of supply. The City has identified the following possible components of a future supplemental source of supply:

- Surface water from bureau of reclamation irrigation canals treated to drinking water standards for potable use; this source could also be treated to the goundwater anti-degradation standard for injection and storage in the basalt aquifer for later recover via City wells.
- Industrial wastewater treated to anti-degradation standard for groundwater injection and storage in the basalt aquifer for later recovery via City wells. Currently industrial wastewater cannot be utilized for direct potable reuse; future changes in regulation may open doors for direct potable reuse of industrial wastewater.

The City has begun a study to investigate the feasibility of establishing a new source of supply which may employ aquifer storage and recovery (ASR) as a means to store treated water in the basalt aquifer. ASR may prove a useful tool for Othello due to several factors:

- Surface water from Bureau of Reclamation canals is not available for use during the winter. Treating water from the canals and storing it in the aquifer could allow Othello to treat and store the volume of water most useful to the City's situation.

- If the City pursued treatment and reuse of industrial wastewater the treated effluent would need to spend time in an environmental buffer such as a basalt aquifer before it could be utilized for drinking water.

- If the City utilizes Well 6 as the injection well for ASR it may dilute the fluoride concentration in the vicinity of the well (refer to previous discussion of options for Well 6). If the City also continues to utilize Well 6 as a recovery well the fluoride concentration may drop below the MCL.

Capacity of a supplemental source will depend on several factors including availability of raw water, construction and operation cost for treatment, and the City's desired ratio of groundwater Vs. supplement supply. Assuming availability of raw water is not the limiting factor, treatment could be designed for incremental expansion based on the City's needs over time.

The timing for implementation of a supplemental source of supply depends on many factors such as:

- Availability of raw water from Bureau of Reclamation canals, industrial users, or other sources not yet identified.

- Contaminants in raw water and treatment requirements to make raw water suitable for potable consumption or storage via ASR

- Permitting with Department of Ecology for reservoir permit and water rights implications

- Availability of funding

- Rate of aquifer decline and effect on Othello's ability to supply system demand

- Viability of Grande Ronde aquifer; if Grande Ronde is viable source of supply it may extend the timeframe Othello chooses to rely on groundwater

The results of Othello's ASR feasibility study will provide the City with some of the information needed to lay out a more specific timeline for implementation.

Appendix X

Cumulative effect of consolidation on the City of Othello water system components

1.1 Estimated Impact to City System

1.1.1 Estimated System Demands

The impact of consolidating all 8 small water systems into the City of Othello water system is evaluated below by system component including supply, distribution and storage. The evaluation will be based on the current City of Othello water system demands as shown on the following table.

Table 1: Current City of Othello Water System Demands

Year	ERUs (1)	ADD (gpm)	MDD (gpm)	PHD (gpm)	Annual (MG)	Annual (acre/ft)
2013		3,340	4,570	7,410	1,757	5,390
2014		3,420	5,070	8,250	1,796	5,510
2015		3,100	4,460	7,250	1,628	5,000
Average	10,490	3,300	4,700 (2)	7,600 (3)	1,700	5,300

(1) *Calculated based on ADD using 453 gpd/ERU*
(2) *Resulting ADD:MDD peaking factor 1.43*
(3) *Resulting MDD:PHD peaking factor 1.62*

Estimated current and future ERUs for the 8 individual systems are shown in the following table.

Table 2: Cumulative Estimated Current and Future Individual Water System ERUs

System	Current ERUs (1)	Future ERUs (2)
Adams County Water District No.1	0	36
Basin View Water Assoc.	15	21
Bird Dog Family Partnership II	30	64
Highland Estates Water System	13	13
Meadow Lane Water System	10	11
Othello Manor Water System	104	194
Rainier Tracts Water Assoc.	12	12
Summerset West Water Assoc.	53	55
Total	237	406

(1) *From individual water system reports (used highest ERU count for data period)*
(2) *From individual system reports*
(3) *ACWD#1 is currently connected and current ERUs are included in Table 1. The Future ERUs are the net increase in ERUs considering substantial reduction in DSL (See ACWD#1 report for more comprehensive explanation)*

Estimated current and future water use for the 8 individual water systems are shown in the following table.

Table 3: Estimated Cumulative Water System Demands (8 systems)

Description	ERUs (1)	ADD			MDD (3)			PHD (4)	Annual (5)	
		gpd/ERU (2)	(gpd)	(gpm)	gpd/ERU	(gpd)	(gpm)	(gpm)	(MG)	(ac-ft/yr)
Current	237	453	107,400	75	951	225,500	157	381	39.2	120.3
Future	406	453	183,900	128	951	386,100	268	583	67.1	206.0

(1) *From Table 2*
(2) *Based on current City of Othello water use for the period 2013 – 2015*
(3) *MDD = ADD(2.1); The ADD(2.1) factor was derived from comparing the average ADD to MMAD ratio from all the systems where this data was available and applying the MDD = MMAD(1.3) calculation per the WSDOH WSDM*
(4) *PHD = (MDD/1440)(CN+F)+18, where C =(varies), N = ERUs and F = (varies); WSDOH WSDM Equation 5-1*
(5) *ADD x 365 days/year*

1.1.2 Supply

Criteria

The WSDOH WSDM provides the following criteria for public water supply:

- Supply must meet MDD
- Supply should meet MDD and replenish Fire Suppression Storage within 72 hours while supplying MDD

Current Capacity

The City's water is supplied via eight groundwater wells. The current supply capacity of the City's wells is shown on the following table.

Table 4: Current City Supply

Well No.	DOH ID No.	Current Capacity (gpm)
2	01	-
3	02	800
4	06	430
5	07	900
6	05	2,500
7	08	630
8	09	395
9	10	1,500
Total Supply Capacity		7,155

Evaluation

The impact of consolidating the 8 water systems into the City of Othello water supply is evaluated in the following table.

Table 5: Supply Capacity Evaluation

Description	Scenario	MDD (gpm)	Replenish FSS [1] (gpm)	Total (gpm)	Current Supply Capacity [2] (gpm)	Excess / (Deficiency) (gpm)
City of Othello	Current [3]	4,700				
8 Water Systems	Current [4]	157				
Total		4,857	347	5,204	7,155	1,951
City of Othello	Current [3]	4,700				
8 Water Systems	Future [4]	268				
Total		4,968	347	5,315	7,155	1,840

(1) *Per City of Othello 2011 WSP Fire Suppression Storage = 6,250 gpm for 4 hours (1,500,000 gallons), Replenish FFS = 1,500,000/72 hrs/60 min*
(2) *From Table 4*
(3) *From Table 1*
(4) *From Table 3*

Conclusion

The City has adequate supply capacity to serve all 8 water systems with no improvements required.

See Appendix F for discussion related to long-term effects on City supply.

1.1.3 Distribution

Criteria

Per the WSDM the distribution system shall maintain a minimum 30 psi during PHD and 20 psi during FF/MDD.

Hydraulic Analysis Model

As described in Section 3.2.2 of each individual report.

Evaluation

The hydraulic model of the City of Othello's water system was run after adding the 8 water system demands. No deficiencies within the existing City of Othello water system were found.

The hydraulic model was then run adding the 8 water system demands and the demands estimated for the future UGA area. No deficiencies within the existing City of Othello water system were found.

Conclusion

The City has adequate distribution system capacity to serve the 8 water systems and the future UGA with no improvements required.

1.1.4 Storage

Criteria

The WSDOH WSDM provides the following criteria for public water storage:

Operational Storage (OS): Storage volume devoted to supplying the water system when sources of supply are in the "off" status (volume between pump "on" and pump "off")

Equalizing Storage (ES): Storage volume required to meet peak system demands which exceed source capacity (min. system pressure 30 psi)

- ES = (PHD-Qs)(150 min.)

Where:

- PHD = peak hour demand in gpm
- Qs = sum of all source capacities in gpm

Standby Storage (SB): Storage volume to provide system reliability in cases where sources fail or during periods of unusually high demands (min. system pressure 20 psi) (Equation 9-3)

- SB = (2 days)[(ADD)(ERUs) – t_M (Q_S-Q_L)]

Where:

- ADD = gpd/ERU
- t_M = 1,440 minutes
- Q_S = Sum of all source capacity in gpm
- Q_L = Largest source capacity in gpm

Alternatively, the WSDM recommends the standby storage volume be no less than 200 gal/ERU

Fire Suppression Storage (FSS): Storage volume required to provide the maximum fire flow rate and duration (min. system pressure 20 psi)

- FSS = (FF)(duration)

Where:

- FF = 6,250 gpm (largest fire flow demand)
- Duration = 4 hours (longest fire flow duration)

Dead Storage (DS): Storage volume below the minimum required system pressure (unusable storage)

Current Capacity

The City of Othello has three reservoirs with a total nominal storage capacity of approximately 6,000,000 gallons. The useable volume available to the system varies from 1.3 MG to 2.8 MG depending on the residual system pressure for the storage component being analyzed, i.e. 20 psi for FF and SB; 30 psi for ES. The remaining volume is referred to as "dead storage".

Evaluation

Operational Storage

Extending service to serve the 8 water systems will not change the pump setting or OS volume.

Equalizing Storage

Description	PHD (gpm)	Qs [1] (gpm)	Duration (min.)	ES (gal.)
Othello	7,600 [2]	7,155	150	66,750
8 water systems	583 [3]	7,155	150	0
Combined	8,183	7,155	150	154,200

(1) *From Table 4*
(2) *From Table 1*
(3) *From Table 3*

Standby Storage

Description	Duration (days)	ADD (gpd/ERU)	ERUs	t_M	Q_S (gpm)	Q_L (gpm)	SB (Eq.9-3) (gal.)	SB (200 gpd/ERU) (gal.)
Othello	2	453	10,490	1440	7155	2500	<0	2,098,000
8 water systems	2	453	406	1440	7155	2500	<0	81,200
Combined	2	453	10,896	1440	7155	2500	<0	2,179,200

Fire Suppression Storage

Description	Largest FF Demand (gpm)	Longest FF Duration (hrs)	FF Volume (gal.)
Othello	6,250	4	1,500,000
8 water systems	1,000	2	120,000

Dead Storage

All service elevations in the 8 water systems are at or below existing City of Othello service elevations so extending City of Othello water service to the 8 water systems will not increase dead storage.

Storage Comparison

The City of Othello storage volumes with and without the 8 water systems is shown in the following table:

Table 6: Storage Comparison

Description	CITY OF OTHELLO		OTHELLO/8 systems	
	Elevation (amsl)	Volume (gal.)	Elevation (amsl)	Volume (gal.)
Overflow (1)	1209.0		1209.0	
OS		239,825		239,825
Bottom of OS (1)	1205.0		1205.0	
ES		65,950		154,200
Bottom of ES (2)	1203.9		1202.4	
SB		2,098,000		2,179,200
Bottom of SB (3)	1168.9		1166.1	
FSS		1,500,000		1,500,000
Bottom of FSS (4)	1178.9		1177.4	
Base Elevation	1119.6		1119.6	

(1) *From 2011 Water System Plan*
(2) *Minimum elevation required to maintain 30 psi service pressure = 1195*
(3) *Minimum elevation required to maintain 20 psi service pressure = 1167*
(4) *Minimum elevation required to maintain 20 psi service pressure = 1170*
(5) *SB and FSS are nested per 2011 Water System Plan*

Conclusion

The City has adequate OS, ES and FSS storage capacity to extend water service to the 8 water systems with no improvements required.

Serving the 8 water systems will require additional SB storage capacity. The additional storage capacity is estimated to be deficient by approximately 54,000 gallons above the elevation 1167. This results in 195 gal/ERU SB storage instead of the 200 gal/ERU minimum recommendation in the WSDM.

It is noted the City has 8 operational wells and when SB is calculated per WSDM Equation 9-3 SB is zero. It would be a highly unusual circumstance with multiple source failures or extended power outage affecting all wells before the SB would be used.

1.1.5 Water Rights

Criteria

The criteria used to evaluate the adequacy of the City's water rights are as follows:

Maximum instantaneous flow (based on total source capacity)	<	Maximum instantaneous withdrawal (Qi)
Maximum annual water use (based on current water use data)	<	Maximum annual withdrawal (Qa)

Current Water Right

The City's water rights were consolidated into a unified water allocation. This unified allocation is as follows:

Qi = 9,550 gpm

Qa = 7,100 acre-ft/yr

Evaluation

The impact on the City's water rights of consolidating the BDWS into the City of Othello water system is evaluated in the following table.

Table 7: Water Rights Evaluation

Description	Qi Instantaneous water use (gpm)	Qa Annual water use (acre-ft/yr)
City of Othello	7,155	5,300 (1)
8 water systems	0 (2)	206 (3)
Total	7,155	5,506
Water Right	9,550	7,100
Excess/(deficiency) (4)	2,395	1,594

(1) *From Table 1*
(2) *The 8 water systems will not increase instantaneous withdrawal (no new sources of supply added to system)*
(3) *From Table 3*
(4) *Potential additional water rights obtained by transferring the individual system water rights to the City of Othello are not shown.*

Conclusion

The City of Othello has adequate water rights to provide service to the 8 water systems.

1.1.6 Summary of Impacts of Consolidation on City Water System

The following table summarizes the impacts to the City of Othello's water system components:

Table 8: Summary of Impacts to City of Othello Water System Components

Component	Deficiencies Identified	Impacts to City System
Supply	none	none
Distribution	none	none
Storage	SB is deficient by ~48,000 gal.	SB is reduced from the DOH recommended 200 gal/ERU to 195 gal/ERU
Water Rights	none	None (1)

(1) *The City will benefit from a net increase in water rights by transferring the individual system water rights to the City as part of the consolidation.*