CONSOLIDATION FEASIBILITY STUDY

SEPTEMBER 2016

HIGHLAND ESTATES WATER SYSTEM

WSDOH System ID No. 32736

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

CONSOLIDATION FEASIBLITY STUDY

HIGHLAND ESTATES WATER SYSTEM
WSDOH System ID No. 32736

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CITY OF OTHELLO
WSDOH System ID No. 64850

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10/3/2016

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TABLE OF CONTENTS

LIST OF FIGURES

(11x17 prints located at end of body of report)

APPENDICES

1.0 INTRODUCTION

1.1 Background

In 2015 Drinking Water State Revolving Fund 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 Highland Estates Water System (HEWS) is shown on the WFI is as follows:

Primary Contact
Lorey C. Sielaff, Operator
Certification No. 009835

Address
1057 S Hi Lo Drive
Othello, WA 99344-9715

Phone
Daytime: 509.488.0219
Mobile: 509.989.0339

Owner Contact
Henry Rivard, President

Address
873 S Highland Drive
Othello, WA 99344

Phone
Daytime: 509.488.6357

2.0 EXISTING SYSTEM

2.1 System Information

Highland Estates Water System (HEWS) is located east of Taylor Road and along the east boundary of the Basin View Water Association (BVWA), 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**).

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

2.2 Service Area

The HEWS service area is shown on **Figure 2**. The service area boundary is approximately 30 acres. The development consists of 15 individual residential lots with 14 single-family residential connections. The well is on the 15th lot. Two connections were added to the HEWS service at a later date and serve two residences outside of the HEWS boundary. HEWS provides water service to a total of 16 single family residences.

Topography

The service area is generally flat and varies in elevation from approximately 993 to 981 amsl. The two southern connections are at elevations 985 and 945 amsl.

2.3 Inventory of Facilities

The HEWS water system is shown on **Figure 2**. The water system is a closed system (no gravity storage) with a well pump, underground storage reservoir, booster pump, chlorination system, pressure tanks and distribution pipe.

The DOH Water Facilities Inventory (WFI) form lists the HEWS system as a Group A Community system serving a residential community with a population of 52. The system is privately owned.

Supply

Supply is provided via one permanent well (S01). The system supply is summarized in the following table.

Table 2-1 Highland Estates Water System Source Inventory [(1)]

Source Number	Source Name	Use	Metered	Treatment	Current Pumping Rate (gpm)
SO1	Well #1 – AFL230	Permanent	Yes	Chlorination	56

(1) *Information obtained from the Water Facilities Inventory (last updated 4/18/16 as of this writing)*

Storage

The HEWS system is a closed system with one CIP concrete reservoir with a reported volume of 12,000 gallons. The distribution system is pressurized by two (2) individual 119-gallon fiberglass bladder pressure tanks with a total nominal volume of 238 gallons.

Distribution System

Per HEWS the distribution system consists of 4-inch, 3-inch, and 2-inch PVC transmission mains with ¾" and 1" PVC service pipe. There are no reported issues with the distribution system nor are there reported pressure drops during peak demands. Services are not currently metered.

Fire Flow

The 2014 Third-Party Sanitary Survey Checklist states that the HEWS system has two fire hydrants which are not certified for fire flow. Supply, storage, and distribution capacity are insufficient to provide fire flow.

The following table summarizes the major components of the HEWS.

Table 2-2 Summary of Highland Estates Water System Components

System	Component	Description	
Supply	Well	ECY Well ID Tag:	AFL230
		Status:	Online
		Log available:	Yes
		Depth:	450'
		Casing:	8" diameter casing to 170'
		Screen:	No
		Date constructed:	1977
		SWL:	Approx. 90' below wellhead elevation (~ Elev. 907') per the well log (not field verified)
		Approx. wellhead elev.:	997' (Well log states 1,150')
		Present pumping rate:	56 gpm (well pump)
		Pump/motor:	Submersible well pump, 5 HP (pressure switch operated)
		Enclosure:	Pump house (wood framed building with metal siding and roof)
		Location:	873 S Highland Rd, Othello, WA 99344, USA
	Booster Pump	Pump/motor:	Submersible booster pump, 3 HP (11-stage, call-on-demand)
		Present pumping rate:	45 gpm (estimated based on pump curve data researched from nameplate info)
Storage	Reservoir	Construction type:	Cast in place concrete (underground)
		Approx. base elevation:	997'
		Date constructed:	Approx. 1977
		Volume:	12,000 gallons
		Pressure zones served:	1
		Location:	873 S Highland Rd, Othello, WA 99344, USA
	Pressure Tank	Construction type:	Fiberglass (bladder)
		Approx. base elevation:	997'
		Date constructed:	Approx. 1977
		Volume:	238 gallons (two individual 119-gallon fiberglass pressure tanks)
		Discharge pressure:	40-60 psi
		Pressure zones served:	1
		Location:	873 S Highland Rd, Othello, WA 99344, USA
Distribution System (1)	4"	Approx. 1,600 LF	
	3"	Approx. 450 LF	
	2"	Approx. 1,400 LF	

System	Component	Description
	1”	Approx. 150 LF
	Total	3,600 LF
	Main Materials	PVC
	Service Pressure	40 – 60 psi

(1) *Distribution system components provided by HEWS. Lengths are approximate.*

2.4 Assessment of the Condition of the Existing Facilities

A site visit of the Water System facilities was conducted on March 3, 2016. The site visit included a tour of the Water System facilities. The following summarizes observations from the site visit regarding the condition of the existing facilities.

Supply

The well head was visible. The well head was capped, ECY tagged and there were no observable defects. The well pump and booster pump were reported to be operating trouble free and has had no recent problems. The condition of the supply appears to be good.

Storage

The storage consists of two individual 119-gallon fiberglass pressure tanks and a 12,000-gallon underground CIP concrete reservoir. Both pressure tanks were observed to be relatively new and in good working order.

The condition of the underground storage reservoir was not observed. It was reported by HEWS that during the last periodic cleaning of the reservoir no issues were observed.

All appeared to be in good visual condition.

Pump House

The pump house is a wood framed building with metal roof and siding. The walls are insulated and interior sheathed with plywood.

The piping is primarily galvanized steel with brass valves. The interior piping, meter, electrical power, chlorine injection system, control panels and pressure tanks all appear to be in good condition. Overall the facility appeared to be in good condition and well maintained.

Distribution

The condition of the distribution system could not be observed. The distribution system is composed of two dead end branches which lead away from the source to the north and south. The distribution system does not currently include service meters.

There was a leak that was discovered along the mainline and repaired in fall of 2013.

Based on a review of the available data it does not appear the system has ongoing leakage issues and the distribution system appears to be in adequate condition.

2.5 Water Use, System Demands and Water Rights

2.5.1 Population/Connections

Existing

Highland Estates subdivision has 14 active connections. The water system serves two additional connections outside the subdivision for a total of 16 single family residential connections. The distribution system does not currently include service meters.

Existing Connections: 16

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

- Existing Population: 52

Projected

The development is fully built out and no growth is expected. Projected future water use will assume that no additional connections will become active; therefore the projected future connections are as follows:

- Projected Connections: 16

The future population is projected to remain the same as current.

- Projected Population: 52

2.5.2 Water Use

Water source meter data was provided by HEWS for Aug-Dec of 2013, 2014 and 2015. Water use is shown on the following tables. Water use represents domestic use only. The Water System receives irrigation water from ECBID.

Table 2-3: Water Use Summary (1)

	Year					
	2013 (2)		2014		2015	
Description	(gal.)	(gpd)	(gal.)	(gpd)	(gal.)	(gpd)
Annual Total	2,014,000	5,500	2,079,000	5,700	1,619,000	4,400
Maximum Month	287,640	9,500	280,170	9,200	202,539	6,700
Average Month	167,833	5,500	173,250	5,700	134,917	4,400
Minimum Month	89,633	2,900	94,954	3,100	81,424	2,700

(1) *Source meter data*
(2) *Meter data provided for Aug - Dec. Annual total is projected by dividing the Aug - Dec total by 5 to get monthly average, then multiplying the monthly average by 12.*

2.5.3 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 Water System's water use to the City of Othello water use.

Table 2-4: ERUs

Description	Year		
	2013 (1)	2014	2015
Total annual water use (source meter)	2,014,000	2,079,000	1,619,000
City of Othello gpd/ERU value (2)	453	453	453
City of Othello ERUs (3)	**12**	**13**	**10**

(1) *Annual water use is projected, see Table 2-3*
(2) *Based on current water use data from 2013, 2014 and 2015*
(3) *Average daily water use (total annual divided by 365) divided by 519 gpd/ERU*

2.5.4 System Demands

Current

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

Table 2-5: Current Water System Demands

Description	ERUs (3)	ADD			MDD (1)			PHD (2)
		gpd/ERU (3)	(gpd)	(gpm)	gpd/ERU	(gpd)	(gpm)	(gpm)
2013	12	453	5,400	4	1,033	12,400	9	44
2014	13	453	5,900	4	923	12,000	8	43
2015	10	453	4,500	3	870	8,700	6	36

(1) *MDD = MMAD(1.3); MMAD from Table 2-3*
(2) *PHD = (MDD/1440)(CN+F)+18, where C = 3.0, N = ERUs and F = 0, DOH WSDM Eq. 5-1*
(3) *From Table 2-4*

Future

Since the development is fully built out and expecting no additional connections, the future water system demands are estimated using the peak water use from the data period. Future water use is summarized in Table 2-6.

Table 2-6: Estimated Future Water System Demands

ERUs	ADD			MDD (1)			PHD (2)	Annual (3)	
	gpd/ERU	(gpd)	(gpm)	gpd/ERU	(gpd)	(gpm)	(gpm)	(gal.)	(ac-ft/yr)
13	453	5,900	4	1,033	13,400	9	46	2,154,000	6.6

(1) *MDD = MMAD(1.3); Using peak MMAD from Table 2-3*
(2) *PHD = (MDD/1440)(CN+F)+18, where C = 3.0, N = ERUs and F = 0, DOH WSDM Eq. 5-1*
(3) *= ADD (gpd) x 365 days*

2.5.5 Water Rights

The 1977 Permit/Certificate No.G3-25232 to Appropriate Public Waters of the State of Washington allows the HEWS well to withdraw a Qi of 100 gpm and a Qa of 12.6 ac-ft/yr for group domestic supply at 1080 feet north and 1700 feet from the SW corner of Section 16 in S16, T25 R29E.

2.6 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 HEWS 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.

2.6.1 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.

The HEWS operates a "closed" system meaning the system is closed to the atmosphere (i.e. pressure storage tanks) with a two-part supply system consisting of a well supplying an underground storage tank and a booster pump supplying the distribution system from the storage tank. Each part of the supply system will be evaluated individually based on its own criteria.

Since the HEWS is a closed system with a two-part supply system, the criteria used to evaluate the HEWS 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 pressure tanks, therefore the supply criteria is as follows.

Well Supply (well pump)

- Supply MDD with equalizing storage and standby storage sufficient to supply PHD

Distribution Supply (booster pump)

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

2.6.2 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.

2.6.3 Storage

HEWS is a closed system with equalizing and standby storage and two vertical fiberglass bladder pressure tanks.

Underground Storage Reservoir

The underground storage reservoir provides equalizing 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

$Q_S^{(1)}$ = Sum of all installed and 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

Bladder Pressure Tank

The two bladder pressure tanks maintain system pressure when the booster pump is off. The criteria used to evaluate the vertical pressure tank are based on the DOH WSDM Chapter 11 "Hydropneumatic (pressure) Tanks".

- Equation 11-3: $$T_S \geq \frac{(R+Qp)}{(Nc)(Vb)} \; ; \; R = \frac{15(P1+14.7)(P2+14.7)}{(P1-P2)(P2+9.7)}$$

Where:

T_S = The number of bladder tanks of size Vb

P1, P2 = P1 corresponds to the pump-off pressure and P2 to the pump-on pressure.

Qp = Pump delivery capacity in gpm at the midpoint of the selected pressure range

Nc = Number of pump operating cycles per hour (6 cycles per hour)

Vb = The volume of an individual bladder tank in gallons

2.6.4 Fire Flow

HEWS 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.

2.6.5 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.

2.6.6 Water Rights

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

2.7 Evaluation/Deficiencies

2.7.1 Supply

The HEWS supply consists of two parts:

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

2.7.1.1 Supply (well pump)

Criteria

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

Required Capacity

Current MDD = 9 gpm (Table 2-5)

Future MDD = 9 gpm (Table 2-6)

Current Capacity

Current capacity = 56 gpm (Table 2-2)

Evaluation

The current well capacity of 56 gpm is adequate to meet the current MDD of 9 gpm.

The current well capacity of 56 gpm is adequate to meet the future MDD of 9 gpm.

Deficiencies

None.

2.7.1.2 Supply (booster pump)

Criteria

Supply PHD at no less than 30 psi to all service connection.

Required Capacity

Current PHD = 44 gpm (Table 2-5)

Future PHD = 46 gpm (Table 2-6)

Current capacity

Current capacity = 45 gpm (Table 2-2)

Evaluation

Current booster pump capacity is adequate to supply current PHD.

Current booster pump capacity is inadequate to supply future PHD.

Deficiencies

The current booster pump capacity is inadequate by 1 gpm to meet future PHD.

2.7.2 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

Available water quality test results from the last three IOC tests are shown in the following table.

Table 2-7: Water Quality Test Results

ANALYTE	RESULT (3/24/10)	RESULT (3/29/07)	RESULT (2/24/03)	UNITS	SRL [3]	MCL	Exceeds MCL (X if yes)
Cadmium	0.0005	0.004	0.003	mg/l	0.002	0.005	
Manganese	0.0196	0.03	0.01	mg/l	0.010	0.050	
Sodium	53.5	62.5	53.7	mg/l	5.000		
Hardness	56.6	72.9	60.8	mg/l	10.000		
Conductivity	385	371	388	Umhos/cm	70.000	700.000	
Turbidity	0.2	1.45	0.77	NTU	0.100		
Chloride	61.2	20	12	mg/l	20.000	250.000	
Sulfate	33.4	32.8	30.7	mg/l	50.000	250.000	
TDS	NT	270	240	mg/l	100.000	500.000	
Barium	0.048	<	<	mg/l	0.400	2.000	
Chromium	<	<	<	mg/l	0.020	0.100	
Iron	0.019	<	<	mg/l	0.100	0.300	
Silver	<	<	<	mg/l	0.100	0.100	
Copper	0.0052	<	<	mg/l	0.020		
Zinc	0.001	<	<	mg/l	0.200	5.000	
Beryllium	<	<	<	mg/l	0.0008	0.004	
Nickel	<	<	NT	mg/l	0.100	0.100	
Color	5	9	<	CU	15.000	15.000	
Fluoride	0.69	0.59	0.47	mg/l	0.500	4.000	
Arsenic	NT	<	<	mg/l	0.001	0.0104	
Lead	NT	<	<	mg/l	0.001		
Mercury	NT	<	<	mg/l	0.0004	0.002	
Selenium	NT	<	<	mg/l	0.010	0.050	
Antimony	NT	<	NT	mg/l	0.006	0.006	
Thallium	NT	<	NT	mg/l	0.002	0.002	
Cyanide	NT	<	NT	mg/l	0.010	0.200	
Nitrate-N	<	<	0.13	mg/l	0.200	10.000	
Nitrite-N	<	<	0.01	mg/l	0.200	1.000	
Total Nitrate/Nitrite	<	<	0.14	mg/l	0.500	10.000	

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

The system continuously chlorinates through a LMI pump/barrel system to achieve disinfection. There appears to be a past history of total coliform hits (one hit in August, 2014). A review of the DOH 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.

2.7.3 Storage

2.7.3.1 Underground Storage Reservoir

Criteria

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

Required Capacity

HEWS is not expected to add any further service connections. Current and future water uses are not expected to change.

From Table 2-5 the current PHD is 44 gpm and from Table 2-2 the Q_S is 56 gpm.

ES = (44 - 56)(150 min.) = 0 gallons

From Table 2-6 the estimated future PHD is 46 gpm and from Table 2-2 the Q_S is 56 gpm.

ES = (46 - 56)(150) = 0 gallons

From Table 2-5 the current/future ADD is 453 gpd/ERU and from Table 2-5 the current/future N is 13.

SB_{TSS} = (2 days)(453)(13) = 11,778 gallons

From Table 2-6 the current/future ADD is 453 gpd/ERU and from Table 2-5 the current/future N is 13.

SB_{TSS} = (2 days)(453)(13) = 11,778 gallons

Current Capacity

Per Table 2-2 the current storage capacity is 12,000 gallons.

Evaluation

The current storage capacity of 12,000 gallons is adequate for current and future equalizing and standby storage needs.

Deficiencies

None.

2.7.3.2 Bladder Pressure Tanks

Criteria

- Equation 11-3: $$T_S \geq \frac{(R+Qp)}{(Nc)(Vb)} \; ; \; R = \frac{15(P1+14.7)(P2+14.7)}{(P1-P2)(P2+9.7)}$$

Where:

R = $\frac{15(60+14.7)(40+14.7)}{(60-40)(40+9.7)}$ = 61.7

T_S = The number of bladder tanks of size Vb

P1, P2 = P1 corresponds to the pump-off pressure and P2 to the pump-on pressure.

Qp = Pump delivery capacity in gpm at the midpoint of the selected pressure
Range

Nc = Number of pump operating cycles per hour (6 cycles per hour)

Vb = The volume of an individual bladder tank in gallons

Required Capacity

- 11-3: $T_S \geq \frac{(61.7+45)}{(6)(119)}$; $R = \frac{15(60+14.7)(40+14.7)}{(60-40)(40+9.7)}$

Where:

Item	Existing	Estimated Current System Demands	Estimated Future System Demands
Ts	**2 tanks**	**1 tank**	**1 tank**
R	61.7	61.7	61.7
P1	60 psi	60 psi	60 psi
P2	40 psi	40 psi	40 psi
Q_P	45 gpm (1)	45 gpm (2)	45 gpm (3)
Nc	6 cycles per hour	6 cycles per hour	6 cycles per hour
Vb	119 gallons	119 gallons	119 gallons

(1) *Existing Booster Capacity (from Table 2-2)*

Current Capacity

Per Table 2-2 the current pressure tank capacity is 328 gallons.

Evaluation

The two 119-gallon bladder pressure tanks current capacity exceeds the calculated required capacity of one 119-gallon bladder pressure tank to meet current and future needs.

Deficiencies

None.

2.7.4 Fire Flow

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

2.7.5 Distribution System

Criteria

Per the WSDM the distribution system shall maintain a minimum 30 psi during PHD.

Required Capacity

The existing water system is shown on **Figure 2.** Based on the reported lowest pressure tank setting there is a maximum 10 psi pressure loss available.

Current Capacity

The distribution system is reported to consist of 4-inch, 3-inch, 2-inch and 1-inch diameter PVC pipe with ¾-inch and 1-inch service pipe.

Evaluation

Based on the information provided by HEWS a hydraulic model of the distribution system was created in Bentley WaterCAD V8i. The distribution system evaluation is limited to the current distribution using current estimated system demands. Future conditions were not modeled because system demands are not expected to occur.

The current estimated PHD of 46 gpm (Table 2-7) was split equally (2.56 gpm/connection) between the 18 current connections and distributed regionally at nodes placed along the distribution pipes. Nodes were analyzed to determine system pressure under static and PHD demand conditions under the "low" pressure condition (when the pump is called on "on").

The HEWS has reported no system pressure deficiencies.

Table 2-8: Distribution System Hydraulic Analysis

Location	Elevation	Static Pressure (psi)	Calculated Pressure Loss during PHD (psi)	PHD System Pressure (psi)
North End (J-383)	993	41.7	-0.2	41.5
Pump House (at pressure reader) (R-3)	997	40.0	0.0	40.0
South-east End (J-386)	985	45.1	-0.6	44.5
South-west End (J-388)	945	62.4	-0.9	61.6

Based on the static pressures and calculated pressure losses during PHD the system pressure exceeds the minimum required pressure.

Deficiencies

None.

2.7.6 Water Rights

Criteria

The adequacy of the HEWS 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 HEWS withdraws water based on a water right certificate with a maximum legal withdrawal rate of 100 gpm and an annual withdrawal amount of 3.528 MG (12.6 acre/ft).

Evaluation

The following table compares the annual water use and calculated maximum day water use for the past three years to the water right.

Table 2-9 Annual Water Use and Water Rights

Certifi-cate #	Name of Claimant	Priority Date	Source Name	Primary/ Supple-mental	Existing Water Rights		Future System Demand (1)(2)		Status excess/(deficiency)	
					Qi (gpm)	Qa (acre-ft/yr)	Qi (gpm)	Qa (acre-ft/yr)	Qi (gpm)	Qa (acre-ft/yr)
PERMITS / CERTIFICATES										
G3-25232	Highland Estates Water Ass.	02/18/1977	SO1	Primary	100	12.6	56.0	6.6	44	6.0

(1) *Qi = minimum required well pump capacity*
(2) *From Table Table 2-6*

Projected annual water rights are currently within the available water right.

Deficiencies

None.

2.7.7 Summary of Deficiencies

The following table summarized the deficiencies.

Table 2-10 Summary of Deficiencies

System Component	Current System Capacity	Current Needs	Current Deficiency	Future Needs	Future Deficiency
Supply (well pump)	56 gpm	9 gpm	none	9 gpm	none
Supply (booster pump)	45 gpm	44 gpm	none	46 gpm	1 gpm
Treatment	No known issues		none		none
Storage (atmospheric ES/SB)	12,000 gal.	11,778 gal.	none	11,778 gal.	none
Storage (pressure tanks)	328 gal.	119 gal.	none	119 gal.	none
Fire Flow	n/a	n/a	n/a	n/a	n/a
Distribution	adequate	adequate	none	adequate	none
Water Rights (Qi)	100 gpm	56 gpm	none	56 gpm	none

System Component	Current System Capacity	Current Needs	Current Deficiency	Future Needs	Future Deficiency
Water Rights (Qa)	12.6 ac-ft/yr	6.6 ac-ft/yr	none	6.6 ac-ft/yr	none

2.8 System Finances

The basic fee for standard lots is $49 per month with larger lots paying a higher fee of $65 and $69 per month. Current water rates are reported as follows.

Basic Fee: $49/mo. (13 lots)

$65/mo. (2 lots)

$69/mo. (1 lot)

Financial data was provided for the period 2012 - 2014. The latest 3-years data (2012-2014) is shown on the following table.

Table 2-11 Annual Operation Budget

Description	2012	2013	2014
INCOME			
Water fees	$ 10,030.55	$ 8,290.65	$ 9,727.47
Interest	$ 3.40	$ 2.70	$ 3.57
Big Bend Capitol Credit	$ 428.96	$ 275.93	$ -
Total Income Received	$ 10,462.91	$ 8,569.28	$ 9,731.04
EXPENSES			
Big Bend (domestic account)	$ 1,399.00	$ 1,018.93	$ 984.75
Big Bend (irrigation account)	$ 1,395.76	$ 1,479.34	$ 1,687.08
Maintenance irrigation	$ -	$ -	$ 466.78
Maintenance domestic	$ -	$ -	$ 2,880.05
Irrigation specialist	$ 267.61	$ -	$ -
Parts to repair main line	$ 83.80	$ -	$ -
Bleach for chlorination	$ 127.94	$ 139.43	$ 126.15
Gremmells Diving Services	$ 1,614.00	$ -	$ -
American Leak Detector	$ 850.00	$ -	$ -
Lorey Sieloff (certified operator)	$ 2,400.00	$ 2,400.00	$ 2,575.00
Water testing (Kuo testing lab)	$ 785.00	$ 297.00	$ 950.20
DOH system operating permit fee	$ 241.00	$ 247.04	$ 250.00
DOH water system inspection	$ -	$ -	$ 600.00
Secretary of State filing fee	$ 20.00	$ -	$ 10.00
Adams County tax	$ 10.00	$ 10.00	$ 10.00
Adams County auditor (lien)	$ -	$ 74.00	$ -
Bank deposit check returned NSF	$ -	$ 50.00	$ -
Bank NSF charge	$ -	$ 10.00	$ -
Hach Company	$ 486.31	$ -	$ 202.55
Office supplies	$ 131.41	$ 46.00	$ 188.05
Sam Redding (reimbursement)	$ -	$ -	$ 135.74
Hank Rivard (reimbursement)	$ -	$ 148.57	$ -

Description	2012	2013	2014
Total Expenses	$ 9,811.83	$ 5,920.31	$ 11,066.35
BALANCE (assume transfer to reserves)	$ 651.08	$ 2,648.97	$ -1,335.31
ACCUMULATED FUNDS			
Total Reserves	$ 14,549.52	$ 17,198.49	$ 15,863.18

The Annual Operation Budget is summarized below on a per user basis.

Table 2-12 Annual Operation Budget – Summary per Connection

Description	2012	2013	2014	Average
Connections	16	16	16	16
Annual Revenue per Connection	$654	$536	$608	$599
Monthly Revenue per Connection	$54	$45	$51	$50
Annual Expenses per Connection	$613	$370	$692	$558
Monthly Expenses per Connection	$51	$31	$58	$47
Monthly net per connection (reserves)	$3	$14	($7)	$3

Based on the above tables it appears the water system finances are well managed, the current water rate structure is adequate to cover the daily operational expenses, ongoing maintenance and repairs and reserves appear adequate for equipment replacement as needed.

3.0 CONSOLIDATION

3.1 Improvements required to meet City Standards

3.1.1 Supply

The existing HEWS 8-inch diameter well, with a 56 gpm capacity, is likely too low for the City to utilize cost-effectively. Therefore, this well would likely be required to be abandoned by the Association as part of a consolidation.

If abandoned properly, the abandonment of this well would also allow the removal of any restrictive covenants related to the wellhead protection sanitary control area and increase the value of the lot the current well is located on.

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 (see **Figure 3**):

- Replace the existing 4-inch, 3-inch, 2-inch, 1-inch diameter water main with a minimum 8-inch diameter DI/PVC water main
- Replace the existing ¾-inch and 1-inch diameter pvc/poly service pipes with new 1-inch diameter K copper pipe
- Install a sampling station
- Install service meters per City standards
- Install fire hydrants at the spacing required per City standards

3.1.3 Storage

The existing pressure storage tanks and underground reservoir are incompatible with the City gravity storage and provide no benefit to the City, therefore the storage tanks and reservoir will likely be required to be abandoned by the Association as part of the consolidation.

3.1.4 Estimated Cost of Improvements

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

Table 3-3 Estimated Improvements Cost

Description	Est. Quan.	Units	Unit Price	Amount
Main (8-inch PVC)	1500	LF	$ 28	$ 42,000
Valves, fittings, restraints	1500	LF	$ 13	$ 19,500
Fire hydrants	1500	LF	$ 9	$ 13,500
Service connections	1500	LF	$ 18	$ 27,000
Surface Replacement	1500	LF	$ 10	$ 15,000
Sampling Station	1	EA	$ 2,000	$ 2,000
			Subtotal	$ 119,000
			Mobilization 10%	$ 12,000
			Contingency 20%	$ 24,000

Description	Est. Quan.	Units	Unit Price	Amount
Estimated construction cost				$ 155,000
Environmental approvals 10% (assuming must meet DWSRF loan requirements)				$ 11,000
Engineering 25% (design, construction management/inspection)				$ 39,000
ESTIMATED PROJECT COST				$ 205,000

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 HEWS by constructing a transmission main from Bench Rd./Buena Vista west on Bench Rd., south on Taylor Rd. and east on Crestline Rd for a total distance of approximately 11,600 feet.

The connection will allow for Othello Manor Water System (OMWS) and Basin View Water Association (BVWA) to connect to the City system and could provide a cost sharing partner to HEWS for the water main extension. HEWS should also consider discussing late comer fees with the City as another way to offset the long term cost of the extension.

See **Figure 4** 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 HEWS 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 ERU 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
- 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 HEWS 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			Scenario	Scenario Demand	Pipe Size
		MDD (gpm)	PHD (gpm)	FF (gpm)		(gpm)	T-Main [3] Dia. (in.)
HEWS [1]	13	9	46	1000	PHD	46	10 / 8
City of Othello UGA Area 4 [2]	285	133	215	1000	PHD	215	10 / 8

Description	ERUs	System Demands MDD (gpm)	PHD (gpm)	FF (gpm)	Scenario	Scenario Demand (gpm)	Pipe Size T-Main [3] Dia. (in.)
HEWS [1]	13	9	46	1000	MDD/FF	1009	10 / 8
City of Othello UGA Area 4 [2]	285	133	215	1000	MDD/FF	1133	10 / 8

(1) *From Table 2-6*
(2) *See Appendix C*
(3) *See Figure 5. 10-inch transmission main needed on Bench and Taylor. Change to 8-inch transmission main through Basin View to HEWS. This is due to the elevation of the HEWS system rather than the result of demands.*

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. Quan.	Unit	Unit Price	Amount
Main (10-inch PVC)	8,000	LF	$32	$ 256,000
Valves, fittings, restraints (10-inch)	8,000	LF	$8	$ 64,000
Main (8-inch PVC)	3,400	LF	$28	$ 95,200
Valves, fittings, restraints (8-inch)	3,400	LF	$7	$ 23,800
Fire hydrants	11,400	LF	$9	$ 102,600
Service connections	11,400	LF	$2	$ 22,800
Surface Replacement	11,400	LF	$2	$ 22,800
Irrigation Canal Crossing (24" casing, 10" carrier pipe)	200	LF	$500	$ 100,000
Sampling Station	1	EA	$2,000	$ 2,000
			Subtotal	$ 689,000
			Mobilization 10%	$ 69,000
			Contingency 20%	$ 138,000
			Estimated construction cost	$ 896,000
			Environmental approvals allowance (assuming must meet DWSRF loan requirements)	$ 20,000
			Engineering 25% (design, construction management/inspection)	$ 224,000
			ESTIMATED PROJECT COST	$ 1,140,000
			ESTIMATED PROJECT COST/LF	$ 98

3.3 Estimated Impact to City System

The impact of consolidating the HEWS 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 HEWS 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 HEWS 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				
HEWS	Current [4]	9				
Total		4,709	347	5,056	7,155	2,099
City of Othello	Current [3]	4,700				
HEWS	Future [5]	9				
Total		4,709	347	5,056	7,155	2,099

(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 HEWS 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 HEWS system demands. No deficiencies within the existing City of Othello water system were found.

The hydraulic model was then run adding the HEWS 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 HEWS 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 HEWS will not change the pump setting or OS volume.

Equalizing Storage

Description	PHD (gpm)	Qs [(1)] (gpm)	Duration (min.)	ES (gal.)
Othello	7,600	7,155	150	66,750
HEWS	46	7,155	150	-
Combined	7,646	7,155	150	73,650

(1) *From Table 3-8*
(2) *From Table 3-7*
(3) *From Table 2-6*

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
HEWS	2	453	13	1440	7155	2500	<0	2,600
Combined	2	453	10,511	1440	7155	2500	<0	2,100,600

Fire Suppression Storage

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

Dead Storage

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

Storage Comparison

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

Table 3-9 Storage Comparison

Description	CITY OF OTHELLO		OTHELLO/HEWS	
	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		73,650
Bottom of ES (2)	1203.9		1203.8	
SB		2,098,013		2,100,600
Bottom of SB (3)	1168.9		1168.7	
FSS		1,500,000		1,500,000
Bottom of FSS (4)	1178.9		1178.8	
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 HEWS 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 HEWS 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 (1)	5,300 (2)
HEWS	0	6.6 (3)
Total	7,155	5,306.6
Water Right	9,550	7,100
Excess/(deficiency)	2,395	1,793.4
HEWS Water Rights Transfer	100 (4)	12.6 (4)
City of Othello Water Rights post Consolidation (3)	9,650	7,112.6

(1) *From Table 3-7*
(2) *From Table 3-6*
(3) *From Table 2-6*
(4) *Based on current water right certificate amount, actual amount would be determined by ECY*

Conclusion

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

Based on estimated future water use from Table 2-9, extending water service to HEWS will not affect Qi and will use 6.6 acre-ft/yr of the City's Qa. Consolidating with HEWS and acquiring the water right associated with HEWS's well could potentially add 100 gpm (current HEWS Qi) to the City's Qi and 12.6 acre-ft/yr (maximum convertible Qa for well) to the City's Qa which would result in a net increase to the City's Qi/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

Table 2-10 does not identify any system deficiencies within the Highland Estates Water System. No capital improvements are proposed for HEWS at this time. Costs associated with unconsolidated system are based on the annual ongoing operation and maintenance costs from Table 2-11 and estimated in the following table.

Table 3-12 Estimated Operation and Maintenance Cost

Description	Amount
Annual O&M [1]	$9,600
Estimated annual debt service on capital improvements	$0
Total Estimated Annual System Cost	$9,600

[1] *Based on Table 2-11 and rounded to nearest $1,000*

3.4.2 Consolidated System

Considered below are several consolidation scenarios that affect the cost impacts of the consolidation on HEWS. These scenarios include Othello Manor Water System (OMWS) and/or Basin View Water Association (BVWA) consolidating with City of Othello Water System and sharing the consolidation costs with HEWS. In each scenario the cost of connection is assumed to be shared based on the total length of transmission main required to connect each of the water systems to the City of Othello Water System (shared with OMWS and BVWA) and transmission main that would be shared only with BVWA. See **Figure 5**.

Table 3-13 Estimated Cost Sharing with Othello Manor and Basin View [1]

Description	Est. Quan.	Unit	Unit Price [2]	Amount		Othello Manor Only	Basin View Only	Both
Portion of shared consolidation transmission Main	6,600	LF	$98	$649,000		$(325,000)	$(325,000)	$(435,000)
Portion of shared consolidation transmission Main	2,450	LF	$98	$241,000			$(121,000)	$(121,000)
ESTIMATEDSHARED PROJECT COST				$890,000		$(325,000)	$(446,000)	$(556,000)

[1] *See Figure 5*
[2] *From Table 3-5*

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

Table 3-14 Estimated Improvements Cost and Annual Debt Service

Description	Consolidation Scenario			
	HEWS	HEWS and OMWS	HEWS and BVWA	HEWS, OMWS and BVWA
Estimated Cost to Improve HEWS [1]	$205,000	$205,000	$205,000	$205,000
Estimated Cost to extend service to HEWS [2]	$1,140,000	$1,140,000	$1,140,000	$1,140,000
Cost sharing reduction [3]		($325,000)	($446,000)	($556,000)
Total Capital Cost	$1,345,000	$1,020,000	$899,000	$789,000
Annual Debt Service [4]				

Description	Consolidation Scenario			
	HEWS	HEWS and OMWS	HEWS and BVWA	HEWS, OMWS and BVWA
DWSRF Loan (1% interest for 20 yrs) (5)	$74,500	$56,500	$49,800	$43,700
DWSRF Loan w/50% Loan Forgiveness (1% interest for 24 yrs) (6)	$31,700	$24,000	$21,200	$18,600

(1) *From Table 3-3*
(2) *From Table 3-5*
(3) *From Table 3-13*
(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* HEWS *is to cease operations until adequate water rights are secured. This will have to be discussed with DWSRF prior to applying for funding.*

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 3-15 Comparison of Costs

Description	BVWA remain separate system	Consolidation Scenario							
		HEWS		HEWS and OMWS		HEWS and BVWA		HEWS, OMWS and BVWA	
		DWSRF Loan	DWSRF Loan (w/50% forgiveness) (4)	DWSRF Loan	DWSRF Loan (w/50% forgiveness) (4)	DWSRF Loan	DWSRF Loan (w/50% forgiveness) (4)	DWSRF Loan	DWSRF Loan (w/50% forgiveness) (4)
Annual O&M (1)	$9,600								
Estimated Debt Service on Improvements (2)	$0	$74,500	$31,700	$56,500	$24,000	$49,800	$21,200	$43,700	$18,600
Estimated Annual Cost	$9,600	$74,500	$31,700	$56,500	$24,000	$49,800	$21,200	$43,700	$18,600
Connections (2016) (3)	16	16	16	16	16	16	16	16	16
Est. Cost Per Connection/month	$50	$388	$165	$294	$125	$259	$110	$228	$97
City of Othello base water rate (5) (outside city)		$51	$51	$51	$51	$51	$51	$51	$51
Total Estimated cost per connection/month	$50	$439	$216	$345	$176	$310	$161	$279	$148

(1) *From Table 3-12*
(2) *From Table 3-14*
(3) *From Section 2.5.1*
(4) *DWSRF will provide 50% principal forgiveness for eligible consolidation projects with repayment extended to 24 yrs. Eligibility will be determined by WSDOH and DWSRF.*

(5) *Does not include overage charges. Base rate is $34 with 50% surcharge ($17) outside the City. It is possible the City could count this $17 monthly surcharge amount toward the debt service lowering the Total Estimated cost per Connection/Month by $17*

Important notes about the above table:

- 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, MBE/DBE requirements and generally higher overhead and administrative cost than comparable privately funding construction.

- The cost table above does not include intangible benefits from consolidation which include increased fire flow capacity (1,000 gpm/2 hrs vs 500 gpm/30 min) as well as elimination of volunteer time/effort needed to run the system (City of Othello would take over all water system administrative/maintenance tasks)

- 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 HEWS make contact with Othello Manor and Basin View as well as others who may benefit from the City of Othello water main extension and discuss cost sharing opportunities which would likely reduce HEWS share of the above estimated costs.

3.5 Barriers to Consolidation

Potential barriers to consolidation are identified as follows:

- Overall estimated cost of the consolidation and significant impact to the monthly user rates without additional subsidies or cost sharing partners
- Financing of improvements (USDA-RD, DWSRF, other)
- Eligibility of system consolidation for DWSRF 50% loan forgiveness
- Coordination between the City and HEWS for funding and construction of the improvements
- Coordination between Othello Manor and Basin View (and or other potential cost sharing partners) regarding their motivation for consolidation

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

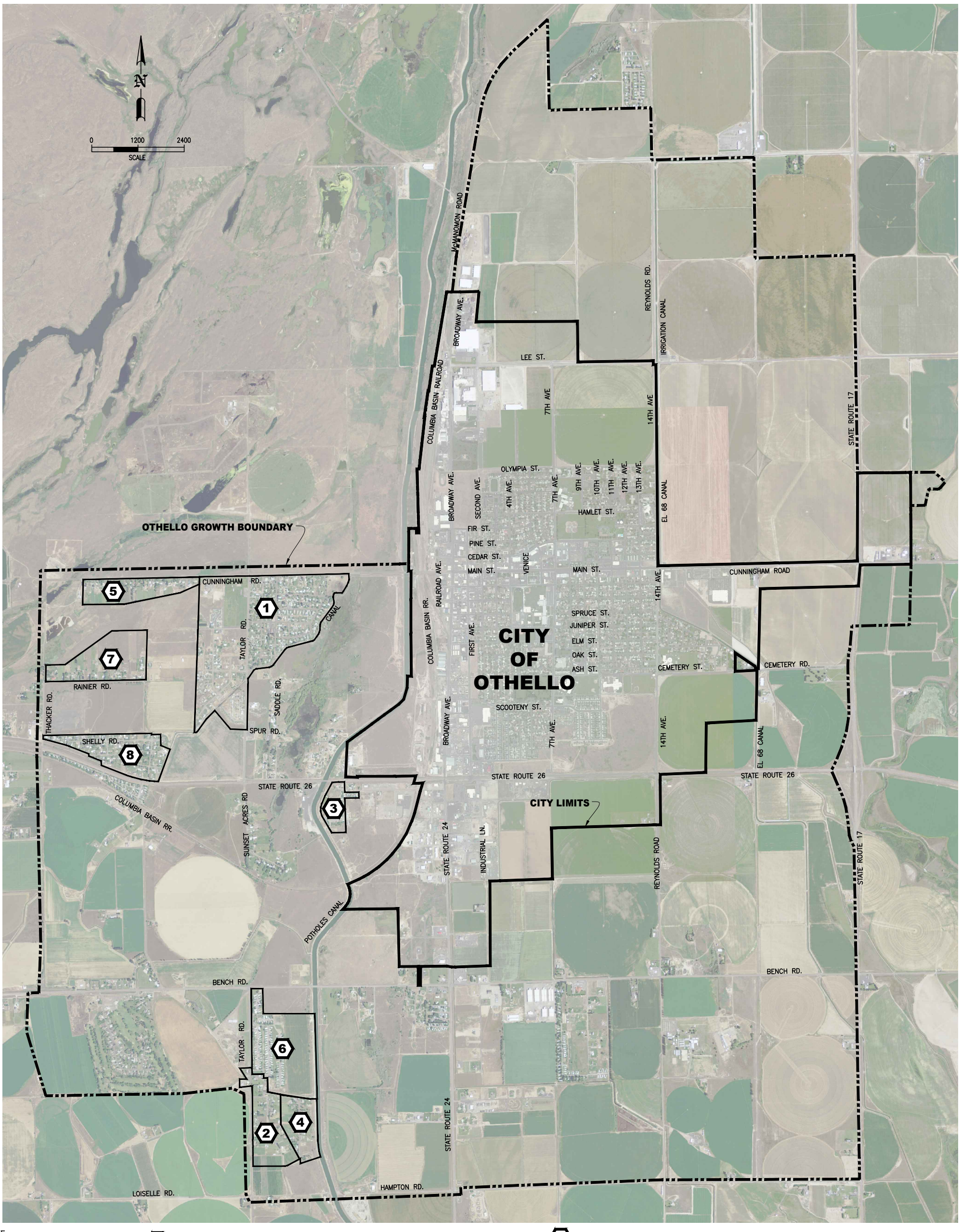
At this time there is inadequate time remaining by the September 30, 2016 DWSRF application deadline to amend the existing WSP, per above, to include the consolidation project(s) and get WSDOH approval.

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 HEWS for review/consideration:	August 31, 2016
City/ HEWS 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/ HEWS 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

N CRESTLINE RD

S CRESTLINE RD

HIGHLAND RD

4" SCH 40

3"

2" SCH 21

2"

2"

WELL

(VACANT)

1

1

HIGHLAND ESTATES
WATER SYSTEM
BOUNDARY

LEGEND

- HEWS BOUNDARY
- PARCEL LINE
- WATER LINE
- WELL
- METER

NOTES

1. RESIDENCE LOCATED OUTSIDE HEWS BOUNDARY BUT HAS WATER SERVICE CONNECTION TO HEWS SYSTEM

0 100 200
SCALE

1720805 Highland Estates Exhibit

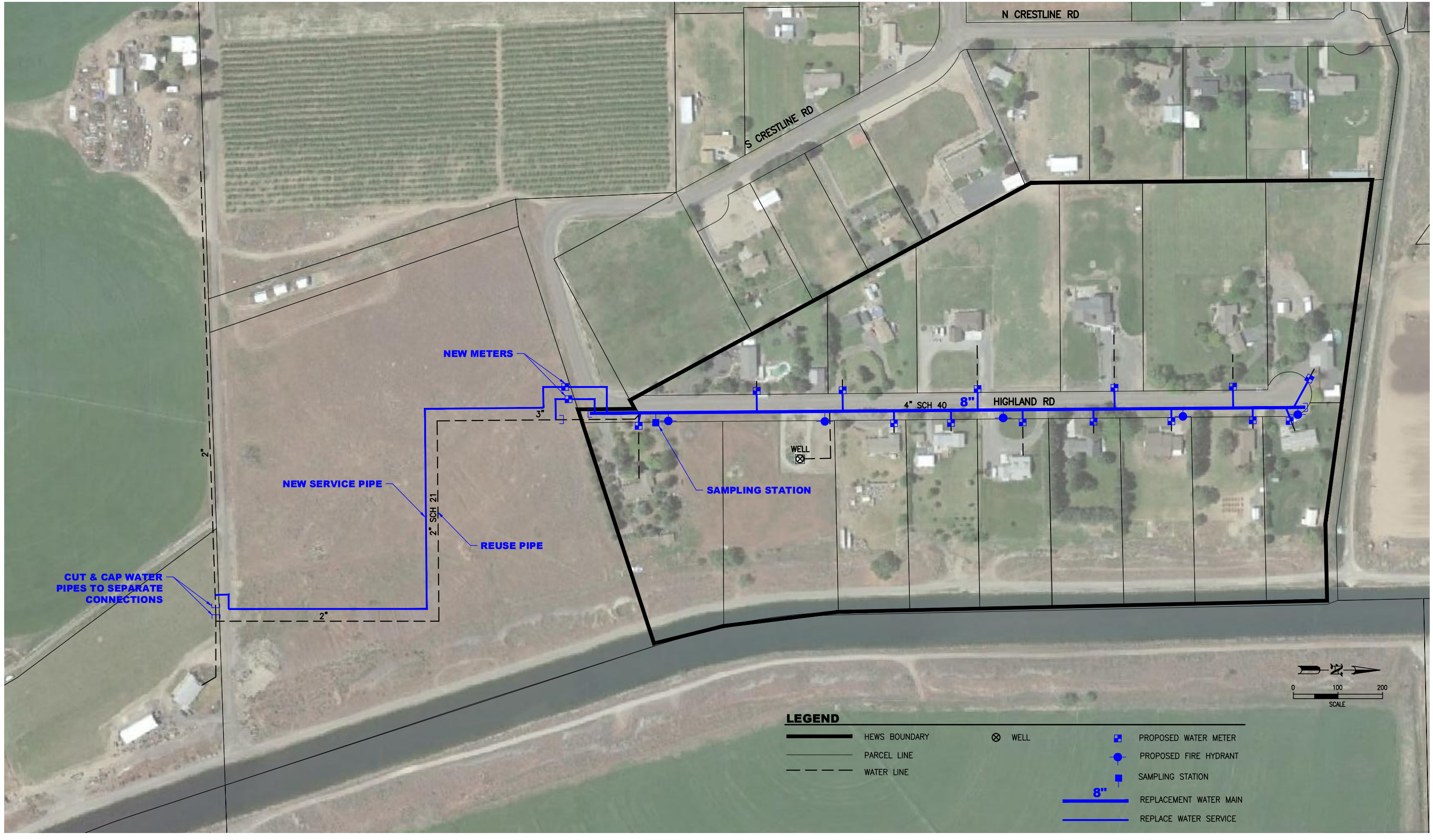
SCALE:	AS SHOWN
DESIGNED:	–
DRAWN:	TVP
CHECKED:	
APPROVED:	
PROJ. NO.:	172-08-05
DATE:	8/3/16

VARELA AND ASSOCIATES, INC.
ENGINEERING AND MANAGEMENT

CITY OF OTHELLO, WASHINGTON
WATER SYSTEM CONSOLIDATION FEASIBILITY STUDIES

HEWS EXISTING WATER SYSTEM AND
WATER SYSTEM BOUNDARY

FIGURE
2



1720805 Highland Estates Exhibit

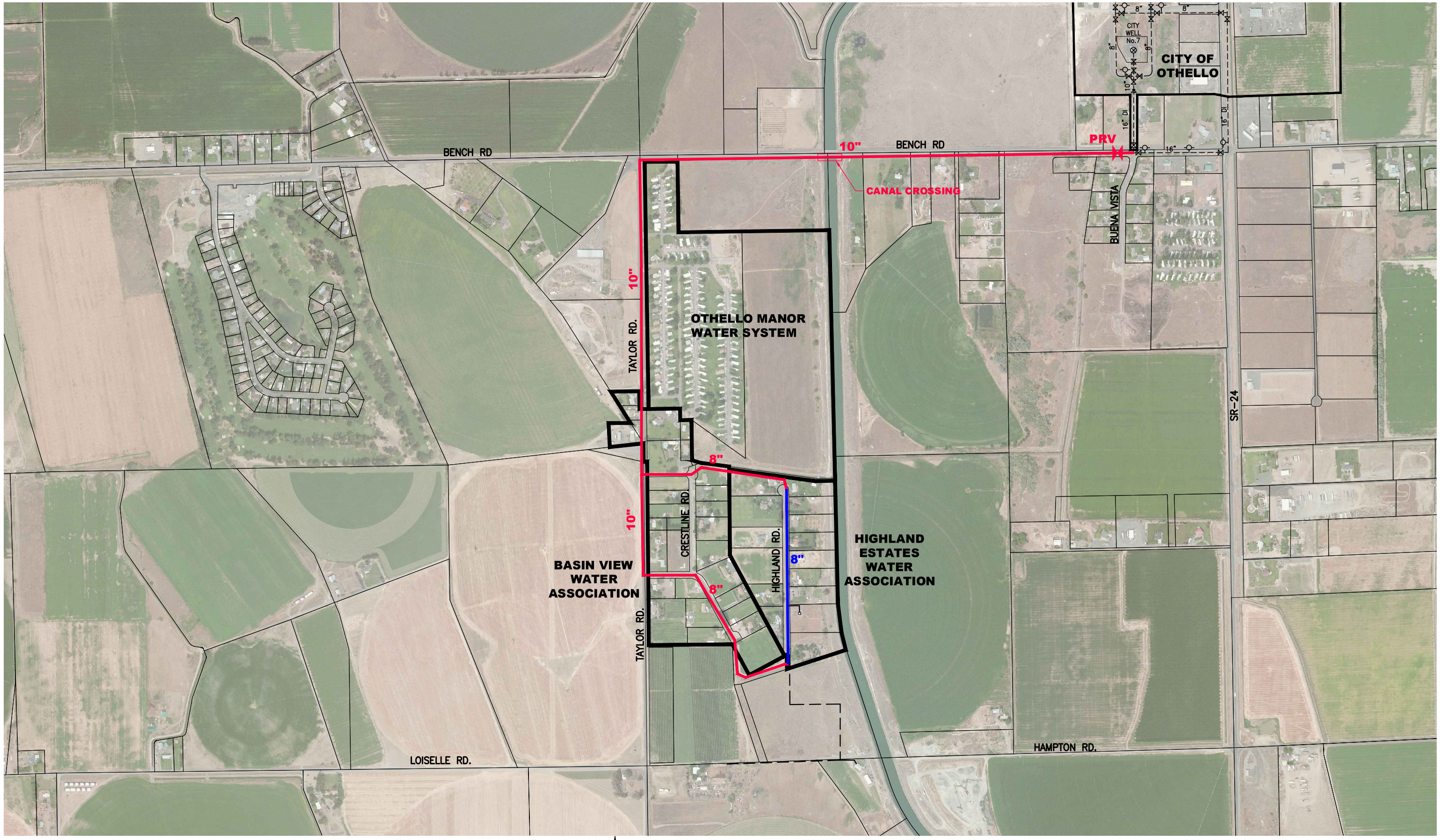
SCALE:	AS SHOWN
DESIGNED:	NVH
DRAWN:	TVP
CHECKED:	
APPROVED:	
PROJ. NO.:	172-08-05
DATE:	8/3/16

VARELA AND ASSOCIATES, INC.
ENGINEERING AND MANAGEMENT

CITY OF OTHELLO, WASHINGTON
WATER SYSTEM CONSOLIDATION FEASIBILITY STUDIES

HEWS IMPROVEMENTS REQUIRED
TO MEET CITY STANDARDS

FIGURE
3



1720805 Highland Estates Exhibit

SCALE:	AS SHOWN
DESIGNED:	NVH
DRAWN:	TVS
CHECKED:	
APPROVED:	
PROJ. NO.:	172-08-03
DATE:	8/3/16

LEGEND

- HEWS BOUNDARY
- PARCEL LINE
- 10" PROPOSED WATER MAIN
- PRV PRESSURE REDUCING VALVE

0 400 800
SCALE

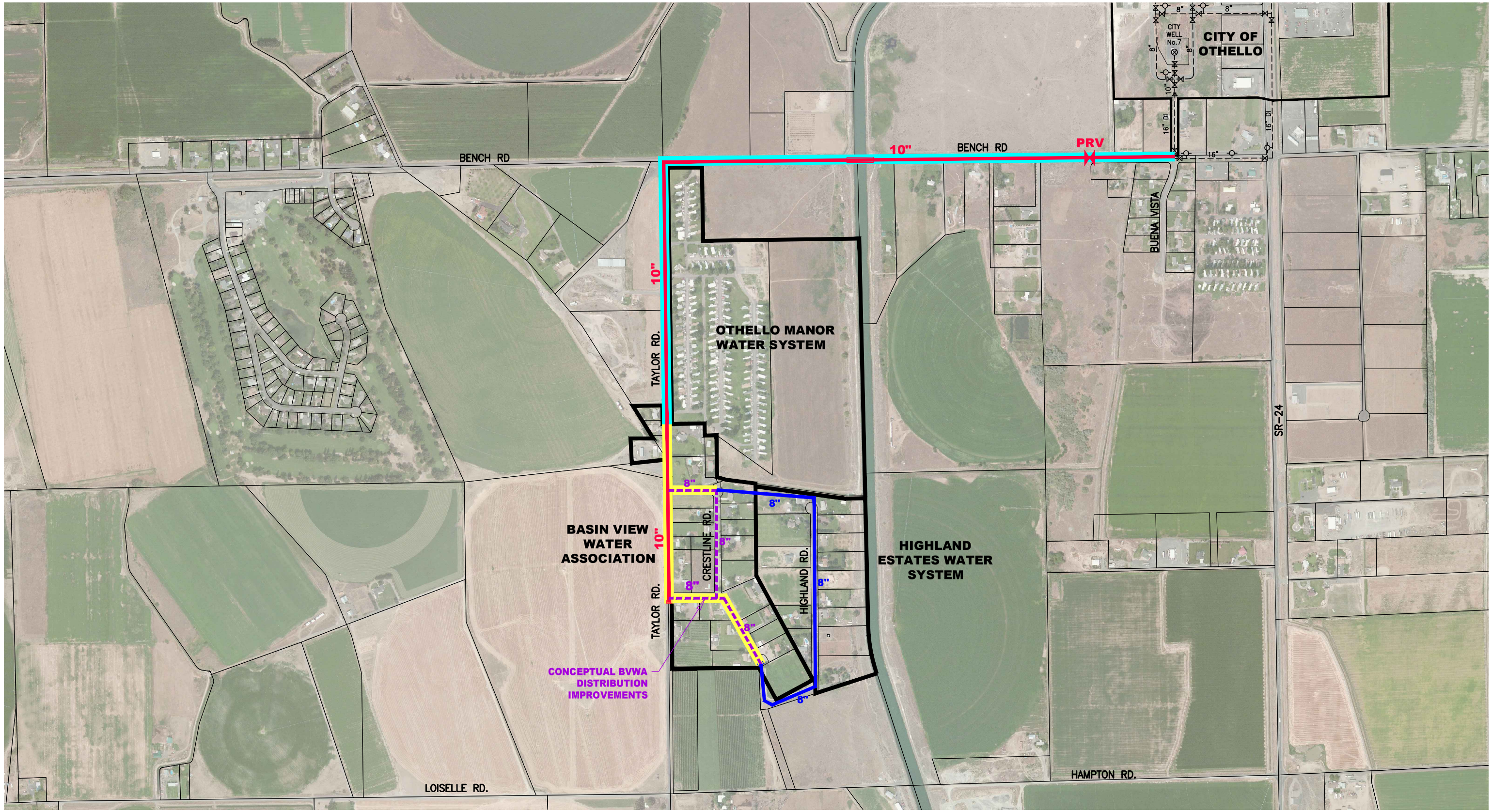
N

VARELA AND ASSOCIATES, INC.
ENGINEERING AND MANAGEMENT

CITY OF OTHELLO, WASHINGTON
WATER SYSTEM CONSOLIDATION FEASIBILITY STUDIES

HEWS CONSOLIDATION IMPROVEMENTS

FIGURE
4



LEGEND

- BOUNDARY
- PARCEL LINE
- 10" PROPOSED TRANSMISSION MAIN
- COST SHARING WITH OMWS & BVWA
- COST SHARING WITH BVWA

0 400 800
SCALE

N

1720805 Highland Estates Exhibit

SCALE:	AS SHOWN
DESIGNED:	JSM
DRAWN:	TVS
CHECKED:	
APPROVED:	
PROJ. NO.:	172-08-03
DATE:	8/3/16

VARELA AND ASSOCIATES, INC.
ENGINEERING AND MANAGEMENT

CITY OF OTHELLO, WASHINGTON
WATER SYSTEM CONSOLIDATION FEASIBILITY STUDIES

COST SHARING WITH OMWS AND BVWA

FIGURE
5

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: 04/18/2016
Printed: 6/29/2016
WFI Printed For: On-Demand
Submission Reason: Pop/Connect 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
32736 0	HIGHLAND ESTATES WATER SYSTEM	ADAMS	A	Comm

6. PRIMARY CONTACT NAME & MAILING ADDRESS

LOREY C. SIELAFF [OPERATOR]
1057 S HI LO DR
OTHELLO, WA 99344-9715

7. OWNER NAME & MAILING ADDRESS — **8. OWNER NUMBER: 007267**

HIGHLAND ESTATES WATER ASSN
SAM REDDING TREASURER
875 S HIGHLAND RD
OTHELLO, WA 99344

STREET ADDRESS IF DIFFERENT FROM ABOVE

ATTN
ADDRESS
CITY STATE ZIP

STREET ADDRESS IF DIFFERENT FROM ABOVE

ATTN
ADDRESS
CITY STATE ZIP

9. 24 HOUR PRIMARY CONTACT INFORMATION

Primary Contact Daytime Phone: (509) 488-3976
Primary Contact Mobile/Cell Phone: (509) 989-0339
Primary Contact Evening Phone: (xxx)-xxx-xxxx
Fax: (509) 488-0219 E-mail: xxxxxxxxxxxxxxxxxxx

10. OWNER CONTACT INFORMATION

Owner Daytime Phone: (509) 488-6357
Owner Mobile/Cell Phone:
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)

12,000

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	Well #1 - AFL230		X										X			Y		X					450	56	NE SW	16	15N	29E

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
32736 0	HIGHLAND ESTATES 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?)		16	17
A. Full Time Single Family Residences (Occupied 180 days or more per year)	16		
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		16	17

29. FULL-TIME RESIDENTIAL POPULATION

A. How many residents are served by this system 180 or more days per year? 52

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 Rights, Well Log

Sackmann & Sackmann
Attorneys at Law
P. O. Box 362
Othello, WA 99344
ATTN: THOMAS F. SACKMANN

STEVE

(183-5636

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

PROGRESS SHEET

COMPUTER INPUT
- [X] APPLICATION
- [ ] PERMIT
- [ ] CERTIFICATE
- [ ] OTHER

[ ] SURFACE WATER [X] GROUND WATER

NAME			TELEPHONE NO.
ASHTON, Robert			488-5676-488-5365
ADDRESS	**(CITY)**	**(STATE)**	**(ZIP CODE)**
~~Route 1, Box 680~~	~~Othello,~~	~~WA~~	~~99344~~
ASSIGNED TO		**TELEPHONE NO.**	**DATE ASSIGNED**
HIGHLAND ESTATES WATER ASSOCIATION		488-5365	3-10-83
ADDRESS	**(CITY)**	**(STATE)**	**(ZIP CODE)**
P. O. BOX ~~430~~ ~~R4 787~~ 787	OTHELLO, WA		99344-0787
APPLICATION NO.	**PERMIT NO.**	**CERTIFICATION NO.**	
G3252??	?	C	
DATE AMENDED	**DATE CANCELLED**	**W.R.I.A.**	
		36	

APPLICATION

DATE APPLICATION RECEIVED	INITIAL $10.00 FEE RECEIVED	DATE FEE RECEIVED
February 18, 1977	[X] YES [ ] NO	February 18, 1977
STATEMENT OF ADDITIONAL EXAMINATION FEE $	**DATE SENT**	**DATE RECEIVED**
DATE RETURNED FOR COMPLETION OR CORRECTION	**DATE RECEIVED**	

TEMPORARY PERMIT

APPROVED BY	DATE ISSUED

PUBLICATION

APPROVED BY	DATE APPROVED	DATE NOTICE SENT
M	2-23-77	March 8, 1977 S

PROTESTED BY AND DATE

DATE AFFIDAVIT RECEIVED	CHECKED BY	TIME EXPIRED	DATE AMENDED NOTICE SENT	DATE AFFIDAVIT RECEIVED	TIME EXPIRED
4-7-77	dLM	4-23-77			

DEPARTMENT OF GAME AND FISHERIES REPORT

OK Game - 12-2-78

APPROVED	PROVISO	PROTEST

EXAMINATION

DATE EXAMINATION MADE	MADE BY	DATE REPORT OF EXAM. WRITTEN	WRITTEN BY	CHECKED BY
11/13/78	DTW	11/27/78	[illegible]	
DATE PERMIT FEE REQUESTED	**AMOUNT DUE**		**DATE RECEIVED**	
6-12-81	$20.00		7-13-84	

PERMIT

PERMIT APPROVED BY	DATE APPROVED	PERMIT NO.	DATE ISSUED
		?	

BEGINNING OF CONSTRUCTION

DATE NOTICE SENT	DATE FILED	EXTENSION FEE
Started		
EXTENDED TO	**EXTENDED TO**	

WELL DRILLER'S AND/OR CONSTRUCTION REPORT

DATE SENT	DATE FILED
	1977

COMPLETION OF CONSTRUCTION

DATE NOTICE SENT	DATE FILED	EXTENSION FEE
Completed		
EXTENDED TO	**EXTENDED TO**	

PROOF OF APPROPRIATION

DATE SENT	DATE FILED	EXTENSION FEE	EXTENDED TO
10-10-84			
DATE CERTIFICATE FEE REQUESTED	**AMOUNT DUE**	**DATE RECEIVED**	**DATE APPROVED FOR CERTIFICATE**	**APPROVED BY**
		10-23-86	11-26-86	CAC

CERTIFICATION

PROOF EXAM. REQUIRED	CERTIFICATE NUMBER	DATE ISSUED
[ ] YES [ ] NO	G3-25232C	12-10-86

REMARKS COLUMBIA BASIN - CL. NOTICE, FINDINGS, PERMIT TO U.S.A.R

DSHS HOLD 3/25/77

PROGRESS

State of Washington
Department of Ecology

APPLICATION FOR PERMIT
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ SURFACE WATER ☒ GROUND WATER

DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

FEB 18 1977

RECEIVED

$10.00 MINIMUM STATUTORY EXAMINATION FEE REQUIRED WITH APPLICATION

(GRAY BOXES FOR OFFICE USE ONLY)

APPLICATION NO. G-32523??	WRIA	COUNTY	PRIORITY DATE	TIME	ACCEPTED
	36	01	2-18-77		

APPLICANT'S NAME: ROBERT ASHTON
BUSINESS TEL: 488-5676
HOME TEL: 488-5365

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
ROUTE 1, BOX 680	OTHELLO	WA	99344

DATE & PLACE OF INCORPORATION IF APPLICANT IS A CORPORATION
not incorporated

1. SOURCE OF SUPPLY

IF SURFACE WATER	IF GROUND WATER
SOURCE (NAME OF STREAM, LAKE, SPRING, ETC.) (IF UNNAMED, SO STATE): not applicable	SOURCE (WELL, TUNNEL, INFILTRATION TRENCH, ETC.): A WELL
TRIBUTARY: not applicable	SIZE AND DEPTH: 8"/400' maximum

2. USE

USE TO WHICH WATER IS TO BE APPLIED (DOMESTIC SUPPLY, IRRIGATION, MINING, MANUFACTURING, ETC.)
DOMESTIC SUPPLY

ENTER QUANTITY OF WATER REQUESTED USING UNITS OF	CUBIC FEET PER SECOND CFS	OR	GALLONS PER MINUTE 100 GPM	ACRE FEET PER YEAR
Continuous Group Domestic Supply				

TIMES DURING YEAR WATER WILL BE REQUIRED
YEAR AROUND

IF IRRIGATION, NUMBER OF ACRES	IF DOMESTIC USE, NUMBER OF UNITS BY TYPE, E.G. 1-HOME, 1-MOBILE HOME, 2-CAMPSITES, ETC.	IF MUNICIPAL USE, ESTIMATED POPULATION 20 YEARS FROM TODAY
not applicable	14 HOMES	N/A

DATE PROJECT WAS OR WILL BE STARTED	DATE PROJECT WAS OR WILL BE COMPLETED
February 18, 1977	December 31, 1977

3. LOCATION OF POINT OF DIVERSION/WITHDRAWAL

3A. IF IN PLATTED PROPERTY

within the SW¼

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)	SECTION	TOWN.	RANGE	ALSO, PLEASE ENCLOSE A COPY OF THE PLAT AND MARK THE POINT(S) OF WITHDRAWAL OR DIVERSION
FU 202	49	Columbia Basin Project	16	15	29	

3B. IF NOT IN PLATTED PROPERTY

ON ACCOMPANYING SECTION MAPS, ACCURATELY MARK AND IDENTIFY EACH POINT OF DIVERSION. SHOW NORTH-SOUTH AND EAST-WEST DISTANCES FROM NEAREST SECTION CORNER OR PROPERTY CORNER.

ALSO, ENTER BELOW THE DISTANCES FROM THE NEAREST SECTION OR PROPERTY CORNER TO THE DIVERSION OR WITHDRAWAL.
1500' WEST AND 1100' NORTH OF THE SW CORNER OF SEC. 16, TWP. 15N, 29 EWM

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	COUNTY
SW1/4	16	15	29 EWM	ADAMS

4. DO YOU OWN THE LAND ON WHICH THIS SOURCE IS LOCATED IF NOT, INSERT NAME & ADDRESS OF OWNER

YES, I OWN THE LAND ON WHICH THIS SOURCE IS LOCATED

5. LEGAL DESCRIPTION OF PROPERTY *ON WHICH WATER IS TO BE USED*

ATTACH A COPY OF THE LEGAL DESCRIPTION OF THE PROPERTY (ON WHICH THE WATER WILL BE USED) TAKEN FROM A REAL ESTATE CONTRACT, PROPERTY DEED OR TITLE INSURANCE POLICY, OR COPY CAREFULLY IN THE SPACE BELOW

(SEE PROPERTY DEED ATTACHED)

I have examined this application as required by S.E.P.A. and find that it is: [ ] not an "action".

Columbia Basin - ☒ categorically exempt.

C.C. NOTICE, FINDINGS, PERMIT TO U.S. 2-18-77

DATE SIGNATURE APPLICATION

ECY 040-1-14(4)
Rev 7-75

WHAT IS YOUR INTEREST IN THE PROPERTY ON WHIC[redacted] WATER IS TO BE USED (PROPERTY OWNER, LESSEE, CO[redacted] PURCHASER, ETC.)

PROPERTY OWNER

ARE THERE ANY EXISTING WATER RIGHTS RELATED TO THE LAND ON WHICH THE WATER IS TO BE USED (INCLUDING WATER PROVIDED BY IRRIGATION DISTRICTS OR DITCH COMPANIES) ☒ YES ☐ NO

IF YES, FROM WHAT SOURCE (i.e. SURFACE OR GROUND WATER) AND UNDER WHAT AUTHORITY

SURFACE WATER - UNDER CONTRACT WITH EAST COLUMBIA BASIN IRRIGATION DISTRICT

6. DESCRIPTION OF SYSTEM PROPOSED OR INSTALLED

(FOR EXAMPLE: SIZE OF PUMP, CAPACITY OF PUMP, PUMP MOTOR HORSE POWER, PIPE DIAMETER, NUMBER OF SPRINKLERS, ETC.)

The system as installed will have a 3 horsepower submersible pump with the capacity to pump 56 gallons per minute from a depth of 140 feet. It will be piped through a four-inch main to supply domestic service to 14 single family residences. Pressure will be maintained by 2 210 gallon pressurized tanks and a pressure pump with a capacity of 55 gallons per minute at 60 P.S.I. It is not anticipated that this water will be used for any other than domestic purposes, with the capacity of the system designed with that in mind.

REMARKS

7.

IF 10 ACRE-FEET OR MORE OF WATER IS TO BE STORED AND/OR IF THE WATER DEPTH WILL BE 10 FEET OR MORE AT THE DEEPEST POINT, A STORAGE PERMIT MUST BE FILED IN ADDITION TO THIS PERMIT. THESE FORMS CAN BE SECURED, TOGETHER WITH INSTRUCTIONS, FROM THE DEPARTMENT OF ECOLOGY.

SIGNATURES

[redacted]
APPLICANT'S SIGNATURE

[redacted]
LEGAL LANDOWNER'S SIGNATURE

ROUTE 1, BOX 680, OTHELLO, WA 99344
LEGAL LANDOWNER'S ADDRESS

FOR OFFICE USE ONLY

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY } ss.

This is to certify that I have examined this application together with the accompanying maps and data, and am returning it for correction or completion as follows: .....

.....

.....

In order to retain its priority date, this application must be returned to the Department of Ecology, with corrections, on or before....., 19.....

Witness my hand this.....*day of*....., 19.....

.....
Department of Ecology

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

CERTIFICATE OF WATER RIGHT

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
February 18, 1977	G3-25232	G3-25232P	G3-25232C

NAME
HIGHLAND ESTATES WATER ASSOCIATION

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
P. O. Box 787	Othello	Washington	99344-0787

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown, but is limited to an amount actually beneficially used.

PUBLIC WATER TO BE APPROPRIATED

SOURCE
a well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	100	12.6

QUANTITY, TYPE OF USE, PERIOD OF USE
100 gallons per minute, 12.6 acre feet per year, continuously, for group domestic supply.

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
1080 feet north and 1700 feet east from the SW corner of Sec. 16

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE E. OR W.M.	W.R.I.A.	COUNTY
NW¼SE¼SW¼	16	15	29 E	36	Adams

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)
Farm Unit 202	49	Columbia Basin Project

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Highland Estates being within a portion of Farm Unit 202, Block 49, Columbia Basin Project, within the SW¼ of Sec. 16, T. 15 N., R. 29 E.W.M.

PROVISIONS

At such time that the Department of Ecology determines that regulation and management of the subject waters is necessary and in the public interest, an approved measuring device shall be installed and maintained in accordance with RCW 90.03.360 or WAC 508-64-020 through WAC 508-64-040.

The amount of water granted is a maximum limit that shall not be exceeded and the water user shall be entitled only to that amount of water within the specified limit that is beneficially used and required.

This authorization to make use of public waters of the state is subject to existing rights, including any existing rights held by the United States for the benefit of Indians under treaty or otherwise.

Maintenance of an access port as described in Ground Water Bulletin No. 1 is required. An airline and gage may be installed in addition to the access port.

If water from facilities of any legally-formed irrigation district is used on any or all of the lands described herein as the place of use, the quantities of water withdrawn under this authorization shall be proportionately reduced to correspond to the acreage for which district water is not available.

All water wells constructed within the state shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells).

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390, and 90.44.020.

This certificate of water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.

Given under my hand and the seal of this office at **Spokane** *Washington, this* **10th** *day of* **December**, *19* **86**.

ANDREA BEATTY RINIKER, Director
Department of Ecology

ENGINEERING DATA
OK CAC

by John L. Arnquist
JOHN L. ARNQUIST, Regional Manager

FOR COUNTY USE ONLY

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

THIS PERMIT SUPERSEDES GROUND WATER PERMIT NO. G3-25232P ISSUED OCTOBER 10, 1984

PERMIT

TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
February 18, 1977	G3-25232	G3-25232P	

NAME
HIGHLAND ESTATES WATER ASSOCIATION

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
P. O. Box 787	Othello	Washington	99344-0787

The applicant is, pursuant to the Report of Examination which has been accepted by the applicant, hereby granted a permit to appropriate the following described public waters of the State of Washington, subject to existing rights and to the limitations and provisions set out herein.

PUBLIC WATER TO BE APPROPRIATED

SOURCE
a well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	100	12.6

QUANTITY, TYPE OF USE, PERIOD OF USE
100 gallons per minute, 12.6 acre feet per year, continuously, for group domestic supply.

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
1080 feet north and 1700 feet east from the SW corner of Sec. 16

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NW¼SE¼SW¼	16	15	29 E	36	Adams

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)
Farm Unit 202	49	Columbia Basin Project

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Highland Estates being within a portion of Farm Unit 202, Block 49, Columbia Basin Project, within the SW¼ of Sec. 16, T. 15 N., R. 29 E.W.M.

DESCRIPTION OF PROPOSED WORKS

A well 8" x 450', distribution system.

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Started	Completed	Completed

PROVISIONS

At such time that the Department of Ecology determines that regulation and management of the subject waters is necessary and in the public interest, an approved measuring device shall be installed and maintained in accordance with RCW 90.03.360 or WAC 508-64-020 through WAC 508-64-040.

The amount of water granted is a maximum limit that shall not be exceeded and the water user shall be entitled only to that amount of water within the specified limit that is beneficially used and required.

This authorization to make use of public waters of the state is subject to existing rights, including any existing rights held by the United States for the benefit of Indians under treaty or otherwise.

A certificate of water right will not be issued until a final examination is made.

The water quantities and uses recommended and/or the number of acres to be irrigated may be reduced at the time of issuance of a final water right commensurate with the capacity of the installed system and the uses and/or the number of acres actually irrigated.

Installation and maintenance of an access port as described in Ground Water Bulletin No. 1 is required. An airline and gage may be installed in addition to the access port.

If water from facilities of any legally-formed irrigation district is used on any or all of the lands described herein as the place of use, the quantities of water withdrawn under this authorization shall be proportionately reduced to correspond to the acreage for which district water is not available.

All water wells constructed within the state shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells).

A well log of the completed well shall be submitted by the driller to the Department of Ecology within thirty (30) days of completion of this well. This well log shall be complete and all information concerning the static water level in the completed well in addition to any pump test data shall be submitted as it is obtained.

This permit shall be subject to cancellation should the permittee fail to comply with the above development schedule and/or fail to give notice to the Department of Ecology on forms provided by that Department documenting such compliance.

Given under my hand and the seal of this office at Spokane *Washington, this* 25th *day of* September *19* 86

ANDREA BEATTY RINIKER, Director
Department of Ecology

by John L. Arnquist
JOHN L. ARNQUIST, Regional Manager

ENGINEERING DATA
OK ...CAC...

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

PERMIT

TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
February 18, 1977	G3-25232	G3-25232P	

NAME
HIGHLAND ESTATES WATER ASSOCIATION

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
P. O. Box 430	Othello	Washington	99344

The applicant is, pursuant to the Report of Examination which has been accepted by the applicant, hereby granted a permit to appropriate the following described public waters of the State of Washington, subject to existing rights and to the limitations and provisions set out herein.

PUBLIC WATER TO BE APPROPRIATED

SOURCE
a well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	100	12.6

QUANTITY, TYPE OF USE, PERIOD OF USE
100 gallons per minute, 12.6 acre feet per year, continuously, for group domestic supply.

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
1100 feet north and 1140 feet east from the SW corner of Sec. 16

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NE¼SW¼SW¼	16	15	29 E.	36	Adams

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)
Farm Unit 202	49	Columbia Basin Project

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Parcel 3 - Vacant

That portion of Farm Unit 202, Irrigation Block 49, Columbia Basin Project, lying in the SW¼ of Sec. 16, T. 15 N., R. 29 E.W.M., Adams County, Washington. Beginning at the SW corner of said Section; thence N 00°24'08" E along the west line of said Section, 1496.41 feet to the SW corner of the plat of Basin View Plat, as per plat recorded in Volume 3, on Page 65, of Plats, records of Adams County, Washington; thence 89°35'52" E along the south line of said Plat 55.61 feet; thence S 27°31'52" E 468.2 feet to the most southerly corner of said Plat; thence S 01°29'23" E 360.5 feet; thence S 17°04' E 732.34 feet to the south line of said Section; thence S 89°02'39" W along said south line 1006.95 feet to said SW corner of Sec. 16. Subject to easements for rights of way for County roads along the west and south boundaries of the described area.

DESCRIPTION OF PROPOSED WORKS

A well 8" x 450', distribution system.

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Started	Completed	October 1, 1985

PROVISIONS

At such time that the Department of Ecology determines that regulation and management of the subject waters is necessary and in the public interest, an approved measuring device shall be installed and maintained in accordance with RCW 90.03.360 or WAC 508-64-020 through WAC 508-64-040.

The amount of water granted is a maximum limit that shall not be exceeded and the water user shall be entitled only to that amount of water within the specified limit that is beneficially used and required.

This authorization to make use of public waters of the state is subject to existing rights, including any existing rights held by the United States for the benefit of Indians under treaty or otherwise.

A certificate of water right will not be issued until a final examination is made.

The water quantities and uses recommended and/or the number of acres to be irrigated may be reduced at the time of issuance of a final water right commensurate with the capacity of the installed system and the uses and/or the number of acres actually irrigated.

Installation and maintenance of an access port as described in Ground Water Bulletin No. 1 is required. An airline and gage may be installed in addition to the access port.

This authorization for the withdrawal of public ground waters within the boundaries of the Columbia Basin Project is based on a tentative conclusion that public ground waters are available. If, however, it is subsequently determined by the department that public ground waters are not available in the amounts authorized for withdrawal, the department shall, by order of notification, withdraw or modify the authority granted therein as may be appropriate. In accordance with WAC 508-14-030(2)(b), no certificate of water right as provided for in RCW 90.44.080, shall be issued by the Department of Ecology until such time as a more definite determination can be reached as to the availability of public ground waters in an area described in WAC 508-14-030(3).

If water from facilities of any legally-formed irrigation district is used on any or all of the lands described herein as the place of use, the quantities of water withdrawn under this authorization shall be proportionately reduced to correspond to the acreage for which district water is not available.

All water wells constructed within the state shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells).

(provisions continued)

This permit shall be subject to cancellation should the permittee fail to comply with the above development schedule and/or fail to give notice to the Department of Ecology on forms provided by that Department documenting such compliance.

Given under my hand and the seal of this office at Spokane *Washington, this* 10th *day of* October, *19* 84

DONALD W. MOOS, Director
Department of Ecology

ENGINEERING DATA
OK J.M.L.

by John L. Arnquist
JOHN L. ARNQUIST, Regional Manager

A well log of the completed well shall be submitted by the driller to the Department of Ecology within thirty (30) days of completion of this well. This well log shall be complete and all information concerning the static water level in the completed well in addition to any pump test data shall be submitted as it is obtained.

RECEIVED
NOV 8 1985
DEPARTMENT OF ECOLOGY
REGIONAL OFFICE

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Rec 10/28/85

REPORT OF EXAMINATION
PROOF OF APPROPRIATION OF WATER

☒ Surface Water

☐ Ground Water

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
		G3-25232	

NAME Highland Estates

ADDRESS (STREET) (CITY) (STATE) (ZIP CODE)

PUBLIC WATERS APPROPRIATED

SOURCE

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR

QUANTITY, TYPE OF USE, PERIOD OF USE

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R.I.A.	COUNTY
	16	15	29 E	36	ADAMS

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS USED

2/10/86 Review of file indicates original application requested POU of Highland Estates. Somehow permit was issued for Parcel 3 shown on deed included with app. Public notice is OK for POU & POW.

We will issue superseding permit to correct DOE errors and request cert. fee.

All this explained to Highland secretary Anita Cummings today.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

REPORT OF EXAMINATION
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
February 18, 1977	G3-25232		

NAME
HIGHLAND ESTATES WATER ASSOCIATION

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
P. O. Box 430	Othello	Washington	99344

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
a well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	100	12.6

QUANTITY, TYPE OF USE, PERIOD OF USE
100 gallons per minute, 12.6 acre feet per year, continuously, for group domestic supply.

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION—WITHDRAWAL
1100 feet north and 1140 feet east from the SW corner of Sec. 16

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
NE¼SW¼SW¼	16	15	29 E.	36	Adams

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)
Farm Unit 202	49	Columbia Basin Project

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Parcel's description

That portion of Farm Unit 202, Irrigation Block 49, Columbia Basin Project, lying in the SW¼ of Sec. 16, T. 15 N., R. 29 E.W.M., Adams County, Washington. Beginning at the SW corner of said Section; thence N 00°24'08" E along the west line of said Section, 1496.41 feet to the SW corner of the plat of Basin View Plat, as per plat recorded in Volume 3, on Page 65, of Plats, records of Adams County, Washington; thence 89°35'52" E along the south line of said Plat 555.61 feet; thence S 27°31'52" E 468.2 feet to the most southerly corner of said Plat; thence S 01°29'23" E 360.5 feet; thence S 17°04' E 732.34 feet to the south line of said Section; thence S 89°02'39" W along said south line 1036.95 feet to said SW corner of Sec. 16. Subject to easements for rights of way for County roads along the west and south boundaries of the described area.

555.61

DESCRIPTION OF PROPOSED WORKS

A well 8" x 450', distribution system.

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE:
Started	Completed	October 1, 1985

REPORT

BACKGROUND

An application to appropriate public ground water was submitted by Robert Ashton to the Department of Ecology on February 18, 1977. The application was accepted and assigned Ground Water Application No. G3-25232. The application was then assigned to Highland Estates Water Association on December 15, 1982, which is the present holder of this application. The applicant proposes to withdraw ground water from a well in the amount of 100 gallons per minute for continuous group domestic supply of 14 units. The proposed point of withdrawal is to be located within Farm Unit 202, Irrigation Block 49 of the Columbia Basin Irrigation Project, within the SW¼ of Sec. 16, T. 15 N., R. 29 E.W.M., Adams County, Washington.

A notice of application was duly published in accordance with RCW 90.03.280; no protests or objections were received.

This application is exempt from the provisions of the State Environmental Policy Act (SEPA) of 1971, Chapter 43.21C RCW.

INVESTIGATION

The field examination for this application was conducted by Dan Weis, State Watermaster, on November 16, 1978. It was found that the proposed well had already been constructed and was in production. This project is located approximately 2 miles southwest of Othello, Washington. Any irrigation of lands on this project is conducted with waters available from the East Columbia Basin Irrigation District.

The applicant's lands are located within the exterior boundaries of the Federal Columbia Basin Irrigation Project. The construction and operation of project facilities and the delivery of imported surface waters have had a major impact on the ground water hydrology in the Columbia Basin. Intentional and incidental water losses from project facilities and irrigated lands have caused a general rise in the ground water levels, which has resulted in making water available in underground storage artificially. Such water is designated as "artificially stored ground water." With the project there has been a substantial commingling of naturally occurring and artificially stored ground water.

As certain persons and entities claim interests to portions of these commingled waters, the department, in 1967, adopted an interim policy, Chapter 508-14 WAC, to guide the department in granting authority to make withdrawals from these commingled waters until ground water subareas are established under the procedures set forth in RCW 90.44.130. Two provisions of the this interim policy apply to all applications for ground water permits within the exterior boundaries of the Columbia Basin Project, but outside established ground water management subareas:

1) Permits may be issued if it appears to the department as a tentative conclusion that public ground waters are available; however, all such permits shall be conditioned that if it is subsequently determined by the department that public waters are not available in the amounts authorized for withdrawal by such permits, the department shall, by order of notification, withdraw or modify the authority granted therein as may be appropriate.

2) No certificates of water right as provided for in RCW 90.44.080 shall be issued by the department until such time as a more definite determination can be reached as to the availability of public waters.

Since the applicant's land lie within the Columbia Basin Project, but outside of an established ground water management subarea, these provisions would apply to this application.

Wells in this area tap a water table aquifer within the sedimentary formations which overlie the Columbia River Basalts or the artesian waters within interflow zones of the basalts. The sedimentary formations consist of sands, gravels and clays and may attain a thickness of up to 300 feet. Aquifers within the basalt occur principally in tabular zones between the basalt flows. These zones are generally composed of scoriaceous basalt, cinder beds, granular sediments or volcanic ash.

There are numerous wells in this area constructed within the sediments or basalts. None of the wells have experienced any noticeable decline in water levels and no reports of well interference have been made to the department.

A review of Department of Ecology records indicate no other pending applications, permits or certificates appurtenant to this project.

A common usage rate for this type of use is 0.9 acre feet per unit, or 12.6 acre feet per year for the 14 units served.

CONCLUSIONS AND RECOMMENDATIONS

It is the tentative conclusion of this examiner that: public ground water is available for appropriation for a beneficial use; that group domestic supply is a beneficial use; that the appropriation of such water will not impair existing rights or be detrimental to the public welfare.

It is recommended that this application for a public ground water permit be approved in the amount of 100 gallons per minute, 12.6 acre feet per year, continuously, for group domestic supply, subject to the following provisions:

"At such time that the Department of Ecology determines that regulation and management of the subject waters is necessary and in the public interest, an approved measuring device shall be installed and maintained in accordance with RCW 90.03.360 or WAC 508-64-020 through WAC 508-64-040."

"The amount of water granted is a maximum limit that shall not be exceeded and the water user shall be entitled only to that amount of water within the specified limit that is beneficially used and required."

"This authorization to make use of public waters of the state is subject to existing rights, including any existing rights held by the United States for the benefit of Indians under treaty or otherwise."

The water source and/or water transmission facilities are not wholly located upon the land owned by the applicant. Issuance of a permit by this department for appropriation of the waters in question does not convey a right of access to, or other right to use, land which the applicant does not legally possess. Obtainment of such right is a private matter between applicant and owner of that land.

"A certificate of water right will not be issued until a final examination is made."

"The water quantities and uses recommended and/or the number of acres to be irrigated may be reduced at the time of issuance of a final water right commensurate with the capacity of the installed system and the uses and/or the number of acres actually irrigated."

"Installation and maintenance of an access port as described in Ground Water Bulletin No. 1 is required. An airline and gage may be installed in addition to the access port."

"This authorization for the withdrawal of public ground waters within the boundaries of the Columbia Basin Project is based on a tentative conclusion that public ground waters are available. If, however, it is subsequently determined by the department that public ground waters are not available in the amounts authorized for withdrawal, the department shall, by order of notification, withdraw or modify the authority granted therein as may be appropriate. In accordance with WAC 508-14-030(2)(b), no certificate of water right as provided for in RCW 90.44.080, shall be issued by the Department of Ecology until such time as a more definite determination can be reached as to the availability of public ground waters in an area described in WAC 508-14-030(3)."

"If water from facilities of any legally-formed irrigation district is used on any or all of the lands described herein as the place of use, the quantities of water withdrawn under this authorization shall be proportionately reduced to correspond to the acreage for which district water is not available."

"All water wells constructed within the state shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells)."

"A well log of the completed well shall be submitted by the driller to the Department of Ecology within thirty (30) days of completion of this well. This well log shall be complete and all information concerning the static water level in the completed well in addition to any pump test data shall be submitted as it is obtained."

Signed at Spokane, Washington this
12th day of June, 1984

DANNIE J. WEIS
Resource Management Division
Department of Ecology

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No. G3-25233

Permit No. .....

(1) OWNER: Name Robert ASTON Address Othello, WN

(2) LOCATION OF WELL: County Adams Unit 208 Block 49 1/4 Sec. 16 T. 15 N., R. 29 W.M.

Bearing and distance from section or subdivision corner W½-SW¼

(3) PROPOSED USE: Domestic [X] Industrial [ ] Municipal [ ]
Irrigation [ ] Test Well [ ] Other [ ]

(4) TYPE OF WORK: Owner's number of well (if more than one) .....
New well [X] Method: Dug [ ] Bored [ ]
Deepened [ ] Cable [ ] Driven [ ]
Reconditioned [ ] Rotary [X] Jetted [ ]

(5) DIMENSIONS: Diameter of well 8 inches.
Drilled 450 ft. Depth of completed well 450 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 8 " Diam. from 0 ft. to 177 ft.
Threaded [ ] " Diam. from ..... ft. to ..... ft.
Welded [X] " Diam. from ..... ft. to ..... ft.

Perforations: Yes [ ] No [X]
Type of perforator used .....
SIZE of perforations ..... in. by ..... in.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.

Screens: Yes [ ] No [X]
Manufacturer's Name .....
Type ..... Model No. .....
Diam. ..... Slot size ..... from ..... ft. to ..... ft.
Diam. ..... Slot size ..... from ..... ft. to ..... ft.

Gravel packed: Yes [ ] No [X] Size of gravel: .....
Gravel placed from ..... ft. to ..... ft.

Surface seal: Yes [X] No [ ] To what depth? 177 ft.
Material used in seal Cement & Clay
Did any strata contain unusable water? Yes [ ] No [X]
Type of water? ..... Depth of strata .....
Method of sealing strata off .....

(7) PUMP: Manufacturer's Name .....
Type: ..... H.P. .....

(8) WATER LEVELS: Land-surface elevation above mean sea level 1150 ft.
Static level 90 ft. below top of well Date 7-25-77
Artesian pressure ..... lbs. per square inch Date .....
Artesian water is controlled by ..... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes [ ] No [X] If yes, by whom? .....
Yield: ..... gal./min. with ..... ft. drawdown after ..... hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test .....
Bailer test ..... gal./min. with ..... ft. drawdown after ..... hrs.
Artesian flow ..... g.p.m. Date .....
Temperature of water ..... Was a chemical analysis made? Yes [ ] No [ ]

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Soil	0	4
Gravel	4	67
Sandy Clay	67	166
Med Grey	166	217
Brown Broken	217	224
Hard Grey	224	294
Green Clay	294	297
Med Basalt/Broken Seams	297	347
Red Cinders Water	347	368
Hard Grey Basalt	368	401
Med Grey	401	423
Pays Black Water	423	431
Hard Grey	431	450

RECEIVED
AUG 30 1977
DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

Work started 7-19 19 77 Completed 7-25 19 77

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME L+L Drilling Inc. (Person, firm, or corporation) (Type or print)

Address Othello, WN

[Signed] Larry Cubley (Well Driller)

License No. 0518 Date 8-24 19 77

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 4-71)
ECY-070-28

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Well Tagging Form

Unique Well Tag No: AFL 230

327360 01

RECORD VERIFICATION (check ✓ one)

- ☐ Well Report available *(please attach this form to the well report and submit it to the Ecology Regional Office near you)*
- ☐ Verification inconclusive
- ☐ Well Report not available

WELL OWNERSHIP, IF DIFFERENT FROM WELL REPORT

First Name: Highland Estates Water Sys. Last Name:

Street Address: PO Box 787

City: Othello, 99344 State: WA

LOCATION OF WELL, IF DIFFERENT FROM WELL REPORT

Well Address:

City: County:

T. 15 N. R. 29 E W.M. Sec. 16 NE 1/4 of the SW

FOR AGENCY USE ONLY

Latitude 46 47 . 07 . 99219 N"

Longitude 119 11 . 30 . 71924 W"

Send info

Elevation at land surface 321 feet/meters *(circle one)*

- ☒ GPS
- ☐ Topographic Map
- ☐ Survey
- ☐ Computer generated

- ☐ Digital Altimeter
- ☐ Topographic Map
- ☒ Other GPS

Additional information, if available:

- ☐ Location marked on topographic map *(please attach)*
- ☐ Location marked on air photo *(please attach)*

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

FOR AGENCY USE ONLY

WELL CHARACTERISTICS

Physical Description of well (size of casing, type of well, housing, etc.)

Location of Well identification Tag:

Was supplemental tag needed for ease of identifying well? ☐ Yes ☒ No

If yes, where was tag placed?

D	C	B	A
E	F	G	H
M	(L)	K	J
N	P	Q	R

Scale 1:24,000 (1"=2,000')

Indicate the location of the well within the Section by drawing a dot at that point.

SECTION 16

COMMENTS:

FOR ECOLOGY WATER RESOURCES PROGRAM ONLY

Water Right # _____ Date Issued _____

Circle One: Application Permit Certificate Claim Exempt

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)

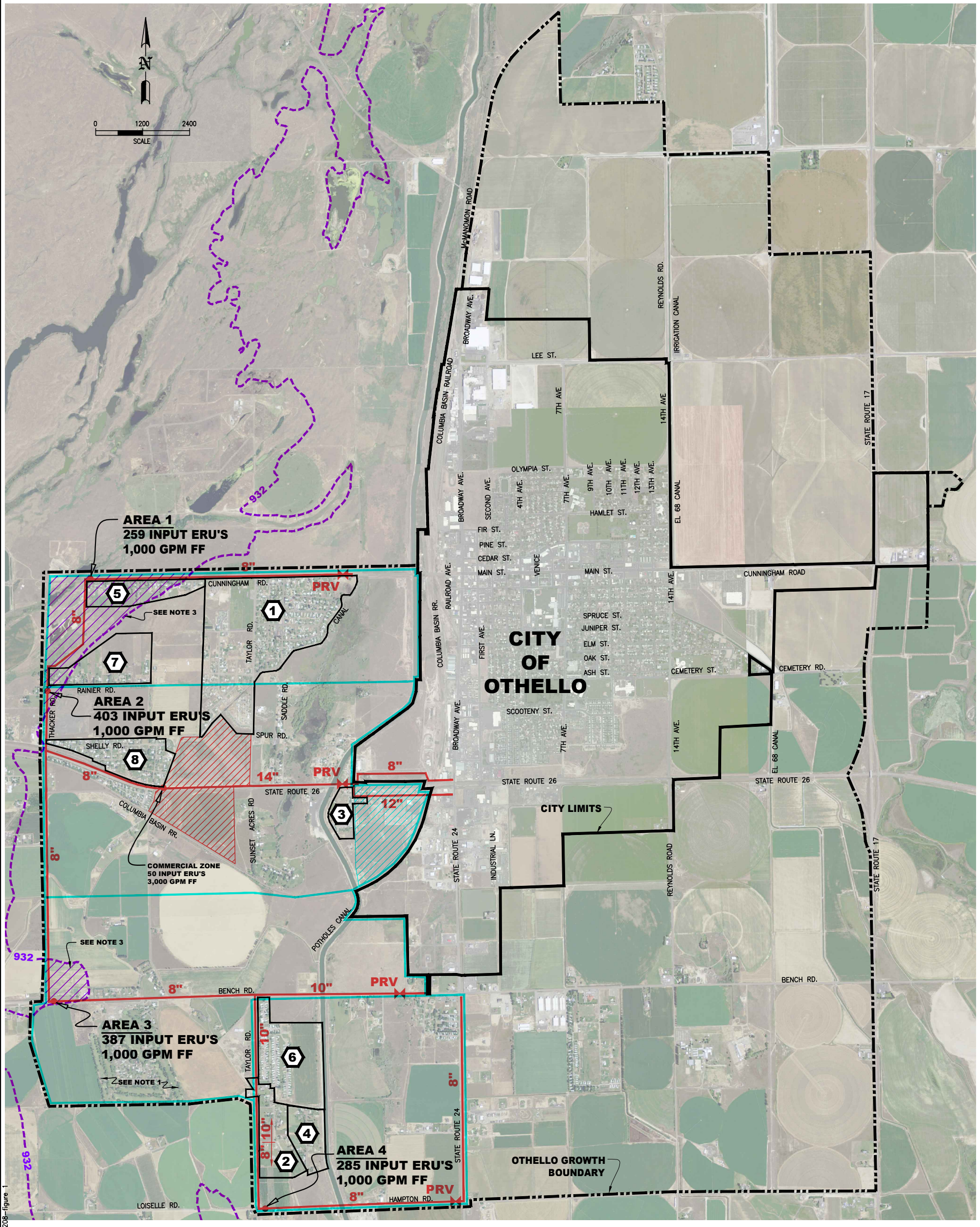
15. ADD, MDD, PHD and FF were evaluated based on the CFS UGA land area

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

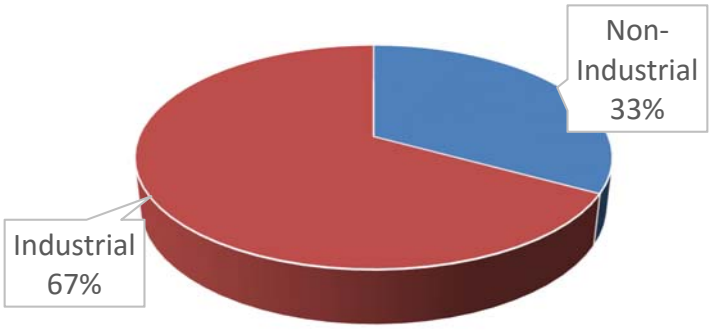
Option	Advantages	Disadvantages
5) Use Well 6 as ASR Injection Well	• May reduce concentration of fluoride in Well 6 to below MCL. • Would not require reducing the pumping rate of Well 6 • If ASR implemented, may slow the decline of the Wanapum aquifer • Supplemental source of supply would reduce the 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

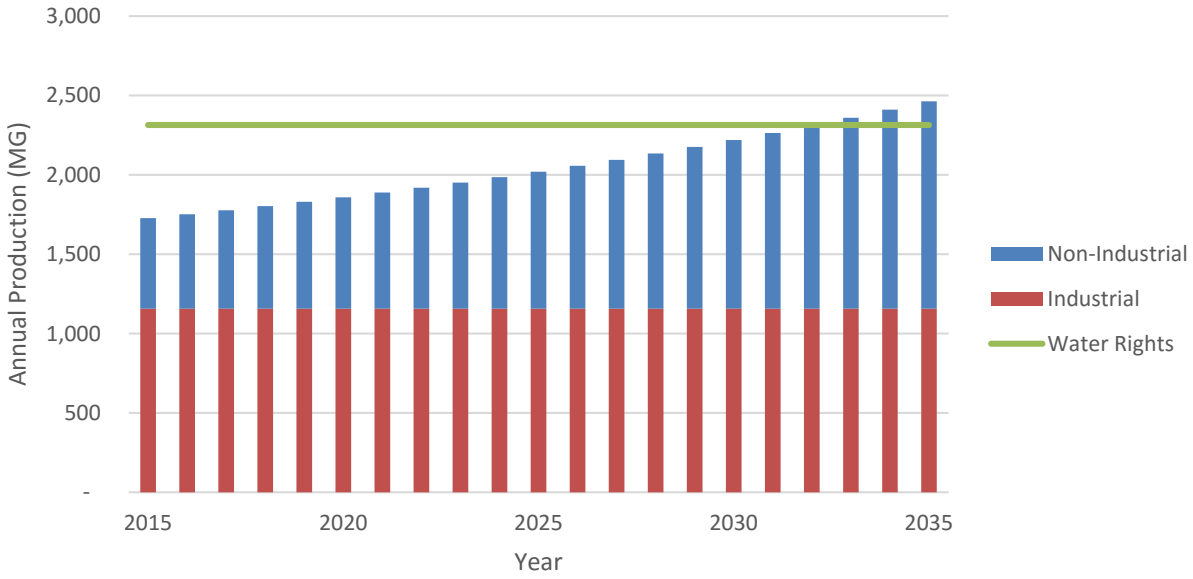
On March 28, 2016 Othello adopted its updated Comprehensive Plan (Comp Plan). The Comp Plan lays out an ambitious vision for growth in Othello which includes population growing from 7,780 in 2015 to 17,825 in 2035. The population growth projected in the Comp Plan equates to an annual rate of 4.23%. In 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



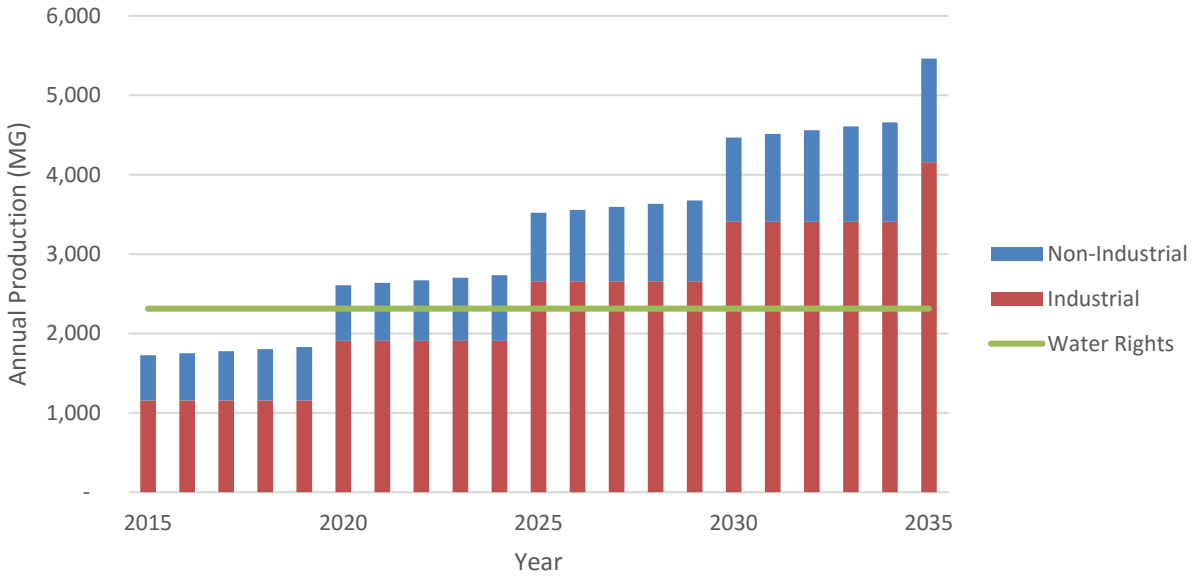
If non industrial water use increases proportionally with projected population growth and industrial demand remains static, the following demand curve results:

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.*