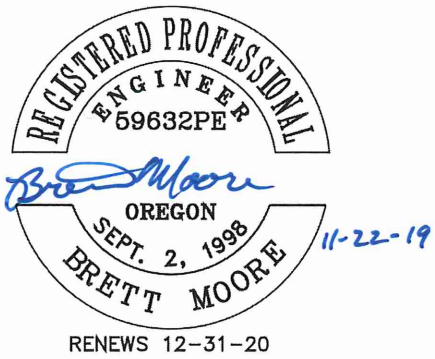
CITY OF

ECHO, OREGON

AMENDMENT TO THE 2015 WASTEWATER FACILITIES PLAN UPDATE

NOVEMBER 2019



ANDERSON PERRY & ASSOCIATES, INC.

La Grande, Redmond, and Hermiston, Oregon
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Job No. 1391-28

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Introduction

The City of Echo, Oregon's 2015 Wastewater Facilities Plan Update (WWFP Update) recommended improvements to the City's collection, treatment, and disposal systems. The City has pursued implementation of the recommended improvements but is experiencing difficulty obtaining appropriate land for the recommended storage lagoon. The inability to acquire land is preventing them from meeting the time constraints of their Oregon Department of Environmental Quality (DEQ) issued Mutual Agreement and Order. Failure to meet the stipulated dates has placed the City at risk of fines and other enforcement actions for not complying with their National Pollutant Discharge Elimination System (NPDES) Permit. To eliminate the issue of land acquisition, an alternative disposal method has been developed.

Additionally, the City has received a proposal for the Northgate Development on land north of the City that may create wastewater flows well beyond the projected growth based on population presented in the WWFP Update. If this development moves forward, it would have a significant impact on any selected wastewater treatment and disposal approach. To address this potential impact to the City's plan, a two-phase option is presented, with the first phase addressing the base projected growth and the second phase for implementation if the Northgate Development proceeds. If this development proceeds in the future, the required improvements would be pursued separately and be paid for from System Development Charges.

Background

The WWFP Update noted that collection system improvements are needed to the City's single lift station and pressure sewer line leading to the wastewater treatment plant (WWTP). The improvements would increase pumping flow rates, correct system control deficiencies, and replace outdated emergency and backup systems. A preliminary design of these improvements has been completed.

The WWFP Update also outlined WWTP improvements associated with influent metering; replacing/ reconstructing lagoon valving, piping, and inlets; removal of sludge and debris; and restoration of the access road and bridge.

The current method for effluent disposal is evaporation during the summer and surface water discharge of treated and disinfected effluent during the winter (November 1 to April 30). The City is also allowed to distribute the reclaimed water on land for dissipation by evapotranspiration and controlled seepage using sound irrigation practices. The compliance issues of the system are related to the location of the City's outfall, which has not provided adequate mixing of the effluent in the Umatilla River, and the inability of the treatment lagoons to consistently and effectively produce effluent that meets the treatment limits stated in the City's NPDES Permit. Faced with likely revisions of regulations governing the disposal of effluent to the Umatilla River, the City decided that future effluent disposal will not include surface water discharge.

The DEQ has also requested that the City evaluate the use of the current Portland State University (PSU) Population Research Center (PRC) forecast growth rates instead of the Umatilla County Comprehensive Plan forecast growth rates used in the 2015 WWFP Update. Also, the adjusted end of the 20-year planning period to 2042 (anticipated end of construction) is considered. The Comprehensive Plan has a forecast growth rate of 0.8 percent. This is what was used in the 2015 WWFP Update to develop a target population of 828 in 2034. The PSU PRC (certified population estimate July 1, 2018) has an

estimated growth rate from 2015 to 2035 for Echo of 0.3 percent with a 2018 population of 710. Applying this growth rate to the year 2042 would provide a design population of 763 with an estimated Average Annual Flow of 0.054 million gallons per day (MGD). This is approximately 0.004 MGD less than was used in the 2015 WWFP Update. Anderson Perry & Associates, Inc., suggests using the design criteria shown in the 2015 WWFP Update, as the difference between this and the PRC growth rate ending in 2042 is too small to affect a change in the proposed improvements.

Option 3A - Phase 1 New Alternative Description

The proposed Phase 1 disposal method is based on increasing evaporation in the City's lagoon system to eliminate current effluent flows and minimize future effluent flows. Flows that exceed the evaporation rate would be pumped via a proposed pump station and forcemain to the City of Stanfield for further treatment and disposal. This could be accomplished by installing a new pump in the existing pump building and piping from the building to the canal, along the canal under Interstate 84 (I-84), then along I-84 to a manhole near the Pilot Truck Stop. A 7.5 horsepower (Hp) centrifugal pump with a 4-inch diameter pipeline is anticipated to be used, with a maximum pumping rate of 100 gallons per minute (gpm). To accomplish this transfer, the Cities of Echo and Stanfield have prepared an intergovernmental agreement (IGA) that set flow criteria and payment rates for accepting the effluent.

Increasing evaporation at the City's lagoon could be achieved by installing a floating fountain system that sprays water from the pond into the air over the pond. The water droplets increase the surface area of water in contact with air, resulting in an increase in the total amount of evaporation. Data on an evaporative system such as this are somewhat limited, so a conservative approach to design was used. For example, sprinkler irrigation loss information suggests a 15 percent evaporation loss rate could be achieved; however, a 5 percent loss rate was used for planning.

As the City of Echo experiences growth and increased wastewater flows, or a wet weather year occurs, there will be periods when evaporation and the available storage capacity will be exceeded. Using an IGA, these excess flows would be pumped to the City of Stanfield via a new transfer pump station and forcemain to the nearest Stanfield collection system manhole.

The attached water balance, using the design criteria from the 2015 WWFP Update, presents projected wastewater flows for the year 2034 with no adjustments for infiltration and inflow reductions (see Figure 1). This balance is based on the fountains operating during the evaporation months of March through October with a pumping rate of 800 gpm. Monthly evaporation rates vary based on pan evaporation data. At these projected 2034 influent flows, approximately 1.6 million gallons (MG) of effluent would be discharged to the Stanfield system in a typical year. The use of the PRC population forecast for a projected 2042 population would provide slightly lower but similar results.

For effluent flows sent to Stanfield for further treatment and disposal, it has been confirmed that the Stanfield WWTP can handle these flows and still meet permit limits. The City of Stanfield's 2008 Wastewater System Improvements design Drawings indicate a facility with the following capacity:

Average Annual Flow: 0.281 MGD
Maximum Month Flow: 0.331 MGD
Biochemical Oxygen Demand (BOD): 662 pounds per day (lbs/day)
Total Suspended Solids (TSS): 662 lbs/day

The City of Stanfield's average 2018 flows are 0.126 MGD, with current influent BOD and TSS at 256 lbs/day and 291 lbs/day, respectively. The design flows and loads from the City of Echo are 0.012 MGD, 5 lbs/day BOD, and 7 lbs/day TSS. Adding the influent flows and loadings from Stanfield to the proposed flows and loadings from Echo provides a total influent flow of 0.138 MGD, 261 lbs/day BOD, and 298 lbs/day TSS. This is less than half of the design capacity of the Stanfield WWTP. As shown in the water balance on Figure 1, flows are only expected to be sent to Stanfield during winter months when evaporation is low. The anticipated flows from the water balance are used in the Stanfield analysis with expected lagoon effluent BOD and TSS concentrations.

The ammonia limit for Stanfield's WWTP is 28 milligrams per liter (mg/L) monthly average. The Daily Monitoring Reports (DMRs) do not have an influent ammonia test result shown. The range of anticipated ammonia in domestic wastewater is between 20 and 40 mg/L. Using 40 mg/L for influent ammonia as the worst case, the nitrification capacity of the trickling filter can be determined based on the BOD loading rate of the trickling filter. The trickling filter has a total volume of 22,600 cubic feet of rock media. The expected influent BOD loading to the trickling filter would be 70 percent of the Stanfield load (30 percent reduction in the primary clarifier) plus all of the Echo load (assume non-settleable BOD). This equates to 184 lbs/day of BOD and 8.2 pounds per 1,000 cubic feet of filter. Table 11-17 of Metcalf and Eddy (Third Edition, 1991) indicates that a minimum of 75 percent of ammonia would be nitrified at these loading rates in a rock media trickling filter. This means that an influent ammonia concentration of 40 mg/L would be reduced to about 10 mg/L. The 2018 Stanfield effluent concentrations of ammonia averaged approximately 8 mg/L. This confirms that a 10 percent increase in flows, even at maximum influent ammonia concentrations, is not expected to raise the effluent ammonia concentrations to above the 28 mg/L permit limit.

A concern has also been expressed over the ability of the Stanfield WWTP to achieve the required BOD and TSS removal efficiencies of 85 percent and 65 percent, respectively. The 2018 influent BOD and TSS concentrations are 243 and 277 mg/L, respectively. It becomes difficult to meet the percent removal efficiencies when the waste concentrations of the influent are low and the waste concentrations of the effluent are high. To be conservative in this calculation, the influent waste concentrations would be reduced as much as possible by assuming the Echo lagoon effluent is pure water. Also, the effluent waste concentrations are assumed to be as high as the permit allows. Both conditions provide the worst-case scenario in the calculations. Obtaining actual water quality information from the lagoons would not be indicative of the anticipated conditions, because the lagoon effluent quality will change as the lagoons are cleaned of sludge and floating fountains are added.

If the 0.012 MGD average flows from Echo were pure water, then the influent concentrations would be reduced to approximately 222 and 253 mg/L, respectively. The average monthly discharge limits for BOD and TSS are 30 and 45 mg/L, respectively. If the discharge limits are achieved, the percent removal efficiency, based on the revised influent concentrations, would be 86 percent and 82 percent, respectively. The 2018 DMRs showed a peak effluent BOD of 22 mg/L.

The actual flows from Echo will contain some waste loads. This lagoon waste is anticipated to be mainly living organisms from the third cell in the treatment system. The organisms may die during transport in the collection system. The organisms that die will most likely be removed by the primary clarifier, and the remaining organisms will be a food source for the trickling filter. It is not expected that the waste loads from Echo will create any challenges for removal by the Stanfield WWTP. Also, due to the storage

flexibility in the Echo lagoons, the effluent from Echo can be sent to the Stanfield WWTP at times when it is best for Stanfield to receive them.

A concern has also been expressed that the Echo lagoons will contribute difficult-to-settle materials to the Stanfield WWTP. The TSS received from the Echo lagoons that is difficult to settle will most likely include living organisms such as macroinvertebrates and algae species. These organisms would be such that thrive in a suspended and aerobic environment. This environment will change as they are moved to an anoxic collection system and primary clarifier and deposited over a fixed-film trickling filter media. The change in environment will kill most (if not all) of these suspended organisms as they become a food source for the anoxic and fixed-film organisms.

The other discharge parameters include pH, *E. coli*, and residual chlorine. These parameters are not expected to be affected by a 10 percent increase in WWTP flows that bring the total flows and loadings to less than one half of the treatment plant design capacity. Disinfection levels and dichlorination can be increased to meet these limits as may be needed.

The above review of the capacity of the Stanfield WWTP shows that Stanfield can easily handle the anticipated flows and loads from the Echo WWTP. An IGA between Stanfield and Echo recognizes that flows and loadings will change over time. As this occurs and when Stanfield reaches its ability to treat approximately 75 percent of the flows and loadings, they will notify Echo of a need to remove their flows from the Stanfield WWTP or participate in the expansion of the Stanfield WWTP.

Option 3A - Phase 1 Proposed Improvements

It is proposed that collection system, WWTP, and effluent disposal improvements be completed as outlined in Chapter 6 of the WWFP Update with the following modifications:

1. Start with Option 3 with its proposed pump station and pressure main to the City of Stanfield collection system manhole as shown on Figure 5-12 of the WWFP Update.

2. Add the fountain evaporation system of Option 2 without the proposed new 2-acre storage lagoon. See Figure 5-9 of the WWFP Update.

The costs for these proposed Phase 1 effluent disposal improvements are itemized on Figure 2 herein. Project costs are estimated at $996,000 (in 2019 dollars). A summary of the complete project costs including collection, treatment, and effluent disposal is shown below.

Summary of Estimated Costs (2019 Dollars)

Collection System	$ 804,000
WWTP Function-Based Improvements	$ 763,000
Phase 1 Effluent Disposal	$ 996,000
Total Project Cost	**$2,563,000**

Option 3A - Phase 2 Alternative Description

With the addition of Northgate Development as currently proposed, the City's wastewater flows would more than double the 2034 projected population design criteria. The treatment capacity of the existing lagoon system the City needs for the 20-year planning period, and the combined City needs with the Northgate Development, are shown below.

	Treatment Capacity[1]	Future City Needs	Future City Needs with Northgate Development[2]
Average Annual Flow (MGD)	0.075	0.058	0.138
Average BOD Load (PPD)	177	124	291

Notes:

[1] Current facility is permitted for 0.12 MGD, but treatment capacity is limited based on a minimum detention time of 90 days.

[2] BOD loadings for the Northgate Development are based on a BOD concentration of 250 milligrams per liter.

PPD = Pounds per day

The current treatment facility is a facultative lagoon system that would not have enough treatment capacity to meet the needs of the Northgate Development. Additional aeration could provide sufficient oxygen to meet the treatment needs of the development. Approximately 5 Hp of aeration is needed to meet the oxygen demand. This could be added to the existing lagoons using floating aspirating aerators.

Discharge to the City of Stanfield at these higher flows would exceed the allowable limits in the IGA. Additionally, effluent disposal at the necessary volume would be cost-prohibitive at the IGA charge rate per 1,000 gallons. For these reasons, an alternative disposal approach is needed. It is assumed that continued discharge to the Umatilla River is not to be considered for the reasons noted in the WWFP Update. Assuming discharge to the Umatilla River is not a consideration, it is proposed that the City provide a new storage lagoon coupled with a reuse irrigation system for effluent disposal. Flows exceeding the available evaporation rates would be reclaimed for irrigation of crops, and discharge to the City of Stanfield would be discontinued except for backup disposal. If continued discharge to the Umatilla River is to be considered, a new WWFP should be completed that fully reevaluates all alternatives for treatment and disposal of the City's wastewater based on modified design criteria that include the Northgate Development.

A water balance for a storage and irrigation system is presented on Figure 3 herein. This system uses fountain evaporation at the WWTP to minimize effluent flows to a storage lagoon. The storage lagoon would provide 6 feet of effective storage depth for irrigation of 24.2 MG of reclaimed water. This could provide irrigation water for approximately 21.2 acres of alfalfa or supplement irrigation of a larger crop in combination with an existing water right.

Option 3A - Phase 2 Proposed Improvements

The Phase 2 improvements would be constructed after the Phase 1 improvements discussed earlier, if the Northgate Development (or something similar) occurs (see the Appendix for estimated flows). Therefore, the collection system, treatment plant, and Stanfield disposal improvements would already have been completed. Phase 2 effluent storage and reuse improvements would include the following:

1. A second transmission pipeline would be constructed from the Phase 1 pump station to a new 8-acre storage lagoon located in the area of the Northgate Development.

2. An irrigation pump station and 22-acre irrigation system would be constructed on land near the storage lagoon to facilitate effluent reuse on crops for beneficial use.

The Phase 2 storage lagoon and irrigation improvements are similar to Option 1 shown on Figure 5-6 of the WWFP Update.

The costs for the Phase 2 effluent storage and reuse improvements are itemized on Figure 4 herein. Construction costs are estimated at $2,097,000 (in 2019 dollars). A summary of the complete project costs including collection, treatment, and effluent disposal is shown below.

Summary of Estimated Costs (2019 Dollars)

Collection System	$804,000
WWTP Function-Based Improvements	$763,000
Phase 1 Effluent Disposal	$996,000
Phase 2 Effluent Disposal	$2,097,000
Total Project Cost	**$4,660,000**

The proposed Phase 1 system improvements were reviewed with the City on July 6, 2017, and have been identified as the preferred alternative to pursue for implementation. Upon approval of this Amendment to the WWFP Update, funding would be secured, design documents would be completed, and environmental clearances would be obtained.

FIGURES

OPTION 3A PHASE 1 - FOUNTAIN EVAPORATION AND STANFIELD DISCHARGE WATER BALANCE
2034 PROJECTED POPULATION

Month	Influent[1] (MG)	Precipitation[2] (in)	Precipitation[2] (MG)	Evaporation[3] (in)	Evaporation[3] (MG)	Seepage[4] (MG)	Fountain Evaporation[5] (MG)	Discharge to Stanfield[6] (MG)	Storage Volume (+/-) (MG)	Cumulative Storage Volume (MG)	Lagoon Depth[7] (ft)
January	1.66	1.17	0.19	0.00	0.00	0.22	0.00	0.36	1.27	4.00	5.08
February	1.72	0.71	0.11	0.00	0.00	0.20	0.00	0.36	1.27	5.27	5.74
March	2.62	0.85	0.14	2.41	0.39	0.22	0.71	0.36	1.08	6.35	6.30
April	2.29	0.73	0.12	3.80	0.61	0.22	0.86	0.36	0.36	6.72	6.49
May	2.02	0.81	0.13	5.54	0.89	0.22	1.43	0.00	-0.39	6.32	6.29
June	1.57	0.74	0.12	6.77	1.08	0.22	1.73	0.00	-1.34	4.98	5.59
July	1.24	0.12	0.02	7.92	1.27	0.22	1.78	0.00	-2.01	2.96	4.54
August	1.14	0.16	0.03	6.76	1.08	0.22	1.79	0.00	-1.93	1.03	3.54
September	1.08	0.32	0.05	4.42	0.71	0.22	1.04	0.00	-0.83	0.19	3.10
October	1.20	0.82	0.13	2.78	0.45	0.22	0.71	0.15	-0.19	0.00	3.00
November	1.33	0.86	0.14	0.00	0.00	0.22	0.00	0.00	1.25	1.25	3.65
December	1.50	1.30	0.21	0.00	0.00	0.22	0.00	0.00	1.48	2.73	4.42
TOTALS	**19.37**	**8.59**	**1.38**	**40.40**	**6.47**	**2.63**	**10.05**	**1.59**	**0.00**		

	Acres	Square Feet	MG
Cell A Area	1.6	69,696	1.82
Cell B Area	2.2	95,832	2.51
Cell C Area	2.1	91,476	2.39
Total	**5.9**	**257,004**	**6.73**

Yellow shading = Maximum storage
Blue shading = Minimum storage

Notes:

1. Influent. Influent flows are based on average monthly flow from January 2009 to December 2013. Data obtained from Discharge Monitoring Reports. Influent flows were calculated using the design population of 828.
2. Precipitation. Utilized precipitation on record with the Western Regional Climate Center (WRCC) for the Hermiston 2NW weather station from 1999 to 2014. Mean rainfall used for each month.
3. Evaporation. Utilized pan evaporation data obtained from the WRCC for the Hermiston 2S station, with a pan coefficient of 0.70.
4. Seepage. Existing lagoon seepage assumed to be 0.045 inch per day.
5. Fountain Evaporation. Based on a pump rate of 800 gallons per minute and estimating a 5 percent water loss.
6. Discharge to Stanfield. Discharge to Stanfield is balanced not to exceed the maximum operating depth of the lagoons.
7. Lagoon Depth. The minimum operating depth is estimated to be 3.0 feet and the maximum operating depth is 6.5 feet.

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CITY OF
ECHO, OREGON
AMENDMENT TO THE 2015 WASTEWATER FACILITIES PLAN UPDATE
OPTION 3A PHASE 1 - FOUNTAIN EVAPORATION AND STANFIELD DISCHARGE WATER BALANCE

FIGURE 1

CITY OF ECHO, OREGON
AMENDMENT TO THE 2015 WASTEWATER FACILITIES PLAN UPDATE
OPTION 3A PHASE 1
FOUNTAIN EVAPORATION AND STANFIELD DISCHARGE
PRELIMINARY COST ESTIMATE
(YEAR 2019 COSTS)

NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
1	Mobilization	LS	All Req'd	$ 45,600	$ 45,600
2	Traffic Control/Project Safety	LS	All Req'd	12,000	12,000
3	Fountains and Appurtenances	LS	All Req'd	80,000	80,000
4	Pump Station to Stanfield	LS	All Req'd	173,000	173,000
5	Piping	LF	4,200	42	176,400
6	Canal Crossing	LS	All Req'd	35,000	35,000
7	Surface Restoration	LS	All Req'd	15,000	15,000
8	Highway Bore and Crossing	LS	All Req'd	95,000	95,000
9	Miscellaneous Work	LS	All Req'd	25,000	25,000
				Total Estimated Construction Cost	**$ 657,000**
				Contingency (15%)	98,000
				Design Engineering, Administration, Legal, and Construction Engineering (20%)	130,000
				Environmental Report	40,000
				Cultural Resource Report	15,000
				Cultural Resource Monitoring	16,000
				Wetland Delineation	10,000
				Permitting	15,000
				Pipeline Easements	15,000
				TOTAL ESTIMATED OPTION 3A PHASE 1 PROJECT COST	**$ 996,000**

PRESENT WORTH ANALYSIS (2019 DOLLARS)

Item	Description	Annual Cost
	ADDITIONAL ANNUAL OPERATION, MAINTENANCE, AND REPLACEMENT (OM&R)	
1	Labor	$ 5,250
2	Supplies, Parts, Maintenance, and Repairs	3,100
3	Replacement	1,500
4	Stanfield Charges for 1.6 Million Gallons of Influent ($2.25/1,000 Gallons)	6,000
5	Electrical Cost (Pond Fountain and Transfer Pump)	3,100
	Total OM&R	**$ 18,950**
	Present Worth Operation and Maintenance Cost (5%, 20 years)	237,000
	Total Present Worth (2019 Dollars)	**$ 1,233,000**

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AMENDMENT TO THE 2015 WASTEWATER FACILITIES PLAN UPDATE
OPTION 3A PHASE 1 - FOUNTAIN EVAPORATION AND STANFIELD DISCHARGE PRELIMINARY COST ESTIMATE

FIGURE 2

OPTION 3A PHASE 2 - FOUNTAIN EVAPORATION AND IRRIGATION DISCHARGE WATER BALANCE
2034 PROJECTED POPULATION WITH NORTHGATE DEVELOPMENT

	Treatment Cells												Storage Lagoon									
Month	Influent[1] (MG)	Precipitation[2] (in)	Precipitation[2] (MG)	Evaporation[3] (in)	Evaporation[3] (MG)	Seepage[4] (MG)	Fountain Evaporation[5] (MG)	Discharge to Stanfield[6] (MG)	Storage Lagoon Transfer (MG)	Storage Volume (+/-) (MG)	Storage Volume (MG)	Treatment Cell Depth[7] (ft)	Precipitation[2] (in)	Precipitation[2] (MG)	Evaporation[3] (in)	Evaporation[3] (MG)	Seepage[4] (MG)	Irrigation Crop: *Alfalfa* Acreage: *21.2* (in)	Irrigation Crop: *Alfalfa* Acreage: *21.2* (MG)	Storage Volume (+/-) (MG)	Storage Lagoon Volume (MG)	Storage Lagoon Depth[8] (ft)
January	4.14	1.17	0.19	0.00	0.00	0.22	0.00	0.00	2.65	1.46	3.77	4.96	1.17	0.24	0.00	0.00	0.00		0.00	2.89	9.68	6.90
February	3.96	0.71	0.11	0.00	0.00	0.20	0.00	0.00	2.65	1.22	4.99	5.60	0.71	0.15	0.00	0.00	0.00		0.00	2.80	12.48	8.03
March	5.10	0.85	0.14	2.41	0.39	0.22	0.71	0.00	2.66	1.26	6.25	6.50	0.85	0.18	2.41	0.50	0.00		0.00	2.34	14.82	8.97
April	4.69	0.73	0.12	3.80	0.61	0.22	0.86	0.00	2.65	0.47	6.73	6.50	0.73	0.15	3.80	0.79	0.00	3.41	1.96	0.05	14.87	8.99
May	4.50	0.81	0.13	5.54	0.89	0.22	1.43	0.00	2.48	-0.39	6.33	6.29	0.81	0.17	5.54	1.15	0.00	5.44	3.13	-1.63	13.24	8.33
June	3.97	0.74	0.12	6.77	1.08	0.22	1.73	0.00	2.48	-1.42	4.91	5.55	0.74	0.15	6.77	1.40	0.00	7.41	4.27	-3.03	10.21	7.11
July	3.72	0.12	0.02	7.92	1.27	0.22	1.78	0.00	2.48	-2.01	2.89	4.51	0.12	0.02	7.92	1.64	0.00	10.29	5.93	-5.06	5.15	5.07
August	3.62	0.16	0.03	6.76	1.08	0.22	1.79	0.00	2.48	-1.93	0.96	3.50	0.16	0.03	6.76	1.40	0.00	8.65	4.98	-3.87	1.28	3.52
September	3.48	0.32	0.05	4.42	0.71	0.22	1.04	0.00	2.48	-0.91	0.04	3.02	0.32	0.07	4.42	0.92	0.00	5.05	2.91	-1.28	0.00	3.00
October	3.68	0.82	0.13	2.78	0.45	0.22	0.71	0.00	2.48	-0.04	0.00	3.00	0.82	0.17	2.78	0.57	0.00	1.79	1.03	1.04	1.04	3.42
November	3.73	0.86	0.14	0.00	0.00	0.22	0.00	0.00	2.65	1.00	1.00	3.52	0.86	0.18	0.00	0.00	0.00		0.00	2.83	3.87	4.56
December	3.98	1.30	0.21	0.00	0.00	0.22	0.00	0.00	2.65	1.31	2.31	4.20	1.30	0.27	0.00	0.00	0.00		0.00	2.92	6.79	5.74
TOTALS	**48.57**	**8.59**	**1.38**	**40.40**	**6.47**	**2.63**	**10.05**	**0.00**	**30.79**	**0.00**			**8.59**	**1.78**	**40.40**	**8.36**	**0.00**	**42.05**	**24.20**	**0.00**		

	Acres	Effective Storage Depth (ft)	Square Feet	MG
Cell A Area	1.6	3.5	69,696	1.82
Cell B Area	2.2	3.5	95,832	2.51
Cell C Area	2.1	3.5	91,476	2.39
Subtotal	**5.9**		**257,004**	**6.73**
Storage Lagoon	7.62	6	331,927	14.90
Total	**13.5**		**588,931**	**21.63**

Orange shading = Irrigation area
Yellow shading = Maximum storage
Blue shading = Minimum storage

Notes:

1. Influent. Influent flows are based on average monthly flow from January 2009 to December 2013. Data obtained from Discharge Monitoring Reports. Influent flows were calculated using the design population of 828 plus 0.08 MGD flow for the Northgate Development.
2. Precipitation. Utilized precipitation on record with the Western Regional Climate Center (WRCC) for the Hermiston 2NW weather station from 1999 to 2014. Mean rainfall used for each month.
3. Evaporation. Utilized pan evaporation data obtained from the WRCC for the Hermiston 2S station, with a pan coefficient of 0.70.
4. Seepage. Existing lagoon seepage assumed to be 0.045 inch per day. Storage lagoon seepage assumed to be 0.
5. Fountain Evaporation. Based on a pump rate of 800 gallons per minute and estimating a 5 percent water loss.
6. Discharge to Stanfield. No discharge to Stanfield for Phase 2; backup disposal only.
7. Treatment Cell Depth. The minimum operating depth is estimated to be 3.0 feet and the maximum operating depth is 6.5 feet.
8. Storage Lagoon Depth. The minimum operating depth is estimated to be 3.0 feet and the maximum operating depth is 9 feet, for an effective operating storage depth of 6 feet.

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OPTION 3A PHASE 2 - FOUNTAIN EVAPORATION AND IRRIGATION DISCHARGE WATER BALANCE

FIGURE
3

CITY OF ECHO, OREGON
AMENDMENT TO THE 2015 WASTEWATER FACILITIES PLAN UPDATE
OPTION 3A PHASE 2
FOUNTAIN EVAPORATION AND IRRIGATION DISCHARGE
PRELIMINARY COST ESTIMATE
(YEAR 2019 COSTS)

NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
1	Mobilization	LS	All Req'd	$ 89,100	$ 89,100
2	Traffic Control/Project Safety	LS	All Req'd	12,000	12,000
3	Pump Station Additions	LS	All Req'd	50,000	50,000
4	Piping	LF	6,900	42	289,800
5	Clearing and Grubbing	Acre	8	1,050	8,400
6	Earthwork	CY	23,100	5	115,500
7	Pond Liner	SF	190,000	0.80	152,000
8	Riprap	CY	4,300	42	180,600
9	Fencing	LF	2,400	11	26,400
10	Base Rock	CY	700	21	14,700
11	Irrigation Pump Station	LS	All Req'd	120,000	120,000
12	Irrigation Piping	LF	2,500	40	100,000
13	Irrigation System (22 acres)	LS	All Req'd	80,000	80,000
14	Canal Crossing	LS	All Req'd	35,000	35,000
15	Surface Restoration	LS	All Req'd	20,000	20,000
16	Highway Bore	LS	All Req'd	10,500	10,500
17	Miscellaneous Work	LS	All Req'd	22,000	22,000
				Total Estimated Construction Cost	**$ 1,326,000**
				Contingency (15%)	191,000
				Design Engineering, Administration, Legal, and Construction Engineering (20%)	255,000
				Land Acquisition for Storage Pond and Irrigation	220,000
				Environmental Report	40,000
				Cultural Resource Report	15,000
				Permitting	15,000
				Pipeline Easements	15,000
				Cultural Resource Monitoring	20,000
				TOTAL ESTIMATED OPTION 3A PHASE 2 PROJECT COST	**$ 2,097,000**

anderson perry & associates, inc.

CITY OF
ECHO, OREGON
AMENDMENT TO THE 2015 WASTEWATER FACILITIES PLAN UPDATE
OPTION 3A PHASE 2 - FOUNTAIN
EVAPORATION AND IRRIGATION DISCHARGE
PRELIMINARY COST ESTIMATE

FIGURE 4

APPENDIX

Potential Water and Wastewater Peak Day Demands by Month
PLANNING LEVEL ESTIMATE
Echo Hill Development
K & L Madison, LLC
December 13, 2016

J-U-B ENGINEERS, INC.

Type of Establishment	Establishment Details	Water Demand[1]		Wastewater Demand[2]	
		Gallons Per Day (gpd)/Unit	Establishment Total (gpd)	Gallons Per Day (gpd)/Unit	Establishment Total (gpd)
NOVEMBER - FEBRUARY					
Gas Station & Convenience Store	285 Vehicles Served[3]	10 gpd/vehicle served	2,850	10 gpd/vehicle served	2,850
Laundry Mat	8 Machines 40 Washings per Day	50 gpd/ washing	2,000	500 gpd/machine	4,000
RV Park	100 Spaces	125 gpd/space	12,500	100 gpd/space	10,000
Hotel	100 Rooms 2 People per Room (Avg.)	50 gpd/ person/room	10,000	120 gpd/room	12,000
	50 People Using Swimming Pool[4]	10 gpd/person	500	10 gpd/person	500
	1,800 ft^2 Swimming Pool Maintenance	10 gpd/100 ft^2	180	10 gpd/100 ft^2	180
Mushroom Farm	Industrial Waste[5]	259,200 gpd	259,200	25,920 gpd	25,920
	150 Employees	15 gpd/person/shift	2,250	15 gpd/person/shift	2,250
Establishments[6]	10 Additional Establishments 6 Employees per Industry	15 gpd/person/shift	900	15 gpd/person/shift	900
NOVEMBER-FEBRUARY PEAK DAY DEMAND SUBTOTAL (gpd)[10]		**290,000**		**60,000**	
MARCH					
Gas Station & Convenience Store	285 Vehicles Served[3]	10 gpd/vehicle served	2,850	10 gpd/vehicle served	2,850
Laundry Mat	8 Machines 40 Washings per Day	50 gpd/ washing	2,000	500 gpd/machine	4,000
RV Park	100 Spaces	125 gpd/space	12,500	100 gpd/space	10,000
	100,000 ft^2 Landscaping	121 gpd/1,000 ft^2[9]	12,100	--	--
Hotel	100 Rooms 2 People per Room (Avg.)	50 gpd/ person/room	10,000	120 gpd/room	12,000
	50 People Using Swimming Pool[4]	10 gpd/person	500	10 gpd/person	500
	1,800 ft^2 Swimming Pool Maintenance	10 gpd/100 ft^2	180	10 gpd/100 ft^2	180
	20,000 ft^2 Landscaping	121 gpd/1,000 ft^2[9]	2,420	--	--
Amphitheater	80,425 ft^2 Landscaping[5]	121 gpd/1,000 ft^2[9]	9,731	--	--
Mushroom Farm	Industrial Waste[6]	259,200 gpd	259,200	25,920 gpd	25,920
	150 Employees	15 gpd/person/shift	2,250	15 gpd/person/shift	2,250
Establishments[7]	10 Additional Establishments 6 Employees per Industry	15 gpd/person/shift	900	15 gpd/person/shift	900
Landscaping	280,900 ft^2 Landscaping[8]	121 gpd/1,000 ft^2[9]	3,497	--	--
MARCH PEAK DAY DEMAND SUBTOTAL (gpd)[10]		**320,000**		**60,000**	
APRIL					
Gas Station & Convenience Store	285 Vehicles Served[3]	10 gpd/vehicle served	2,850	10 gpd/vehicle served	2,850
Laundry Mat	8 Machines 40 Washings per Day	50 gpd/ washing	2,000	500 gpd/machine	4,000
RV Park	100 Spaces	125 gpd/space	12,500	100 gpd/space	10,000
	100,000 ft^2 Landscaping	216 gpd/1,000 ft^2[9]	21,600	--	--
Hotel	100 Rooms 2 People per Room (Avg.)	50 gpd/ person/room	10,000	120 gpd/room	12,000
	50 People Using Swimming Pool[4]	10 gpd/person	500	10 gpd/person	500
	1,800 ft^2 Swimming Pool Maintenance	10 gpd/100 ft^2	180	10 gpd/100 ft^2	180
	20,000 ft^2 Landscaping	216 gpd/1,000 ft^2[9]	4,320	--	--
Amphitheater	80,425 ft^2 Landscaping[5]	216 gpd/1,000 ft^2[9]	17,372	--	--
Mushroom Farm	Industrial Waste[6]	259,200 gpd	259,200	25,920 gpd	25,920
	150 Employees	15 gpd/person/shift	2,250	15 gpd/person/shift	2,250
Establishments[7]	10 Additional Establishments 6 Employees per Industry	15 gpd/person/shift	900	15 gpd/person/shift	900
Landscaping	280,900 ft^2 Landscaping[8]	216 gpd/1,000 ft^2[9]	6,242	--	--
APRIL PEAK DAY DEMAND SUBTOTAL (gpd)[10]		**340,000**		**60,000**	

Potential Water and Wastewater Peak Day Demands by Month
PLANNING LEVEL ESTIMATE
Echo Hill Development
K & L Madison, LLC
December 13, 2016

J-U-B ENGINEERS, INC.

Type of Establishment	Establishment Details	Water Demand[1]		Wastewater Demand[2]	
		Gallons Per Day (gpd)/Unit	Establishment Total (gpd)	Gallons Per Day (gpd)/Unit	Establishment Total (gpd)
MAY					
Gas Station & Convenience Store	285 Vehicles Served[3]	10 gpd/vehicle served	2,850	10 gpd/vehicle served	2,850
Laundry Mat	8 Machines 40 Washings per Day	50 gpd/ washing	2,000	500 gpd/machine	4,000
RV Park	100 Spaces	125 gpd/space	12,500	100 gpd/space	10,000
	100,000 ft^2 Landscaping	291 gpd/1,000 ft^2 [9]	29,100	--	--
Hotel	100 Rooms 2 People per Room (Avg.)	50 gpd/ person/room	10,000	120 gpd/room	12,000
	50 People Using Swimming Pool[4]	10 gpd/person	500	10 gpd/person	500
	1,800 ft^2 Swimming Pool Maintenance	10 gpd/100 ft^2	180	10 gpd/100 ft^2	180
	20,000 ft^2 Landscaping	291 gpd/1,000 ft^2 [9]	5,820	--	--
Amphitheater	80,425 ft^2 Landscaping[5]	291 gpd/1,000 ft^2 [9]	23,404	--	--
Mushroom Farm	Industrial Waste[6]	259,200 gpd	259,200	25,920 gpd	25,920
	150 Employees	15 gpd/person/shift	2,250	15 gpd/person/shift	2,250
Establishments[7]	10 Additional Establishments 6 Employees per Industry	15 gpd/person/shift	900	15 gpd/person/shift	900
Landscaping	280,900 ft^2 Landscaping[8]	291 gpd/1,000 ft^2 [9]	8,410	--	--
MAY PEAK DAY DEMAND SUBTOTAL (gpd)[10]		**360,000**		**60,000**	
JUNE					
Gas Station & Convenience Store	285 Vehicles Served[3]	10 gpd/vehicle served	2,850	10 gpd/vehicle served	2,850
Laundry Mat	8 Machines 40 Washings per Day	50 gpd/ washing	2,000	500 gpd/machine	4,000
RV Park	100 Spaces	125 gpd/space	12,500	100 gpd/space	10,000
	100,000 ft^2 Landscaping	373 gpd/1,000 ft^2 [9]	37,300	--	--
Hotel	100 Rooms 2 People per Room (Avg.)	50 gpd/ person/room	10,000	120 gpd/room	12,000
	50 People Using Swimming Pool[4]	10 gpd/person	500	10 gpd/person	500
	1,800 ft^2 Swimming Pool Maintenance	10 gpd/100 ft^2	180	10 gpd/100 ft^2	180
	20,000 ft^2 Landscaping	373 gpd/1,000 ft^2 [9]	7,460	--	--
Amphitheater	10,000 Seat	5 gpd/seat	50,000	5 gpd/seat	50,000
	80,425 ft^2 Landscaping[5]	373 gpd/1,000 ft^2 [9]	29,999	--	--
Mushroom Farm	Industrial Waste[6]	259,200 gpd	259,200	25,920 gpd	25,920
	150 Employees	15 gpd/person/shift	2,250	15 gpd/person/shift	2,250
Establishments[7]	10 Additional Establishments 6 Employees per Industry	15 gpd/person/shift	900	15 gpd/person/shift	900
Landscaping	280,900 ft^2 Landscaping[8]	373 gpd/1,000 ft^2 [9]	10,780	--	--
JUNE PEAK DAY DEMAND SUBTOTAL (gpd)[10]		**430,000**		**110,000**	

Potential Water and Wastewater Peak Day Demands by Month
PLANNING LEVEL ESTIMATE
Echo Hill Development
K & L Madison, LLC
December 13, 2016

J-U-B ENGINEERS, INC.

Type of Establishment	Establishment Details	Water Demand[1]		Wastewater Demand[2]	
		Gallons Per Day (gpd)/Unit	Establishment Total (gpd)	Gallons Per Day (gpd)/Unit	Establishment Total (gpd)
JULY					
Gas Station & Convenience Store	285 Vehicles Served[3]	10 gpd/vehicle served	2,850	10 gpd/vehicle served	2,850
Laundry Mat	8 Machines 40 Washings per Day	50 gpd/ washing	2,000	500 gpd/machine	4,000
RV Park	100 Spaces	125 gpd/space	12,500	100 gpd/space	10,000
	100,000 ft^2 Landscaping	419 gpd/1,000 ft^2 [9]	41,900	--	--
Hotel	100 Rooms 2 People per Room (Avg.)	50 gpd/ person/room	10,000	120 gpd/room	12,000
	50 People Using Swimming Pool[4]	10 gpd/person	500	10 gpd/person	500
	1,800 ft^2 Swimming Pool Maintenance	10 gpd/100 ft^2	180	10 gpd/100 ft^2	180
	20,000 ft^2 Landscaping	419 gpd/1,000 ft^2 [9]	8,380	--	--
Amphitheater	10,000 Seat	5 gpd/seat	50,000	5 gpd/seat	50,000
	80,425 ft^2 Landscaping[5]	419 gpd/1,000 ft^2 [9]	33,698	--	--
Mushroom Farm	Industrial Waste[6]	259,200 gpd	259,200	25,920 gpd	25,920
	150 Employees	15 gpd/person/shift	2,250	15 gpd/person/shift	2,250
Establishments[7]	10 Additional Establishments 6 Employees per Industry	15 gpd/person/shift	900	15 gpd/person/shift	900
Landscaping	280,900 ft^2 Landscaping[8]	419 gpd/1,000 ft^2 [9]	12,109	--	--
JULY PEAK DAY DEMAND SUBTOTAL (gpd)[10]		**440,000**		**110,000**	
AUGUST					
Gas Station & Convenience Store	285 Vehicles Served[3]	10 gpd/vehicle served	2,850	10 gpd/vehicle served	2,850
Laundry Mat	8 Machines 40 Washings per Day	50 gpd/ washing	2,000	500 gpd/machine	4,000
RV Park	100 Spaces	125 gpd/space	12,500	100 gpd/space	10,000
	100,000 ft^2 Landscaping	372 gpd/1,000 ft^2 [9]	37,200	--	--
Hotel	100 Rooms 2 People per Room (Avg.)	50 gpd/ person/room	10,000	120 gpd/room	12,000
	50 People Using Swimming Pool[4]	10 gpd/person	500	10 gpd/person	500
	1,800 ft^2 Swimming Pool Maintenance	10 gpd/100 ft^2	180	10 gpd/100 ft^2	180
	20,000 ft^2 Landscaping	372 gpd/1,000 ft^2 [9]	7,440	--	--
Amphitheater	10,000 Seat	5 gpd/seat	50,000	5 gpd/seat	50,000
	80,425 ft^2 Landscaping[5]	372 gpd/1,000 ft^2 [9]	29,918	--	--
Mushroom Farm	Industrial Waste[6]	259,200 gpd	259,200	25,920 gpd	25,920
	150 Employees	15 gpd/person/shift	2,250	15 gpd/person/shift	2,250
Establishments[7]	10 Additional Establishments 6 Employees per Industry	15 gpd/person/shift	900	15 gpd/person/shift	900
Landscaping	280,900 ft^2 Landscaping[8]	372 gpd/1,000 ft^2 [9]	10,751	--	--
AUGUST PEAK DAY DEMAND SUBTOTAL (gpd)[10]		**430,000**		**110,000**	

Potential Water and Wastewater Peak Day Demands by Month
PLANNING LEVEL ESTIMATE
Echo Hill Development
K & L Madison, LLC
December 13, 2016

J-U-B ENGINEERS, INC.

Type of Establishment	Establishment Details	Water Demand[1]		Wastewater Demand[2]	
		Gallons Per Day (gpd)/Unit	Establishment Total (gpd)	Gallons Per Day (gpd)/Unit	Establishment Total (gpd)
SEPTEMBER					
Gas Station & Convenience Store	285 Vehicles Served[3]	10 gpd/vehicle served	2,850	10 gpd/vehicle served	2,850
Laundry Mat	8 Machines 40 Washings per Day	50 gpd/ washing	2,000	500 gpd/machine	4,000
RV Park	100 Spaces	125 gpd/space	12,500	100 gpd/space	10,000
	100,000 ft^2 Landscaping	246 gpd/1,000 ft^2 [9]	24,600	--	--
Hotel	100 Rooms 2 People per Room (Avg.)	50 gpd/ person/room	10,000	120 gpd/room	12,000
	50 People Using Swimming Pool[4]	10 gpd/person	500	10 gpd/person	500
	1,800 ft^2 Swimming Pool Maintenance	10 gpd/100 ft^2	180	10 gpd/100 ft^2	180
	20,000 ft^2 Landscaping	246 gpd/1,000 ft^2 [9]	4,920	--	--
Amphitheater	10,000 Seat	5 gpd/seat	50,000	5 gpd/seat	50,000
	80,425 ft^2 Landscaping[5]	246 gpd/1,000 ft^2 [9]	19,785	--	--
Mushroom Farm	Industrial Waste[6]	259,200 gpd	259,200	25,920 gpd	25,920
	150 Employees	15 gpd/person/shift	2,250	15 gpd/person/shift	2,250
Establishments[7]	10 Additional Establishments 6 Employees per Industry	15 gpd/person/shift	900	15 gpd/person/shift	900
Landscaping	280,900 ft^2 Landscaping[8]	246 gpd/1,000 ft^2 [9]	7,109	--	--
SEPTEMBER PEAK DAY DEMAND SUBTOTAL (gpd)[10]		**400,000**		**110,000**	
OCTOBER					
Gas Station & Convenience Store	285 Vehicles Served[3]	10 gpd/vehicle served	2,850	10 gpd/vehicle served	2,850
Laundry Mat	8 Machines 40 Washings per Day	50 gpd/ washing	2,000	500 gpd/machine	4,000
RV Park	100 Spaces	125 gpd/space	12,500	100 gpd/space	10,000
	100,000 ft^2 Landscaping	100 gpd/1,000 ft^2 [9]	10,000	--	--
Hotel	100 Rooms 2 People per Room (Avg.)	50 gpd/ person/room	10,000	120 gpd/room	12,000
	50 People Using Swimming Pool[4]	10 gpd/person	500	10 gpd/person	500
	1,800 ft^2 Swimming Pool Maintenance	10 gpd/100 ft^2	180	10 gpd/100 ft^2	180
	20,000 ft^2 Landscaping	100 gpd/1,000 ft^2 [9]	2,000	--	--
Amphitheater	80,425 ft^2 Landscaping[5]	100 gpd/1,000 ft^2 [9]	8,043	--	--
Mushroom Farm	Industrial Waste[6]	259,200 gpd	259,200	25,920 gpd	25,920
	150 Employees	15 gpd/person/shift	2,250	15 gpd/person/shift	2,250
Establishments[7]	10 Additional Establishments 6 Employees per Industry	15 gpd/person/shift	900	15 gpd/person/shift	900
Landscaping	280,900 ft^2 Landscaping[8]	100 gpd/1,000 ft^2 [9]	2,890	--	--
OCTOBER PEAK DAY DEMAND SUBTOTAL (gpd)[10]		**310,000**		**60,000**	
AVERAGE PEAK DAY DEMAND TOTAL (gpd)[10]		**350,000**		**80,000**	
AVERAGE PEAK DAY DEMAND TOTAL (MGD)[10]		**0.35**		**0.08**	
AVERAGE PEAK DAY DEMAND TOTAL (gpm)[10]		**243**		**56**	
AVERAGE YEARLY DEMAND TOTAL (gallons/year)[10]		**127,750,000**		**29,200,000**	
AVERAGE YEARLY DEMAND TOTAL (million gallons/year)[10]		**127.75**		**29.20**	

Potential Water and Wastewater Peak Day Demands by Month
PLANNING LEVEL ESTIMATE
Echo Hill Development
K & L Madison, LLC
December 13, 2016

J·U·B ENGINEERS, INC.

Type of Establishment	Establishment Details	Water Demand[1]		Wastewater Demand[2]	
		Gallons Per Day (gpd)/Unit	Establishment Total (gpd)	Gallons Per Day (gpd)/Unit	Establishment Total (gpd)
SUMMARY					
NOVEMBER - FEBRUARY	DOMESTIC DEMAND	Water = 0.03 MGD (10% of Total)		Wastewater = 0.03 MGD (50% of Total)	
	IRRIGATION DEMAND	Water = N/A		Wastewater = N/A	
	INDUSTRIAL DEMAND	Water = 0.26 MGD (90% of Total)		Wastewater = 0.03 MGD (50% of Total)	
MARCH	DOMESTIC DEMAND	Water = 0.03 MGD (9% of Total)		Wastewater = 0.03 MGD (50% of Total)	
	IRRIGATION DEMAND	Water =0.03 MGD (9% of Total)		Wastewater = N/A	
	INDUSTRIAL DEMAND	Water = 0.26 MGD (81% of Total)		Wastewater = 0.03 MGD (50% of Total)	
APRIL	DOMESTIC DEMAND	Water = 0.03 MGD (9% of Total)		Wastewater = 0.03 MGD (50% of Total)	
	IRRIGATION DEMAND	Water =0.05 MGD (15% of Total)		Wastewater = N/A	
	INDUSTRIAL DEMAND	Water = 0.26 MGD (76% of Total)		Wastewater = 0.03 MGD (50% of Total)	
MAY	DOMESTIC DEMAND	Water = 0.03 MGD (8% of Total)		Wastewater = 0.03 MGD (50% of Total)	
	IRRIGATION DEMAND	Water =0.07 MGD (20% of Total)		Wastewater = N/A	
	INDUSTRIAL DEMAND	Water = 0.26 MGD (72% of Total)		Wastewater = 0.03 MGD (50% of Total)	
JUNE	DOMESTIC DEMAND	Water = 0.08 MGD (19% of Total)		Wastewater = 0.08 MGD (73% of Total)	
	IRRIGATION DEMAND	Water =0.09 MGD (21% of Total)		Wastewater = N/A	
	INDUSTRIAL DEMAND	Water = 0.26 MGD (60% of Total)		Wastewater = 0.03 MGD (27% of Total)	
JULY	DOMESTIC DEMAND	Water = 0.08 MGD (18% of Total)		Wastewater = 0.08 MGD (73% of Total)	
	IRRIGATION DEMAND	Water =0.10 MGD (23% of Total)		Wastewater = N/A	
	INDUSTRIAL DEMAND	Water = 0.26 MGD (59% of Total)		Wastewater = 0.03 MGD (27% of Total)	
AUGUST	DOMESTIC DEMAND	Water = 0.08 MGD (19% of Total)		Wastewater = 0.08 MGD (73% of Total)	
	IRRIGATION DEMAND	Water =0.09 MGD (21% of Total)		Wastewater = N/A	
	INDUSTRIAL DEMAND	Water = 0.26 MGD (60% of Total)		Wastewater = 0.03 MGD (27% of Total)	
SEPTEMBER	DOMESTIC DEMAND	Water = 0.08 MGD (20% of Total)		Wastewater = 0.08 MGD (73% of Total)	
	IRRIGATION DEMAND	Water =0.06 MGD (15% of Total)		Wastewater = N/A	
	INDUSTRIAL DEMAND	Water = 0.26 MGD (65% of Total)		Wastewater = 0.03 MGD (27% of Total)	
OCTOBER	DOMESTIC DEMAND	Water = 0.03 MGD (9% of Total)		Wastewater = 0.03 MGD (50% of Total)	
	IRRIGATION DEMAND	Water =0.03 MGD (9% of Total)		Wastewater = N/A	
	INDUSTRIAL DEMAND	Water = 0.26 MGD (82% of Total)		Wastewater = 0.03 MGD (50% of Total)	

[1] Water demand determined using the following publication: Water System Design Manual, December 2009, Table 5-2: Guide for Average Daily Nonresidential Water Demand.

[2] Wastewater demand determined using the following publication: OAR 340-071-0220 Onsite Wastewater Treatment Systems - Standard Subsurface Systems, Table 2: Quantities of Sewage Flows.

[3] Assume 15% of ODOT 2015 AADT (1900 AADT located 0.9 miles south of Umatilla-Stanfield Highway U.S. 395)

[4] Assume 25% of the average number of people staying at the hotel (~200 people/night) use the pool.

[5] Area is that of 1/4 of a 320' center pivot.

[6] Mushroom farm provided demands of 180 gal/min (water) and 18 gal/min (wastewater).

[7] Industrial waste is not anticipated at these undefined establishments.

[8] Assumes additional undefined landscaping is approximately 5% of the 132 acre site.

[9] The landscape demand per unit was calculated using nearby (Hermiston) historic precipitation, evaporation, and evapotranspiration data from AgriMet (http://www.usbr.gov/pn/agrimet/chartkey.html) and the Western Region Climate Center (http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?or3847) to determine the monthly irrigation needs. 1" of rainfall/ft^2 = 0.63 gpd/ft^2.

[10] The estimated demand is planning level and are to be taken as approximate. Actual demands will be refined as the site design progresses and establishments are secured.