AQUA ENGINEERING

Osprey Ranch

Preliminary Engineering Report

November 2021

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STATE OF UTAH

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1. INTRODUCTION

This report is to evaluate wastewater alternatives for the Osprey Ranch Development near the Northwest arm of Pineview Reservoir. This will be a new development that will not have access to wastewater services from the local community. Therefore, this Preliminary Engineering Report (PER) will address items needed to develop a sewer system for this development.

There is currently a wastewater master plan being completed for the County. When locating this treatment facility, it is assumed that this could be converted to a regional facility. As part of this PER the capability of the system to be expanded will be discussed.

1.1. PROJECT LOCATION

The project is located in Weber County as shown in the highlighted portion in Figure 1 and Figure 2.

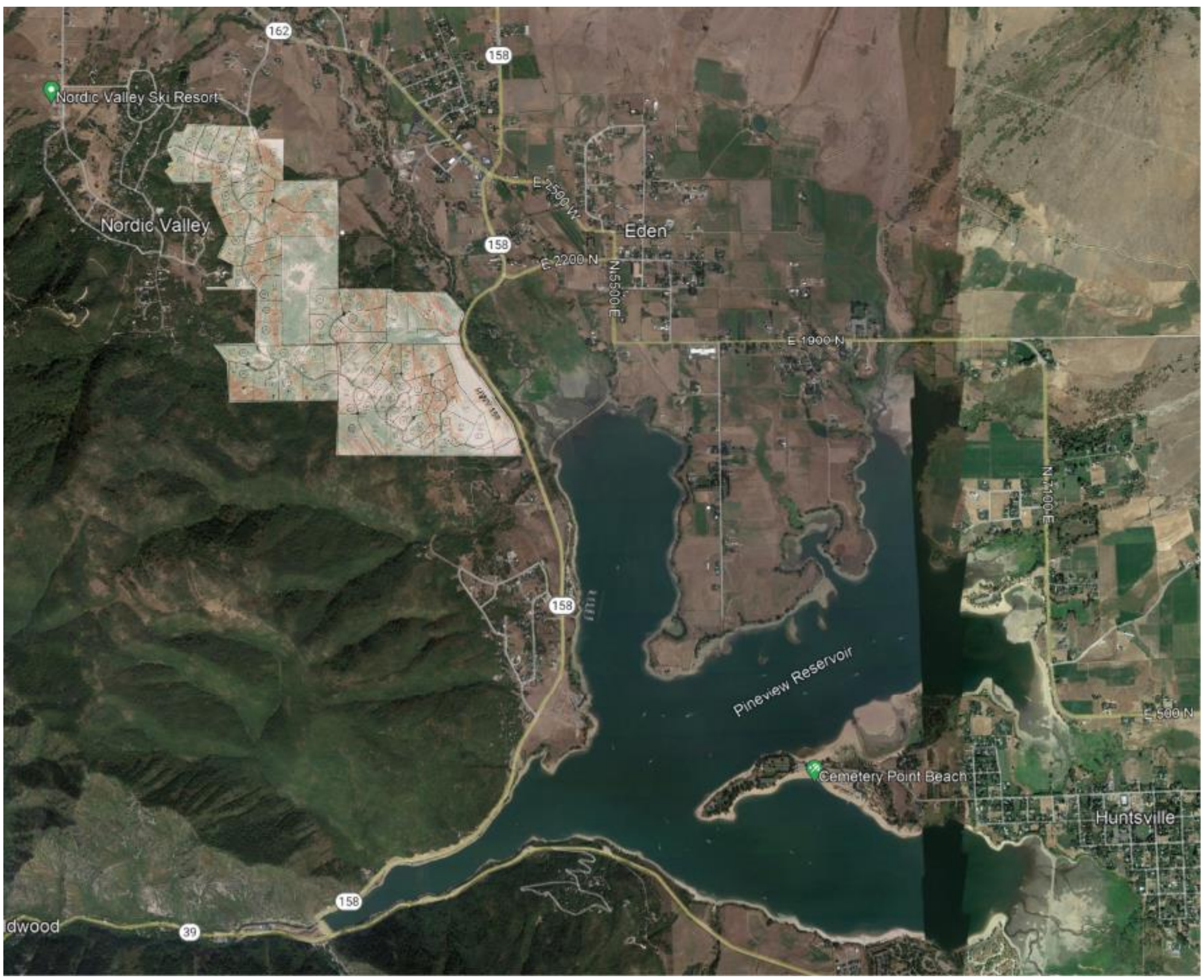

Figure 1 Project Location Map

Figure 2 Project Location Map Close Up

1.2. ANTICIPATED PROJECT DEVELOPMENT

It is anticipated that Osprey Ranch will be a residential development without provisions for commercial development. It is projected that treatment for 200 residential connections will be initially constructed. Additional phases providing future expansion of 1000 total connections and potentially up to 2000 connections have been discussed.

2. DESIGN CRITERIA

2.1. FLOW

The flow will be based on the Utah Administrative Code (UAC) Section R317-3-4. Table 1 uses the individual flows from the UAC and then estimates water use to determine a design flow for the facility.

Residential Water Use	100	gallons / person / day
People / Household	3.2	people
Gallons / Connection	320	gallons
Connections	200	
Design Water Use	64,000	gallons / day
Design Flow	0.0640	MGD

Table 1 Design Criteria

2.2. PRIMARY POLLUTANTS

The primary design pollutants are based on UAC 317-3-4 for new system design. It is assumed that all the wastewater will be domestic and there will be no industrial users connected to the system.

2.2.1. BOD

There is no existing BOD data available so typical municipal waste strength will be used. Therefore, it is assumed that the BOD will be 260 mg/L which will be 139 lbs/day.

2.2.2. TSS

There is no existing TSS data available so typical municipal waste strength will be used. Therefore, it will be assumed that the TSS will be 300 mg/L which is a loading of 160 lbs/day.

2.2.3. TKN

There is no existing flow data, so the nitrogen levels are also unknown currently. The assumed value for TKN is 45 mg/L which is a loading of 24 lbs/day.

2.2.4. Phosphorus

There is no existing flow data, so the Phosphorus levels are also unknown currently. The assumed value for TP is 7 mg/L which is a loading of 3.74 lbs/day.

3. DISPOSAL ALTERNATIVES

3.1. DISCHARGE PERMIT

A discharge permit will not be allowed because the Ogden Valley is located within the Forest Service boundary and is a Category 1 water as found in UAC 317-2-3.3.2. New discharges of wastewater are prohibited. Therefore, the only way to surface discharge at this location would be to pipe the water outside of the valley.

For discharge within the valley, subsurface alternatives need to be considered. These alternatives include conventional drain field, deep trench drain field, drip systems, reuse combined with winter storage, Rapid Infiltration Basins, and Injection Wells.

3.2. CONVENTIONAL DRAIN FIELD

A conventional drain field for this site would require a large footprint. The Weber Morgan health department has inspected several pits that were excavated in the area that could accommodate the area required for a drain field. However, the soils were not acceptable within this area.

The area required for the drain field would include a fully redundant drain field along with additional space for a replacement drain field if one of the required drain fields failed. A conventional Drain field will not be recommended for this treatment system based upon the poor drainage in the soils.

3.3. DEEP TRENCH DRAIN FIELD

Using a deep trench drain field would reduce the footprint to a conventional drain field. Because the health department is concerned with the soils it is assumed that this alternative would not be available.

3.4. DRIP IRRIGATION SYSTEM

Drip irrigation systems have been used successfully to dispose of wastewater. The water emitted through the system is at a lower application rate than conventional drain fields and will require a large area. The drip lines are typically placed in the root zones which allow plants to utilize the water in the summer. In the winter the system can be designed to emit the water and the manufactures have installations that seem to work in frozen soils. However, the system must be designed to allow for freezing conditions. During the winter there will not be uptake from plants and nutrients will need to be controlled to protect ground water. It is our understanding that the health department has allowed several of these systems to be installed but they have had problems. Therefore, this disposal alternative is not recommended.

3.4.1. Reuse Combined with Winter Storage

Reuse can only be used during the growing season. A winter storage pond is required during the winter to store the treated wastewater. During the summer, the water will be used for irrigation and the water in the winter would be stored to be used during the next summer. It is assumed that the pond would need to store 180 days of discharge from the treatment system. Therefore, the required storage would be 11.52 million gallons. Assuming turf, about 12-inches of water is required a year for irrigation. Assuming no infiltration or evaporation this could water about 72 acres of turf a year. Once evaporation and infiltration were accounted for, the area for land application would be reduced but this would depend on the size of the winter storage pond.

Treating the water to meet type I reuse requirements would allow the water to be used in a secondary irrigation system. This would require an application for reuse rights on the water and an irrigation system to supply the water to the irrigation site.

3.4.2. Rapid Infiltration Basin

If a suitable site was available, a shallow permeable pond could be constructed that would allow the water to filter through the ground. This is currently being used in the valley at the Wolf Creek treatment facility. This alternative would require water to be treated to meet groundwater standards. This is a viable option if an acceptable site could be located.

3.4.3. Reuse with Injection Well

The seasonal disposal using both reuse and injection wells provides this system with several benefits. During the winter, non-growing season, treated effluent will be discharged to one of four injection wells as shown in Figure 3. An irrigation well was installed in the area near the proposed injection well location. The soils test pit log is included in Appendix A. The well is anticipated to be a shallow well that is in a gravel layer that extends from about 6-feet to 14-feet. When the well was excavated the water level was at the 6-foot level. A pump test was completed on the well. When the well was pumped, the water level had decreased to about 12-feet. The pump was operated at a little over 100 gpm and the draw down was about 14-inches at that time and still moving down. This is a dry time and it is anticipated that the well can easily receive 50 gal/min. One well would have the capacity to meet the 64,000 gpd design flow. However, it is recommended to install four separate wells so the flow can be rotated between each well and allow a resting period. This operation would be similar to Rapid Infiltration Basins (RIB). It is assumed the treatment requirements for this disposal method would be like RIBs in the area. The well field could be expanded to adequately handle increased flows in the future. During irrigation season, a secondary irrigation system would be used to transport the water to irrigation sites. It is assumed that the treated effluent would need to meet both ground water standards and Type I reuse requirements. Once expansion is needed, it is presumed the same site will support additional injection wells to meet the increased disposal flows.

Figure 3 Preliminary Proposed Injection Well Locations

4. TREATMENT ALTERNATIVES

4.1. TREATMENT REQUIREMENTS

Based on the preferred disposal method of land application with injection wells, the treatment requirements will need to meet UAC R317-3-11.4 for Type I Reuse and nitrate is assumed to be the limiting constituent for subsurface discharge. In general, the anticipated water quality requirements are:

BOD < 10 mg/L
TSS < 5 mg/L
E coli < Non Detect
PH between 6 and 9
TIN < 10 mg/L
P < 1 mg/L

It is assumed that these limits will allow for both Type I reuse application and shallow injection well disposal.

4.2. ORENCO

Orenco Treatment Systems provide reduction of BOD, and TSS. The ability to reduce TN and P to the required concentrations is not normally obtained with the Orenco Systems. Thus, an Orenco Treatment will not be considered further for this application.

4.3. SEQUENCING BATCH REACTOR (SBR)

A treatment alternative that is fairly simple to operate and has the ability to reach the lower TIN limits is an SBR. Figure 4 below is a flow sheet for the SBR process and it will include the following components:

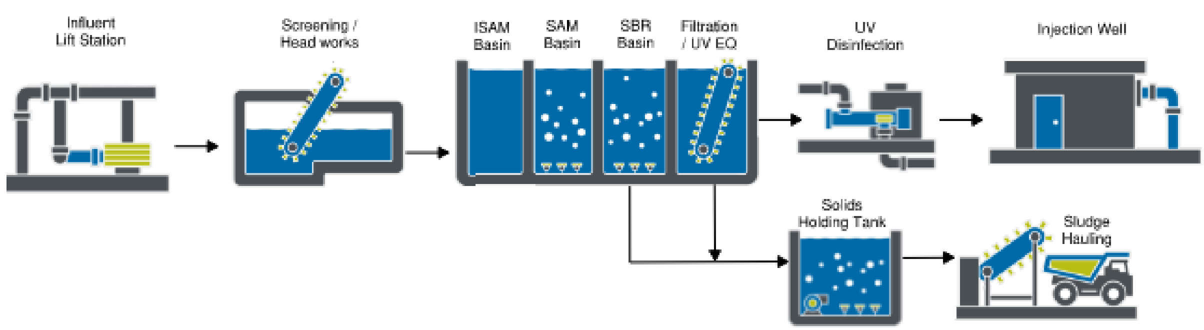

Figure 4 SBR Flow Sheet

4.3.1. Headworks

It is assumed that screening will be required prior to the treatment system. The solids removed from the wastewater stream will be collected in a trash can and landfilled. For a system this small it is anticipated that grit removal will not be needed.

4.3.2. Biological Treatment

The biological process in a SBR utilizes a batch process that mixes, aerates, and decants in a single basin. The cycles in the process allow for biological removal of nitrogen and phosphorus in a single basin. However, several other different activated sludge type processes could work for this application.

The SBR process will be used for cost comparisons. It is assumed that the treatment facility will be small enough to install in a building. This will allow for odor control of the system and the building could be structured to architecturally match the surrounding neighborhood. The construction of the tanks needed for the treatment system is assumed to be concrete.

4.3.3. Filtration

To meet Type I reuse, filtration will be required after the SBR process to further reduce phosphorus concentrations. Sizing this filtration basin so that it provides flow equalization enables a more efficient UV Disinfection process.

4.3.4. Disinfection

Disinfection is required to meet Type I reuse. UV disinfection is assumed to be the method of disinfection. Because of the batch process it is assumed an equalization basin will be required to keep fairly uniform flow through the disinfection system.

4.3.5. Biosolids Treatment

The mechanical system will produce biosolids and they will need to be dewatered and landfilled. A small dewatering system will be installed. The solids can be stored in a dumpster and sent to the landfill using a standard garbage truck. The solids will need to meet the paint filter test for that disposal method. Assuming a yield of 0.7 about 110 lbs of dry solids would be produced from the facility each day. Dewatered to 15% will generate about 739 lbs a day of biosolids that will need to be landfilled.

4.3.6. Future Expansion

Recognizing potential for future expansion within the development in addition to the surrounding community, consideration for the expansion of the facility is critical. As shown in Figure 5 a 200 connection SBR footprint will utilize most of the existing site. This will not leave adequate space for desired future expansion without extensive site work.

Figure 5 SBR Phase 1 Treatment Footprint

4.4. MEMBRANE BIOREACTOR (MBR)

A treatment alternative that produces high quality effluent is the MBR. Figure 6 below is a flow sheet for the MBR process which includes the following components:

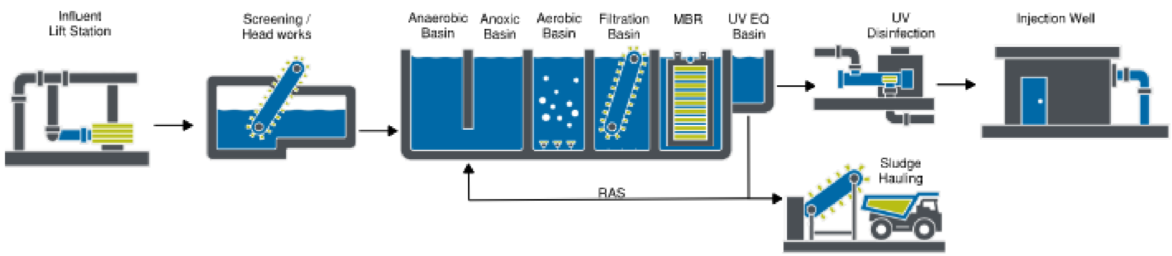

Figure 6 MBR Flow Sheet

4.4.1. Headworks

It is assumed that 2 mm screening will be required prior to the treatment system. The solids removed from the wastewater stream will be collected in a trash can and landfilled. For this small of a system, it is anticipated that grit removal will not be needed.

4.4.2. Biological Treatment

A Membrane Bioreactor (MBR) could be used. This treatment process is often installed in a building and has a small footprint. It is assumed that the treatment facility will be small enough to install in a building. This will allow for odor control of the system and the building could be structured to architecturally match the surrounding neighborhood. It is anticipated that there will be an anoxic basin for nitrogen reduction and an aeration basin for additional processing. The construction of the tanks needed for the treatment system is assumed to be concrete. The membranes pore size is smaller than bacteria and will filter the solids and leave a clean clear effluent.

4.4.3. Disinfection

Disinfection is required to meet Type I reuse. UV disinfection is assumed to be the method of disinfection. It is anticipated that the bacteria will be captured by the membranes and the water will be clear allowing for simple disinfection.

4.4.4. Biosolids Treatment

The mechanical system will produce biosolids and they will need to be dewatered and landfilled. A small dewatering system will be installed to dewater the solids. The solids can be stored in a dumpster and sent to the landfill using a standard garbage truck. The solids will need to meet the paint filter test for that disposal method. Assuming a yield of 0.7 about 111 lbs of dry solids would be produced from the facility each day. If they were dewatered to 15% the plant would generate about 739 lbs a day of biosolids that will ultimately need to be landfilled.

4.4.5. Future Expansion

Recognizing future expansion within the development, in addition to the surrounding community, consideration for the expansion of the facility is critical. As shown in Figure 7 the initial MBR footprint will utilize a small portion of the existing site leaving room for expansion to 1000 connections. This site initially appears that it may support up to a maximum of 2000 connections, however extensive site work will be required for this large of a facility.

Figure 7 MBR Footprint w/ Expansions

5. COST ESTIMATES

5.1. CAPITAL COST

The cost estimates are planning level. Much of the detail of the site and the exact design will dictate the final cost. The purpose of the estimates is to compare the cost of an alternative. In addition, the cost estimates are intended to be used for project budgeting. No land costs are included in the cost estimates.

5.1.1. Orenco

The cost estimate for an Orenco system was not calculated since the effluent is not able to meet the discharge requirements.

5.1.2. Sequencing Batch Reactor (SBR)

The cost estimate for the SBR mechanical treatment system is shown below. The treatment system is assumed to be contained within a building. Enclosing within a building will be the most aesthetic pleasing.

AQUA ENGINEERING

CLIENT: Osprey Ranch
PROJECT: Sequencing Batch Reactor (SBR)
WORKSHT: Engineers Opinion of Probable Cost
DATE: 13-Oct-21

Sequencing Batch Reactor (SBR)					
Item	**Description**	**Unit**	**Qty**	**Unit Price**	**Total Cost**
1	Mobilization	LS	1	$25,000	$ 25,000
2	Influent Lift Station	LS	1	$200,000	$ 200,000
3	Head Works / Primary Screening	LS	1	$75,000	$ 75,000
4	Concrete Work	CY	280	$1,500	$ 419,926
5	Process Building	SF	5,500	$75	$ 412,500
6	Site Work / Landscaping	LS	1	$75,000	$ 75,000
7	Yard Piping	LS	1	$50,000	$ 50,000
8	Packaged ISAM treatment Module	LS	1	$285,000	$ 285,000
9	Sludge Storage Tank	LS	1	$50,000	$ 50,000
10	Sludge Dewatering	LS	1	$150,000	$ 150,000
11	Post Treatment / UV EQ Basin	CY	17	$1,500	$ 25,556
12	Chemical Feed System	LS	1	$35,000	$ 35,000
13	Disinfection System	LS	1	$50,000	$ 50,000
14	Equipment Installation	LS	1	$92,500	$ 92,500
15	General Electrical & Control	LS	1	$92,500	$ 92,500
16	Injection Well	EA	4	$15,000	$ 60,000
				Subtotal	**$ 2,097,981**
				Contingency 25%	$ 524,495
				Construction Cost Subtotal	**$ 2,622,477**
				Engineering/ Administration 15%	$ 393,372
				Project Total	**$ 3,015,848**

Table 2 SBR Capital Cost

5.1.3. Membrane Bio-Reactor (MBR)

The cost estimate for the MBR mechanical treatment system is shown below. The treatment system is assumed to be contained within a building. This option will be the most aesthetic pleasing.

AQUA ENGINEERING

CLIENT: Osprey Ranch
PROJECT: Membrane Bioreactor (MBR)
WORKSHT: Engineers Opinion of Probable Cost
DATE: 13-Oct-21

Membrane Biological Reactor (MBR)					
Item	**Description**	**Unit**	**Qty**	**Unit Price**	**Total Cost**
1	Mobilization	LS	1	$25,000	$ 25,000
2	Lift Station	LS	1	$200,000	$ 200,000
3	Concrete Work	CY	113	$1,500	$ 169,037
4	Process Building	SF	1,000	$75	$ 75,000
5	Site Work / Landscaping	LS	1	$50,000	$ 50,000
6	Yard Piping	LS	1	$50,000	$ 50,000
7	Packaged MBR treatment Module	LS	1	$1,065,000	$ 1,065,000
8	Sludge Storage Tank	LS	1	$50,000	$ 50,000
9	Sludge Dewatering	LS	1	$150,000	$ 150,000
10	Chemical Injection System (backup or primary)	LS	1	$35,000	$ 35,000
11	Equipment Installation	LS	1	$266,250	$ 266,250
12	General Electrical & Control	LS	1	$159,750	$ 159,750
13	Injection Well	EA	4	$15,000	$60,000
				Subtotal	**$ 2,355,037**
				Contingency 25%	$ 588,759
				Construction Cost Subtotal	**$ 2,943,796**
				Engineering/ Administration 15%	$ 441,569
				Project Total	**$ 3,385,366**

Table 3 MBR Capital Cost

5.2. OPERATION AND MAINTENANCE COST (O&M)

The operational cost include power necessary to operate the facility. It is assumed a contract operator will be hired to operate the facility with the appropriate certifications for the treatment option evaluated. Water used for irrigation will require samples to be sent to the laboratory for analysis and these costs are estimated. It is assumed for a system this small it will require monthly sampling.

5.2.1. Sequencing Batch Reactor (SBR)

The cost to operate the SBR facility is shown below.

AQUA ENGINEERING

CLIENT: Osprey Ranch
PROJECT: Sequencing Batch Reactor (SBR) Annual O & M
WORKSHT: Engineers Opinion of Probable Cost
DATE: 13-Oct-21

Item	Description	Unit	Qty	Unit Price	Total Cost
1	Power (assuming $0.12 / kwh)	HP	15	$0.12	$ 15,768
2	Chemical Addition	LS	1	$25,000	$ 25,000
3	Water Testing	LS	1	$3,000	$ 3,000
4	Operations	LS	1	$150,000	$ 150,000
5	Dewatering Sludge	LS	1	$10,000	$ 10,000
6	Solid Disposal (Landfill)	Ton	944	$30	$ 28,322
				Subtotal	**$ 232,090**
				Contingency 25%	$ 58,023
				Project Total	**$ 290,113**

Table 4 SBR O&M Cost

5.2.2. Membrane Bio-Reactor (MBR)

The cost to operate the MBR facility is shown below.

AQUA ENGINEERING

CLIENT: Osprey Ranch
PROJECT: Membrane Bioreactor (MBR) Annual O & M
WORKSHT: Engineers Opinion of Probable Cost
DATE: 13-Oct-21

Item	Description	Unit	Qty	Unit Price	Total Cost
1	Power (assuming $0.12 / kwh)	HP	17.7	$0.12	$ 18,606
2	Chemical Addition	LS	1	$25,000	$ 25,000
3	Water Testing	LS	1	$3,000	$ 3,000
4	Operations	LS	1	$60,000	$ 60,000
5	Dewatering Sludge	LS	1	$10,000	$ 10,000
6	Solid Disposal (Landfill)	Ton	944	$30	$ 28,322
7	MBR Replacement Module (10 yr Service)	LS	1	$2,400	$ 2,400
				Subtotal	**$ 144,928**
				Contingency 25%	$ 36,232
				Project Total	**$ 181,161**

Table 5 MBR O&M Cost

5.3. NET PRESENT VALUE (NPV)

The net present value combines capital costs with the O&M costs over a set period. The following NPV costs, Table 6 and Table 7, provide a 20 year assessment of these systems.

5.3.1. Sequencing Batch Reactor (SBR) NPV

AQUA ENGINEERING

CLIENT:	Osprey Ranch
PROJECT:	Sequencing Batch Reactor (SBR) NPV
WORKSHT:	Engineers Opinion of Probable Cost
DATE:	13-Oct-21
Inflation	3%
Discount Rate	6%
Capital Cost	$ 3,015,848
O&M Costs	$290,113

Annual O&M Cost		
Year	**Inflated Value**	**Present Value**
1	290,113	$290,113
2	298,816	$281,902
3	307,781	$273,691
4	317,014	$265,507
5	326,524	$257,372
6	336,320	$249,307
7	346,410	$241,331
8	356,802	$233,459
9	367,506	$225,705
10	378,531	$218,081
11	389,887	$210,597
12	401,584	$203,261
13	413,631	$196,081
14	426,040	$189,062
15	438,822	$182,210
16	451,986	$175,528
17	465,546	$169,019
18	479,512	$162,684
19	493,897	$156,524
20	508,714	$150,541
20-Year O&M Present Value	$4,331,976	
Capital Cost	$3,015,848	
20-Year Net Present Value	**$7,347,824**	

Table 6 SBR Net Present Value

5.3.2. Membrane Bioreactor (MBR) NPV

CLIENT:	Osprey Ranch	
PROJECT:	Memebrane Bioreactor (MBR) NPV	
WORKSHT:	Engineers Opinion of Probable Cost	
DATE:	13-Oct-21	
Inflation		3%
Discount Rate		6%
Capital Cost		$ 3,385,366
O&M Costs		$181,161

Annual O&M Cost		
Year	**Inflated Value**	**Present Value**
1	181,161	$181,161
2	186,595	$176,033
3	192,193	$170,906
4	197,959	$165,795
5	203,898	$160,716
6	210,015	$155,680
7	216,315	$150,699
8	222,805	$145,783
9	229,489	$140,941
10	236,373	$136,180
11	243,465	$131,507
12	250,769	$126,926
13	258,292	$122,442
14	266,040	$118,060
15	274,022	$113,781
16	282,242	$109,608
17	290,709	$105,543
18	299,431	$101,588
19	308,414	$97,741
20	317,666	$94,005
20-Year O&M Present Value	$2,705,097	
Capital Cost	$3,385,366	
20-Year Net Present Value	**$6,090,463**	

Table 7 MBR Net Present Value

6. BODY POLITIC

UAC 317-3-1 requires that a treatment plant that supports multiple units under separate ownership must be sponsored by a Body Politic. The property that this treatment system will support is within the County. There are basically two different alternatives that will all apply for the Body Politic requirement:

1. Weber County can assume that responsibility
2. Through the authority of Weber County, a District can be formed that would be the body politic.

This PER will assume the County will assume the responsibility of the body politic for this treatment facility. It is anticipated that the County will not have staff available to operate this facility, so the following plan of operation outlines an alternative to allow the County to be the body politic but contract out the operations of the facility.

There are two primary duties associated with the operation and maintenance of the treatment system. The first is general management. The management of the system includes collecting the funds required to run the system, planning for future maintenance costs, purchasing consumables that are necessary for operation, being responsible for managing permitting requirements, and managing the operations of the collection system, treatment system and disposal system. The second primary duty is the operations of the treatment facility. The operation includes maintenance on equipment, process controls, solids handling, and general upkeep of the system. Currently Aqua Environmental Services (AES) operates the Wolf Creek Facility.

We recommend a contractual agreement between the County, the Homeowners Association (HOA) and AES. This agreement would allow the HOA to collect the fees and pay for the operations of the facility. AES would operate and maintain the facility. There are many ways these contracts can be developed but with the three parties it reduces the effort from the County and will allow the treatment facility to operate successfully.

7. SUMMARY

7.1. ORENCO

Due to the inability for an Orenco system to provide the quality of effluent needed, an Orenco system will not be considered for this location.

7.2. SBR ALTERNATIVE

An SBR system will provide Osprey Ranch with consistent high-quality effluent that can be used for reuse and/or disposal via injection wells. An SBR system presents a capital cost of $3.015 Million. The annual operations and maintenance costs for this SBR is approximated to be $290,113. The 20 year life of the SBR is projected to have a net present value of about $7.35 million.

The SBR sized for the criteria discussed in this report will fit in the chosen location. If future expansion is desired, this site will need significant site work to provide adequate space for future expansion footprint.

7.3. MBR ALTERNATIVE

An MBR system will provide Osprey Ranch with consistent high quality effluent that can be used for reuse and/or disposal via injection wells. An MBR system presents a capital cost of $3.39 Million. The annual operations and maintenance costs for this MBR is approximated to be $181,161. The 20 year life of the MBR is projected to have a net present value of about $6.09 million.

The MBR sized for the criteria discussed in this report will fit in the chosen location. Once future expansion is desired, this site will support multiple expansions without the need for extensive site work.

7.4. RECOMMENDATION

Both an SBR and a MBR treatment system has shown the ability to consistently provide high quality effluent that meets or exceeds the design parameters discussed in this report. An SBR provides a lower capital cost, however with an increased operations and maintenance costs associated with running the SBR, it will cost more over a 20 year period.

It is recommended that an MBR is installed at this location. The MBR will provide consistent treated effluent for a $1.3 Million reduction in costs over a 20 year period compared to the SBR. The MBR also requires a significant smaller footprint than the SBR treatment. This ensures space within the selected site for future expansion enabling additional connections to be made utilizing the same infrastructure.

Appendix A Soil Test Pit Log

TEST PIT LOG

Date		
Started:	9/29/2021	
Completed:	9/29/2021	
Backfilled:	---	

Logged By: M Christensen
Equipment: Trackhoe

Test Pit No. **TP-67**

Sheet 1 of 1

Location: Rapid Infiltration Well (41.295325 N -111.829439 W)

Depth (feet)	Sample Type	Groundwater	Graphic Log	Group Symbol	Material Description	Dry Density (pcf)	Moisture Content (%)	Minus #200 (%)	Liquid Limit	Plasticity Index
0–2					Topsoil; Lean CLAY - moist, dark brown					
2–6				CL	Lean CLAY - stiff, moist, brown					
6–14		▽ (at 6 ft)		GP	Poorly Graded GRAVEL with sand - medium dense, wet, brown, with cobbles and boulders up to 12 inches in diameter					
14–14½				CL	Lean CLAY - medium stiff, wet, dark gray					
14½					Bottom of test pit at 14½ feet					

Depth scale: 5, 10, 15

☒ Bulk/Bag Sample
▥ Undisturbed Sample
▼ Stabllized Groundwater
▽ Groundwater At Time of Excavation

Christensen Geotechnical

Lewis Homes
Osprey Ranch Subdivision
Eden, Utah
Project No.: 133-012

Plate

1

Appendix B Pump Test Results

Thom Summers & sons EXCAVATING PO BOX 45, EDEN, UT 84310

10/26/21

John Lewis
Shane Dunlevy

RE: Water Service Well

We pumped the surface well for 360 minutes. We had a draw down of 0.38” per minute, which equals a 14” draw down. We pumped 103.05 gallons per minute and the water level was still going down.

We knew that it would not last the night, it would run dry. This is my report.

Thom Summers