

MEMORANDUM



Date: June 24, 2025

To: Eden Valley Opportunity
3718 N Wolf Creek Dr
Eden, UT 84310
Transmitted Via Email: reverson@evoutah.com
CC:

From: Ryan Bradley PE, PMP

RE: Osprey Ranch
1800 N HYW 158
Eden, UT
Ensign Engineering Project No.: 14085

The purpose of this memorandum is to describe the sewage flow and lift station hydraulic calculations for Osprey Ranch located at 1800 N HYW 158 Eden, Utah. Osprey Ranch contains 30 homesites. 17 of these houses will discharge sanitary sewer to a sewage lift station near the north end of the site which pumps through force main to a gravity sewer main manhole to the south.

Sewage Generation – Total System

Flow for these houses was estimated based around an average of 100 gallons per day (gpd) per person. Using the Utah average of 3.2 people per household produces an average flow of 320 gpd/household. Applying this to 17 houses gives a sewage generation of 5440 gpd flowing to the sewage lift station. With a peaking factor of 4.5 the total peak hour is 17 gallons per minute (gpm).

Lift Station Hydraulics

Hazen-Williams C values of 100, 120, 140, and 150 are used to calculate the initial and extended performance of the force main when considering the peak hour inflow. There is one sewage effluent inlet into the wet well shown in the design drawings. The pumps selected are Flygt NP 3171 SH 3~274 with pump curves shown in Appendix B.

The sewage lift station elevation head is 232.3 feet from pumps off to the discharge to the gravity main. With a Hazen-Williams C value of 140 for the 4,300 linear foot DR11 4-inch HDPE force main, the total dynamic head is calculated to be 286.7 feet with a target discharge of 109 gpm and velocity of 3.37 feet per second.

The active volume is calculated to be 750.9 gallons with an emptying time of approximately 8.2 minutes, fill time of 44.2 minutes, and 1.1 cycles per hour. Lift station hydraulic calculations are included in Appendix A.

If you have any questions concerning the information noted above, feel free to contact us at any time at (801) 255-0529.

SANDY
45 W 10000 S, STE 500
Sandy, UT 84070
P: 801.255.0529

LAYTON
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Layton, UT 84041
P: 801.547.1100

CEDAR CITY
88 E Fiddler's Canyon Rd, STE 210
Cedar City, UT 84721
P: 435.865.1453

TOOELE
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Erda UT 84074
P: 435.843.3590

RICHFIELD
225 N 100 E
Richfield, UT 84701
P: 435.896.2983

Appendix A: Lift Station Hydraulics

LIFT STATION HYDRAULICS

Project: Osprey
By: Designer
Date: 6/24/2025

Project No.: #####
Checked By: Manager
NP 3171 SH 3~ 274



FORCE MAIN HEADLOSS

REACH 1.0 FM * ID shown is for 4" DR 11 HDPE					
MIN. DR	11	11	11	11	15.5
NOM. PIPE DIA.	4	4	4	4	in
PRES. CLASS	200	200	200	200	psi
PIPE DIA. *	3.633	3.633	3.633	3.633	in
Q _{max}	83.2	96.4	109.0	114.5	gpm
C _{H-W}	100	120	140	150	
Length	4,300	4,300	4,300	4,300	ft
VELOCITY	2.57	2.99	3.37	3.55	ft/s
CAV Minor Loss K _L	0.20	0.20	0.20	0.20	$h_L = k * \frac{v^2}{2g}$
# CAV	0	0	0	0	#
CAV Minor Loss	0.000	0.000	0.000	0.000	ft
Unit h _L	1.396	1.310	1.235	1.191	ft/100'
Reach 1.0 h _L Subtotal	60.01	56.32	53.10	51.23	ft
Min. Elevation	5349.74	5349.74	5349.74	5349.74	ft
Max. Elevation	5582.00	5582.00	5582.00	5582.00	ft
Max. Pressure	126.9	125.4	124.1	123.3	psi

FM Total Length	4300	4300	4300	4300	ft
FM Headloss Total	60.01	56.32	53.10	51.23	ft

FM Volume	2315.4	gal
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SYSTEM PEAK HOURLY INFLOW	17.0	17.0	17.0	17.0	GPM
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	CH-W=100	CH-W=120	CH-W=140	CH-W=150	
TARGET FLOW	83.2	96.4	109.0	114.5	GPM
ELEVATION HEAD	232.3	232.3	232.3	232.3	FT
PIPE AND MINOR HEADLOSS	60.83	57.33	54.42	52.55	FT
TDH	293.1	289.6	286.7	284.8	FT

DIAMETER	8	8	8	8	FT
ACTIVE DEPTH	2.0	2.0	2.0	2.0	FT
CONE BOTTOM DIAMETER	2	2	2	2	FT
CONE HEIGHT	2.6	2.6	2.6	2.6	FT
VOLUME	750.9	750.9	750.9	750.9	GAL
EMPTY TIME	11.3	9.5	8.2	7.7	MIN
FILL TIME	44.2	44.2	44.2	44.2	MIN
CYCLES PER HOUR	1.1	1.1	1.1	1.2	

RIM ELEV.	5370.44
INFLUENT INVERT ELEV.	5356.04
INVERT TO ALARM DEPTH	3.30
ALARM ELEV.	5352.74
ALARM TO LAG PUMP DEPTH	0.50
LAG PUMP ON ELEV.	5352.24
LAG TO LEAD PUMP ON DEPTH	0.50
LEAD PUMP ON ELEV.	5351.74
PUMPS OFF ELEV.	5349.74
PUMPS OFF TO BASE DEPTH	2.50
BASE ELEVATION	5347.24
TOTAL MH DEPTH	23.20

72.99 minutes

Lift Station Reach Headloss

	Length (ft)	Nom. Dia. (in)	ID (in)	h _L CH-W=100 083-gpm	h _L CH-W=120 096-gpm	h _L CH-W=140 109-gpm	h _L CH-W=150 115-gpm	
Lift Station Reach								
4-inch Class 53 DIP Piping	30	4	4.16	0.22	0.20	0.19	0.19	ft
4-inch Class 53 DIP Piping	10	4	6.22	0.01	0.01	0.01	0.01	ft
Lift Station Reach Headloss Subtotal				0.23	0.21	0.20	0.20	ft

Lift Station Minor Loss

Fitting Type	# Fittings	Dia. (in)	ID (in)	Velocity C _{H-W} =100 (ft/s)	Velocity C _{H-W} =120 (ft/s)	Velocity C _{H-W} =140 (ft/s)	Velocity C _{H-W} =150 (ft/s)	K _L	$h_L = k * \frac{v^2}{2g}$	Minor Losses C _{H-W} =100	Minor Losses C _{H-W} =120	Minor Losses CH-W=140	Minor Losses C _{H-W} =150	
Entrance	1	4	4.16	1.96	2.28	2.57	2.70	0.50	0.03	0.03	0.04	0.05	0.06	ft
ROMAC	1	4	4.16	1.96	2.28	2.70	2.70	1.00	0.06	0.06	0.08	0.11	0.11	ft
90 Degree Bend	3	4	4.16	1.96	2.28	2.70	2.70	0.50	0.09	0.09	0.12	0.17	0.17	ft
Ball Check Valve	1	4	4.16	1.96	2.28	2.70	2.70	1.50	0.09	0.09	0.12	0.17	0.17	ft
Plug Valve	2	4	4.16	1.96	2.28	2.70	2.70	1.60	0.19	0.19	0.26	0.36	0.36	ft
Cross	1	4	4.16	1.96	2.28	2.70	2.70	0.50	0.03	0.03	0.04	0.06	0.06	ft
CAV	1	4	4.16	1.96	2.28	2.70	2.70	0.20	0.01	0.01	0.02	0.02	0.02	ft
Meter	1	4	4.16	1.96	2.28	2.70	2.70	1.20	0.07	0.07	0.10	0.14	0.14	ft
Reducer	0	4	4.16	1.96	2.28	2.70	2.70	1.00	0.00	0.00	0.00	0.00	0.00	ft
45 Degree Bend	1	4	4.16	1.96	2.28	2.70	2.70	0.35	0.02	0.02	0.03	0.04	0.04	ft
Lift Station Minor Headloss Subtotal										0.60	0.80	1.12	1.13	ft

Lift Station Headloss Total	0.82	1.01	1.32	1.32	ft
System Headloss Total	60.83	57.33	54.42	52.55	ft

Appendix B: Pump Curve

	V Min (f/s)	Q (gpm)	H (ft)
CH-W=100	2.56	82.7	299.4
CH-W=120	2.94	95.1	296.2
CH-W=140	3.33	107.7	292.9
CH-W=150	3.53	113.9	291.2

