



CASE STUDY – SMALL WINERY

Winery Recycles 98% of wastewater with RWS Solution

A north coast winery produces 450,000 cases of wine per year and 5.3 million gallons of winery wastewater. Winery wastewater production averages 14,400 gallons per day (gpd) but spikes to twice that during high usage periods such as harvest and bottling. The water composition is similar to that included in the winery general order, determined by Kennedy/Jenks Consultants in 2009. Analysis is included in appendix 1.

The winery holds water in a pond and releases it to its Land Application Area (LAA) per its permit. The winery is proud to “reuse” the water for irrigation on a local farmer’s cropland. What the winery does not discuss is the 10 million gallons it must pump from the well to maintain the crops during low water generation periods and to dilute the organic material and salts to meet irrigation requirements.

Recovered Water Solutions (RWS) developed a process flow to recycle 99% of the winery wastewater. While still using water for irrigation, the winery was able to reduce its LAA significantly. Equally important, the winery vastly reduced the amount of ancillary irrigation water it was required to provide for contaminant dilution and irrigation during low usage periods.

The first step in the process is to reduce the wastewater biological oxygen demand (BOD). In wineries, BOD is directly related to the amount of sugar and other organic material in the waste streams. The BOD is the amount of oxygen beneficial microorganisms need to break down the organics. For this process, RWS specified a membrane bioreactor (MBR). The MBR, equipped with ten Suez (Veolia) ZW500 ultrafilter cartridges, reduced BOD and volatile dissolved solids (VDS) by 99%, making the wastewater suitable for some limited irrigation and reuse applications.

The next step is softening the wastewater stream via nanofiltration (NF). Properly implemented, NF will reject the majority of the divalent ions from the water, making it suitable for high recovery reverse osmosis separation. Given this wastewater composition, the NF can operate at 94% recovery, pushing the membrane-fouling divalent ions into the rejection stream. RWS recommends the Suez/Veolia PROFlex LT8-6 to meet the flow requirements of the NF.

Under this scenario, the NF reject (concentrate) is approximately 860 gallons per day. The winery could haul this to off-site disposal, utilizing a tank truck every 5 – 6 days. The concentrate, however, contains many of the micronutrients desired for grapevine and other crop irrigation. By diluting this stream with RO permeate (1 part concentrate, 3

parts permeate), the blended water is an outstanding water source for irrigation anywhere in the vineyard or surrounding grounds.

To blend NF concentrate for irrigation and recycle wastewater for use within the winery, RWS specifies the Suez/Veolia PROFlex LT8-3 with high-rejection membranes. This system is capable of recovering 96% of the NF permeate as high purity water. The RO is protected by a small water softener that generates its own wastewater. The softener blowdown coupled with the RO concentrate represents 5% of the total wastewater volume, for a recovery of 95%. While meeting potable water specifications, the winery can choose to recycle this water as cooling water tower make up, boiler feed water make up or for use within the winery.

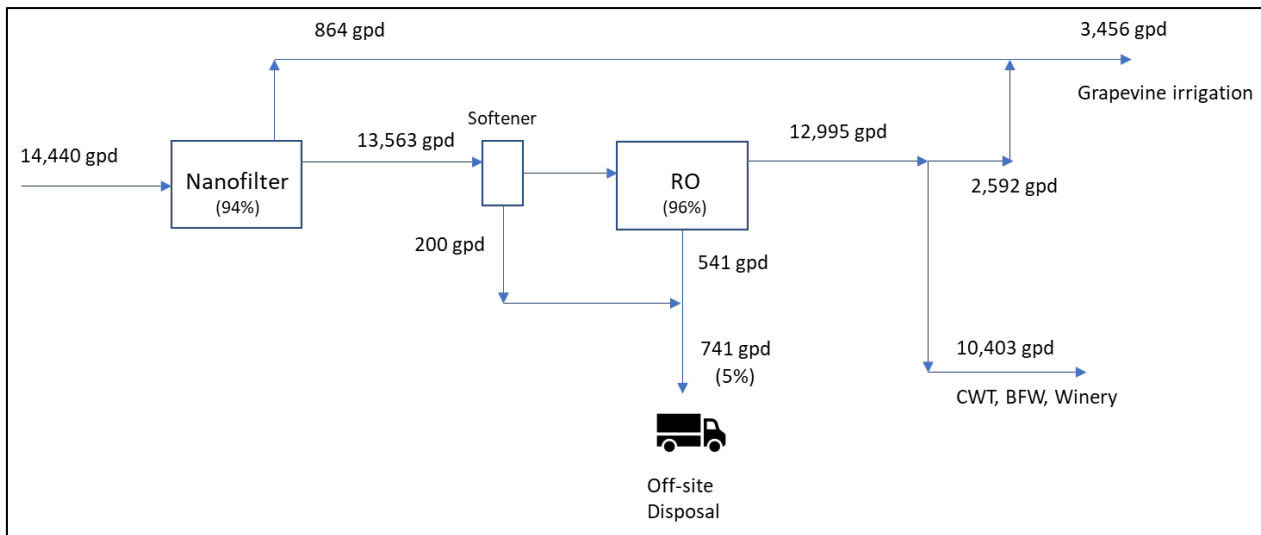


Figure 1: Process Flow with Standard RO

Installation of the RWS Osmoninator will bring the recycle rate up to 98%. The Osmoninator is an osmotically assisted reverse osmosis (OSRO) device. Using the transmembrane concentration gradient, OSRO defeats the operational issues associated with high osmotic pressure, allowing the Osmoninator to process water from the highly concentrated reject of the standard RO. The OSRO permeate is suitable for the same recycling uses as the RO permeate. The RO no longer requires the softening unit, reducing overall water to waste. The remaining 2% of wastewater can be hauled off-site for disposal or crystallized to create a zero liquid discharge winery.

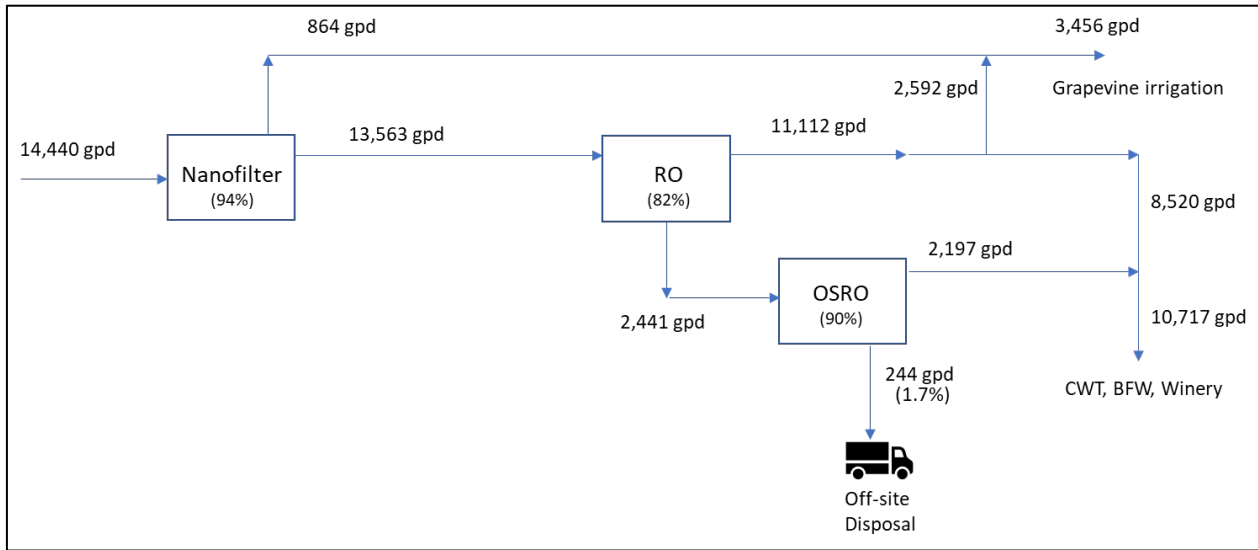


Figure 2: Process Flow with Osmotically Assisted RO

Of the 5.3 million gallons of wastewater created by this winery, RWS provides the systems to recycle up to 5.2 million gallons. In an environment with bans on new well drilling and new regulations regarding water discharge, the path to expansion and trouble-free operations starts with RWS wastewater recycling systems. Contact RWS today to discuss your opportunities to recycle winery wastewater.

Appendix 1

Parameter	Unit	Process water average ⁽¹⁾	Process water range ^(1,2)
pH	pH units	--	3.8 - 9.3
BOD	mg/L	2,767	190 - 9,100
EC	µS/cm	1,428	958 - 2,100
TDS	mg/L	1,356	520 - 2,270
FDS	mg/L	759	350 - 1,000
VDS	mg/L	598	100 - 1,290
TSS	mg/L	580	40 - 2,300
NH ₃ as N	mg/L	60	0.5 – 360
NO ₂ as N	mg/L	0.4	<0.1 - 1.6
NO ₃ as N	mg/L	1.8	<0.45 - 5.7
Organic N	mg/L	17	3 – 70
TKN	mg/L	64	<4 – 430
Total N	mg/L	78	5 – 430
B	mg/L	0.25	0.1 - 0.4
Na	mg/L	108	31 - 200
K	mg/L	144	36 - 369
Ca	mg/L	55	13 - 130
Mg	mg/L	21	8 - 44
Fe	mg/L	1.03	0.50 - 1.67
Mn	mg/L	0.10	<0.025 - 0.16
Cu	mg/L	0.16	0.04 - 0.62
Zn	mg/L	0.30	0.06 - 1.2
Cl	mg/L	85	5 - 180
S ²⁻	mg/L	3	<0.1 - 7.2
SO ₄	mg/L	149	56 - 359

Source: Wine Institute. 2009. Comprehensive Guide to Sustainable Management of Winery Water and Associated Energy. Prepared by Kennedy/Jenks Consultants.

"< [value]" = analytical result below reported detection limit

(1) Process water samples collected from two wineries during crush and non-crush periods; conditions at other wineries will vary.

(2) Maximum values in range are generally representative of crush operations.