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Assessment of the septic system capacity in support of a planning application for Sunnybrook Farm Estate Winery Inc. (1425 Lakeshore Rd., Niagara-on-the-Lake, ON.)

Rivercourt Engineering has been asked to complete an assessment of the existing septic system to ensure that it is sufficiently designed to service the current and proposed occupancy at Sunnybrook Farms (1425 Lakeshore Road, Niagara-on-the-Lake, ON). The capacity of the septic system will determine what occupancies can be supported. This assessment is to be included in a zoning by-law amendment and site plan application, which NPG Planning Solutions is currently undertaking.

Rivercourt designed the existing septic system in 2017-2018 and the septic permit was issued by the Niagara Region on May 17, 2018 (permit #L087/18). The septic system was designed with an engineered pretreatment step to treat 8,400 L/d of combined sanitary sewage and winery process water. The design flow of 8,400 L/d included 4,325 L/d of sanitary sewage and 4,074 L/d of winery process water. The system includes a 30,000 L septic tank, 10,350 L pump tank, 2-cell 116.7 m^2 Aqua Wetland System (AWS), 10,350 L pump tank, four (4) Ecoflo STB-650 tanks, and eight (8) 21.34 m shallow buried trenches (170 m total).

In addition to this system, there was a 3-bedroom house (design flow 1,600 L/d) that was serviced by its own septic system. That house has since been demolished.

When the septic system was originally designed, the owners were planning a winery with retail. However, those plans changed and the focus is now on cider production and expanded hospitality offerings, including a tent for additional outdoor capacity in the summer months. There are also plans for a new storage building.

To determine if the existing septic system can support the change in occupancy/production, Rivercourt has completed updated design flow calculations based on conversations with the owner, the planner, and a review of the updated facility floor plans. In addition, we have reviewed 2025 municipal water use data to confirm that the updated design flow calculations are reasonable.

A comparison of the 2018 design flow and updated 2026 design flow are presented below. Following that, we discuss the changes to the occupancies on the property and winery vs. cidery wastewater flows.

	Unit	2018 Design Flow			2026 Updated Design Flow			Note/comment
		# of units	L/d per unit	Flow (L/d)	# of units	L/d per unit	Flow (L/d)	
Office (floor area)	9.3 m2	12	75	900	9	75	675	Office space reworked (900 sq ft)
Production (employees)	8 hr shift	15	75	1,125	-	-	-	
Production (employees with shower access)	8 hr shift	-	-	-	3	125	375	Shower for employees to be added in the new storage barn
Retail (floor area)	9.25 m2	10	40	400	15	40	600	Retail floor area reworked (137.6 m2)
Retail (WCs)	water closets	2	950	1,900	1	950	950	Count only 1 WC for retail, focus is on hospitality
Hospitality	seats	-	-	-	100	36	3,600	Tasting + events (max. combined capacity is 100 seats)
Process Wastewater	-	Winery process water		4,074	Cidery process water		2,200	The original plan was to produce wine but now it is a cidery
		TOTAL		**8,399**	**TOTAL**		**8,400**	

Design flow comparison: Original 2018 calculations versus updated 2026 calculations.

Updated Occupancy and Design Flow

Sanitary Sewage

The addition of the outdoor tent and storage barn, the increase to the retail area, the addition of hospitality seating and the new washwater calculation for cider production will require reallocation of flows.

The outdoor tent and space inside the existing building now allow for up to 100 guests, when previously there was no design flow allocated for hospitality. Now we are only counting one (1) water closet for retail, and the other water closets will be associated with the hospitality occupancy.

The previous design allowed for up to 15 production employees, but now only three (3) are required for the type of cider production done on this property. A shower for the production employees will be added in the new storage barn, which increases the flow per employee, but the overall flow from production employees is decreased.

The office area is also being reworked. The existing building has some office space but most of that will be moved to the new storage barn. The owner is planning for three (3) office employees and there will be approximately 83.6 m^2 (900 sq ft) of office floor area between the existing building and future storage barn. The office floor area calculation results in the larger figure, so it is used in the design flow calculation. There will be some conference room space and other spaces for the employees, but these are not counted in the office area, as they will only be used intermittently.

The total sanitary sewage flow is 6,200 L/d, compared to 4,325 L/d from the 2018 design. The full calculations are presented in the table below:

	Unit	# units	L/d per	L/d
Office floor area (83.6 m^2)	9.3 m^2	9	75	675
Production employees (with showers)	8 h shift	3	125	375
Retail (137.6 m^2)	9.25 m^2	15	40	600
Water closets for retail	WCs	1	950	950
Hospitality	Seats	100	36	3600
Total Sewage Design Flow				**6,200**

Process Water

Rivercourt regularly designs systems like this for Niagara wineries and we occasionally work with cideries. The process of making alcohol from a fruit source is generally the same. For cideries, the industry standard is that for every 1 L of cider produced, 5 L of wastewater is generated, a ratio of 1:5. This is similar to wineries when we use the Napa Valley Formula to estimate wastewater volumes based on the annual wine production. The 1:5 ratio for cideries assumes that fruit is pressed and processed onsite, stored and fermented, and then bottled and packaged. However, at Sunnybrook, two of the most water intensive processes, fruit pressing and bottling/packing, are completed offsite. The Sunnybrook property is only used for fermenting and ageing, as well as storage. The owner estimates that they use 95% less water than a typical cider operation. That would equate to a ratio of 1:0.25 (cider to wastewater). To ensure that we conservatively account for peaks and fluctuations when estimating the cidery wastewater flows, we will assume a ratio of 1:2, instead of the normal 1:5 or the owner's estimate of 1:0.25.

Sunnybrook currently produces about 100,000 L of cider/year, but they have the capacity to produce up to 400,000 L/yr. 100,000 L/yr would result in an average daily wastewater volume of ~550 L/d and 400,000 L of cider would generate ~2,200 L/d. Therefore, we will use 2,200 L/d as for the process water design flow.

To ensure our calculations are reasonable, we reviewed the water use data from 2025, which is discussed below.

Water Use Data

We reviewed the 2025 water use data for the property. This is the volume of water purchased from the municipality, as measured and reported by them. It will not be a one-to-one ratio of municipal water to sewage, however, as there are activities like irrigation that consume water but do not generate sewage. In general, we expect the data to be a slight overestimation of the wastewater volumes but still a valuable data source for understanding the limits of how much sewage could be generated.

The table shows average daily flows, but in reality, there will be some days that generate more wastewater than others. The Estimated Peak Flow column attempts to show what a peak day in that period may have looked like. We are using a peaking factor of 2 for this calculation.

Month	Total Volume (L/month)	Daily Avg. (L/d)	Estimated Peak Flow (L/d)
January	28,610	923	1,846
February	21,680	699	1,399
March	22,270	718	1,437
April	33,870	1,093	2,185
May	23,140	746	1,493
June	46,650	1,505	3,010
July	70,600	2,277	4,555

August	60,290	1,945	3,890
September	70,790	2,284	4,567
October	56,810	1,833	3,665
November	29,090	970	1,939
December	29,960	966	1,933

The average daily flow and estimated peak flows are well within the rated septic system capacity of 8,400 L/d. The current cider process water flow is estimated to be ~550 L/d but could increase by 1,650 L/d if cider production is maximized at the site (2,200 L/d total). If we look at September, the month with the highest flow, the average daily flow is 2,284 L/d and the estimated peak is 4,567 L/d. If an additional 1,650 L/d of cider process water is added to those values, the new daily average would be 3,934 L/d and the new peak would be 7,867 L/d, still within the rated capacity of the existing septic system.

Aqua Wetland System Design

The design of the engineered pretreatment step, the Aqua Wetland System (AWS), is determined by the organic loading (measured as BOD) to the system. The AWS can remove approx. 70 grams of BOD per m^2 of AWS area, per day ($g/d/m^2$). We are assuming that winery process water and cidery process water have similar chemistries and organic loads. The table below compares the BOD loading calculations for the existing system to the new wastewater scenario:

	2018 Design Flow			2026 Updated Design Flow		
	Flow (L/d)	Expected	Mass of BOD	Flow (L/d)	Expected	Mass of BOD
Sanitary Sewage	4,325	130	562	6,200	130	806
Process water (winery/cidery)	4,074	1,500	6,111	2,200	1,500	3,300
Total	8,399		6,673	8,400		4,106

In the original design, the AWS needed to remove 6,673 g of BOD per day. In the updated scenario, it only needs to remove 4,106 g/d. Therefore, the AWS is sufficiently sized to pretreat the combined wastewater prior to discharge to the Level IV treatment unit (Ecoflo).

Conclusion

The existing septic system has the capacity to support the new outdoor tent and the construction of a future storage barn. The updated design flow calculation allows for 8,400 L/d of sewage and cidery process water. The total flow for the property is 8,400 L/d as a 3-bedroom house that was previously on the property (1,600 L/d) has since been removed. Therefore, if the septic system needs to be expanded, the property could support an additional 1,600 L/d before requiring approval from the Ministry of the Environment, Conservation and Parks.

The 2025 water use data further confirms that the septic system is sufficiently sized to manage the wastewater generated on the property and shows that there is room to expand the cider production to the maximum of 400,000 L cider per year.

It is our understanding that a holding provision will limit hospitality occupancy on the property to 100 guests, with a potential future increase to 150. If occupancy is increased, the septic system will need to be expanded to accommodate the additional load. Our preliminary assessment confirms that there is sufficient area to expand the treatment and dispersal system by 1,600 L/d, increasing total capacity to 10,000 L/d. At that time, an updated design flow assessment will be required, and the septic permit must be amended to reflect the increased capacity.

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