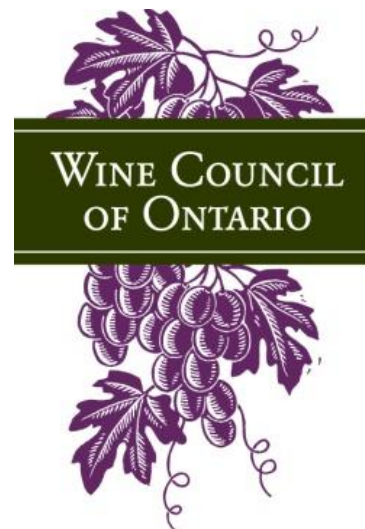


Sustainability Committee Newsletter

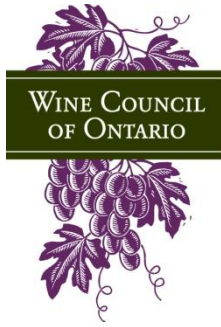
March 2011: Wastewater

3/15/2011
Wine Council of Ontario



CONTENTS

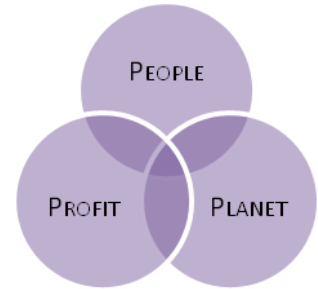
Overview	1
Wastewater	1
Characteristics	1
Regulatory Requirements	2
Discharge to municipal treatment plants	2
On-site treatment.....	3
Hauled Sewage.....	4
Treatment Options.....	4
Aerobic digestion.....	5
Anaerobic Digestion	6
Constructed Wetlands	6
Septic Tanks and Leaching Beds.....	7
Wastewater reuse.....	8
Water conservation	8



Sustainability Committee Newsletter

WASTEWATER

MARCH 2011



OVERVIEW

Water is becoming an increasingly precious resource. With fresh water becoming scarce in the western United States and the degradation of aquifers and many freshwater bodies, governments are focusing on protecting and using our water supply more efficiently.

Water use plays a crucial role in the winemaking process. Wineries can generate large quantities of wastewater during the harvesting and winemaking seasons. [Nutrients](#) present in this wastewater, such as [phosphorus](#), are limiting nutrients in algal growth in surface water. Often, if these nutrients enter surface water bodies they will trigger algal blooms that will consume dissolved oxygen and cause the loss of aquatic life.

Municipal wastewater treatment plants tend to have problems treating these particular nutrients. Additionally, high acidity or alkalinity, along with elevated levels of other contaminants may limit the effectiveness of water treatment by killing the microbes used in municipal water treatment facilities. Consequently, the municipalities responsible for these plants are becoming more vigilant in enforcing water quality standards.



WHAT'S YOUR STORY?

Help Ontario's wine industry become more 'Green'. Share a story on how your company has become more sustainable. We are also interested in what specific topics you would like to see addressed in these newsletters.

Please contact Regina Foisey with your stories or requests at:
regina.foisey@winesofontario.org

WASTEWATER

CHARACTERISTICS

Typically, due to the seasonal nature of the wine industry, wastewater quantity and quality can be quite variable during the year. During harvesting season winery wastewaters can typically have a very high organic loading (BOD₅ and TSS), high nitrogen levels, high phosphorus levels, and low pH levels.

REGULATORY REQUIREMENTS

Typically regulatory requirements for wastewater depend on the receiving body of water. Accordingly, Section 36 of the Fisheries Act prohibits the discharge of harmful substances into water frequented by fish and Section 14 of the Environmental Protection Act prohibits the discharge to the natural environment of any contaminant which may be harmful.

DISCHARGE TO MUNICIPAL TREATMENT PLANTS

When water is discharged into a municipal treatment facility, wineries will be required to gain approvals from the municipality. These approvals will typically require information on the quantity (volume) and quality (pH, BOD₅ Total Suspended Solids and phosphorus levels) or wastewater. Contact information for the specific wastewater treatment divisions several municipalities include:

WASTEWATER DIVISIONS OF LOCAL MUNICIPALITIES

Region	Contact	Phone Number	e-mail address/website
Niagara	Niagara Region Water & Wastewater Services	1-800-263-7215	http://www.niagararegion.ca/living/water/default.aspx
Prince Edward County	Water and Wastewater Services	613-476-3537	water@pecounty.on.ca
Lake Erie North Shore	Ontario Clean Water Agency	(519)727-6256 (North) (519)326-4447 (South) (519)344-7429 (West)	http://www.ocwa.com
Toronto	Environmental Monitoring and Protection's Waste Control Group	416-392-9940	http://www.toronto.ca/water/protecting_quality/pollution_prevention/contact.htm

ON-SITE TREATMENT

Approval from the Ministry of the Environment is required to treat water on-site, according to Section 53 of the Ontario Water Resources Act, if you:

- operate a sewage system with a capacity greater than 10, 000 litres per day,
- operate multiple sewage works on a site with a combined capacity greater than 10,000 litres per day
- The sewage works is not contained entirely on the property it serves,

The application process for obtaining approval for a sewage works is outlined in the '[Guide for Applying for Approval of Sewage Works](#)'. Information the application will require is:

- Applicant information
- Project description
 - Environmental site information
- Type of facility
- Regulatory requirements
- Supporting Information
- Engineering drawings

The technical documents must include details on:

- Site Plan
- Characterization of the wastewater
 - Quantity
 - Quality
- Design report
- Engineering drawings and specifications
- Environmental impact analysis by a Professional Engineer or a Professional Geoscientist
- Stormwater Management Report

If the design capacity for your wastewater treatment plant does not exceed 10, 000 L you will still be required to obtain approvals from either the regional or municipality. The Wine Council's document "[Eco-Winegrowing 101](#)" does suggest starting with your Public Health office, which tends to regulate sewage systems in many regions.



CARBON 101 WORKSHOP

The Niagara Sustainability Initiative is a local not for profit organization designed to bring economic strength back to the Niagara region by greening local businesses and municipalities.

On April 5th the Niagara Sustainability Initiative will be offering a technical workshop on their Carbon Management Software. This software is an online tool designed to help companies determine and track their greenhouse gas emissions. The workshop will cost \$25 to attend and be held at 135 Taylor Road (Glendale Campus of Niagara College) in Niagara-on-the-Lake at 8:00 am.

Please visit their [website](#) or contact Donya Danesh at ddanesh@niagarasustainability.org for more information

LOCAL PUBLIC HEALTH OFFICES

Region	Phone Number	e-mail address/website
Niagara Region	(905)699-3762	http://www.niagararegion.ca/living/health_wellness/default.aspx
Prince Edward County	(613)376-7471 (Local) (613)966-5500 (Head Office)	http://www.hpechu.on.ca/applications/web_cms/index.php?siteid=25
Lake Erie North Shore	(519)258-2146(HOTLINE)	http://www.wechealthunit.org http://www.wechealthunit.org/contact-us/forms/general-comments
Toronto	416-392-0658	publichealth@toronto.ca

HAULED SEWAGE

Currently, haulers of septic waste are required to have a certificate of approval from the Ministry of the Environment. Wineries should ensure that their waste haulers have the appropriate approvals. These haulers are required to have the sewage type and the sewage generator approved by the region and they are required to leave a sample with the wastewater treatment facility for testing. It is important to understand the characteristics of your wastewater to avoid any additional fees from the wastewater treatment facility.

TREATMENT OPTIONS

The process for the treatment of wastewater generally consists of primary treatment, which is the physical removal of solid material, through means such as settling or filtration. Primary treatment may occur before and/or after the bioreactor, when secondary treatment is involved.

Secondary treatment involves microbial organisms breaking down the organic material in the wastewater and neutralizes its pH. Options for the biological treatment of winery wastewater include:

- Aerobic bio-reactors
- Anaerobic
- Constructed wetlands

- Septic tanks and leaching beds

Some processes may require further (tertiary) treatment of the wastewater to obtain the required water quality parameters. Tertiary treatment may be employed by chemical addition to remove phosphorus (alum, ferric sulphate or ferric chloride) or neutralize pH (lime, calcium carbonate or sodium hydroxide). Tertiary treatment may also involve disinfection of the wastewater by methods such as [ozonation](#), [chlorination](#) and [ultra-violet disinfection](#). However, disinfection will rarely be employed unless the treated wastewater is being discharged to surface water or groundwater.

AEROBIC DIGESTION

The most common process for removing organic material from the waste stream is the use of an aerobic process. The process also removes nutrients and naturally buffers the pH of the wastewater.

Since the process employs aerobic bacteria, they require significant amounts of oxygen to process the organic material. In fact, providing this oxygen (aeration) is often the most significant cost associated with these systems.



Many types of reactors are employed to improve oxygen transfer into and biological contact with the waste water.

- [Suspended growth bioreactor](#)
- [Rotating biological contactors](#)
- [Active biological contactors](#)
- [Fluidized bed bioreactors](#)
- [Trickling filters](#)
- [Membrane bio reactors](#)

These systems do remove significant quantities of organic materials. However, they are not as effective at removing nutrients from the water and often require tertiary treatment to remove nutrients, phosphorus in particular.

BIO-DIGESTER TREATS WASTEWATER AND SAVES ENERGY

The Sun-Maid Growers of California installed a bio-digester to treat their process water. This process water created serious problems when it became septic and created offensive odours. By installing a bio-digester Sun-Maid managed to produce enough methane gas to replace 75% of their natural gas needs while solving their process water problem. They have also been able to sell the solids from this operation for compost.

For more information please refer to the [original article](#)



ANAEROBIC DIGESTION

Similar to the aerobic process, the anaerobic process uses microbial organisms. However, it operated in the absence of oxygen to breakdown organic material in the waste stream. The process typically operates in a temperature range between 20°C and 35 °C.

In fact, the anaerobic process can be applied as a 'batch' process with quick start up and shut down, which is beneficial due to the seasonal nature of the wine industry. The process also eliminates the need for aeration of the wastewater. This may significantly reduce the energy cost associated with wastewater treatment. However, the anaerobic process often must be followed by an aerobic process to achieve the desired water quality parameters.

Anaerobic digestion is also typically in conjunction with the aerobic process to stabilize and digest the solid materials discharged from the settling of solid materials in primary and secondary treatment. The process also has the advantage of producing methane gas, which may be used to generate energy, and nutrient rich soil, which may be applied to land (with government approvals).

CONSTRUCTED WETLANDS

Research into [constructed wetlands](#) began in the late '60s in the Netherlands, with the technology gaining popularity due to its effectiveness and robustness in treating wastewater. Organic materials and nutrients are primarily removed through microbial activity and plant growth.

Several types of constructed wetland systems exist. Systems with **free floating** or **submerged vegetation** remove organic material, nutrients and pathogens effectively from the wastewater.





PROGRESSIVE WASTEWATER TREATMENT IN ACTION

EastDell Estates winery treats their wastewater with BIOBED Filtrations designed by Aqua Treatment Technology. The treated water is recycled back to their toilets. Please visit their [website](#) for more information on the green initiatives at Diamond Estates Wines & Spirits.



It is important to note that harvesting the plant material is crucial for the efficient removal of phosphorus, since uptake by plants is the main method of phosphorus removal. Additionally, if dissolved oxygen levels are too low phosphorus may be released from the sediment due to anaerobic digestion.

Two other common constructed wetland systems are the **horizontal subsurface flow** and **vertical flow systems** which efficiently remove organic material. However they are not as effective at nitrogen and phosphorus removal as the systems with free floating or submerged vegetation.

These constructed wetland systems provide an excellent opportunity to reduce the energy used by aeration and provide food and habitat for native wildlife.

SEPTIC TANKS AND LEACHING BEDS

These technologies are growing increasingly out of favour with municipalities and regulatory bodies due to concerns over odours and environmental concerns.

WASTEWATER TREATMENT DESIGN COMPANIES

Company	Specialization	Phone	Contact Information
Siemens	Water treatment systems	1-866-926-8420	Information.water@siemens.com
GE Power & Water	Water treatment systems	1-866-439-2837	http://www.gewater.com/who we are/contactus.jsp?Industries We Serve
AQUA Treatment Technologies	Constructed wetlands	(905)563-3778	lrozema@aquat-t.com
Team Aquatic Management	Water Treatment Systems	1-800-704-4188	teamaquatics@on.aibn.com
Decommissioning Consulting Services	Water Treatment Systems	(905)882-5984	engineers@dcslltd.ca
EcoWerks Technologies Corporation	Sustainable Solutions	(905)856-5225 ext. 33	living@ecowerks.ca

WASTEWATER REUSE

The treated waste water may contain nutrients that are crucial to the growth of plant material and may be used to irrigate land. This application of treated wastewater will close nutrient loops and reduce the quantities of fertilizers used. In order to apply treated water to land a Certificate of Approval must be obtained from the [Ministry of the Environment](#) according to Section 53 of the Ontario Water Resources Act. Please contact your local branch of the [Ministry of the Environment](#) for pre-consultation about any plans you have for wastewater reuse.

WATER CONSERVATION

'Waste' is an unavoidable component of any process. Minimizing those 'wastes' is a key step towards becoming sustainable. Some approaches that wineries have taken to reduce the quantity of 'wasted' water include:

- Pressure washers or steam cleaning tanks and barrels
- Shut-off nozzles for hoses
- Good maintenance practices
- [Greywater recycling systems](#)
- Low flow toilets and timers or sensors on taps
- Barrels for rainwater collection
- Weather stations
- Soil moisture monitoring
- Stormwater management plans

Wine Business Magazine outlines many of these systems in their article on ["Water Saving Products"](#)

STAY TUNED FOR THE APRIL SUSTAINABILITY COMMITTEE NEWSLETTER ON WASTE MANAGEMENT