


# Agricultural Waste Water and Water Quality

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by

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# Waste Water and Water Quality

- We all share a concern for protecting our water
- Nutrient loading in the Lake Simcoe watershed has a tremendous impact on water quality and negatively affects both aquatic and terrestrial life forms.
- Over time, Lake Simcoe has shown the effects of nutrient loading – cold water fish species have been impacted, there have been beach closures, excess algae growth and blue green algae blooms to name just a few.
- In order to combat nutrient loading in the watershed, all sources – retail, industrial, commercial, residential and agricultural sources need to be addressed, to improve and sustain water quality for future generations.
- The ministry's role is to ensure that all sources of waste water are treated and discharged in accordance with the appropriate environmental approval that helps protect the environment and local water bodies like Lake Simcoe.
- This includes waste water from sewage treatment plants, commercial and manufacturing operations and the water used to wash and process vegetables.

# Waste Water and Water Quality cont'd

- In 2010 the Ministry of the Environment and Climate Change responded to a complaint that a portion of the surface water was running orange.
- In responding to that complaint, the ministry learned that vegetable processing facilities were operating in south Simcoe County and the Holland Marsh area and that they were discharging vegetable washing waste water directly into the Lake Simcoe watershed – to ground or to surface water.
- This raised the question – what was in that wash water and was it causing an adverse impact?
- So Ministry staff took samples from point sources – or end of the pipe samples.
- Samples collected showed significant exceedences of the Provincial Water Quality Objective, which sets out water quality criteria to protect our water for all our uses and for aquatic life.

# Waste Water and Water Quality continued

What did we find?

The sample results revealed that untreated waste water from vegetable processing/washing facilities was high in:

- *total suspended solids (soils)*
- *organic material (vegetable skins)*
- *biological oxygen demand (from decomposing vegetable skins), and*
- *nutrients (phosphorous, nitrogen, and potassium)*

Which has the potential to adversely impact groundwater and surface water resources

To put this in perspective, the sample levels of Total Suspended Solids (soils) and Biological Oxygen Demand in the waste water entering the creeks directly from vegetable washing was several times higher than those that can kill aquatic life.

# Water Quality: What You Don't See

Of equal concern were the nutrients that are not visible to the naked eye, such as phosphorous, nitrogen and potassium. Samples from one site identified levels of some nutrients that exceeded provincial water quality objective, namely

- Total phosphorus: up to 19.4 mg/L (PWQO = 0.01 mg/L)
- Chloride: up to 76.7mg/L
- Biological Oxygen Demand: up to 1880 mg/L
- Total Suspended Solids: up to 7490 mg/L
- Ammonia as Nitrogen: up to 22.4 mg/L (PWQO = 0.02 mg/L)
- Total Kjeldahl Nitrogen: up to 157 mg/L
- Pesticides

# Some Results

- Samples results of effluent from vegetable processing facilities discharging into the Lake Simcoe watershed in 2011. These samples identified contaminant levels harmful to receiving waters and aquatic life:

Parameter	Sample 1 (mg/L)	Sample 2 (mg/L)	Sample 3 (mg/L)	Sample 4 (mg/L)	Discharge Criteria (mg/L)	PWQO Limits (mg/L)
Ammonia as N	22.4	11.8	25.9	4.49	10*	0.02
Biological Oxygen Demand	1880	654	559	314	25*	
Total Phosphorous	19.4	7.9	3.82	4.05	1*	0.03
Total Suspended Solids	1090	290	5770	147	25*	
Chloride	76.7	36.4	26.2	15.6	750**	

**Note:** \* MOE Guideline F-5-1 for Municipal STP

\*\* Preliminary Greenhouse Discharge Criteria

# Science-Based Evidence

- Vegetable processing discharges show extremely high levels of nutrients such as phosphorus and nitrogen (ammonia), being discharged into sensitive watersheds including Lake Simcoe.
- Soils and organic material (such as vegetable skins) are also present in extremely high concentrations in the vegetable processing discharges. The levels of Total Suspended Solids (soils) and Biological Oxygen Demand (from the decomposition of vegetable skins) in the effluent being discharged to the creeks are several times higher than the levels that can kill aquatic life in the receiving waters.
- For example, the untreated discharge from one vegetable processing facility in the Lake Simcoe watershed was found to be 7.5 kilograms of phosphorus per day. For comparison, that is greater than the combined phosphorous loading from both the Innisfil and Bradford sewage treatment plants. (which discharge 0.87 and 2.05 kg/day respectively)

# Options for Management of Washwater

1. Treatment & Discharge to surface water or groundwater – requires an Environmental Compliance Approval (ECA) under the Ontario Water Resources Act
2. Treatment and discharge to a sub-surface sewage system
  - subject to an Environmental Compliance Approval under the Ontario Water Resources Act if capacity is >10, 000 l/day
  - Subject to Building Code approval if capacity is <10,000 l/day (if approved by the municipality)
3. Discharge to municipal sanitary sewer – with the approval of the operating authority does not need an ECA only Municipal approval required
4. NMA only applies to livestock facilities and does not apply to vegetable growers or processors.



# Possible Design Options for Washwater

Best Management Practice: Consider water conservation first – consider water re-use - utilizing washing systems that minimize waste water discharges – The less water you use the less waste water you need to treat

Design considerations:

1. Infiltration basin. A lagoon that discharges to groundwater - requires an Environmental Compliance Approval (ECA)
2. Treatment in an onsite lined sewage lagoon with seasonal discharge with spray irrigation onto a crop field - requires an Environmental Compliance Approval (ECA)
3. Treatment in an onsite lined sewage lagoon with discharge to surface water or groundwater – requires an Environmental Compliance Approval (ECA)
4. Mechanical treatment with discharge to surface water or groundwater – requires an Environmental Compliance Approval (ECA)
5. Treatment and discharge to on-site sub-surface sewage system – requires an Environmental Compliance Approval (ECA)
6. Discharge to municipal sanitary sewer – with the approval of the operating authority does not need an ECA only Municipal approval required

# Our Approach

First and foremost assessing risk to water quality and human health

Surface water discharges

- we consider vegetable washing facilities to have a high risk if we find that that, based on sampling, the volume and concentration of the effluent could potentially impact surface water quality.

Our approach is to:

- Assess potential risk
- Understand the chemistry, volume and concentration of the waste water
- Assess each receiving water body to determine what must be done to enable it take the discharge without additional impairment
- Focus on not “overworking” the solution – keep it simple which often helps keep the annual maintenance requirements at a reasonable level.

# Our Approach

## Discharges to groundwater

- again assess the risk
  - know the chemistry, volume and concentration of the waste water
  - look at physical location of the waste water lagoons and the proximity to the property ownership boundaries or wells
  - assess ground water flow direction
  - look at soil types, etc.
  - and determine the potential risk to ground water and/or the movement off site of contaminants.
- It may be necessary for a facility to show - through sampling at the property boundaries - that the discharge is not affecting groundwater quality.
- Culminating with an Environmental Compliance Approval (ECA) - Treatment and discharge to surface water or groundwater require an ECA under the Ontario Water Resources Act

# In a nut shell

Our approach has been to:

- Focus on not “overworking” the solution – using technical information, together with an assessment of what already existed for waste water treatment and developing solution options that are practical, simple, cost effective and reasonably easy to maintain.
- A voluntary approach preferred – being flexible with compliance dates and approaches where facilities show progress.
- Focussing on improving the environmental outcomes first – sharing sampling results and addressing environmental risks – recognizing the need to reduce the amounts of nutrients such as phosphorus entering the watershed from the vegetable washing process.
- Working to address the required abatement actions proposed to address compliance with provincial legislation, and allowing waste water treatment systems to operate while the application for the ECA is processed

# Compliance Strategy

## **Existing Facilities Approach:**

- Abatement Plans leading toward full compliance

## **Expanding Facilities Approach:**

- Compliance expected for the expanded portion
- Movement toward compliance, using an Abatement Plan, for existing portion

## **New Facilities**

- Full compliance expected across the sector

# How are we doing?

- We still have more work to do ... but we are happy to report
- Our actions to address wastewater discharges by facilities in the Holland Marsh area have resulted in a measureable reduction in phosphorus loading to the Lake Simcoe watershed.
- Sample results pre- and post- abatement work from three large facilities found approximately 7,369 kilograms per year (kg/yr) reduction in phosphorus loading.
- To put this in perspective, that reduction is more than the total contribution from the 15 sewage treatment plants (14 municipal, 1 industrial) in the Lake Simcoe watershed that contributed 3,700 kg/yr in 2009.
- We want to continue our cooperative working relationships and build upon the positive abatement actions that have yet to be started or ongoing.
- We want also to move forward and ensure those systems that have been put in place, obtain the required approvals - ECAs



Thank you  
Questions?