

**WPI**



**Stantec**

# MINK FARM WASTEWATER MANAGEMENT

A Major  
Qualifying  
Project  
Completed by  
Jacob  
Lautman

# ABSTRACT

- This Major Qualifying Project proposed a chemical treatment facility for a Nova Scotia mink farm, and pest control methods for seagulls.
  - Design of a batch reactor system
  - Proposal for a system of spikes

# Removal of Phosphorus

Biological

Not used due to inconsistent flow, and **cold weather during the winter.**

Due to both of these factors, it will be difficult to prevent microorganism death

Chemical

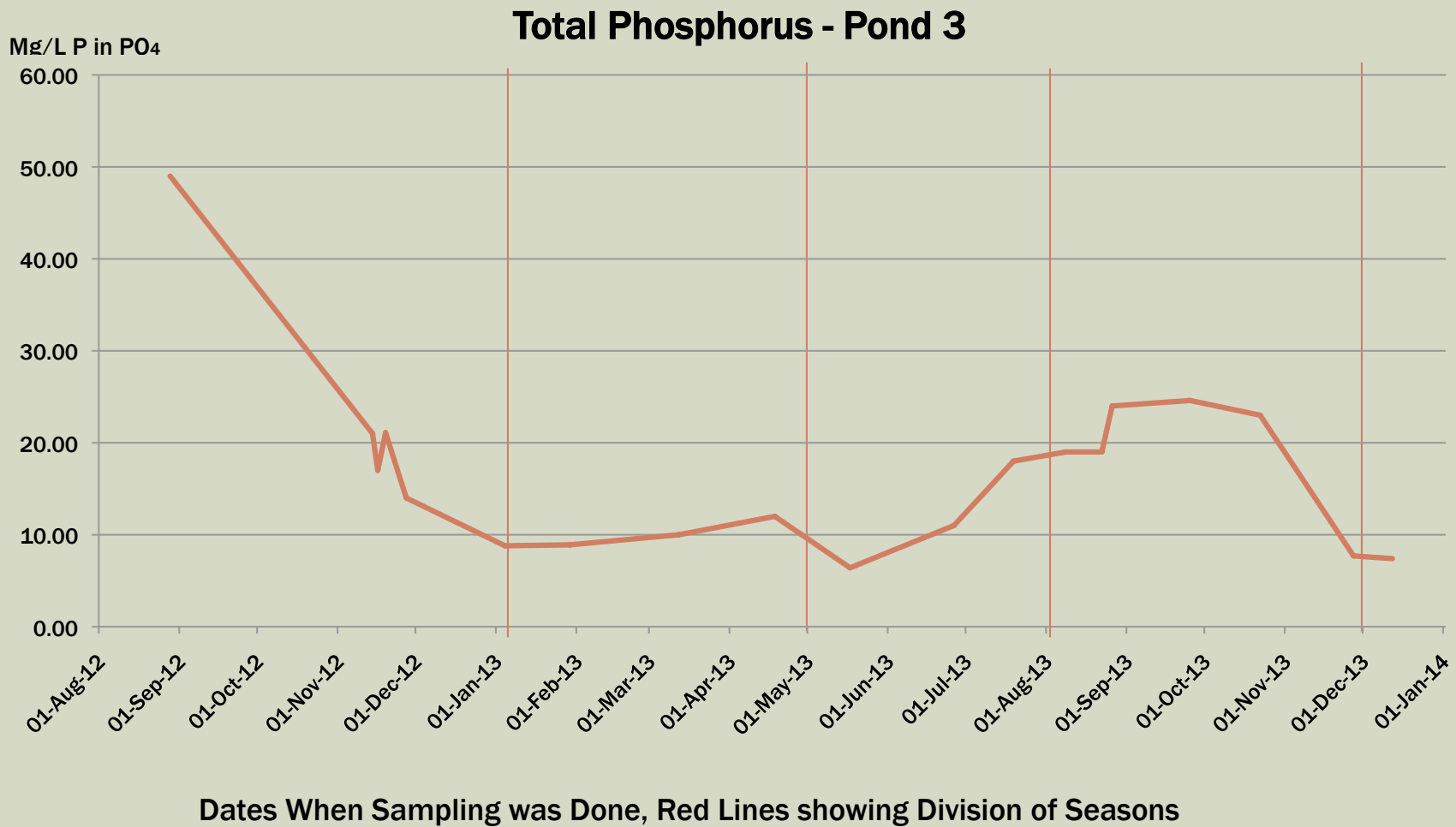
Flow-Through Reactor

Not used due to inconsistent flow. Inconsistent flow affects chemical dosing, mean that it will be very wasteful of chemicals, and possibly lead to more pollution

Batch Reactor

Used. Allows for inconsistent Flow and Chemical dosing can be determined by reactor size

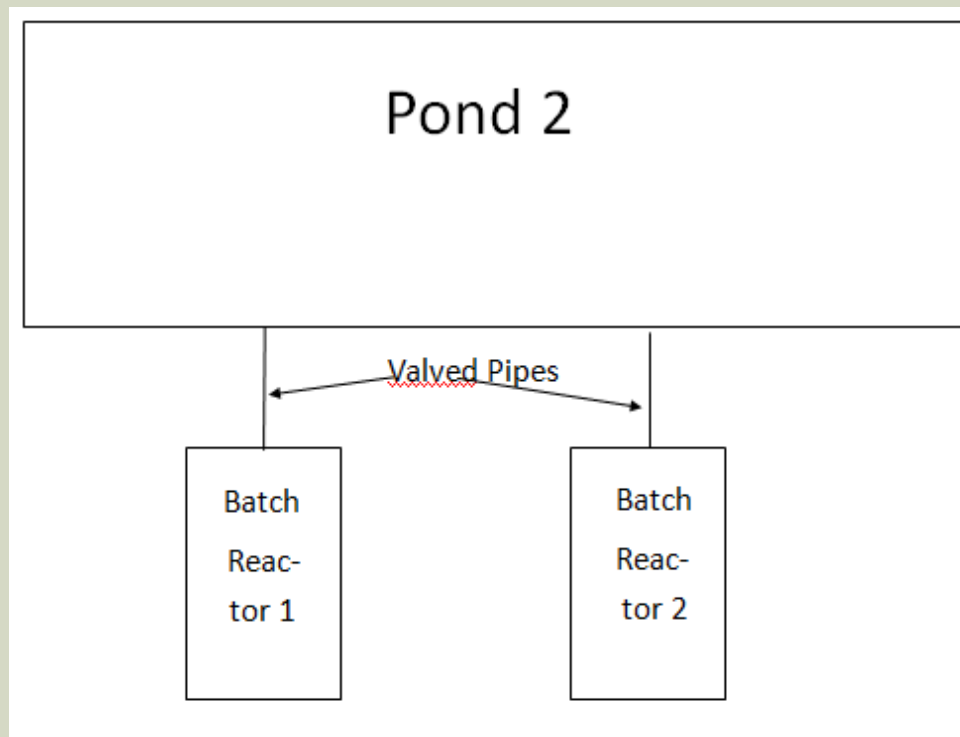
# DETERMINATION OF CONCENTRATION



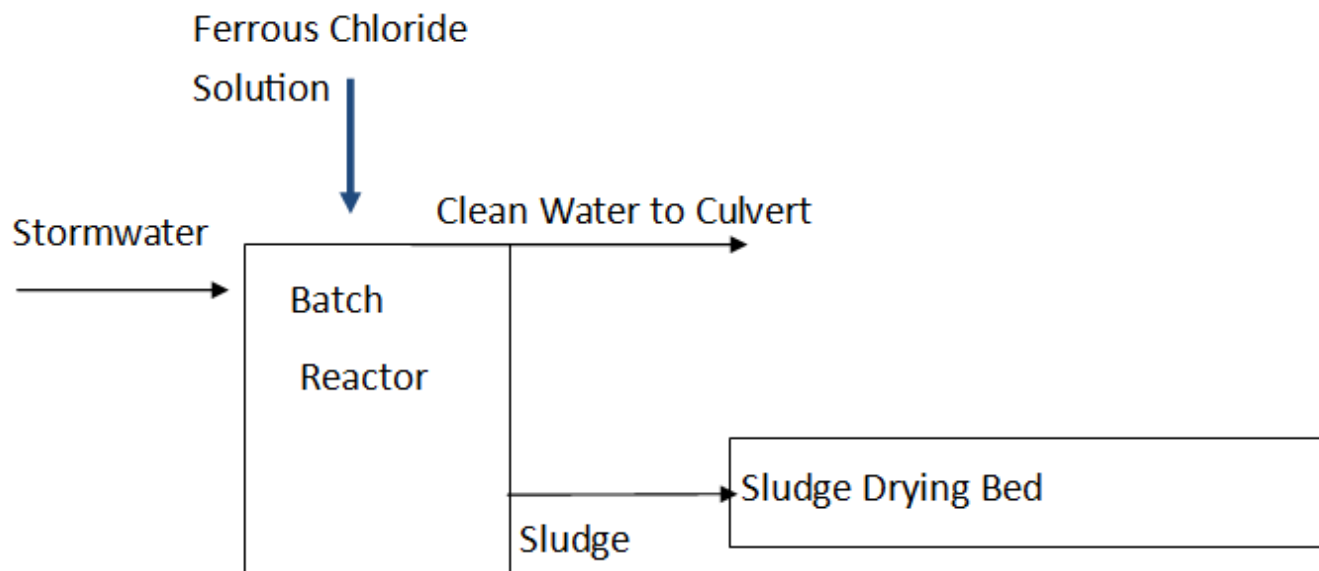
# CHEMICAL DECISION MAKING

- Lime Will Raise the pH to a Level Higher Than What is Specified in the Fur Industry Regulations
- Struvite is too Destructive: Need a Larger Influent
- Alum's Operating Region is Not Within pH values Found in Effluent
- Ferric Chloride's Operating Region is Within pH Values of 7-9, With Peak Phosphorus Removal Occurring at 8.
- Average pH Value at Pond 3 is 8.10.
- Ferric Chloride Was Thus Selected

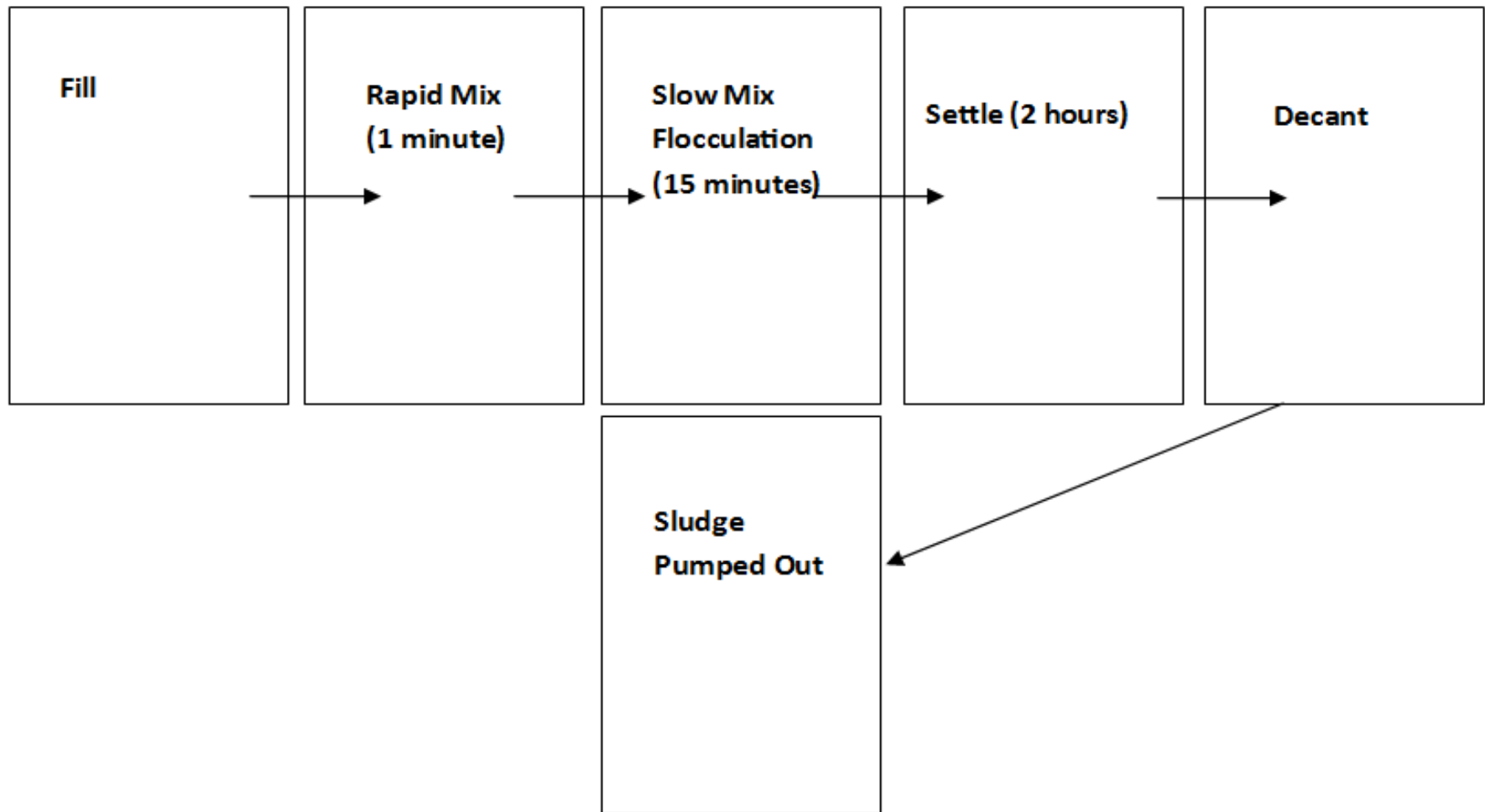
# FLOW DIAGRAMS



# FLOW DIAGRAMS



# PROCESS OPERATION

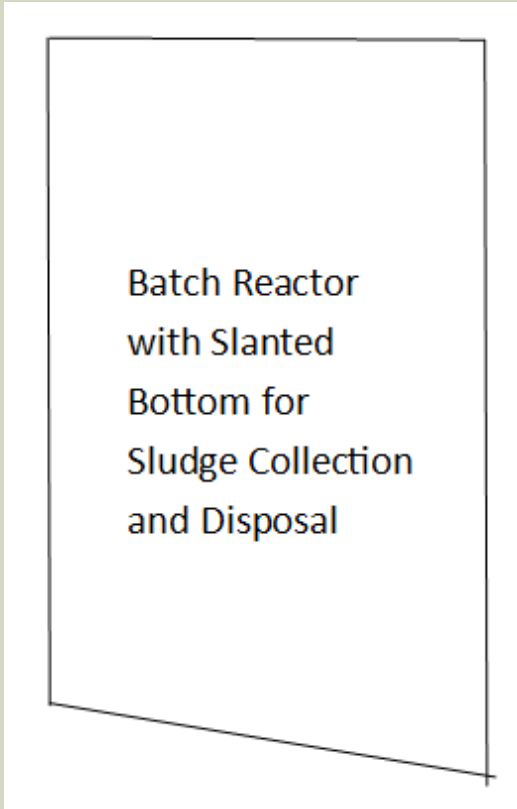




# BATCH REACTOR SIZING

Dimension	Unit	Value
Height	Meters	5
Diameter	Meters	7.2
Volume	Cubic Meters	203.575
Flow Rate	Cubic Meters per Day	1244.14
Hydraulic Resonance Time	Hours	2.5

# DECANTING



Batch Reactor  
with Slanted  
Bottom for  
Sludge Collection  
and Disposal

The diagram shows a rectangular tank with a slanted bottom. The slant is from the left side towards the right side, creating a wedge-shaped area at the bottom for sludge collection. The text is centered within the tank's outline.

# COST ANALYSIS

Description	Material	Labor	Total
Piping	\$18,900.00	\$4,250.00	\$23,150.00
Reactor			\$2,020,000.00
Sludge Pump	\$21,200.00	\$5,425.00	\$26,625.00
Sludge Piping	\$2,200.00	\$980.00	\$3,180.00
Total	\$42,300.00	\$10,655.00	\$2,072,955.00

# METHODS

Method	Pros	Cons	Decision
<b>Nets</b>	<ul style="list-style-type: none"> <li>• Birds cannot get through</li> <li>• Very effective</li> </ul>	<ul style="list-style-type: none"> <li>• Expensive</li> <li>• Not intended for large areas</li> </ul>	Not likely a good fit for the farm
<b>Spikes</b>	<ul style="list-style-type: none"> <li>• Very effective</li> <li>• Birds cannot roost</li> <li>• Durable</li> </ul>	<ul style="list-style-type: none"> <li>• Somewhat expensive</li> </ul>	Might be a good fit for the farm
<b>Lines</b>	<ul style="list-style-type: none"> <li>• Inexpensive</li> <li>• May prevent birds from landing</li> </ul>	<ul style="list-style-type: none"> <li>• Ineffective in areas with an established population</li> <li>• Ineffective against a large amount of birds</li> </ul>	Not likely a good fit for the farm
<b>Electricity</b>	<ul style="list-style-type: none"> <li>• Very effective</li> <li>• Shocks birds, scaring them away</li> </ul>	<ul style="list-style-type: none"> <li>• Most expensive</li> <li>• Requires electricity</li> <li>• May not be as resistant to weather events as other methods</li> </ul>	Might be a good fit for the farm
<b>Fake Eggs</b>	<ul style="list-style-type: none"> <li>• Inexpensive</li> </ul>	<ul style="list-style-type: none"> <li>• No case studies available</li> <li>• Removal of eggs illegal under Canadian laws</li> </ul>	Not a good fit for the farm

**QUESTIONS?**