

AERATED LAGOON

All lagoons take advantage of natural processes to treat wastewater. Wind and sunlight on the lagoon surface also plays an important role as do the microbes that live in the wastewater. Natural lagoons are made up of three layers an aerobic (layer with oxygen), an anaerobic (layer with no oxygen) and a facultative (mixed layer). In a constructed aerated lagoon air is pumped into the lagoon to turn the whole pond into an aerobic zone. Adding air to the water speeds up the natural processes that break down organic waste. This means that the lagoon can process more waste in less space.



Odours

When air is added to the lagoon it changes the environment and the types of microbes that process the wastewater. Different microbes create different chemical reactions as they process waste. The difference in chemical reaction changes or reduces the odours produced by the lagoon.

Aerated Lagoons in Cold Climates

Lagoons have proven to be very adaptable and well suited to Northern climates. An example of an aerated lagoon in the North is Fort Nelson, B.C and Haines Junction, Y.T. The lagoon in Haines Junction is naturally aerated by the wind, there are no mechanical pumps.

When temperatures drop and sunlight disappears in the winter the microbes that do the work of processing waste in the lagoons slow down. This does not mean that the lagoon stops working. Microbes are still active and solids can settle at the bottom of the pond. When spring returns the microbes in the aerobic level of the pond become very active again.

How does the system deal with seasonal flow?

Lagoons are resilient and adaptable to variations in seasonal flows because of the size of the ponds.

LOCATION CONSIDERATIONS

Land Area

- An aerated lagoon requires as little as 10 acres or 4 hectares of land.

Type of Land

- Requires stable, permafrost-free and level ground where berms and structures can be built. All potential Dawson lagoon locations have challenging soil conditions due to discontinuous permafrost soil conditions and mining activity. All proposed lagoons would be lined with an impermeable membrane.

- Soil testing would be needed to confirm how the lagoon should be designed and constructed.

Infrastructure

Many factors need to be considered when calculating the cost of each of these systems. The following is a list of some of the major cost factors required for the infrastructure for a facultative lagoon.

- Length of forcemain and effluent pipes
- Heating forcemain and effluent pipes
- Installation and maintenance of air pumps and ultraviolet lamps
- Construction of Access Roads
- Elevation of locations
- Small facility buildings

	South Bench Aerated Lagoon	Dome Aerated Lagoon	Vallison 'C' Aerated Lagoon
Length of Influent Pipe (New + Existing): town screening plant (lift station) to proposed lagoon site	2300m+1900m (and new lift station)	2300m+700m (and new lift station)	1100+2900m
Length of Effluent Pipe: proposed lagoon site to outfall	4500m	3200m	4300m

Drainage Location

- All three of the proposed aerated lagoon locations would have a tie-back into the effluent pipe which is connected to the existing Yukon River outfall. The outfall is located downstream of Dawson's potable water intake on the Klondike River.

PROPOSED DAWSON LOCATIONS

See attachments

- Dome Road
- South Bench
- Callison 'C'

OPERATION AND MAINTENANCE

Aerated lagoons use mechanical equipment to add air to the wastewater. Operation and maintenance duties are more involved than a non-aerated lagoon as a result. Operators would need to monitor and maintain equipment as needed. In addition screened solids and sludge must be removed regularly, water must be discharged from the lagoon, and liners and other mechanical equipment require repair and replacement.

CONSTRUCTION COSTS

Capital costs can be reduced as the same amount of sewage can be treated in a much smaller area.

OPERATION AND MAINTENANCE COSTS

Operation and maintenance costs may be higher than those of a non-aerated lagoon due to the need to maintain and replace the equipment required to aerate the ponds.