

Pumping vs. Dredging Bio-Solids



Hydraulic Dredge moored in a lagoon prior to dredging it

When a lagoon or pond needs to be dewatered and the bio-solids and sludge removed you have several options available. You can dredge it, pump it, or mechanically remove it with excavators and other earth moving equipment.

Dredging and Pumping to Disposal Site

A dredge is used when there are large volumes of top water over the sludge or when the incoming influent makes agitation and pumping not practical. Dredging is more expensive due to the number of employees and equipment required to tend the process. In addition, the mobilization, set-up and operating costs are considerably higher.

The hydraulic dredge is moved over the lagoon in swaths of approximately 9 feet wide cut with a one-foot overlap to make sure all bio-solids are removed. Our dredge has a cutter head with skid plates that ride 1" to 2" inches above the lagoon floor. The dredge takes an effective eight-foot-wide by two-foot-high cut on each swath. An average of 1.5 to 2.5 cubic feet of material is removed every minute.

The forward travel of the dredge depends on the density of the sludge or substrate being cut. This is anywhere from 3 to 5 feet per minute. If the bio-solids are higher than 2 feet then multiple passes on the same swath are made to reach the desired depth.

The dredge cutter head will loosen the bio-solids and a high-volume pump will vacuum up the loosened solids and suck the solids along with additional wastewater. This is pumped to the shore where a booster pump will pressurize and push the slurry through 8" to 10" fire hose to the disposal site.

The disposal site can be one of several options: 1) evaporation pond where the sun and wind will evaporate the water and leave the bio-solids behind, 2) settling basin where the sediment and sand is allowed to drop out of solution and the excess water returned to the source, 3) geo-textile bags along with polymers to floc the sediment so it will be easily contained in the bags, or 4) pumped to agriculture fields where the slurry is applied evenly over the land to provide nutrient value for a future agriculture crop.



Agitation boat force feeder pumping an 80-million-gallon lagoon

Agitation and Pumping to Disposal Site

Agitation and pumping a lagoon or pond is the most cost effective way to move wastewater and bio-solids.

Several agitators are used to loosen up the sludge and bio-solids from the lagoon floor. This will suspend the solids which will then be rapidly pumped out while the solids are maintained in suspension.

On large lagoons, more agitation is required throughout the pumping process to maintain the solids in suspension. We traditionally use one or more agitation boats as this allows us to work the whole pond simultaneously, so all the solids are in suspension and the whole pond becomes a homogenous slurry.

Agitation and Pumping is the most cost-effective means of cleaning a lagoon or pond. The ultimate cost of agitation and pumping will depend on six factors: 1) Number of gallons being pumped, 2) How much agitation is required, 3) How far the disposal site is, 4) The method of disposal, 5) How thick the slurry is, and 6) The price of off road dyed diesel fuel.

Summary

The methodology chosen, dredging or pumping, will depend upon the size of the lagoon or pond, the amount of incoming wastewater, and whether there is sufficient water to float a dredge during the whole cleanout process.

The transportation and disposal of the bio-solids is the same whether we are dredging or pumping. The type of disposal will depend on the kind of solids: sediment, sludge, silt, sand or bio-solids and the most cost effective and best practices for the situation.