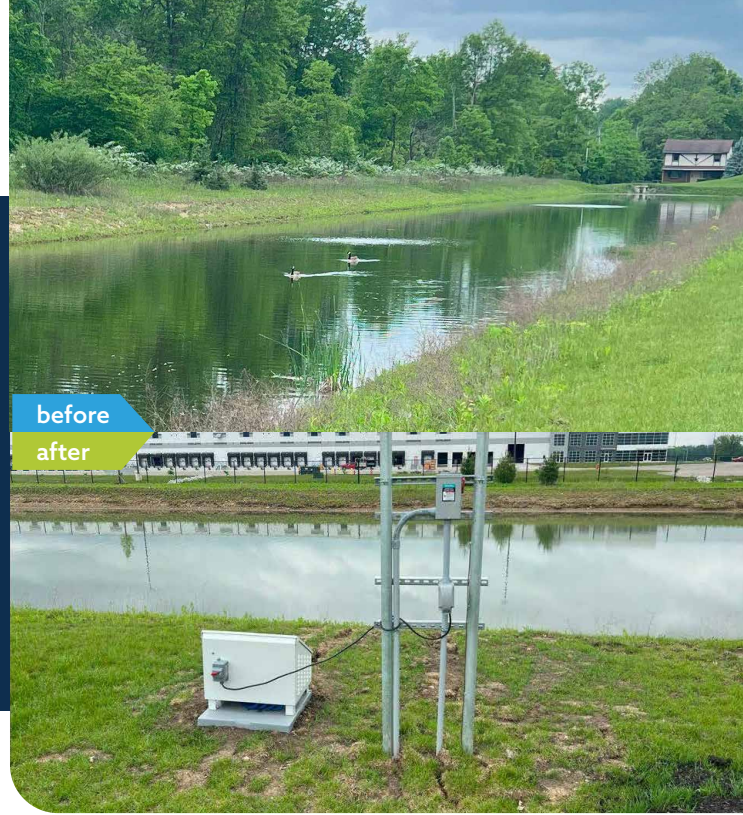


PATASKALA, OHIO

POND AERATION NOV



before
after

PROBLEM

This commercial distribution center has four retention ponds on the property to offset the impervious surface area. These ponds collect, store and treat stormwater runoff.

The town issued a zoning violation to the property owner. All retention ponds in this municipality are required to have functional aeration fountains sized appropriately for the size of the pond. The town gave the property owner twenty days to correct the violation before fines would be imposed.

Aeration fountains are common in stormwater and recreational ponds as they offer aesthetic and function benefits. Fountains disrupt any stagnation within the water. Ponds benefit from this diffusion as the introduced oxygen breaks up the organic stratification layers. Naturally, deep ponds develop varied temperature layers as cold water is more dense than warm water. These layers become more pronounced in the late spring where the bottom of the pond can be 30 degrees cooler than the surface layer. In the colder months, ponds are more likely to freeze on the surface while the lower layers are warmer. A shift in water temperature placement occurs in the early spring when warm water surfaces and the cold water settles to the bottom. The opposite occurs in the fall as colder water surfaces which sends the warmer water down. The process, called overturn, is often emphasized by strong winds. In extreme cases, the overturn may cause fish kills as the temperature changes dramatically and oxygen levels drop, stifling aquatic life.

Because of this stratification, the pond is not circulating as the water is stagnant within the temperature barriers. This stimulates poor bacteria growth that leads to algae, odors, weeds and invasive species like mosquitos. As the layers become more stratified, less oxygen is produced which can negatively affect the health of the pond.

SOLUTIONS

To rectify the violation, each pond on the property must have an aeration system. There are multiple options for aerating ponds including surface aeration machines, diffused systems or mixers. The size, shape and depth of the pond should dictate the aeration technique. Due to the size of the ponds, bottom diffused aeration was chosen.



Surface aeration machines, or floating fountains, are often chosen as an aesthetic technique for smaller ponds. However, these aeration devices are more likely to freeze and may require removal in the winter. Mixers act as manufactured undercurrent, introducing horizontal circulation to ponds. They are ideal for shallow bodies of water.

To install the diffusers, AQUALIS first had to install transformers for electricity to reach the ponds. Connected to the power supply for the buildings, these transformers bring electricity to the ponds at the appropriate voltage. The location of the transformers is crucial as pond water levels often fluctuate. Positioning the transformers above the high-water line ensures minimal danger. Installing the transformers too close to the water introduces additional risk. Next to the transformers, AQUALIS installed disconnect stands and strut racks to hold additional electrical paneling and meters.

Once all the proper electrical was installed, 220 voltage lines in conduit were then run underground to air compressors on the edge of the ponds. Self-sinking air lines were attached to the air compressors connecting to the diffusers strategically placed in the bottom of the ponds. A single pump compressor and two diffusers were installed in three of the ponds of similar size. The fourth and largest pond required four diffusers with dual compressors for proper aeration. These diffusers introduce fine air bubbles into the pond that float upward disrupting the layers, creating circulation in the water body. The bubbles also improve dissolved oxygen in the water, benefiting the ecosystem.

An additional benefit of introducing the aerator into the pond's ecosystem is the natural muck from decaying materials is decreased. Less muck at the bottom of the pond means the capacity of the pond is more consistent and potential dredging projects will be less frequent.