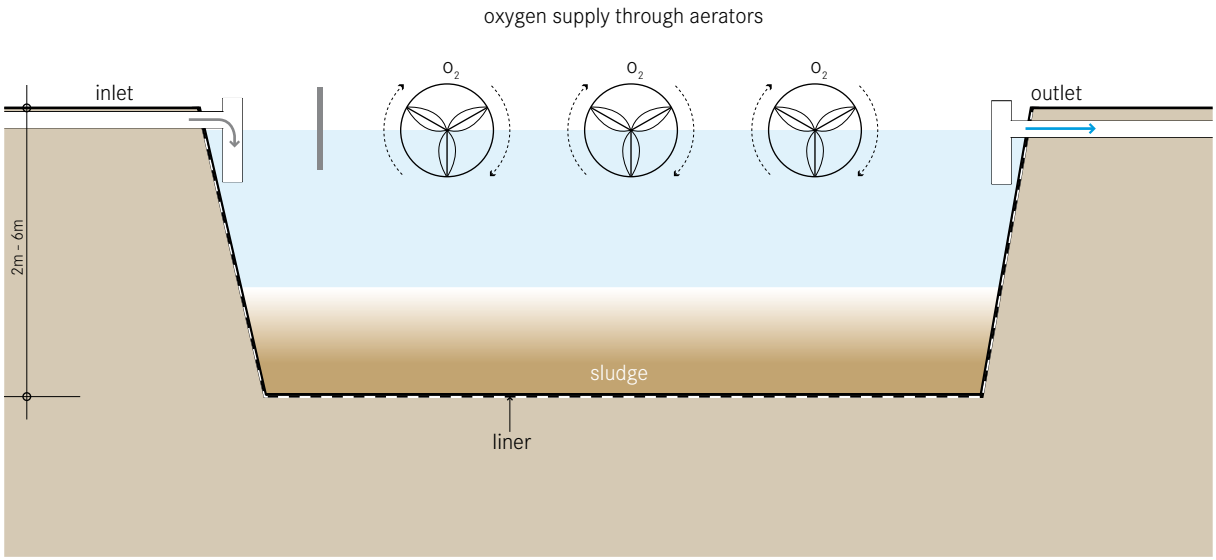
T.6 Aerated Pond

Applicable to: **Systems 1, 6-9**

Application Level:	**Management Level:**	**Inputs:** Effluent, Blackwater, Brownwater, Greywater
Household Neighbourhood City	Household Shared Public	**Outputs:** Effluent, Sludge



An aerated pond is a large, mixed, aerobic reactor. Mechanical aerators provide oxygen and keep the aerobic organisms suspended and mixed with water to achieve a high rate of organic degradation.

Increased mixing and aeration from the mechanical units means that the ponds can be deeper and tolerate much higher organic loads than a maturation pond. The increased aeration allows for increased degradation and increased pathogen removal. As well, because oxygen is introduced by the mechanical units and not by light-driven photosynthesis, the ponds can function in more northern climates.

Design Considerations Influent should be screened and pre-treated to remove garbage and coarse particles that could interfere with the aerators. Because the aeration units mix the pond, a subsequent settling tank is required to separate the effluent from the solids.
The pond should be built to a depth of 2 to 5 m and should have a detention time of 3 to 20 days, depending on the treatment target.
To prevent leaching, the pond should have a liner. This can be made from clay, asphalt, compacted earth, or any other impervious material. A protective berm should be built around the pond, using the fill that is excavated, to protect it from runoff and erosion.

Appropriateness A mechanically aerated pond can efficiently handle concentrated influent and significantly reduce pathogen levels. It is especially important that electricity service is uninterrupted and that replacement parts are available to prevent extended downtimes that may cause the pond to turn anaerobic.
Aerated ponds can be used in both rural and peri-urban environments. They are most appropriate for regions with large areas of inexpensive land located away from homes and businesses. Aerated lagoons can function in a larger range of climates than Waste Stabilization Ponds (T.5) and the area requirement is smaller compared to a maturation pond.

Health Aspects/Acceptance The pond is a large expanse of pathogenic wastewater; care must be taken to ensure that no one comes in contact with or goes into the water.

The aeration units can be dangerous to humans and animals. Fences, signage, or other measures should be taken to prevent entry into the area.

Operation & Maintenance Permanent, skilled staff is required to maintain and repair aeration machinery and the pond must be desludged every 2 to 5 years. Care should be taken to ensure that the pond is not used as a garbage dump, especially considering the damage that could result to the aeration equipment.

Pros & Cons

+ Resistant to organic and hydraulic shock loads
+ High reduction of BOD and pathogens
+ No real problems with insects or odours if designed and maintained correctly
- Requires a large land area
- High energy consumption, a constant source of electricity is required
- High capital and operating costs depending on the price of land and of electricity
- Requires operation and maintenance by skilled personnel
- Not all parts and materials may be locally available
- Requires expert design and construction
- Sludge and possibly effluent require further treatment and/or appropriate discharge

References & Further Reading

_ Arthur, J. P. (1983). *Notes on the Design and Operation of Waste Stabilization Ponds in Warm Climates of Developing Countries.* World Bank Technical Paper No. 7. The World Bank, Washington, D.C., US.
Available at: documents.worldbank.org/curated/en/home
(Notes on applicability and effectiveness)

_ Crites, R. and Tchobanoglous, G. (1998). *Small and Decentralized Wastewater Management Systems.* WCB/McGraw-Hill, New York, US. pp. 527-558.
(Comprehensive summary chapter)

_ Tchobanoglous, G., Burton, F. L. and Stensel, H. D. (2004). *Wastewater Engineering: Treatment and Reuse,* Metcalf & Eddy, 4th Ed. (Internat. Ed.). McGraw-Hill, New York, US. pp. 840-854.
(Detailed design and example problems)