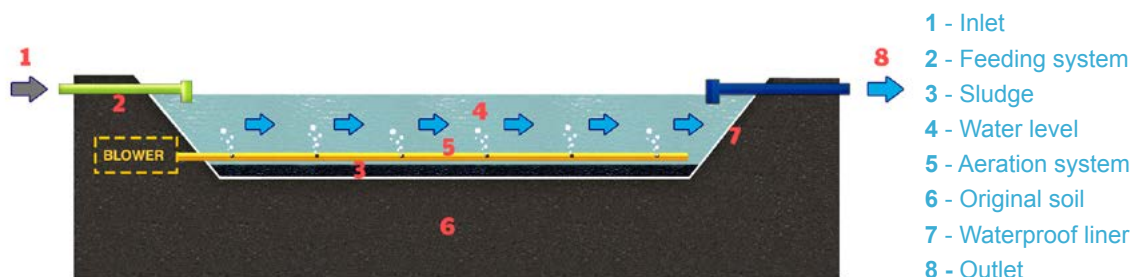

SURFACE AERATED PONDS

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Description

Surface aerated ponds (SAP), also called aerated lagoons, are moderately shallow (typically 1.5–2 m) open basins, enclosed by earthen embankments, often rectangular in shape and typically lined with concrete or synthetic materials, using a combination of mechanical aeration and natural processes to treat wastewater. Mechanical surface aerators are used to maintain dissolved oxygen levels of 2 mg/L or higher near the surface. Aerobic conditions at the surface, anoxic at the bottom. Use of aerators can be seasonal.

Advantages		Disadvantages			
<ul style="list-style-type: none"> • Robust against load fluctuations • No harvesting of biomass required • Lower construction price than subsurface flow treatment wetlands 		<ul style="list-style-type: none"> • Potential mosquito habitat • Use of delicate technology, which is not needed in passive treatment wetland systems • Additional energy consumption and operation and maintenance due to aeration system 			
Co-benefits					
High	 Water reuse	 Biosolids			
Medium					
Low	 Biodiversity (fauna)	 Biodiversity (flora)	 Carbon sequestration	 Aesthetic value	 Recreation

Compatibilities with Other NBSs

Mainly used for the secondary treatment of wastewater; often used in combination with anaerobic ponds, facultative ponds, and maturation ponds.

Operation and Maintenance

Regular

- Controlling submerged, floating, and overall site vegetation (weekly)
- Preventing/controlling erosion (seasonally)
- Controlling pests (as needed)
- Maintaining control structures (periodically)
- Monitoring seepage (weekly)
- Maintenance of entry roads, fence, gates, signage (annually)
- Desludging (every 2–10 years)
- Biannual service of surface aerators

Extraordinary

- Replacement of surface aerators
- Replacement of lining

Troubleshooting

- Odor: due to organic overloading
- Mechanical breakdown of surface aerators

Literature

Triplepoint Water Technologies Blog. www.triplepointwater.com/wastewater-lagoon-blog

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NBS Technical Details

Type of influent

- Raw domestic wastewater
- Primary treated wastewater
- Secondary treated wastewater

Treatment efficiency

- COD 50–85%
- BOD₅ ~77%
- TN 20–90%
- NH₄-N 50–95%
- TP 30–45%
- TSS 53–90%
- Indicator bacteria Fecal coliforms $\leq 1-2 \log_{10}$

Requirements

- Net area requirements: 1–5 m² per capita
- Electrical needs: 1–7 W/m³

Design criteria

- HRT: 5–20 days (10-state standards (used in the USA) recommend 8.5–17 days for 70% BOD reduction, depending on operating temperature. For 80% BOD reduction, recommended retention time would be 14–29 days, depending on temperature (longer times required for colder climates))
- OLR: 100–400 kg BOD/hectare/day
- L:W ratio: 1:1–4:1
- Types of aerator: fixed/ floating surface aerators
- Sludge accumulation rate: 0.03–0.08 m³/year and per capita

Commonly implemented configurations

- SAP
- SAP – FP – MP
- AP – SAP – FP

Climatic conditions

- Suitable in both warm and cold climates
- Suitable for tropical climates

Literature

von Sperling, M. (2007). Waste Stabilisation Ponds. Volume 3: Biological Wastewater Treatment Series, IWA Publishing, London, UK.

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