McKinleyville Community Services District

Wastewater Facilities Plan
Treatment System Improvements
Recommended Alternative Review

Presented By:
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November 16, 2011

Introduction

SHN presented the Administrative Draft of the Facilities Plan for the MCSD Wastewater Management Facility (WWMF) to the MCSD Board on October 19, 2011 and held a public workshop on November 7, 2011 for the public to ask questions and provide comments.

The Facilities Plan identifies a recommended alternative for upgrading the existing treatment system to meet current regulatory requirements as well as address projected growth needs in the community.

Board approval of the recommended alternative is needed to move forward with system upgrades.

Presentation Overview

The goal of tonight's presentation is to:

- Provide an overview of the recommended alternative as set forth in the Facilities Plan developed for the MCSD WWMF.

The objective of tonight's presentation is to:

- Review the various elements of an in-basin extended aeration system and present the benefits of the recommended alternative.

Facilities Plan Objective

Provide a clear, feasible, and appropriate "road map" to capital improvements, upgrades, and maintenance of the District's wastewater collection, treatment, and disposal facilities.

The plan is designed to be used in the development of a wastewater management system that:

1. addresses immediate permit requirements,
2. anticipates future permit and regulatory requirements, and
3. accommodates anticipated growth and community needs.

Treatment System Improvements

Secondary treatment alternatives were evaluated with regard to:

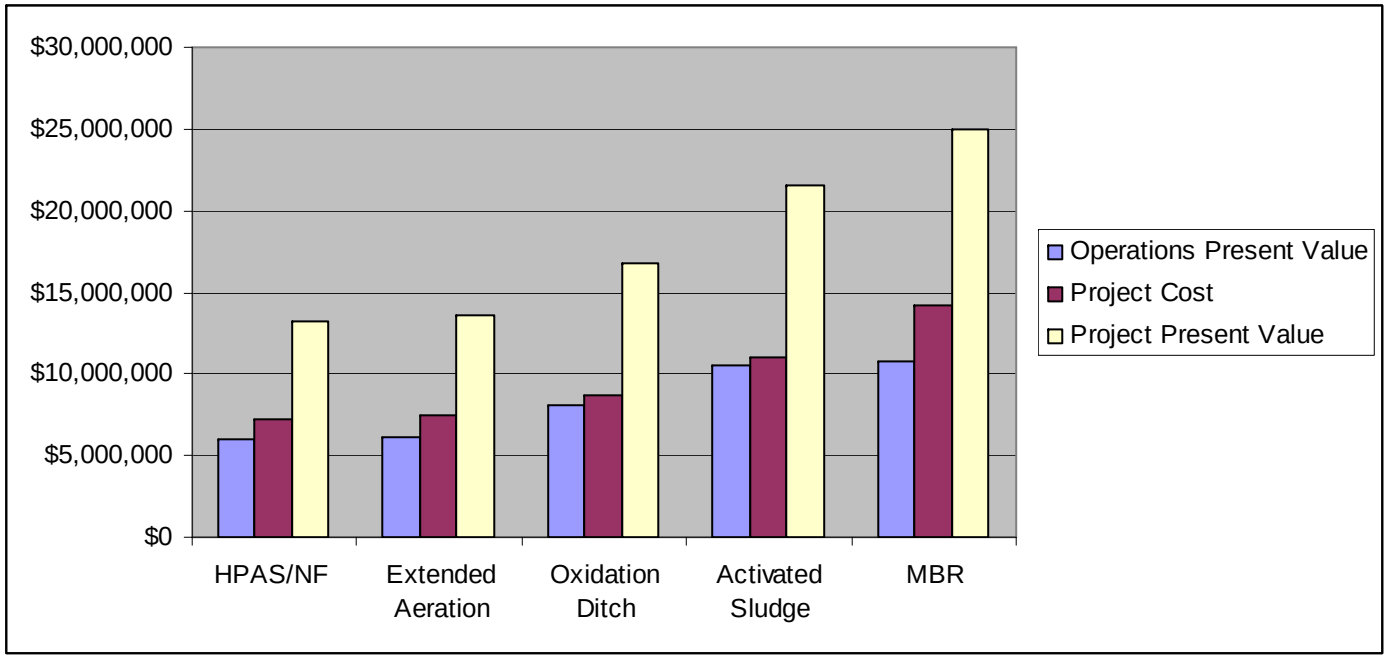
- treatment,
- cost,
- regulatory issues
- implementability, and
- public acceptance .

Nitrogen removal, in addition to secondary treatment, was considered a priority.

Treatment System Improvements, cont.

Secondary treatment alternatives reviewed in detail included:

1. a high performance aeration system with a nitrifying filter;
2. an in-basin extended aeration system;
3. an oxidation ditch;
4. an activated sludge system; and
5. a membrane treatment system.



Treatment System Improvements, cont.

The in-basin extended aeration system provides a high quality effluent that would reliably meet anticipated permit requirements for land application and discharge to Mad River.

Of the high reliability alternatives considered, the in-basin extended aeration system had the lowest capital and operational costs.

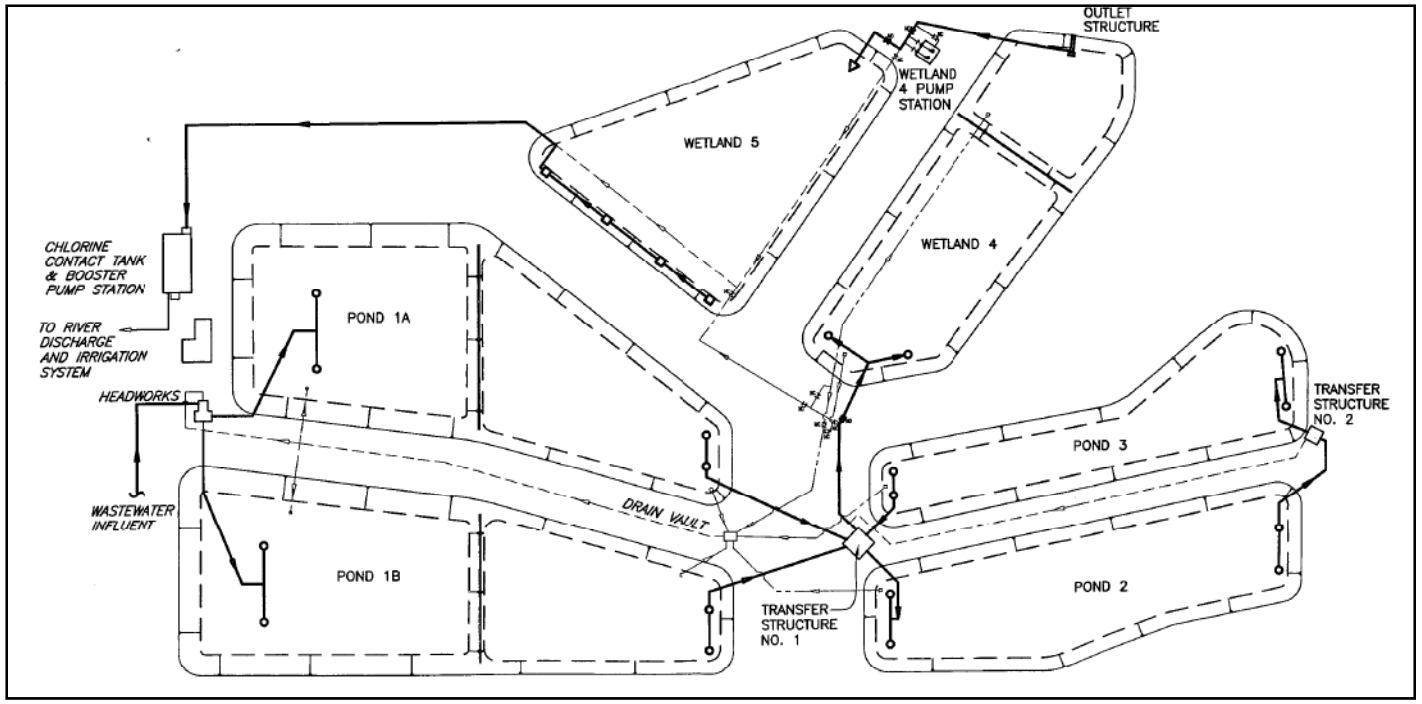
Costs for the in-basin extended aeration system were estimated to be $7.4M.

Additional costs for a new headworks were estimated to be $1.1M.

Existing Treatment System

Existing treatment system components:

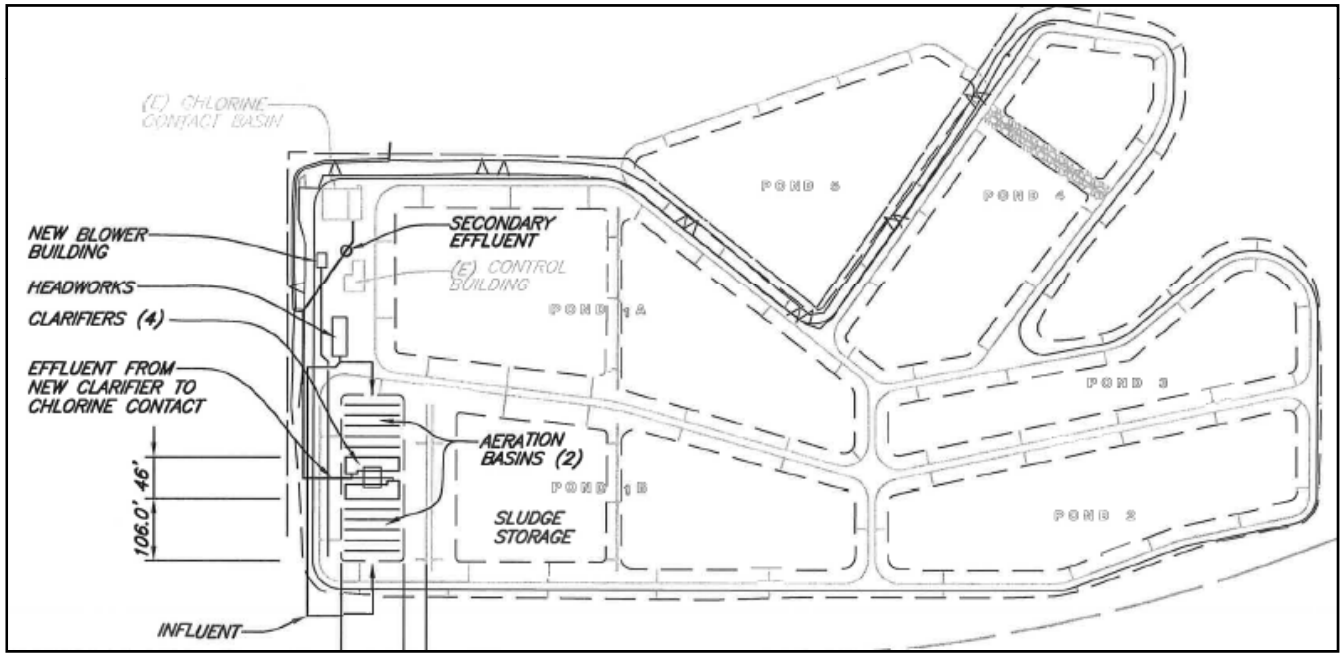
- oxidation/stabilization ponds
- treatment wetlands
- chlorine disinfection



Proposed Treatment System

Proposed treatment system components:

- new headworks/blower building
- aeration basins (2)
- clarifiers (4)



In-Basin Extended Aeration Systems

There are two leading manufacturers of in-basin extended aeration systems in the United States:

BioWorks® – Bioworks North America
Biolac® – Parkson Corporation

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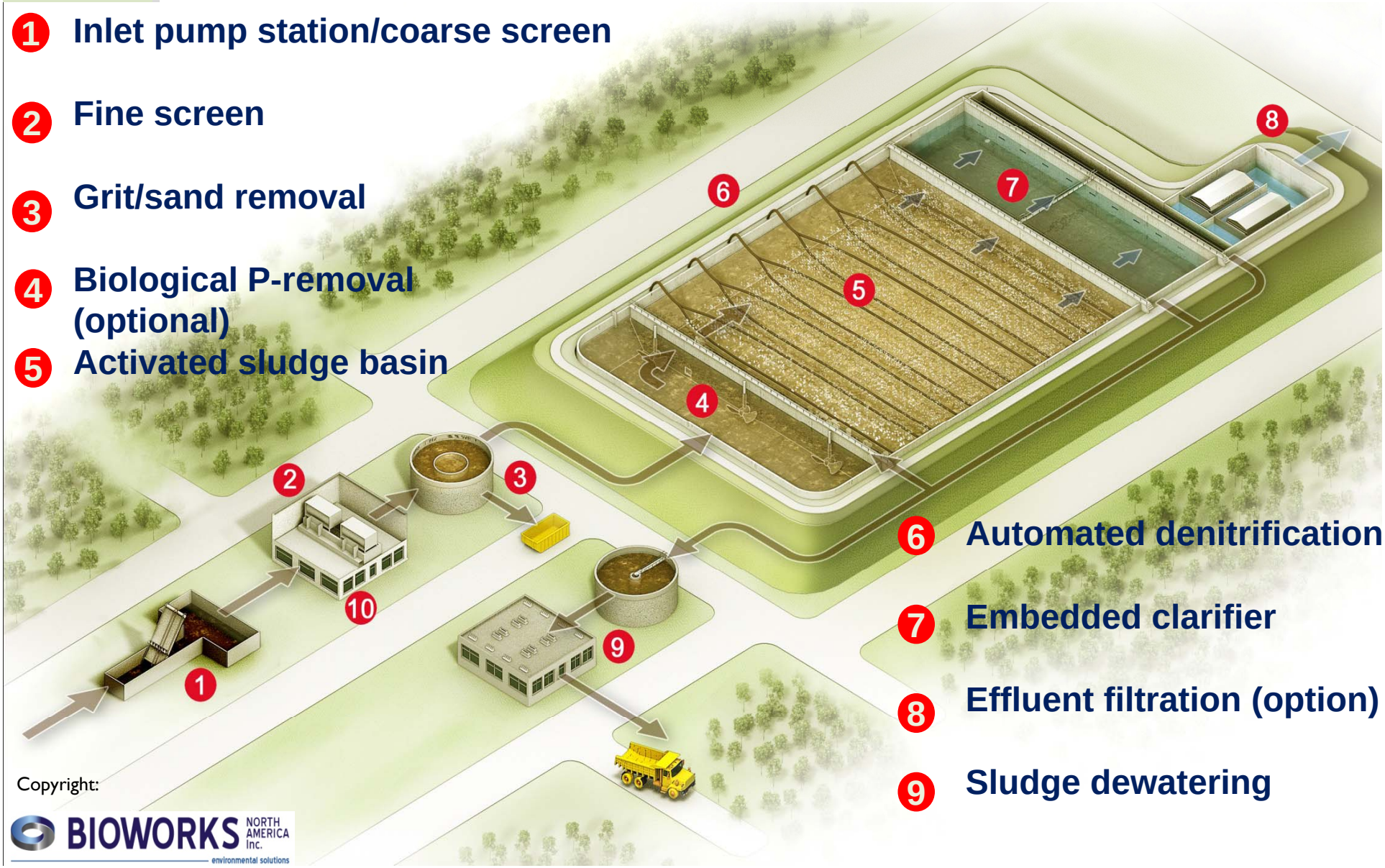
In-Basin Extended Aeration – Typical Design



In-Basin Extended Aeration – Basic Concepts

An "Extended Aeration System" speeds up Mother Nature's normal way of eliminating biological waste.

This is done by helping the already-present microorganisms to consume the waste (the waste is their food).

Those microorganisms are "aerobic" (they breathe air - oxygen).

Following preliminary treatment, the wastewater is contained in a large basin full of the wastewater and microorganisms.

High volumes of air are added to allow the microorganisms to breath and flourish.

The biological waste is consumed as their food.

In-Basin Extended Aeration – Diffuser System

Aeration is typically responsible for 2/3 of the total electric costs in the operation of wastewater treatment plants.

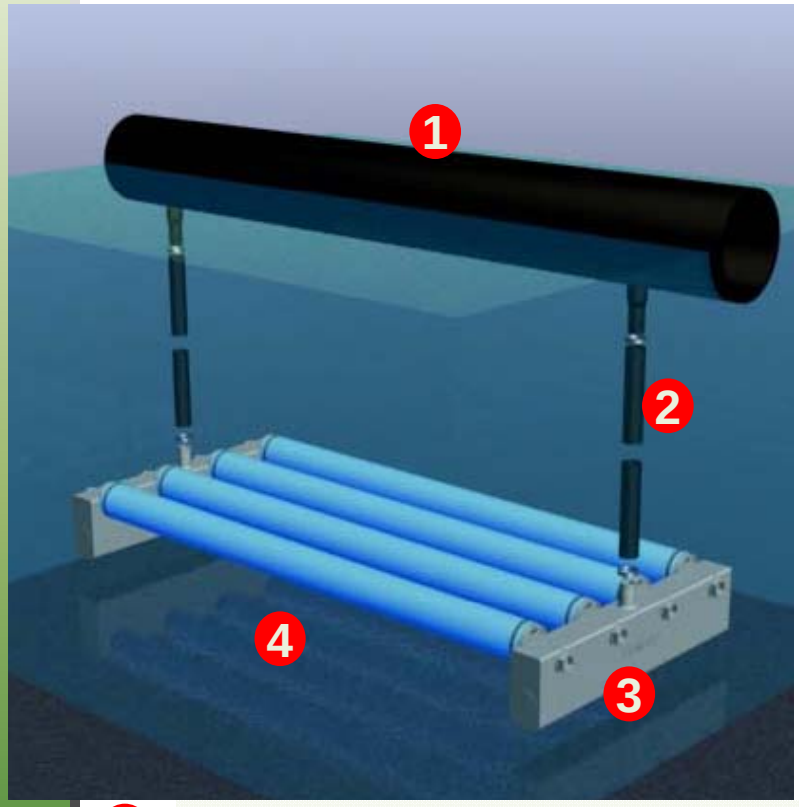
The in-basin extended aeration system uses fine-bubble diffused aeration. The fine-bubble diffuser process is energy-efficient:

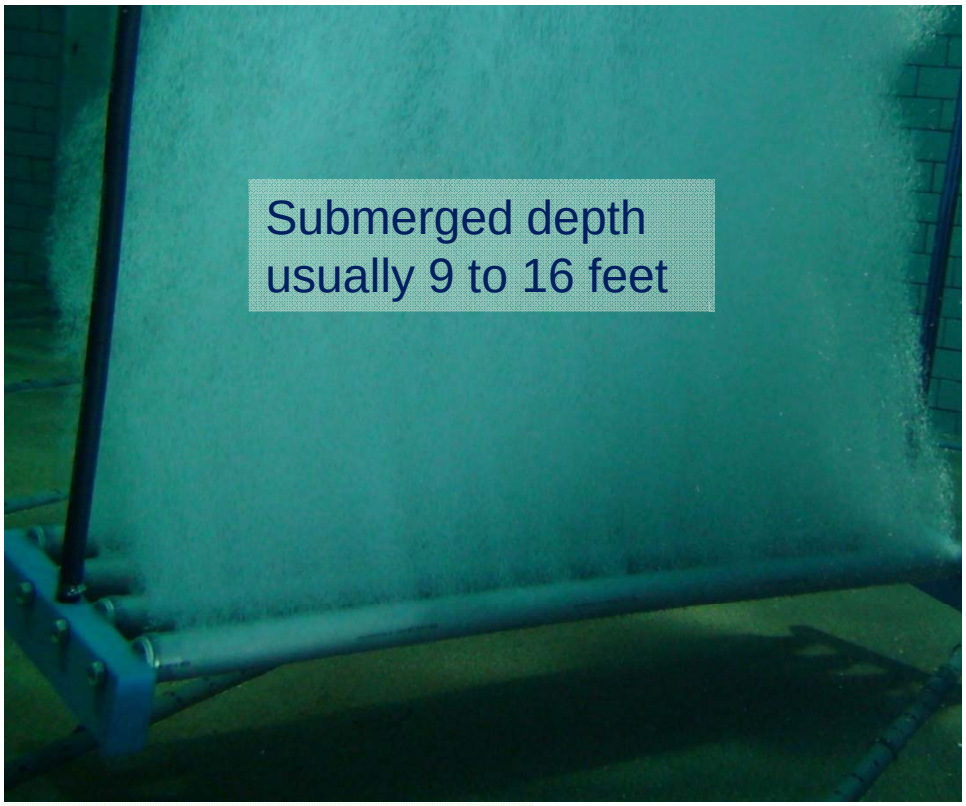
- it minimizes energy usage,
- provides the right amount of air, and
- keeps the basins well mixed.

The diffuser assemblies are suspended from floating air lines.

The Aeration Basin is then followed by a a settling tank (clarifier) where the heavy solids fall to the bottom and the clean water flows over a weir.

In-Basin Extended Aeration – Diffuser System





1. Floating air header
2. Downcomer hose
3. Air manifold with ballast weights
4. Single diffuser tubes with silicone membranes

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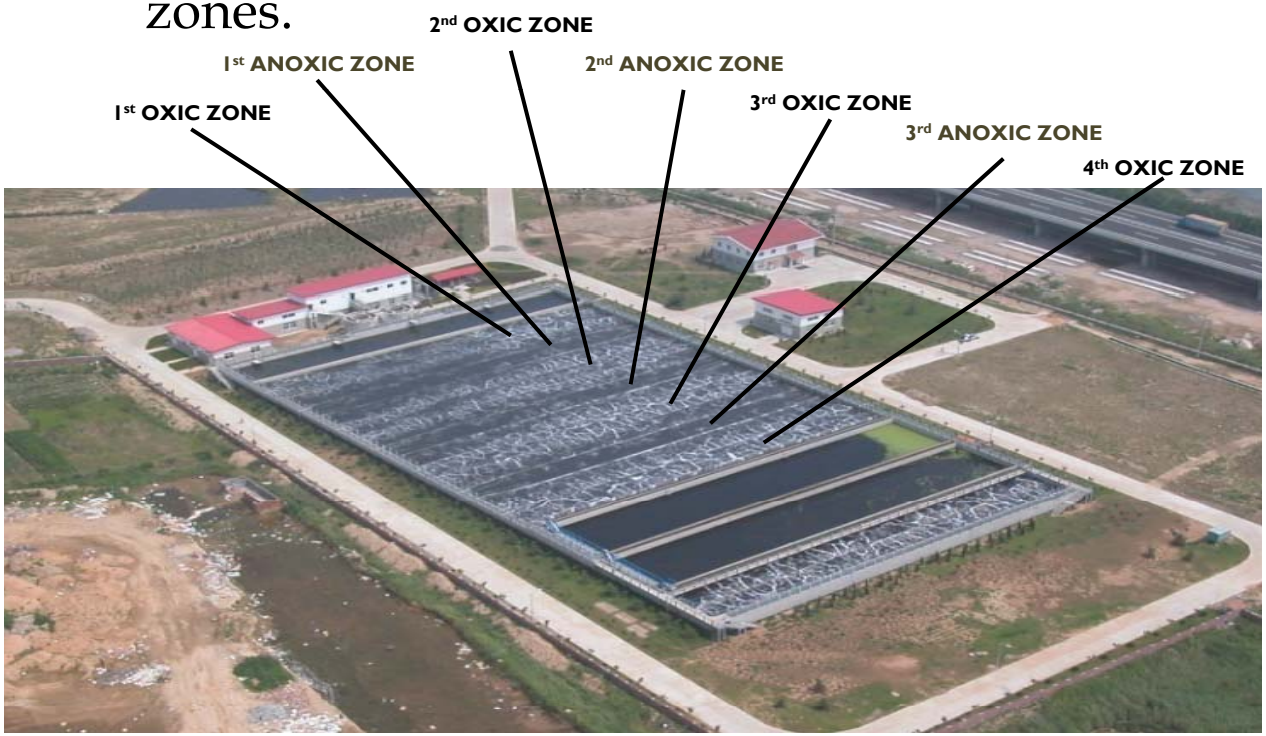
In-Basin Extended Aeration – Nitrogen Removal

Nitrogen is removed in the treatment system by turning the incoming ammonia to nitrates (through aeration), then getting the nitrates out by "anoxic" action. This is done by alternating aerated (oxic) and non-aerated (anoxic) zones.



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In-Basin Extended Aeration – Effluent Water Quality

The extended aeration system can produce excellent effluent quality:

- **BOD below 10 mg/L**

(below 5 mg/L w/ filter)

- **TSS below 15 mg/L**

(below 5 mg/L w/filter)

- **Ammonia below 1 mg/L**

- **Nitrogen/phosphorous removal where needed**

In-Basin Extended Aeration - Benefits

Cost Advantages

- Construction cost is lower than other alternatives
  - The main (aeration) basin is lined earthen basin (not expensive concrete)
  - Simple design
- Operating costs are also lower
  - Energy-efficient
  - Easy to operate & maintain

Overall Benefits

- Cost-Effective Construction
- Easy & Stable Operation
- High-efficiency fine-bubble aeration
- Excellent Effluent Water Quality
- Nitrogen Removal
- Simple & Easy Maintenance
- Low Operating Costs

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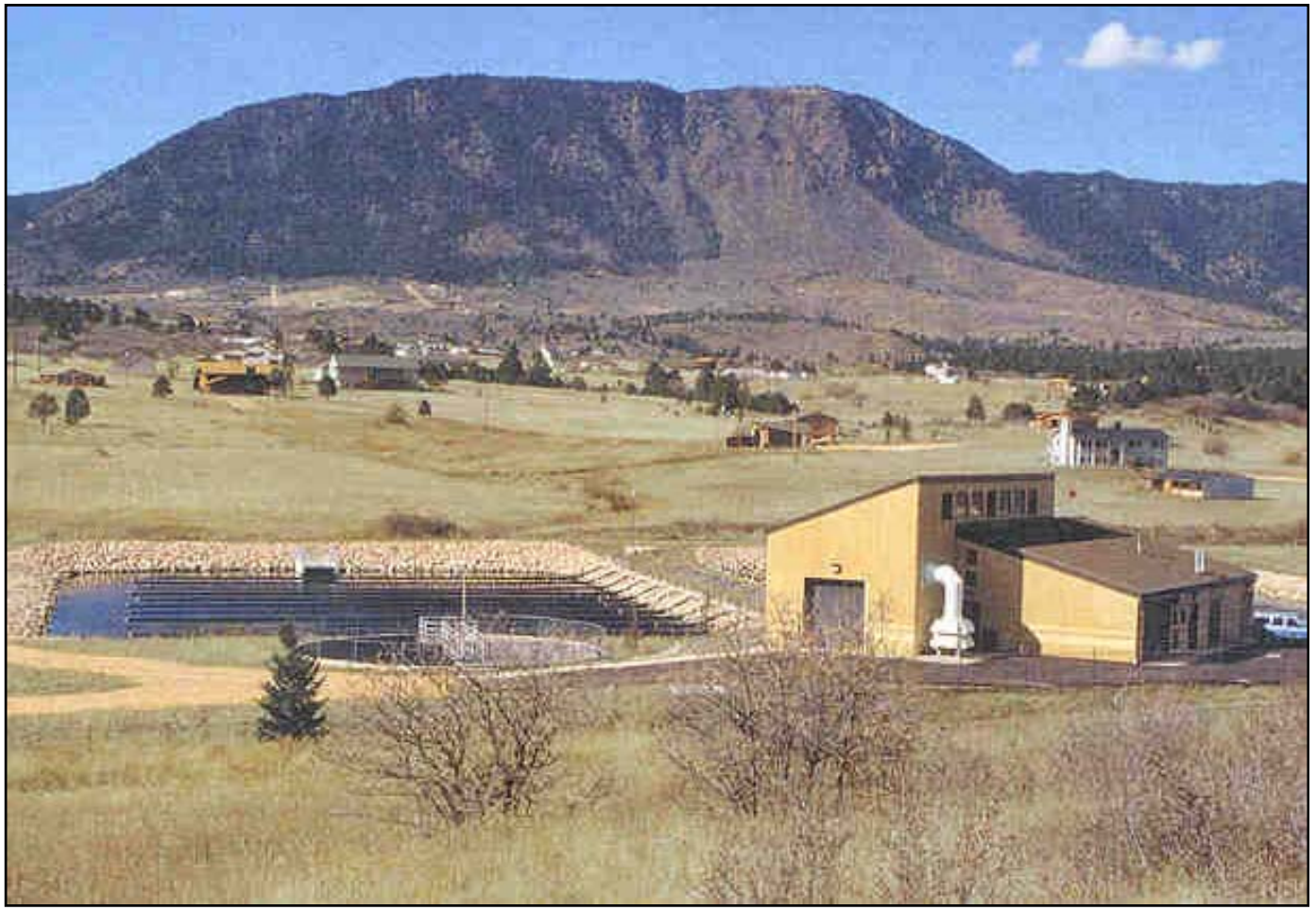

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