Wetland and constructed wetland for wastewater treatment

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PREFACE

"A generation ago, wetlands were considered a nuisance. They were drained and filled in, then farmed or built on.

Today, we know better than to erase these valuable ecosystems from our coastal and inland landscapes."

CONTENTS

Wetlands naturally clean water to help keep our rivers, streams, and oceans clear. Both the extensive root mass of the plants and the soil itself work together to extract contaminants and nutrients from the water.

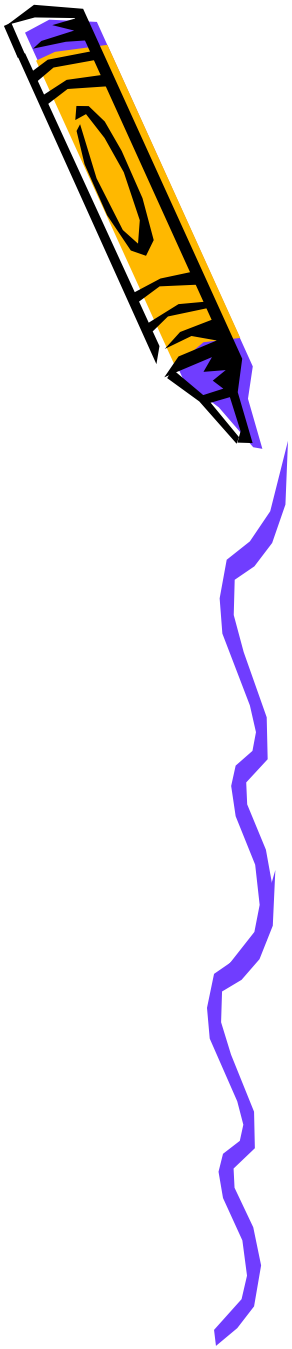
Sand dunes act as natural soil filters for contaminants and nutrients found in water that is ocean bound. Nutrients, such as nitrogen, become food for microorganisms.

Sand represents just one type of soil filter. Gravel, brick, and earth also filter soil, while combinations of these soils can provide more extensive-filtering.

Natural wetlands and soil filters such as sand dunes do not have the capacity to clean water contaminated by humans and industry.

For this purpose, one can learn from nature and imitate her by building constructed wetlands, contained soil filters, and other designed ecosystems for the purpose of purifying human, agricultural, and industrial wastewater.

Constructed wetland



A system consist of a series of plots filled with crushed brick, sand, and gravel.

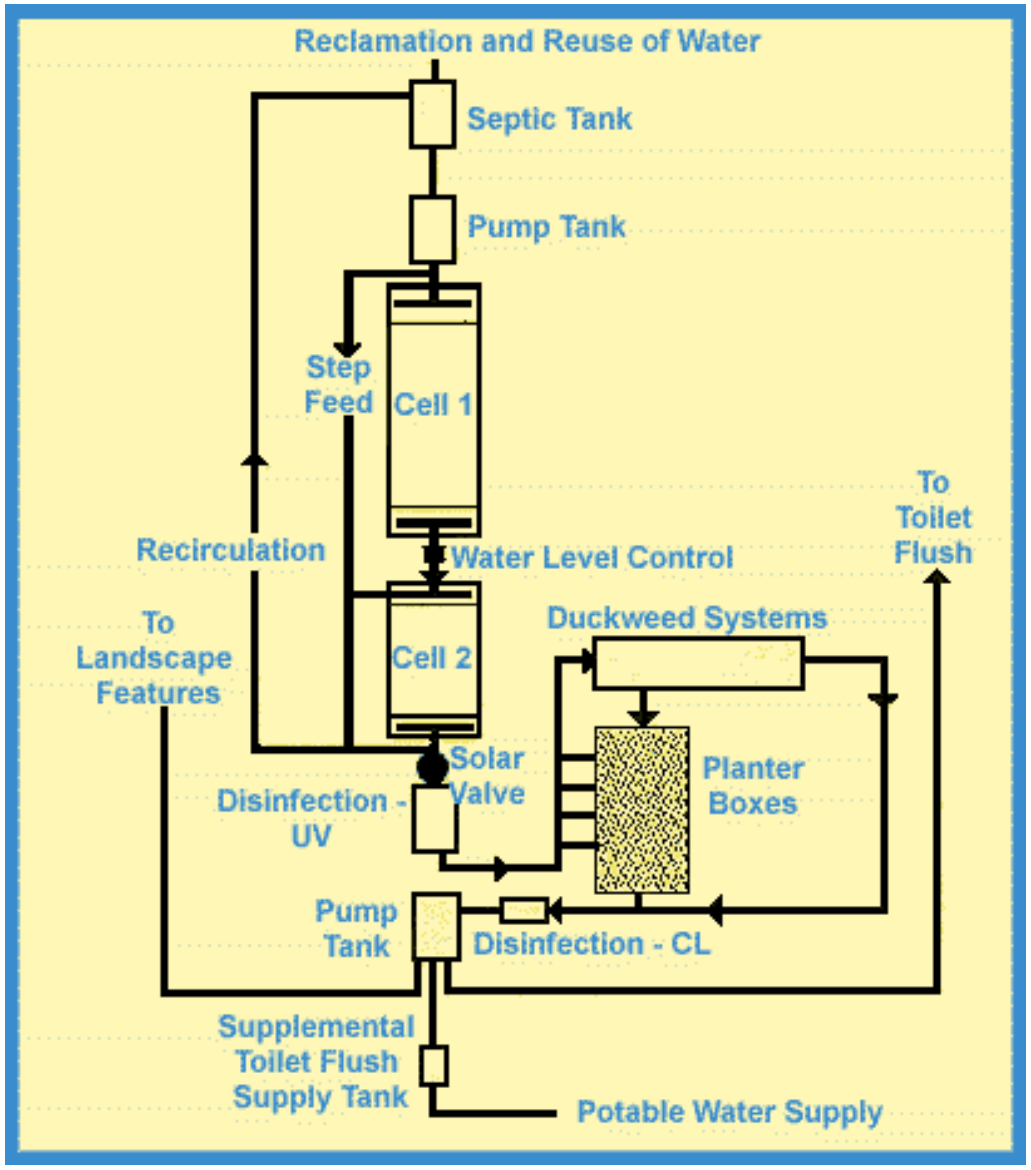
The plots are lined with plastic to prevent waste from leaching into groundwater, and are populated by native wetland plants to aid in wastewater treatment.

These constructed wetlands mimic nature by mechanically filtering, chemically transforming, and biologically consuming potential pollutants in the wastewater stream.

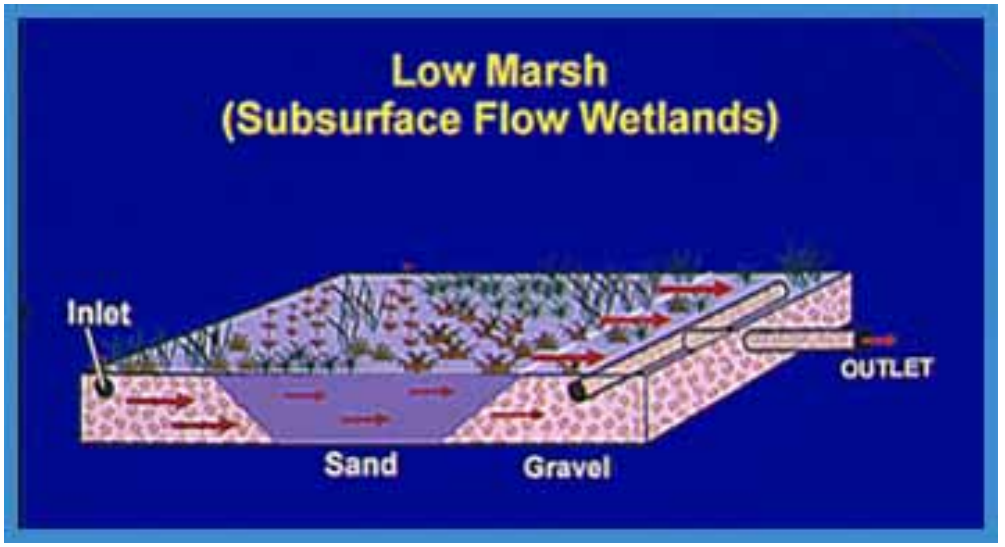
Wetland systems are used to remove biological materials, suspended solids, nutrients, and pathogens from the wastewater.

The constructed wetland wastewater treatment system consists of three components: septic tank, constructed wetland, and land application system.

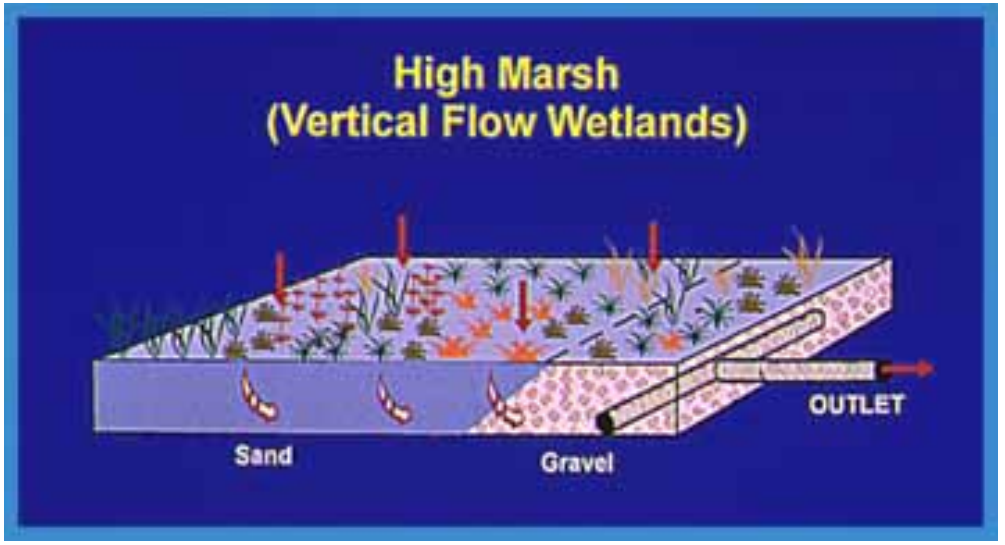
The schema of designed wetland



Two types of constructed wetlands are shown below.



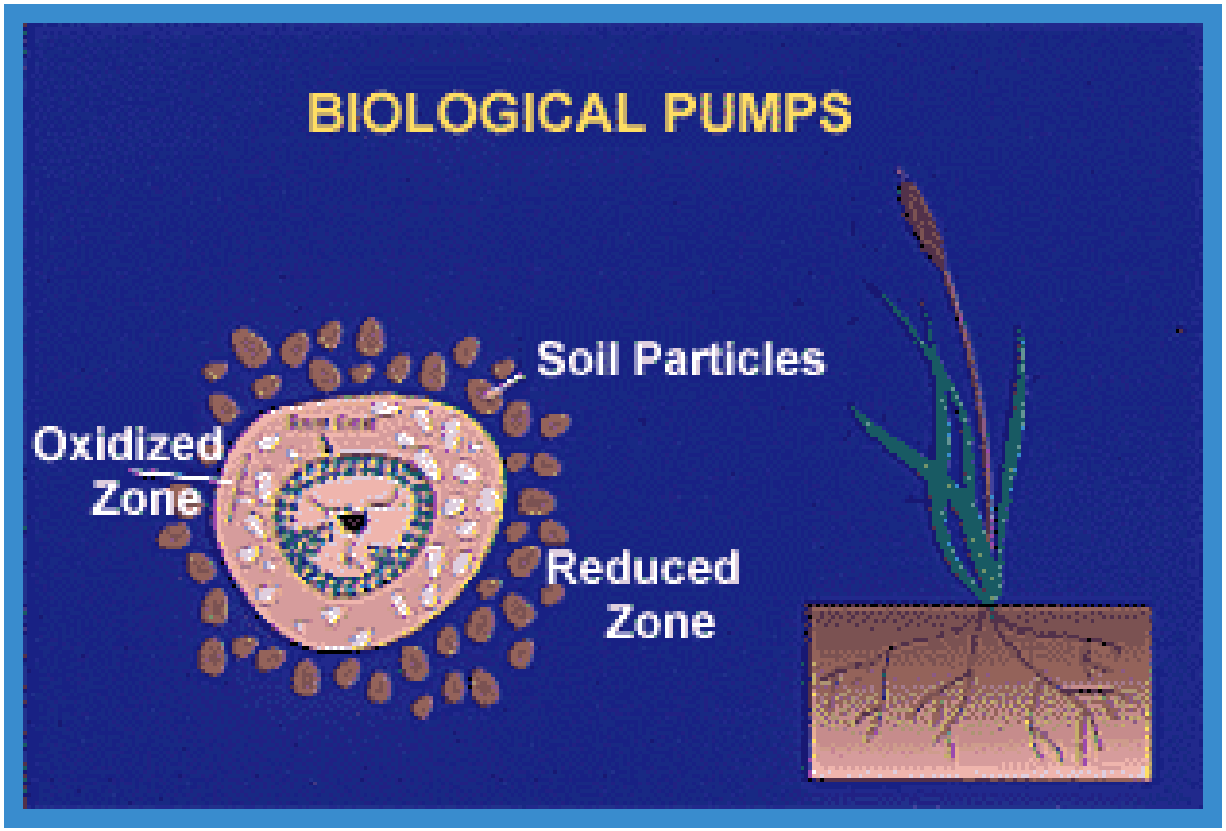
Cell 1



Cell 2

The **plants** grown in these plots are specifically chosen for their ability to assist in the biological treatment of water.

Plants act like biological pumps, converting sunlight into chemical energy and carrying oxygen from their leaves to their roots.



Pollution eating **microbes** colonize in the oxidized zone surrounding the root surface. Microbes convert nitrates into a harmless gas.

Alternating aerobic and anaerobic environments work together to remove nitrogen from-wastewater.

Phosphorus is reduced as it chemically binds to crushed brick, and biological oxygen demand (BOD) created by organic materials and other substances is filtered out or eaten by microbes.

BOD and phosphorus removal are relatively quick processes requiring an aerobic environment, while nitrogen transformation takes several days.

There are several studies of wetland for wastewater treatment in District 9 – Ho Chi Minh city

The canal of water outlet

The canal with hyacinth

Grassland beside the farm

Go Cat landfill - Ho Chi Minh City

Wastewater treatment plants

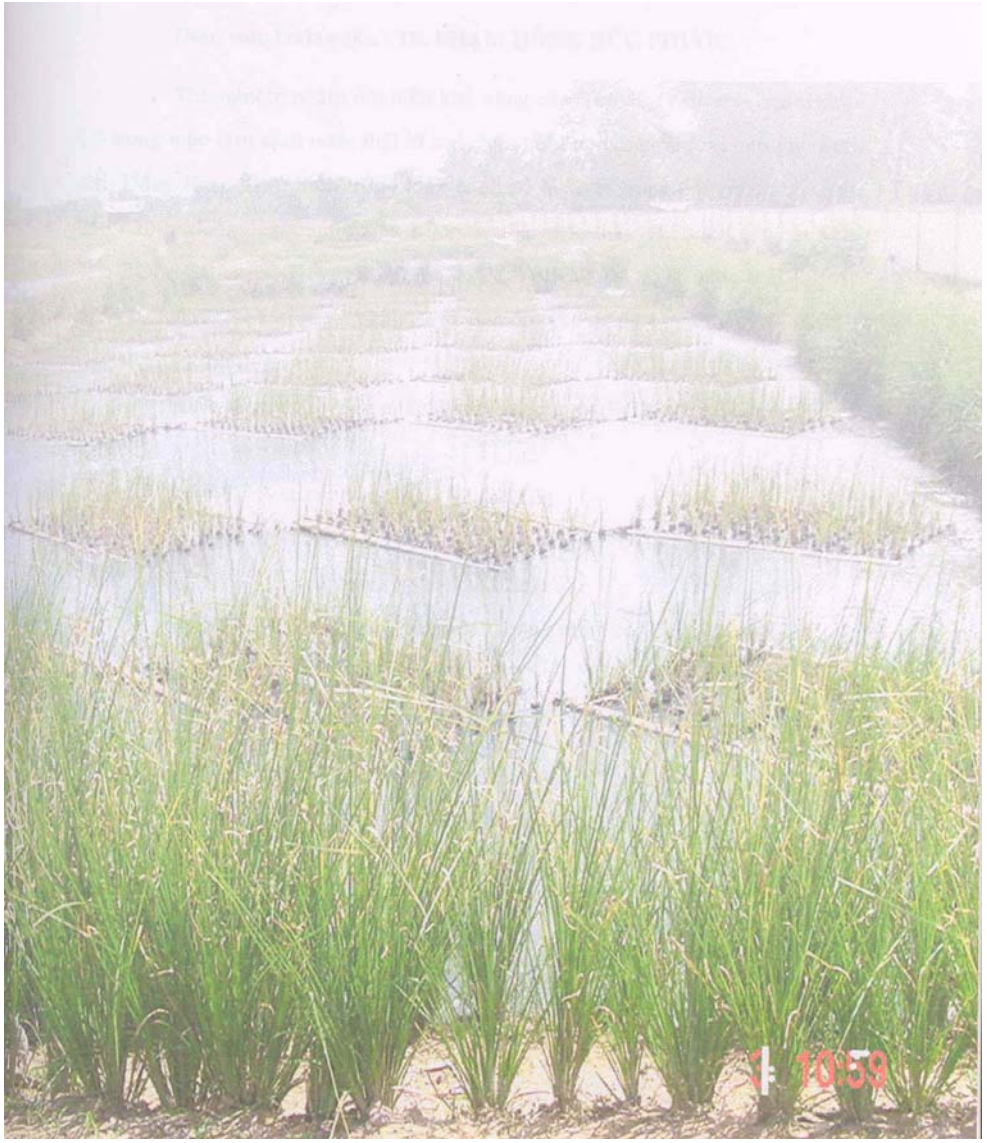
The wetland for clearing water

With hyacinth and duckweed

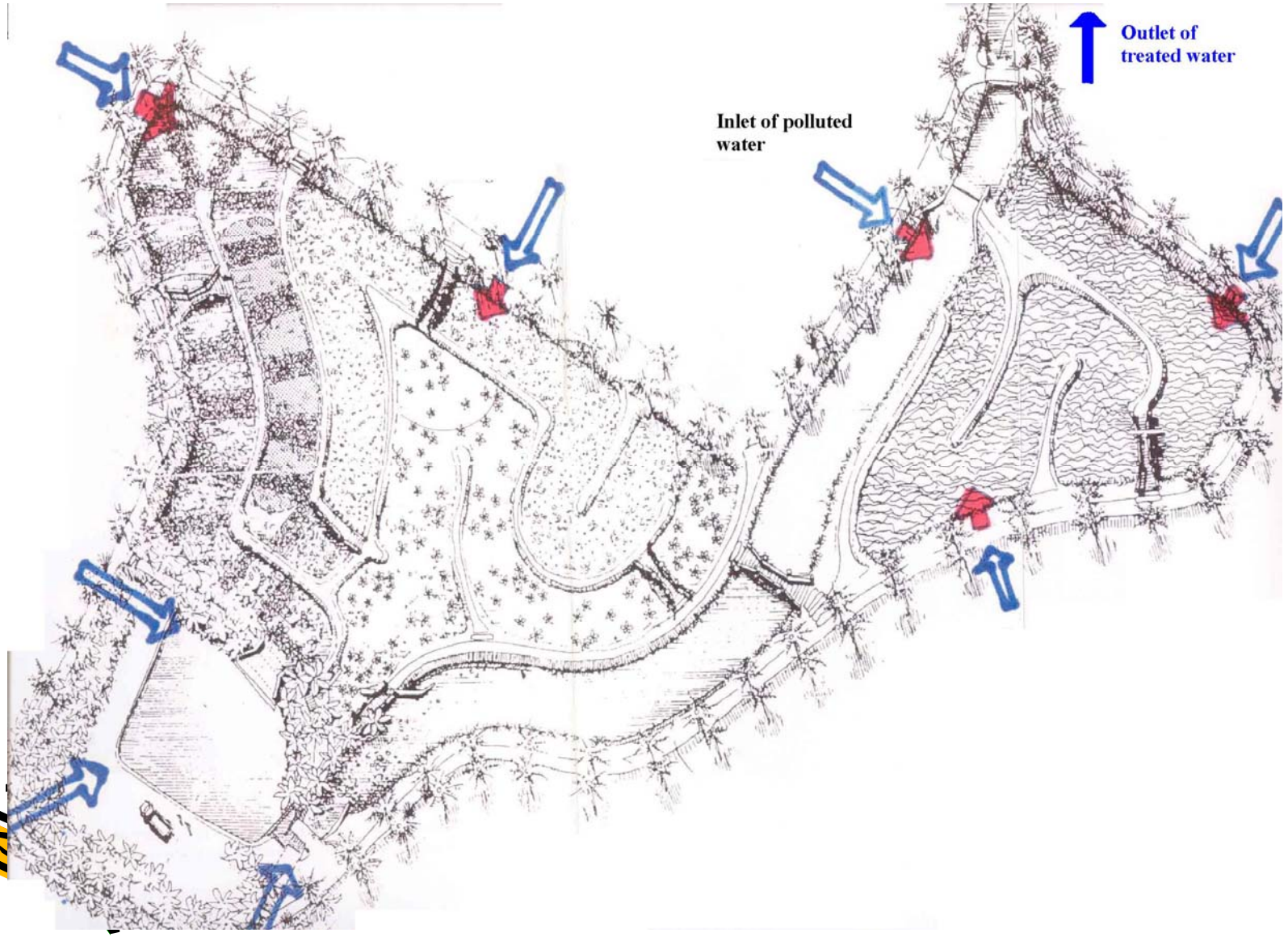
Wastewater treatment in Dong Nai province

Treating sludge from piggegy farming

Floating grass in wetland



Constructed wetland in Dam Rong – Da Nang city



Friendly landscape in commune

And so on

In Hue city

Map of Hue Citadel

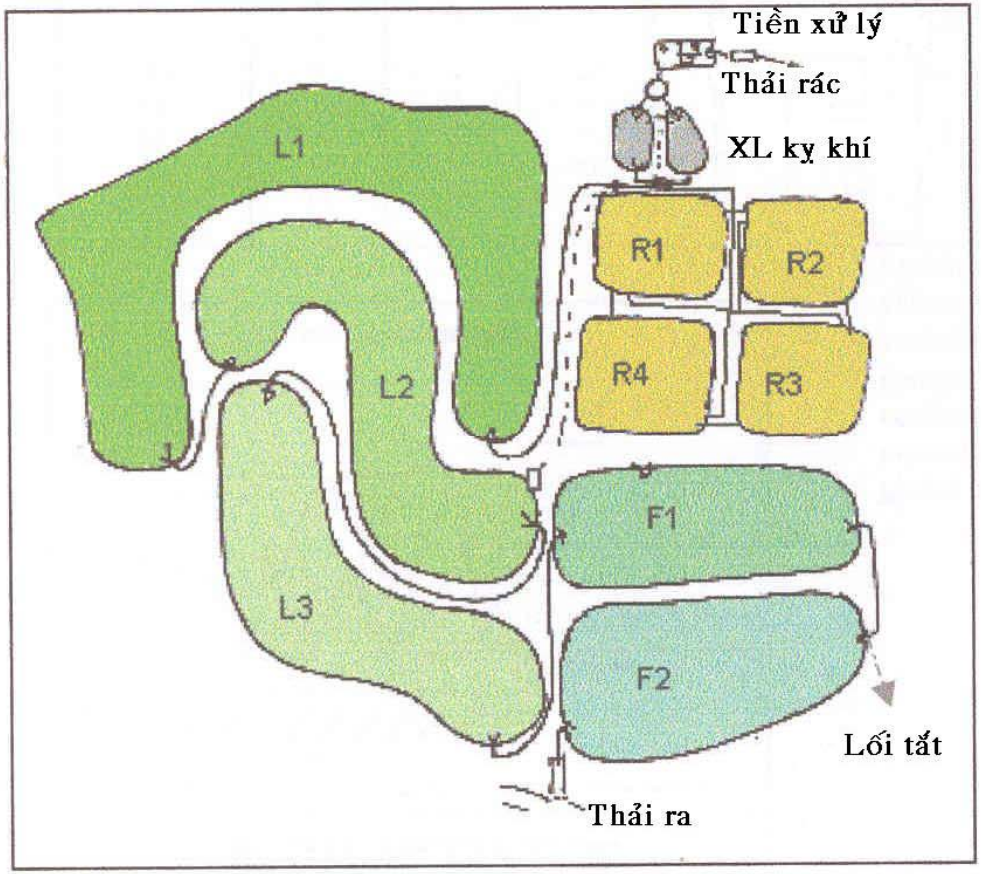
Ponds for treatment of wastewater with plenty of water morning-glory and lotus

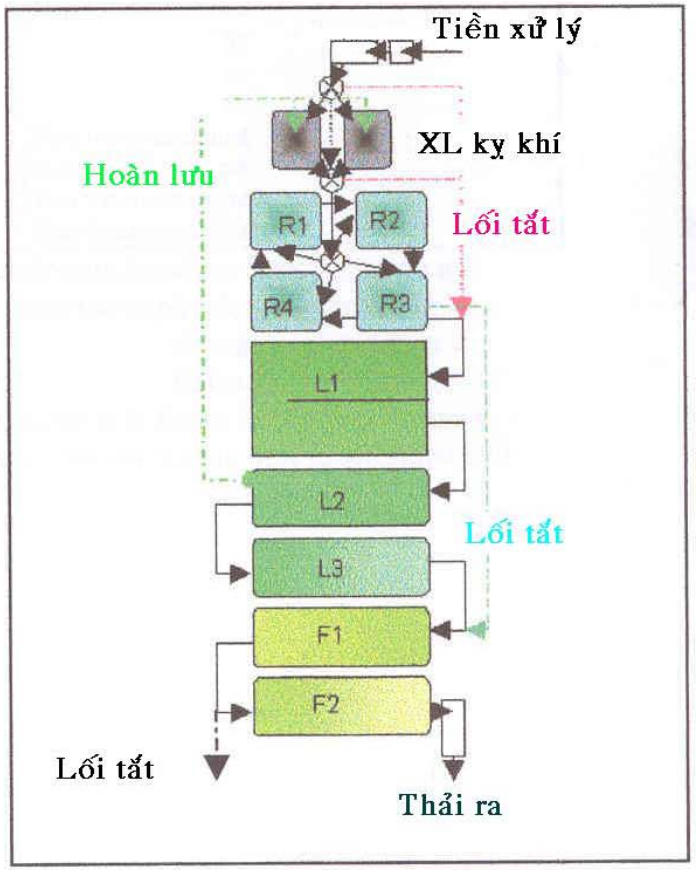
Constructed wetland situated in Southern France

Constructed wetland situated in southern France

Dimension of 7 ha for treating wastewater
from 20 000 habitats

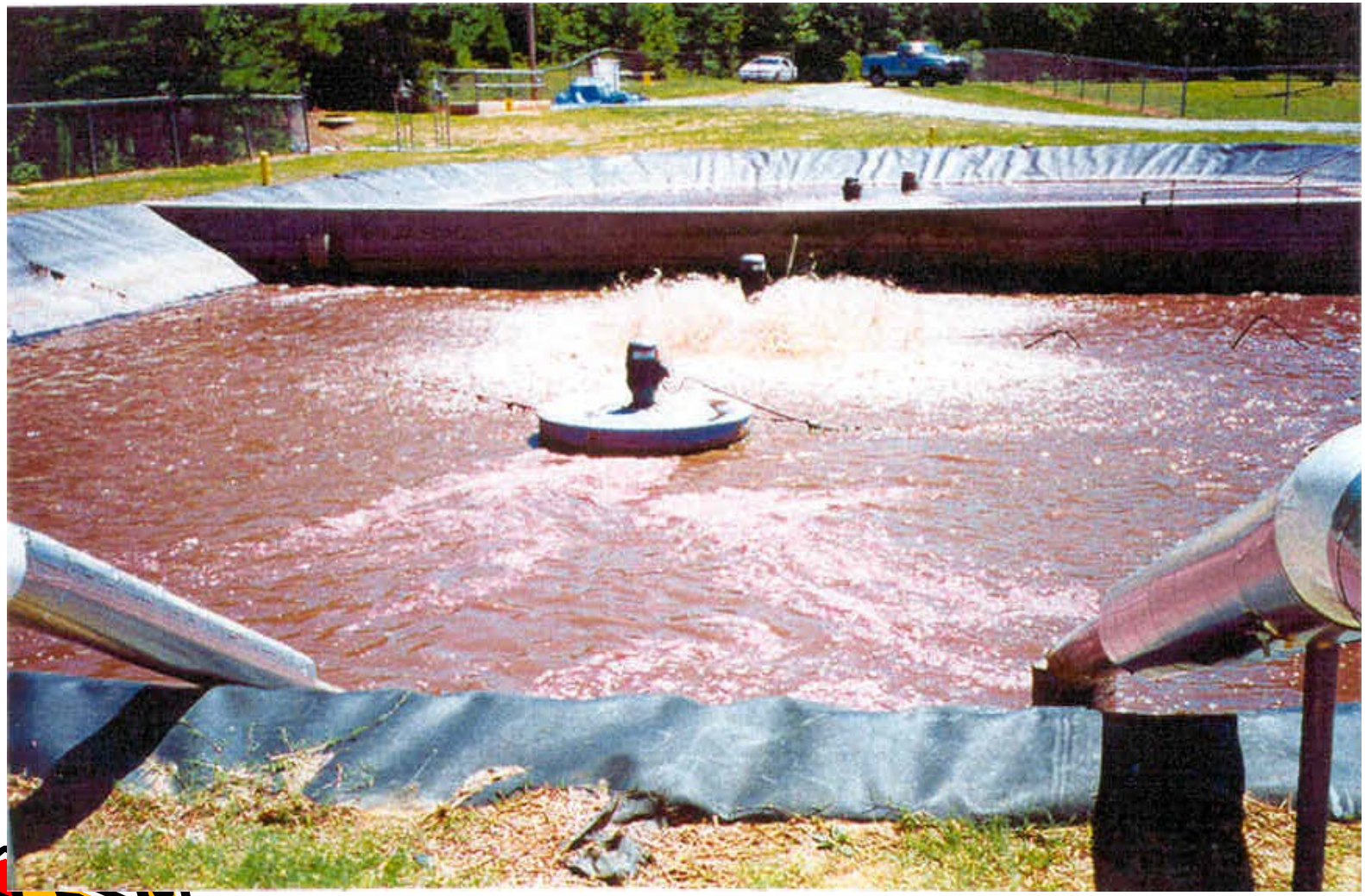
Schema of the operating system





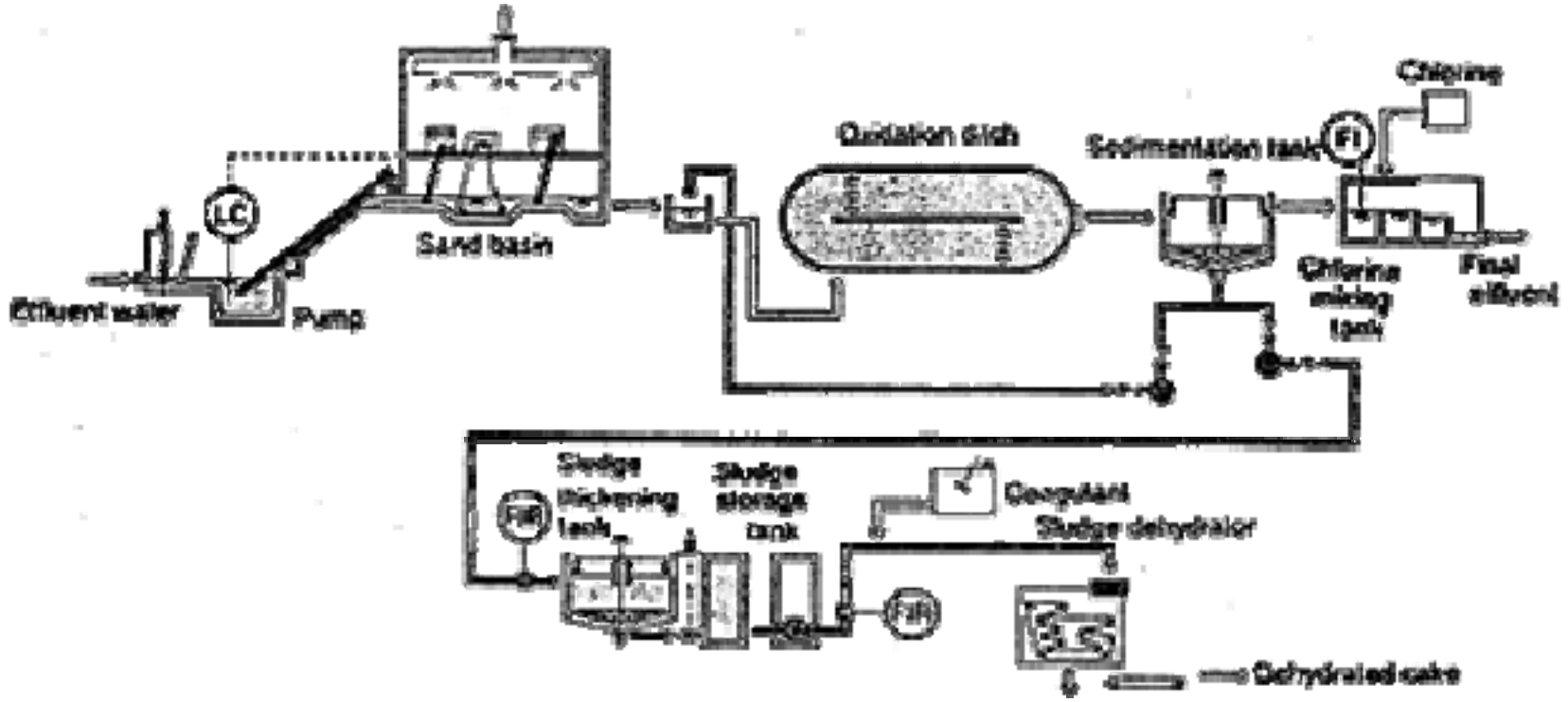
AEROBIC POND IN OPERTATION

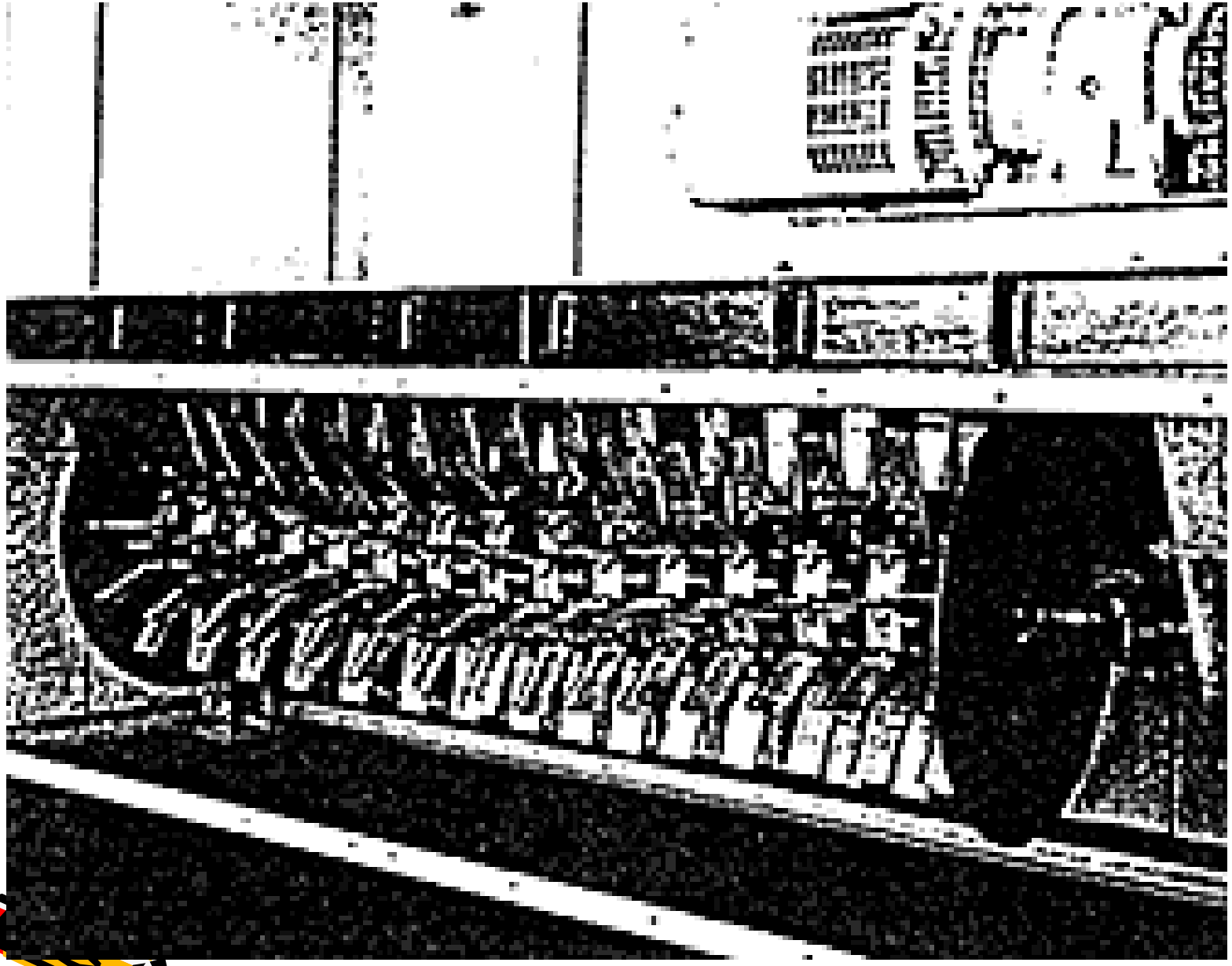
CLOSE-UP

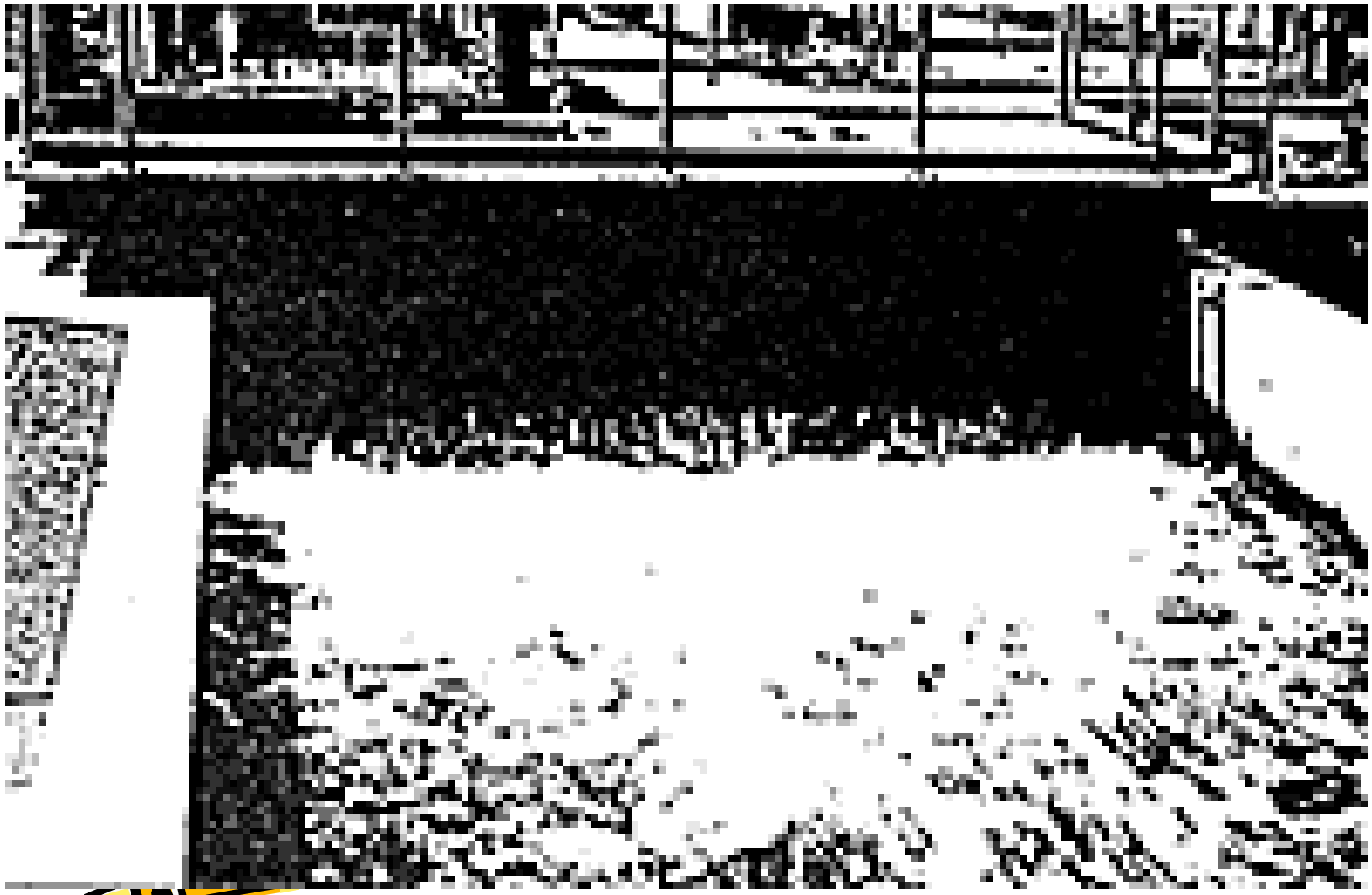


AEROBIC POND AND CLORIDATION

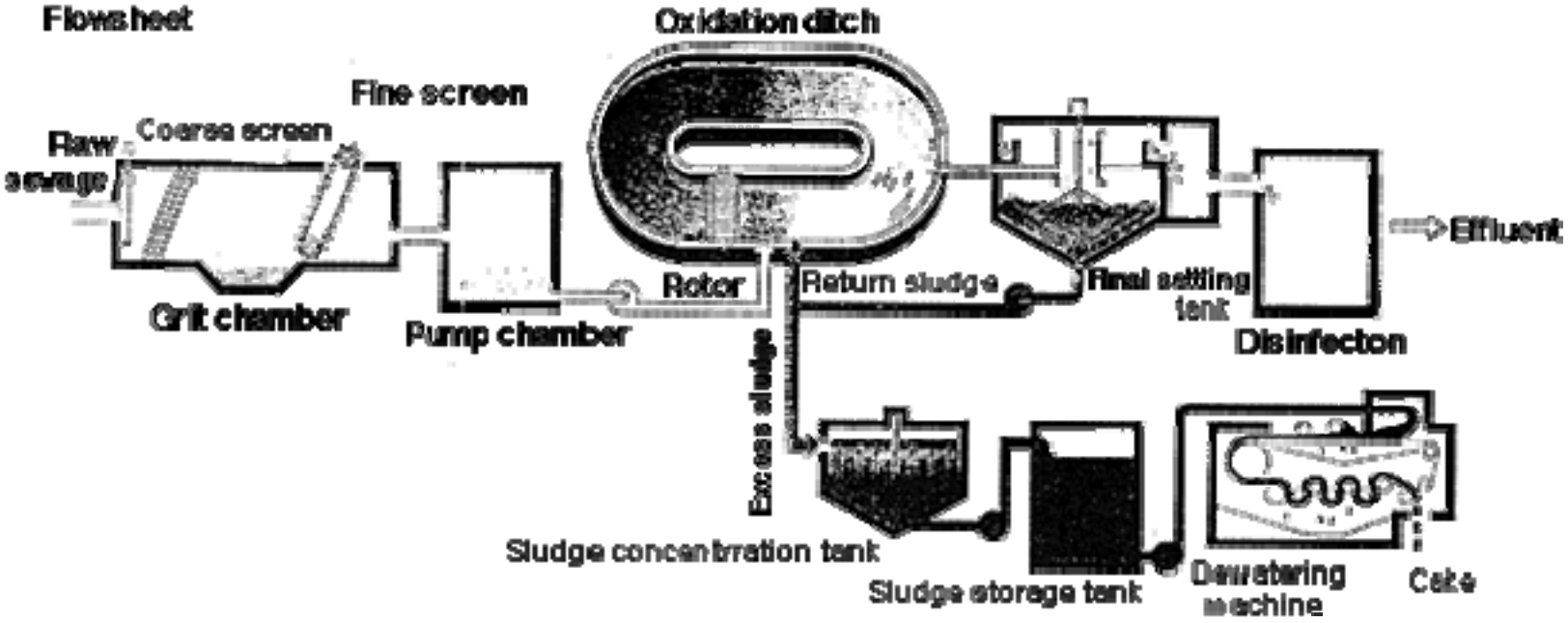
BIOLOGICAL MODULE



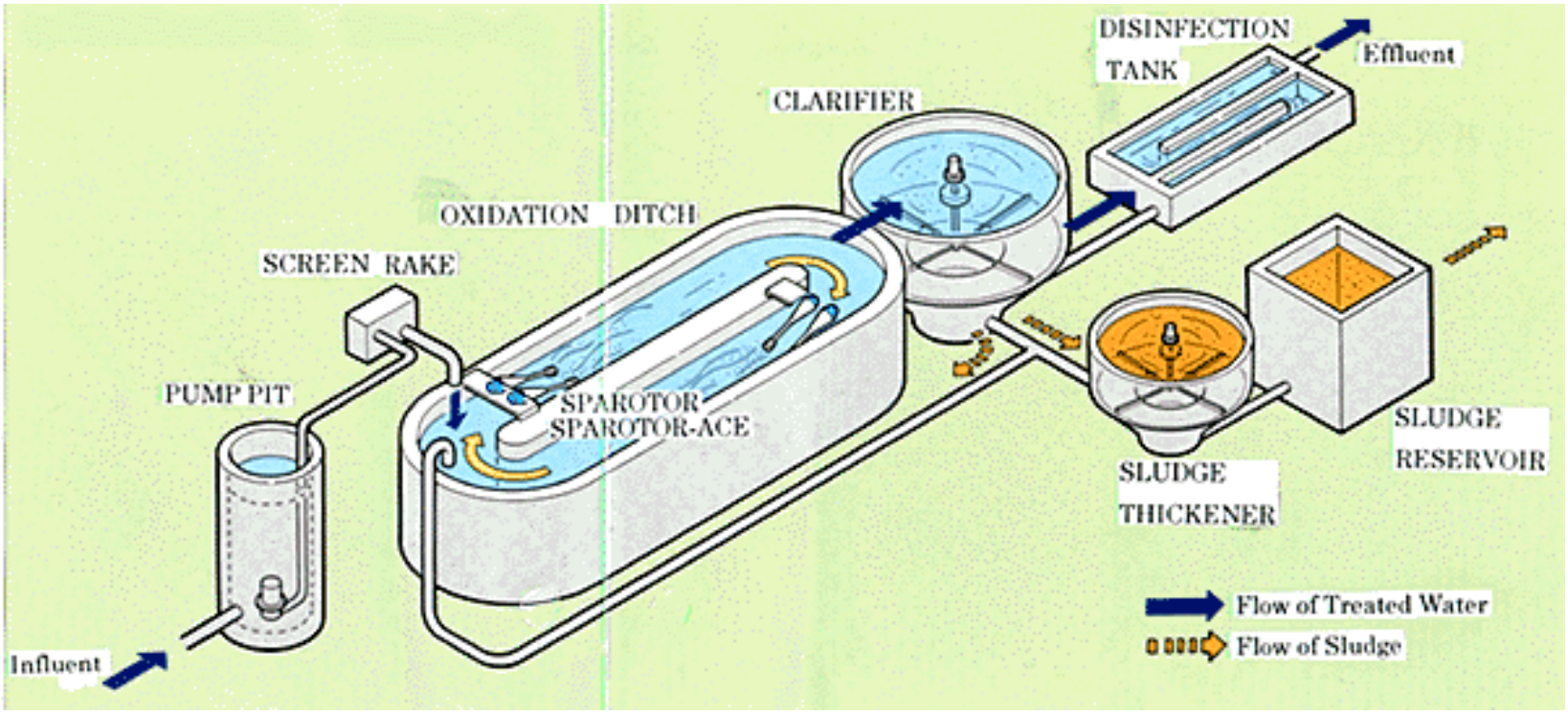


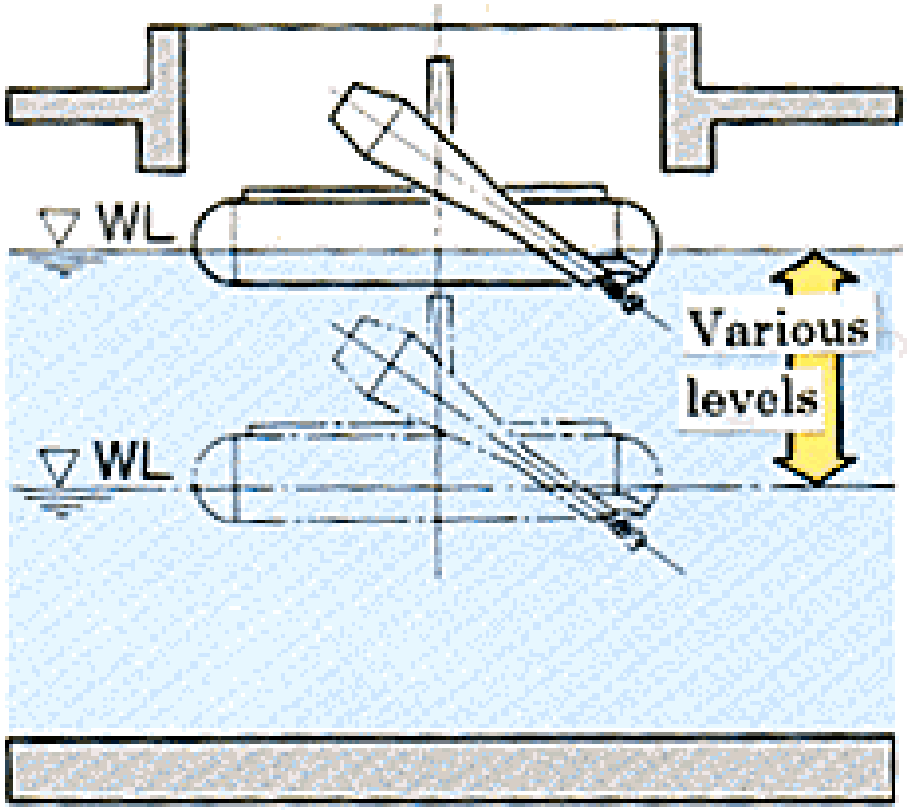


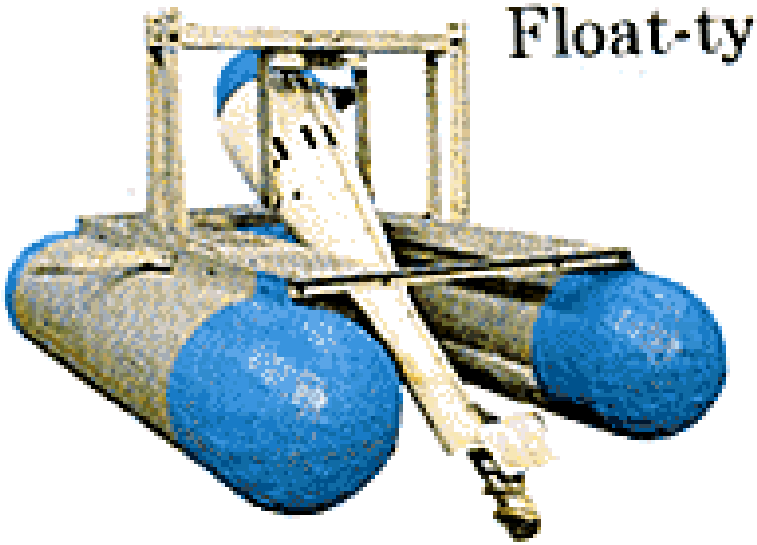
BIOLOGICAL CANAL



BIOLOGICAL CANAL IN OPERATION

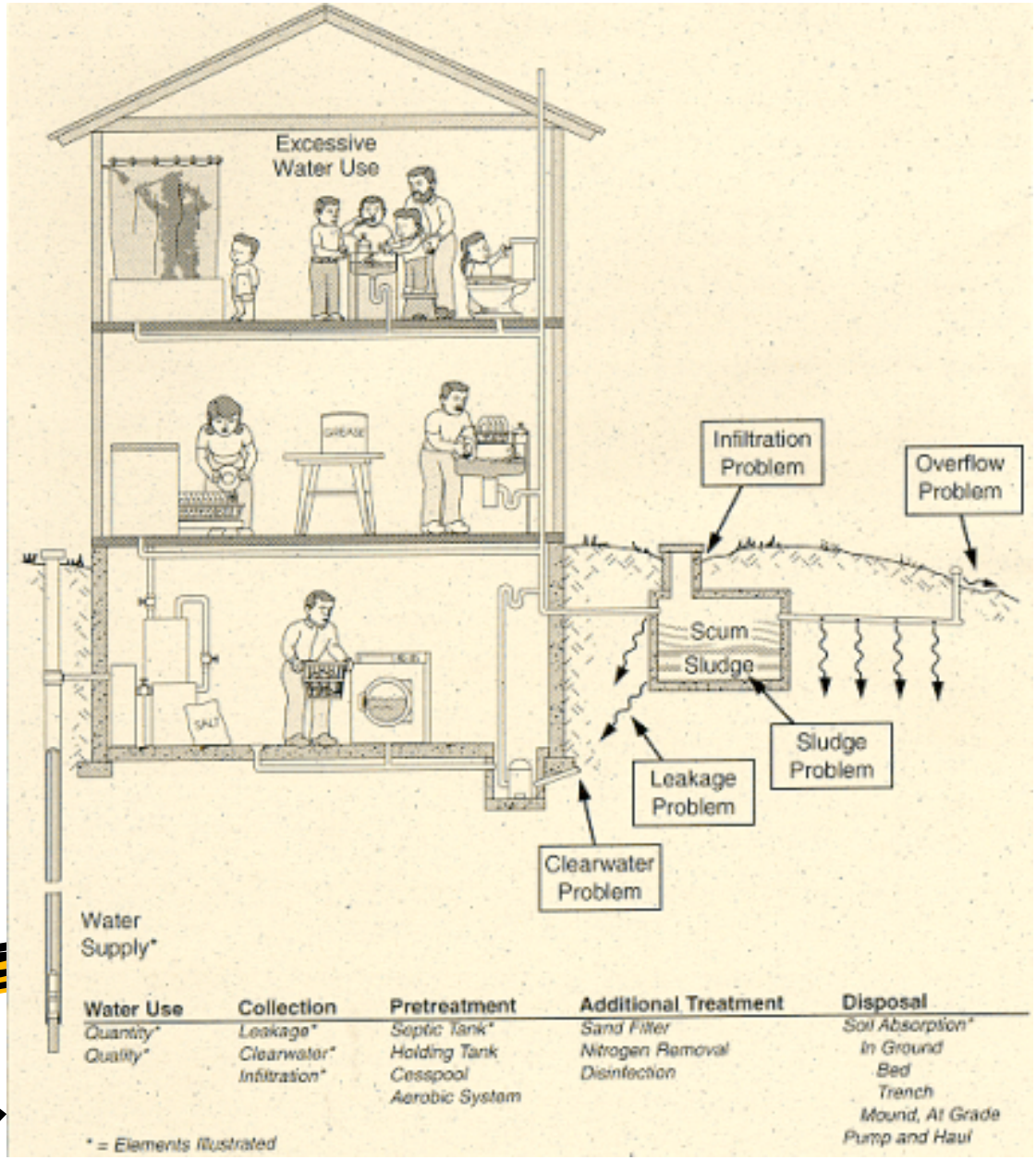

DISINFECTION
TANK
Effluent
CLARIFIER
OXIDATION DITCH
SCREEN RAKE
PUMP PIT
SPAROTOR
SPAROTOR-ACE
SLUDGE
RESERVOIR
SLUDGE
THICKENER
Flow of Treated Water
Flow of Sludge
Influent



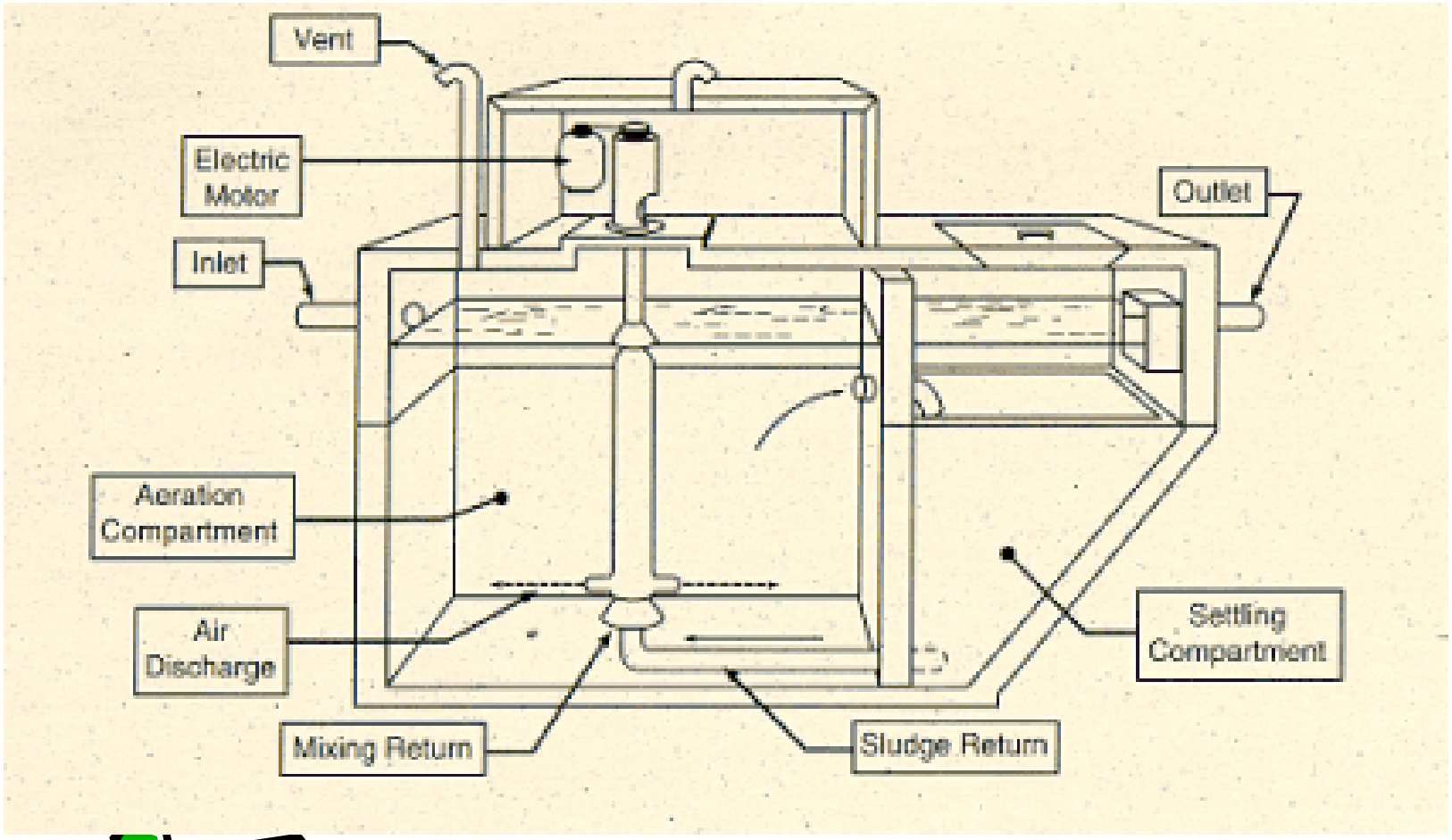


Float-type

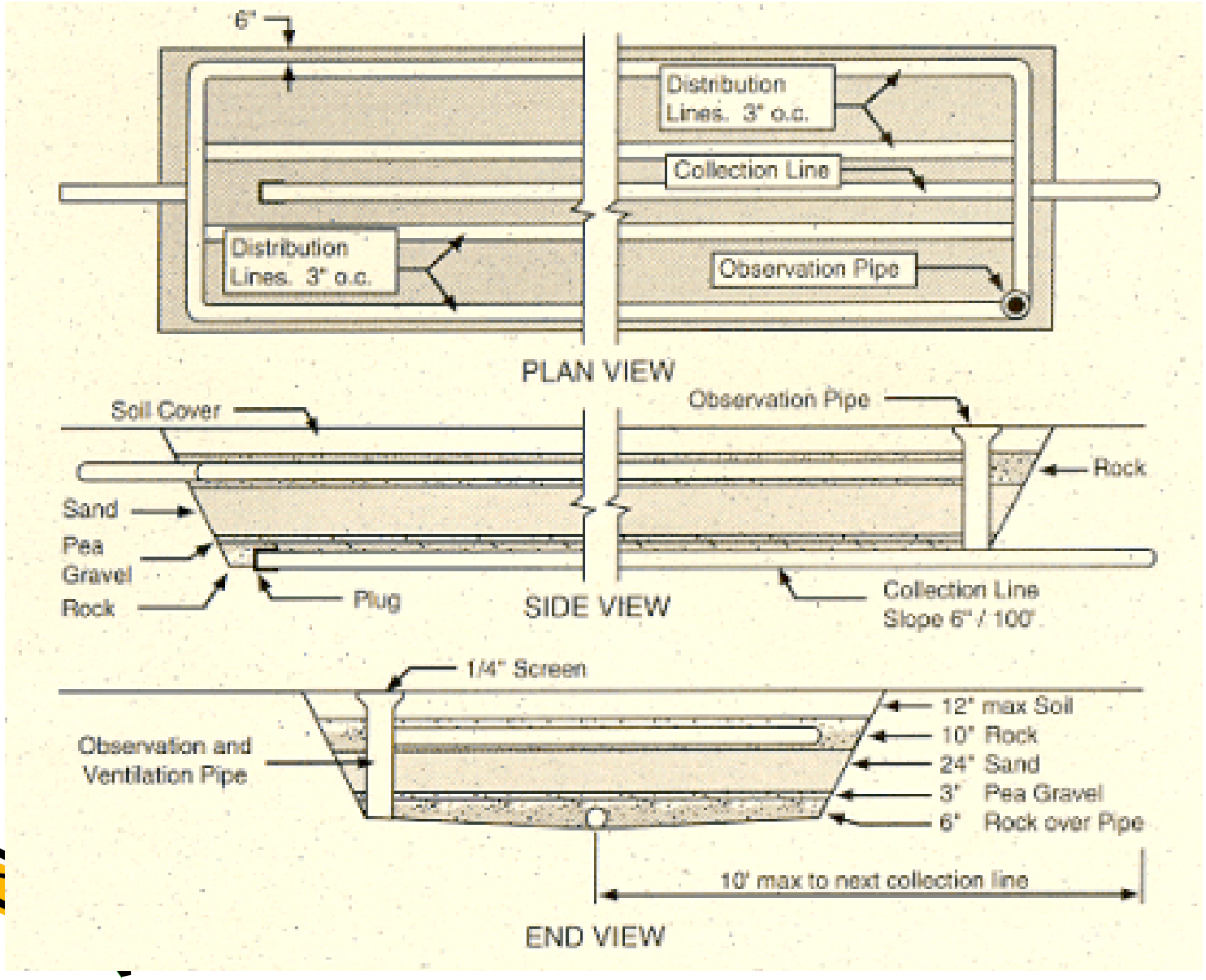
DOMESTIC WASTE WATER TREATMENT



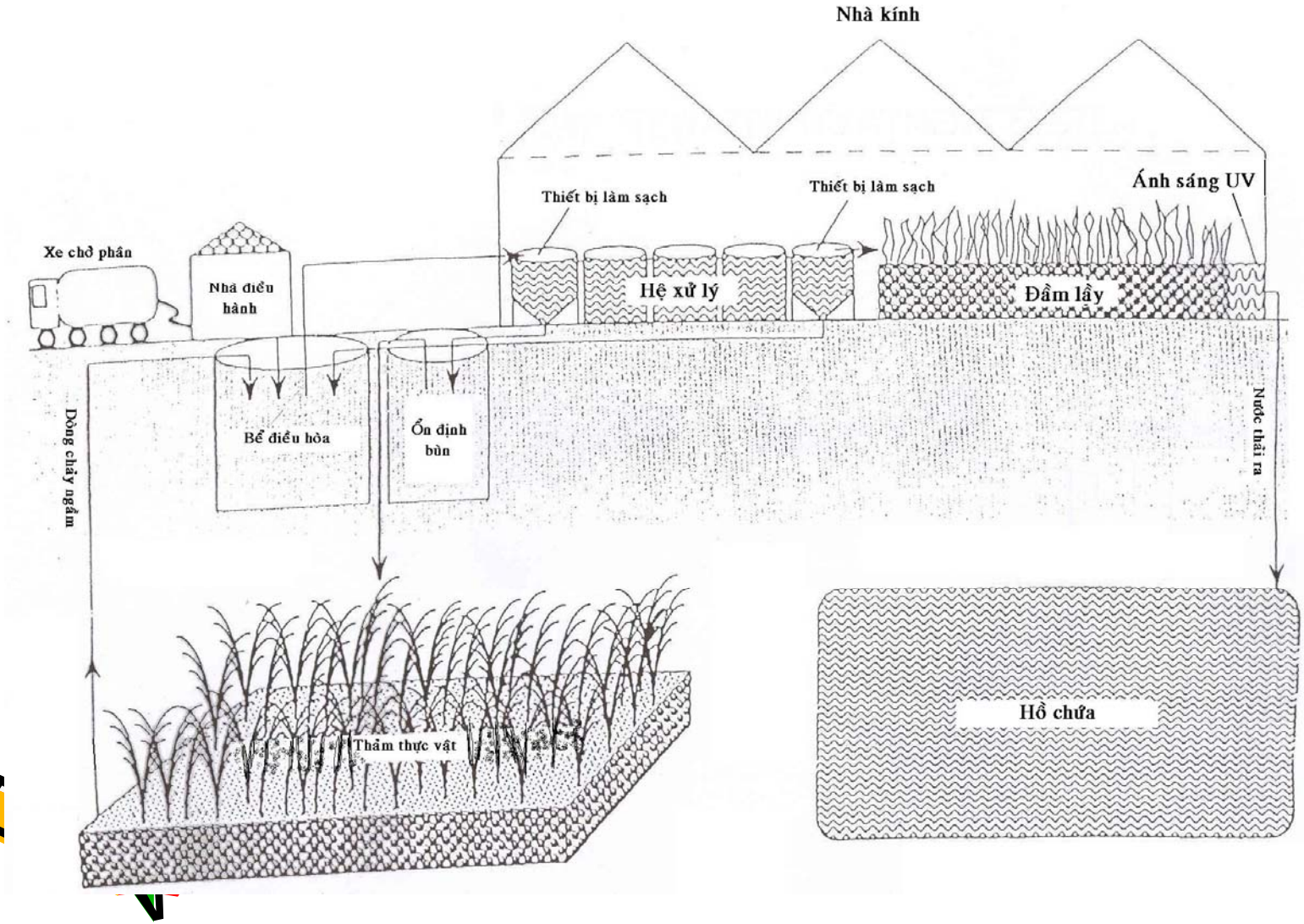
AEROTANK


Vent
Electric Motor
Inlet
Outlet
Aeration Compartment
Air Discharge
Mixing Return
Sludge Return
Settling Compartment

LANDFILL FILTRATION SYSTEM



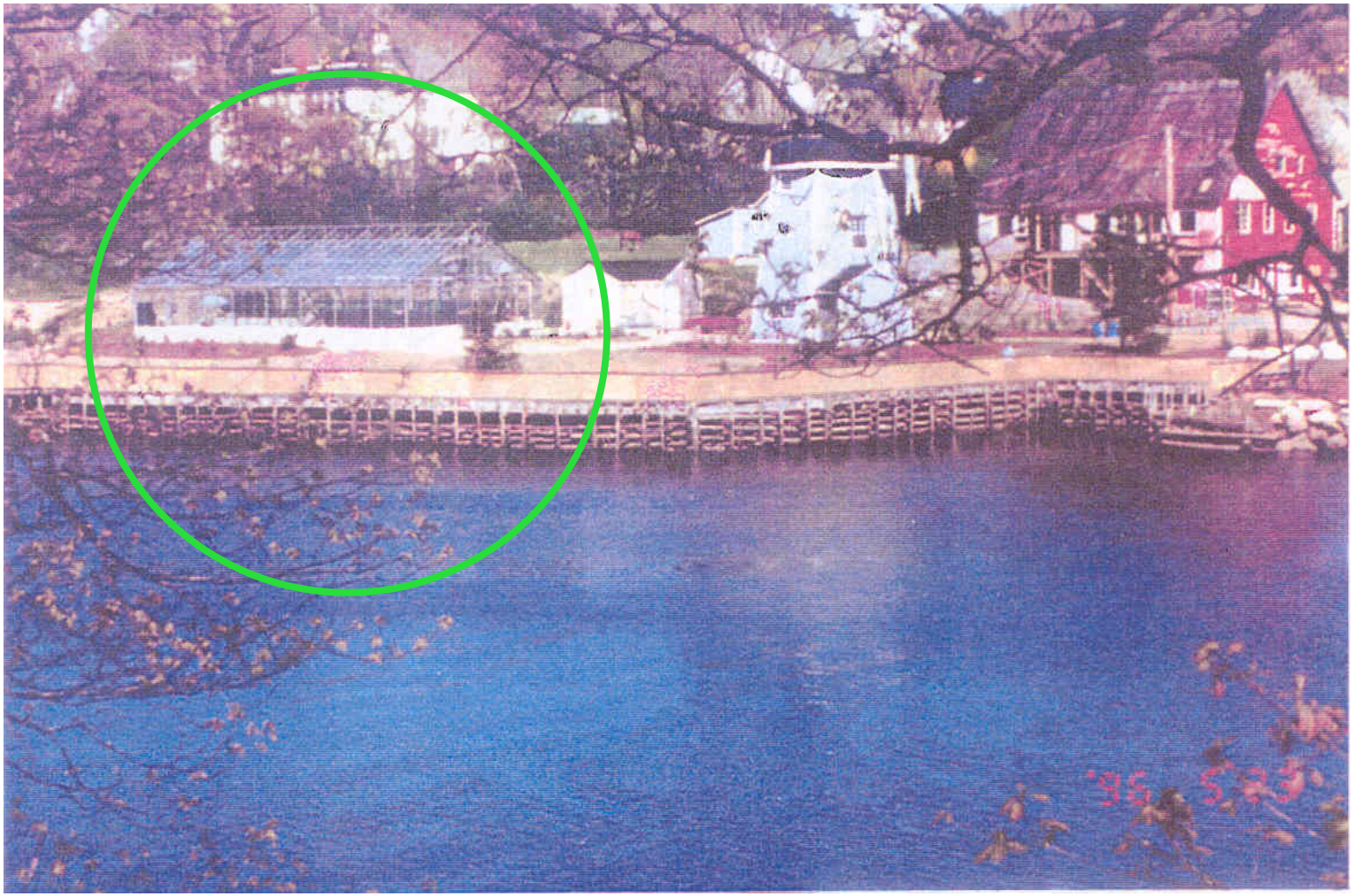
DOMESTIC WASTE WATER TREATMENT BY BIOLOGICAL SYSTEM



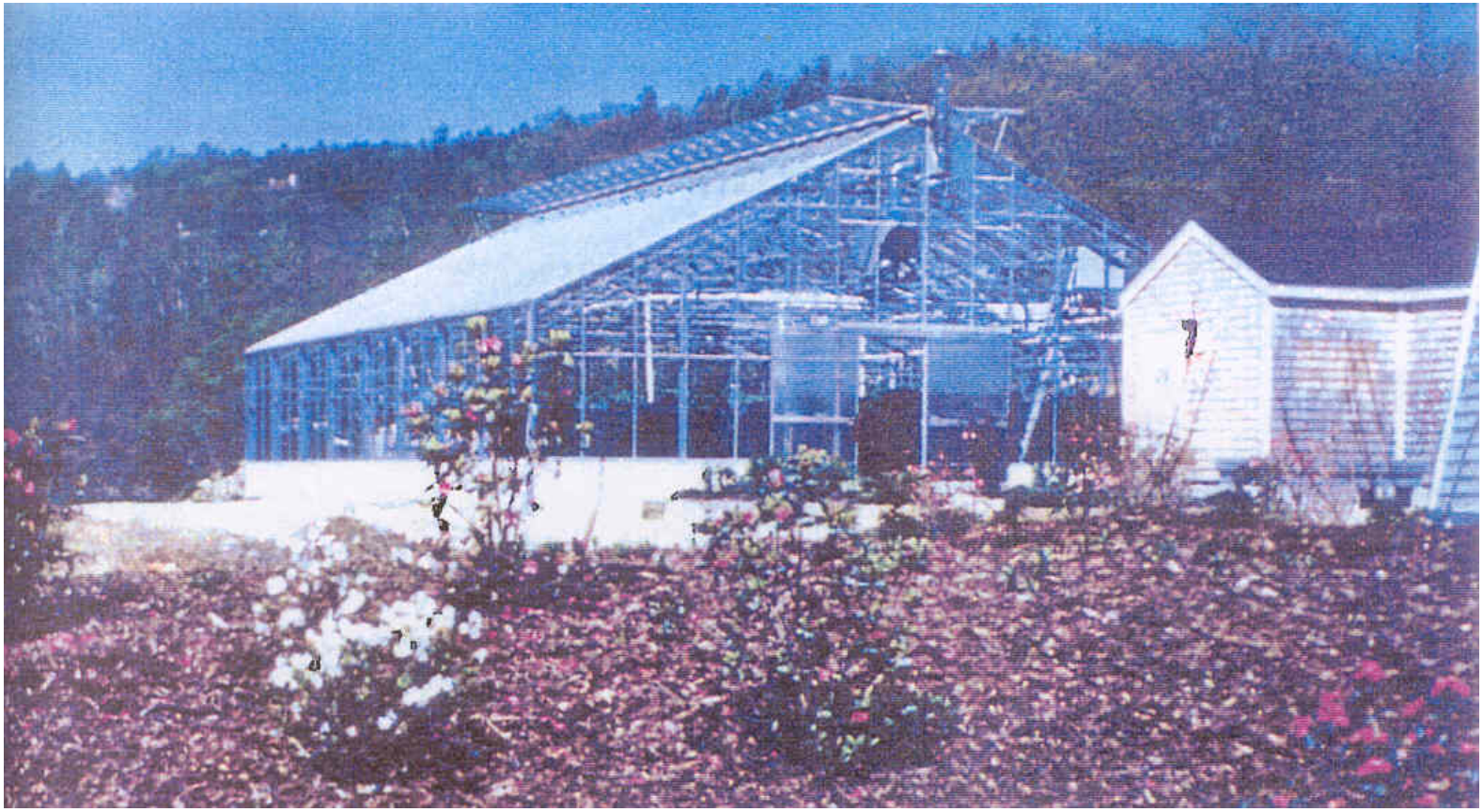
AEROTANK WITH HIGHER PLANTS

PLANT IN GLASS-HOUSE

The plants fully cover the treatment pond



FRIENDLY TREATMENT PLANT IN LANDSCAPE



CLOSE-UP

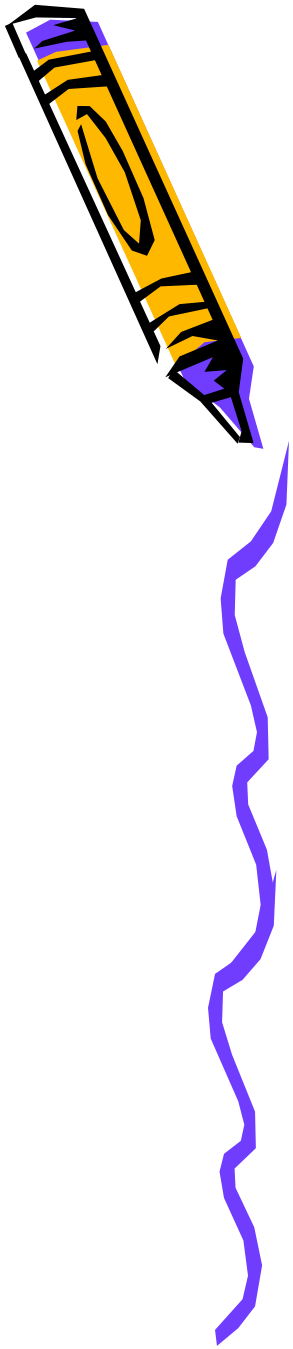
INSIDE THE GLASS-HOUSE

Some experiments in Faculty of Environmental Technology

Wastewater is distributed into constructed wetland

Outlet water from constructed wetland is used for watering flower by drainage system under ground

Conclusion



- Wetland and constructed wetland are very important in **protection** of environment
- Wetland ecosystems where water is being **purified** and **reused**, and hence **recycled**.
- Constructed wetland where processes of **purification**, and **reclamation** of water take place with the purpose of capturing other valuable products, such as nitrogen and phosphorus.

THANK YOU

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