

**HIGHER TECHNICAL INSTITUTE  
CIVIL ENGINEERING DEPARTMENT**

**DIPLOMA PROJECT**

**DESIGN OF OXIDATION PONDS**

**by**

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**JUNE 1997**

# DESIGN OF OXIDATION PONDS

by

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Project report

Submitted to

the Department of Civil Engineering

of the Higher Technical Institute

Nicosia, Cyprus

in partial fulfillment of the requirements

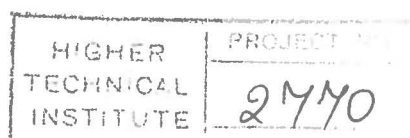
for the diploma of

TECHNICIAN ENGINEER

in

CIVIL ENGINEERING

June 1997



## **ACKNOWLEDGEMENTS**

I would like to express my appreciation and gratitude to the supervisor of this project Mr N. Kathitziotis, lecturer of the Higher Technical Institute for his willing co-operation during the preparation of this project.

I also would like to thank my brother Georghios Karayiannis who guided me and discussed with me the problems of this project. Many of the ideas resulted from endless discussions with him.

I would like to express my thanks to Mr Pantelis Pantelides, Chief Engineer of Peyeia Municipality for his useful information and advice about this project.

Finally, I would like to thank Fiona for correcting my English, and making everything to make sense.

## SUMMARY

The aim of this project is the design of a Waste Stabilisation Ponds (otherwise known as Oxidation ponds or lagoons) system to treat the sewage of Peyeia municipality, a relatively small developing community in Paphos.

Waste stabilisation ponds are the appropriate technology for projects of this scale in hot climates. The most important reasons are: the land is readily available at a low price, sunlight and high temperatures are plentiful, it does not involve high technology, and is therefore easy to be operated and maintained, and it achieves high pathogen removal and therefore enable the re-use of its effluent.

The results of the design involve simple preliminary treatment facilities (screening, comminutor), aerated lagoon, two facultative ponds in parallel, two maturation ponds in series, and a rock filter for effluent polishing.

The effluent will be used for irrigation of the nearby citrus trees plantations. Unrestricted irrigation will be applied only for the irrigation period from May-October.

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## **1.0. INTRODUCTION**

Every community, be it large or small, produces wastewater, so the need to develop technologies appropriate to specific areas for managing the wastewater is essential. Wastewaters must be treated to remove contaminants such as organic matter, inorganic matter, bacteria, viruses, pathogens and toxic substances. Untreated wastewater could be discharged into receiving waters used as potable supplies, onto land used for crops or onto land resulting in drainage into groundwaters. Receiving waters could result in a dramatic depletion of dissolved oxygen and cause large scale ecological damage.

There is continuous work being carried out to improve existing facilities and to establish new systems to regions around the world. With respect to developing countries where a large proportion of the population live in remote areas and small communities with limited or no water supply and sanitation facilities, the need for cheap, effective and maintainable systems is great. The contribution of sewage, treated effluents and sludges to many human and animal health problems and diseases has been proven and is recognised world-wide, leading to the increased attention in developing countries.

There are many types of unit processes used for conventional wastewater treatment systems such as physical, chemical, biological and natural processes. When considering the developing countries specifically, most of the conventional processes are not suitable for different reasons. These may be financial resources, small communities, education, or maintenance and operational capabilities. Waste stabilisation ponds are an alternative method of treatment.

Conventional wastewater treatment systems are aerobic unit processes designed to speed up the natural aeration occurring, and hence the biological breakdown of organic material, by using mechanical aeration.



This involves continuous use of aerators and skilled labour to maintain and operate the plant at optimum efficiency. If this is neglected, the BOD and nutrient level of the treated effluent will not be satisfactory. In some parts of the world the removal of pathogens is the primary function of wastewater treatment facilities and so conventional systems simply are not the most applicable. Waste stabilisation ponds are a cheap and effective alternative to conventional treatment and also give a high quality effluent.

The system usually consists of a number of shallow ponds or lagoons arranged in series or parallel receiving a continuous flow of wastewater from the preceding pond. The degree of treatment depends on the configuration and type of pond used, plus the retention time of the wastewater.

This project aims to study the basic principles and design considerations of waste stabilisation ponds and their applications in treating Peyeia's village sewage, a tourist developing community in Paphos. It is dealing with the sewage problem of Peyeia village and it gives suggestions on the re-use of the ponds effluent.