

INTRODUCTION

In this study, the implementation of upgrading or/and retrofitting of 4 existing Wastewater Treatment Plants (WWTPs) is presented. These plants are located at Nea Kerdylia (of Amphipolis Municipality), Nea Zichni (of Nea Zichni Municipality), and Eleftheres and Orfano (of Paggiao Municipality), Northern Greece (Figure 1).

DESIGN

A Membrane Bioreactor (MBR) Unit is proposed for Nea Kerdylia and Nea Zichni WWTP, while filtration of the secondary effluent through membranes is proposed for Eleftheres. Finally, A Continuous Backwash Upflow Sand Filter (SF) Unit is proposed for Orfano WWTP.

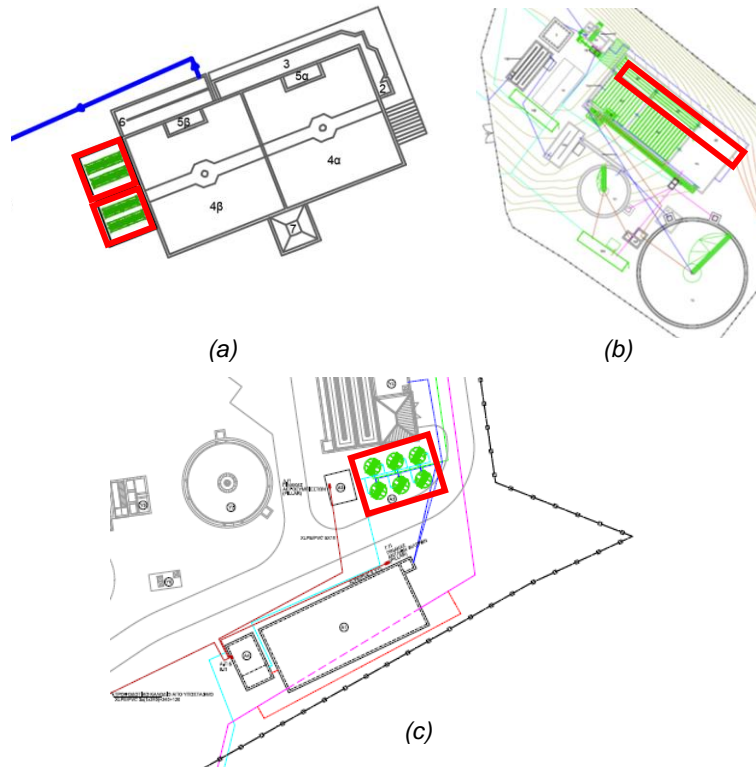


Figure 1. Spatial Arrangement for (a) Proposed MBR Unit of Nea Kerdylia WWTP, (b) Proposed MBR Unit of Nea Zichni WWTP and (c) Proposed Sand Filtration Unit of Orfano WWTP (red rectangles)

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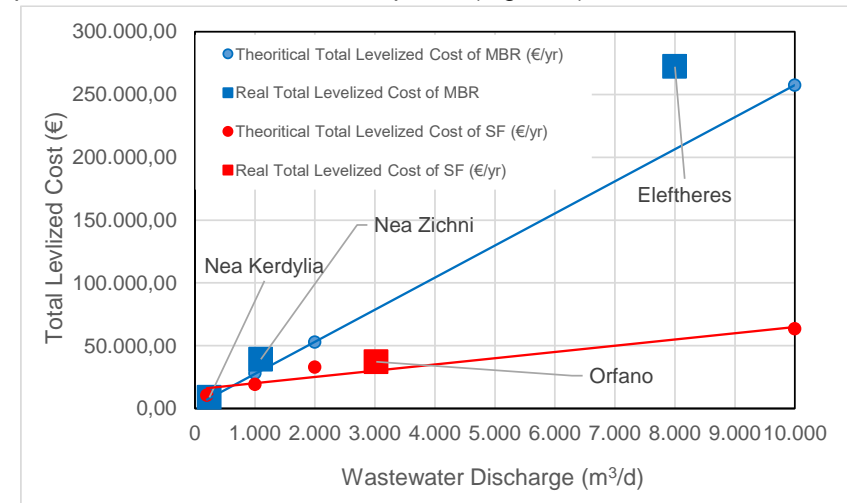
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ECONOMIC EVALUATION

The theoretical levelized construction, maintenance and operational cost of MBR and SF units was calculated, according to relative bibliography, for wastewater discharge up to 10.000 m³/d. Then, this cost compared to the real cost of these 4 plants (Figure 2).



COMBINED EVALUATION

The cost of drinking water, that is also used for garden irrigation in the summer period, compared to the annual operational cost of these 4 plants and a surplus results for all 4 cases (Figure 3).

Wastewater Treatment Plant	Wastewater Discharge (m ³ /d)	Unit Cost of Drinking Water (€/m ³)	Daily Cost of Drinking Water (€/d)	Summer Period (90 days) Cost of Drinking Water (€/yr)	Annual Operational Cost of WWTPs (€/yr)	Annual Surplus (€/yr)
Nea Kerdylia	240	0.50	120.00	10,800.00	2,207.52	8,592.48
Nea Zichni	1,100	0.50	550.00	49,500.00	9,303.12	40,196.88
Eleftheres	8,000	0.50	4,000.00	360,000.00	59,918.40	300,081.60
Orfano	3,024	0.50	1,512.00	136,080.00	12,220.97	123,859.03