

CRITICAL ASSESSMENT OF UTILIZING CONSTRUCTED WETLANDS TO
SUSTAINABLY TREAT PETROLEUM INDUSTRY WASTEWATER

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ABSTRACT

Current practices regarding the treatment of petroleum industry wastewater rely on high resource consumption and the effluent maintains elevated nutrient levels. After treatment, the high nutrient wastewater is discharged into local waterways and can lead to eutrophication in surrounding waters, thereby making the process an environmentally, socially and economically damaging process. Both the high energy demand and elevated nutrient levels in the effluent are reasons to explore new methods to sustainably treat the petroleum industries wastewater. Constructed wetlands, utilized by a minority of waste management facilities, are a low energy treatment option that produces effluent with very low nutrient levels. In this study, a sustainability analysis of the two treatment processes showed the constructed wetland to be more sustainable. The analysis scored metrics of both treatment processes to fully understand the complete environmental, social and economic impacts of each. The constructed wetland proved most sustainable in the economic and social categories, due to low associated costs and contributing to Hawaii State H.B. No. 623, Hawaii's Sustainability Initiative. Relatively similar scores in the environmental category showed both were efficient in hazardous component removal but effluents maintained elevated nutrient levels. The low energy demand and less resource use by the constructed wetland were responsible for showing improved sustainability in the environmental category.