

Stage by stage design for primary, conventional activated sludge, SBR and MBBR units for residential wastewater treatment and reusing

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Abstract. To date, there is no central wastewater (WW) treatment plant in Erbil city, Kurdistan region, Iraq. Therefore, raw WW disposes to the environment and sometimes it used directly for irrigation in some areas of Erbil city. Disposal of the untreated WW to the natural environment and using for irrigation it causes problems for the people and the environment. The aims of the current work were to study the characteristics, design of primary and different secondary treatment units and reusing of produced WW. Raw WW samples from Ashty city-Erbil city were collected and analyzed for twenty three quality parameters such as Total Suspended Solids (TSS), total dissolved solids, total volatile and non-volatile solids, total acidity, total alkalinity, total hardness, five-day Biochemical Oxygen Demand (BOD₅), Chemical Oxygen Demand (COD), biodegradability ratio (BOD₅/COD), turbidity, etc. Results revealed that some parameters such as BOD₅ and TSS were exceeded the standards for disposal of WW. Design and calculations for primary and secondary treatment (biological treatment) processes were presented. Primary treatment units such as screening, grit chamber, and flow equalization tank were designed and detailed calculation were illustrated. While, Conventional Activated Sludge (CAS), Sequencing Batch Reactor (SBR) and Moving Bed Biofilm Reactors (MBBR) were applied for the biological treatment of WW. Results revealed that MBBR was the best and economic technique for the biological treatment of WW. Treated WW is suitable for reusing and there is no restriction on use for irrigation of green areas inside Ashty city campus.

Keywords: activated sludge; Erbil city; MBBR; primary units; reusing; SBR

1. Introduction

With increasing pressures on water resources, the possibility of the useful utilization of treated

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