

Monitoring and Improving Performance of Soil Aquifer Treatment System and Infiltration Basins Performance: North Gaza Emergency Sewage Treatment Plant as Case Study

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Abstract : As part of Palestine, Gaza Strip (365 km² and 1.8 million habitants) is considered a semi-arid zone relies solely on the Coastal Aquifer. The coastal aquifer is only source of water with only 5-10% suitable for human use. This barely cover the domestic and agricultural needs of Gaza Strip. Palestinian Water Authority Strategy is to find non-conventional water resource from treated wastewater to irrigate 1500 hectares and serves over 100,000 inhabitants. A new WWTP project is to replace the old-overloaded Biet Lahia WWTP. The project consists of three parts; phase A (pressure line & 9 infiltration basins - IBs), phase B (a new WWTP) and phase C (Recovery and Reuse Scheme - RRS - to capture the spreading plume). Currently, phase A is functioning since Apr 2009. Since Apr 2009, a monitoring plan is conducted to monitor the infiltration rate (I.R.) of the 9 basins. Nearly 23 million m³ of partially treated wastewater were infiltrated up to Jun 2014. It is important to maintain an acceptable rate to allow the basins to handle the coming quantities (currently 10,000 m³ are pumped an infiltrated daily). The methodology applied was to review and analysis the collected data including the I.R.s, the WW quality and the drying-wetting schedule of the basins. One of the main findings is the relation between the Total Suspended Solids (TSS) at BLWWTP and the I.R. at the basins. Since April 2009, the basins scored an average I.R. of about 2.5 m/day. Since then the records showed a decreasing pattern of the average rate until it reached the lower value of 0.42 m/day in Jun 2013. This was accompanied with an increase of TSS (mg/L) concentration at the source reaching above 200 mg/L. The reducing of TSS concentration directly improved the I.R. (by cleaning the WW source ponds at Biet Lahia WWTP site). This was reflected in an improvement in I.R. in last 6 months from 0.42 m/day to 0.66 m/day then to nearly 1.0 m/day as the average of the last 3 months of 2013. The wetting-drying scheme of the basins was observed (3 days wetting and 7 days drying) besides the rainfall rates. Despite the difficulty to apply this scheme accurately a control of flow to each basin was applied to improve the I.R. The drying-wetting system affected the I.R. of individual basins, thus affected the overall system rate which was recorded and assessed. Also the ploughing activities at the infiltration basins as well were recommended at certain times to retain a certain infiltration level. This breaks the confined clogging layer which prevents the infiltration. It is recommended to maintain proper quality of WW infiltrated to ensure an acceptable performance of IBs. The continual maintenance of settling ponds at BLWWTP, continual ploughing of basins and applying soil treatment techniques at the IBs will improve the I.R.s. When the new WWTP functions a high standard effluent quality (TSS 20mg, BOD 20 mg/l and TN 15 mg/l) will be infiltrated, thus will enhance I.R.s of IBs due to lower organic load.

Keywords : SAT, wastewater quality, soil remediation, North Gaza

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