

TREATMENT AND RESOURCE RECOVERY OF SHOPPING MALL WASTEWATER IN TIMES OF DISASTER

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ABSTRACT

Several corporations such as Robinsons Land Corporation – Robinsons Malls are increasingly practicing a new ethos called corporate environmental governance. The underlying philosophy is: "good environmental management makes good business sense." The corporate mission includes provision of quality products and services in a manner that will not unduly burden the environment. Global competitiveness is now predicated also on good environmental performance. Corporate environmental governance encompasses technologies and best management practices that enhance business operations and profitability leading towards a sustainable business operation. Among these technologies and practices involve is the wastewater management and water conservation. Operating Robinsons Malls consume a lot of water and produce big volume of wastewater. Currently, water resources are scarce and costly not only for shopping malls located in Metro Manila, but also in other urban areas of the Philippines. Robinsons Malls Engineering Department has recommended for sustainable wastewater management and resource recoveries implemented and are working effectively and efficiently in times of disaster. An effective wastewater management and resource recovery is anchored on better management of resources and effective management of generation of wastes that can be translated to good products and services. The sustainability of shopping malls core businesses depends a great deal on good corporate image and improved resources management. The environmental management plan has lead the company to be an environmental cause champion, which boost its corporate image, while generating increased productivity and profit.

Keywords: sustainable wastewater management, resource recovery, good environmental governance, tertiary treatment, biological aerobic treatment system

1. Introduction

Shopping malls all over the Philippines are affected by the changing climate and disasters that hit the environment. Just recently, Robinsons Place Tacloban Mall in Tacloban City was hardly hit by the super typhoon Yolanda (international name Haiyan), that it has to be closed for several months. The natural calamities and disasters that affect the operation of the shopping malls are largely contributed to rapid urbanization of the surrounding environment, changing climate, inadequate maintenance of estuaries in the vicinity and locality. In some areas of the Philippines, there is flooding right at the moment of storms. The floods have caused a lot of health impacts and risks, and sometimes death and injury.

In every disaster that hit the Philippines, there is a big loss to business. Shopping malls has also suffered big financial losses in every natural calamity and disasters that hit the country. In order to survive the business, shopping malls implement corporate environmental governance, which encompasses technologies and best management practices.

Operating a mall used a lot of water and produces big amount of wastewater. Water is very expensive in the Philippines. In order to sustain its business all year round, and even in times of

disasters, wastewater is being reused and recycled for use in cooling system, landscaping, cleaning of floors and equipment, and for flushing of toilets. Rainwater is also being harvested used to augment water scarcity especially dry season.

2. Brief Description of Environmental Performance of operating shopping mall

Robinsons Malls has established various environmental management measures since the operation of the first mall, like solid waste management, wastewater management, kitchen exhaust management, traffic management, energy conservation activities, water conservation activities, and community relations.

Environmental management practices have been established and maintained in all Robinsons malls. There are segregation schemes and scheduled daily hauling of solid wastes. The sewage treatment plant, operated daily, monitored for influent and effluent indicating compliance with Department of Environment and Natural Resources Administrative Order No. 35, series of 1990 (Revised Effluent Regulations of 1990). Sewage treatment plants effluent is being monitored daily not only its compliance to the effluent regulations, but also its removal efficiencies, especially that for, biochemical oxygen demand (BOD), chemical oxygen demand (COD), total suspended solids (TSS), settleable solids (SS), and oil and grease (O & G).

Kitchen exhaust ducts are cleaned regularly, and regular inspections are conducted to ensure compliance. Robinsons malls deploy security officers as traffic officers in order to ensure an orderly traffic flow of vehicles and pedestrians.

Robinsons malls maintains an energy conservation program and water conservation program. Robinsons malls has continuously engaged in different community relations activities with all the stakeholders in the environment directly and indirectly affecting its mall operation.

3. Treatment of Domestic Wastewater produced in operating the mall

Robinsons malls maintains sewage treatment plant (STP) to treat the organic-based wastewater generated from the various facilities. Operation of the sewage treatment plant is covered by a Discharge Permit issued by the Department of Environment and Natural Resources (DENR) Regional Office, and the Laguna Lake Development Authority (LLDA) where the Robinsons Mall is located.

Water quality monitoring is being conducted regularly, and reported by the Pollution Control Officer (PCO) in the Quarterly Self Monitoring Report (SMR) to be submitted to DENR and LLDA, which shows the pH, BOD, COD, TSS, SS and O&G of the final effluent. Effluent standards are prescribed under DAO 35. The effluents passing the government standards are attributed to the relatively high treatment efficiency of the STP.

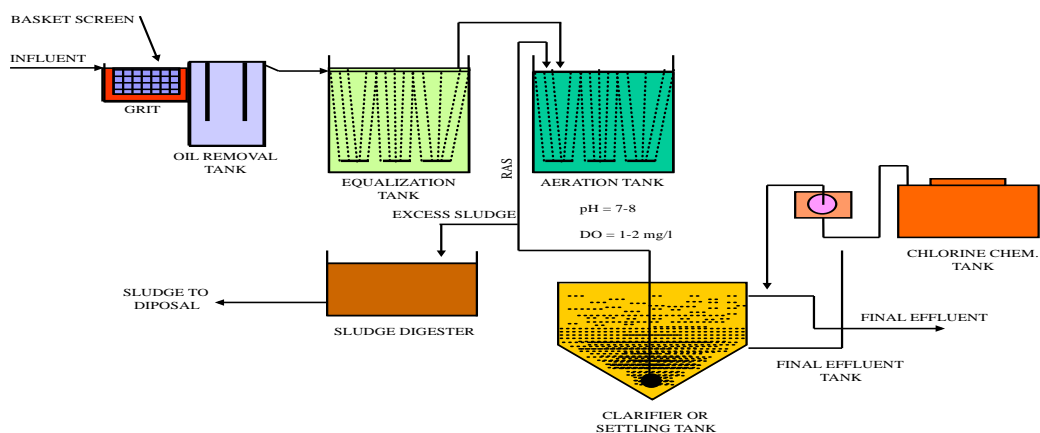


Figure 1: Extended Aeration Aerobic Treatment System flow chart in Robinsons Mall.

Robinsons mall is implementing a wastewater management plan. Wastewater generated from the mall are piped or pumped through cast iron sewage pipes connected to a sewage treatment plant or STP, which is operated and maintained for 24 hours by three-shift operators, who operate the facility, maintaining logs, collects water samples for analysis, and reporting to the designated Pollution Control Officer.

4. Water Conservation Program

As part of water conservation program, Robinsons Malls will recover the wastewater coming from STP through a tertiary conventional treatment system. Treated wastewater will be piped flowing to the cooling tower as make-up water.

Robinsons Malls also maintains the following activities to optimize the use of the water, and thereby helps reduce the environmental impacts elsewhere, with respect to the production and consumption of water:

1. Routine inspection of mall restrooms, replacing any possible defective fixtures to arrest wastage resulting from leaks.
2. Metering of all in-house equipment to monitor consumption.
3. Maintenance, servicing and replacement of defective valves; monitoring of water consumption on a daily basis.
4. Replacement of defective steam traps and steam valves.
5. Daily calculation and monitoring utilities consumption in order to be alerted for any unusual increase in utilities consumption figures.
6. Inspection of kitchen and public toilet fixtures for prompt repair of leaks.
7. Monitoring of water tank levels in order to be alerted for possible overflow in event of level control malfunction.
8. Maintenance/servicing of valves and other fittings to arrest wasteful drips.
9. At intervals, reduction of flow rate at guestroom washes basin faucets to pre-set standard.
10. Daily routine checking of faucets at kitchens in order to minimize waste due to unnecessary drips.
11. Recycling with treatment of water.

5. Environmental Monitoring and Corporate Laboratory

Robinsons Malls has established a corporate central laboratory that is DENR accredited and recognized to analyse BOD, COD, TSS, pH, temperature, Total Coliform, Volatile Suspended Solids, fats oil and grease, and other environmental parameters. The central laboratory is also a Department of Health recognized, thus, it conducts water potability analysis.

The analytical laboratory analyses are being used to gauge and monitor the efficiency of the sewage treatment plants of 38 Robinsons Malls all over the Philippines.

6. Results

Table 1: Estimated Wastewater Recovered in m³

| Month 2014 | Wastewater Recovered (m3) | Estimated Savings |
|--------------|---------------------------|-----------------------|
| February | 17,459.563 | 1,484,062.855 |
| March | 17,998.024 | 1,529,832.04 |
| April | 16,876.101 | 1,434,468.585 |
| May | 15,477.913 | 1,315,622.605 |
| June | 17,280.483 | 1,468,841.055 |
| July | 21,072.502 | 1,791,162.67 |
| August | 16,566.363 | 1,408,140.855 |
| Total | 122,730.949 | 10,432,130.665 |

The implementation of the effective and efficient operation and maintenance of the aerobic treatment system not only in good climate and business condition, but also, in times of disaster, such as, tropical storms, typhoons, flooding, storm surges, and earthquakes, has put the business operation of Robinsons Malls be competitive. In return, the company can provide, all year round, workers and employees, a fixed and regular income.

Recycling of treated wastewater has produced and recovered a total of 122,730.949 cubic meters of water. The recovered treated wastewater has produced a savings of Php 10,432,130.665 for the period spanning February-August 2014.

7. Conclusions

Corresponding to the mitigating and enhancement measures are monitoring activities categorized as involving the personnel performance, equipment performance, environmental status, and resource consumption and conservation activities. The monitoring activities are needed elaborately in order that Robinsons Malls be alert, not only during good climate conditions, but also in times of natural disasters. However, performance indicators shall be specified as practicable as possible, under a participatory approach among the personnel, especially for those not required under sectoral regulations and largely for internal purposes. The idea is to achieve an upstream or preventive approach in environmental management and avoiding the costlier end-of-pipe approach. Sectoral regulations, for example, entail monitoring of the operation of the STP, effluent quality and discharge flowrate.

In addition, Robinsons Malls shall maintain records of environmental performance, continue to obtain sectoral environmental permits, and maintain a good library of environmental documents as part of good environmental management practices.

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