



## End-of-pipe Waste Analysis and Integrated Solid Waste Management Plan

Adriel Alfred U. Palomar <sup>a</sup>, Marloe B. Sundo <sup>b\*</sup>, Perlie P. Velasco <sup>b</sup>,  
Donny Rey D. Camus <sup>b</sup>

<sup>a</sup> Total Water Solutions Inc., Ortigas Center, Pasig City, Philippines.

<sup>b</sup> Faculty of Civil Engineering, University of the Philippines Los Baños, Laguna 4031 Philippines.

Received 24 May 2019; Accepted 03 August 2019

### Abstract

A ten-year integrated solid waste management plan was established for the University of the Philippines Los Baños which complies with the provisions of RA 9003. An end-of-pipe Waste Analysis and Characterization Study (WACS) was performed to identify the classification of wastes in UPLB. Waste generation was found to be 593.67 kg/day on the average and is expected to increase by 2% per year which is 709.49 kg/day on the year 2027. The waste composition by weight of the non-biodegradable wastes are as follows: plastic (55.68%); paper (35.77%); glass bottles (5.22%); metal (2.77%); and residuals (0.55%). A large portion of the wastes, which is 99.45% by weight, are recyclables. The loose density of wastes is 131.93 kg/m<sup>3</sup>. Feasible collection points were assigned to improve efficiency of the collection of wastes in the university. Building units inside the campus were clustered and was assigned to dispose wastes to a single temporary storage facility per cluster. There are 181 units of 240-L garbage bin needed for the 39 clusters in UPLB. Two sets of dimensions of a proposed temporary storage facility were provided for the temporary storage facility; 5×2×2.2 m and 3.5×2×2.2 m. Conceptual design and structural plans of the materials recovery facility were provided. Mass balance was performed, and the theoretical diversion efficiency of the materials recovery facility is 99.445%.

*Keywords:* Solid Waste Management; WACS; Loose Density; Collection Points; Temporary Storage Facility; Conceptual Design; Mass Balance.

### 1. Introduction

Solid waste management pose a wide variety of administrative, economic, and social problems that must be managed and solved [1]. The production of solid waste has increased from 0.64 kg/capita/day to 1.20 kg/capita/day in the past 10 years due to the urbanization of rural areas [2]. It is expected to increase to 1.42 kg/capita/day of municipal solid waste since continuous increase of the population logically correlates to the increase in waste generation. Moreover, the Philippines is part of the East Asia and Pacific Region where the annual waste generation recorded for the year 2005 is approximately 270 million tons per year with an average of 0.95 kg/capita/day [1]. On the other hand, the waste generation of the Philippines is 40,000 tons/day with a per capita generation of 0.32 to 0.71 kg/day; with a collection efficiency of 40% to 85% [3]. Municipal solid waste generated in 2016, 2.10 billion tonnes, may grow to 3.76 billion tonnes by 2050 [4].

\* Corresponding author: [mbsundo1@up.edu.ph](mailto:mbsundo1@up.edu.ph)

 <http://dx.doi.org/10.28991/cej-2019-03091386>



© 2019 by the authors. Licensee C.E.J, Tehran, Iran. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC-BY) license (<http://creativecommons.org/licenses/by/4.0/>).