AIN SHAMS UNIVERSITY

FACULTY OF ENGINEERING

Public Works

USING POLYTHYLENE STRIPS IN WASTEWATER TREATMENT

A Thesis submitted in partial fulfilment of the requirements of the degree of

Doctor of Philosophy in Civil Engineering

(Public Works)

by

Mahmoud Mohamed Abdelmomen Elsayed

Master of Science in Civil Engineering

(Public Works)

Faculty of Engineering, Ain Shams University, 2015

Supervised By

Prof. Dr. Mohamed EL Hosseiny EL Nadi

Dr. Hossam Mostafa Hussien

Cairo - (2020)

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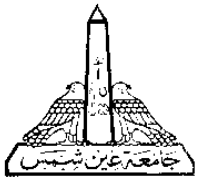

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Dedication

This thesis is lovingly dedicated to all the close, special and beautiful people in my life.

A special dedication to

MY SUPPORTIVE PARENTS

and to

my wonderful
sisters and brothers

and finally
special dedication to

MY LOVELY WIFE AND MY SONS

for encouraging me to complete this work and for always being there for me.

Statement

This thesis is submitted as a partial fulfilment of Doctor of Philosophy in Civil Engineering Engineering, Faculty of Engineering, Ain shams University.

The author carried out the work included in this thesis, and no part of it has been submitted for a degree or a qualification at any other scientific entity.

Mahmoud Mohamed Abdelmomen Elsayed

Signature

……..…….

Date: -- June 2020

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ABSTRACT

Name*:* MAHMOUD MOHAMED ABDELMOMEN ELSAYED
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Abstract:-

Wastewater treatment has became one of the important subject taken into consideration in the developing countries, as the most important cause of pollution is discharging wastewater without adequate treatment into watercourses. The big funds and land areas required for the distribution of the use of wastewater treatment in these countries. These reasons led the scientific researches to concentrate on the use of new local products for new modified wastewater treatment techniques suitable for each country conditions. Also, the concentration on minimizing of power consumption, maintenance requirements, complicated techniques and imported equipment became one of the main targets for the ongoing studies. This leads to choose the attached growth system to decrease the required land, minimize the construction and operation cost as possible.

The main objectives of our work were as follows:

- Investigate, determine and study the performance and the change in substrate removal by using the polyethylene sheets.
- Formulate a simplified simulation model for the proposed system.
- Verifying the model.

This study was carried out to determine the applicability and the efficiency for using polyethylene sheets for enhancement wastewater characteristics at the effluent for wastewater treatment plant.

The study had done at Abu Rawash wastewater treatment plant, where the polyethylene strips were placed at the effluent channel for WWTP.

The study ensured the applicability of the polyethylene sheets as cheap technique for enhancement wastewater characteristics. For media type (1) "Germany smooth polyethylene strips with polystyrene web", the study resulted removal ratio ranged between 6.28 % - 15.56 % for BOD and 6.56 % - 14.47 % for TSS for one line of media. For media type (2) "Egyptian smooth polyethylene strips" the study concluded that removal ratio ranged between 3.04 % - 5.16 % for BOD and 3.45 % - 5.83 % for TSS for one line of media. While for two lines of the media removal ratio

ranged between 6.15 % - 10.37 % for BOD and 6.14 % - 10.38 % for TSS. And for three lines of the media the removal ratio ranged between 10.52 % - 14.77 % for BOD and 9.20 % - 15.55 % for TSS. For media type (3) "Egyptian rough polyethylene strips" the study for one line of the media resulted removal ratio ranged between 10.05 % - 19 % for BOD and 10.50 % - 22.97 % for TSS. While for two lines of the media removal ratio ranged between 17.8 % - 33.66 % for BOD and 17.88 % - 36.46 % for TSS. And for three lines of the media the removal ratio ranged between 24.77 % - 47.74 % for BOD and 23.75 % - 51.95 % for TSS.

SUPERVISORS

Prof.Dr. Mohamed El Hosseiny El Nadi,
Assistant Prof. Dr. Hossam Mostafa Hussien.

KEY WORDS

Wastewater Treatment, Polishing treated wastewater, New innovative technique, Polyethylene strips, Enhancement for wastewater characteristics.

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