THE EFFECTIVENESS OF WATER POLLUTION CONTROL MEASURE AT CONSTRUCTION SITE.

MOHD SHAHRUL IZWAN BIN RAZMI

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DEDICATION

I would like to dedicate this to my beloved mother and father, my lovely wife, children, family, friends and lecturers

Thanks for everything

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In the name of Allah , the most Grasious, the most Compassionate-

Praise to be Allah, I am grateful to dear Allah for His Graciousness and blessings that I finally managed to complete this research and project report after going through the challenges and anticipations.

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ABSTRACT

Construction activities have gained a lot of momentum since the era of the industrial revolution. This is one of the measures taken through the provision of basic infrastructure such as housing, roads, schools, hospitals and many more. The construction industry itself has grown drastically all over the world. However, construction is one of the major contributors to environmental impacts carrying pollution risks including water pollution. Water quality is very important for economic, ecological, aesthetic, and recreational purposes. Changes in water quality may affect its aesthetic value or even prevent some uses of the water. To overcome this problem, I have came out with my research study on the effectiveness of water pollution control measure at the construction site.This study was conducted on a construction project; Bachok Hospital Construction Project located in Kelantan. This study was carried out at three different stations ; the first station (W1) identified at the workers' home area, the second station (W2) was located in the effluent silt trap and the third station (W3) was at the Melor River outlet. The parameters used in this study were including the temperature, Dissolved Oxygen (DO), pH, Total Suspended Solid (TSS), Turbidity, Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD), oil and grease, presence of *E-Coli* bacteria and ammonical nitrogen. All the parameters were analyzed from the collected samples taken from all three stations. From this study it was found that at W1 station (in the working house area) there was presence of *E-coli* , supported by the reading value exceeded the set of standard of 510 CFU / 100mL. Apart from that, for Oil and Grease reading value also high exceeded the standard of 15mg / L. For the sample results taken from station W2 (Effluent Silt Trap) there was an increased in the Turbidity reading value based on the standard set by the National Water Quality Standard (NWQS) which was 52 (NTU) and the Biochemical Oxygen Demand (BOD) reading value was also high which was 10 mg / L. From W3 Station (Sungai Melor Outlet) samples in January 2020 shown that there was high level of turbidity, Biochemical Oxygen Demand (BOD) , Chemical Oxygen Demand (COD) , Total Suspended Solid (TSS) with the presence of *E-Coli* and oil and grease exceeded the the standard set by the National Water Quality Standard (NWQS) which was 53 NTU, 23mg / L, 89 mg / L, 67mg / L, 415 CFU / 100mL and 47 μg / L respectively. All these problems were identified and it can be improved or overcome if the construction site can provide with adequate number of silt fence and check dams. In addition, proper drainage need to be installed to rapidly remove all the excess soil water to reduce or eliminate waterlogging and return soils to their natural field capacity.

ABSTRAK

Momentum kegiatan pembinaan telah meningkat dan mengalami satu revolusi industri. Ini adalah salah satu langkah yang diambil melalui penyediaan infrastruktur asas seperti perumahan, jalan raya, sekolah, hospital dan banyak lagi. Industri pembinaan sendiri telah berkembang secara drastik di seluruh dunia. Walau bagaimanapun, pembinaan adalah salah satu penyumbang utama kepada kesan persekitaran yang membawa risiko pencemaran termasuk pencemaran air. Kualiti air sangat penting untuk tujuan ekonomi, ekologi, estetika, dan rekreasi. Perubahan kualiti air boleh mempengaruhi nilai estetiknya atau bahkan menghalang penggunaan air. Untuk mengatasi masalah ini, saya telah membuat kajian penyelidikan mengenai keberkesanan langkah kawalan pencemaran air di tapak pembinaan. Kajian ini dijalankan di sebuah projek pembinaan iaitu Projek Pembinaan Hospital Bachok , Kelantan di mana ianya dilakukan di tiga stesen yang berbeza, iaitu stesen pertama (W1) di kawasan Rumah Pekerja, stesen kedua (W2) berada di Silt Trap efluen dan stesen ketiga (W3), yang merupakan outlet Melor Sungai. Parameter yang digunakan dalam kajian ini adalah Temperature, Dissolved Oxygen (DO), pH, Total Suspended Solid (TSS), Turbidity, Chimical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD), Oil and Grease, E-Coli, dan Ammonical Nitrogen dianalisis untuk sampel yang dikumpulkan. Kajian ini mendapati, pada stesen W1 di kawasan rumah berkerja terdapat peningkatan dari segi keputusan sample bagi e-coli iaitu nilai bacaanya melebihi standard yang di tetapkan iaitu 510 CFU/100mL dan bagi Oil and Grease nila bacaan juga melebihi standard iaitu 15mg/L. Selain itu, bagi keputusan sample pada stesen W2 (Effluent Silt Trap) terdapat peningkatan pada nilai bacaan Turbidity melebihi standard yang ditetapkan oleh National Water Quality Standard (NWQS) iaitu 52 (NTU) dan selain itu nilai bacaan BOD 5 juga adalah tinggi iaitu 10 mg/L . Bagi Stesen W3 (Outlet Sungai Melor) pada bulan Januari 2020 terdapat peningkatan pada nilai bacaan Turbidity, BOD 5, COD, TSS, E-Coli and Oil and Grease melebihi standard yang ditetapkan oleh National Water Quality Standard (NWQS) iaitu 53 NTU, 23mg/L ,89 mg/L, 67mg/L , 415 CFU/100mL dan 47 µg/L. Semua masalah ini telah dikenal pasti dan dapat diperbaiki atau diatasi jika tapak pembinaan dapat menyediakan jumlah pagar kelodak dan bendungan cek yang mencukupi. Di samping itu, saliran yang betul perlu dipasang untuk membuang semua kelebihan tanah tanah dengan cepat untuk mengurangkan atau menghilangkan genangan air dan mengembalikan tanah ke kapasitas ladang semula jadi.

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LIST OF ABBREVIATIONS

UTM	-	Universiti Teknologi Malaysia
IWK	-	Indah Water Konsortium
WICAM	-	Water and Energy Consumer Association of Malaysia
BOD	-	Biological Oxygen Demand
COD	-	Chemical Oxygen Demand
TSS	-	Total Suspended Solid
NH3	-	Ammoniacal Nitrogen
MS	-	Malaysia Standard
D	-	Desludging
ND	-	Non-desludging
IST	-	Individual Septic Tank
IT	-	Imhoff Tank
STP	-	Sewerage Treatment Plant
WSIA	-	Water Services Industry Act
EA	-	Extended Aeration
OD	-	Oxidation Ditch
RBCS	-	Rotating Biological Contactors
BR	-	Sequenced Batch Reactors
PE	-	Population Equivalent
DOE	-	Department of Environment
EQA	-	Environmental Quality Act
FOG	-	Fat, Oil & Grease

LIST OF SYMBOLS

0C	-	Celsius
NH3	-	Ammoniacal Nitrogen
Mg/L	-	Miligram per litre PercentageCarbon
%	-	Celsius

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CHAPTER 1

INTRODUCTION

1.1 Background Information

Construction activities gain a lot of momentum since the era of industrial revolution. It is among the measures of nation's level of development through provision of basic infrastructure such as housing, roads, schools, hospital and many others. Construction industry has grown drastically all over the world. In Malaysia context, according to the Malaysia Construction Industry Development Board (2008) construction industry is among the major pillars of domestic economy, and it is also a key factor in economic growth. The activities of this construction take place within the context of the environment and with the support of the environmental resources.

Construction activities near rivers, rivers and lakes have the potential to cause water pollution and river destruction if erosion control and sedimentation are not implemented fully on the site. As construction and development activities continue throughout Malaysia, large volumes of sediment will continue to be transferred to bodies of water during rain events, if not properly controlled it will impact water pollution in the construction area and impact river and lake pollution. Pollution due to sedimentation may have physical, chemical, biological, and economic effects on the waters. Siltation causes changes in flow patterns, increased water treatment costs, barriers to navigation, and possible flooding. Sediments can also limit the penetration of light, transport of other pollutants into bodies of water, eggs and fish nests, and rivers that provide habitat for fish and aquatic life.

1.2 Problem Statement

The Malaysia country's rapid development is a catalyst for the growth of the socio-economic population. It is undeniable that any development taking place will have an impact on the sustainability of the environment, whether urban or rural. The relationship between economic development and environmental change is a complex one. This is because it involves all aspects of human life that directly interact with the environment (Abu Bakr, 2000). However, construction activities are also seen as contributors to environmental pollution and destruction. Exploration of forests and wetlands and the construction of slopes have led to deterioration in the quality of the environment and society.

Construction activities conducted irrespective of the environment will cause environmental degradation and affect the well-being and harmony of the locals. The relevant parties have now begun to look into the situation and take action to resolve the issue. Anyway, there's something else environmental, logistical, and local issues that contribute to development delays. For example, the Environmental Impact Assessment (EIA) should be provided in line with the Government's interest in protecting and improving the environment. In Malaysia, a list and designated activities have been prepared where the EIA is mandatory under the Environmental Quality (Assigned Activities) (Environmental Impact Assessment) Order 1987. Some of these lists are construction infrastructure, highways and national highways.

Project Construction can be a significant source of pollution to our country's environment, especially to water. Pollution is generated during construction, maintenance, and use. Pollution from sources of land-based activities at the beginning of construction without proper environmental monitoring will result in the residual waste being transported into streams, rivers, lakes and swamps. In the same way, development will involve environmental issues, even if only by removing the trees. Therefore, it is our responsibility to focus on the detrimental effects of environmentally sustainable projects.

1.3 Project Description

Project Hospital Bachok is located on Lot P.T 13535, Bachok District, Kota Bharu District, Kelantan. MOH's land area covers 20.32 hectares and the building area is 8.9 hectares. The project site is in close proximity to the villagers' area and the School Rendah Kebangsaan Jelawat 2. The main entrance to the project site is via Gunong Road - Jelawat.

1.4 Aim and Objectives

The aim of the study is to analyze the charge in water quality from Hospital Bachok Project during the construction period", by:

i. To study the water quality parameter for existing water body that may affected by on – going building construction.
ii. To analyze the effective of silt trap during construction.
iii. To access the appropriate treatment and quality of sewage from worker homes.

1.5 Scope of Study

The scope in this study is from latitude 6 ° 00'21.7 ″ N102 ° 21'26.6 ″ E for W1 station (Worker House), 6 ° 00'24.20 ″ N102 ° 21'23.6 ″ E for W2 station (Silt Trap) and 6 ° 0'30.21 ″ N102 ° 21'17.21 ″ E for W3 station (Sungai Melor Outlet). In this study there are ten Parameters considered for this study are Ph, Temperature, Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), Total Suspended Solit (TTS), Chemical Oxygen Demand (COD), Ammoniacal Nitrogen (AN), E -Color, Oil and Grease (O&G). In addition, this water quality sampling is taken every month for six months starting from January 2020 until June 2020, where in April 2020 the water sample could not be run due to the Movement Control Order (MCO), from

Coronavirus disease (Covid -19) which hit the country. All water quality parameters will be analyzed based on the Water Quality Index (WQI), National Interim Water Quality Standards (INWQS) and Sewegare Regulation 2009 (EQ).

1.6 Rationale of Study

Based on the goals and objectives, this study is required to be carried out as the construction work and the placement of construction workers will impact the environment especially the water source of a construction project. Basically, the initial phase of cleanup and ground work such as removing trees and woody plants from the ground up as well as soil-clearing phases such as excavation and slope filling to ensure erosion and sediment control plan (ESCP) comply, construction phases such as building works and installation of road drainage; as well as road construction, will reduce water quality by runoff from mud, debris and sedimentation, as well as the use of chemicals and nutrients in waterways. From the analysis, this study can be a planning tool to prevent environmental problems or at least minimize pollution, due to project work. It is intended to avoid costly mistakes in project implementation, either due to environmental damage or due to possible modifications later in order to take action that is environmentally acceptable.

1.7 Study Limitation

This study has several limitations, including the time frame of this project study is quite short, only Six months.The most suitable location for sampling station can not be made becauce some of the area can not fully accessible by private vehicle. The study parameter focus only on WQI parameters, by adding only two more parameters.

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