

**INTI INTERNATIONAL UNIVERSITY**

**Faculty of Engineering and Quantity Surveying**

**WATER QUALITY INVESTIGATION OF THE OLD REPAS DAM IN  
BENTONG, PAHANG**

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## SUPERVISOR'S DECLARATION

This Project report entitled "Water Quality Investigation of the Old Repas Dam in Bentong, Pahang" is prepared and submitted by Noa Gaga Naeqe - I13004086 as partial fulfilment of the requirement for Bachelor of Engineering (HONS) in Civil Engineering, INTI International University.

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## STUDENT'S DECLARATION

I hereby declare that the final year project is based on my original work except for quotations and citations, which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at INTI INTERNATIONAL UNIVERSITY or other institutions.

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## ABSTRACT

The land development and agricultural activities within the catchment of the Old Repas Dam in Bentong, Pahang is expected to cause deterioration in water quality due to contaminants getting into the water bodies from various non-point sources (NPS) which were picked up by surface run-offs occurring due to precipitation. Traces of heavy metals common to tin mining areas should also be a problem as tin mining was a common activity within the watershed. Furthermore, water discolouration is common on the downstream of the dam which may signify water contamination. To fully understand the effect of the water discolouration at the downstream of the dam, a total of 8 water samples were collected from 4 selected critical sampling points. The sample were then tested on 11 parameters including 5 heavy metals common to areas popular with tin mining and the remaining 6 parameters are those required for calculation of the water quality index (WQI). The five selected heavy metals are Arsenic (As), Copper (Cu), Lead (Pb), Tin (Sn) and Zinc (Zn). The remaining six parameters required for WQI calculations are Dissolved Oxygen(DO), BOD<sub>5</sub>, COD, Suspended Solids (SS), pH and Ammoniacal Nitrogen (AN). The water was first analysed using each parameter separately before combining them to determine the WQI. The two samples taken for each sampling points represents the water quality on two different weather condition one being dry and the other after heavy rainfall. The water quality was generally lower after the rainfall on most of the parameters except DO. The selected heavy metals were all found to be within the natural levels (or absent) on both sampling days except at one of the sampling point having a very high Tin concentration resulting from the wet weather. By taking the average of the WQI value, the water at each of the four sampling points were classified into their respective classes and a short statement was given to describe the samples. Two Sampling points are classified Class II and is considered clean while the other two were classified as Class III and are slightly polluted. Recommendations were given on how the two slightly polluted sampling points can be improved.

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## CHAPTER 1

### INTRODUCTION

#### 1.1 General

Water Quality can be referred to as the physical, chemical, biological, and radiological characteristics of water. The condition of water relative to the requirements of one or more biotic species and/or to any human need or purpose can be measured by determining the water quality. By referring to a set of standards against which compliance can be assessed, it is most commonly used. The most common standards used for the assessment of water quality relate to ecosystems health, human contact safety, and water for human consumption.

The importance of water quality is that it affects the health of the people, plants and animals that drink or otherwise utilize the water directly. Users are at risk of developing health complications when water quality is compromised. Humans, animals and plants survival totally depends on the availability of high-quality water. Almost all living things will not survive without water, making water quality one of the most vital factors in determining whether an area can be inhabited.

As water is transported from one stream to another, it picks up any contaminants along its way and carries them with it thus having the potential to reach thousands of communities downstream. Water quality is also very important in determining the health of plants and animals. Water from nearby streams is used for irrigation in most farms so if the water is contaminated, any food grown with it or animals that graze on the grass have contamination risks and so as the people who eat those crops or animals.

In the biological system, water acts as a solvent, temperature buffer and metabolite thus providing a living environment for organisms, and acts as a transportation medium in the biological processes. In almost all reactions, water is a metabolite (i.e. chemical involved in a

reaction), either as a reactant or as the result of the reaction. Water, for instance, is required in processes such as photosynthesis, aerobic respiration and digestion. Water is a habitat for many organisms which includes fish and other aquatic life.

Water also have some important properties that support most of its functions and these includes polarity, hydrogen bonding, cohesion and surface tension. These properties result from the combination of water molecules ( $H_2O$ ) and are essential for creation and support of life. Seventy-five percent of the earth consists of water. Even 80 percent of the human body consists of water. Most of the compounds with ionic bonding (cations & anions), including metal salts, dissolves in water. Even most molecular compounds (covalent bonded) dissolve in water such as sugar, small nucleic acids, amino acids and proteins. This property of water makes it behaves as a solvent for chemical reaction and enables the transportation of dissolved compounds into and out of cells. Water also acts as a buffer in providing the right temperature for enzymes which catalyse most of the chemical reactions.

According to the United Nations Development Programme (UNDP), poor management of available water resources is one of the main causes of water scarcity. The depletion of fresh water resources also contributes to water scarcity. Other causes of water scarcity include overuse of water, pollution, growth in population, low precipitation, increased water use, global warming, production of food, change in climate, water quality and land use. Growth in population has led to the increased fresh-water usage, resulting in the depletion of freshwater resources.

## **1.2 Statement of Problem**

The land development as well as agricultural activities going on upstream of the Old Repas Dam in Bentong (Figure 1.2), Pahang, the Water Quality is expected to deteriorate as a result of contaminants getting into the water bodies from various non-point sources (NPS) which were picked up by surface run-offs occurring due to precipitation. These contaminants would end up on the said dam and may affect the wild life especially the aquatic life. The mentioned dam was to retain silt, clay and sediments from previous tin mining activities that has been washed down by surface run-off and prevent it from being washed downstream and blocking the lower part of the river which would cause flooding during high precipitation. In addition, other human activities upstream will somehow have an impact on the water quality.

Sighting of discoloured water have been reported around the dam recently. The places where the discolouring of water appeared are noted to have no life on it. Even grasses die as found in Figure 1.1. Therefore, it is evident that some sort of pollutants exists around the dam facility causing the discolouring of the water. Since pollutants travel through water bodies, it is therefore important that water quality investigation be carried out to see if it has any link to the pictured problem.



Figure 1.1: Current Problem

Since water quality is a vital component to people and other living things, it is important that frequent water quality monitoring is carried out and prevention measures taken to keep water quality within the healthy limits for the benefits of all.



Figure 1.2: Study Location (Google Earth, 2016)

### 1.3 Research Objectives

The research objective for this research are as follows:

- a) To analyse the river quality status and classify the river's health in accordance to the WQI adopted in Malaysia.
- b) To test for selected heavy metals associated with the past tin mining activities and compare it against the National Water Quality Standards (NWQS) for Malaysia

### 1.4 Scope of Study

Having good water quality is important for a healthy river and ecosystem. Several basic conditions must be met for aquatic life to thrive in the water. When these conditions are not optimal, species populations become stressed. When conditions are poor, organisms may die. Thus, various water quality parameters need to be measured to determine the health of the river water so that it is safe to use for any purpose. To develop a water quality or river index, there are several parameters that need to be considered. These parameters can be divided into four groups, which are physical, chemical, biological and radioactive.