ASSESSMENT OF THE WATER SUPPLY SYSTEM IN KAYQUIT III, INDANG, CAVITE

THESIS

ALISXANDRE JOSHUA P. BABAAN

College of Engineering and Information Technology
CAVITE STATE UNIVERSITY
Indang, Cavite

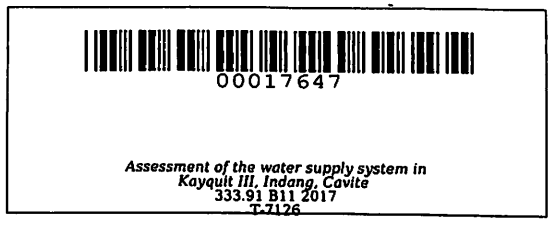
Cavite State University (Main Library)
T7126
THESIS/SP 333.91 B11 2017

May 2017

ASSESSMENT OF THE WATER SUPPLY SYSTEM IN KAYQUIT III, INDANG, CAVITE

Undergraduate Thesis
Submitted to the Faculty of the
Department of Agriculture and Food Engineering
College of Engineering and Information Technology
Cavite State University

In partial fulfillment
of the requirements for the degree
Bachelor of Science in Agricultural Engineering


00017647

Assessment of the water supply system in
Kayquit III, Indang, Cavite
333.91 B11 2017
T-7126

ALISXANDRE JOSHUA P. BABAAN
May 2017

ABSTRACT

BABAAN, ALISXANDRE JOSHUA P. Assessment of the Water Supply System of Kayquit III, Indang, Cavite. Undergraduate Thesis. Bachelor of Science in Agricultural Engineering. Cavite State University, Indang, Cavite. March 2017. Adviser: Engr. Cesar C. Carriaga.

The study was conducted from October 2016 to February 2017 to assess the water supply system of Kayquit III, Indang, Cavite. Specifically, the study aimed to: 1) assess the functional elements of the water supply system; 2) assess the present water demand of the service area; 3) project the water demand in the next ten years; and 4) determine the physical, chemical and microbial properties of the water supplied by the system in the service area.

Only one water supply system exists in Kayquit III, the Kayquit III Waterworks System. This water supply system has three functional elements: source, storage and distribution. The water supply system utilizes the groundwater supply with four water tanks as the main source. The measured water discharge is 201,312 L/day.

Water flows from the tanks directly to distribution pipes by gravity. The entire service area of Kayquit III has a total water demand 182,587.43 L/day from 408 individual connections. Although the present water supply is sufficient for the 2016, it will not meet the projected demand for 2017, assuming that the discharge remains the same.

Collected water samples passed the physical and chemical analysis requirements of the Philippine National Standards for Drinking Water (PNSDW). However, the latest result of the microbiological analysis of water samples in January 2017 collected from the water supply system failed the requirements of the PNSDW.

TABLE OF CONTENTS

	Page
BIOGRAPHICAL DATA	iii
ACKNOWLEDGEMENT	iv
ABSTRACT	vii
LIST OF TABLES	x
LIST OF FIGURES	xii
LIST OF APPENDIX FIGURES	xiii
LIST OF APPENDICES	xiv
INTRODUCTION	1
Objectives of the Study	4
Importance of the Study	4
Time and Place of the Study	5
Scope and Limitations of the Study	5
REVIEW OF RELATED LITERATURE	6
METHODOLOGY	21
Assessment of Functional Elements	21
Assessment of Present Water Demand	22
Projection of Water Demand	23
Assessment of Water Quality	24
RESULTS AND DISCUSSION	26
The Water Supply Systems of Kayquit III, Indang, Cavite	

Page

The Functional Elements of the Water Supply Systems..... 29

Present Water Demand..... 34

Projection of Water Demand..... 35

Water Quality Analysis..... 37

SUMMARY, CONCLUSION AND RECOMMENDATIONS..... 42

Summary..... 42

Conclusion..... 43

Recommendations..... 43

REFERENCES..... 45

APPENDIX FIGURES..... 46

APPENDICES..... 48

LIST OF TABLES

Table		Page
1	Water quality parameters to be tested (Ancheta, 2012)	13
2	Minimum frequency of sampling for drinking-water supply systems for microbiological examination (PNSDW as cited by Ancheta, 2012)	14
3	Pipe materials used in transmission and distribution systems (Grigg, 2003)	19
4	Water rates in Kayquit III Waterworks System	29
5	Water pump size and well depth of the pump stations	29
6	Sizes and estimated length of pipes used in the water supply system	31
7	Fittings used in the distribution system	32
8	Water consumption of the population served in Kayquit III, Indang, Cavite	35
9	Population served and water demand projection in the next 10 years (2017-2026)	36
10	Temperature of water samples collected during the wet season	37
11	Temperature of water samples collected during the dry season	38
12	Chemical analysis of water samples collected during the wet season	39
13	Chemical analysis of water samples collected during the dry season	39
14	Microbiological analysis of water samples collected during the wet season	40

Table **Page**

15 Microbiological analysis of water samples collected during the dry season..... 41

LIST OF FIGURES

Figure		Page
1	Location map of Kayquit III, Indang, Cavite	26
2	Kayquit III Waterworks System (K3WS)	28
3	The functional elements in Kayquit III Waterworks System	30
4	The four water tanks located at Kayquit III, Indang, Cavite	30
5	Distribution layout of the water supply system	33
6	Average monthly consumption of water supplied by K3WS in 2016	34
7	Projected water demand in the next 10 years (2017 to 2026)	36

LIST OF APPENDIX FIGURES

Appendix Figure		Page
1	Instrument used in measuring physical and chemical characteristics of water samples.....	47
2	Instrument was used in establishing the coordinates of the sampling sites.....	47

LIST OF APPENDICES

Appendix		Page
1	Computation of water demand for Kayquit III Waterworks System in 2016	49
2	Computation of system losses for Kayquit III Waterworks System	50
3	Computation of projected water demand up to the year 2026 in the service area of Kayquit III, Indang, Cavite	51
4	Result of water quality test done by Cavite Water and Wastewater Testing Laboratory at Trece Martires City, Cavite in January 2017	52

ASSESSMENT OF THE WATER SUPPLY SYSTEM IN KAYQUIT III, INDANG, CAVITE

Alisxandre Joshua P. Babaan

An undergraduate thesis manuscript submitted to the faculty of the Department of Agricultural and Food Engineering, College of Engineering and Information Technology, Cavite State University, Indang, Cavite in partial fulfillment of the requirements for the degree of Bachelor of Science in Agricultural Engineering with Contribution No. CEIT-2016-17-2-111. Prepared under the supervision of Engr. Cesar C. Carriaga.

INTRODUCTION

Water plays a vital role in the sustenance of all life forms, as well as in agricultural, industrial, household, recreational and environmental activities. As the population continues to rise, the demand for fresh water rises, too. Water is a major factor shaping the natural environment. It has a long-term influence on the vegetation, fauna, and shape of the landscape and on various ecosystems. Many of the water systems that help ecosystems survive have become stressed. Rivers, lakes and aquifers are drying up or becoming too polluted and non-fit for use. More than half the world's wetlands have disappeared. Agriculture consumes more water than any other applications with high wastage because of inefficiencies in the water supply transport and distribution. Climate change alters the weather patterns and the hydrologic cycle worldwide, causing shortages and droughts in some areas and even flood.