HYDROLOGY AND WATER MANAGEMENT STUDY AT PT BHUMIREKSA NUSASEJATI PALM OIL PLANTATION

FINAL REPORT

Prepared by

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Report Submitted to

KUMPULAN GUTHRIE BHD
Wisma Guthrie
21 Jalan Gelanggang
Damansara Heights
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EXECUTIVE SUMMARY

The hydrology and water management study in Bhumireksa Nusasejati Palm Oil Plantation was commissioned by the Kumpulan Guthrie Bhd. The objective of this study is to evaluate the hydrologic and hydraulic characteristics of the project area in relation to water navigation system of the existing canal. This study involved mainly field and hydrographic survey and investigation that include field data compilation and interpretation and hydraulic modeling exercise.

The major findings of this study can be categorised under three issues.

a.) Topography and peat depth configuration
b.) Water and water balance analysis
c.) Field demarcation system and canal water level control

Primary field data was collected between the periods of 15 July 2006 to 15 October 2006. These data include the topography of the areas adjacent to the canals, the bathymetry, peat depths, canal flow and water quality. Topography and bathymetry were determined using Global Positioning Satellite (GPS) and echo-sounding equipments. Peat depths were measured at fifty points along the navigable canals using a standard peat auger. Standard river gauging procedures were used in determining the water flow in the canals. The continuous water level was also monitored using automatic loggers. Rainfall and water table data were obtained from the estate managers. Modeling of the observed data was performed using the HEC-RAS software.

The study area is relatively flat, as depicted by the topographic data, with a difference of 2.5m in elevation. Based on the norm water demand of oil palm trees and run-off parameters, the hydrology analysis pertaining to water balance indicate that there is a surplus by considering the flow in the canal is free without any obstruction.

Two distinct flow conditions have been observed along the canals. The discharge at the main outlet 15 m^3/s during the wet season and 3 m^3/s during the dry season.

The demarcation of the study area is based on three (3) options, namely, A, B and C. These options were adopted based on the discussions with the senior managers and the senior engineer of the company. These options include the demarcation of the area into suitable sub-divisions, maintaining some of the existing structures and putting in place new water structures. It is anticipated that any one of the options would enable to achieve the objectives of the study. Verification of the modeling data has been performed by comparing them against observed values. Modeling results have shown that they follow the pattern of the observed parameters collected during the study.

After due considerations of the present conditions and existing water management practices Option A is recommended. When this option is in placed, the water level in the entire canal (both main and secondary canals) is sufficient to ensure navigability throughout the year. At the same time, the water level of the ground surface would be below 70 cm, i.e., an optimum condition for plant growth. Furthermore, the installation of the proposed scheme would also alleviate flooding woes to the majority of the area.

As with any design or schemes, flaws or weaknesses are inevitable and must be highlighted so that adequate and proper measures can be made or planned. Three significant weaknesses are anticipated with the proposed scheme. Firstly, isolated topographically low lying areas could be flooded during the wet season, thus, additional flood protection bunds may be required along KM2 to KM3 of the main canal and in areas beyond the proposed water-gates at KM8.5 and KM21. Secondly, the collapse of hydraulic structures on peat soil is a common phenomenon, simply due to the settlement of soil and erosion. Hence, a continuous monitoring on the hydraulic structures with potential eroding areas such as Spillway gate at KM 0 must be carried out to alleviate this problem. Furthermore, effort should also be made to reduce velocity of canal flow upon entering the spillway gate in a way to reduce the erosive forces. Finally, since the water level in the whole proposed system is highly dependent on the water level at the

KM 0 spillway crest, a series of continuous water level monitoring stations (preferably equipped with data loggers) should be established so that a continuous water level records can be obtained.

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