CHAPTER 1
INTRODUCTION

The purpose of hydrogeologic study is to primarily study the groundwater resources. Hydrogeologic study generally consisted of mapping the geology and hydrogeology, determining the groundwater recharge, and defining the groundwater quality in the study area. Understanding these phenomena is important for the management and development of the groundwater resources.

Bang Khla Royal Development Project is located in the eastern part of Thailand. Groundwater in the study area is mainly used for agriculture and animals farming. This study is a sub-project of the joint study between the Department of Groundwater Resources and the Crown Property Bureau on the evaluation of groundwater potential at Bang Khla. The development and management of groundwater resources for Bang Khla Royal Development Project will base on this hydrogeologic study, in order to maintain the sustainability of groundwater use.

1.1 Location of the study area

Bang Khla Royal Development Project is located in Bang Khla District, Chachoengsao Province, between latitude 13°40′28″ N and 13°40′52″ N and longitude 101°12′44″ E and 101°12′54″ E or grid UTM Zone 47 from 1512300 N to 1513500 N and 739450 E to 739950 E. The study area covers about 0.2 square kilometers and is characterized by flat terrain of flood plain deposits (Figure 1.1). This area formed part of Bang Pakong River Basin. Five groundwater wells were drilled in the study area by the Department of Groundwater Resources in 2003 (Figure 1.1). All wells have been systematic recorded with relevant hydrogeologic information (Table 1.1).

1.2 Purpose and scope

The purpose of the thesis is to study hydrogeology of Bang Khla Royal Development Project in order to determine its groundwater resource potential, using

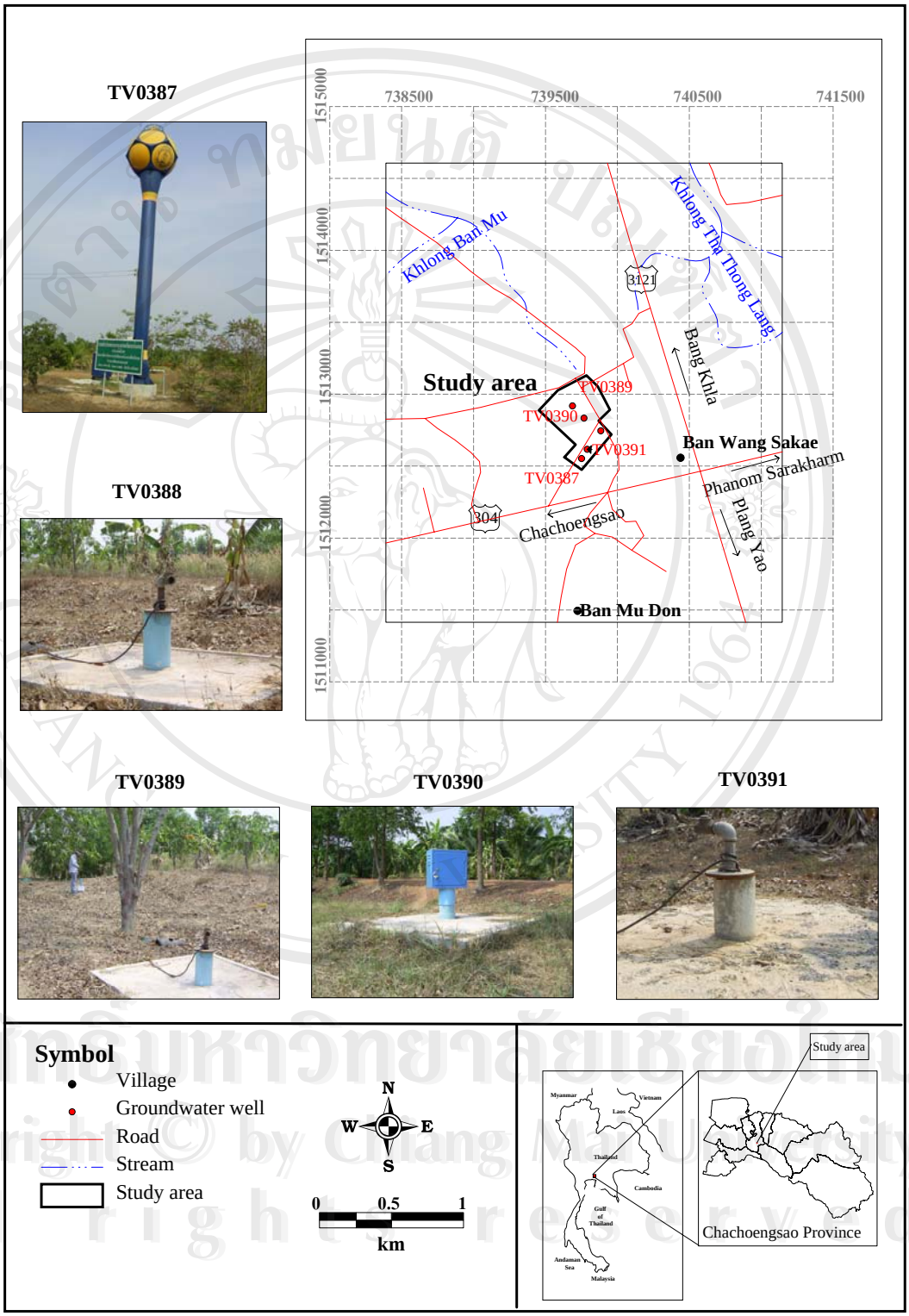


Figure 1.1 Location of the Bang Khla Royal Development Project.

Table1.1 Details of groundwater wells in the study area (from Department of Groundwater Resources, 2003).

No.	Well No.	Grid		Depth (m)	Diameter (mm)	Water level (m)	Drawdown (m))	Yield (m^3/hr)
		UTM_E	UTM_N					
1.	TV387CCS001	739751	1512553	178	150	17.29	31.29	5.14
2.	TV388CCS002	739885	1512746	180	150	10.70	62.40	1.00
3.	TV389CCS003	739687	1512919	168	150	7.10	60.86	0.63
4.	TV390CCS004	739768	1512834	120	150	11.80	53.16	0.65
5.	TV391CCS005	739790	1512617	162	150	21.00	42.00	2.50

Geographic Information System (GIS) to establish systematic description of hydrogeological data.

The study will focus on geological setting, hydrogeological setting, groundwater recharge, groundwater quality, and groundwater potential. GIS will be used to simplify data management, analysis, and display. The study area is confined to Bang Khla Royal Development Project.

The geological study include lithology, stratigraphy, structure, geomorphology, and drainage systems. These data is derived from field surveys and will be represented by geologic map.

The hydrogeologic setting is based on the geologic setting. It classifies the types, characteristics, and distribution of aquifers and represents these data by hydrogeologic map. Geophysical survey is conducted using vertical electrical sounding (VES) that is run in the study area to determine aquifer types and thickness.

The hydrological information is used to study the quantity and quality of groundwater. The quantity of groundwater recharge is calculated from permeability tests in the field, along with meteorological data concerning rainfall and evapotranspiration. Water quality are considered in terms of chemical and physical characteristics. Chemical analysis of water included determining the concentration of water chemical constituents and pH, temperature, color, and turbidity are evaluated by physical analysis.

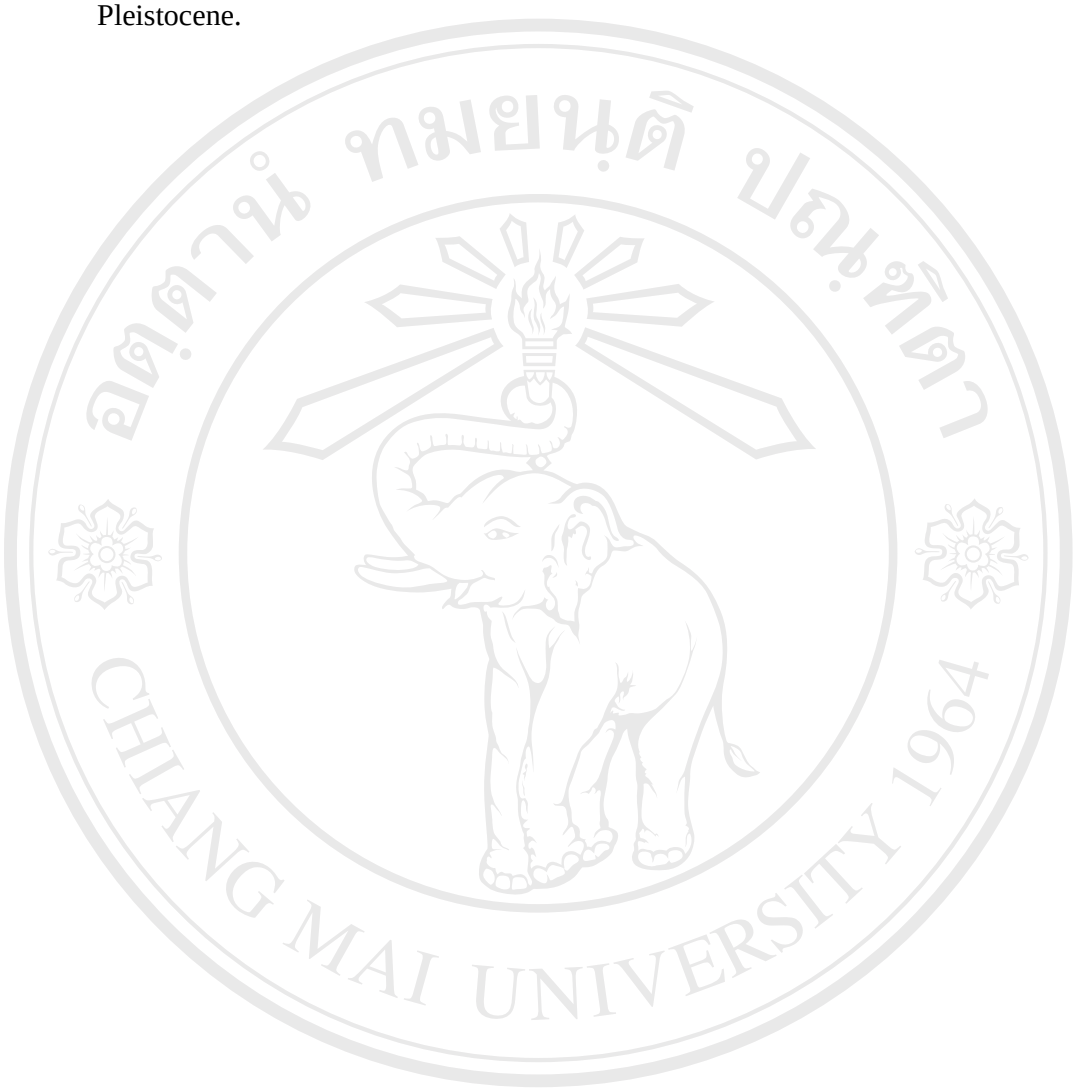
1.3 Previous investigations

The Asian Institute of Technology and the Department of Mineral Resources (1982) studied the water balance of the upper Chao Phraya basin and estimated the approximate amount of groundwater recharge to the aquifers within the basin. The hydrological components in the study comprised stream flow, evapotranspiration, change in soil moisture storage, change in surface water storage, change in groundwater storage and groundwater recharge. These components were expressed by a mass equation, inflow = outflow. The rainfall for the upper Chao Phraya basin computed by the Thiessen polygon method using data from 61 gauge stations is equal to an annual rainfall 1,202 millimeters. Average annual evapotranspiration is 887 millimeters, which is 74 % of the basin rainfall. Actual monthly soil moisture storage varied from a minimum of 72.1 millimeters in April to almost its maximum capacity of 300 millimeters in September. The average annual groundwater recharge is 95.9 millimeters, which is 8 % of the basin total rainfall.

The Department of Mineral Resources (1996) mapped the groundwater occurrence of Chachoengsao Province at a scale of 1:100,000. This is the base map for determining well locations and groundwater management at local and regional levels. It shows the types of aquifers, groundwater quality, and groundwater quantity. From the groundwater availability map of Chachoengsao Province (Figure 1.2) it can be seen that the groundwater in the study area occurs in an unconsolidated aquifer that is the flood plain aquifer (Qfd). This composed of gravel, sand, silt, and clay and its thickness ranges from 15 to 60 meters. It yields less than 5 cubic meters per hour. The groundwater generally has total dissolved solids content less than 500 milligram per liter.

Sinsakul (2000) studied late Quaternary geology of the Lower Central Plain in Thailand. The study area formed part of the Lower Central or Chao Phraya Plain. It is a fault bounded basin developed in the Plio-Pleistocene epoch. Consequently, the basin has been filled with Quaternary sediment reaching a thickness of almost 2,000 meters, of which only the upper 300 meters is known. The Pleistocene deposits of the Lower Central Plain represent a complex interplay of alluvial, fluvial and deltaic environments of the Chao Phraya River and its tributaries. The upper sequence of sand and stiff clay with iron-oxide concretions on the surface was

deposited in a fluviatile environment subjected to a regressive period in the late Pleistocene.



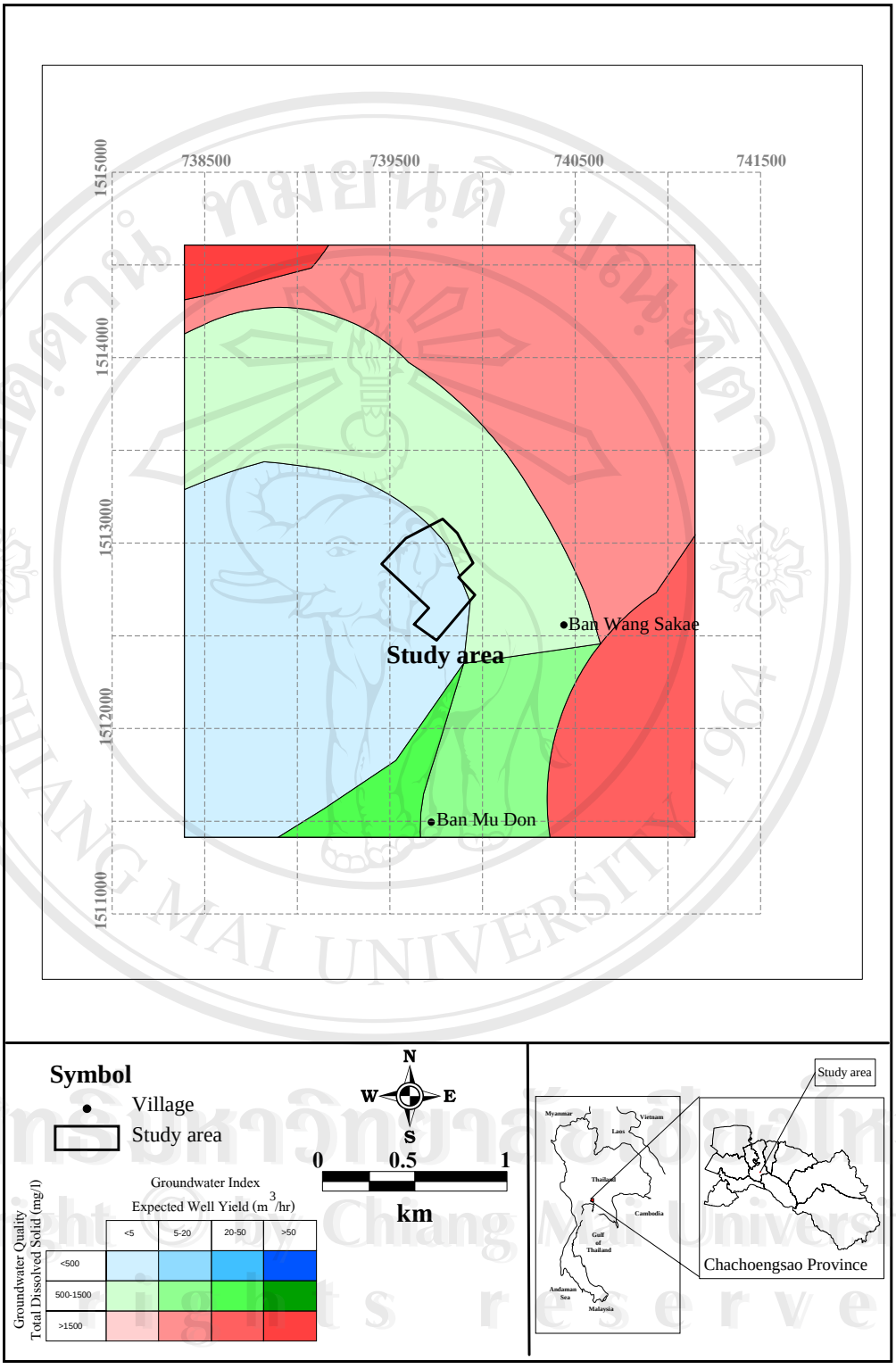


Figure 1.2 Map of groundwater availability in the study area and its vicinity (modified from Department of Mineral Resources, 1996).