# CHAPTER III

## GEOLOGY OF THE STUDY AREA

The knowing of the geologic condition at the site of study area is essential for a subsurface exploration, interpreting the groundwater situation, selecting the effective remedial method, and understanding the physical properties of the rocks and soils being responsible for the stability of embankment and natural colluvial slopes. The regional and detailed geology of the study area are as follow.

### 3.1 Regional Geology.

According to Hinthong (1974) and DMR (1976) the rock sequences from Permo-Triassic to Early Jurassic and unconsolidated sediments of Lower Holocene (Thiramongkol, 1983a) were found on this area. Their distribution is shown in Figure 3.1 and the units are described below.

#### 3.1.1 Khao Yai Volcanics.

The rock unit consists of rhyolites, andesites tuffs, agglomerates and volcanic breccia of Permo-Triassic age. The area of Khao Yai National Park is underlain mostly by these volcanic rocks.

#### 3.1.2 Phu Kradung Formation.

A sedimentary rock formation consists of soft and

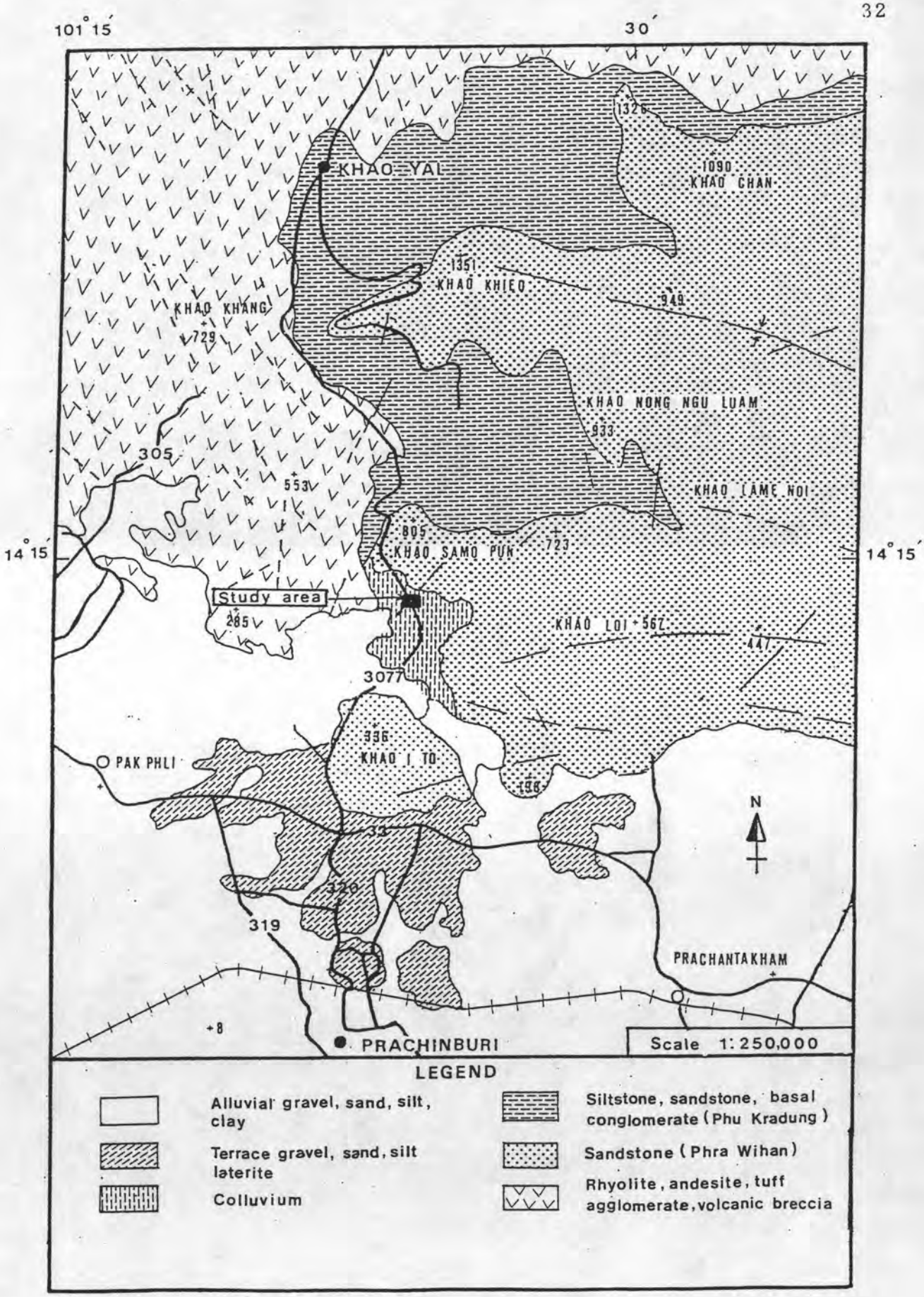



Figure 3.1 Regional geological map of the study area.

[ Modified after DMR, 1976 ]

slightly calcareous, micaceous, reddish brown, and purplish-red siltstone of late Triassic to Early Jurassic age with local basal conglomerate in the lower part. This formation unconformably overlies the Khao Yai Volcanics (Hinthong, 1974).

3.1.3 Phra Wihan Formation.

The unit comprises chiefly of a sequence of thick resistant massive and cross-bedded, white, medium to coarse grained sandstone of Early Jurassic age. This sandstone unit crops out at Khao I To, Khao Samo Phun, and on the top of Khao Khieo.

3.1.4 Unconsolidated Sediments.

In the southern part of the area lie the unconsolidated sediments of tidal flat of brackish clay (Thiramongkol, 1983a), colluvium, terrace gravels and alluvium deposits on top of Triassic to Early Jurassic sedimentary bedrocks.

3.2 Areal Geology.

A detailed geologic investigation was carried out covering an area about 12 square kilometers in where the embankment failures occurred. This includes a surficial geologic survey and subsurface exploration in order to obtain information on the origin, stratigraphy and structural features of rocks and soils here. The geology of this area are summarized as follows:

3.2.1 Rock units and stratigraphy.

The unconsolidated sediments and bedrocks in this area can be generally classified into three main units as the volcanic,

siltstone & sandstone and colluvial soil units.

3.2.1.1 Volcanic rocks unit.: The volcanic rocks belong to Khao Yai Volcanics of Permo-Triassic age of Hinthong (1974) and DMR, 1976. These rocks are the oldest stratigraphic unit found in this area. The rocks are andesites and rhyolites which cropped out at the toe of the colluvial slope in the stream channel (Figure 3.2). These rocks are firmed and not involve in the instability of the embankment.

3.2.1.2 Mudstone & Siltstone Unit.: The rocks are of Phu Kradung formation of Jurassic age (Hinthong, 1974; DMR, 1976). These rocks cropped out only at the left stream bank of the area. They form the bedrocks above which the embankment failures occurred (Figure 3.3).

3.2.1.3 Colluvial soil unit.: The colluvial soils overlie mudstones and siltstones and generally cover the study area. The soils are characterized by a lot of large sandstone cobbles and boulders set in gravelly clayey fine sand matrix (Figures 3.4).

Mudstone-Siltstone and colluvial soil units play a major role in the embankment failure.

3.2.2 Geologic structures.:

The geologic structures in the study area to be considered are faults, and bedding planes.

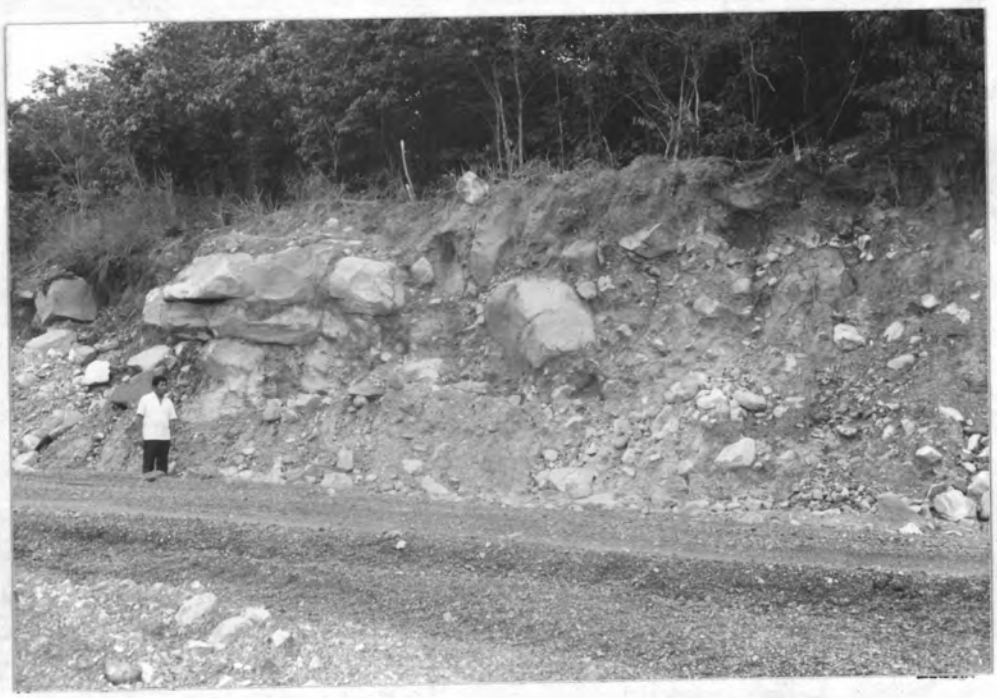
A detailed aerial photographs interpretation and field investigation indicate that the fault of NE-SW trending coincide with

the drainage pattern in this area. The attitude of siltstone bedrocks were measured to strike $140^{o}$-$150^{o}$ and dip 10-15 degrees south west.

Figure 3.2 Khao Yai Volcanic rocks cropped out at the toe of colluvial slope in a stream course.

Figure 3.3 Outcrop of mudstone and siltstone of Phu Kradung formation in the study area.

a)



b)

Figure 3.4 The colluvium deposit in the study area.

a) With very large sandstone boulders.

b) Angular to subangular large rock fragments set in fine grained matrix.