

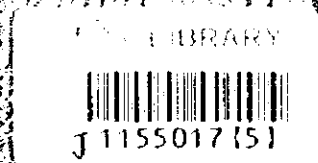
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

ROYAL IRRIGATION DEPARTMENT  
MINISTRY OF AGRICULTURE AND COOPERATIVES  
KINGDOM OF THAILAND

**THE STUDY  
ON THE KOK-ING-NAN WATER DIVERSION PROJECT  
IN THE KINGDOM OF THAILAND**

**DATABASE REPORT FOR THE GEOLOGICAL INVESTIGATION**

**(Feasibility Study)**



NOVEMBER 1999

SANYU CONSULTANTS INC.  
NIPPON KOEI CO., LTD.





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## 1. General

Table 1.1 List of Drilling Investigation (Location, Drilling Depth, In-situ Test etc.)

| Location                     | Hole No.   | Drilling Depth (m) | Ground Height(EL.m) | Coordinate of Location |           | Geophysics Logging | Lagoon Test (Times) | Permeability Test (Times) | S.P.T. (Times) | Rock Test (Samples) | Performed by | Drilled Year |
|------------------------------|------------|--------------------|---------------------|------------------------|-----------|--------------------|---------------------|---------------------------|----------------|---------------------|--------------|--------------|
|                              |            |                    |                     | X-coord.               | Y-coord.  |                    |                     |                           |                |                     |              |              |
| Kok intake                   | DHK-A1     | 30.0               | 389                 | 596,800                | 2,205,280 |                    |                     |                           | 29             |                     | Thai side    | 1997         |
|                              | DHK-B1     | 30.0               | 389                 | 591,100                | 2,202,730 |                    |                     |                           | 29             |                     | Thai side    | 1997         |
| Kok-ing canal route          | DHK-B2     | 30.0               | 391                 | 593,780                | 2,200,400 |                    |                     |                           | 30             |                     | Thai side    | 1997         |
|                              | DHK-B7     | 30.0               | 397                 | 606,290                | 2,190,630 |                    |                     |                           | 21             |                     | Thai side    | 1997         |
|                              | DHK-B8     | 20.0               | 367                 | 618,230                | 2,182,290 |                    |                     |                           | 19             |                     | Thai side    | 1997         |
|                              | DHK-B9     | 20.0               | 372                 | 617,100                | 2,175,370 |                    |                     |                           | 20             |                     | Thai side    | 1997         |
|                              | DKI-2      | 30.0               | 389                 | 591,740                | 2,201,950 |                    |                     |                           | 29             |                     | Thai side    | 1997         |
|                              | DKI-4      | 30.0               | 385                 | 598,800                | 2,199,080 |                    |                     |                           | 25             |                     | Thai side    | 1997         |
|                              | DKI-5      | 20.0               | 386                 | 601,000                | 2,198,400 |                    |                     |                           | 10             |                     | Thai side    | 1997         |
|                              | DKI-6      | 20.0               | 387                 | 606,480                | 2,192,420 |                    |                     |                           | 19             |                     | Thai side    | 1997         |
| Kok-ing canal (south route)  | DKI-7      | 20.0               | 392                 | 606,740                | 2,191,000 |                    |                     |                           | 19             |                     | Thai side    | 1997         |
|                              | DKI-8      | 20.0               | 373                 | 617,600                | 2,183,720 |                    |                     |                           | 20             |                     | Thai side    | 1997         |
|                              | DHK-B4     | 30.0               | 395                 | 598,100                | 2,193,900 |                    |                     |                           | 12             |                     | Thai side    | 1997         |
|                              | DHK-B5     | 30.0               | 397                 | 600,000                | 2,190,600 |                    |                     |                           | 17             |                     | Thai side    | 1997         |
|                              | DHK-B6SP   | 30.0               | 397                 | 602,920                | 2,192,120 | 0                  |                     |                           | 14             |                     | Thai side    | 1997         |
|                              | DHKBT1-ISP | 70.0               | 430                 | 604,090                | 2,197,150 | 0                  |                     |                           |                | 3                   | Thai side    | 1997         |
|                              | DHK-B1     | 70.0               | 436                 | 610,000                | 2,190,000 |                    | 3                   |                           |                | 1                   | Thai side    | 1997         |
|                              | DHK-B2     | 65.0               | 426                 | 613,830                | 2,188,900 |                    | 3                   |                           |                | 1                   | Thai side    | 1997         |
| Ing diversion weir           | DHK-EXTRA7 | 50.0               | 480                 | 610,400                | 2,189,800 |                    | 3                   |                           |                |                     | JICA side    | 1997         |
|                              | DHKBT2-1   | 65.0               | 435                 | 610,200                | 2,193,300 |                    | 3                   |                           |                | 3                   | Thai side    | 1997         |
|                              | DHKBT2-2   | 55.0               | 420                 | 611,730                | 2,192,250 |                    | 3                   |                           |                |                     | Thai side    | 1997         |
|                              | DHB-4.5    | 165.0              | 520                 | 613,100                | 2,190,650 | 0                  | 7                   |                           |                | 4                   | JICA side    | 1998         |
|                              | DHD-1      | 40.0               | 362                 | 624,300                | 2,175,400 |                    |                     |                           | 39             |                     | Thai side    | 1997         |
|                              | DHD-2      | 40.0               | 362                 | 624,410                | 2,175,400 |                    |                     |                           | 39             |                     | Thai side    | 1997         |
|                              | DHD-3      | 40.0               | 364                 | 624,600                | 2,175,400 |                    |                     |                           | 40             |                     | Thai side    | 1997         |
|                              | DHY-1      | 50.0               | 394                 | 627,500                | 2,174,500 |                    | 4                   |                           |                |                     | Thai side    | 1997         |
| Ing-Yot No.1 tunnel          | DHY-2      | 30.0               | 373                 | 628,690                | 2,174,480 |                    | 3                   |                           | 10             |                     | Thai side    | 1997         |
|                              | DH1AD1     | 65.0               | 482                 | 640,570                | 2,174,400 |                    | 3                   |                           |                |                     | Thai side    | 1997         |
|                              | DH2AD1SP   | 90.0               | 495                 | 645,550                | 2,174,000 | 0                  |                     |                           |                |                     | Thai side    | 1997         |
|                              | DH3AD1     | 60.0               | 530                 | 648,300                | 2,169,850 |                    | 3                   | 1                         | 9              | 1                   | Thai side    | 1997         |
|                              | DH4AD1     | 65.0               | 535                 | 649,000                | 2,160,000 |                    | 3                   |                           |                |                     | Thai side    | 1997         |
|                              | DH5AD1     | 70.0               | 550                 | 654,290                | 2,155,780 |                    | 3                   |                           |                |                     | Thai side    | 1997         |
|                              | DH6AD1SP   | 120.0              | 660                 | 657,350                | 2,154,940 | 0                  | 6                   |                           |                | 3                   | Thai side    | 1997         |
|                              | DH7AD1     | 60.0               | 460                 | 665,410                | 2,146,680 |                    | 3                   |                           |                | 2                   | Thai side    | 1997         |
| Ing-Yot No.2 tunnel          | DHB-1      | 40.0               | 383                 | 635,150                | 2,173,750 |                    | 3                   |                           | 1              |                     | Thai side    | 1996         |
|                              | DHB-2      | 45.0               | 388                 | 636,030                | 2,174,000 |                    | 3                   |                           | 5              |                     | Thai side    | 1996         |
|                              | DHB-3      | 55.0               | 402                 | 635,710                | 2,175,520 |                    | 3                   |                           | 19             |                     | Thai side    | 1996         |
|                              | DHB-4      | 120.0              | 463                 | 638,820                | 2,175,580 |                    | 3                   |                           | 5              |                     | Thai side    | 1996         |
|                              | DHB-5      | 120.0              | 461                 | 644,940                | 2,174,990 |                    | 3                   |                           | 6              |                     | Thai side    | 1996         |
|                              | DHB-6      | 150.0              | 482                 | 652,550                | 2,156,750 |                    | 3                   |                           | 6              |                     | Thai side    | 1996         |
|                              | DHB-7      | 60.0               | 383                 | 665,840                | 2,145,420 |                    | 3                   |                           | 5              | 1                   | Thai side    | 1996         |
|                              | DHB-8      | 50.0               | 375                 | 668,140                | 2,144,030 |                    | 3                   |                           | 10             | 1                   | Thai side    | 1996         |
| Ing-Yot tunnel (south route) | DHA-1      | 60.0               | 403                 | 635,050                | 2,177,260 |                    | 3                   |                           | 1              | 1                   | Thai side    | 1996         |
|                              | DHA-2      | 70.0               | 412                 | 636,230                | 2,177,510 |                    | 3                   |                           | 1              |                     | Thai side    | 1996         |
|                              | DHB0       | 35.0               | 382                 | 634,570                | 2,174,520 |                    | 3                   |                           | 9              |                     | Thai side    | 1997         |
|                              | DHB0.6     | 50.0               | 390                 | 634,820                | 2,175,420 |                    | 3                   |                           |                | 1                   | Thai side    | 1997         |
|                              | DHB1SP     | 80.0               | 420                 | 636,500                | 2,174,770 | 0                  |                     |                           |                | 1                   | Thai side    | 1997         |
|                              | DHB8SP     | 145.0              | 488                 | 642,420                | 2,175,870 | 0                  | 6                   |                           |                | 2                   | Thai side    | 1997         |
|                              | DHB1-16.5  | 200.0              | 532                 | 648,900                | 2,171,420 | 0                  | 7                   |                           |                | 6                   | JICA side    | 1998         |
|                              | DHB1-18.0  | 205.0              | 537                 | 649,350                | 2,170,160 | 0                  | 7                   |                           |                | 4                   | JICA side    | 1998         |
| Yao flood control dam        | DHB1-22.5  | 220.0              | 547                 | 650,000                | 2,166,890 | 0                  | 7                   |                           |                | 4                   | JICA side    | 1998         |
|                              | DHB1-26.0  | 300.0              | 619                 | 651,150                | 2,160,550 | 0                  | 4                   |                           |                | 4                   | JICA side    | 1998         |
|                              | DHB1-33.0  | 310.0              | 638                 | 655,000                | 2,157,250 | 0                  | 7                   |                           |                | 5                   | JICA side    | 1998         |
|                              | DHB46SP    | 100.0              | 420                 | 665,670                | 2,146,630 | 0                  |                     |                           |                | 3                   | Thai side    | 1997         |
|                              | DHB49      | 60.0               | 390                 | 668,240                | 2,145,820 |                    | 3                   |                           |                |                     | Thai side    | 1997         |
|                              | DHB50SP    | 90.0               | 420                 | 668,830                | 2,145,170 | 0                  |                     |                           |                | 1                   | Thai side    | 1997         |
|                              | DHC-1      | 42.0               | 387                 | 628,480                | 2,159,310 |                    | 3                   |                           | 3              | 1                   | Thai side    | 1996         |
|                              | DHC-2      | 65.0               | 410                 | 629,500                | 2,153,000 |                    | 3                   |                           | 11             | 1                   | Thai side    | 1996         |
| Total                        | DH1        | 50.0               | 322                 | 678,015                | 2,141,785 |                    | 7                   | 11                        | 1              |                     | Thai side    | 1997         |
|                              | DH2        | 80.0               | 284                 | 678,095                | 2,141,845 |                    | 7                   | 25                        |                |                     | Thai side    | 1997         |
|                              | DH3        | 60.0               | 296                 | 678,135                | 2,141,875 |                    | 14                  | 18                        | 3              |                     | Thai side    | 1997         |
|                              | DH4        | 50.0               | 331                 | 678,187                | 2,141,925 |                    |                     | 40                        | 4              |                     | Thai side    | 1997         |
|                              | DH5        | 30.0               | 328                 | 678,470                | 2,142,120 |                    | 5                   | 12                        | 3              |                     | Thai side    | 1997         |
|                              | DH6        | 30.0               | 316                 | 678,515                | 2,141,946 |                    | 4                   | 8                         | 3              |                     | Thai side    | 1997         |
|                              |            | 4632.0             |                     |                        |           | 170                | 115                 | 546                       | 54             |                     |              |              |

\* S.P.T. : Standard penetration test

\* The test contents of geophysics logging are as follows.

(1) Caliper logging, (2) Full waveform sonic logging, (3) Electric logging, (4) Resistivity logging, (5) Natural Gamma logging

**Table 1.2 List of Survey Line for Refraction Prospecting Survey**

| Line Name     | Location                                | Length (m) | Coord. of Starting Point |           | Coord. of Ending Point |           | Performed by |
|---------------|---|------------|--------------------------|-----------|------------------------|-----------|--------------|
|               |   |            | X-coord.                 | Y-coord.  | X-coord.               | Y-coord.  |              |
| SKIT-1-1      | Kok-Ing No.1 tunnel inlet (main)        | 400        | 601,425                  | 2,198,150 | 601,805                | 2,198,005 | Thai side    |
| SKIT-1-1      | Kok-Ing No.1 tunnel inlet (sub)         | 400        | 601,740                  | 2,198,230 | 601,555                | 2,197,890 | Thai side    |
| SKIT-1-2      | Kok-Ing No.1 tunnel outlet (main)       | 1,000      | 603,435                  | 2,197,355 | 604,215                | 2,196,705 | Thai side    |
| SKIT-1-3      | Kok-Ing No.1 tunnel outlet (sub)        | 300        | 603,345                  | 2,197,250 | 603,530                | 2,197,490 | Thai side    |
| SKIT-1-4      | Kok-Ing No.1 tunnel outlet (sub)        | 400        | 603,880                  | 2,196,725 | 604,165                | 2,197,055 | Thai side    |
| SK1-1, SKIT-2 | Kok-Ing No.2 tunnel inlet (main)        | 4,800      | 606,190                  | 2,190,320 | 609,689                | 2,189,850 | Thai side    |
| SKIT-2/RRR    | Kok-Ing No.2 tunnel inlet (sub)         | 500        | 609,860                  | 2,190,320 | 610,128                | 2,189,850 | Thai side    |
| SKIT-3/RRR    | Kok-Ing No.2 tunnel inlet (main)        | 800        | 613,670                  | 2,188,635 | 614,435                | 2,188,370 | Thai side    |
| SKIT-3/RRR    | Kok-Ing No.2 tunnel outlet (main)       | 800        | 614,220                  | 2,188,740 | 614,033                | 2,188,279 | Thai side    |
| Line 1Y       | Ing-Yot No.1 tunnel (main)              | 1,925      | 626,540                  | 2,174,395 | 628,475                | 2,174,500 | Thai side    |
| SB0(Main)     | Ing-Yot No.2 tunnel inlet (main)        | 3,100      | 634,350                  | 2,175,370 | 637,475                | 2,175,615 | Thai side    |
| SB0(SubA)     | Ing-Yot No.2 tunnel inlet (sub)         | 500        | 634,800                  | 2,175,620 | 634,827                | 2,175,127 | Thai side    |
| SB0(SubB)     | Ing-Yot No.2 tunnel inlet (sub)         | 500        | 635,680                  | 2,175,675 | 635,830                | 2,175,195 | Thai side    |
| SB0(SubC)     | Ing-Yot No.2 tunnel inlet (sub)         | 600        | 637,055                  | 2,175,780 | 636,620                | 2,175,360 | Thai side    |
| S2B0(Main)    | Ing-Yot No.2 tunnel inlet (main)        | 1,100      | 635,720                  | 2,174,275 | 636,650                | 2,174,830 | Thai side    |
| S2B0(Sub)     | Ing-Yot No.2 tunnel inlet (sub)         | 500        | 636,360                  | 2,174,950 | 636,635                | 2,174,535 | Thai side    |
| SAd1(Main)    | Ing-Yot No.2 tunnel Adit No.1 (main)    | 1,000      | 640,495                  | 2,174,025 | 640,995                | 2,174,890 | Thai side    |
| SAd1(Sub)     | Ing-Yot No.2 tunnel Adit No.1 (sub)     | 500        | 640,435                  | 2,174,320 | 640,795                | 2,174,030 | Thai side    |
| SAd2-RFR1     | Ing-Yot No.2 tunnel Adit No.2 (main)    | 400        | 645,280                  | 2,173,350 | 645,105                | 2,172,990 | Thai side    |
| SAd3-RFR1     | Ing-Yot No.2 tunnel Adit No.3 (main)    | 500        | 648,300                  | 2,169,700 | 647,825                | 2,169,854 | Thai side    |
| SAd3-RFR2     | Ing-Yot No.2 tunnel Adit No.3 (sub)     | 500        | 648,086                  | 2,169,507 | 648,257                | 2,169,977 | Thai side    |
| SAd4-RFR2     | Ing-Yot No.2 tunnel Adit No.4 (main)    | 600        | 648,906                  | 2,160,205 | 649,020                | 2,159,616 | Thai side    |
| SAd4-RFR1     | Ing-Yot No.2 tunnel Adit No.4 (sub)     | 650        | 649,170                  | 2,160,005 | 648,631                | 2,159,686 | Thai side    |
| SAd5-RFR1     | Ing-Yot No.2 tunnel Adit No.5 (main)    | 300        | 654,410                  | 2,155,900 | 654,181                | 2,155,705 | Thai side    |
| SAd5-RFR2     | Ing-Yot No.2 tunnel Adit No.5 (sub)     | 500        | 654,566                  | 2,155,725 | 654,131                | 2,155,971 | Thai side    |
| SAd6-RFR1     | Ing-Yot No.2 tunnel Adit No.6 (main)    | 500        | 657,120                  | 2,155,040 | 656,799                | 2,155,423 | Thai side    |
| SAd6-RFR2     | Ing-Yot No.2 tunnel Adit No.6 (sub)     | 500        | 656,683                  | 2,155,205 | 657,164                | 2,155,343 | Thai side    |
| SAd7-RFR1     | Ing-Yot No.2 tunnel Adit No.7 (main)    | 400        | 665,400                  | 2,146,650 | 665,702                | 2,146,389 | Thai side    |
| SAd7-RFR2     | Ing-Yot No.2 tunnel Adit No.7 (sub)     | 500        | 665,494                  | 2,146,857 | 665,390                | 2,146,367 | Thai side    |
| SB49-RFR1     | Ing-Yot No.2 tunnel outlet (main)       | 800        | 668,810                  | 2,145,250 | 669,308                | 2,144,624 | Thai side    |
| SB49-RFR2     | Ing-Yot No.2 tunnel outlet (sub)        | 600        | 669,230                  | 2,145,203 | 668,738                | 2,144,858 | Thai side    |
| SK1-B20(Main) | Kok-Ing tunnel south route (main)       | 1,035      |                          |           |                        |           | Thai side    |
| SK1-B20(Sub)  | Kok-Ing tunnel south route (sub)        | 345        |                          |           |                        |           | Thai side    |
| SB0(Main)     | Ing-Yot No.1 tunnel (main)              | 990        |                          |           |                        |           | Thai side    |
| SB0(Sub)      | Ing-Yot No.1 tunnel (sub)               | 495        |                          |           |                        |           | Thai side    |
| NY-A          | Yao dam - dam axis                      | 440        |                          |           |                        |           | Thai side    |
| NY-B          | Yao dam - left saddle                   | 220        |                          |           |                        |           | Thai side    |
| NY-C          | Yao dam - cross section toward dam axis | 385        |                          |           |                        |           | Thai side    |
| Total         | 38 lines                                | 29,485     |                          |           |                        |           |              |

\* Line name SKIT-2 corresponds to SKI-1/2RR as line name of tunnel survey line

**Table 1.3 List of Survey Line for Reflection Prospecting Survey**

| Line Name  | Location   | Length (m) | Coord. of Starting Point |           | Coord. of Ending Point |           | Performed by |
|------------|--|------------|--------------------------|-----------|------------------------|-----------|--------------|
|            |  |            | X-coord.                 | Y-coord.  | X-coord.               | Y-coord.  |              |
| SKIT1-RFL1 | Kok-Ing No.1 tunnel (along the road)             | 1,200      | 602,855                  | 2,197,965 | 602,190                | 2,197,155 | Thai side    |
| SKIT2-RFL1 | Kok-Ing No.2 tunnel (center part of alignment)   | 1,000      | 612,955                  | 2,188,865 | 612,030                | 2,189,195 | Thai side    |
| SB0(Main)  | Ing-Yot No.2 tunnel, between inlet and adit No.1 | 4,500      | 637,475                  | 2,175,615 | 642,000                | 2,176,000 | Thai side    |
| SB0(Sub)   | Ing-Yot No.2 tunnel, near adit No.1              | 900        | 641,450                  | 2,176,300 | 641,820                | 2,175,500 | Thai side    |
| S2B0(Main) | Ing-Yot No.2 tunnel, near inlet                  | 1,600      | 636,650                  | 2,174,830 | 638,000                | 2,175,652 | Thai side    |
| S2B0(Sub)  | Ing-Yot No.2 tunnel, near inlet                  | 900        | 637,845                  | 2,175,165 | 637,130                | 2,175,525 | Thai side    |
| S2B0-RFL1  | Ing-Yot No.2 tunnel, between inlet and adit No.1 | 1,100      | 639,095                  | 2,175,520 | 638,055                | 2,175,935 | Thai side    |
| S2B0-RFL2  | Ing-Yot No.2 tunnel, between inlet and adit No.1 | 800        | 639,555                  | 2,175,330 | 639,095                | 2,176,205 | Thai side    |
| SB8-RFL1   | Ing-Yot No.2 tunnel, between adit No.1 and No.2  | 900        | 642,320                  | 2,175,490 | 642,450                | 2,176,475 | Thai side    |
| SB10(Ext)  | Ing-Yot No.2 tunnel, between adit No.1 and No.2  | 500        | 645,050                  | 2,174,950 | 645,550                | 2,174,800 | Thai side    |
| SB10(W)    | Ing-Yot No.2 tunnel, between adit No.1 and No.2  | 600        | 644,530                  | 2,174,830 | 644,550                | 2,175,450 | Thai side    |
| SB10(E)    | Ing-Yot No.2 tunnel, between adit No.1 and No.2  | 900        | 645,050                  | 2,174,700 | 645,360                | 2,175,550 | Thai side    |
| SAd2-RFL2  | Ing-Yot No.2 tunnel, adit No.2 (along the road)  | 1,300      | 644,895                  | 2,172,965 | 645,230                | 2,174,020 | Thai side    |
| SB16(Main) | Ing-Yot No.2 tunnel, between adit No.2 and No.3  | 1,000      | 649,195                  | 2,171,525 | 648,495                | 2,172,255 | Thai side    |
| SB16(Sub)  | Ing-Yot No.2 tunnel, between adit No.2 and No.3  | 900        | 648,745                  | 2,171,125 | 649,095                | 2,172,065 | Thai side    |
| SAd3-RFL1  | Ing-Yot No.2 tunnel, adit No.3 (along the road)  | 900        | 647,695                  | 2,169,515 | 648,250                | 2,170,205 | Thai side    |
| SB17(Main) | Ing-Yot No.2 tunnel, near adit No.3              | 1,000      | 649,035                  | 2,170,305 | 650,045                | 2,170,150 | Thai side    |
| SB17(Sub)  | Ing-Yot No.2 tunnel, near adit No.3              | 700        | 649,425                  | 2,169,960 | 649,665                | 2,170,435 | Thai side    |
| SB21(Main) | Ing-Yot No.2 tunnel, between adit No.3 and No.4  | 1,100      | 649,415                  | 2,167,055 | 650,515                | 2,166,815 | Thai side    |
| SB21(Sub)  | Ing-Yot No.2 tunnel, between adit No.3 and No.4  | 700        | 650,125                  | 2,166,470 | 650,350                | 2,167,245 | Thai side    |
| SB35(Main) | Ing-Yot No.2 tunnel, adit No.6                   | 2,000      | 657,335                  | 2,155,665 | 658,740                | 2,154,255 | Thai side    |
| SB35(Sub)  | Ing-Yot No.2 tunnel, adit No.6                   | 800        | 657,320                  | 2,155,065 | 658,290                | 2,155,325 | Thai side    |
| SAd7-RFL1  | Ing-Yot No.2 tunnel, adit No.7 (along the road)  | 1,600      | 665,905                  | 2,145,250 | 665,535                | 2,146,670 | Thai side    |
| SB46(Main) | Ing-Yot No.2 tunnel, near adit No.7              | 900        | 665,335                  | 2,147,255 | 665,505                | 2,148,045 | Thai side    |
| SB48(Main) | Ing-Yot No.2 tunnel, near outlet                 | 1,100      | 668,445                  | 2,145,625 | 667,730                | 2,146,350 | Thai side    |
| SB48(Sub)  | Ing-Yot No.2 tunnel, near outlet                 | 800        | 668,425                  | 2,145,960 | 668,065                | 2,145,455 | Thai side    |
| SB49-RFL1  | Ing-Yot No.2 tunnel, outlet                      | 1,500      | 668,485                  | 2,144,670 | 668,525                | 2,145,905 | Thai side    |
| Total      | 27 lines   | 31,200     |                          |           |                        |           |              |

\* Survey line length is described on the basis of "Seismic Reflection Survey Report, Volume 2, Seismic Velocity Contour Interpretation".

Report, Volume 2, Seismic Velocity Contour Interpretation".

\* Survey line length by location map on the above report are as follows, S2B0-RFL1 : 1,000 m, SB16 (Main) : 900 m, SB21 (Sub) : 800 m

\* The whole line of SB0 (Main), S2B0 (Main), SB10 (Ext) and SB35 (Main) line are located on tunnel alignment.

SB48 (Main) line is located in parallel towards tunnel alignment.

**Table 1.4 List of Survey Line for Electromagnetic Prospecting  
(TEM, TDEM) Survey**

| Site No. / TDEM line | Coordinates (A)<br>- Start point of line - |           |       | Coordinates (B)<br>- End point of line - |           |           | Line length<br>(km) | No. points<br>(Nos) |    |
|----------------------|--|-----------|-------|--|-----------|-----------|---------------------|---------------------|----|
|                      | Easting                                    | Northing  | (ELm) | Easting                                  | Northing  | (ELm)     |                     |                     |    |
| TMB 3.0              | 610,735                                    | 2,191,989 | 573   | 613,190                                  | 2,190,567 | 537       | 2.9                 | 146                 |    |
| TMB 3.9              | 638,039                                    | 2,175,421 | 481   | 639,425                                  | 2,175,622 | 497       | 1.4                 | 71                  |    |
| TMB 8.1              | 642,300                                    | 2,175,900 | 491   | 642,681                                  | 2,175,777 | 500       | 0.4                 | 21(6)               |    |
| TMB 11.0 a           | 644,967                                    | 2,174,972 | 468   | 645,573                                  | 2,174,176 | 501       | 1.0                 | 51                  |    |
| TMB 11.0 b           | 645,752                                    | 2,174,252 | 523   | 645,274                                  | 2,174,103 | 482       | 0.5                 | 26                  |    |
| TMB 11.0 c           | 645,126                                    | 2,174,515 | 490   | 645,332                                  | 2,174,244 | 541       | 0.34                | 18(18)              |    |
| TMB 11.0 d           | 645,419                                    | 2,174,625 | 564   | 645,601                                  | 2,174,387 | 509       | 0.3                 | 16                  |    |
| TMB 11.0 e           | 645,569                                    | 2,174,676 | 621   | 645,751                                  | 2,174,438 | 541       | 0.3                 | 16                  |    |
| TMB 46.0             | 665,270                                    | 2,147,150 | 465   | 665,877                                  | 2,146,355 | 425       | 1.0                 | 51                  |    |
| KOK-JNG B            | point sounding                             |           |       |  |           |           |                     |                     | 15 |
|                      |  |           |       |  |           | sub-total | 8.14                | 455                 |    |
| TDEMB 29.4           | - 653,231                                  | 2,160,066 | 935   | 654,126                                  | 2,159,719 | 1292      | 1.0                 | 21                  |    |
| TDEMB 30.0           | 654,005                                    | 2,158,937 | 950   | 654,741                                  | 2,157,190 | 640       | 2.4                 | 49                  |    |
| TDEMB 35.0           | 657,600                                    | 2,155,400 | 581   | 659,061                                  | 2,154,035 | 801       | 2.0                 | 41                  |    |
|                      |  |           |       |  |           | sub-total | 5.4                 | 111                 |    |
|                      |  |           |       |  |           | total     | 13.54               | 566                 |    |

## 2. Location Map of Geological Investigation

**2.1. Location Map of Geological Investigation**  
(Scale 1/10,000(Original Scale 1/50,000))



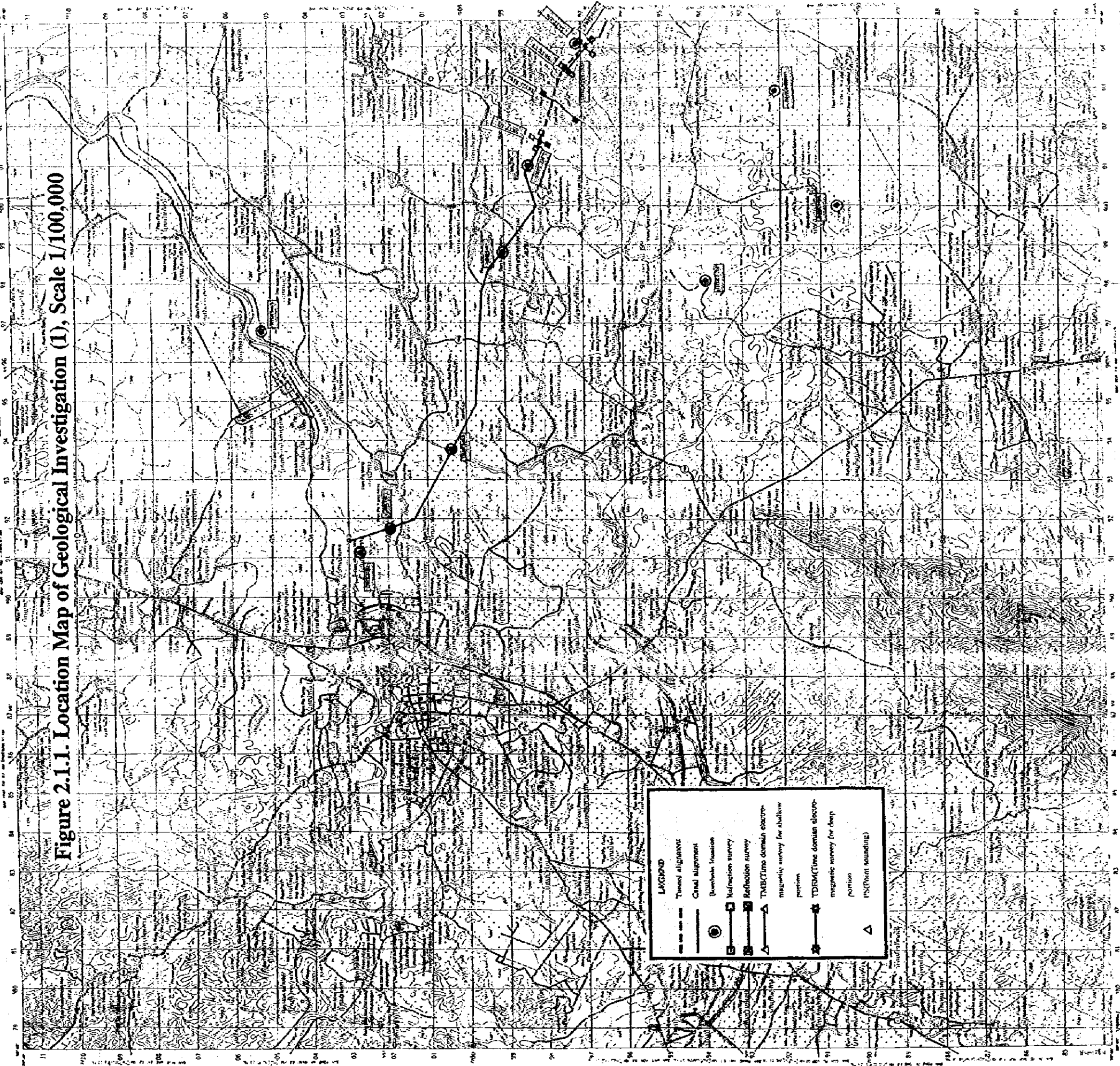


Figure 2.1.1. Location Map of Geological Investigation (1), Scale 1/100,000

CHANGWAT CHIANG RAI จังหวัดเชียงราย

2-RISO L7017 49481

1:100,000

Geological map details and scale information.

Geological map details and scale information.

1:100,000

Geological map details and scale information.

1:100,000

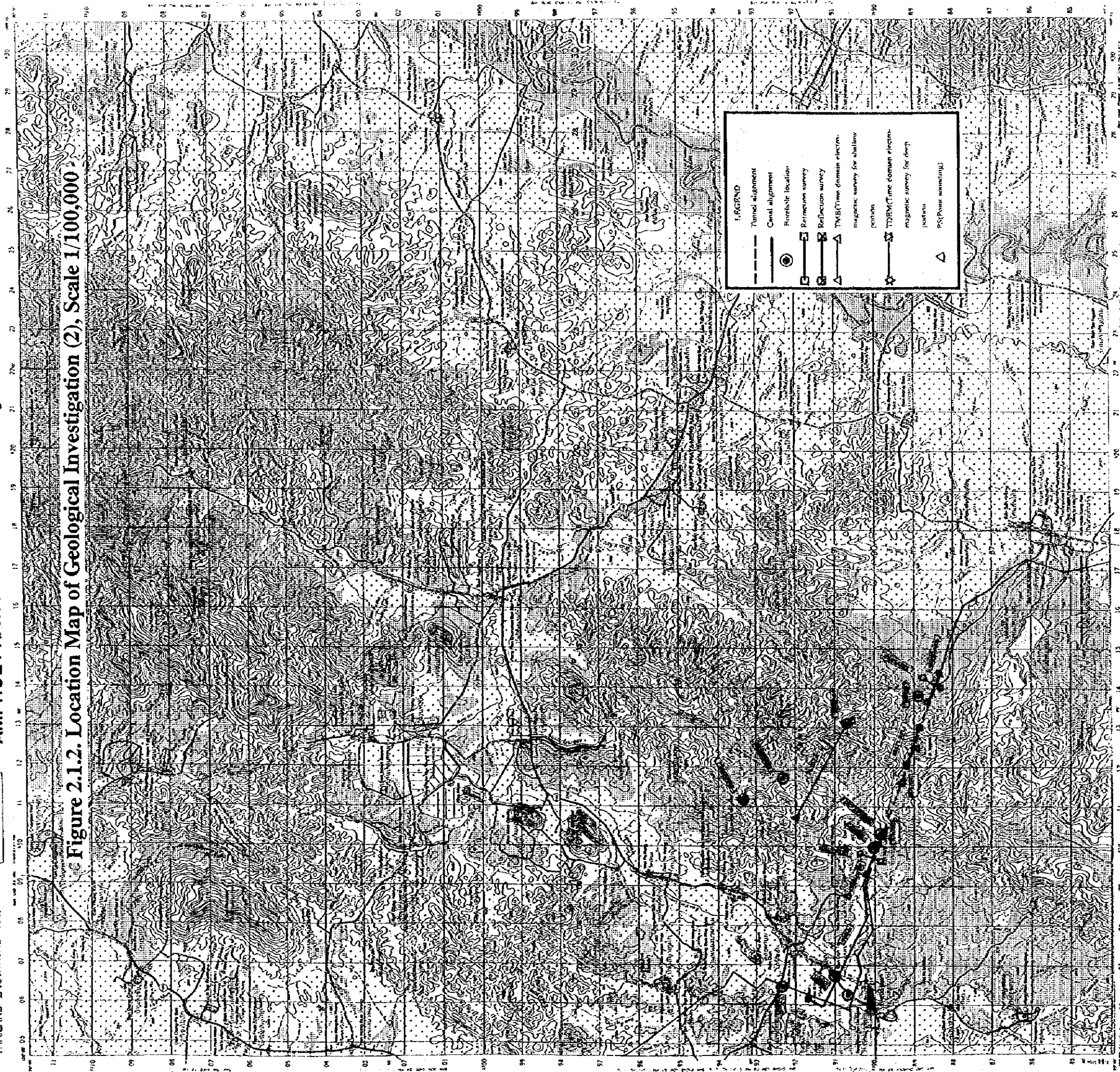


Figure 2.1.2. Location Map of Geological Investigation (2), Scale 1/100,000

กรมแผนที่ทหารบก  
กรมสำรวจธรณีวิทยา  
กรมการแผนที่

Scale 1:50,000

Sheet 3 - RTSD L7017 5048 IV

AMPHOE PHAYA MENG RAI อำเภอพญาเม็งราย

|                   |                       |
|-------------------|-----------------------|
| ชื่อโครงการ       | โครงการสำรวจธรณีวิทยา |
| ชื่อพื้นที่       | อำเภอพญาเม็งราย       |
| ชื่อหน่วยงาน      | กรมการแผนที่          |
| ชื่อผู้จัดทำ      | ...                   |
| ชื่อผู้ตรวจสอบ    | ...                   |
| ชื่อผู้แก้ไข      | ...                   |
| ชื่อผู้พิมพ์      | ...                   |
| ชื่อผู้จัดจำหน่าย | ...                   |

0100010

STOCK NO. L7017/04

กรมการแผนที่

Scale 1:50,000

Sheet 3 - RTSD L7017 5048 IV

AMPHOE PHAYA MENG RAI อำเภอพญาเม็งราย

|                   |                       |
|-------------------|-----------------------|
| ชื่อโครงการ       | โครงการสำรวจธรณีวิทยา |
| ชื่อพื้นที่       | อำเภอพญาเม็งราย       |
| ชื่อหน่วยงาน      | กรมการแผนที่          |
| ชื่อผู้จัดทำ      | ...                   |
| ชื่อผู้ตรวจสอบ    | ...                   |
| ชื่อผู้แก้ไข      | ...                   |
| ชื่อผู้พิมพ์      | ...                   |
| ชื่อผู้จัดจำหน่าย | ...                   |

กรมการแผนที่

Scale 1:50,000

Sheet 3 - RTSD L7017 5048 IV

AMPHOE PHAYA MENG RAI อำเภอพญาเม็งราย

|                   |                       |
|-------------------|-----------------------|
| ชื่อโครงการ       | โครงการสำรวจธรณีวิทยา |
| ชื่อพื้นที่       | อำเภอพญาเม็งราย       |
| ชื่อหน่วยงาน      | กรมการแผนที่          |
| ชื่อผู้จัดทำ      | ...                   |
| ชื่อผู้ตรวจสอบ    | ...                   |
| ชื่อผู้แก้ไข      | ...                   |
| ชื่อผู้พิมพ์      | ...                   |
| ชื่อผู้จัดจำหน่าย | ...                   |

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STOCK NO. L7017/04

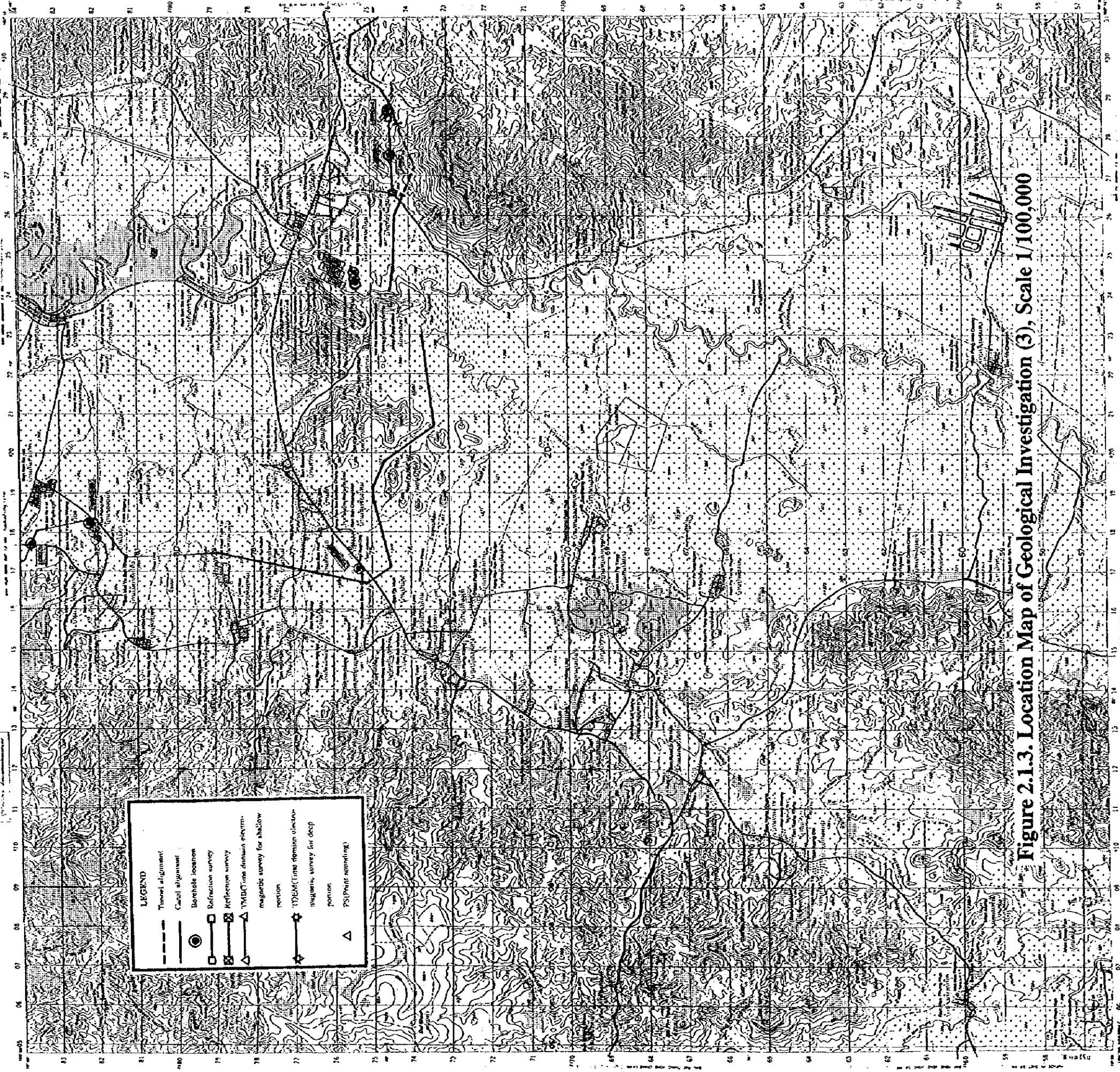


Figure 2.1.3. Location Map of Geological Investigation (3), Scale 1/100,000

กรมทรัพยากรธรณีวิทยา  
กรมแผนที่ทหาร  
กรมการแผนที่  
กรมการสำรวจ  
กรมการช่าง  
กรมการช่าง  
กรมการช่าง

Scale 1:100,000

๕๐๔๘ III ๓-RTSD ๕๐๔๘ III

๕๐๔๘ III ๓-RTSD ๕๐๔๘ III

๕๐๔๘ III ๓-RTSD ๕๐๔๘ III

๕๐๔๘ III ๓-RTSD ๕๐๔๘ III

๕๐๔๘ III ๓-RTSD ๕๐๔๘ III

๕๐๔๘ III ๓-RTSD ๕๐๔๘ III

๕๐๔๘ III ๓-RTSD ๕๐๔๘ III