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TABLE V. 1 GEOLOGY AT SEKRANG-1

| Site                             | SEKRANG-1   |   |   |
|----------------------------------|---|---|---|
| Geological formation and age     | Stage I of the Belaga Formation<br>Upper Cretaceous |   |   |
|                                  | Left bank   | River bed   | Right bank  |
| Geologic structure               | N 50 W 78 SE (dips toward upstream)                 |   |   |
| Classification of bed rock       | Slate   | Slate   | Slate   |
| Rock quality                     | Soft  | Soft  | Soft  |
| Weathering condition (Thickness) | Clayey slate<br>( 10 m )                            | Soft slate<br>( 1 - 3 m )   | Clayey slate<br>( 2 - 5 m )<br>Soft slate<br>( 5 - 6 m )        |
| Condition of fissure             | Schistosity at intervals of 2 - 10 cm, oxidization  | -   | Schistosity at intervals of 2 - 5 cm, oxidization               |
| Overburden (Thickness)           | Talus deposit<br>( 3 m )<br>Clay and silt, soft     | River deposit<br>( 7 - 8 m )<br>sand and gravel<br>dia: 3-10 cm<br>ave.: 5 cm<br>rounded-well rounded, mainly hard graywacke, loose | -   |
| Permeability of bed rock         | Clayey zone: low<br>Rock zone: middle               | Soft rock zone: middle<br>Rock zone: middle   | Clayey zone: low<br>Soft rock zone: middle<br>Rock zone: middle |

TABLE V. 2 GEOLOGY AT SEKCRANG-2

| Site                             |  | SEKCRANG-2   |  |  |
|----------------------------------|--|--|--|--|
| Geological formation and age     |  | Stage I of the Belaga Formation<br>Upper Cretaceous  |  |  |
|                                  | Left bank  | River bed  | Right bank   |  |
| Geologic structure               | N 30 W 50 SW (dips toward upstream)                    |  |  |  |
| Classification of bed rock       | Graywacke  | Graywacke  | Graywacke  |  |
| Rock quality                     | Very hard  | Very hard  | Hard   |  |
| Weathering condition (Thickness) | Sand and rubble due to weathering ( 10 m )             | (0)  | Sand and rubble due to weathering (10 - 20 m)                  |  |
| Condition of fissure             | Joint at intervals of more than 20 - 30 cm, tight      | -  | Joint at intervals of less than 15 - 30 cm cracky, oxidization |  |
| Overburden (Thickness)           | Alluvial terrace (2 - 3 m)<br>Fine sand and silt. Soft | River deposit ( 1 - 2 m)<br>sand and gravel<br>dia: mainly 3-5cm<br>max. 150 cm<br>rounded-well rounded, mainly graywacke, loose | Talus deposit (5 - 7 m)<br>clay and silt.<br>Soft              |  |
| Permeability of bed rock         | Weathered zone: high<br>Rock zone: low-middle          | Rock zone: low-middle  | Weathered zone: high<br>Rock zone: high                        |  |

TABLE V. 2 GEOLOGY AT KANOWIT

| Site                             |   | KANOWIT  |   |  |
|----------------------------------|---|--|---|--|
| Geological formation and age     |   | Stage II of the Belaga Formation<br>Lower Eocene   |   |  |
|                                  | Left bank   | River bed  | Right bank  |  |
| Geologic structure               | N 60 W 80 SW (dips toward up stream)  |  |   |  |
| Classification of bed rock       | Phyllite  | Phyllite   | Phyllite  |  |
| Rock quality                     | Soft  | Soft - hard  | Soft  |  |
| Weathering condition (Thickness) | Clayey phyllite ( 15 - 20 m )   | Soft phyllite ( 1 - 2 m )  | Clayey phyllite ( 15 - 20 m )   |  |
| Condition of fissure             | Schistosity at intervals of 1 - 2 mm<br>Joint at intervals of 3-10 cm, Cracky |  | Schistosity at intervals of 1 - 2 mm  |  |
| Overburden (Thickness)           | Talus deposit (3 - 5 m)<br>sand and silt soft                                 | River deposit ( 2 - 4 m )<br>sand and gravel<br>dia: 5-7 cm, max: 10 cm, well rounded-rounded<br>mainly hard gray-wacke, loose | Alluvial terrace ( 1 - 4 m )<br>fine sand, soft Talus deposit. ( 5 - 6 m )<br>clayey soil, soft |  |
| Permeability of bed rock         | Clayey zone: low<br>Rock zone: middle - high                                  | Rock zone: middle  | Clayey zone: low<br>Rock zone: middle   |  |

TABLE V. 4 GEOLOGY AT MEDAMIT-2

| Site                             | MEDAMIT-2  |   |   |
|----------------------------------|--|---|---|
| Geological formation and age     | Setap Shale Formation<br>Oligocene - Miocene         |   |   |
|                                  | Left bank  | River bed   | Right bank  |
| Geologic structure               | N 30 W 50 NE (dips toward down stream)               |   |   |
| Classification of bed rock       | Graywacke  | Shale<br>Graywacke  | Shale   |
| Rock quality                     | very hard  | Hard<br>very hard   | Hard  |
| Weathering condition (Thickness) | Looseness zone<br>( 1 - 2 m )                        | (0)   | Weathered shale<br>( 5 m )                              |
| Condition of fissure             | Low dip joint at intervals of 15-20 cm, tight - open | -   | Schistosity at intervals of 1-5 cm, tight - oxidization |
| Overburden (Thickness)           | Top soil<br>(less than 1 m)<br>loose                 | River deposit<br>( 2 m )<br>Sand and gravel<br>dia: 5-15 cm,<br>max. 70 cm<br>hard graywacke,<br>shale, rounded-<br>subrounded, loose | Top soil<br>clayey soil<br>( 5 m )<br>Soft              |
| Permeability of bed rock         | High   | Middle - high   | Middle  |



TABLE V. 5 GEOLOGY AT PASIA

| Site                             | PASIA                                       |                            |                             |
|----------------------------------|---|----------------------------|-----------------------------|
| Geological formation and age     | Meligan Formation<br>Miocene                |                            |                             |
|                                  | Left bank                                   | River bed                  | Right bank                  |
| Geologic structure               | NS - N20W 40 - 80NE (dips toward left bank) |                            |                             |
| Classification of bed rock       | Graywacke                                   | Graywacke                  | Graywacke                   |
| Rock quality                     | very hard and massive                       | very hard and massive      | very hard and massive       |
| Weathering condition (Thickness) | Assumed to be thin                          | Assumed to be fresh        | Assumed to be thin          |
| Condition of fissure             | Assumed to be massive and tight             | Assumed to be tight        | Assumed to be tight - open  |
| Overburden (Thickness)           | Exposed graywacke                           | River deposit (1 - 2 m)    | Exposed graywacke           |
| Permeability of bed rock         | Assumed to be low - middle                  | Assumed to be low - middle | Assumed to be middle - high |

TABLE V. 6 GEOLOGY AT AYAT

| Site                             | AYAT   |  |   |
|----------------------------------|--|--|---|
| Geological formation and age     | Stage II of the Belaga Formation<br>Lower Eocene - Paleocene                   |  |   |
|                                  | Left bank  | River bed                                    | Right bank  |
| Geologic structure               | N 70 W 85 NE (dips toward downstream)  |  |   |
| Classification of bed rock       | Alternation of siliceous sandstone and slate                                   | Alternation of graywacke and slate           | Alternation of graywacke and slate  |
| Rock quality                     | Siliceous sandstone: very hard<br>Slate: hard                                  | Hard   | Hard - soft   |
| Weathering condition (Thickness) | Clayey slate and sandstone-rubble ( 5-10 m )                                   | -  | Clayey slate, sand and rubble ( 5-10 m )  |
| Condition of fissure             | Joint at intervals of 15-20 cm in parallel with heading                        | Tight bedding planes at intervals of 5-10 cm | Oxidized and open bedding at intervals of 20-40 cm release joint at intervals of 15-30 cm |
| Overburden (Thickness)           | Alluvial terrace deposit ( 3-4 m )<br>sand and gravel<br>Clayey zone ( 2-3 m ) | -  | Top soil ( 3-4 m )  |
| Permeability of bed rock         | Middle   | Middle - low                                 | Middle - high   |

TABLE V. 7 GEOLOGY AT BANGKIT

| Site                             | BANGKIT  |  |                                    |
|----------------------------------|--|--|------------------------------------|
| Geological formation and age     | Stage II of the Belaga Formation<br>Lower Eocene - Paleocene |  |                                    |
|                                  | Left bank  | River bed  | Right bank                         |
| Geologic structure               | N 53 W 85 NE (dips toward downstream)                        |  |                                    |
| Classification of bed rock       | Alternation of argillite and slate                           | Alternation of argillite and slate   | Alternation of argillite and slate |
| Rock quality                     | Soft - hard  | Soft - hard  | Soft - hard                        |
| Weathering condition (Thickness) | Clayey soil (about 10 m)                                     | Soft rocks ( 2-3 m )   | Soft rocks ( 5-10 m )              |
| Condition of fissure             | Joints at intervals of a 1-5 cm in parallel with bedding     | -  | -                                  |
| Overburden (Thickness)           | Top soil ( 2 m )   | River deposit ( 1-2 m )<br>dia: mainly 2-4 cm<br>max. 40 cm,<br>subangular - sub-rounded, graywacke slate, loose | Alluvial terrace deposit ( 5-6 m ) |
| Permeability of bed rock         | Middle   | Middle   | Middle                             |

TABLE V. 8 GEOLOGY AT KAPIT-2

| Site                             | KAPIT-2   |   |  |
|----------------------------------|---|---|--|
| Geological formation and age     | Stage II of the Belaga Formation<br>Lower Eocene - Paleocene                |   |  |
|                                  | Left bank   | River bed   | Right bank   |
| Geologic structure               | EW 80 N-S (approximately vertical)  |   |  |
| Classification of bed rock       | Slate / Alternation of graywacke and slate                                  | Alternation of graywacke and slate                                  | Alternation of graywacke and slate / Slate                                   |
| Rock quality                     | Soft - hard   | Hard  | Soft - hard  |
| Weathering condition (Thickness) | Clayey slate (5-10 m)   | -   | Clayey slate (5-10 m)  |
| Condition of fissure             | Slate: Schistosity at intervals of 2 - 3 mm<br>Bedding plane: tight (altn.) | Slate: Schistosity at intervals of 2 - 3 mm<br>Bedding plane: tight | Slate: Schistosity at the intervals 2 - 3 mm<br>Bedding plane: tight (altn.) |
| Overburden (Thickness)           | Alluvial terrace (4-5 m)<br>sand and gravel                                 | -   | -  |
| Permeability of bed rock         | Clayey zone: Low<br>Rock zone: middle                                       | Rock zone: middle   | Clayey zone: Low<br>Rock zone: middle  |

TABLE V. 9 GEOLOGY AT MUKOH

| Site                             | MUKOH  |  |  |
|----------------------------------|--|--|--|
| Geological formation and age     | Stage II of the Belaga Formation<br>Lower Eocene - Paleocene   |  |  |
|                                  | Left bank  | River bed  | Right bank   |
| Geologic structure               | N 88 W 75-80 SW ( dips toward upstream)  |  |  |
| Classification of bed rock       | Graywacke  | Graywacke  | Graywacke  |
| Rock quality                     | Very hard  | Very hard  | Very hard  |
| Weathering condition (Thickness) | Looseness zone ( 2-3 m )   | (0)  | Looseness zone ( 4-5 m )   |
| Condition of fissure             | Vertical joint at intervals of 15-20 cm open, oxidation<br>Flat-lying joint at intervals of 10-20 cm, open | Vertical joint at intervals of 15 - 20 cm, tight | Vertical joint at intervals of 15 - 20 cm, open<br>Flat-lying joint at intervals of 10-20 cm, open |
| Overburden (Thickness)           | -  | -  | -  |
| Permeability of bed rock         | High   | Middle - low                                     | High   |

TABLE V. 10 GEOLOGY AT KAPIT-1

| Site                             | KAPIT-1   |  |   |
|----------------------------------|---|--|---|
| Geological formation and age     | Stage III of the Belaga Formation<br>Middle Eocene - Upper Eocene   |  |   |
|                                  | Left bank   | River bed  | Right bank  |
| Geologic structure               | N 60 W 40 NE (dips toward. right bank)                              |  |   |
| Classification of bed rock       | Slate   | graywacke<br>Slate   | slate<br>graywacke  |
| Rock quality                     | Soft  | Soft - Loose   | Soft - hard   |
| Weathering condition (Thickness) | Clayey slate  | Graywacke :<br>Looseness zone (4-5 m)<br>Soft slate :<br>(5-10 m)  | Graywacke :<br>Looseness zone (5-10 m)<br>Clayey slate :<br>(10-15 m) |
| Condition of fissure             | Schistosity at intervals of 1-2 mm<br>Joint at intervals of 5-10 cm | -  | Graywacke : open joint at intervals of 15-30 cm                       |
| Overburden (Thickness)           | -   | River deposit (2-3 m)<br>sand and gravel, dia:3-10 cm max. 15 cm, subangular-subrounded, graywacke, slate, loose | -   |
| Permeability of bed rock         | Clayey zone:<br>Low<br>Rock zone :<br>Middle                        | middle - high  | Graywacke : high<br>Slate : low - middle                              |

TABLE V. 11 GEOLOGY AT IBAU

| Site                             | IBAU  |   |   |
|----------------------------------|---|---|---|
| Geological formation and age     | Stage III of the Belaga Formation<br>Middle Eocene - Upper Eocene |   |   |
|                                  | Left bank   | River bed   | Right bank                                |
| Geologic structure               | EW - N 80 W 80 N ( dips toward upstream)                          |   |   |
| Classification of bed rock       | Slate   | Slate   | Slate                                     |
| Rock quality                     | Soft  | Soft - hard   | Soft                                      |
| Weathering condition (Thickness) | Clayey slate<br>( 10 - 15 m )                                     | Soft slate<br>( 5 - 6 m )   | Clayey slate<br>( 10 - 15 m )             |
| Condition of fissure             | -   | -   | Joint at intervals of 5-10 cm             |
| Overburden (Thickness)           | Alluvial terrace deposit (5 m)<br>sand and gravel                 | River deposit<br>( 2-3 m )<br>dia: 3-7 cm, max. 20 cm, subangular - subrounded, graywacke | -   |
| Permeability of bed rock         | Clayey zone :<br>Low<br>Rock zone: middle                         | Rock zone: middle   | Clayey zone :<br>Low<br>Rock zone: middle |

TABLE V. 12 GEOLOGY-AT QUARRY SITES

| SITE      | GEOLOGY                            | LOCATION                                    | REMARKS   |
|-----------|------------------------------------|---|-----------|
| SEKRANG-1 | Alternation of graywacke and slate | 2 km to the north-northwest of the damsite  | -         |
| SEKRANG-2 | Graywacke                          | 1 km to the north of the damsite            | -         |
| KANOWIT   | Sandstone                          | 20 km to the south-southeast of the damsite | -         |
| MEDAMIT-2 | Shale                              | -   | No quarry |
| PASIA     | Graywacke                          | 2 km to the north-east of the damsite       | -         |
| AYAT      | Graywacke                          | 1.5 km to the north of the damsite.         | -         |
| BANGKIT   | Alternation of slate and argillite | -   | No quarry |
| KAPIT-2   | Slate                              | 4 km to the north of the damsite            | -         |
| MUKOH     | Graywacke                          | 1 km to the east of the damsite             | -         |
| KAPIT-1   | Slate                              | -   | No quarry |
| IBAU      | Slate                              | -   | No quarry |





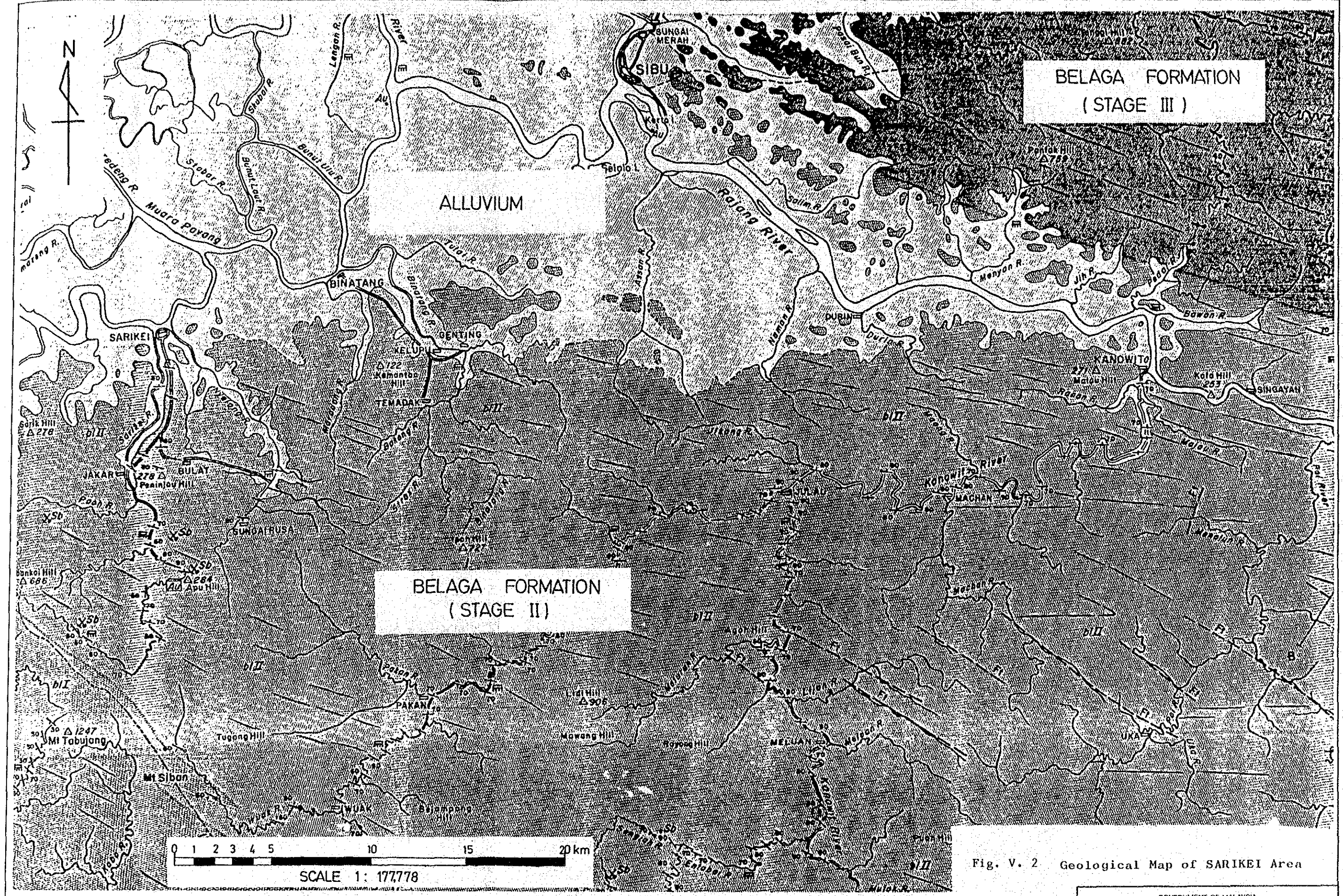


Fig. V. 2 Geological Map of SARIKEI Area

GOVERNMENT OF MALAYSIA  
 FEASIBILITY STUDY  
 SMALL SCALE HYDROELECTRIC POWER PROJECT IN SARAWAK  
 JAPAN INTERNATIONAL COOPERATION AGENCY

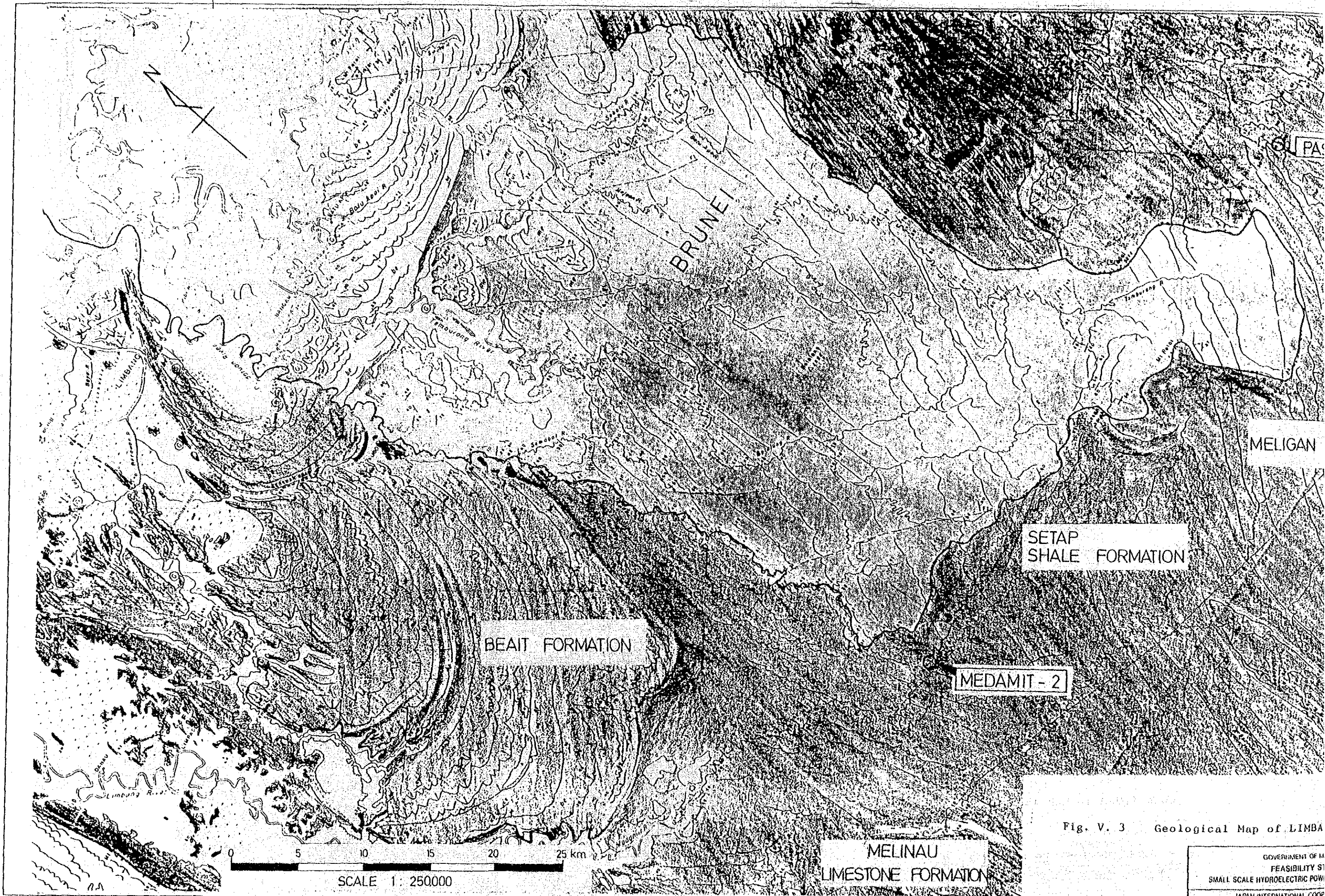


Fig. V. 3 Geological Map of LIMBAU

GOVERNMENT OF MALAYSIA  
 FEASIBILITY STUDY  
 SMALL SCALE HYDROELECTRIC POWER  
 JAPAN INTERNATIONAL COOPERATION AGENCY

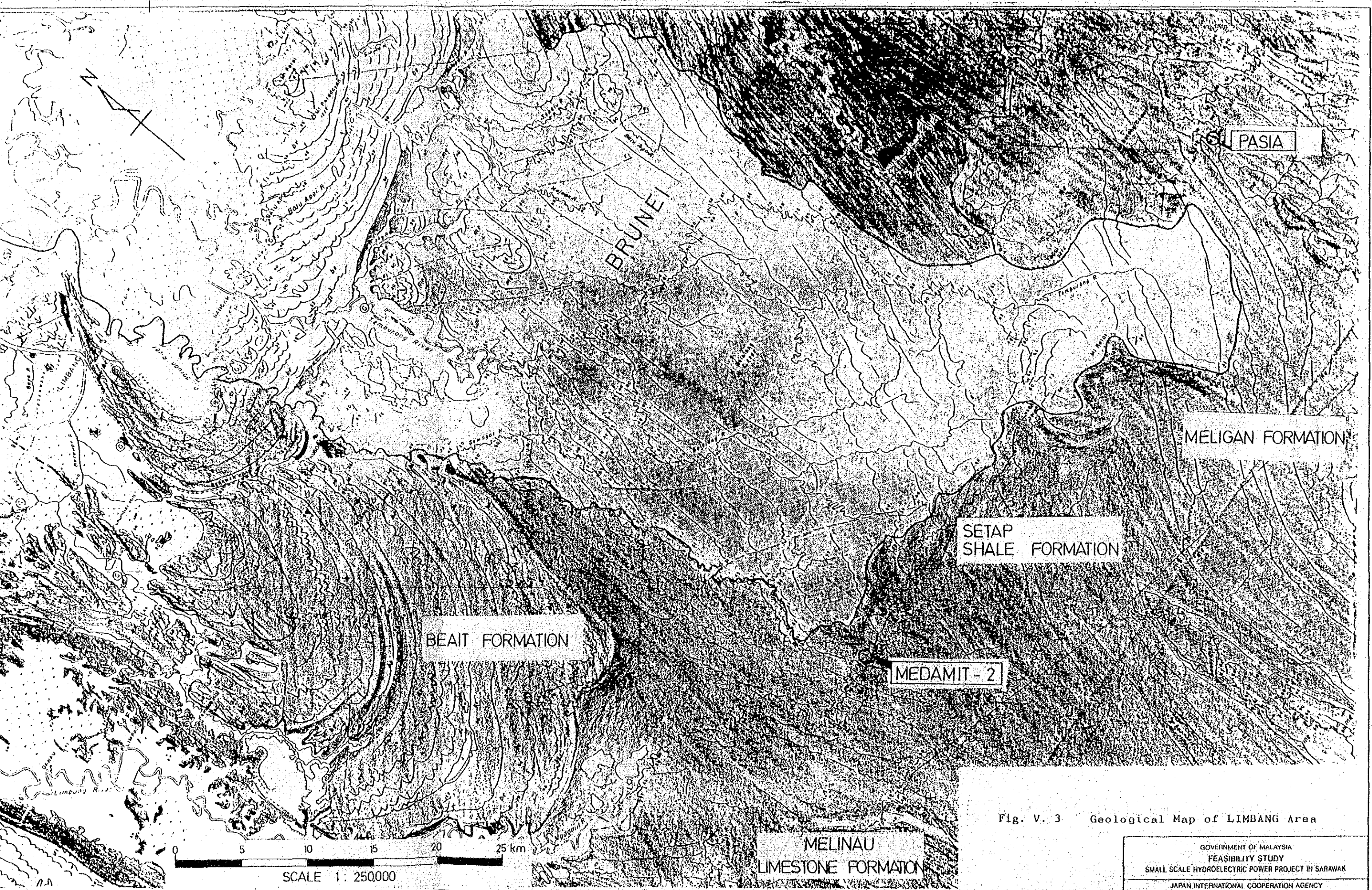


Fig. V. 3 Geological Map of LIMBANG Area

GOVERNMENT OF MALAYSIA  
 FEASIBILITY STUDY  
 SMALL SCALE HYDROELECTRIC POWER PROJECT IN SARAWAK  
 JAPAN INTERNATIONAL COOPERATION AGENCY