



Bawakaraeng Urgent Sediment Control Project (The Most Urgent Components)

August 2005

The Collapse

- ◆ On March 26, 2004, Mt. Sorongan (EL.2,541m) in the caldera of Mt. Bawakaraeng Collapsed.
- ◆ **The estimated collapsed volume:** 200 – 300 mil. cum.
- ◆ **Damage:** 32 people death and missing, 635 cows losing, Houses and elementary school in Lengkese village and about 1,500 ha. of agricultural land buried;
- ◆ **The damages expected:**
 - The riverbed aggradations and loss of properties along the river such as paddy fields;
 - Sedimentation of Bili-Bili Dam (; and
 - Secondary disaster due to debris flow (Carrying away of Daraha Bridge, Existing bank erosion etc.).

Location

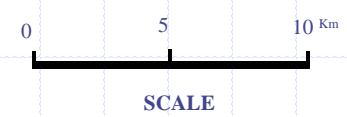
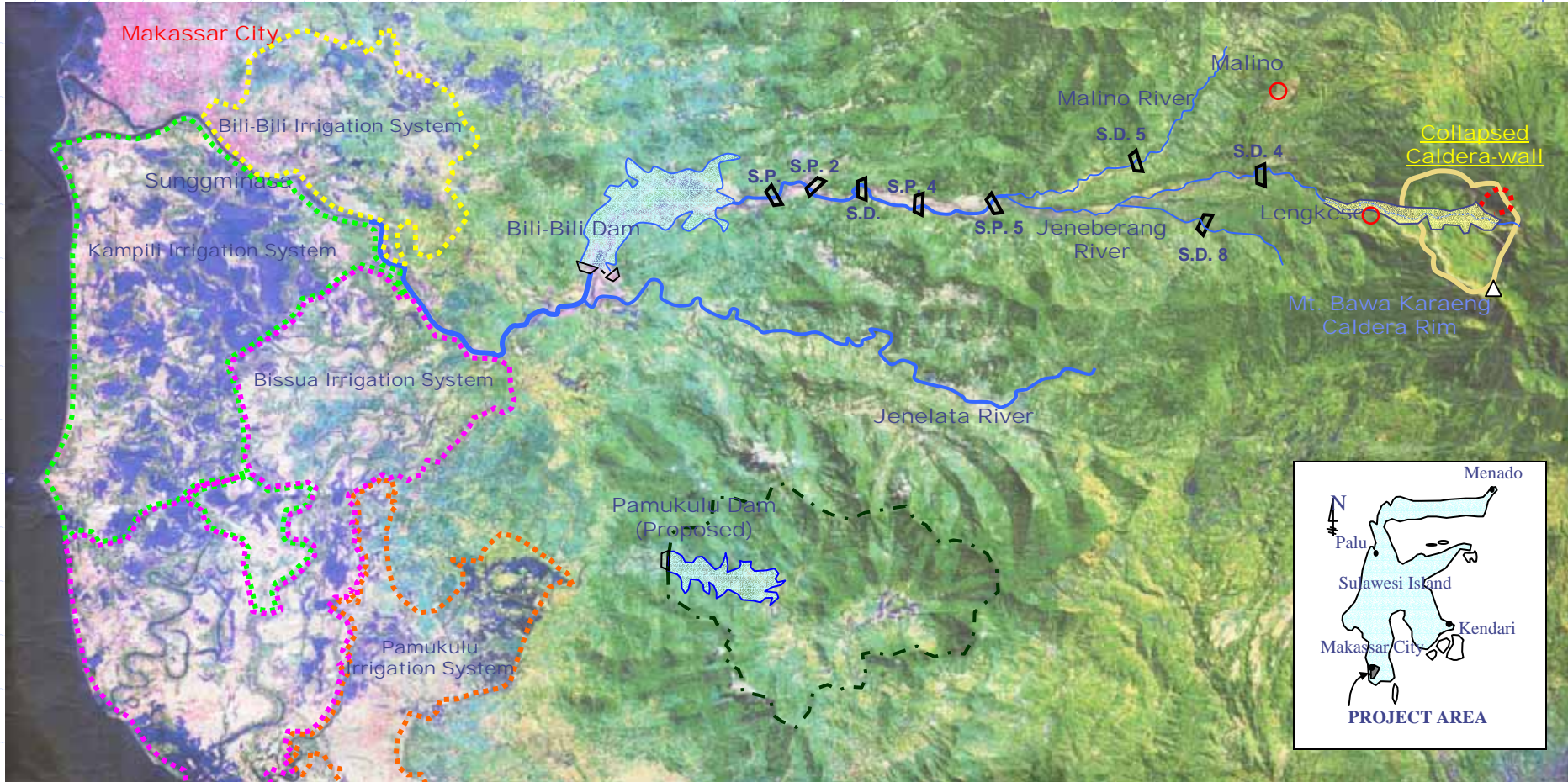
35 km

7 km

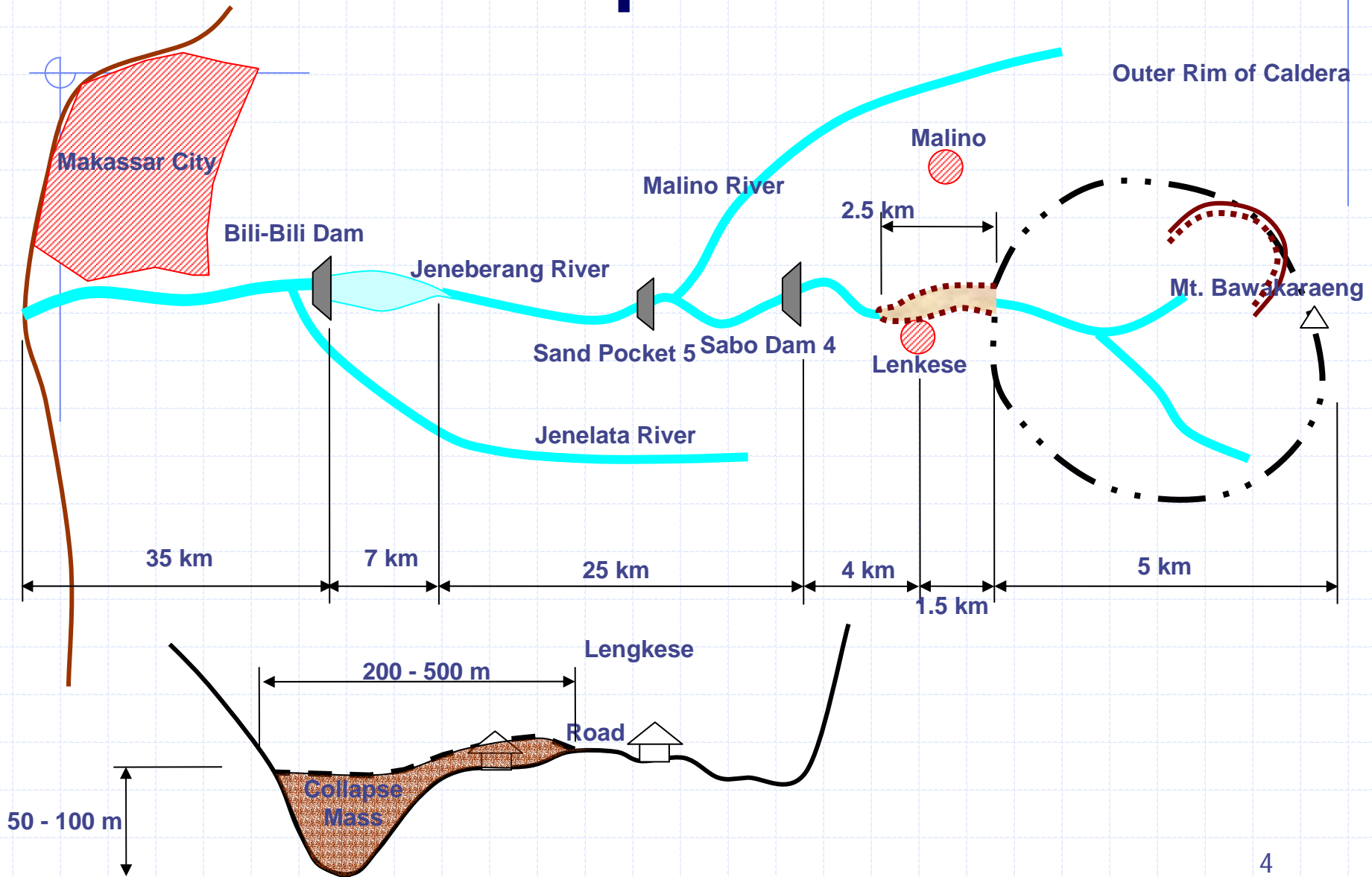
12 km

17 km

5 km

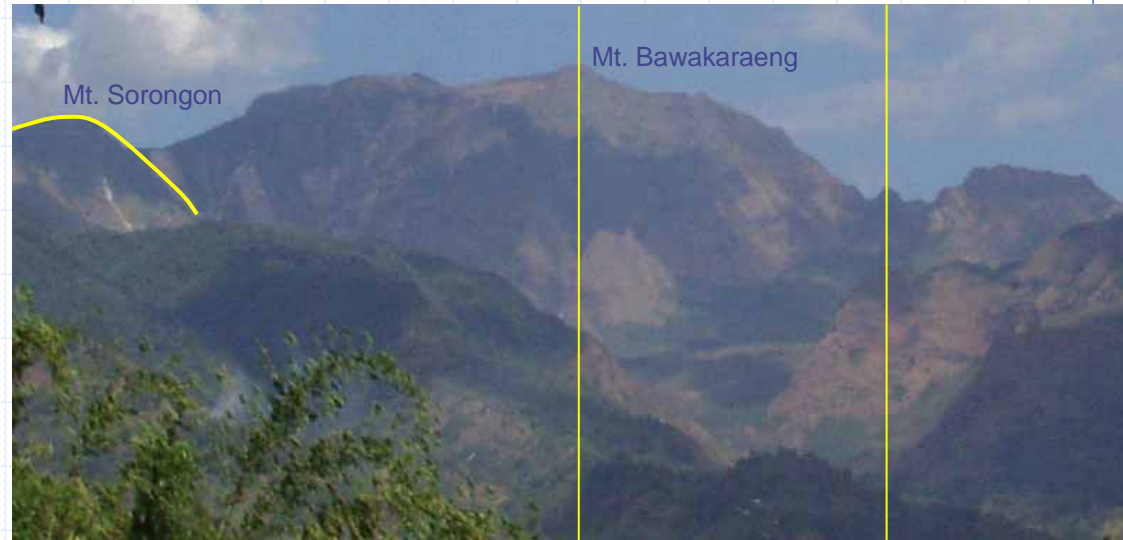


Schematic Map of Site



Collapsed Mountain

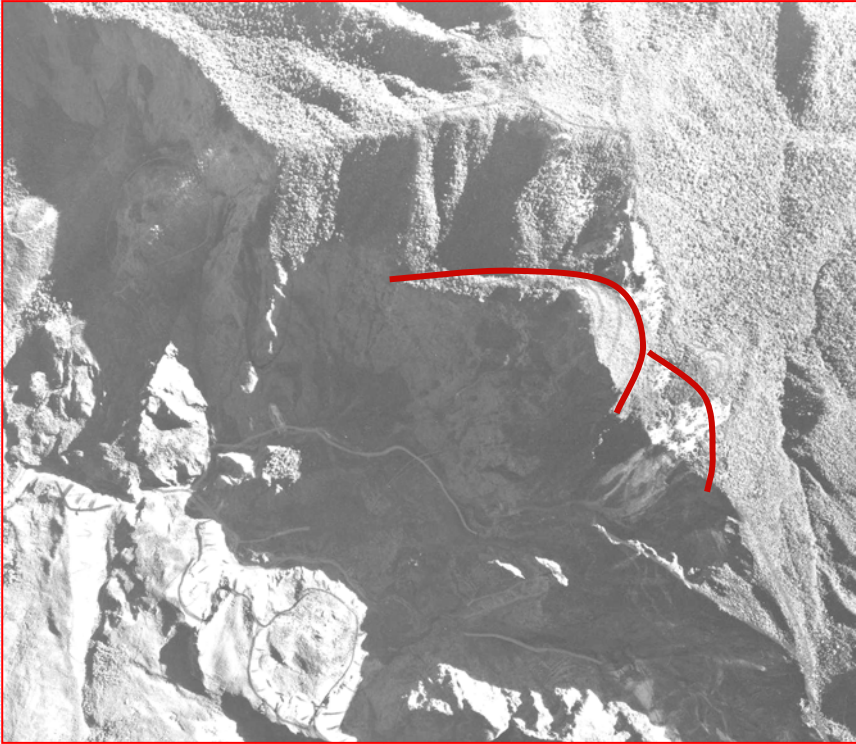
Before the Collapse
As of July 2002



After the Collapse
As of March 2004



Collapsed Mountain (Aerial Photos)

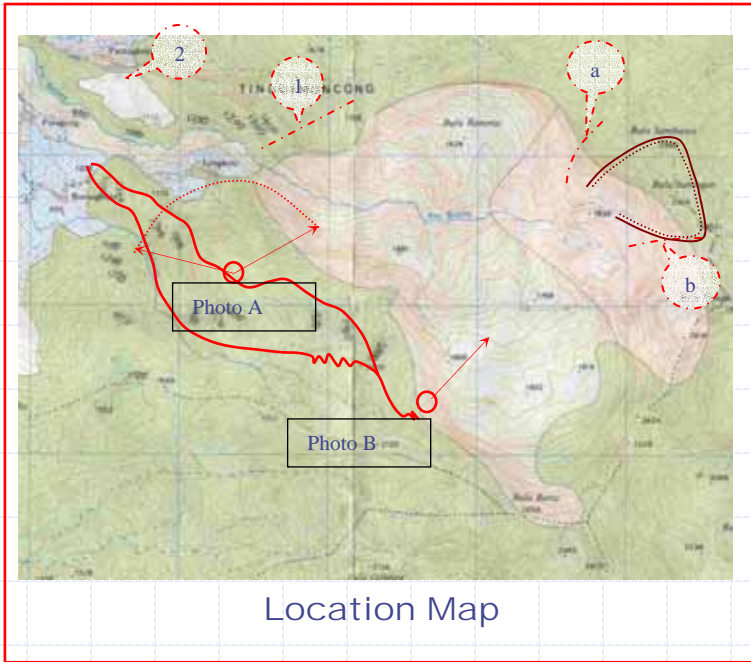


August 1993



July 2004

Collapsed Area (As of April 8, 2005)



After Collapse – at Lengkese (March 26, 2005)



Buried
Houses



Evacuation of
Village People



Buried Paddy Field
(Parangkeke)



Development of Gully



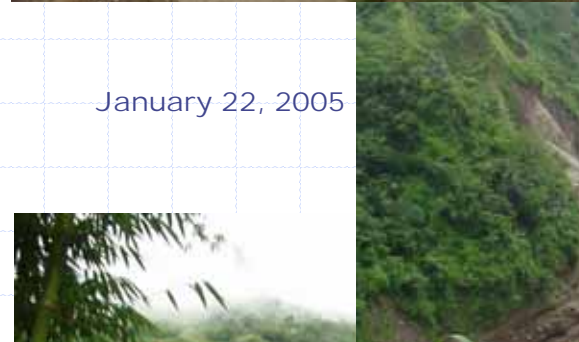
April 8, 2004



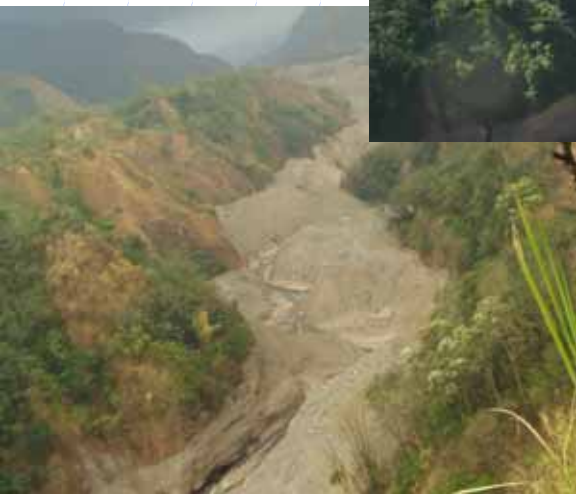
December 9, 2004



June 20, 2004



January 22, 2005



September 27, 2004



February 14, 2005

Damages – Debris Flow



Jeneberang River Channel

Paddy fields along the river were buried. The damage expands day by day.

Sand Pocket Dam No. 5

Before Collapse



Evacuated Houses along the River (Bonto-Jai)

The left abutment of SP No. 5 was completely buried by debris.

At the downstream of SP No.5, village people start cultivating.

March 26, '04



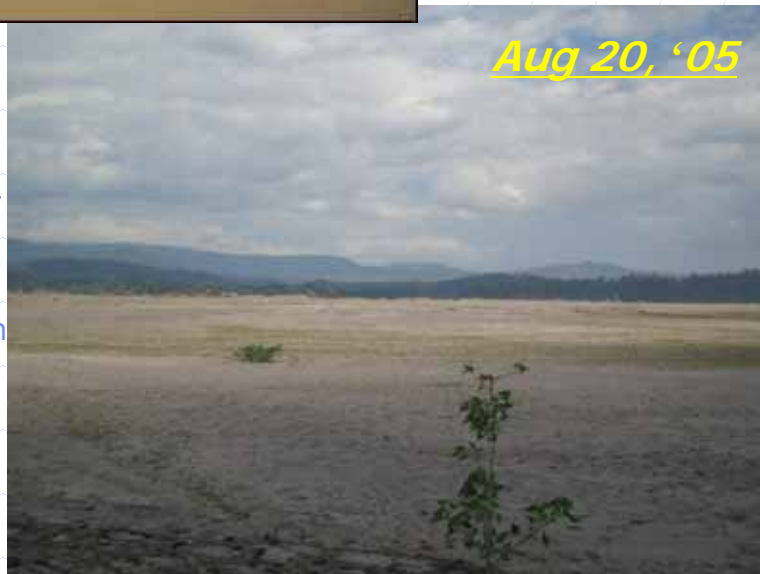
March 26, '05



Damages – Sedimentation of Bili-Bili Dam



Sedimentation at
Upstream of the
Bili-Bili Reservoir
at present, the sediment
volume is estimated at
10mil m³ while the design
sediment volume is set at
29mil. m³.



Raw Water Turbidity
at Somba-Op Water Purification
Plant

During rainy season in '04 to '05,
the operation and supply water
were stopped for 22days or
350hrs. in total due to the
sediment content.

Damages – River Structures

Sand Pocket No. 4



Daraha Bridge

Daraha Bridge was flushed out by debris flow on 14 April 2005. Trans 13,000 village People has been affected.



The Project

Bawakaraeng
Urgent Sediment Control Project

Objectives of the Project

- ◆ *To protect public assets such as Bili-Bili dam and the farmlands and properties along the river;*
- ◆ *To mitigate the secondary disaster due to the debris flow,*
- ◆ *To realize sustainable Sabo works and sand management, and*
- ◆ *To improve the social welfare in the affected area.*

Counter Measures

*Following countermeasures will be provided to achieve the objectives in accordance with the **ISDM** concept:*

◆ **Structural Measures**

- Construction of Sabo Dams;*
- Rehabilitation of existing structures (Road, bridge and Sand Pocket Dam No. 4);*
- Removal of River Deposit at Sand Pocket Dams and Bili-Bili Reservoir.*

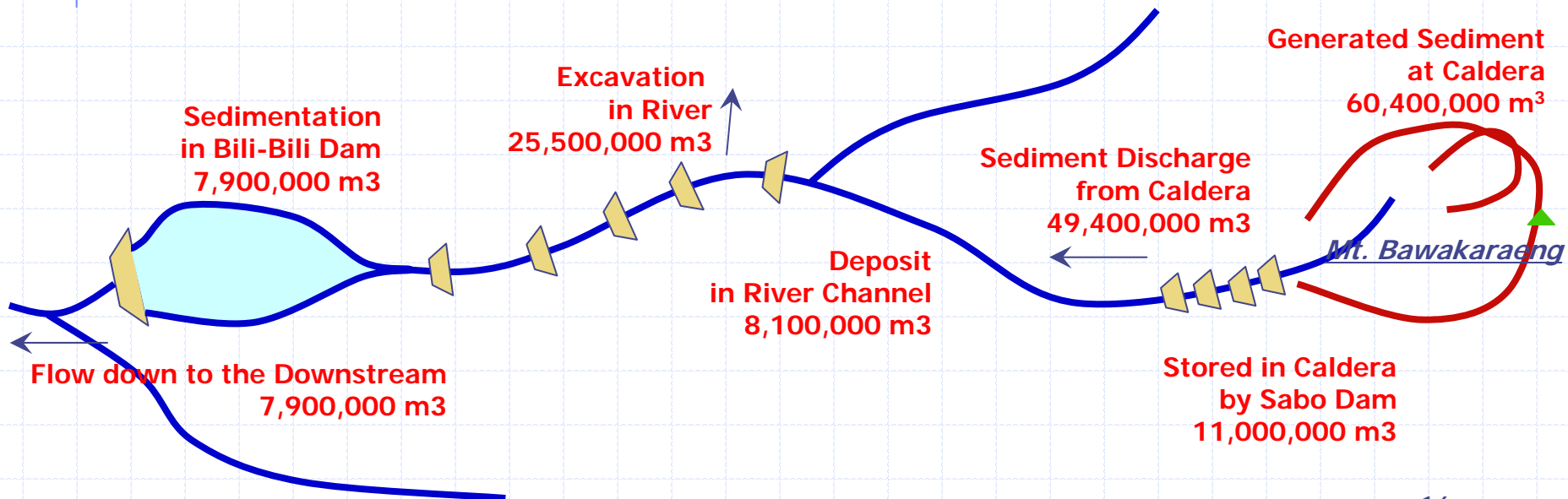
◆ **Nonstructural Measures**

- Urgent inspection for prediction of further collapse and occurrence of debris flow;*
- Providing forecasting and warning system against the debris flow.*

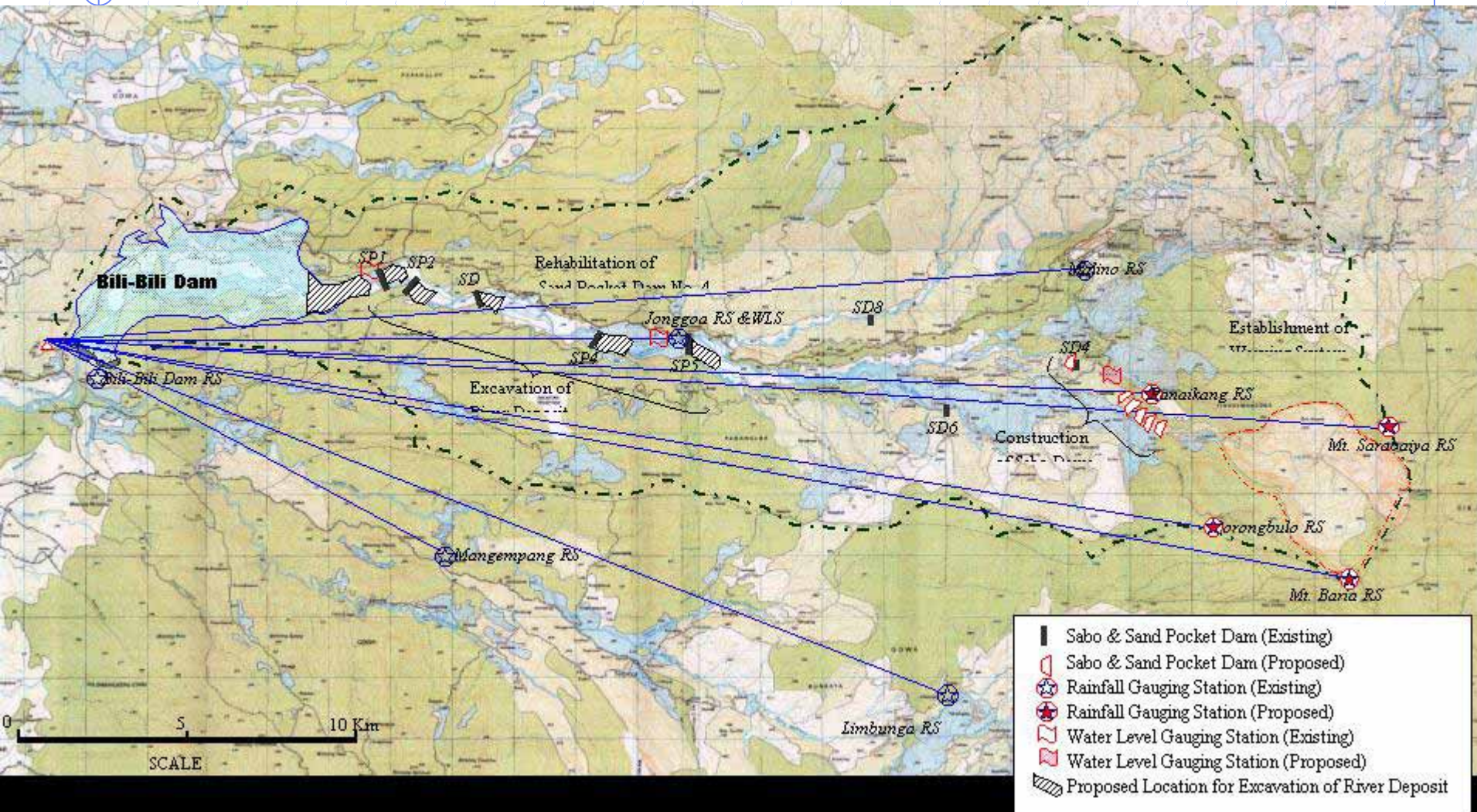
Sediment Control plan

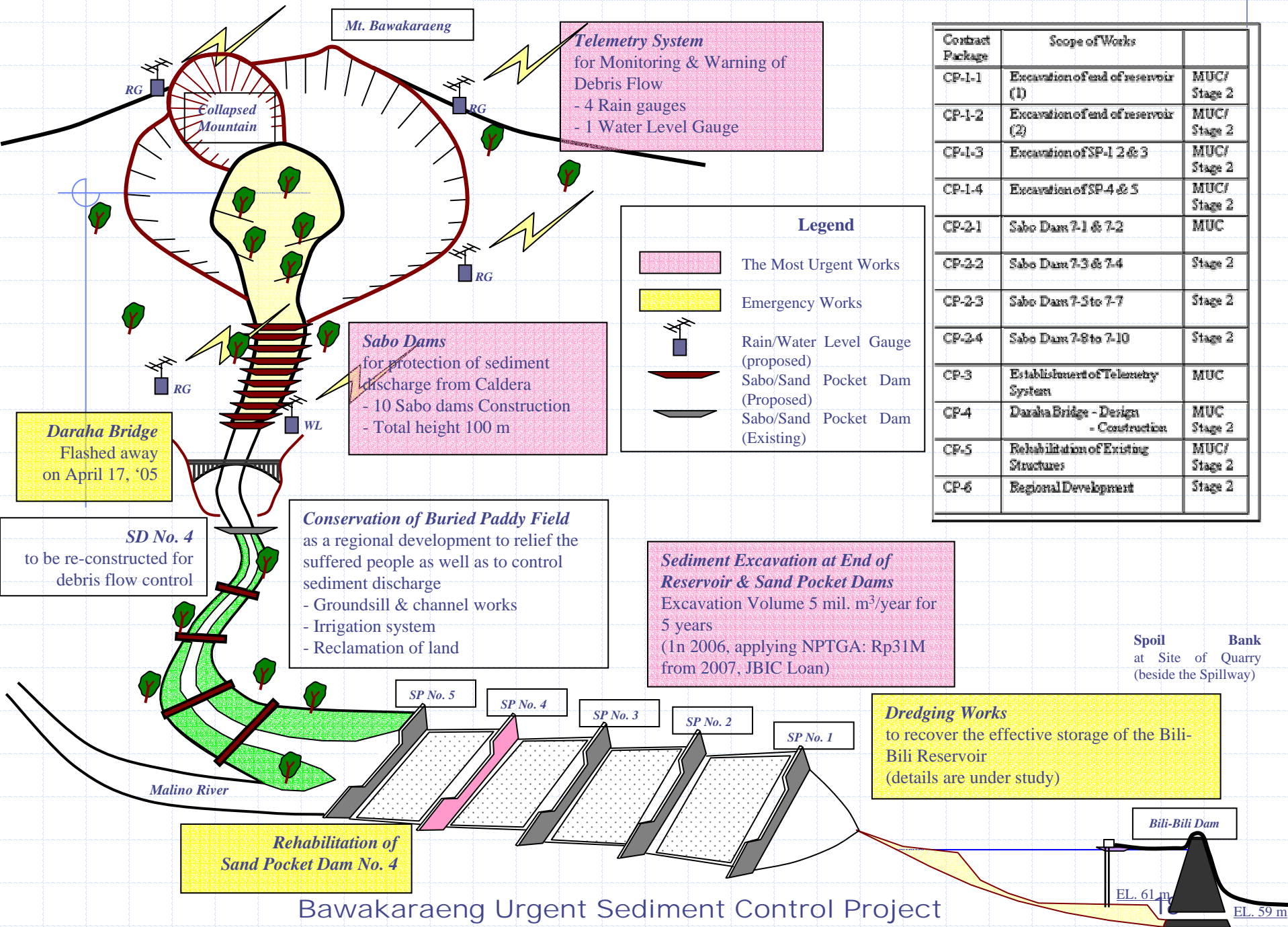
◆ Sediment Balance up to 2009

- Generated Sediment at Caldera	60,400,000 m ³
- Stored in Caldera by Sabo Dam	11,000,000 m ³
- Sediment Discharge from Caldera	49,400,000 m ³
- Deposit in River Channel	8,100,000 m ³
- Excavation in River	25,500,000 m ³
- Sedimentation in Bili-Bili Dam	7,900,000 m ³
- Flow down to the Downstream	7,900,000 m ³



General Map of the Project





Mt. Bawakaraeng

Telemetry System
for Monitoring & Warning of
Debris Flow
- 4 Rain gauges
- 1 Water Level Gauge

Collapsed Mountain

Sabo Dams
for protection of sediment
discharge from Caldera
- 10 Sabo dams Construction
- Total height 100 m

Daraha Bridge
Flashed away
on April 17, '05

Legend

- The Most Urgent Works
- Emergency Works
- Rain/Water Level Gauge (proposed)
- Sabo/Sand Pocket Dam (Proposed)
- Sabo/Sand Pocket Dam (Existing)

Contract Package	Scope of Works	
CP-1-1	Excavation of end of reservoir (1)	MUC/ Stage 2
CP-1-2	Excavation of end of reservoir (2)	MUC/ Stage 2
CP-1-3	Excavation of SP-1, 2 & 3	MUC/ Stage 2
CP-1-4	Excavation of SP-4 & 5	MUC/ Stage 2
CP-2-1	Sabo Dam 7-1 & 7-2	MUC
CP-2-2	Sabo Dam 7-3 & 7-4	Stage 2
CP-2-3	Sabo Dam 7-5 to 7-7	Stage 2
CP-2-4	Sabo Dam 7-8 to 7-10	Stage 2
CP-3	Establishment of Telemetry System	MUC
CP-4	Daraha Bridge - Design - Construction	MUC/ Stage 2
CP-5	Rehabilitation of Existing Structures	MUC/ Stage 2
CP-6	Regional Development	Stage 2

Conservation of Buried Paddy Field
as a regional development to relief the
suffered people as well as to control
sediment discharge
- Groundsill & channel works
- Irrigation system
- Reclamation of land

Sediment Excavation at End of Reservoir & Sand Pocket Dams
Excavation Volume 5 mil. m³/year for 5 years
(In 2006, applying NPTGA: Rp31M from 2007, JBIC Loan)

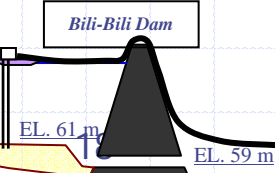
SD No. 4
to be re-constructed for
debris flow control

Dredging Works
to recover the effective storage of the Bili-Bili Reservoir
(details are under study)

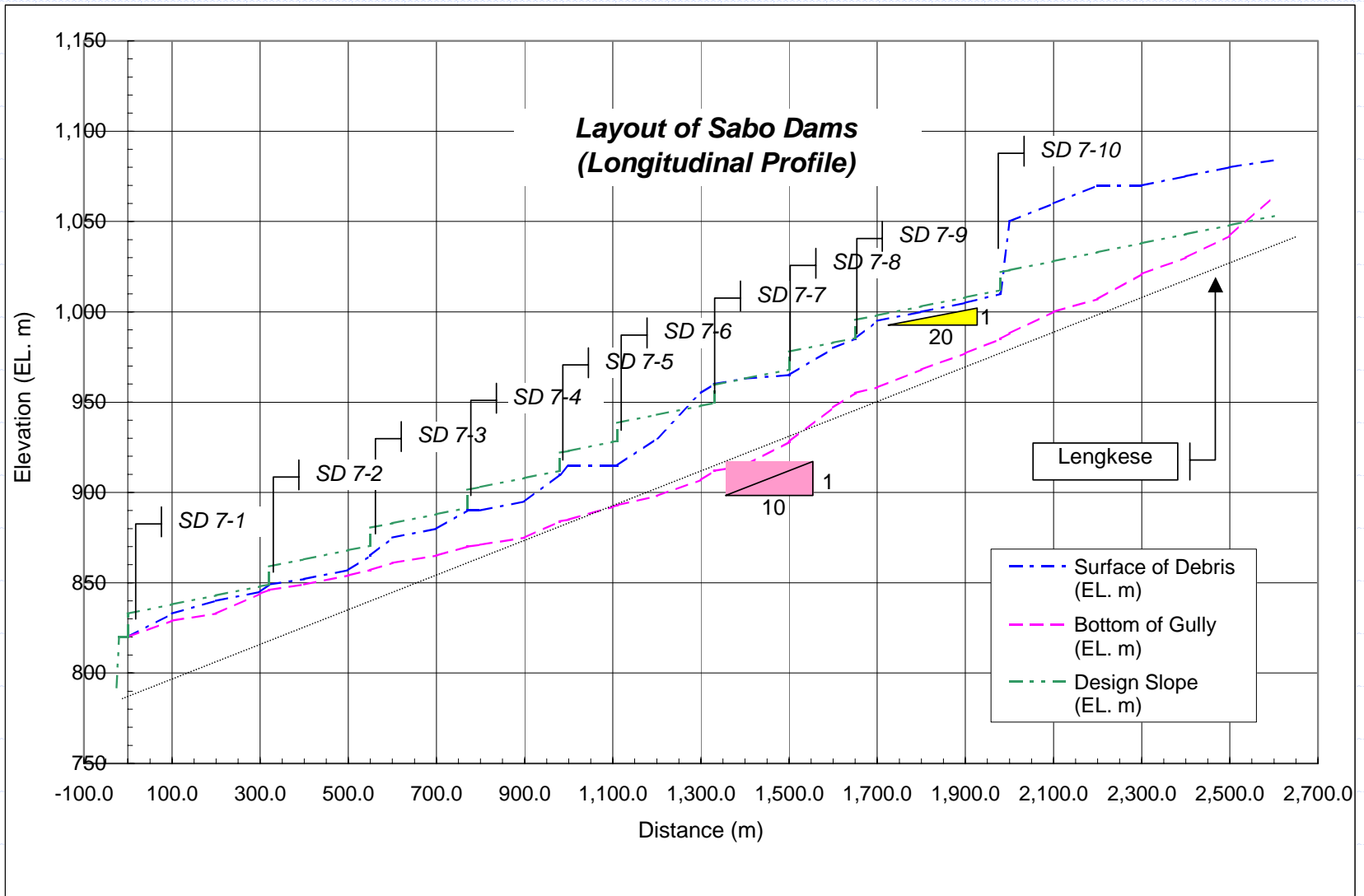
Rehabilitation of Sand Pocket Dam No. 4

Spoil Bank at Site of Quarry (beside the Spillway)

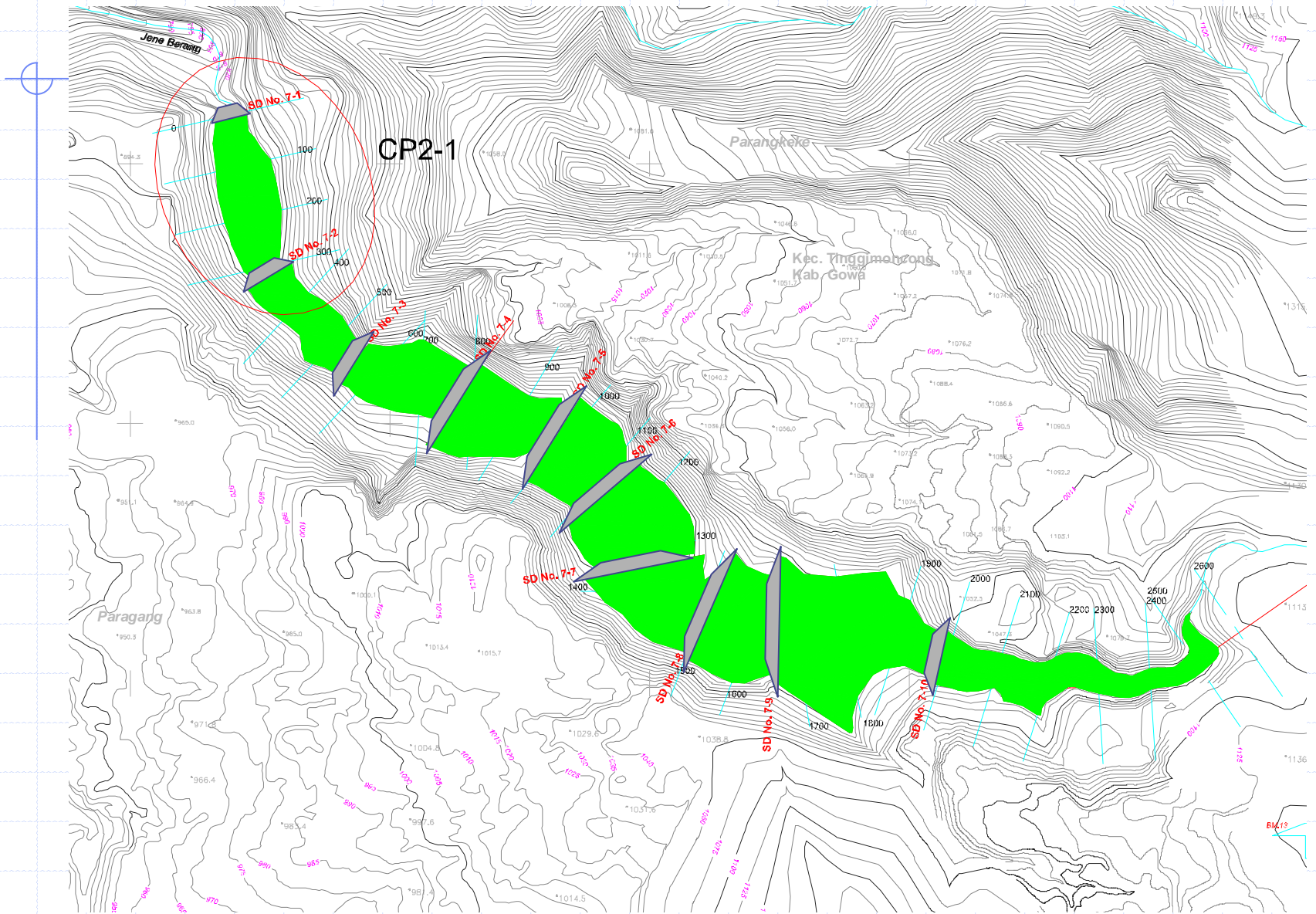
Bawakaraeng Urgent Sediment Control Project



Sabo Dam Plan: Profile



Sabo Dam Plan: Plan



The Most Urgent Components Selection Concepts

For the early implementation of the works, the Consultant was selected under direct appointment. But the scope of works were limited to the Most Urgent Components which were selected in accordance with following concepts:

- ◆ The works will affect the peoples' lives and their daily activities.
- ◆ The works related to the sediment control and must be conducted within this year to catch up the proposed schedule.

Scope of Works

the Most Urgent Components

(1) Study Components

- ◆ Urgent Investigations (Data Collection, Survey for Further Collapse);
- ◆ Preparation of hazard map and monitoring, warning and evacuation systems;
- ◆ Periodical survey of river and reservoir and its analysis;

(2) Environmental and Regional Development Components

- ◆ Establishment of PAFs' Participatory Process to the Project;
- ◆ Environmental Monitoring;

(3) Structural Components

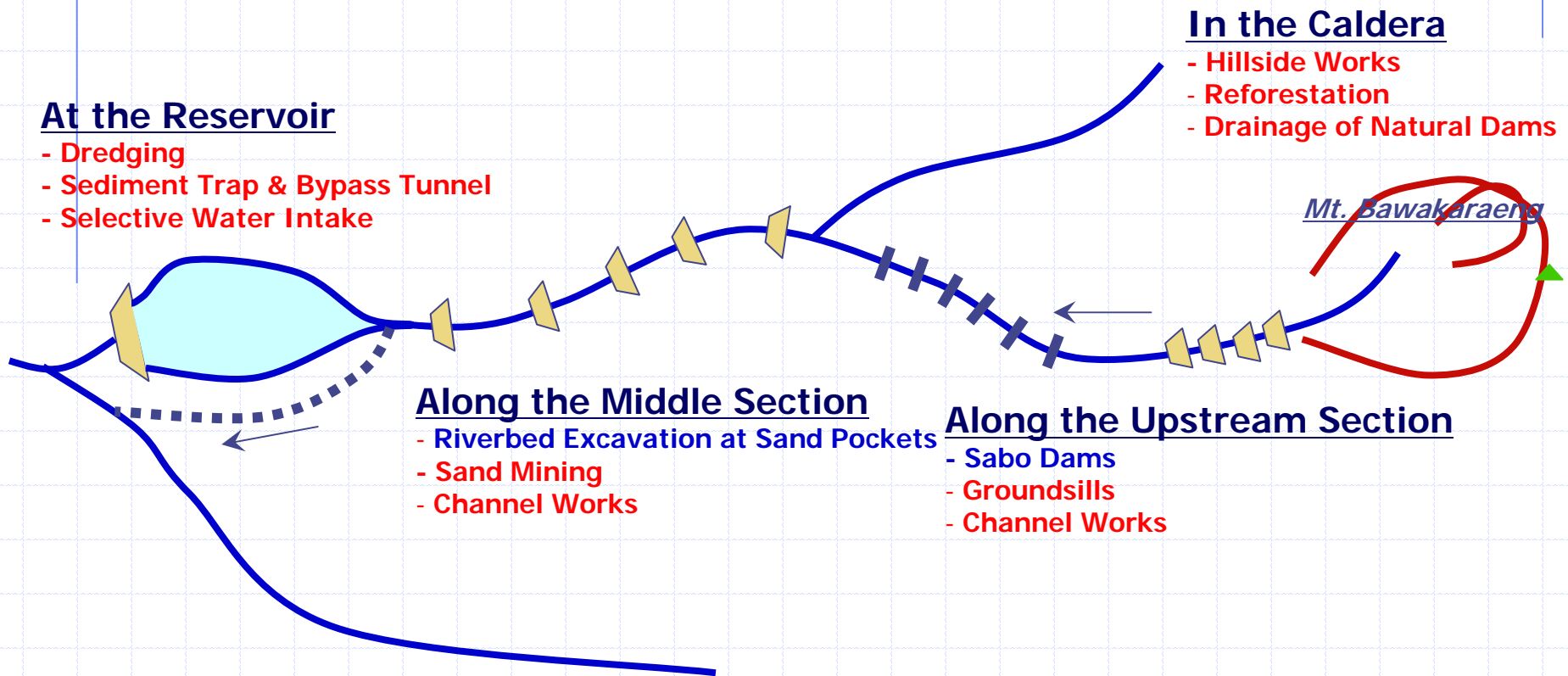
- ◆ Excavation of Riverbed Deposit to be conducted in 2005 and 2006;
- ◆ Construction of Series of Sabo Dams No. 7 to be constructed in 2005 and 2006;
- ◆ Establishment of Telemetry System;

Proposed Additional Works

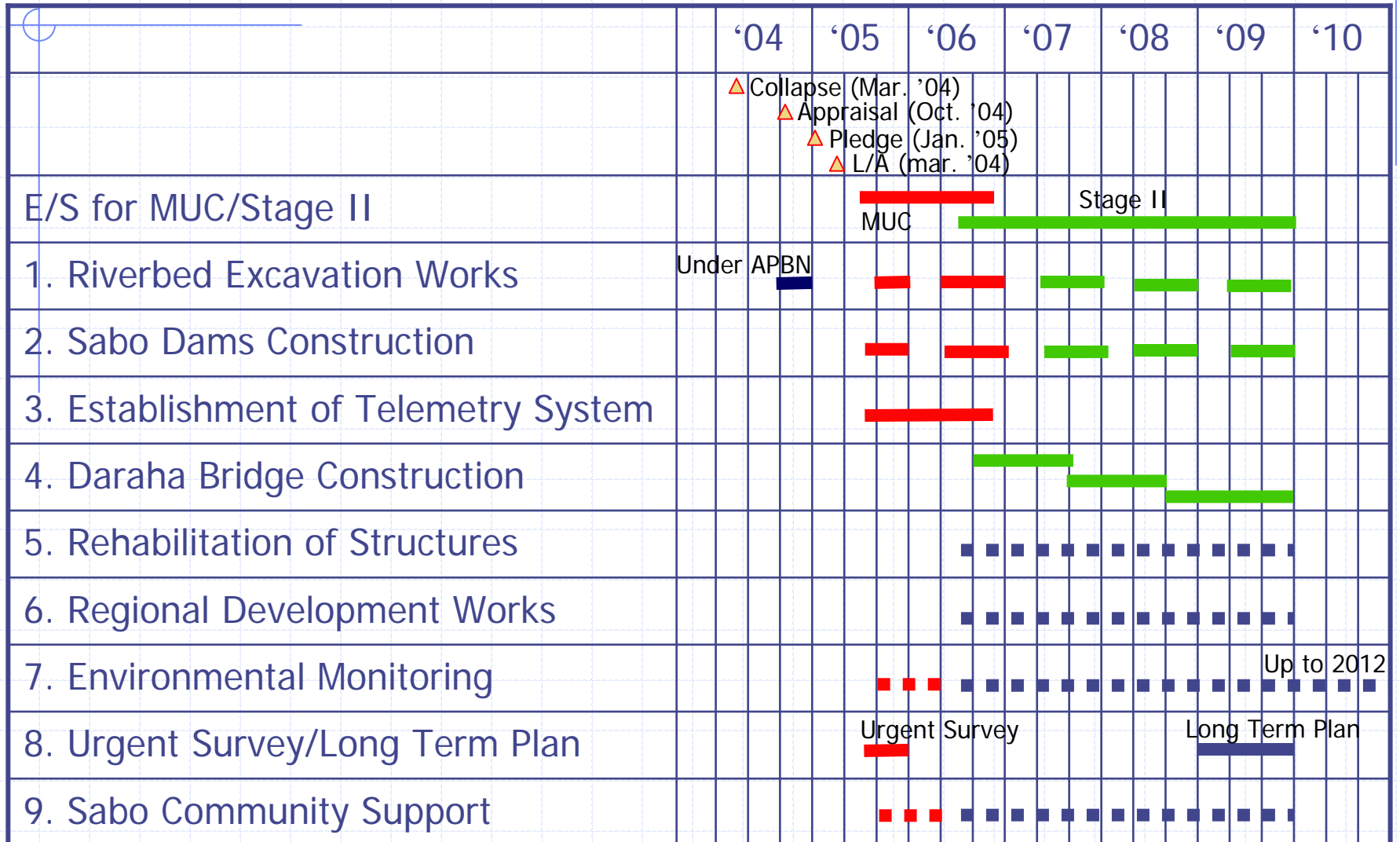
- ◆ Works should be conducted immediately
 - Design of Daraha Bridge.
 - Rehabilitation of Sand Pocket Dam No. 4.
 - Sediment Flashing for Bili-Bili Dam.
- ◆ Works to be conducted in Stage II
 - Succeeding works of MUC
 - Construction of Daraha Bridge
 - Regional Development
- ◆ Works to be conducted in future
 - Reservoir Sedimentation Control Measures.
 - Surface Water Intake System.
 - Watershed Management Plan of the JRB.

Proposed Additional Works

Proposed Additional Sediment Control Measures



Implementation Schedule



Present Activities

Construction Works

◆ Construction of Sabo Dam No. 7-1

- Design Dec. 2004
- Tender May - Jul. 2005
- Construction Jul. 2005 - Oct. 2005

◆ Telecommunication System

- Design Jun. - August 2005
- Tender Sep. - Dec. 2005
- Construction Jan. - Oct. 2006

Present Activities

Urgent Survey

Starting from June 2005

- ◆ **Site Investigation in & around the Caldera.**
- ◆ **Data Collection**
 - Related Reports/Topographic Maps
 - Rainfall Data from DCO/DINAS;
 - Turbidity of Raw Water from PDAM & PLN;
 - Debris Flow & Rainfall records from Sabo Communities.
- ◆ **Evaluation of Collapse Mass & Sediment Movement**
through Map/Aerial Photo Readings.
- ◆ **Geological Evaluation**
 - Geological
 - Verification of Mechanism of the Collapse;
 - Evaluation of further collapse.

Present Activities

Subcontract Works

- ◆ Topographic Survey
 - Aerial photo & Ortho-photo mapping
 - River Cross-sectional Survey
 - Reservoir echo-sounding
 - Topographic survey at Daraha Bridge
- ◆ Material & Geological Investigation
 - Riverbed Material Survey
 - CSG & ISM Trial Mix.
 - Geological Survey at Daraha Bridge
- ◆ The environmental monitoring for the construction works
- ◆ Assistance works of the activities of Sabo Communities in Jeneberang

Activities of Sabo Community

- ◆ Monitoring of Sediment Movement and Debris Flow.
- ◆ Monitoring of Rainfall at Panaikang.
- ◆ Public Awareness of Sediment Disaster.
 - Preparation of Hazard Map applying the PRA Process;
 - Establishment of Evacuation Center;
 - Indication of Hazardous Zone;
 - Emergency Drill of Warning & Evacuation.
- ◆ Support of Local Economic Activities.
 - Training of Production of Concrete Pavement Block;
 - Nourish of young trees, etc.;





The End