環境社会配慮助言委員会事務局

環境社会配慮助言委員会ワーキンググループ

・日時：2010 年 7 月 21 日（水）１３：３０～１５：３０
・場所：JICA 研究所　（会議室：２階　２０３会議室）

議　題

1. インドネシア 水力開発マスタープラン調査（開発計画調査型技術協力）のスコーピング案についての助言案作成
（担当 WG 委員：石田委員、福田委員、松下委員、満田委員、柳委員）

（備考等）

- 本調査は旧ガイドライン適用案件であり、審査会に代わり助言委員会が助言を行うもの。
- MP＋プレ FS を行う開発計画調査型技術協力において、プレ FS 対象の選定過程とプレ FS のスコーピング案を含む資料を確認し、助言案を作成。
- 今回の助言後は、2011 年 3 月頃に報告書ドラフトに対して助言を行う予定。

資料

1）インテリムレポート（第 1 回委員会で配付済）

以上

助言検討対象案件

インドネシア国「水力開発マスタープラン調査プロジェクト」（開発計画調査型技術協力（M/P））

（1）基礎情報
・国名：インドネシア
・場所：全国
・事業概要：
インドネシア国における水力開発マスタープランを策定する。
主な調査項目：最新の電力需要予測、送電計画との整合性等、電力セクター全体の計画の確認。
地域/流域/系統毎に水力発電が果たすべき役割の検討。
水力開発候補地点における開発優先順位付け及び具体的な投資計画の策定。
また、特に有望な案件についてのプレFSレベルの開発計画を策定する。

・カテゴリ分類とその根拠：カテゴリ分類：「A」
本事業は、「環境社会配慮確認のための国際協力銀行ガイドライン」（2002年4月制定）に掲げる水力発電セクターに該当するため、カテゴリAに該当する。

（2）今後の想定スケジュール

	調査段階		環境レビュー段階
	スコーピング案	報告書ドラフト	環境レビュー
委員会開催時期（予定）	**2010年7月21日 15時～**	2011年3月頃	-
備考等	-	-	-

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Ministry of Energy and Mineral Resource

PT PLN (Persero)

Project for the Master Plan Study of Hydropower Development in Indonesia

2nd Stakeholder Meeting

22nd June, 2010

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Today's Agenda

1. Project Outline
2. Interim Result of the Study
3. Outline of Further Investigation

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1. Project Outline

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1-1. Objectives of the Study

1)Assistance to formulate the hydropower development master plan

- Scenario of hydropower development until 2027
- Consistency with the demand forecast and transmission line plan
- Role of hydropower in each power system
- Prioritization of candidate hydropower sites, and concrete investment program
- Pre-feasibility level study for selected prospective plans taking account of ODA financing

2)Transfer of knowledge through joint implementation of the Study

3)Conducting studies by referring JICA Guidelines for Environmental and Social Considerations (Apr 2004)[5]

1-2. Relevant Parties

Organization	Role
MEMR	Project Proponent
PLN	Project Proponent
JICA (*1) Study Team	Study Team for Project for the Master Plan Study of Hydropower Development in Indonesia

*1: JICA stands for Japan International Cooperation Agency

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1-3. Study Area

- Whole country of Indonesia
- The Study will focus on the hydropower potential sites listed in the inventory attached in the Minutes of Meeting agreed between MEMR, PLN and JICA.
  - ✓ Projects which passed 3rd screening in HPPS2
  - ✓ Pumped storage projects in Java screened in HPPS2
  - ✓ 5.0～10.0MW class projects screened in HPPS2
  - ✓ D/D, F/S and Pre-F/S completed
- Additional examination:
  - ✓ Modification of dam/reservoir project to run-of-river project
  - ✓ Expansion of existing plants
  - ✓ Pumped storage projects in Sumatra

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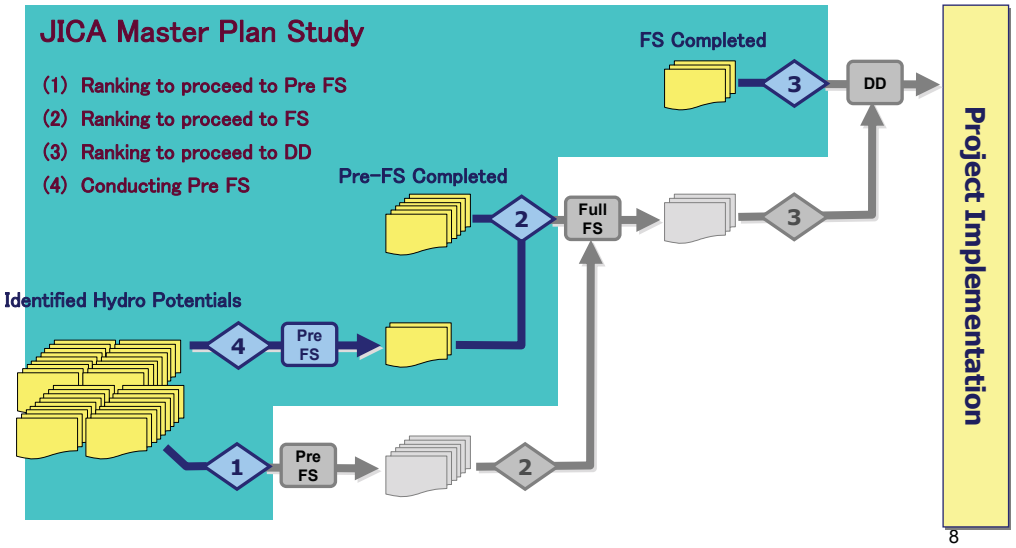
1.4 Flow of Hydropower Development and JICA Master Plan Study



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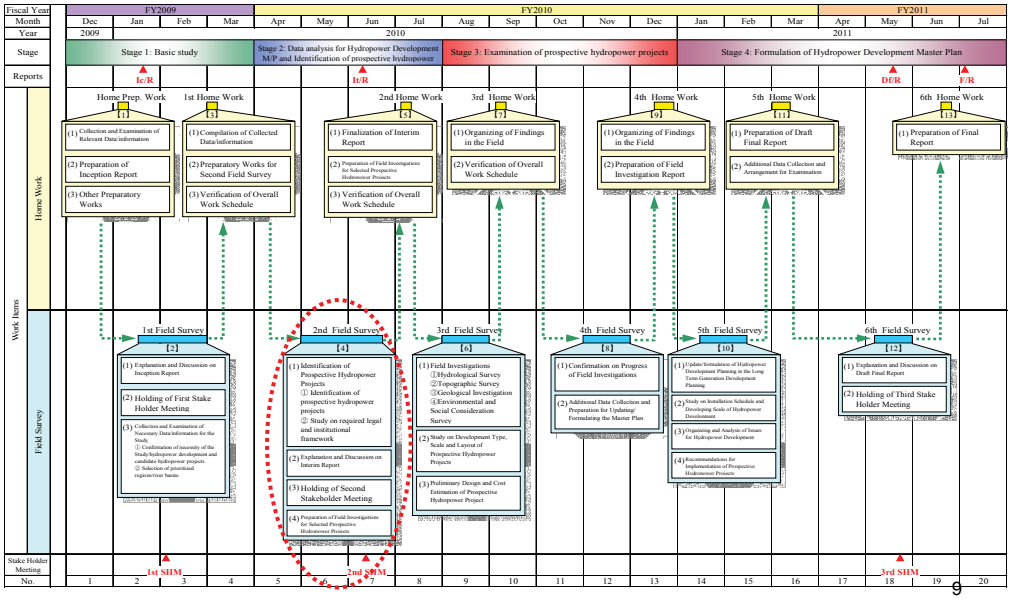
1-5. Overall Work Flow and Schedule



2. Interim Result of the Study

2-1. Classification and Screening for Selecting Pre-FS Sites

- Evaluating degree of development difficulty due to environmental aspects by indicators
- Evaluating project economy by simplified cost-benefit analysis
- Screenings in two stages
  - ✓1st screening： projects for conducting site reconnaissance survey
  - ✓2nd screening： projects for conducting pre FS

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2-2. Degree of Difficulty due to Environmental Aspects

Rank / Items	A	B	C	D
Definition	With nothing special difficulties	Although certain difficulties are expected, the solution could be found.	The solution for the constraints is considered as difficult.	The solution for the constraints is considered as very difficult.
Forest type	NA	Production Forest(HP), and Conversion Forest(HK)	Protection Forest (HL)	Nature Forest Reserve and Tourism/Recreation Forest (Hutan Suaka Alam:HSA)
Resettlement	0~50 HH	50~400 HH	400~1000 HH	1000~HH
Reservoir Area	0~100 ha	100~1000 ha	1000~10,000 ha	10,000~ ha

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2-3. Screening Criteria for 1st Screening

- Development Difficulty due to Environmental Aspects: Rank “A” or “B”
- Higher project economy among the said rank
- No IPP projects in stages of construction or PPA process, which are mutually exclusive
- With a scale of more than 10MW

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2-4. Result of 1st Screening

	Project Name	Type	Province	Capacity (MW)	Energy (GWh)
1.	Sirahar	ROR	N. Sumatra	35	228
2.	Simanggo-2	ROR	N. Sumatra	59	367
3.	Gumanti-1	ROR	W. Sumatra	16	85
4.	Anai-1	ROR	W. Sumatra	19	109
5.	Endikat-2	ROR	S. Sumatra	22	180
6.	Cibareno-1	ROR	Banten	18	117
7.	Cimandiri-1	ROR	W. Jawa	24	168
8.	Masang-2	ROR	W. Sumatra	40	256

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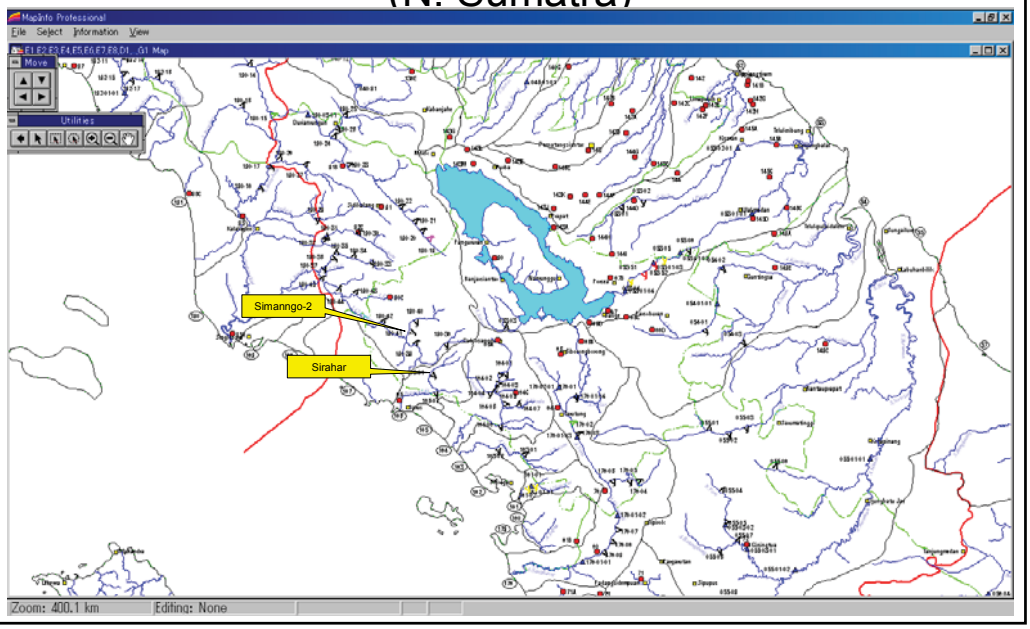
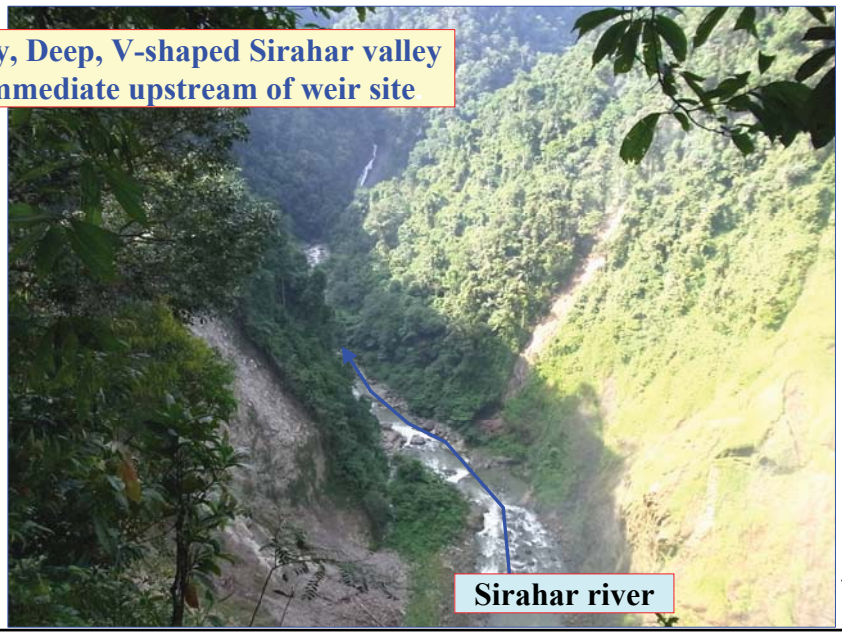
2-5 Result of Site Reconnaissance

(N. Sumatra)



Sirahar

Rocky, Deep, V-shaped Sirahar valley at immediate upstream of weir site



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Condition of Sirahar

Env.	-No residential houses -Covered with secondary forest -No paddy field
Tech.	-Appx. 120m lower riverbed elevation than plan -Difficulty of access to the site due to steep/deep slopes -No regulating pond for daily peak operation due to planned IPP powerhouse in upstream reach

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Simanggo-2

View of the intake point from 1km downstream

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View of the PH site from the existing road

Condition of Simanngo-2

Env.	-No residential houses -No cultivated areas -Five houses and small scale paddy field at the opposite site of power house (no need of relocation)
Tech.	- Large catchment area and high discharge

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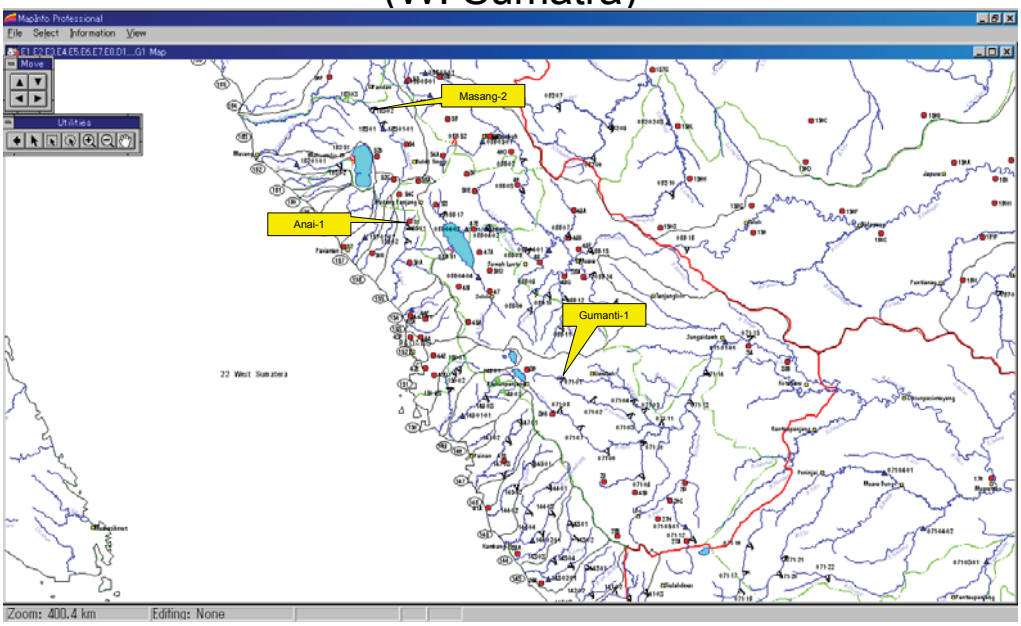
(W. Sumatra)



Gumanti-1

1. Intake Site

2. Powerhouse Site

Downstream of Powerhouse Site

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Condition of Gumanti-1

Env.	-No residential houses -Extending paddy field entirely at the site
Tech.	-Easy access by using existing public roads -Small catchment area and low discharge

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Anai-1

Intake Site

Powerhouse Site

Condition of Anai-1

Env.	-No residential houses and no paddy field -Existing tourism spot of water fall “Air Mantur” -Most of project site locating in Protection Forest (HL: Hutan Lindung) -Water use at 3km downstream from the site
Tech.	-Easy access by using existing public roads -Small catchment area and low discharge

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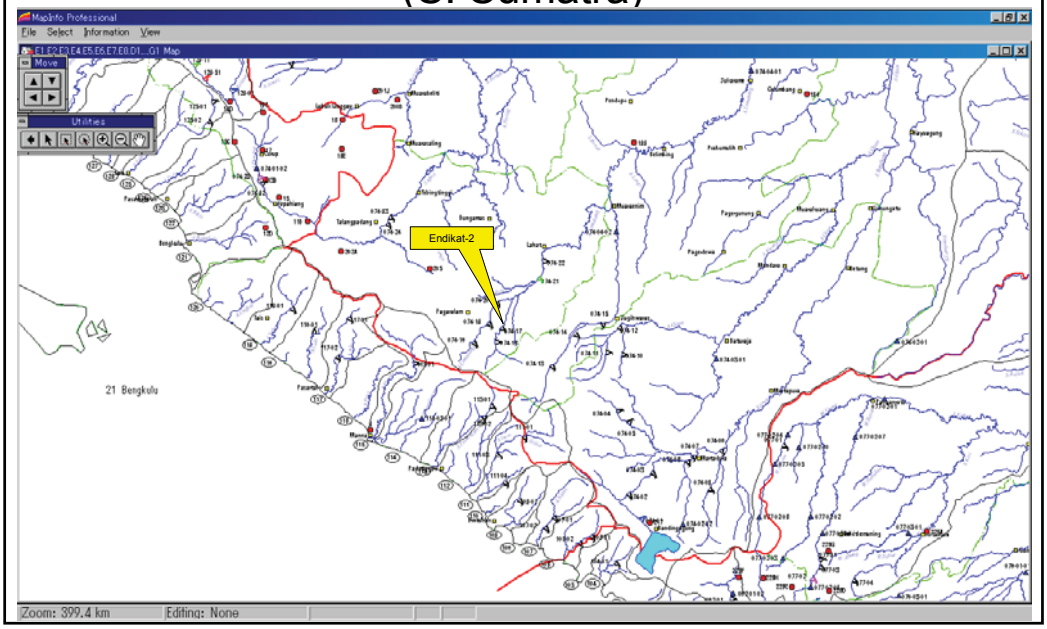
(S. Sumatra)



Endikat-2

Condition of Endikat-2

Env.	-No residential houses -Covered with secondary forest and coffee plantation -Possibility to locate a part of the project site in the Protection Forest (Hutan Lindung) -No substantial water use at the site
Tech.	-Relatively easy access by using existing public roads

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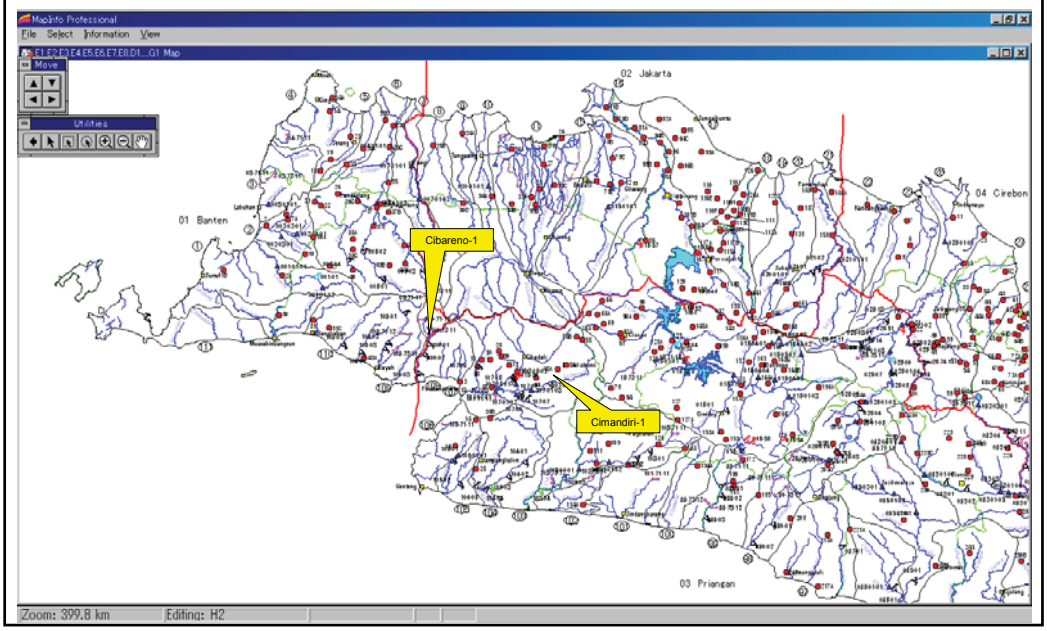
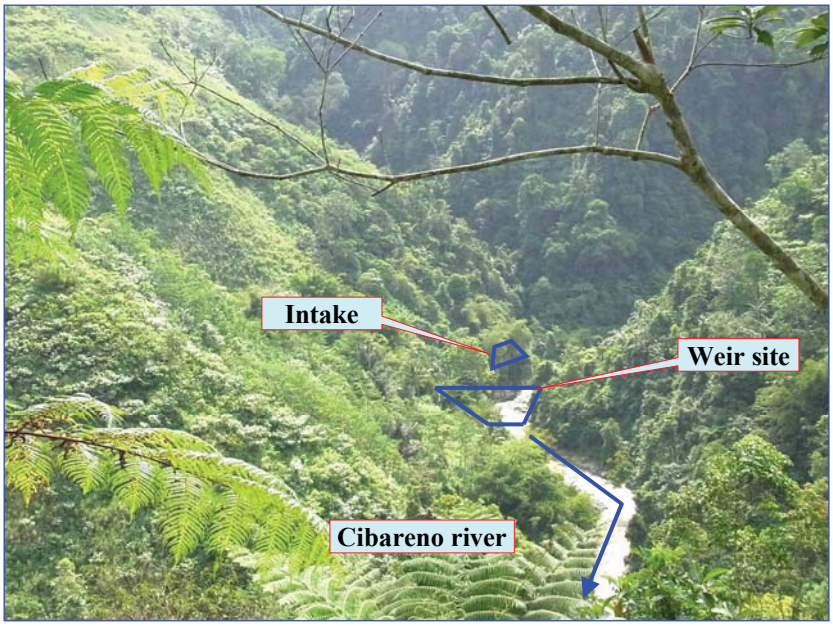
(Banten, West Jawa)



Cibareno-1



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Condition of Cibareno-1

Env.	-No residential houses -Covered with secondary forest -Paddy field at the powerhouse area
Tech.	-Relatively difficult of access the sites due to steep topographical condition

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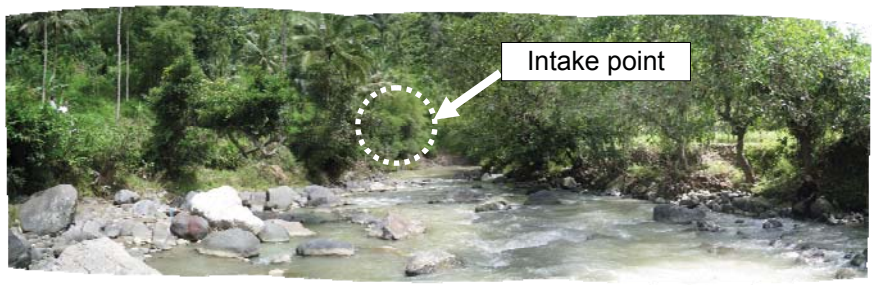
Cimandiri-1



Condition of Cimandiri-1

Env.	-No residential houses at intake site but some residential houses and paddy fields at the powerhouse site -Intensive agricultural activity and irrigation system around the site
Tech.	-Insufficient ground level at downstream part of headrace tunnel

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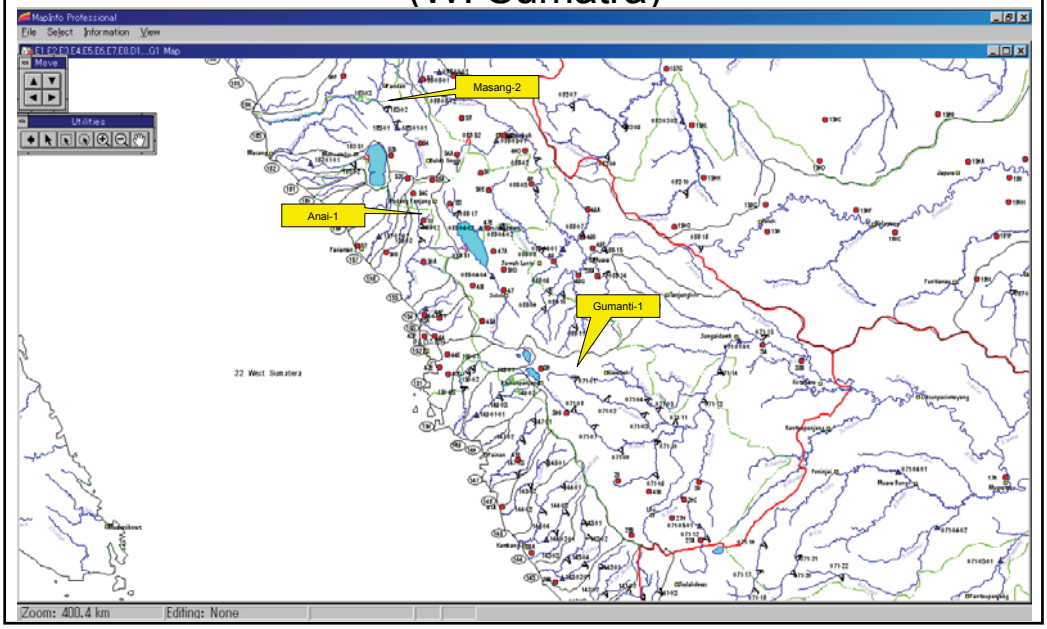
(W. Sumatra)



Masang-2

View of the power house point from the 2km downstream

Rubber Plant

Durian Tree

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Masang-2

Env.	-Production Forest around the site -Some residential houses at regulating pond area but no residential houses at powerhouse site
Tech.	- Preferable to layout the waterway at the left bank of the river as originally planned

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2-6. Evaluation Result of Project Economy in 2nd Screening

	Scheme Name	Type	Province	Capacity (MW)	Energy (GWh)	Cost ($m)	NPV ($m)	B/C	EIRR
1.	Sirahar	ROR	N. Sumatra	18	114	71	-14	0.8	8%
2.	Simanggo-2	ROR	N. Sumatra	59	367	118	81	1.6	17%
3.	Gumanti-1	ROR	W. Sumatra	16	85	54	-11	0.8	8%
4.	Anai-1	ROR	W. Sumatra	19	109	57	-1	1.0	10%
5.	Endikat-2	ROR	S. Sumatra	22	154	69	12	1.2	12%
6.	Cibareno-1	ROR	Banten	18	117	61	-1	1.0	10%
7.	Cimandiri-1	ROR	W. Jawa	24	168	111	-28	0.8	7%
8.	Masang-2	ROR	W. Sumatra	40	256	111	24	1.2	12%

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2-7. Result of 2nd Screening

Scheme Name	Environmental		Technical					Economical	Evaluation
	Natural	Social	Topography	Geology	Hydrology	Access	T/L		
Sirahar	◎ Forest Type A	◎ No inhabitants around the site	× Actual riverbed elevation at weir site is lower by 120m.	◎	○ CA= 207km^2 Qf= 7.1 m^3/s	× Access is difficult due to steep topography.	○ L=58km (PLTP Pumuk Bukit)	× NPV=-14 B/C=0.8	
Simanggo-2	◎ Forest Type A	○	○	○	◎ CA= 480km^2 Qf= 15.7m^3/s	○	◎ L=40km (Dolok Sanggui)	◎ NPV=81 B/C=1.6	Pre FS
Gumanti-1	◎ Forest Type A	○	○	○	△ CA= 129km^2 Qf= 3.1 m^3/s	◎ Access is easy.	○ L=80km (Solok)	× NPV=-11 B/C=0.8	
Anai-1	△ Most part in Forest Type C	△ Scenic place	○	○	△ CA= 86km^2 Qf= 2.7 m^3/s	◎ Access is easy.	◎ L=40km (Singkara)	△ NPV=-1 B/C=1.0	
Endikat-2	○ Forest Type A, partly C	○	○	○	○ CA= 306km^2 Qf= 6.6 m^3/s	○	◎ L=32km (Pagar Alam)	○ NPV=12 B/C=1.2	
Cibareno-1	◎ Forest Type A	○	○	○	○ CA= 161km^2 Qf= 5.3 m^3/s	△ Access to intake weir is difficult due to steep topography.	◎ L=50km (Bunar)	△ NPV=-1 B/C=1.0	
Cimandiri-1	◎ Forest Type A	△ Impact on existing irrigation	△ Insufficient ground level at the headrace tunnel	○	○ CA= 428km^2 Qf= 7.7 m^3/s	○	◎ L=18km (Sukabumi)	× NPV=-28 B/C=0.8	
Masang-2	○ Forest Type B	○	○	○	○ CA= 409km^2 Qf= 9.7 m^3/s	○	◎ L=36km (Simpang Empat,Maninjau)	○ NPV=24 B/C=1.2	Pre FS

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2-8. Principal Features and General Layout of Projects for 2 Pre F/S

Simanggo-2	
Province	**: North Sumatra**
Catchment Area	**: 480 km^2**
Installed Capacity	**: 59.0 MW**
Annual Total Energy	**: 366.9 GWh**
Max. Plant Discharge	**: 38.1 m^3/s**
Average Net Head	**: 187.4 m**
Reservoir	
- Active Storage Volume	**: 0.8 mil.m^3**
Weir	
- Type	**: Gated Weir**
- Weir Height	**: 15.0m**
Headrace Tunnel	
- Length	**: 4,750.0m**
- Diameter	**: 4.1m**
Surge Tank	
- Height	**: 30.7m**
- Diameter	**: 16.3m**
Penstock	
- Length	**: 429.0m**
- Diameter	**: 3.2m**
Tailrace	
- Type	**: Open Channel**

Masang-2	
Province	**: West Sumatra**
Catchment Area	**: 409 km^2**
Installed Capacity	**: 39.6 MW**
Annual Total Energy	**: 256.1 GWh**
Max. Plant Discharge	**: 33.2 m^3/s**
Average Net Head	**: 144.3 m**
Reservoir	
- Active Storage Volume	**: 0.6 mil.m^3**
Weir	
- Type	**: Gated Weir**
- Crest Length	**: 14.9m**
Headrace Tunnel	
- Length	**: 6,700.0m**
- Diameter	**: 3.9m**
Surge Tank	
- Height	**: 33.5m**
- Diameter	**: 15.5m**
Penstock	
- Length	**: 500.0m**
- Diameter	**: 3.1m**
Tailrace	
- Type	**: Open Channel**

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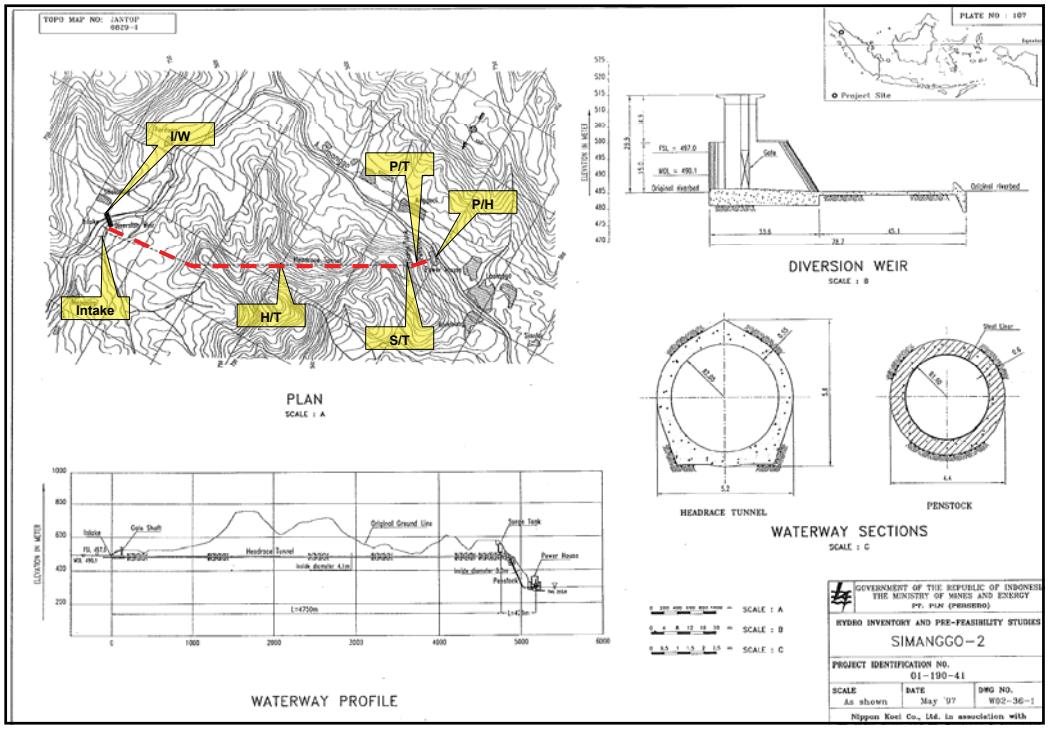
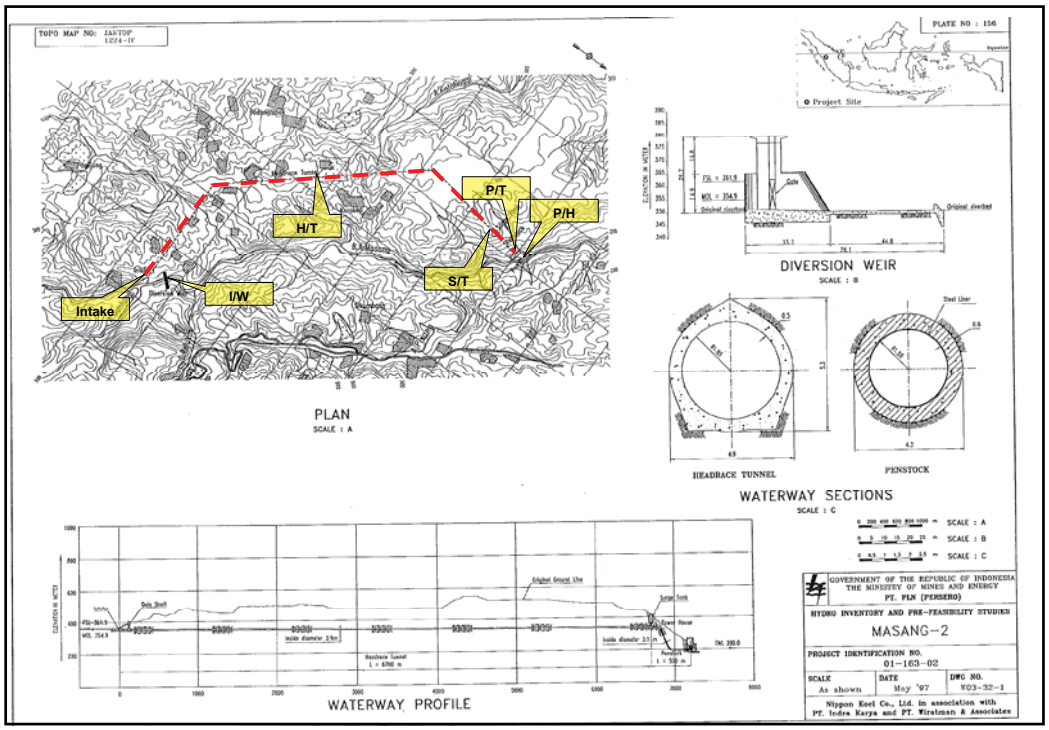

I/W
P/T
P/H
Intake
H/T
S/T
PLAN
SCALE : A
DIVERSION WEIR
SCALE : B
HEADRACE TUNNEL
PENSTOCK
WATERWAY SECTIONS
SCALE : C
WATERWAY PROFILE
SIMANGGO-2
01-190-41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SCALE : B
HEADRACE TUNNEL
PENSTOCK
WATERWAY SECTIONS
SCALE : C
WATERWAY PROFILE
MASANG-2
01-163-02

3. Outline of Further Investigation

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3-1. Outline of Survey at Pre F/S

1) Candidate Sites

- Simanggo-2 (North Sumatra)
- Masang-2 (West Sumatra)

2) Site Survey

- Geological Survey
- Topographical Survey
- Hydrological Survey
- Environmental Survey

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3-2. Outline of Geological Survey

1) Survey Items

- Surface geological mapping
- Core drilling investigation
- Seismic refraction survey
- In-situ tests
- Laboratory tests for selected soil and rock samples

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3-2. Outline of Topographical Survey

1) Survey Items

- Control point survey (Benchmark survey) by GPS
- Leveling
- Topographic mapping or digital mapping
- Terrestrial map by spot survey
- Longitudinal profile and cross-section survey

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3-3. Outline of Hydrological Survey

1) Survey Items

- Installation of water level gauge
- Water level observation and recording
- Stream flow measurement
- Suspended load sampling and testing
- Riverbed material sampling and testing
- Water quality test

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3-4. Environmental and Social Considerations

1) Objectives of Environmental Survey
2) Method of Provisional Scoping for 2 Pre-F/S Projects
3) Results of Provisional Scoping
4) Items of environmental Survey
5) Work Schedule
6) Plan of 3rd Stakeholder Meeting

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1) Objectives of Environmental Survey

a) Based on the concept of SEA

b) Collecting secondary data

c) Collecting information at the sites for the items which need further confirmation, especially water recession section

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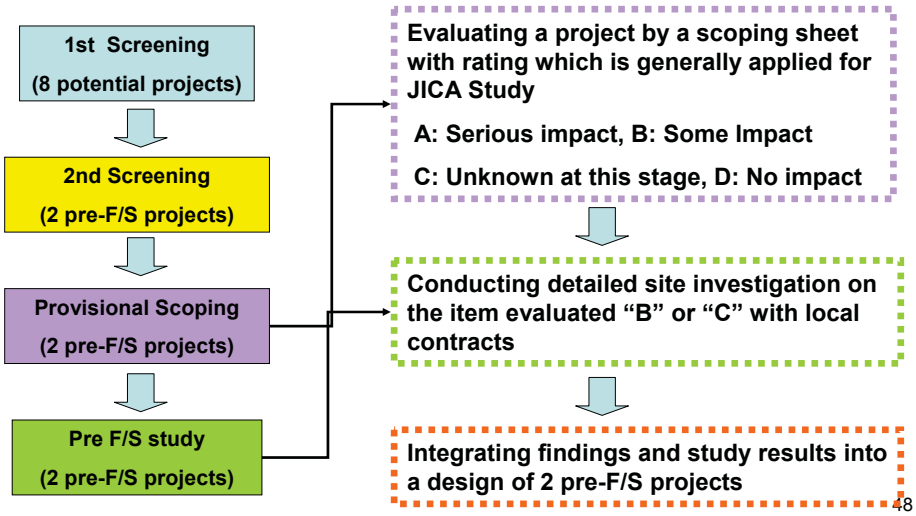
2)Method of Provisional Scoping for 2 Pre-F/S Projects



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3) Provisional Scoping: Simanggo-2

Social Environment		Natural Environment	
Some Impact			
Involuntary resettlement	Possibility of some impact due to access road construction	Soil Erosion	Risk of soil erosion due to cutting and embankment
Daily life of people in surrounding areas	Temporal impact due to noise and vibration by construction activities	Ground Water	Recession of ground water level due to tunnel excavation
Sanitation	Temporal deterioration due to mobilization of construction workers	Hydrological Situation	Change/impact on hydrological condition
Hazards (Risk), Infectious Diseases	Infection diseases relevant to construction activities	Landscape	Change of landscape due to facilities construction
		Global Warming	Temporal increment of GHG emission

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3) Provisional Scoping: Simanggo-2

Social Environment		Natural Environment	
Unknown Impact			
Land Use	Present status of water recession section	Flora, fauna, biodiversity	Possibility of habitation of endangered species, according to IUCN classification
The poor, indigenous groups	Probability of no indigenous groups, but necessary of further confirmation		
Water use, Water rights	Water use at water recession section		
No Impact			
Physical community diversion	Misdistribution of benefit and damage	Topography, geology	Costal zone
Local conflict of interests	Cultural heritage	Meteorology	Ground subsidence

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3) Provisional Scoping: Masang-2

Social Environment		Natural Environment	
Some Impact			
Involuntary resettlement	Possibility of some impact due to access road construction	Soil Erosion	Risk of soil erosion due to cutting and embankment
Daily life of people in surrounding areas	Temporal impact due to noise and vibration by construction activities	Ground Water	Recession of ground water level due to tunnel excavation
Sanitation	Temporal deterioration due to mobilization of construction workers	Hydrological Situation	Change/impact on hydrological condition
Hazards (Risk), Infectious Diseases	Infection diseases relevant to construction activities	Landscape	Change of landscape due to facilities construction
		Global Warming	Temporal increment of GHG emission

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3) Provisional Scoping: Masang-2

Social Environment		Natural Environment	
Unknown Impact			
Land Use	Present status of water recession section	Flora, fauna, biodiversity	Possibility of habitation of endangered species, according to IUCN classification
The poor, indigenous groups	Probability of no indigenous groups, but necessary of further confirmation		
Water use, Water rights	Water use at water recession section		
No Impact			
Physical community diversion	Misdistribution of benefit and damage	Topography, geology	Costal zone
Local conflict of interests	Cultural heritage	Meteorology	Ground subsidence

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4) Outline of Environmental Survey

i) Survey Items

Social Environment	Natural Environment
-Socio-economic (population, water use, land use, education etc) -Cultural aspects (cultural assets, custom, religion, sanitation, etc) -Opinion about hydropower projects -Opinion about involuntary resettlement	-Flora, fauna, biodiversity -Protection area -Endangered species

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4) Outline of Environmental Survey

ii) Survey Method

- Site investigation
- Reviewing secondary data and academic documents
- Interview to relevant authorities and village leaders

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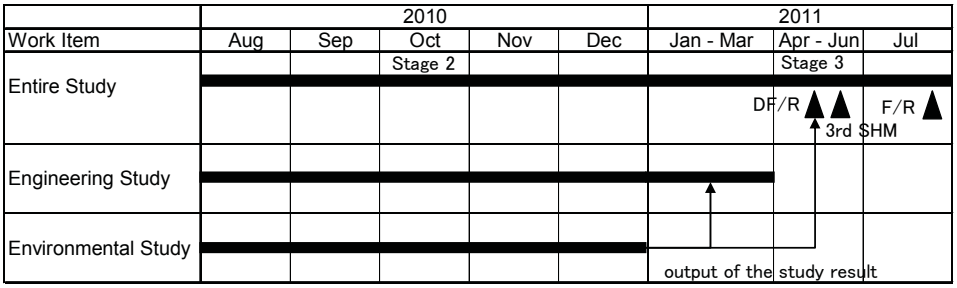
5) Work Schedule



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6) Plan of 3rd Stakeholder Meeting

[Objectives]

- Explanation of draft final report including M/P and pre-F/S
- Explanation of 2 pre-F/S projects
- Explanation of environmental and social considerations

[Tentative Schedule]

- May, 2011

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Question & Answer

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Thank you very much for your attention

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