Minutes of the Stakeholders meeting

Date:	7th August 2012, 9:30-11:30
Venue:	GAZEBO, Lagawe, Ifugao
Participants:	1. Provincial Government of Ifugao Governor's office, PPDO, ICHO. PACCO, Legal office 2. Municipality of Asipulo (Mayor, MPDO) 3. Brgy. Haliap (Brgy. Captain, Council members) 4. IFELCO (Electric Cooperative) 5. DOE 6. NIA (National level) 7. JICA (JICA headquarter, Philippine Office, Consultant team) 35 participants in total
Agenda:	Explanation of JICA Grant Aid for the Likud Mini-hydropower development project 1. Objective of the project 2. Schedule of preparatory survey (Stage 1), and construction (Stage 2) 3. Role and responsible of the recipient country (DOE, PGI)

Open Forum:

1 IFELCO Will the Likud project apply for FIT?

- IFELCO has ESA with SM Avoitiz which will renew another 5 years up to 2017 with same buying rate of 4.20peso per kW. Since the Likud project has no capital investment because of JPN Grant Aid, it is better to take a bilateral contract.
- IFELCO will buy electricity with lower rate of 4.20 peso per kW.

DOE It will be decided by consulting between DOE and PGI. We have to consider the increasing of RTCF and the burden of raising the tariff rate for the consumers

TEPSCO In terms of technical issue on FIT, if the Likud apply for FIT, IFELCO distribution line will have to be upgraded and/or need to be installed a new higher voltage of line. It may add the additional cost for the line.

IFELCO IFELCO peak load is around 2.2 MW, and base load is around 1.1MW. IFELCO still can receive the generated electricity from the Likud as the embedded system.

2 IFELCO Is it possible that IFELCO can operate and maintain the Likud power

		plant as the embedded system? So that the PGI has no extra money of O&M, and will provide necessary RTCF to the PGI.
	PGI	It is one of options that IFELCO would manage by contract, since the PGI has not enough man-power who is capable of O&M.
3	DOE	Regard with acquisition of necessary permits, we had very bitter experience affected by delay of procedure during the e8 project.
	TEPSCO	During the e8 project, the stance of DOE support the PGI, but for the Likud, DOE has responsible for handling the project, thus need to close coordinate with the PGI
	PGI	It was very hardship of acquiring permits for the PGI, may we request DOE to appoint person from national level to designate processing all permits/certificates? Because the schedule has already fixed, and it is very difficult to get all necessary permits by the end of this year.
	DOE	DOE also has limited resource person though DOE wish to support. Joint hand of DOE and the PGI
4	PGI	If IFELCO will extend the contract with SN Aboitiz another 5 years, what will be happened to the Likud power purchase?
	IFELCO	As of now, IFELCO buys the power from SN Aboitiz, 800,000kw per month. And we amend the volume of power purchase every year
5	TEPSCO	Would PGI update the status of the motion to ERC for raising the selling rate of the Ambangal power plant? It might be affected to the Likud project.
	PGI	PGI submitted it to ERC, and it is still in ERC on hand. We will follow it up.

PGI Action Plan

1 Exit meeting of the 1st survey was fixed by the Governor on 27th August, but 26th August will be a national holiday so as to be a holiday on 27th August. In such case, the meeting will be held on 28th August.

2 Draft MOA between DOE and PGI shall be prepared as soonest.

3. Application of ECC has already submitted to the DENR Region office but not yet replied by DENR, so will follow it up.

4. Water Right Permit has yet ready to submit. Appropriate office of PGI will be

prepared.

5. Application of FPIC will be apply to NCIP provincial office as soonest.
6. Raising additional 1.43/kW for the Ambangal will be followed up.
7. Draft of ESA between PGI and IFELCO will be prepared by appropriate office of the PGI.

2012.8.7

PROVINCE OF IFUGAO

ATTENDANCE SHEET

Office: PPDO

Title of meeting/ seminar/ workshop: Stakeholders meeting

Venue: Gazebo Garden Restaurant

Date: ______

Expected Number of participants: 35

Scheduled time: ______

NO.	NAME	MALE	FEMALE	OFFICE	CONTACT NO.	SIGNATURE
1	Nancy Gano - Walonne		✓	PPDO	09056733727	
2	Virginia D. Farro		✓	PBO	09175278482	
3	RENATO B. PATAGSIL	✓		PPDO-ICHO	09264988831	
4	Rosemarie M. Dacquel		✓	[illegible]	09067503587	
5	EPIFANIO G. GACUSAN, JR	✓		DOE-HUEMO	0916782458	
6	JUAN PAULO [illegible]	✓		JICA	09998847059	
7	OSHIMA Kazunari	✓		JICA		
8	Yoshida Kenichi	✓		TEPSCO		
9	ROGER MANGAI	–		BRGY CAPT.	09351108896	
10	CONSTANCIO CATAMA	✓		BLGU	09265656922	
11	Rosemarie P. Lindawan		✓	PLGU-Ifugao	09052193576	
12	Ignacio Bunoba	✓				
13	Nobuki Hayashi		✓	JICA/TEPSCO		
14	Mitsuru Shimizu	✓		//		
15	Yukio Miyamoto	✓		//		
16	Hiroshi Kobayashi	✓		//		
17	Kiminori Nakamata	✓		//		
18	~~Kenichi Yoshida~~	✓		//		
19	~~Kiminori Nakamata~~	✓				
20	CHRISTOPHER MADDUL	✓		IFELCO		
21	[illegible] TUGUINAY	✓		IFELCO		
22	JAIME PE BENITO VI	✓		IFELCO	09175827998	
23	CHARLES BAGUILAT	✓		PACCO		
24	JONATHAN K. PADDUMAO	✓		PPDO		
25	EDEN P. BULATOT		✓	NIA C.O.	09175261920	
26	Norberto N. Tayaban	✓		PLGU-PEO		
27	Arnold G. Guyguyon	✓		MPDO-Asipulo	09175652520	
28	ELARIO H. BANGGUD	✓		Mayor	09088971938	
29	GARY GUYGUYON	✓		LO-V	09172077139	
30	ARNEL CARACMAN			TEPSCO		

CERTIFIED CORRECT:

____

PROVINCE OF IFUGAO

ATTENDANCE SHEET

Office: _____

Title of meeting/ seminar/ workshop: _____

Venue: _____ Date: _____

Expected Number of participants: _____ Scheduled time: _____

NO.	NAME	MALE	FEMALE	OFFICE	CONTACT NO.	SIGNATURE
31	ROMULO F. SOLIS	✓		NIA-CO	09291586654	
32	ENRIQUE P. ASPERAS JR	✓		NIA-CO		
33	FIDEL MAQUILAN	✓		JICA/TEPSCO		
34	ROMMEL S. OLEA	✓		JICA/TEPSCO		
35	ROGER P. MADAITON	✓		JICA/TEPSCO		
36	Kristine Guazon		✓	PPDO	09061197827	
37	BILIBLI, ARNEL D.	✓		PPDO		

CERTIFIED CORRECT:

_____

Preparatory Survey for Mini-Hydropower Development Project in the Philippines

July 2012

Background of the Project

The Government of the Philippines, in the "National Renewable Energy Program" of June 2011, targets to triple its renewable energy capacity to compare with the rate of 2010 in order for energy security as well as reduction of greenhouse gas emissions. In this situation, small scale hydropower is expected to contribute to secure power supply especially in provincial areas since its potential (10MW or less) is plenty and promising sites distribute nationwide.

In Ifugao Province, one of the target sites of the Project, is famous for the Rice Terrace designated as a World Heritage. Due to its preferred topographic and hydrological conditions, the area is very rich in mini hydropower potential which is currently unutilized. In addition, the Provincial Government of Ifugao (PGI), which took over the responsibility to conserve the World Heritage from National Government, is running short of fund for conservation of the Rice Terrace.

On the other hand, in Isabela Province, located next to Ifugao Province, power consumption is high especially in Santiago City, however, the power supply to this area is dependent on other area.

In line with above background, in March 2012, the Government of the Philippines requested Japanese Government for Grant Aid on development of Likud Mini-hydro Project in Ifugao Province and a mini-hydro project utilizing at existing irrigation systems in Isabela Province.

Objectives

- To contribute to diversifying energy and reduction of greenhouse gas emissions by utilizing domestic renewable energy with developing mini-hydro plants
- To enhance RTCF using profit of Likud Mini-hydro Plant
- To demonstrate the value of newly-introduced mini-hydro plants in terms of regional contribution by energy resource development in the region as well as effective use of untapped hydro potential in the region.

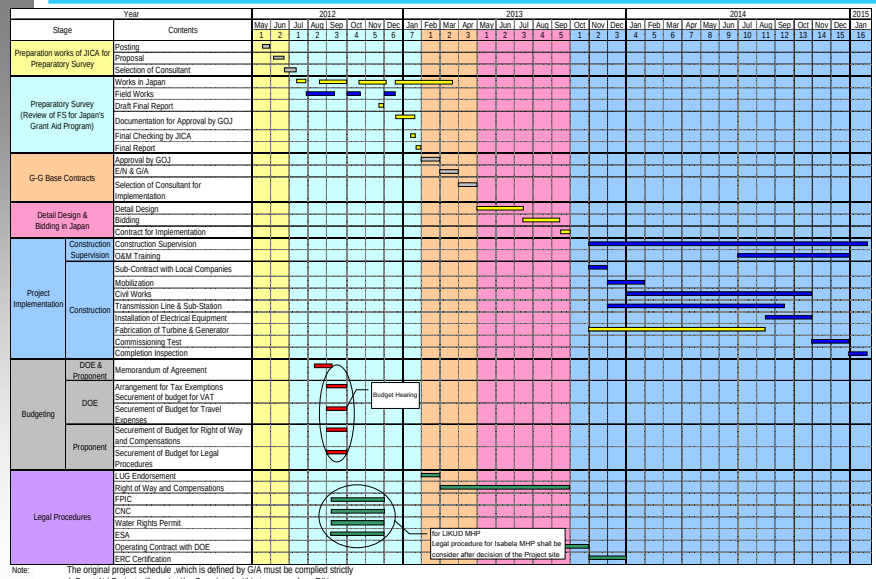
Outcomes of the Projects

- Likud Mini-hydro Plant in Ifugao Province,
- Mini-hydro Plant utilizing existing irrigation facilities in Isabela Province, and
- Electric transmission/transformation/distribution facilities in the vicinity of each site.

Preparatory Survey for Mini-Hydropower Development Project in the Philippines

Target Sites

Tentative Overall Schedule of Mini-Hydropower Development of Japan's Grant Aid Program



Note: The original project schedule ,which is defined by G/A must be complied strictly
A Grant Aid Project will surely cbe Completed within two years from E/N

Preparatory Survey for Mini-Hydropower Development Project in the Philippines

<Reference: Cost Sharing>

Cost Sharing between Philippines Side and Japan Site

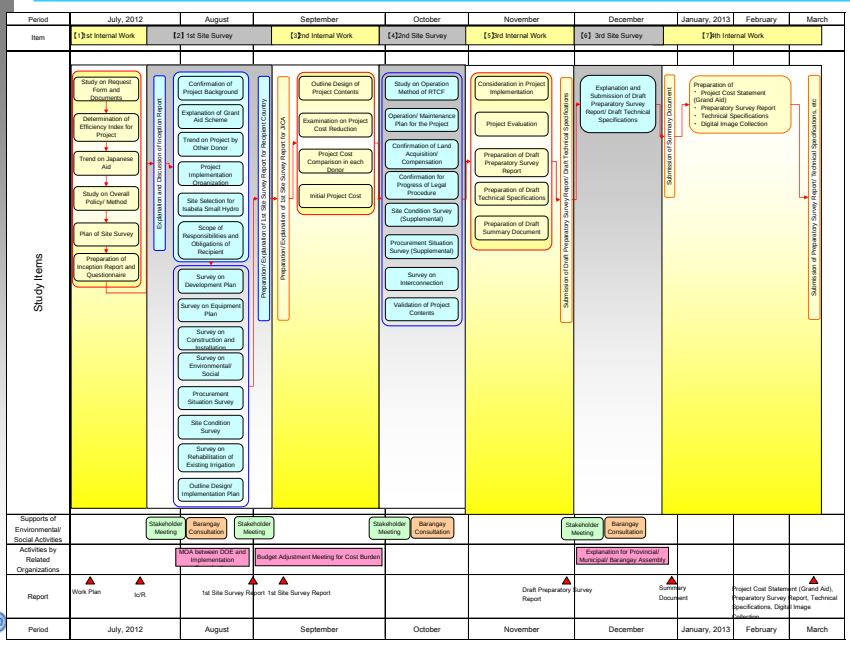
Items		Remarks	Philippines	Japan	Note
Project Management Cost		Cost of C/P for Project Supervision and Management Travel Expenses, Accommodation, Allowance etc.	○	×	
Tax and Compensation	Right of Way		○	×	
	Compensation		○	×	
	Cost for Legal Procedure	Operation Contract, FPIC,EIA, Right of Way etc.	○	×	
	VAT	VAT for Local Procurements *1	○	×	Civil and Transmission & Sub Station Cost
	TAX	Import Tax Exemption and Custom Clearance	○	×	
	Cost for Banking Arrangement		○	×	
Consultant's Cost	Cost for Detail Design	Consultant is limited to Japanese Company	×	○	
	Cost for Preparation of Biding Documents		×	○	
	Construction Supervision by the Consultant		△	○	except Cost for Supervision by Recipient Country (DOE,NIA,PGI etc)
	O&M Training & Preparation of Guidelines		×	○	
Construction Cost	Direct Cost	Main Contractor is limited to Japanese Company The Construction Cost should be estimated based on Japanese Standards. The Material & Labor Cost are based on Local Market Price	×	○	Sub-Contractor : Civil& Transmission will be Local
	Indirect Cost		×	○	
	Main Electrical & Mechanical Equipment		×	○	Including Marine Transportation
	Contingency Cost		—	—	Basically Contingency dose not allowed *2
Operation and Maintenance Cost			○	×	

Note: Cost Sharing between DOE and Implementation Agency should be clearly specified in the MOA

*1:For Japan's grant aid program in the Philippines, VAT is not treated as tax exemption , the governmental organization of the Philippines such as DOE should pay VAT whenever it is required from the contractor which is specified in the E/N & G/A

*2:Since the contingency costs are included in the Direct Cost, JICA will not accept Any Claim/Change Order from the Contractor

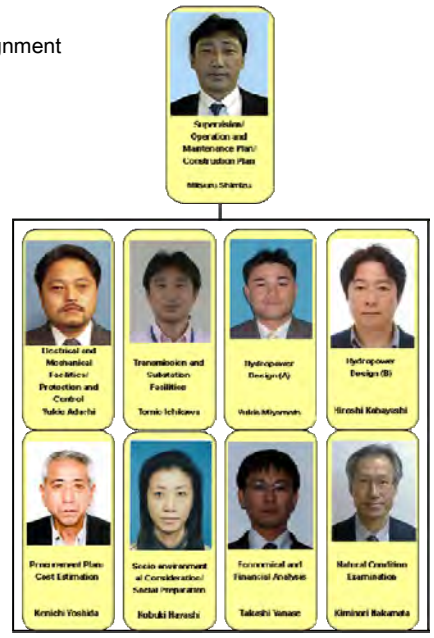
Preparatory Survey for Mini-Hydropower Development Project in the Philippines



Preparatory Survey for Mini-Hydropower Development Project in the Philippines

Personnel Assignment

(Consultant)



Implementation Policy of the Project

Policy-1 : The Project is planned based on consultation with JICA and is implemented complying with JICA's "The Guidelines of the Japanese Grant Aid" and other relevant guidelines.

Category	Title	Version	Issue
Preparatory Survey for Grant Aid	Preparatory Survey Integration Manual	Trial	Mar. 2009
	Preparatory Survey Integration Manual (Civil Works)	Trial	Mar. 2009
	Preparatory Survey Integration Manual (Equipments)	-	Mar. 2009
	Guidelines of Preparing Report for Grant Aid Project	-	Mar. 2011
	Guidelines of Soft Component	Third edition	Oct. 2010
Procurement for Grant Aid	Guidelines of Consulting Services in Grant Aid Project	Revised	Nov. 2010
	The Procurement Guidelines of the Japanese Grant Aid (Japanese Version)		Sep. 2010
	The Procurement Guidelines of the Japanese Grant Aid (English Version)	Tentative	Aug. 2009
Others	Notifications from JICA and others		

Implementation Policy of the Project

Policy-2 : In order to duly understand and consider local community's intention to the Project, Stakeholder meeting as well as Barangay consultations are held in a timely manner.

Items	Organization	Ifugao	Isabela
Competent authority	Department of Energy (DOE)	PA	PA
	National Irrigation Administration (NIA)	-	PA
Province	Representative of Provincial Council	PA	PA
	Provincial planning and Development Office (PPDO)	PA	PA
	Ifugao Cultural Heritage Office (ICHO)	PA	-
	Provincial Legal Office (PLO)	PA	PA
	Provincial Engineering Office (PEO)	PA	PA
	Provincial Accounting Office (PACCO)	PA	-
	Provincial Treasury Office (PTO)	PA	-
Municipal	Municipal Planning and Development Office (MPDO)	PA	-
Irrigation	Magat River Integrated Irrigation System (MARIIS), etc	-	PA
Project area	Representative of Barangay (Barangay Captain, Elders Meeting)	PA	-
Others	Electric Cooperative (IFELCO/ ISELCO-I)	PA	PA
	Local NGO (Save the Ifugao Terraces Movement :SITMO)	PA	-

PA: Participation
Note: Members in Ifugao Province are same members in Technical Working Group organized in e8 Ambangal Mini-hydro Project. Members in Isabela Province is arranged considering the project site, implementation body, etc.

Implementation Policy of the Project

Policy-2 : In order to duly understand and consider local community's intention to the Project, Stakeholder meeting as well as Barangay consultations are held in a timely manner.

No.	Time	Main Agenda
1	Beginning of 1st Site Survey	Explanation of survey contents/ method Confirmation of issues and needs of related authorities Necessity/ contents of MOA Responsibility/ obligation of each authority Activity/ schedule of each authority in the Project
2	End of 1st Site Survey	Explanation of 1st site survey outline Discussion/ confirmation of issues for land acquisition, legal procedure, etc
3	2nd Site Survey	Explanation of project contents (development plan, facility plan) Confirmation of process/ condition for land acquisition, legal procedure, etc discussion for maintenance/ operation system in the Project
4	3rd Site Survey	Explanation of Draft Preparatory Survey Report Confirmation of process/ condition for land acquisition, legal procedure, etc

Implementation Policy of the Project

Policy-3 : In order to facilitate the Project, various application procedure is carried out complying with relevant laws of the Philippines and considering required particulars and period.

Permission/ License	Remarkable matters in the Project
1). Pre-Development Contract	Unnecessary because DOE is supervisory organization in the Project
2) LGU Endorsement	When appropriate, report on progress, and gain their consensus and support
3). Right of Way	When appropriate, hold a community consultation, and report on progress of the survey, and gain their consensus and support
4) NCIP Certification FPIC	When appropriate, hold a community consultation, and report on progress of the survey, and gain their consensus and support. At the same time report on progress to NICP provincial office
5)Environment Compliance Certificate	Relatively shorter period of issuing Certificate for Non-coverage (CNC) for run-of-river type
6) Water Rights Permit	CNC (ECC) has to attaché when you apply water right.
7) Energy Sales Agreement	During the survey, coordinate with electric cooperative and NGCP, and gain the basic agreement.
8) Renewable Energy Service/ Operating Contract	Need to submit; F/S report, NICP Certificate, ECC, Water right permit, and Energy Sales Agreement
9) Certificate of Compliance	Need to submit; FS report, ECC, Water Right Permit, Draft ESA, RE-contract, Certificate of Endorsement of DOE (COE)

Implementation Policy of the Project

Policy-4 : The Project, in principle, complies with technical/integration Standards of the Philippines ,while Japanese/international codes and JICA's "Guideline and Manual for Hydropower Development" are also referred as appropriate.

Policy-5 : Aiming at sustainable and stable project efficiency, durability of equipments and cost reduction in construction/operation are enhanced by introducing Japanese technology combined with Local traditional techniques in designing, execution planning and cost estimation.

< Reference >

Ifugao Province is famous for its unique but accurate and reliable stone masonry technique used in construction of rice terraces. The technique has been utilized for the construction of intake weir, headrace, foundation of powerhouse, etc. of Ambangal Mini-hydro Project. This local traditional technique is also applicable for immediate repair of damaged structures. Ambangal Mini-hydro Project introduced traditional subcontract method called "Pakyaw" for securing labor and completed as scheduled. Application of such local culture or custom to construction works is examined in the survey to facilitate implementation of the Project.

Tentative Schedule of 1st Mission

	Date		JICA		Consultant								
			Planning Management	Leader	Consultant Leader	Hydropower-A	Environment	Hydropower-B	Procurement	Natural Condition	Economist	Electrical	Distribution
			N.FURUKAWA	K.OSHIMA	M.SHIMIZU	Y.MIYAMOTO	N.HAYASHI	H.KOBAYASHI	K.YOSHIDA	K.NAKAMATA	T.YANASE	Y.ADACHI	T.ICHIKAWA
1	29-Jul	San	Move to Manila										
2	30-Jul	Mon	Courtesy Call & Presentation of IR for DOE-REMB,ECJ,JICA-Manila Pre-Meeting on Isabela Site with DOE-REMB										
3	31-Jul	Tue	Kickoff Meeting with DOE-REMB and NIA (Presentation about Japanese Grant Aid and the Projects)										
4	1-Aug	Wed	Discussion with DOE (Project Proponent, Project Site in Isabela, Schedule of Site Survey)										
5	2-Aug	Thu	Discussion of MD		Data Collection (DENR, NIA)								
6	3-Aug	Fri	Signing of MD		Data Collection (DENR, NIA)								
7	4-Aug	Sat	Back to Tokyo		Team Internal Meeting				Move to Manila				
8	5-Aug	Sun			Move to Ifugao								
9	6-Aug	Mon			Courtesy Call for Government of Ifugao (Presentation about Japanese Grant Aid and the Likud Project)								
10	7-Aug	Tue			Stakeholder Meeting			Site Study of Ambangal MHP					
11	8-Aug	Wed			Barangay Consultation/ Move to Isabela								
12	9-Aug	Thu			Courtesy Call for Government of Isabela (Presentation about Japanese Grant Aid and the Project)								
13	10-Aug	Fri		Move to Manila	Site Reconnaissance/Stakeholder Meeting (if necessary)				Preparation of Local Contract				
14	11-Aug	Sat		Back to Tokyo	Team Internal Meeting								
15	12-Aug	Sun			Data Arrangement								
16	13-Aug	Mon			Site Reconnaissance		Meeting w Proponent	Survey on	Procurement Survey	Site Reconnaissance			
17	14-Aug	Tue			Contract w Local	Site Reconnaissance	Contact w Local	Electric Demand and Supply					
18	15-Aug	Wed			Move to Ifugao			Local Materials					
19	16-Aug	Thu			Survey on Condition of Construction	Survey on Structures	Survey on Regal Procedure						
20	17-Aug	Fri						Move to Ifugao					
21	18-Aug	Sat			Team Internal Meeting								
22	19-Aug	Sun			Data Arrangement								
23	20-Aug	Mon			Survey on Condition of Construction Grid Connection	Survey on Electric Demand and Supply Local Materials	Survey on Regal Procedure Project Organization Environment	Survey on Electric Demand and Supply Local Materials	Procurement Survey	Geological Survey			
24	21-Aug	Tue											
25	22-Aug	Wed											
26	23-Aug	Thu											
27	24-Aug	Fri											
28	25-Aug	Sat			Team Internal Meeting								
29	26-Aug	Sun			Data Arrangement								
30	27-Aug	Mon			Survey on Condition of Construction	Survey on Electric Demand and Supply	Survey on Regal Procedure Project Organization	Survey on Electric Demand and Supply Local Materials	Procurement Survey	Geological Survey			
31	28-Aug	Tue											
32	29-Aug	Wed			Stakeholder Meeting (Result of 1st Survey)								
33	30-Aug	Thu			Move to Isabela			Move to Manila	Move to Isabela	Move to Manila			
34	31-Aug	Fri			Stakeholder Meeting (Result of 1st Survey)			Back to Tokyo	Data Collection	Back to Tokyo			
35	1-Sep	Sat			Move to Manila				Move to Manila				
36	2-Sep	Sun			Data Arrangement				Data Arrangement				
37	3-Sep	Mon			Additional Data Collection				Data Collection				
38	4-Sep	Tue											
39	5-Sep	Wed			Preparation of 1st Site Survey Report (Draft)				Preparation of 1st Site Survey Report (Draft)				
40	6-Sep	Thu											
41	7-Sep	Fri											
42	8-Sep	Sat											
43	9-Sep	Sun											
44	10-Sep	Mon			Report to DOE-REMB,NIA,JICA-Manila,ECJ				Report				
45	11-Sep	Tue			Back to Tokyo				Back to Tokyo				
					45	45	45	34	39	28	0	0	0

Tentative Schedule of 2nd Mission

	Date (Tentative)		Consultant								
			Consultant Leader	Hydropower-A	Environment	Hydropower-B	Natural Condition	Procurement	Distribution	Economist	Electrical
			M.SHIMIZU	Y.MIYAMOTO	N.HAYASHI	H.KOBAYASHI	K.NAKAMATA	K.YOSHIDA	T.ICHIKAWA	T.YANASE	T.ICHIKAWA
1	30-Sep	San	Move to Manila								
2	1-Oct	Mon	Meeting with DOE-REMB			Move to Manila					
3	2-Oct	Tue	Move to Isabela			Move to Isabela					
4	3-Oct	Wed	Additional Survey in Isabela			Confirmation of Result of Topo-Survey and Geological Survey				Move to Manila	
5	4-Oct	Thu	Stakeholder Meeting			Additional Survey				Meeting w/DOE&NIA	
6	5-Oct	Fri	Move to Ifugao			Move to Ifugao				NEDA	
7	6-Oct	Sat	Internal Meeting		Move to Manila	Internal Meeting		Move to Manila		Data Arrangement	
8	7-Oct	Sun	Data Arrangement		Move to Ifugao	Data Arrangement		Move to Ifugao			
9	8-Oct	Mon	Stakeholder Meeting in Ifugao				Additional Survey in Ifugao				
10	9-Oct	Tue	Barangay Consultation				Additional Survey in Ifugao				
11	10-Oct	Wed	Additional Survey in Ifgao			Move to Isabela					
12	11-Oct	Thu	Additional Survey in Ifgao			Additional Survey in Isabela					
13	12-Oct	Fri	Additional Survey in Ifgao			Additional Survey in Isabela					
14	13-Oct	Sat	Move to Manila								
15	14-Oct	Sun	Data Arrangement				Back to Tokyo				
16	15-Oct	Mon	Additional Survey in Manila								
17	16-Oct	Tue	Additional Survey in Manila								
18	17-Oct	Wed	Preparation of Site Report								
19	18-Oct	Thu	Preparation of Site Report								
20	19-Oct	Fri	Explanation of Results of Survey (DOE,JICA,EOJ)								
21	20-Oct	Sat	Back to Tokyo								

3rd Mission : Dec.2 – Dec.22,2012 (Tentative) Explanation/Discussion DF/R

Major Activities for Likud MHP

Technical Components

Items		Results of FS	Preparatory Survey	Remarks
Review of Feasibility Study	Fund Source	Loan (EDP) Equity : 10% of Cost Interest Rate: 8-10%	Grant Except: VAT, Tax, ROW, Compensation, Cost for Approval Permission	<Additional Survey> •Stacking 25m each •Geological Survey •Survey for Procurement of Materials and Equipment •Survey for ROW and Compensation
	Development Scale	810kW	Review based on Additional Survey and Guideline for Japan's Grant Aid	
	Civil Structures	It will be same as FS		
	Turbine	Inline Francis x 2 units	Normal Type of Francis x 1 or 2 units	
	Project Cost	Based on Philippine's Standard	It shall be followed Guideline for Japan's Grant Aid	

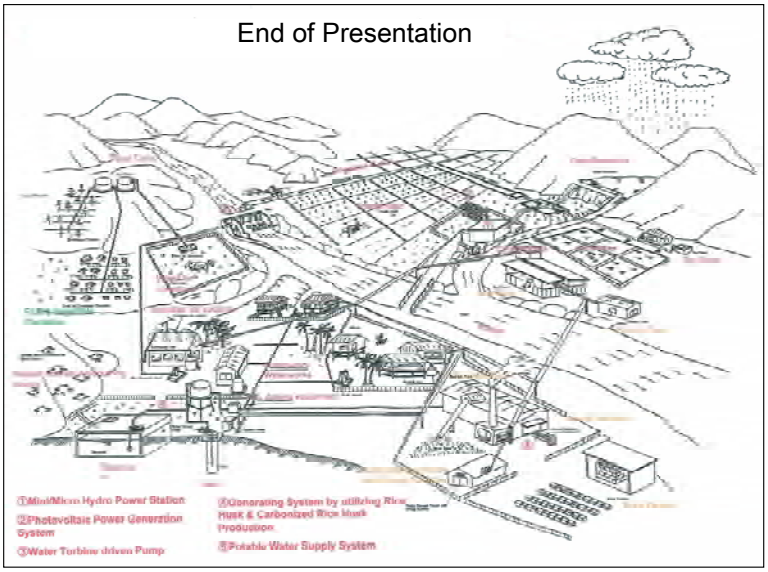
Soft Components

Items	Original/ Present	for Likud MHP	Remarks
RTCF Regulation	Fund Source from Ambangal MHP only	It shall be consider New Source from Likud MHP	Technical Working Grope will be established by PGI DOE/JICA will support
Energy Seles Agreement	2.58 peso/kWh e8 require 4.00/peso kWh ERC has not approved	ERC issues shall be solved ESA for Likud MHP shall be established	
Plant Management System	Plant Management System is only for Ambangal MHP	Comprehensive Management System shall be established	
O & M Training Program	It was leaded by Doe & e8	Collaboration with Japanese consultant and Ambangal MHP Team	

Major Activities for Isabela MHP

Items	Contents	Preparatory Survey
Selection of Project site	Discussion with DOE and NIA Verification at the site	
Organization Structures	Plant Owner Plant Operation and Management Management of the Benefits from Power Sales	To Check the Capability of each bodies
Confirmation about Legal Matter	Water Right Permit, IEE/EIA, FPIC	Technical Working Grope will be established by PGI DOE/JICA will support
Establishment Plant Management System	Plant Manage, Plant Supervisor, Operator Regulation :O & M method, Recording, Accounting etc O&M Training Program	
Energy Seles Agreement	Draft ESA shall be established	
Survey for Construction	Topographic Survey, Geological Survey, Hydrological Survey, Checking of Existing Structures, Procurement Survey, Power Demand Survey, Survey for Grid Connection	

End of Presentation



Minutes of the BRGY consultation

Date:	8th August 2012 9:40-12:00
Venue:	Barangy Haliap Hall, Asipulo, Ifugao
Participants:	1. Provincial Government of IFugao (PPDO) 2. Municipality of Asipulo (MPDO) 3. Brgy. Haliap (Brgy. Captain, Council members) 4. Affected landowners 5. DOE 6. JICA (JICA headquarter, Philippine Office, Consultant team) 30 participants in total
Agenda:	Explanation of JICA Grant Aid for the Likud Mini-hydropower development project 1. Objective of the project 2. Schedule of preparatory survey (Stage 1), and construction (Stage 2) 3. Request of assistance for the survey on the site

Highlights:

1. Barangay Kagawad acknowledged the participants and stated the meeting.
2. Mr. Shimizu of TEPSCO study team presented the objective of the project, schedule of the survey and construction. Afterwards he requested to local community to assist/guide the study team at the site. Mr. Arnold Guyguyon of MPDO translated what he said to the local community.

   Discussion points were: a. the deference between the previous FS in 2011 and the survey this time
   b. Request assistance of the local community for the survey

3. Mr. Nakamata of TEPSCO study team requested assistance to the local community for checking the geological condition of the site.
4. Ms. Hayashi of TEPSCO study team explained the necessity of household survey that she analyzes the impact of affected lands by the project. The schedule of interview is fixed based on the response of the community as follows.
   a. Sitio Likud: August 19th, 2pm
   b. Sitio Tangadon: August 18th, 9am
   c. Sitio Mappit: August 26th, 2pm
   d. Sitio Haliap: August 16th, am
   e. Irrigator's Association: August 17th, 9am

The result of the consultation

1. The community agreed to conduct the survey this time and promised to support the study team.
2. No particular question raised by the community.
3. Mr. Arnold Guyguyon of MPDO expressed his remembrance of a long history of mini-hydropower development in Ifugao. The local community could not understand the benefit of hydropower project at that time thus the project was not push through in Municipality of Asipulo. But after realization of the Ambangal mini-hydropower in Municipality of Kiangan in 2010, no one doubt of the hydropower development.

LIKUD MINIHYDRO POWER PROJECT

BARANGAY CONSULTATION
August 08, 2012, Wednesday, 9:00 A.M.
Haliap Barangay Hall
Haliap, Asipulo, Ifugao

PROGRAM

I. Opening:		
a. Prayer	:	
b. Acknowledgment of Pax	:	Ms. Nancy Gano-Nalunne PPDO Technical Support
c. Opening & Welcome Statement	:	Hon. Roger M. Manghi Barangay Captain, Haliap, Asipulo
d. Message	:	Mr. Kazunari Oshima Leader of the Grant Aid Survey Mission JICA Headquarters, Japan
e. Overview & Objectives of the Meeting	:	Engr. Epifanio G. Gacusan DOE-HOEMD
II. Discussion Proper		
a. The Proposed Likud Minihydro Power Plant Project (LMHPP), Project Timetable & Mission Schedule	:	Grant-Aid Survey Mission Mr. Mitsuru Shimizu-Consultant Leader
b. Interview Schedule with Lot owners and Elders	:	Mr. Ignas N. Bunolna Local Counterpart Survey Mission
c. Open Forum		
III. Closing:		
a. Next Steps	:	PPDO
b. Impression	:	Engr. Arnold G. Guyguyon MPDC, Asipulo, Ifugao
	:	Hon. Tomas U. Pullupul Municipal Vice-Mayor, Asipulo, Ifugao
c. Closing statement	:	Mr. Raymundo Binbinon Executive Assistant, MLGU Asipulo
d. Closing Prayer	:	

Emcee: Hon. Rosemarie Dacquel

Minutes of the Stakeholders meeting

Date:	28th August 2012,10:40-12:10
Venue:	Sangunian Panlalawigan's conference room 3F, Lagawe, Ifugao
Participants:	1. Vice Gov., 7 Sangunian Panlalawigan members 2. Provincial Planning Development Office (Ms. Camelita Buyuccan, Nancy) 3. DOE representative (Mr. Ronnie Sergent, Mr. Jowill Rodriges) 4. JICA Philippine Office, TEPSCO Consultant team 31 participants in total
Agenda:	Explanation of JICA Grant Aid for the Likud Mini-hydropower development project 1. Objective of the project 2. Schedule of preparatory survey (Stage 1), and construction (Stage 2) 3. Role and responsible of the recipient country (DOE, PGI)

Highlights:

1. For better understanding by the SP members regards with JICA Grant Aid project, DOE representative, JICA Philippines officials, and JICA consultant (TEPSCO) jointed the SP regular meeting. And explained the scheme of JICA Grant Aid, the schedule of JICA survey, and implementation, and the required documents are to be prepared by the PGI
2. Major information for the PGI was informed as follows.
   a. The PGI responsible for getting the permits and licenses for the Likud project, such as, ECC, Water right, FPIC and Right of Way (ROW) at their cost.
   b. DOE and the PGI will have to take MOA for making clear each role and responsibility for the project

Open Forum:

1	Vice GOV.	Will the Likud project be a grant or a loan? Can we disregard the loan project at page 9 in your presentation?
	JICA	The Likud project will be implemented by a Grant Aid project.
2	A SP member	Regarding the counterpart share, Can DOE shoulder the application fees instead of the PGI? Because PGI's budget is not be enough.
	DOE	Application fees for the permits are minimal. Those fees shall be shouldered by the PGI.
3	Vice GOV.	Since the consultant and the contractor will be selected from Japanese companies, Will the all materials and goods are Japanese made?
	TESPCO	Electrical mechanical portion, such as water turbine, generator and

		controller will be procured from Japan. Cement and other materials for civil structure, and distribution line will be procured from the Philippines.
	DOE	For the electrical mechanical parts, DOE will procedure of tax exemption (Duty free).
4	Vice GOV.	Regarding the MOA between DOE and the PGI, can we check the contents?
	DOE	DOE's legal office is now reviewing the draft MOA.
	GOV.	I have a draft MOA, so please provide the copy to all SP members, so that we can input and make comments on that.
	A SP member	Will the MOA cover all project phases until construction stage, or will we have separate MOAs for the survey and the construction?
	DOE	The MOA will be only one to make sure the role and responsibility of each DOE and the PGI for the Project. DOE will be responsible for the VAT and TAX exemption, while the PGI will be responsible for the permits and the clearance, such as ECC, FPIC, water right and the land acquisition.
	B SP member	Will DOE facilitate the MOA to avoid misunderstand of the SP members. During the Ambangal project, it took so long time to go and back to finalize.
5	B SP member	As for the selling rate of the Ambangal, it is stressful for us that ERC dictate the lower price. The negotiation between the PGI and IFELCO was useless. DOE should help the PGI for ERC approval.
	DOE	We will elevate to our secretary to consider.
	PPDO	The motion of raising the selling rate to ERC is still on processing. 2.58 peso per kWh is not final price. The legal officer of the PGI has to check everyweek.
6	C SP member	Has PPDO already started to consult about land acquisition to possible affected landowners?
	PPDO	Yes, we conducted the 1st consultation regards with the affected lands by the Project and its compensation last May 2012. So far there is no big issue raised. And we also plan to apply the budget for land acquisition for next supplement budget hearing in October 2012.

Minutes of the Stakeholder Meeting

Date:	8th October 2012, 10:46-12:30
Venue:	GAZEBO, Municipal of Lagawe, Ifugao
Participants:	The Affected communities Brgy. Council members Municipal Government of Asipulo: Mayor, MPDO Provincial Government of Ifugao: PPDO, Provincial Assessor's Office, Legal, PEO IFELCO DOE, JICA Philippine Office, TEPSCO study team 40 participants in total
Agenda:	1. Result of 1st survey (technical, geological, social conditions) 2. Status of required documents for the Likud 3. Confirm the 2nd mission schedule (Walk through, install staff gauge)

Highlights:

1. Opening and welcome statement by Ms. Buyuccan of Provincial Planning Development Coordinator (PPDC)
2. Mr. Miyamoto (Civil), Mr. Nakamata (Geologist), Ms. Hayashi (Social) presented the result of 1st survey mission of the Likud Hydropower Development Project
3. Ms. Nany of Provincial Planning Development Office (PPDO) informed the present status of preparation of the required documents for the Likud hydropower development project (ROW, NCIP, ECC, Water right, MOA).
4. Joint Walk through along the affected area will be held at 8am on 10th October 2012. The participants are;
    a. Provincial Assessors Office
    b. Provincial Engineering Office
    c. Municipal Assessors Office
    d. Municipal Planning Development Office
    e. Affected land owners
    f. TEPSCO study team
5. Closing statement was presented by the Mayor of Asipulo.

Open Forum

- NICP Provincial office asked the PGI to submit the assurance of implementation of

project.

↓

JICA Philippines office answered that JICA cannot commit the implementation at this moment because now is middle of survey, and the decision depends on the Japanese cabinet in next February 2013.

- DENR-EMB (for ECC) required the PGI to submit DOE endorsement, the registration of pre-development contract, and the resolution from host community that they have no objection for the project.

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  DOE answered that the responsible agency is DOE for the project, thus pre-development contract is not necessary. And DOE will send the endorsement letter to the concerned agencies for processing permits and licenses.

  The Barangay council members and the affected land owners agreed to prepare the resolution.

- Joint Walk Through is to confirm the affected land area by the affected land owners and the PGI officials by walking along from the proposed intake site, the proposed headrace, the proposed head-tank, the proposed penstock and the proposed power house.

  ↓

  Barangay Captain and the affected land owners agreed to join the walk through.

The list of affected land owners by the Likud project

CLAIMANT	Total Land Area (m^2)	Affectedl Land Area (m^2)	Affected Percentage (%)	Remark
REPUBLIC OF THE PHILIPPINES	4,833	508	10.5	
JOSE BIMMUCAL, et. al.	15,954	96	0.6	Replaced by Anita Dalanag, et. al.
NIDO LUMAHO	5,872	395	6.7	
LEON DONATO	73,228	1,128	1.5	
BENITA DAMMIT	12,488	622	5.0	
MOD-E PAD-E	12,602	307	2.4	
BEN POH NAC	10,393	0	0.0	
ERNESTO PALIJA	2,582	172	6.7	
RAMON APOY	8,345	599	7.2	
LAGGUY NAD-UG	30,874	720	2.3	
CHRISTOPHER CATAMA	20,507	1,003	4.9	
ROGELIO CATAMA	12,470	914	7.3	
CALIXTO CATAMA	18,073	1,178	6.5	
CARLOS CATAMA JR.	22,633	519	2.3	
CONSTANCIO CATAMA	19,011	398	2.1	
ALVIN CATAMA	24,721	580	2.3	
JOSE BIMMUCAL, et. al.	11,387	93	0.8	Replaced by Linda Pitpitunge
JOSEPH OTAHA	8,254	245	3.0	
ANTONIO TIMOTEO	2,405	199	8.3	
BENITO BAGTO	5,676	325	5.7	
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JOSEPHINE OCAMPO	9,733	1,737	17.8	
UNKNOWN (Penstock)		128		
UNKNOWN (Pwerhouse Access)		538		
UNKNOWN (Headrace Access)		2,107		
	351,772	15,007	4.3	

The status of required documents for the Likud project

	Areas of Concern	Time Frame	Lead Office	Remarks	as of 19th Oct. 2012
1	Land and ESA				
	a. Settle right of way	Nov. 2012 to January 2013	Office of the Provincial Assessor	Fund is proposed in the 2013 Provincial AIP	Conducted the 2nd walk through to verify the boundaries of each landowner Initial Agreement between PGI and the landowners which is described willing to sale the land will be signed by end of Nov. 2012
	b. Energy Sales Agreement	Draft ESA by end of Oct. 2012	PPDO IFELCO	ERC should approved by the completion of construction	Bilateral Contract (PGI & IFELCO) Unit Price : 4.35 peso/kWh
2	Acquisition of the following permits & licenses:				
	a. Certificate of Pre-condition with NCIP Provincial Office	Sep. to Dec. 2012	PPDO	Request forwarded to NCIP on Aug. 9, 2012	1. Pre-FBI meeting was done on Sep.19th 2012. The cost of FBI is 37,000pesos, once the PGI pay, the FBI will carry out within 15 days. 2. NCIP requested to have project commitment for assurance the project from JICA, but DOE said it is beyond NCIP's mandate. DOE will confirm it with NCIP.
	b. Water Permit with NWRB	Sep. to Dec. 2012	PPDO	Application submitted on Aug. 13, 2012 through JRS speed mail	NWRB requested PGI to submit the DOE endorsement. DOE will send.
	c. Environment Compliance Certificate with Regional DENR Office	Sep. to Dec. 2012	PPDO	Application e-mailed on Feb. 1, 2012 at DENR Office, La Trinidad, Benguet	DENR-EMB requested PGI to submit DOE endorsement, BRGY's endorsement, and FS report.
	d. Memorandum of Agreement with DOE	Sep. 10, 2012	PPDO	MOA being reviewed by Provincial Legal Office of the Provincial Government	DOE's legal finished reviewing and waiting for the SP's comments of PGI.
	e. Hydro service Contract with DOE				DOE is the owner of the project until turn over the ownership to PGI, thus the pre-development contract is not necessary. But the development contract will be needed for COC of ERC and the operation.
3	New Findings in 2nd Mission	Non			

PROVINCE OF IFUGAO

ATTENDANCE SHEET

Office: _____

Title of meeting/ seminar/ workshop: Meeting of Stakeholders of the Liku MHPP Project

Venue: Gazebo Restaurant, Pob. West, Lagawe Date: Oct. 8, 2012

Expected Number of participants: _____ Scheduled time: 10:00 a.m.

NO.	NAME	MALE	FEMALE	OFFICE	CONTACT NO.	SIGNATURE
1	EPIFANIO G GACUSAN JR	✓		DOE-REMB	(02)8402192	
2.	FLORO O. ADVIENTO	✓		JICA	889-7112 loc 212	
3.	REY V. SALVANIA	✓		DOE-REMB	840 2192	
4.	JOWIN E. RODRIGUEZ	✓		DOE-REMB	840 2192	
5.	Carmelita B. Buyuccan		✓	PPDO / PLGU	(074) 382-21-09	
7	Mitsuru SHIMIZU	✓		TEPSCO		
8	Yukio MIYAMOTO	✓		TEPSCO		
9	Hiroshi Kobayashi	✓		TEPSCO		
10	Kiminori NAKAMATA	✓		TCC		
11	Kenichi YOSHIDA	✓		JEM		
12	Tomio ICHIKAWA	✓		TEPCO		
13	Takashi YANASE	✓		TEPCO		
14	Nobuki HAYASHI		✓	TEPSCO	0919 459 2138	
15	Hiroyuki Matsuda	✓		JICA		
16	JUAN PAULO PANARES	✓		JICA		
17	CATAMA CONSTANCIO	✓		BLGU	09265656922	
18	BASILIO BAYAORA	✓		BLGU	09068923195	
19	ROGER MANGKI	✓		BLGU	09357108	
20	BALTAZAR DAMMIT	✓			09058737606	
21	Laurence Putac	✓		BLGU	09261218726	
22	PEDRO K. NAMINGIT	✓		PASSO	09054162673	
23	Fedelito A. Rendon	✓		BLGU	09262709077	
24	ARNEL CARACUEL	✓		TEPSCO		
25	FIDEL MAQUILAN	✓		TEPSCO		
26	ROMEO S. OLEA			TEPSCO		
27	SICATUNA TIAMSON			JICA		
28	Mauricio Galotia	✓		PASSO		
29	Roger Madarang			TEPSCO		
30	Rosemarie M. Degud		✓	BLGU		
31	NANCY D. ADOAKINA		✓	KAHAP		

CERTIFIED CORRECT:

_____

PROVINCE OF IFUGAO

ATTENDANCE SHEET

Office: _____

Title of meeting/ seminar/ workshop: _____

Venue: _____ Date: _____

Expected Number of participants: _____ Scheduled time: _____

NO.	NAME	MALE	FEMALE	OFFICE	CONTACT NO.	SIGNATURE
32	Maria L. Laod-ao		✓	BLGU	09064137346	
33	Hoover T. Rimohya	✓		PEO		
34	GARY B. GUYGUYO	✓		PLO		
35	ELLIOT B. BAWAD	✓		Mayor	09088971938	
36	CHRIS MADDUL	✓		IFELCO		
37	ORLINO ATOLBA	✓		11		
38	JAIME PE BENITO, JR	✓		11		
39	Nancy Gau-Walwine		✓	PPDO		
40	Arnold G. Guyguyon	✓		MPDO-Asipulo	09176652520	
41	Kristine Guazon		✓	PPDO	09061197827	
42	Jonathan K. Padayao	✓		PPDO	09249[illegible]0427	
43						
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CERTIFIED CORRECT:

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Preparatory Survey for Mini-Hydropower Development Project in the Philippines

Results of 1st Survey

Oct. 1, 2012

Background of the Project

The Government of the Philippines, in the "National Renewable Energy Program" of June 2011, targets to triple its renewable energy capacity to compare with the rate of 2010 in order for energy security as well as reduction of greenhouse gas emissions. In this situation, small scale hydropower is expected to contribute to secure power supply especially in provincial areas since its potential (10MW or less) is plenty and promising sites distribute nationwide.

In Ifugao Province, one of the target sites of the Project, is famous for the Rice Terrace designated as a World Heritage. Due to its preferred topographic and hydrological conditions, the area is very rich in mini hydropower potential which is currently unutilized. In addition, the Provincial Government of Ifugao (PGI), which took over the responsibility to conserve the World Heritage from National Government, is running short of fund for conservation of the Rice Terrace.

On the other hand, in Isabela Province, located next to Ifugao Province, power consumption is high especially in Santiago City, however, the power supply to this area is dependent on other area.

In line with above background, in March 2012, the Government of the Philippines requested Japanese Government for Grant Aid on development of Likud Mini-hydro Project in Ifugao Province and a mini-hydro project utilizing at existing irrigation systems in Isabela Province.

Objectives

- To contribute to diversifying energy and reduction of greenhouse gas emissions by utilizing domestic renewable energy with developing mini-hydro plants
- To enhance RTCF using profit of Likud Mini-hydro Plant
- To demonstrate the value of newly-introduced mini-hydro plants in terms of regional contribution by energy resource development in the region as well as effective use of untapped hydro potential in the region.

Outcomes of the Projects

- Likud Mini-hydro Plant in Ifugao Province,
- Mini-hydro Plant utilizing existing irrigation facilities in Isabela Province, and
- Electric transmission/transformation/distribution facilities in the vicinity of each site.

Part-I

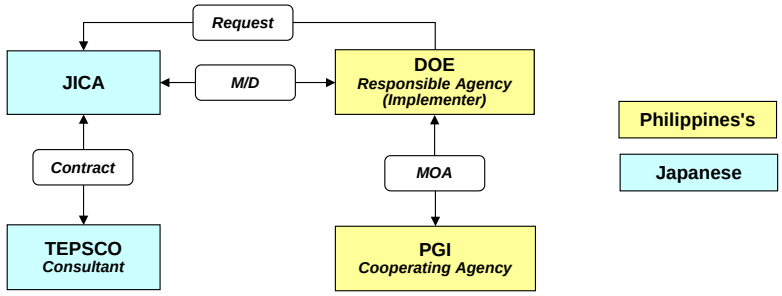
Likud Mini-Hydropower Development in Ifugao

1. Minutes of Discussion
2. Project Site
3. Overall Schedule of Japan's Grant Aid Program
4. Results of Site Survey
5. Action Plan of PGI
6. Project Component
7. Concerns / Issues

1. Minutes of Discussion

(1) Responsible and Implementing Organization

a. Organization Structure : Preparatory Survey Stage

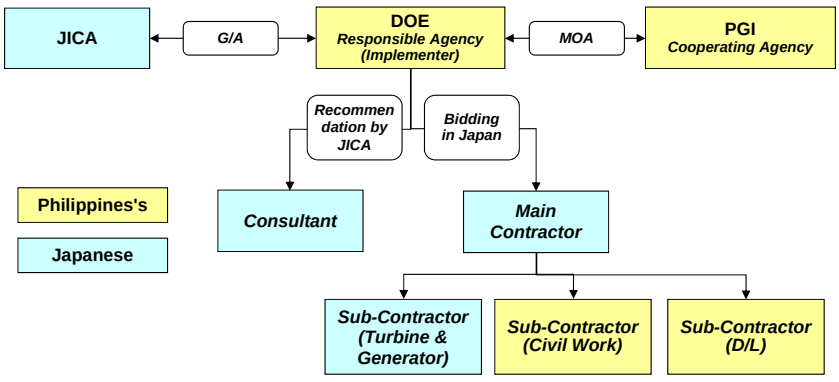


Note; The MOA shall be given to the Team by Sep. 10,2012
The Plan of O & M Structure shall be submitted to JICA by Nov. 2012

1. Minutes of Discussion

(1) Responsible and Implementing Organization

b. Organization Structure : Implementation Stage



1. Minutes of Discussion

(2) Component of the Project

Items Originally Requested by POG	Confirmed Components of the Project
a. Construction and Installation of Likud MHP	a. Construction and Installation of Likud MHP
b. Connecting Power System to 13.8kV	b. Connecting Power System to 13.8kV
c. Overseas Study Tour and Training for HOEMD	c. Training in the Philippine

(3) Counterpart Personnel

The Team requested the Philippines side that the necessary number of counterpart personnel shall be assigned to the Team and necessary arrangement with related organization shall be made during the Survey

1. Minutes of Discussion

(4) Cost Sharing

Cost Sharing between Philippines Side and Japan Site

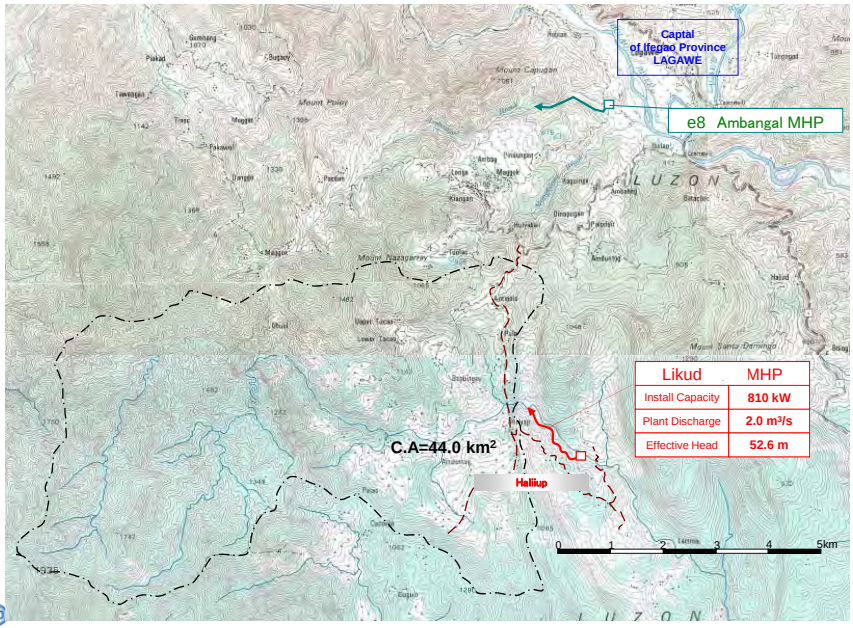
Items		Remarks	Philippines	Japan	Note
Project Management Cost		Cost of C/P for Project Supervision and Management Travel Expenses, Accommodation, Allowance etc.	○	×	
Tax and Compensation	Right of Way		○	×	
	Compensation		○	×	
	Cost for Legal Procedure	Operation Contract, FPIC,EIA, Right of Way etc.	○	×	
	VAT	VAT for Local Procurements *1	○	×	Civil and Transmission & Sub Station Cost
	TAX	Import Tax Exemption and Custom Clearance	○	×	
	Cost for Banking Arrangement		○	×	
Consultant's Cost	Cost for Detail Design	Consultant is limited to Japanese Company	×	○	
	Cost for Preparation of Biding Documents		×	○	
	Construction Supervision by the Consultant		△	○	except Cost for Supervision by Recipient Country (DOE,NIA,PGI etc)
	O&M Training & Preparation of Guidelines		×	○	
Construction Cost	Direct Cost	Main Contractor is limited to Japanese Company The Construction Cost should be estimated based on Japanese Standards. The Material & Labor Cost are based on Local Market Price	×	○	Sub-Contractor : Civil&Transmission will be Local
	Indirect Cost		×	○	
	Main Electrical & Mechanical Equipment		×	○	Including Marine Transportation
	Contingency Cost		–	–	Basically Contingency dose not allowed *2
Operation and Maintenance Cost			○	×	

Note: Cost Sharing between DOE and Implementation Agency should be clearly specified in the MOA

*1:For Japan's grant aid program in the Philippines, VAT is not treated as tax exemption , the governmental organization of the Philippines such as DOE should pay VAT whenever it is required from the contractor which is specified in the E/N & G/A

*2:Since the contingency costs are included in the Direct Cost, JICA will not accept Any Claim/Change Order from the Contractor

2. Project Site



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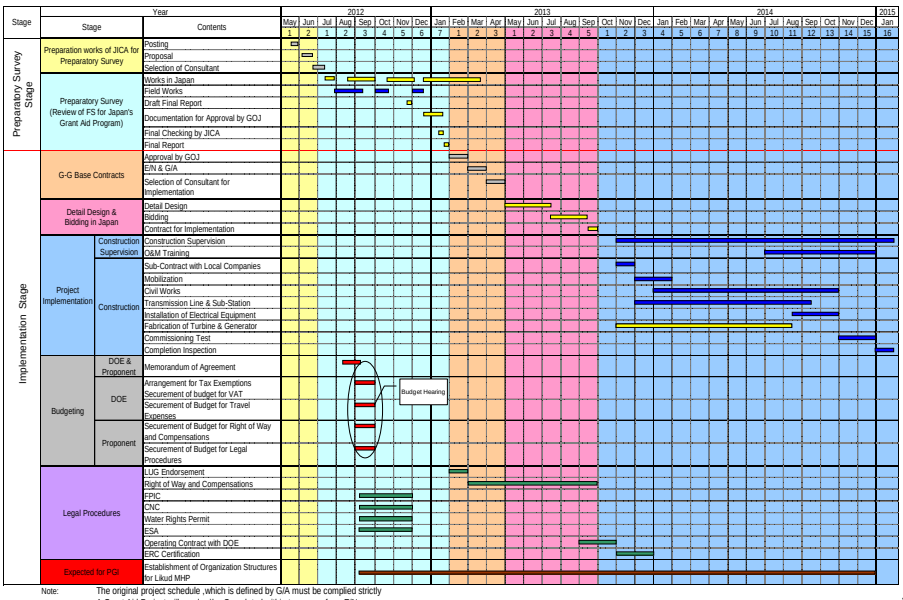
3. Overall Schedule of Japan's Grant Aid Program



Note: The original project schedule ,which is defined by G/A must be complied strictly
A Grant Aid Project will surely c\be Completed within two years from E/N

10

4. Results of Site Survey

(1) Detail Survey for Route of Water Way

4. Results of Site Survey

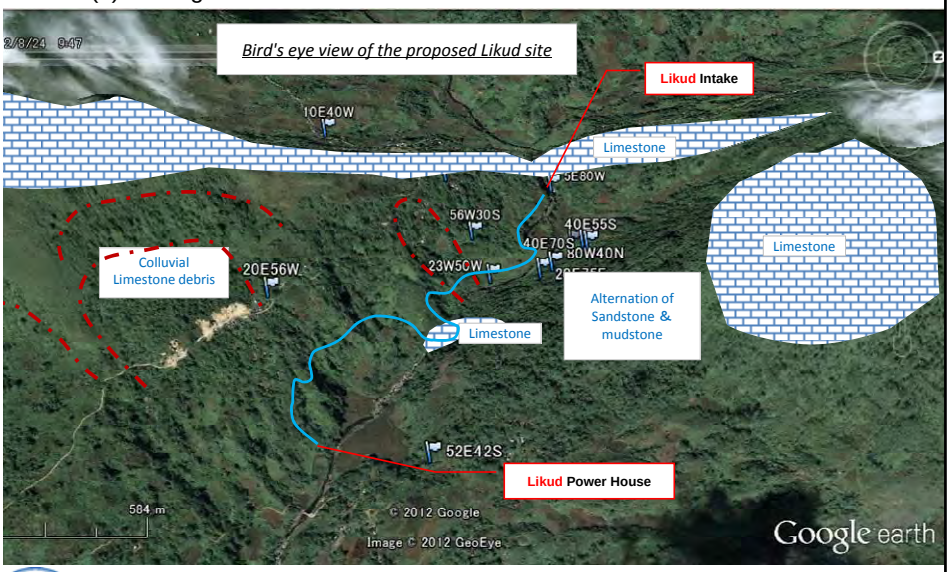
(1) Detail Survey for Route of Water Way

Comparison of Headrace and Penstock between Preparatory Survey and F/S

Item	Unit	Preparatory Survey	F/S
Headrace			
Total length	m	1,833.9	1,875.3
Channel	m	1,704.3	1,841.5
Flume	m	118.0	22.2
Overflow spillway	m	11.6	11.6
Penstock			
Total length	m	160.0	118.5

4. Results of Site Survey

(2) Geological Condition



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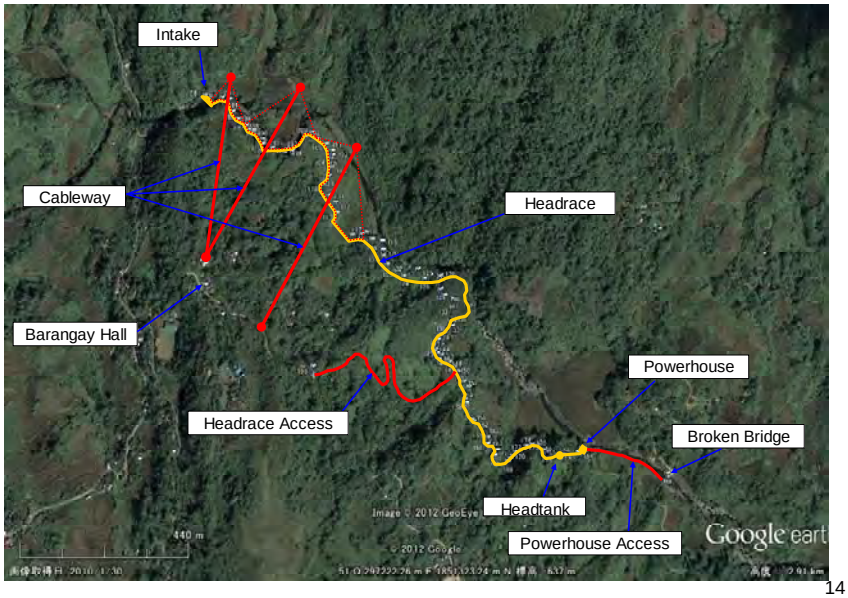
4. Results of Site Survey

(3) Construction Works (Transportation of Construction Materials)



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4. Results of Site Survey

(4) Affected Land Area (Including Access Road)

Name of Land Owner	Total Land Area (m^2)	Affectedl Land Area (m^2)	Affected Percentage (%)	Remark
REPUBLIC OF THE PHILIPPINES	4,833	508	10.5	
JOSE BIMMUCAL, et. al.	15,954	96	0.6	Replaced by Anita Dalanag, et. al.
NIDO LUMAHO	5,872	395	6.7	
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JOSEPHINE OCAMPO	9,733	1,737	17.8	
UNKNOWN (Penstock)		128		
UNKNOWN (Pwerhouse Access)		538		
UNKNOWN (Headrace Access)		2,107		
Total	351,772	15,007	4.3	

4. Results of Site Survey

(5) Interview with Affected Land Owners

Number of the affected landowners	23

Number of the interview with the affected landowners : 22

- All affected landowners knew about the project.
- 20 out of 22 respondents positively accept the project.
- 2 respondent accepted with condition of employment during the construction stage and/or officer of LGU.
- All affected landowners can offer their lands for the Project
  4 respondents said to donate the land with conditions.
  (rehab of CIS and employment opportunity as LGU officers.)
  18 respondents said to negotiated purchase.
- Compensation by the project will not make their daily life change since the affected area will be small.
- 16 respondents take tax clearance annually, but 6 have not transferred the land title officially thus no tax pay. They need to update the official land title.

4. Results of Site Survey

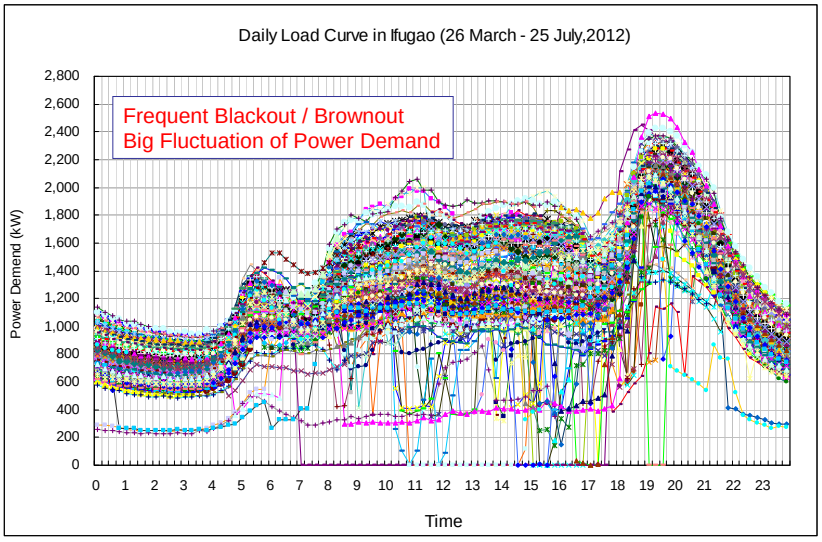
(5) Interview with Affected Land Owners

Basic information of the affected land owners

No. of family members:	Minimum: 1, Average : 4.7, Maximum : 8
Living years in present house:	19 respondents have been living the present house since they were birth.
Ownership of the house	19 respondents owned the houses.
No. of family members earning income	Minimum: 1, Average: 2, Maximum: 6
Annual Income of 2011	Minimum : P 5,000 , Mean: P 30,900 Average : P 74, 641 , Maximum: P309,075
Major source of cash income	• Some of family members work as teacher and/or LGU officer, the family 's income is stable. • The family income less than 30,000 pesos, they are subsistence farming farmers and/or daily wage workers.
No. of electrified household	• 16 HHs electrified , 6HHs have no electricity

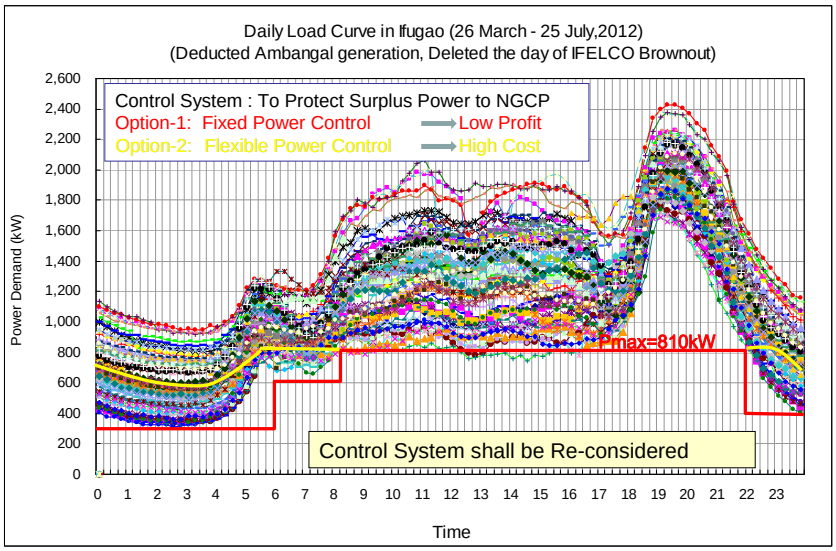
4. Results of Site Survey

(6) Electric Power Demand in Ifugao



4. Results of Site Survey

(6) Electric Power Demand in Ifugao



4. Results of Site Survey

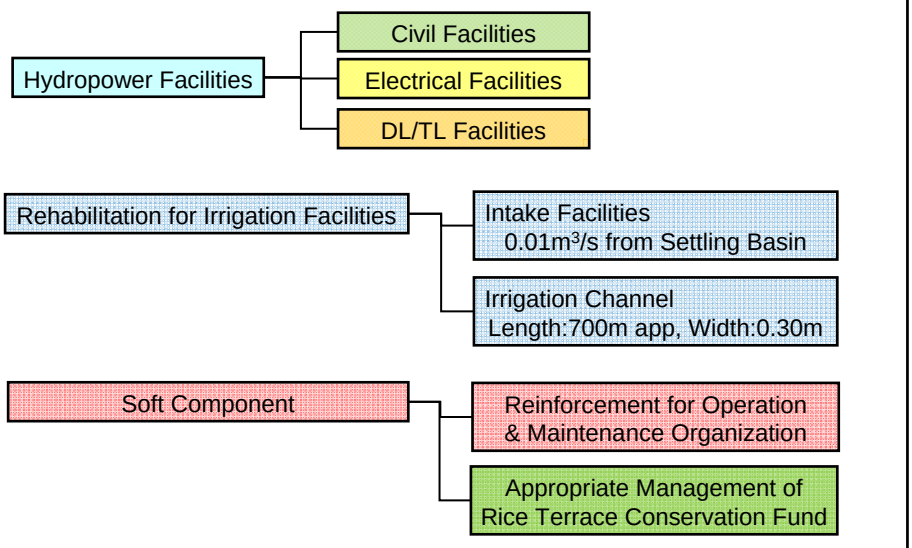
(7) Rehabilitation of Cot-Cot CIS

5. Action Plan of PGI

PGI's Action Plan prepared by PPDO

	Areas of Concern	Time Frame	Lead Office	Remarks
1	Settle right of way	Nov. 2012 to January 2013	Office of the Provincial Assessor	Fund is proposed in the 2013 Provincial AIP
2	Acquisition of the following permits & licenses:			
a.	Certificate of Pre-condition with NCIP Provincial Office	Sep. to Dec. 2012	PPDO	Request forwarded to NCIP on Aug. 9, 2012
b.	Water Permit with NWRB	Sep. to Dec. 2012	PPDO	Application submitted on Aug. 13, 2012 through JRS speed mail
c.	Environment Compliance Certificate with Regional DENR Office	Sep. to Dec. 2012	PPDO	Application e-mailed on Feb. 1, 2012 at DENR Office, La Trinidad, Benguet
d.	Memorandum of Agreement with DOE	Sep.10,2012	PPDO	MOA being reviewed by Provincial Legal Office

6. Project Component



7. Concerns / Issues

Items	Present	Concerns / Issues for Likud MHP	Remarks
RTCF Regulation	Fund Source from Ambangal MHP only	It shall be consider New Source from Likud MHP	Technical Working Grope will be established by PGI DOE/JICA will support
Energy Seles Agreement	2.58 peso/kWh e8 require 4.00/peso kWh ERC has not approved	ERC issues shall be solved ESA for Likud MHP shall be established	
Plant Management System	Plant Management System is only for Ambangal MHP	Comprehensive Management System shall be established	
O & M Training Program	It was leaded by DOE & e8	Collaboration with Japanese consultant and Ambangal MHP Team Who will be Trainees ?	

Minutes of the Stakeholder Meeting

Date:	10th December 2012, 10:40-12:30
Venue:	GAZEBO, Municipality of Lagawe
Participants:	Provincial Government of Ifugao: PPDO, PAO, Legal, PAENRO, PEO Municipal Government of Asipulo: Vice Mayor, Assessor's Office IFELCO, DOE, TEPSCO study team 22 participants in total
Agenda:	1. Final Design of the Likud Hydropower Development Project 2. Implementation Schedule 3. Status of documentary Requirements for the Province of Ifugao 4. Final list of affected land owners

Highlights:

1. Opening and welcome statement by Ms. Buyuccan of Provincial Planning Development Coordinator (PPDC) who is the head of executing office of the Likud hydropower project.(20 minutes)
2. Mr. Shimizu presented the final design of the Likud Hydropower Development Project, and informed the implementation schedule of the Project (1hour).
3. Ms. Nany of Provincial Planning Development Office (PPDO) informed the present status of preparation of the required documents for the Likud hydropower development project, such as acquiring the land, Environmental clearance, social acceptability for the project and so on. The following table shows each status.
4. The PGI together with TEPSCO will hold the BRGY consultation to explain the final design of the Likud hydropower development project and to confirm the final affected area by the Project at 9am on 13th Dec. 2012. The PGI asked MLGU to attend the BRGY consultation on 13th Dec. 2012.
5. Closing statement was presented by the Vice Mayor of Asipulo to hope realizing the project in Ifugao, and promising the assistance of the land acquisition.

The status of the required documents by DOE for the Project

	Activity	Status/Time Frame
1	Checking of Land Titles	by Dec-13(Thu)
2	Right of Way for finalizing the affected area	Discuss on Dec-13
3	Brgy Consultation	Dec-13 @Halip Brgy Hall
4	Baseline Evaluation (value of land)	PPDO to evaluate and provide all needed documents to TEPSCO after discussion w/ land owner on Dec-13
5	Certification from JICA	submitted to PLGU
6	MOA btw PGI and DOE	Consult w/ Legal and Accountant to finalize until Dec-14
7	Certificate of Endorsement from DOE	After signning MOA (between DOE and PGI)
8	Certificate of Registration from DOE	After signning MOA (DOE & PGI) and Hydro Service Contract
9	Certificate of Non-Coverage/ECC	Pending Certificate of Endorsement/Registration
		Submit PDP and Certificate of No-objection
10	FPIC	FBI:completed FPIC:to be scheduled later
11	Water Right Permit	Pending Certificate of Endorsement/Registration
12	MOD btw JICA and DOE	Shall be concluded on Dec-20
13	Energy Sales Agreement	Drafted, to be finalized after ERC approval

PROVINCE OF IFUGAO
ATTENDANCE SHEET

2012.12.10

Office: **Provincial Local Government of Ifugao**
Title of meeting/ seminar/ workshop: **Meeting of Stakeholders of the Likud Mini-hydro Power Project**
Venue: **Gazebo Garden Restaurant, Poblacion West, Lagawe, Ifugao** Date: **December 10, 2012**
Expected Number of participants: ______ Scheduled time: **10:00 A.M.**

NO.	NAME	MALE	FEMALE	OFFICE	CONTACT NO.	SIGNATURE
1	Nobuki HAYASHI		✓	TEPSCO		[signature]
2	Mitsuru SHIMIZU	✓		TEPSCO		[signature]
3	Hiroshi KOBAYASHI	✓		TEPSCO		[signature]
4	Carmelita B. Buyuccan		✓	PPDO		[signature]
5	Honorio T. Bimohya	✓		PEO		[signature]
6	Ignacio Bunolna	✓				[signature]
7	BENJAMIN LUMAG JR.	✓		PENRO		[signature]
8	IGNACIO B. BANIYA	✓		ASIPULO		[signature]
9	Robert Pinighan	✓		ASIPULO		[signature]
10	PEDRO K. NAMINGIT	✓		PASSO		[signature]
11	GARY B. GUYGUYON	✓		PLO		[signature]
12	Epifanio G. Gacusan, Jr.	✓		DOE-REMB	4792980	[signature]
13	CRIS MADDUL	✓		IFELCO		[signature]
14	JAIME PE BENITO VI	✓		IFELCO		[signature]
15	[illegible]	✓		V.M	09273863900	[signature]
16	CHARLES BAGUILAT	✓		PACCO		[signature]
17	Jonathan K. Patdungao	✓		PPDO		[signature]
18	ARNEL CARACMEL	✓		TEPSCO		[signature]
19	Macario Galotia	✓		PASSO		[signature]
20	FIDEL MAQUILAN	✓		TEPSCO		[signature]
21	Mario Balawc	✓		PPDO		[signature]
22	DERICK Humiwat	✓		PACCO		[signature]
23	GREG OPANI	✓		IFELCO		[signature]
24	Kristine Guaga		✓	PPDO		[signature]
25						
26						
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CERTIFIED CORRECT:

____

LIKUD MINI-HYDRO POWER DEVELOPMENT PROJECT
STAKEHOLDERS' MEETING
10 December 2012, Monday 10:00 A.M.
Gazebo Garden Restaurant
Dullagan, Poblacion West, Lagawe, Ifugao

PROGRAM

I. OPENING

a. Prayer	:	
b. Acknowledgement of Participants	:	Secretariat
c. Opening and Welcome Statement	:	**Engr. Carmelita B. Buyuccan** PPDC & AMHPP Plant Manager

II. DISCUSSION PROPER : **Mr. Mitsuru Shimizu**
Grant-Aid Survey Mission Leader

a. Final Design of the Likud Hydro Power Development Project
b. Implementation Schedule
c. Documentary Requirements
d. Final List of Lot Owners
e. Others

III. CULMINATING

a. Wrap-up and Next Steps	:	Secretariat
b. Closing Statement	:	**Hon. Eladio H. Bang-ud** Municipal Mayor, Asipulo, Ifugao
c. Closing Prayer	:	**Hon. Fedelito A. Rendon** Barangay Kagawad, Haliap, Asipulo

Republic of the Philippines
Preparatory Survey for
Mini-Hydropower Development
in the Philippines
(Mini Hydropower Project in the Province of Ifugao)

Draft Preparatory Survey Report

December 2012

1

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Outline of the Project

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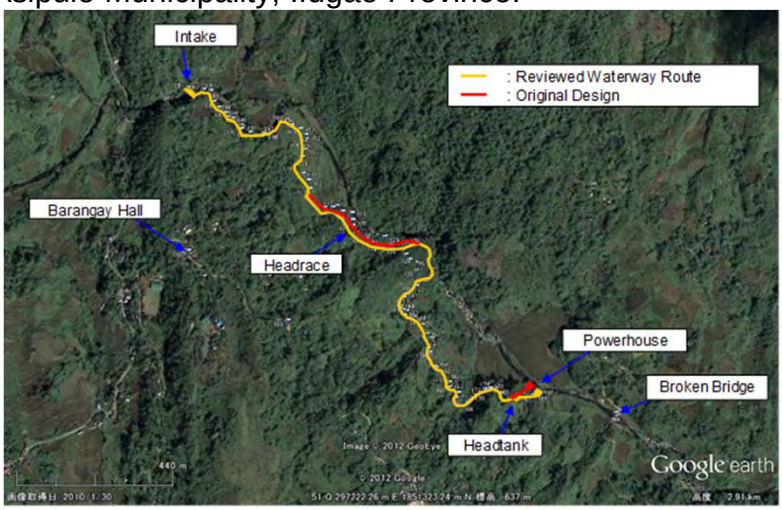
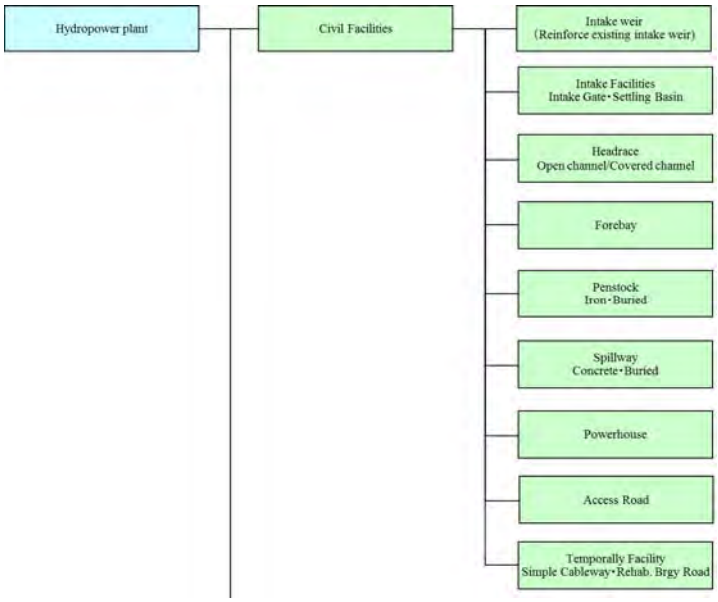


3

Project Components (Likud MHP)



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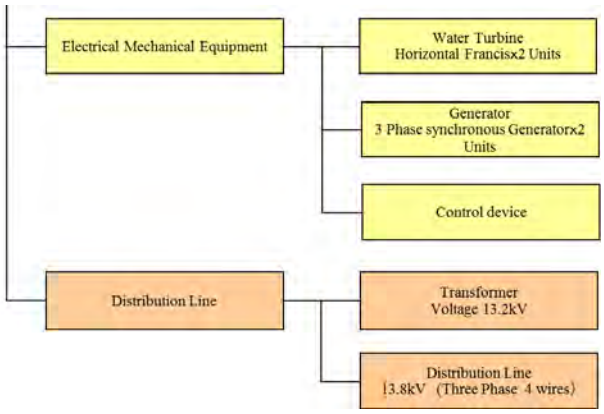
Project Components (Likud MHP) Cont.



5

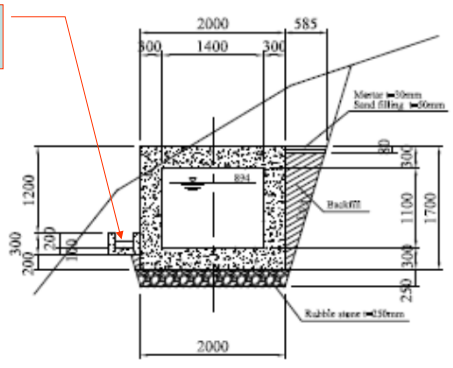
Project Components (Rehab. Cot-Cot CIS)

Rehabilitation of existing irrigation weir

Intaek・Diversion gate
From Settling Basin（0.01m³/s）

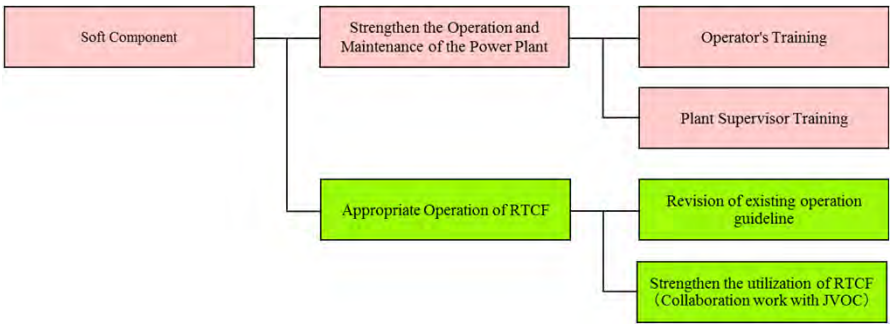
Existing irrigation weir
Length：Around 700m、Width 0.3m

Irrigation Channel



6

Project Components (Soft Component)



7

Project Schedule

Japanese Financial Year	2012				2013				2014			
Month	Dec.	Jan	Feb	Mar	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Preparation of Document	■											
Submission of the Documents to the Cabinet		■										
Approval by Japanese Cabinet			▲									
Exchange Note GOP & GOJ				▲								
Grant Agreement DOE & JICA				▲								
Detail Design					■							
Bidding for Main Contractor in Japan						■						
Construction							■	■	■	■	■	
Soft Components (O&M training)							■	■	■	■	■	
Commissioning												▲
Basic Agreement of Land Acquisition	▲											
FPIC	▲											
CNC	▲											
Endorsement of DOE	▲											

8

Cost Burdening

Cost burden on the Japanese side

Cost for Consultant and Construction (Except VAT, Land acquisition etc.)

Cost burden on the Philippine side

(1) Value added tax on locally procured equipment and materials

(2) Land acquisition cost

(3) Authorization procedural fees

(4) Operation – Maintenance and Management Cost

9

Operation – Maintenance and Management Cost

（Draft)

Power Plant Operation and Maintenance Cost　　Php/year

Type	Personnel	Numbers	Monthly Unit Cost (Php)	Annual Cost (Php)
Power plant operation Maintenance personnel expenses	Plant supervisor	2	18,000	432,000
	Operator	6	15,000	1,080,000
	Line operator	1	12,000	144,000
	Office staff	1	10,000	120,000
	Subtotal			1,776,000
Repair cost				2,980,000
Total				4,756,000

10

Highlights of the Community Consultation Meeting at Haliap, Asipulo held on December 13, 2012

PRESENT:

Calixto Catama	Lot owner	Fedelito Rendon	Kagawad
Leon Donato	Lot Owner	Rodrigo Gucmi	Kagawad
Romeo Apoy	Lot Owner	Basilio Bayaona	Brgy. Captain
Benito Duppog	Representative	Maria Ladao	Kagawad
Christopher Catama	Lot Owner	Rosemarie Daquel	Kagawad
Carlos Catama Sr.	Lot owner	Nancy Addangna	Secretary
Nido Lumaho	Lot Owner	Estela Basilio	Treasurer
Jose Bimmucal	Lot Owner	Robert Pinkihan	Municipal Assessor
Agusta Otana	Representative	Arnold Guyguyon	MPDC- Asipulo
Josephine Ocampo	Lot Owner	Christopher Tenenan	LGU Staff- Asipulo
Ben Pohnac	Lot Owner	Julita Bahingawan	Agriculturist
Baltazar Dammit	Representative	Tomas Pulupul	Vice Mayor-Asipulo
Susan Pillog	Representative	Herman Tenenan	IFELCO
Pedro Namingit	Prov'l Assessor	Epiphanio Gacusan Jr	DOE
Gary Guyguyon	Prov'l Legal Officer	Hiroshi Kobayashi	Study team
Carmelita Buyuccan	PPDC	Nobuki Hayashi	Study team
Nancy Gano Nalunne	PPDO	Mitsuru Shimizu	Study Team Leader
Kristine Guazon	PPDO		

- The meeting started at 10.0'clock A.M with a prayer led by Kagawad Fedelito Rendon who also acted as facilitator.
- Engr.Carmel Buyuccan of the PPDO introduced the participants starting of with the members of the study team, representative of the Department of Energy, the representatives of the municipal local government of Asipulo and the provincial local government of Ifugao. Kagawad Fedelito Rendon introduced the members of the barangay council present and the Lot owners.
- Barangay Captain Basilio Bayaona gave the welcome remarks . He apologized for the use of the vernacular and the incomplete attendance from the lot owners as the letters were distributed Just a day before. He expressed hope that the project will push through and reiterated his warmest welcome to everyone.
- Engr. Shimizu presented the final design of the project, implementation schedule and documentary requirement necessary for project approval by the Japanese cabinet who will meet in February 2013. He said that the project documents will be submitted on January 2013 and therefore all the requirements needed be done within this month of December.

  Engr. Arnold Guyguyon was asked to translate in the vernacular what was presented for better understanding.
- Engr. Carmel Buyuccan briefly recalled the previous activities undertaken especially regarding the determination of lot owners affected, the lot to be acquired and the vegetation that maybe affected. She informed that they already proposed in the provincial budget for 2013 the money to be utilized for the compensation of land to be acquired. For the vegetation and properties that will be damaged, this will be taken with whoever will be the contractor of the project. In the meantime, the documents needed for land acquisition should start.

At this point, the secretariat together with Provincial assessor and legal officer reviewed the contents of the land titles submitted and checking it with the report that was presented. Since there were inconsistencies and errors, the report presented was corrected and updated. (See updated records) It was also proposed that a final walk through with the presence of all lot owners be undertaken again to finalize the listing and the area affected per lot. After the correction, Engr Carmelita Buyuccan asked if the lot owners are now ready to commit to sell a portion of their lot to the project.

- Leon Donato and other lot owners said they are willing to sell depending on the buying price. Atty Gary Guyguyon and Mr. Pedro Namingit explained the position of the provincial government based on approved ordinance. The schedule of rates for all types of land was presented and converted into per square meter rates.
  The lot owners however were not happy saying the rates are very very low.
- Since there were no counter offers, the PPDC after conferring with legal officer and provincial assessor offered a higher price based on the Ambangal land acquisition valuation. The lot owners bargained that the price shoul d be increased . After some discussion the lot owners and the representatives of the provincial government agreed on the prices, as follows:

  Irrigated Riceland - Php 85.00 per square meter
  Unirrigated 70.00 per square meter
  Others 50.00 per square meter
- After the parties agreed on the price, the PPDC asked if the lot owners are now ready to sign the promise to sell. The document was given to the vice mayor who informed the lot owners that this is not yet the deed of sale but just to get their commitment to sell in case the project will have the money and assured them that it is safe for them to sign. MPDC Arnold Guyguyon read the content of the paper. The lot owners proceeded then to sign the document.
- Activities agreed to be undertaken are the following:

  1. Barangay Captain to submit Lot Titles or Tax Declarations on or before January 4, 2013 (Except those already submitted) to the PPDO
  2. Barangay Captain to have the other lot owners sign the promise to sell document and to submit the same to the PPDO on December 18,2012
  3. Undertake the final walk through on January 2013. Exact date will be communicated to the lot owners before the schedule date.
- Closing Remarks was given by the Honorable Tomas Pulupul, Vice Mayor. He expressed gratitude to the members of the study team, to JICA and DOE for the project. He also thanked the provincial government and expressed hope that the project will be approved, implemented for the benefit of Asipulo and the province. He assured of the support of the municipal government.
- The meeting was adjourned at 12.40 PM

PREPARED BY:

IGNACIO N. BUNOLNA

PROVINCE OF IFUGAO
ATTENDANCE SHEET

2012. 12. 13

Office: **Provincial Local Government of Ifugao**
Title of meeting/ seminar/ workshop: **Barangay Consultation Meeting re. the Likud Mini-hydro Power Project**
Venue: **Haliap Barangay Hall, Haliap, Asipulo, Ifugao** Date: **December 13, 2012**
Expected Number of participants: _____ Scheduled time: **9:00 A.M.**

NO.	NAME	MALE	FEMALE	OFFICE	CONTACT NO.	SIGNATURE
1	CALIXTO N. CATAMA	✓			09069711899	
2	LEON DONATO	✓				
3	ROMEO APOY	✓			09058064126	
4	ESTELA P. BASILIO		✓		09069014582	
5	SUSAN I. PILLOG		✓		09262709715	
6	BENITO DUPPOG	✓				
7	CHRISTOPHER Catama				09058607964	
8	Carlos T. Catama SR					
9	CHRISTOPHER TEHEHAN	✓		LGU-ASIPULO	09358881693	
10	Fedelito Rendon	✓		BLGU	09262709077	
11	Rodrigo Guanni	✓		BLGU		
12	Nido Lumaho	✓			09353069488	
13	Basilio Bayarong	✓		BLGU	09068823195	
14	Lea D. Bimucal	✓	✓			
15	Agusta Otana		✓		09066047426	
16	JOSEPHINE D. OCAMPO		✓		09057318433	
17	ROBERT PINKIHAN	✓		LGU		
18	Arnold G. Guggayon	✓		LGU		
19	Rosemarie M. Dacpano		✓	BLGU		
20	NANCY D. ADDANGNA		✓	BLGU		
21	Maria Lourdes		✓	BLGU		
22	PEDRO K. NAMINGIT	✓		PASSO	09054162673	
23	ERNESTO T. NGATIYON	✓		BARANGAY	09057961651	
24	GARY B. GUYGUYON	✓		PLO		
25	~~EAR~~ Ben Pothiac	✓	✓			
26	~~ALAN~~ BALTAZAR DAMMIT					
27	~~KRI~~ Engr. Epifanio Gacusan Jr.	✓		DOE-HOESMO	09167824568	
28	HERMAN TENENAN	✓		IFELCO	09178671744	
29	CARMELITA BUYUCCAN		✓	PPDO		
30	NANCY GANO NALUNUE		✓	PPDO		

CERTIFIED CORRECT:

PROVINCE OF IFUGAO

ATTENDANCE SHEET

Office: **Provincial Local Government of Ifugao**

Title of meeting/ seminar/ workshop: **Barangay Consultation Meeting re. the Likud Mini-hydro Power Project**

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Expected Number of participants: ________ Scheduled time: **9:00 A.M.**

NO.	NAME	MALE	FEMALE	OFFICE	CONTACT NO.	SIGNATURE
31	Ignacio Buroher	✓				[signature]
32	KRISTINE GUAZON			PPDO		[signature]
33	BENJIE LUNAG	✓		PAENRO		[signature]
34	MARIO BALAWO	✓		PPDO		[signature]
35	NOBUKI HAYASHI		✓			[signature]
36	MITSURU SHIMIZU	✓				
37	HIROSHI KOBAYASHI	✓				[signature]
38	ARNEL	✓				
39	FIDEL	✓				
40	MACARIO GALATIA	✓		PASSO		
41	Tomas Pulhoy	✓		LBU [illegible]		[signature]
42	JULITA BAHINGAWAN		✓	M. Agri.		[signature]
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CERTIFIED CORRECT:

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LIKUD MINI-HYDRO POWER DEVELOPMENT PROJECT
BARANGAY CONSULTATION MEETING
13 December 2012, Thursday 9:00 A.M.
Haliap Barangay Hall, Haliap, Asipulo, Ifugao

PROGRAM

I. OPENING

a. Prayer	:	Hon. Fedelito A. Rendon Barangay Kagawad
b. Acknowledgement of Participants	:	PPDO
c. Opening and Welcome Statement	:	**Hon. Basilio B. Bayaona** Barangay Captain, Haliap, Asipulo

II. DISCUSSION PROPER : **Mr. Mitsuru Shimizu**
Grant-Aid Survey Mission Leader

a. Final Design of the Likud Hydro Power Development Project
b. Implementation Schedule
c. Documentary Requirements
d. Final List of Lot Owners
e. Prices of Lots and Vegetation
f. Others

III. CULMINATING

a. Schedules/ Next Steps	:	PPDO
b. Closing Statement	:	**Hon. Eladio H. Bang-ud** Municipal Mayor, Asipulo, Ifugao
c. Closing Prayer	:	

PROMISE TO SELL

WE, Anita Dalanag, Nido Lumaho, Leon Donato, Benita Dammit, Miguel Mabbin, Ben Ponhac, Ernesto Palija, Ramon Apoy, Lagguy Nad-ug, Christopher Catama, Rogelio Catama, Calixto Catama, Carlos Catama Sr., Constancio Catama, Victor Basilio, Linda Pitpitungue, Joseph Otaha, Antonio Timoteo, Robert Apoy, Jimmy Bimmucal, Pablo Bittuwon, Alex Pillog, Josephine Ocampo, Tessie Pinkihan, Joseph Ngitit, Jose Bimmucal, Clarence Catama and Calixto Catama are owners of land located at Haliap, Asipulo, Ifugao. We have been recently informed that the Provincial Government of Ifugao, in cooperation with other agencies, will be constructing a Mini-Hydro Project at Haliap, Asipulo, Ifugao and that portions of our land would be affected by the development.

For purposes of allowing the smooth construction of the project, we express our willingness to cooperate and hereby promise to sell portions of our land which will be directly affected by the said project to the Provincial Government of Ifugao in the following amounts:

Irrigated Riceland----------P85-00 per square meter

Unirrigated Riceland P70.00 per square meter

Cornland (Rootland/ Coffee land----------P50.00 per square meter

Grassland & others P50.00 per square meter

Forested land P50.00 per square meter

This ___ day of December 2012 at Haliap, Asipulo, Ifugao.

Anita Dalanag

Nido Lumaho represented by NOEL BAS-ILAN

Leon Donato

Benita Dammit represented by BALTAZAR DAMMIT

Miguel Mabbin

Ben Ponhac

Ernesto Palija represented by Victoria Sandoe

Ramon Apoy

Lagguy Nad-ug

Christopher Catama

Rogelio Catama

Carlos Catama Sr.

Constancio Catama

Victor Basilio

Linda Pitpitunge

Joseph Otaha

Antonio Timoteo

Robert Apoy

Jimmy Bimmucal

Pablo Bittuwon

Alex Pillog

Josephine Ocampo

Tessie Pinkihan

Jose Bimmucal

Clarence Catama

Signed in the presence of:

_____

Joseph Ngitit

Charise Catama

Calixto Catama

_____

Republic of the Philippines
Preparatory Survey for
Mini-Hydropower Development
in the Philippines
(Mini Hydropower Project in the Province of Ifugao)

Draft Preparatory Survey Report

December 2012

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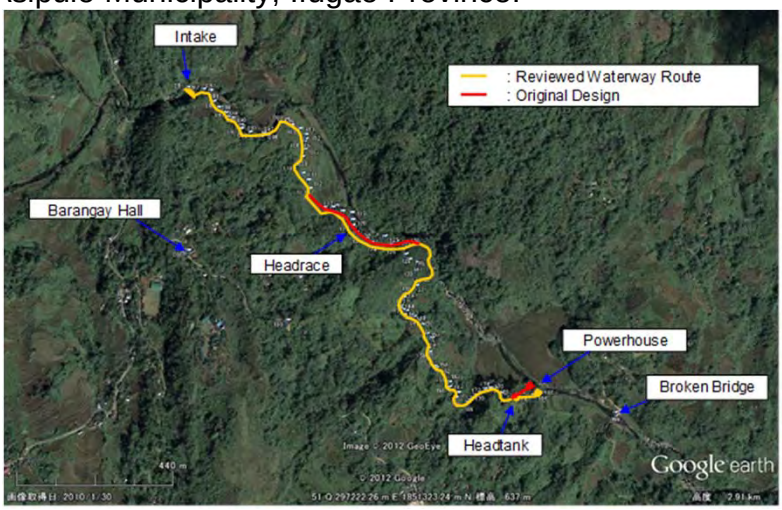
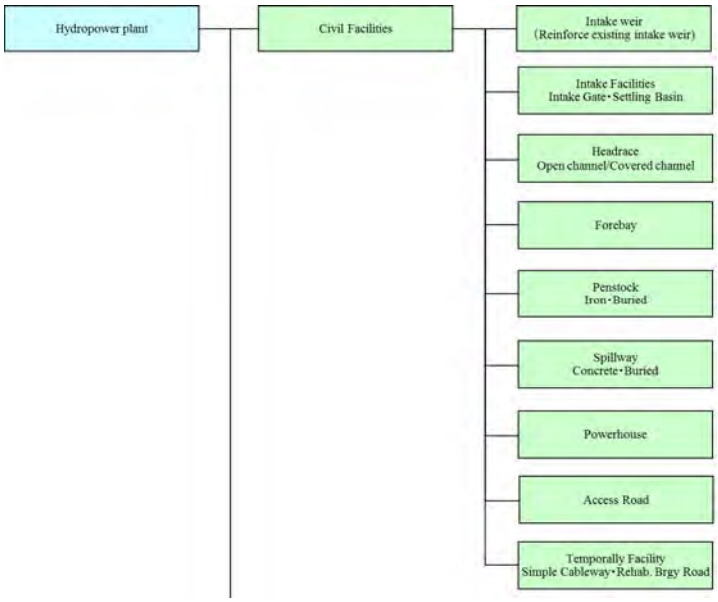


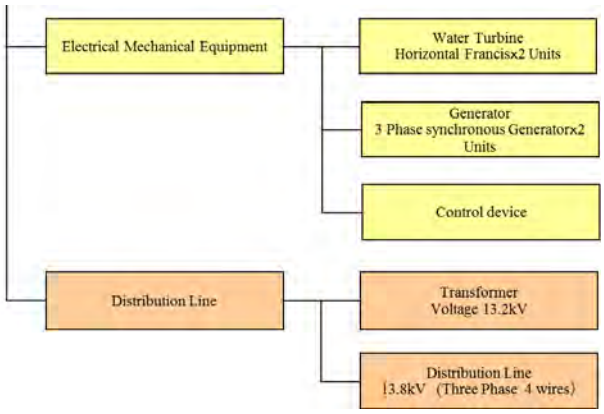
3

Project Components (Likud MHP)



4

Project Components (Likud MHP) Cont.



5

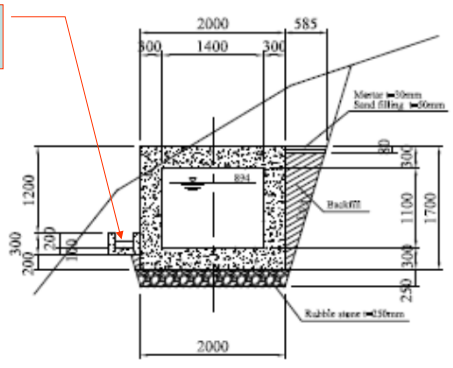
Project Components (Rehab. Cot-Cot CIS)

Rehabilitation of existing irrigation weir

Intaek・Diversion gate
From Settling Basin（0.01m³/s）

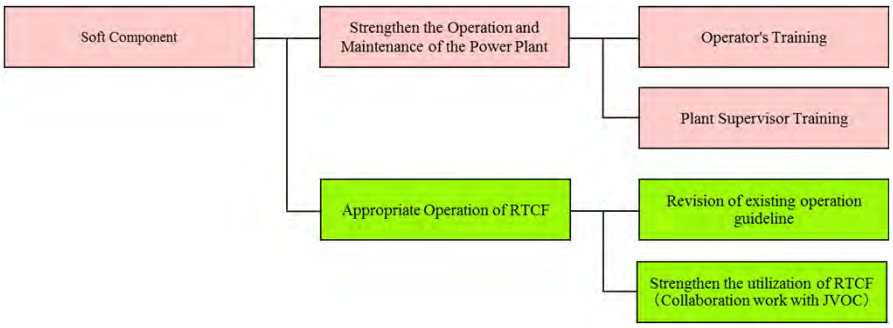
Existing irrigation weir
Length：Around 700m、Width 0.3m

Irrigation Channel



6

Project Components (Soft Component)



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Project Schedule

Japanese Financial Year	2012				2013				2014			
Month	Dec.	Jan	Feb	Mar	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Preparation of Document												
Submission of the Documents to the Cabinet												
Approval by Japanese Cabinet												
Exchange Note GOP & GOJ												
Grant Agreement DOE & JICA												
Detail Design												
Bidding for Main Contractor in Japan												
Construction												
Soft Components (O&M training)												
Commissioning												
Basic Agreement of Land Acquisition												
FPIC												
CNC												
Endorsement of DOE												

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Cost Burdening

Cost burden on the Japanese side

Cost for Consultant and Construction (Except VAT, Land acquisition etc.)

Cost burden on the Philippine side

(1) Value added tax on locally procured equipment and materials

(2) Land acquisition cost

(3) Authorization procedural fees

(4) Operation – Maintenance and Management Cost

9

Operation – Maintenance and Management Cost

（Draft)

Power Plant Operation and Maintenance Cost　　Php/year

Type	Personnel	Numbers	Monthly Unit Cost (Php)	Annual Cost (Php)
Power plant operation Maintenance personnel expenses	Plant supervisor	2	18,000	432,000
	Operator	6	15,000	1,080,000
	Line operator	1	12,000	144,000
	Office staff	1	10,000	120,000
	Subtotal			1,776,000
Repair cost				2,980,000
Total				4,756,000

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1.1.1 Landscape and Visual Assessment

"Cultural landscapes reflect the interactions between people and their natural environment over space and time. Nature, in this context, is the counterpart of human society; both are dynamic forces shaping the landscapes. In some regions of the world, cultural landscapes stand out as models of interaction between people, their social system and the way they organize space. A cultural landscape is a complex phenomenon with a tangible and intangible identity. The intangible component arises from ideas and interactions which have an impact on the perceptions and shaping of the landscape, such as sacred beliefs closely linked to the landscape and the way it has been preserved over time. Cultural landscapes mirror the cultures which created them."[1]

The World Heritage Convention[2] became the first international legal instrument to recognize and protect cultural landscapes. In 1992 World Heritage Committee acknowledged that cultural landscapes represent the "combined works of nature and man" that are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and successive economic and cultural forces.

Cultural landscapes, as explained by the World Heritage Secretariat, often reflect specific techniques of sustainable land use, considering the characteristics and limits of the natural environment they are established in, and a specific relation to nature. Protection of cultural landscapes can contribute to modern techniques of sustainable land use and can maintain or enhance natural values in the landscape. The continued existence of traditional forms of land use supports biological diversity in many regions of the world.

"Cultural landscapes – cultivated terraces on lofty mountains, gardens, sacred places – testify to the creative genius, social development, and the imaginative and spiritual vitality of humanity."

Rice terraces cover an extensive area encompassed by the five highland provinces of Kalinga-Apayao, Abra, Mountain Province, Ifugao, and Benguet, covering an area of approximately 20,000 square kilometers that equals 7% of the total landmass of the Philippines. However for purpose of World Heritage inscription, the nominated area included only five small terrace clusters in Ifugao province because these were the sites with adequate legal protection existing during inscription time.

The location and exact coordinates of the five terrace clusters inscribed in the cultural landscape category of the World Heritage List in 1995 are[3]:

a. Rice Terrace Clusters of Banaue: Batad – N16 56 02, E121 08 12
b. Rice Terrace Clusters of Banaue: Bangaan – N16 55 28, E121 03 56
c. Rice Terrace Clusters of Mayoyao: Mayoyao Central – N16 57 49, E121 13 19
d. Rice Terrace Clusters of Kiangan: Nagakadan – N16 46 13, E121 03 38
e. Rice Terrace Clusters of Hungduan – N16 50 13, E120 58 17

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[1] Plachter, Harald and Rössler, Mechtild, "Cultural Landscapes: Connecting Nature and Culture" in *Cultural Landscapes of Universal Value*: *Components of a Global Strategy*, von Droste, Bernd and Rössler, Mechtild. Stuttgart, 1995

[2] Operational Guidelines (1992), the World Heritage Convention, UNESCO, Paris

[3] Villalón, Augusto, Nomination Dossier, Rice Terraces of the Philippine Cordilleras, 1994

The inscription citation from the World Heritage Committee reads, "The Committee decided to inscribe the property [Rice Terraces of the Philippine Cordilleras] under criteria (iii), (iv), and (v)[4], based on the joint evaluation of ICOMOS[5] and IUCN[6]. The Rice Terraces of the Philippine Cordilleras are outstanding examples of living cultural landscapes. They illustrate the traditional techniques and a remarkable harmony between humankind and the natural environment."

Furthermore, the Report of the World Heritage Committee Meeting of 1995 declared, "The Committee also congratulated Philippine authorities for having proposed this example of a cultural landscape, thereby contributing towards improving the representative nature of this type of property on the World Heritage List". This statement is further collaborated by the ICOMOS-IUCN evaluation that "…the Rice Terraces of the Philippine Cordilleras qualify as cultural landscapes in the terms set out in the Operational Guidelines is fully substantiated: they conform precisely with the intentions of the Committee and its advisers in defining the subcategory of continuing landscape". Both statements clearly signify the significance of the property as the first living (or continuing) cultural landscape inscribed on the World Heritage List. Further noting its fragile nature and the precarious balance that must be sustained between man and nature to assure future existence of the site, its maintenance procedure is of high interest to the World Heritage Committee and academic circles. It is a pity that national, provincial, and local authorities do not appreciate the high level of international interest in the property.

Adding further significance and honor to the site is the 2001 declaration of the *Hudhud*, a traditional Ifugao chant recited during sowing and harvesting of rice, at funeral wakes, and in other traditional Ifugao rituals as a "Masterpiece of the Oral and Intangible Heritage of Humanity" by UNESCO, a declaration that confirms further the intertwining of natural and cultural heritage in the Rice Terraces of the Philippine Cordilleras.

The terraced Cordillera landscape is one of the few nationally recognized sites that bestows Filipinos, typically so unaware of their own culture, that elusive pride of place ingrained from childhood days when most schools taught young, impressionable Filipino students the hyperbole that their Rice Terraces are the "eighth wonder of the world." Further demonstrating its importance to the Filipino nation, the rice terraces are engraved on 1,000-peso bills acknowledging its national treasure status.

Due to concerns of the World Heritage Committee regarding the property's state of conservation, they voted in 2001 to include the Rice Terraces of the Philippine Cordilleras in the World Heritage In Danger List, an action signifying that more intensive conservation methods had to be undertaken by the Philippines with detailed technical assistance of UNESCO experts. Rather than be regarded as an embarrassment to the host country, the '"In Danger" listing simply signifies that a period of intensive care must be carried out to assure in-depth conservation of the ailing property and its nursing back to health. Once conservation is back on track, the property is subsequently removed from the "In Danger List" and once again returned to the regular World Heritage List.

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[4] refer to Operational Guidelines, World Heritage Convention

[5] International Council for Monuments and Sites (ICOMOS), advisory body to the World Heritage Committee on cultural heritage matters

[6] International Conservation Union (IUCN), advisory body to the World Heritage Committee on natural heritage matters

Its “In Danger” inscription brought much-needed attention to the property’s alarming state of conservation that was continually taken for granted by most Filipinos. Fanned by media sensationalism, a rumor that the property was facing delisting spread quickly. The misconception is still difficult to correct to this day. On the positive side, the National Commission for Culture and the Arts granted USD1 million to finance conservation and rehabilitation programs for the World Heritage terraces. In 2006, UNESCO, ICOMOS, and IUCN performed a Joint Reactive Monitoring Mission [7] that established conservation benchmarks for corrective measures to be achieved by national and local authorities in order to remove the property from the “In Danger List”.

Benchmarks established by the Reactive Monitoring Mission and their indicators relevant to the proposed project is shown in **Table 10.**

Table 1. Conservation benchmarks established by the Reactive Monitoring Mission, relevant to the project.

Conservation Benchmarks	Indicators
Benchmark B Immediate implementation of the Conservation Management Plan for the Rice Terraces of the Philippine Cordilleras with focus on community-based land use and zoning	Establishment of community-based land use and zoning plans of the barangays hosting rice terrace clusters included in the World Heritage Site adopted by Municipal Ordinance by end 2007
Benchmark C Development of a resource strategy at the national, provincial, municipal, and village (*barangay*) levels according to the management objectives determined in the Conservation Management Plan. Top priority should be given to the maintenance and stabilization of the rice terraces and lifeline irrigation systems to reverse their deterioration.	Poverty alleviation of the local communities with considerable household income increase by end 2008. Conservation trust fund to be established and managed by the Ifugao Heritage Conservation Council by December 2007.
Benchmark D Establish appropriate procedures for development projects in the Rice Terraces of the Philippine Cordilleras	Rice terraces watershed and forest areas of Ifugao declared as environmental critical areas by December 2006 through an Executive Order. Introduction of Environmental Impact Assessment (EIA) for any development and infrastructure project by June 2007. The property exempted from standard contracting and design rules and procedures of national government agencies by December 2006.

[7] Joint Reactive Monitoring Mission, April 2006

The proposed project will generate a modest 200kW of electricity, sufficient to power 200 households. Power generated by the project shall be sold to the provincial power supplier for retail distribution, and a percentage of proceeds are marked for terrace conservation purposes. e8 and TEPCO foresee yearly proceeds amounting to approximately PhP 3.14 million to be available for conservation projects that will include those specified as UNESCO benchmarks that ultimately will lead to removal of the site's "In Danger" inscription. With existing financial constraints in both national and provincial governments resulting in the low priority for conservation funding, the additional budget infusion from the Ambangal Mini-Hydropower Project is a welcome contribution to the attainment of the UNESCO-specified benchmarks.

Project location was originally at Hungduan, a UNESCO-inscribed terrace cluster. UNESCO authorities recommended relocation since a mini hydroelectric project in Hungduan would seriously compromise the integrity of the World Heritage Site. In "Report on River Control in the Property of the World Heritage Center" [sic] Mario Greppi, UNESCO expert, reported in 2005 "In this area [Hungduan] where river control walls have been constructed, a mini hydro power plant has also been projected. Mini hydropower plant is important for the development of Ifugau [sic], but there are many possible sites to construct hydropower plants. For a natural heritage, this construction will completely change the site and destroying [sic] its heritage view. The local government is very determined to realize this construction … " TEPCO responded to the objection of Mr Greppi and relocated its project to the slower-flowing Ambangal River in Kiangan Municipality, another of the many highland rivers and streams forming a massive, untapped water distribution network in Ifugao Province.

The proposed facility taps the Ambangal River as it flows in a valley between Ambabag and Pindungan, two barangays reached by a steep, difficult 1.7 km foot mountain path beginning in sparsely populated Barrio Ambabag. Project characteristics include a floating-type diversion weir equipped with a flushing gate and settling basin located in Sitio Ba-ay From the Ambangal intake, the open 0.6 m wide headrace extends 1.4 km downriver to the open-type head-tank leading to a steel pipe penstock of 0.5m diameter x 225.7m length leading to the project power house of 3mx6.2m x2.5m dimension.

Dimensions of the proposed project's facilities to be constructed indicate the small project size and further show that, although it will most definitely impact on the landscape, its impact will not be of alarming proportions and can be managed to the minimum. The scale of proposed facilities is in consonance with the natural elements and terraces that surround it. The pond size equals that of a large terrace, and when filled will appear like another flooded terrace. It is suggested to design the headrace to show a minimum of concrete on ground surface and to cover as much concrete as possible with vegetation, following the 2005 specification of UNESCO expert Mario Greppi who required planting of vegetation to hide the backfill resulting from a river bank erosion control project constructed in Hungduan to "improve the appearance of the site". It is further suggested that the power plant be housed in a simple structure of unassuming, contemporary design. The original design proposal is an enlarged, over-scaled version of an Ifugao house, is a concept that sends wrong signals about the acceptability changing the scale of traditional architecture. Authenticity is seriously compromised by a change in scale.

The difficulty with the proposed project facilities is that even though it is located within the imposing rice terrace landscape of the Cordillera Mountain Range, it is outside protected area boundaries and not governed by any guidelines or legislation for landscape protection.

Although it is clearly outside the World Heritage Nagakadan Terrace Cluster boundary, there exist no measured surveys that indicate exact core and buffer zone boundaries for Nagakadan or any of the other four World Heritage clusters in Ifugao so that its distance from the buffer zone boundary can be established. The annotated map on page 37 of the UNESCO-ICOMOS-IUCN Reactive Monitoring Mission Report (2006) indicates no definite surveys indicating core or buffer zone boundaries for each of the five World Heritage clusters. Furthermore, it shows Barangays Ambabag and Pindongan are located within an ambiguous "Candidate Site" area with undefined boundaries. "Candidate Site" status is undefined as well. Is the site officially declared as a Candidate Site and if so, under what authority? What are its exact boundaries? What legal framework protects heritage within the site and what are the guidelines? Will it be nominated as an extension of an existing World Heritage property? What is the difference between a Candidate Site and the Buffer Zone? For the purposes of the project, what cultural, environmental, landscape, and construction regulations prevail over the proposed project located within the Candidate Site? If regulations do exist, then who enforces them?

In partial compliance with Benchmark B imposed by UNESCO, the Municipality of Kiangan recently concluded stakeholder consultations resulting in a community-based zoning plan, specifically including the Nagakadan – Julongan terrace cluster but not going as far as Barangays Ambabag and Pindongan. Therefore, the proposed project located outside the area covered by new municipal zoning laws is not covered by zoning restrictions.

Recommendation No. 3 of the 2005 Reactive Monitoring Mission has relevance to the project, suggesting to authorities to look into "prevention of future infrastructure projects from degrading the fragile World Heritage Site and the encouragement of the Philippine Government and its agencies to be flexible in imposing national design standards on infrastructure projects within Philippine World Heritage Sites, and the mitigation or minimization of negative impact of infrastructure within Philippine World Heritage Sites." In support of this recommendation, in 2006 the UNESCO National Commission of the Philippines drafted a Presidential Proclamation "Declaring UNESCO World Heritage Sites in the Philippines as Environmentally Critical Areas and Within the Scope of the Environmental Impact Statement System." No mention is made in the draft proclamation of the equally important cultural impact assessments for sensitive heritage sites. The President has not signed the proclamation. Nor have there been new design guidelines drawn for any new construction within World Heritage sites.

Although outside of the legal jurisdiction of local, national, or UNESCO authority, the proposed project is located in the mountainous rice terrace landscape of the Cordillera range that includes five small areas designated as World Heritage Sites. How, then, could a modern facility that provides much-needed improvement of stakeholder living standards insert itself quietly and sustainably into such a strong landscape? The answer is definitely that the new structure should blend into its cultural landscape surroundings by not calling attention to itself.

Although the project site is outside World Heritage site boundaries, its setting possesses practically the same landscape qualities as the inscribed terrace clusters. The terraces at Ambabag and Pindungan, although not as extensive or dramatic as the World Heritage clusters, are likewise the result of a long interaction between man and nature, objects of beauty, and therefore qualifying without a doubt as part of the vast Cordillera cultural landscape that covers a 20,000 square kilometer area of mountain peaks. Although no protective legislation covers the entire Cordillera area, in respect of its status as a national icon, it is right to ensure that the proposed hydroelectric facility is built in total consonance with the nationally and internationally

acknowledged cultural landscape protective measures and fit into the cultural landscape as seamlessly as possible.

Barangays Ambabag and Pindongan are so isolated, sparsely populated, and far removed from the remote Kiangan adventure tourism circuit only accessed by the hardiest of tourists. It is reached with difficulty through narrow barangay roads that disintegrate into a mountain foot trail system stitching together the few houses, open areas and rice fields that make up the landscape. Existing concrete or wood houses are nondescript, roofed with rusty corrugated galvanized iron sheets. Despite the magnificent landscape, there are no postcard-pretty picturesque villages unlike those sometimes seen in other Cordillera terraced landscapes or especially in the World Heritage clusters. Although a beautiful landscape, it feels like the back door to the more magnificent terraces, a back-of-the-house area where service facilities can be hidden.

Unlike the sweeping vistas framing World Heritage clusters, views in this area are cramped. The topography of the Ambabag and Pindongan area confines sight lines and views to the ring of mountains surrounding the barangays. The proposed facility, located in a valley behind the first mountain ring, is completely hidden from public view. Despite its not being a designated World Heritage area, the organically evolved Ambabag andPindonganlandscape nevertheless strongly demonstrates inherent qualities of authenticity and integrity, achieving a balance between culture and nature just as the five inscribed clusters do which is reason enough for the facility's intrusion into the landscape be as gentle as possible. The cultural significance of the Cordilleras must not be trivialized.

Culturally, no traditional taboos impede development in the project site. On the other hand, the cultural significance of harnessing water for progress resonates with age-old Ifugao traditions that revere water as a primary life force, a belief figuring importantly in cultural, religious, agricultural, and hydrological practices. Water is a natural resource harnessed by Ifugaos for agriculture but also as an engineering tool to help build terraces, dams, and to move large rocks.

Local residents, says Ifugao cultural scholar Manuel Dulawan, welcome sustainable development opportunities like the proposed mini hydroelectric plant and look forward to its contribution to local economy. The proposed project benefits Ifugao in various ways. It proves that natural resources can be harnessed sustainably to provide added income for the province and to maintain heritage. It is a concrete example that natural and cultural heritage is an untapped income resource for the province and its people. Project income earmarked for heritage maintenance lays bare the present stakeholder misconception that heritage is anti-progress and freezes people in the past. The Ambangal project illustrates that heritage is proactive, and that as is a sustainable resource for income generation it can benefit local population.

The proposed project is a pioneering project in the cultural landscapes sphere. Questions arise: How should a landscape beyond a World Heritage area be protected when no controls exist? Can heritage be used sustainably as a resource for income generation? How can heritage serve its host community? Responding to these questions may bring about a long-awaited paradigm shift in local perception of heritage.

Presently many Ifugao stakeholders view World Heritage inscription negatively. A common feeling is that UNESCO inscription hinders progress by imposing conservation restrictions that impinge on personal freedom and curtails rights of private landowners, many of whom see the

terraces as bondage to poverty and to the past. It is further believed that UNESCO should fund conservation requirements imposed despite the fact that the World Heritage Convention clearly indicates that it is the State Party responsible for conservation of its inscribed monuments. It is hoped that the Ambangal example will encourage stakeholders to initiate their own innovative projects using heritage as a means for additional income to not only sustain their daily existence and to be able to contribute in the maintenance of their heritage.

The long interface of man and nature results in a unique landscape illustrating how each influenced the other. A cultural landscape does not mark man's triumph over nature or vice versa. It shows the close, sustainable, and mutually beneficial relationship developed by man with his environment or vice-versa. Following the UNESCO definition, the Ambangal Mini-Hydropower Project could be regarded as a sustainable 21st century mutually beneficial relationship of man with his environment.

Although this project is clearly outside any World Heritage Site or its buffer zone, during its community consultation procedure and in the course of all other studies, it has complied with all of the stipulations of the ICOMOS Document, "Xian Declaration on the Conservation of the Setting of Heritage Structures, Sites, and Areas"[8].

Respected Kiangan scholar Manuel Dulawan perceptively writes, "A culture or society needs to adapt and adopt in order to continue to exist. The Ifugao culture has been able to adapt to natural and man-made conditions … through the process of acculturation, many good and beneficial changes like farming technologies, centralized governance, Christianized religion, formal education, etc. But in spite of all this, the Ifugaos in Kiangan have maintained their distinctive cultural identity which distinguishes them from other cultures or ethnic groups. There has been a *balancing of the old and the new* in Kiangan, and the process is continuing."

[8] Please refer to **Annex E**

SOCIO CULTURAL IMPACT OF THE LIKUD MINI-HYDROPOWER DEVELOPMENT PROJECT IN HALIAP, ASIPULO, IFUGAO

The Likud Mini-Hydropower Development Project located at Haliap, Asipulo, Ifugao is proposed for development to generate funds for the conservation and preservation of the Ifugao Rice Terraces.

The activities and processes involved during the preparatory surveys include a wide range of consultations with all stakeholders; barangay, municipal and provincial officials; affected landowners, members of farmers/Irrigators Association and the community to ensure participation and acceptance.

It is my honest belief and conviction that the project has no major negative impact on the social and cultural heritage of the community; and if there are any negative impacts as in any development project, the positive impact of contributing to the improvement of the quality of life is still larger.

The proposed project is thus socially and culturally acceptable.

RAYMUNDO A. BINBINON
Executive Assistant/Community Elder

August 29, 2012

資料７　初期環境影響評価報告書(IEE)

Likud Mini-hydropower Development Project

Initial Environmental Examination

Likud Mini-hydropower Development Project

Initial Environmental Examination

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Annex

Abbreviations

ºC	Degree Celsius
ANSI	American National Standards Institute
B	Bill (horny projecting mouth of a bird)
BOD	Biological Oxygen Demand
C	Dominance Index
CAA	Clean Air Act
CAR	Cordillera Administrative Region
CIS	Communal Irrigation Systems
cm	Centimeter
DAO	DENR Administrative Order
dBA	A-weighted decibels
DBH	Diameter at breast height
DENR	Department of Environment and Natural Resources
DOE	Department of Energy
DO	Dissolved oxygen
e	Evenness index
E	Ear
e8	Emerging 8
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EL	Elevation
EMP	Environmental Management Plan
FA	Forearm for bats
FS	Feasibility Study
G	gape
H’	Shannon diversity index
H	hour
HF	Hind foot
HH	Household
IFELCO	Ifugao Electric Cooperative
IRTCHO	Ifugao Rice Terraces Cultural Heritage Office
ICOMOS	International Council for Monuments and Sites
IUCN	International Conservation Union
km	kilometer
km^2	Square kilometer
kW	Kilowatt
LGU	Local Government Unit
LTO	Land Transportation Office
m	meter
m^3	Cubic meter
masl	Meter above sea level
mg/L	Milligrams/liter
mL	milliliter
mm	Millimeter
m/s	Meter per second
MBN	Municipal Basic Need
MPN/100mL	Most probabale number per 100 milliliter
PET	Polyethylene terephthalate
MW	Megawatt
NAAQG	National Ambient Air Quality Guidelines
NO2	Nitrogen dioxide
NPCC	National Pollution Control Commission
PAC	Project-affected Community
PPE	Personal Protective Equipment

ppm	Parts per million
PWRC	Philippine Wildlife Resources Conservation (Act of 2001)
RA	Republic Act
SE	Southeast
SEP	Socio-economic Profile
SO2	Sulfur dioxide
T	Tarsus
TEPCO	Tokyo Electric Power Corporation
TL	total length
TV	tail-vent length
TSP	Total Solid Particulates
TSS	Total Suspended Solid
TWG	Technical Working Group
ug/NCM	Microgram per normal cubic meter
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPLB-CFNR	University of the Philippines – College of Forestry and Natural Resources
WC	Wing cord
WT	Weight

1.0 Executive Summary

The project site is approximately 334 km away from Metro Manila. It is in Barangay Haliap, Municipaity of Asipulo and Province of Ifugao.

The components of the project include:

- Diversion weir
- Intake and Settling Basin
- Headrace
- Headtank
- Penstock and Spillway
- Powerhouse
- Switchyard
- New access road to the power house
- Distribution line

Ifugao Province is well known for its extensive rice terraces. In 1995, UNESCO had included the Cordillera rice terrace in their World Heritage List of Cultural Landscapes. However, in 2001, UNESCO included them on the List of World Heritage in Danger because of its continuous deterioration primarily due to the decline of the traditional balance as a result of out-migration, slow but continuous disappearance of the old culture and leadership, and indiscriminate deforestration. In addition, there is no effective and comprehensive rice terraces conservation plan.

This project is primarily being developed to create funds from the sales of electricity that will be generated. These funds will be used in the rehabilitation programs, conservation projects for the rice terraces in Ifugao Province. It also envisioned that the funds generated will help in improving the quality of lives of the people engaged in terrace farming and removal of the Rice Terrace from the List of the UNESCO World Heritage in Danger.

Brief Summary of Project's IEE Process

The Initial Environmental Examination (IEE) conducted for the 810kW Likud Mini Hydropower Plant Project is consistent with the Revised Procedural Manual for Department of Environment and Natural Resources (DENR) Administrative Order (DAO) 2003-30 of August 2007. The Terms of Reference used for this study was based on environmental impacts identified for a hydropower project.

The baseline environmental conditions were assessed through the conduct of rapid site assessments and field observations from February 2011 until June 2011. Supplemental secondary information was collected from government agencies and institutions.

Summary of Baseline Characterization

Ecosystem	Findings
Land	The project site falls under the classification alienable and disposable land with some locations outside the proposed facility falling under the forest/timber land classification. The municipality of Asipulo covers a land area of 29,043 hectares. Of this, 490 hectares is covered by barangay Haliap. Alienable and disposable land covers for the 98% of the total land area of barangay Haliap while the remaining 2% is forest and timber land. Previous studies and correlation with outcrops of the neighbouring mountain ranges indicate that the stratigraphy of the basin is largely composed of deep marine sediments and extrusive igneous

Ecosystem	Findings
	rocks (Hipol et al., 2001). There are four main vegetation communities within and along the immediate surroundings of the project. These are agricultural land (planted mainly to rice, winged beans, and sweet potato), shrubland/grassland (dominated by various species of grass and woody shrubs), tree plantation (planted to Gmelina), and patches of forest (secondary growth and original vegetation restricted to the very steep portions of the river stretch). A total of 12 bird species were observed and confirmed present along the entire stretch of project site. Except for the white-eared brown-dove (*Phapitreron leucotis*), Philippine bulbul (*Hypsipetes philippensis*), and Philippine coucal (*Centropus viridis*), all recorded species are resident breeding but are non-endemic. None are considered under any threat categories based on PWRC 2001 and IUCN Red List of Threatened Species 2010.
Water	The project has a catchment area of 44.02 km^2. There is no historical stream flow data available for the Lamut River. Probable flood discharges for various return periods for Lamut River is calculated using the Dimensionless Hydrograph. The Lamut River is identified in the DENR Memorandum Circular No. 07 series of 1993 Additional List of Classified Rivers and Bays (DMC 1993-07) as a Class C fresh surface water body. Based on the classification guidelines of DAO 1990-34, Class C waters are used for aquaculture, recreational activities such as boating, and industrial water supply. In terms of pH, samples from the two stations along Lamut River were both alkaline. The DO levels at the Intake and Powerhouse are above the minimum limit in the DAO 1990-34 for Class C waters. BOD levels in the two stations both passed the DAO 1990-34 maximum allowable limit for Class C. Surface water stations have undetected levels of TSS. Elevated levels of total and fecal coliform were noted in the Intake and Powerhouse stations. In general, the entire reach of the proposed project area is in good condition. Other than the man-made weir bridge at Station LH-8, the stream reach experiences no significant perturbation that would likely impact the freshwater habitats and organisms thriving in the area.
Air	The prevailing climate in the project area falls under Type II of the Modified Corona's Classification of the Philippines. Under this classification there is a very short dry season with pronounced maximum rain during summer months. Using DAO 2000-81 air quality indices, the air quality of the project area based on the 24-hour concentrations of TSP and SO2 can generally be classified under good condition.
People	The municipality of Asipulo has 12 barangays and a total land area of 29,043.1533 ha. It has a total population of 13,100 and population density of 2.18 hectares per person (CBMS, 2007). The project site is within the administrative area of Barangay Haliap. As of 2007, the National Statistics Office (NSO) reported a population of 1,013 for the barangay with an average household size is 4.7. According to the 2007 CBMS survey, the total population is 979 with a 1.84% population growth rate. Agriculture and forestry are the main sources of livelihood. Beans, tomato and palay are the major crops planted in the barangay primarily used for subsistence while the remaining harvests are for cash crops.

Summary of Impact Assessment and Environmental Management Plant

Project Phase / Environmental Aspect (Project Activity Which Will Likely Impact the Environmental Component)	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement
I. PRE- DEVELOPMENT PHASE			
Development of project facilities	Biological Resources	Various facilities may disturb vegetation.	• Vegetation along the project stretch is heavily disturbed and

Project Phase / Environmental Aspect (Project Activity Which Will Likely Impact the Environmental Component)	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement
			will only entail clearing of limited areas. • All clearing activities will be carried out in a manner such that damage or disruption to vegetation is minimized. • All trees that will be cut will be properly compensated. • Relevant permits will be secured from concerned agencies prior to cutting.
	Biological Resources	Disturbance of wildlife.	• A "No Hunting" policy from the contractor to minimize the potential increase for wildlife hunting and poaching due to temporary increase of workers in the area.
	Socio-economic Cultural Conditions	Displacement of agricultural and land properties may cause apprehension on the community regarding the acquisition of land as project site.	• Conduct IEC to explain the project in terms of land acquisition and land use.
	Socio-economic Cultural Conditions	Expectation of lower cost of electric service.	• Conduct IEC on effects of project on the cost of electric service to level-off expectations.
II. CONSTRUCTION PHASE			
Construction of the key project facilities	Physical Resources	Potential degradation of water quality due to the generation of wastes during the construction period.	• Proper housekeeping will be initiated by the proponent and contractors during the construction phase.
	Physical Resources	Possible soil erosion from digging activities and increased sedimentation.	• Establishment of sediment traps during the construction stage.
	Physical Resources	Construction of the hydropower plant will alter the natural landscape of the project site.	• The dimensions of the facilities indicates that with a small project its impact will not be of alarming proportions and can be managed through:
Construction of the key project	Socio-economic Cultural Conditions Socio-economic Cultural	• Creation of employment (about 200 workers will be employed during the construction of the plant). • Increased local labor pool and skills base. • Pressure on existing public services. • Possible peace and order problems. • Possible informal settlements that could eventually become permanent settlement	• Priority will be given to qualified local residents; A "local first" hiring policy will be implemented. • Develop a clear, precise, and well-defined employment policy and transparent procedures as part of the workforce management strategy to make clear what the process for employment in the project will be, what opportunities are available, and what the minimum skills requirements are in due coordination with concerned LGUs.

Project Phase / Environmental Aspect (Project Activity Which Will Likely Impact the Environmental Component)	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement
facilities	Conditions	unless regulated.	• Adequate provision of company provided medical and health services. • Increase in community policing (e.g. barangay tanods or barangay security officer, etc.) and registration of workers for identification purposes with local authorities. • Workers will be provided with PPEs. • Noisy activities will be limited during the daytime to avoid annoyance to the community.
III. OPERATIONS PHASE			
General Operation	Physical Resources	Water pollution by domestic effluent from the administration building.	Effluent will be treated in a conventional septic system.
	Physical Resources	Potential increase of sedimentation.	Regular cleaning of the settling pond will be conducted to prevent siltation and to remove large organic debris before any incipient decomposition occurs.
	Physical Resources	There will be competition on water resource as a result of the plant operation.	• Water use for irrigation will be prioritized over power generation to avoid any water competition. The power plant will be shut down during summer months when the river flow is at its minimum to prioritize irrigation requirements.
	Socio-economic Cultural Conditions	Threat to public health if domestic solid waste generated from the operation will not be properly disposed of.	A Solid Waste Management Plan which includes recycling, proper housekeeping and waste disposal will be formulated and implemented.
	Socio-economic Cultural Conditions	• Six to seven operators will be hired for the plant operation • Potential to stimulate business as a result of improved supply of electricity. • Potential supply/enterprise development in relation to the project include: ➢ Supply of food for the project's	• Establish "local first" hiring policy for qualified applicants. • Provide a clear, precise, and well-defined employment policy and transparent procedures as part of the workforce management strategy. • Continue to implement enhancement measures to facilitate equity and fairness in access to employment and to maximize opportunities for local participation.
General Operation		➢ workforce and employees ➢ Building maintenance ➢ General consumables ➢ Transportation	

Project Phase / Environmental Aspect (Project Activity Which Will Likely Impact the Environmental Component)	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement
		➢ Tourism	
	Socio-economic Cultural Conditions	The number of available jobs will decrease modestly but will remain above the expected number of jobs to be created. Each year, the number of jobs is directly tied to constructing the facility.	• Prioritize employment to qualified locals. • Carry out activities consistent with TEPSCO and Provincial Government of Ifugao commitment to equal and fair employment opportunity.
	Socio-economic Cultural Conditions	Host communities will receive benefits indicated in Sections 4 and 66 of EPIRA 2001 (The Generation Company and/or energy resource developer should set aside one centavo per kilowatt hour (P0.01/kWh) of the total electricity sales as financial benefits to host communities). This is in relation with Sec. 5(i) of R.A. 7638 which states that DOE shall devise ways and means of giving direct benefits to the province, city, or municipality, especially the community and people affected, and equitable preferential benefit to the region that hosts the energy resource and/or energy-generating facility provided, however, that the other provinces, cities, municipalities, or regions shall not be deprived of their energy requirements.	• Closely coordinate with the local govt. units to monitor the use of the allocated Funds generated from the EPIRA benefits.
General Operation	Socio-economic Cultural Conditions	The project will generate funds for conservation programs and projects.	• Proceeds of the project will be used to fund projects for the conservation of the terraces, thus maintaining heritage. • The additional budget generated from the project is a welcome contribution to achieve the UNESCO's recommendations to the conservation of the Rice Terraces and eventually removal of which from the List of World Heritage In-Danger.

2.0 Introduction

2.1 Terms of Reference of the IEE Study

The Terms of Reference of this study is consistent with the Revised Procedural Manual for DAO 2003-30 (August 2007), based on environmental impacts identified for renewable energy (hydro power plant) project. The Study Plan was circulated to the stakeholders for their comments prior to implementation.

2.2 The Study Team

Name	Role
Jess Bayrante	Project Director
Mike de Guia	Project Manager/ Wildlife Specialist
Rene Cruz	Hydrologist
Wilfrido Palarca	Sociologist/ Stakeholder Consultation Specialist/ Landscape/ Cultural/ Heritage Assessment Specialist
Kathy Hipol	Geologist
Abba Grace Sanchez	Vegetation Specialist
Larry Padilla	Freshwater Biota Specialist
Martin John Morales	Environmental Scientist
Sheryl Gutierrez	Water Quality Specialist
Michael Andrew Manalili	GIS Specialist
Llore Juanico	Environmental Assistant
Kathleen Anne Cruz	Peer Reviewer

2.3 The Project Schedule

The propose work program for the project study started from February until July 2011.

Activities	Feb.			March				April				May				June				July		
	w2	w3	w4	w1	w2	w3	w4	w1	w2	w3	w4	w1	w2	w3	w4	w1	w2	w3	w4	w1	w2	w3
Notice to Proceed / Contract																						
Review of related literatures, laws, and regulations																						
Site visit and field investigations																						
Social Environmental Influence during Construction/Operation Phase																						
Identification of Mitigations and Monitoring Plan																						
Field Survey Reports																						
Draft Report																						
Final Report																						
Submission of IEE checklist																						
Barangay Consultation (reference)																						

2.4 Project Location

The proposed 810kW Mini-Hrydro Power Plant project is in the northern Philippine island of Luzon, under Cordillera Administrative Region (CAR). The Mini-Hydro Power Plant project is sited on the northern part of Luzon, province of Ifugao, in the municipality of Asipulo and falls within the Barangay of Haliap. Asipulo is in the lower Southern portion of the Cordillera Mountain range and is about 334 kilometers away from Manila (Figure 2-1). It is bounded on the north by Kiangan, south by Ambaguio, Nueva Vizcaya Province and east by Lamut.

Asipulo has 12 barangays. The proposed project is in Barangay Haliap. Haliap is bounded to the north by Barangay Duit, the south by Pula, the east by Panubtuban and Mappit and west by Amduntog (Figure 2-2) The host barangay is approximately nine kilometres away and is accessible by tricycles (a three-wheeled vehicle consisting of a motorcycle attached to a sidecar) via a one lane concrete-paved road.

The proposed intake along Lamut River is in Barangay Haliap. Access to the weir site is by foot, either through a 150m trail from an existing concrete bridge or through another paved trail about 100m long. Both trails are rarely travelled. The powerhouse in Barangay Haliap is about nine kilometres from the Poblacion and is accessible by tricycle. The open type headrace which will start near the intake will run parallel with the river following existing contours and will extend for 1.8 km up to the head-tank. From the head-tank, water will flow through a steel pipe all the way through the powerhouse.

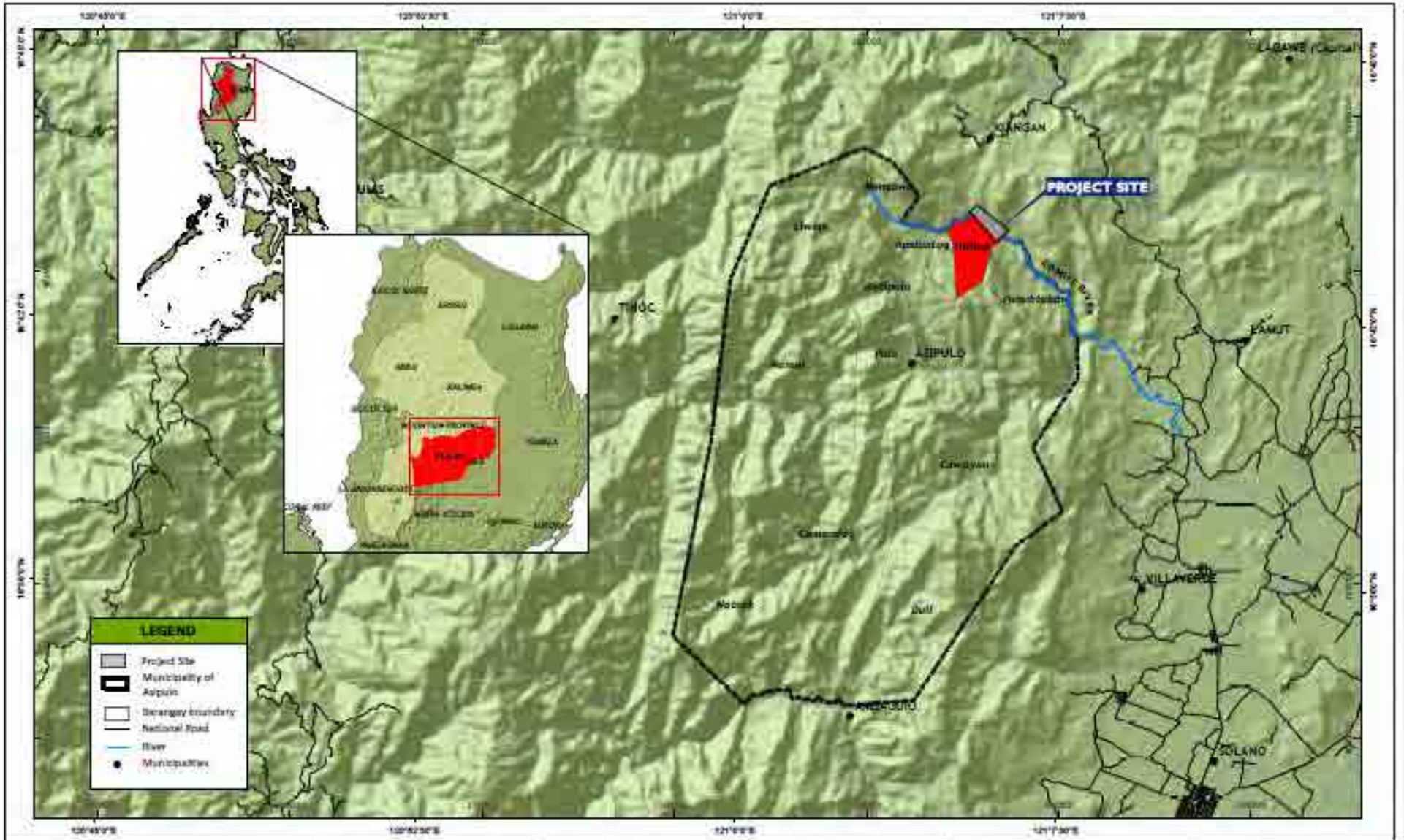


Figure 2-1

Location Map of Ifugao Province and Asipulo Municipality

REVISION	GRAPHICAL SCALE	NOTES	SOURCES OF INFORMATION
Rev 2	N		

TEPSCO

Tokyo Electric Power Services Co., Ltd.

IEE - 810 kW Likud Mini Hydropower Plant Project

Barangay Lagay, Municipality of Asipulo
Province of Ifugao

AECOM

Arc GIS

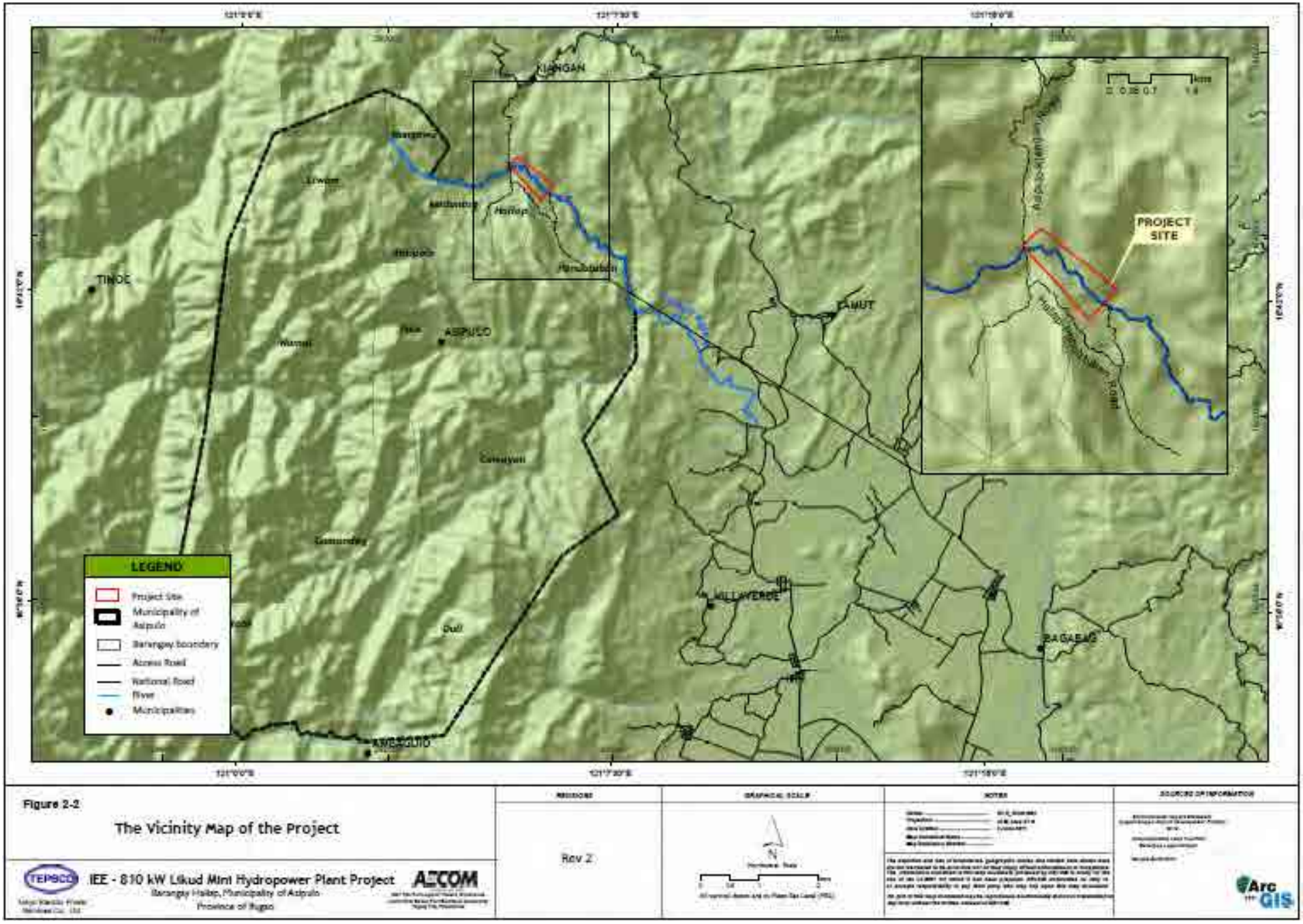


Figure 2-2

The Vicinity Map of the Project

REVISIONS: Rev 2

GRAPHICAL SCALE

NOTES

SOURCES OF INFORMATION

TEPSCO

IEE - 810 kW Likud Mini Hydropower Plant Project
Barangay Hailep, Municipality of Asipulo
Province of Ifugao

AECOM

ArcGIS

2.5 Project Rationale

The Cordillera Mountain region of Northern Luzon is almost synonymous to the rice terraces. Rice terracing is practiced throughout the whole region of Pacific Asia but those found in the Cordilleras are said to be the most unique in the world. In 1995, UNESCO included the Cordillera rice terraces in their World Heritage List of cultural landscapes. However, the region is also considered as one of the poorest provinces in the country. The situation is made worse by a number of factors such as the deterioration of the traditional balance due to out-migration, slow but continuous disappearance of the old culture and leadership and indiscriminate deforestration. These factors together with the absence of an effective and comprehensive rice terraces conservation plan led to the slow but continuous degradation of the rice terraces. Hence in 2001, UNESCO included the Cordillera rice terraces on the List of World Heritage in Danger. The Cordillera rice terraces are one of the most unique in the world but also one of the most threatened.

In response to the above problem, the Philippine Government tapped the Provincial Government of Ifugao to lead the rice terraces conservation efforts. Thus, the Ifugao Cultural Heritage Office (ICHO) under the office of the Governor was created.

In 2009, the Tokyo Electric Power Company (TEPCO) implemented the 200KW mini-hydro power plant as a demonstration project providing a model of locally sustainable energy-based development, regional vitalization and promoting the development of sustainable mini-hydro power resources in the rural areas.

Currently, the Provincial Government of Ifugao is running the Ambangal power Plant and manages the Rice Terraces Conservation Fund (RTCF). Despite effort of the provincial government, the funds to conserve the Ifugao Rice Terraces is still not enough to accomplish its goal while the terraces remain in the Endanger List of UNESCO.

This project is developed, primarily, to create funds from the sales of the electricity. The funds will be utilized in the rehabilitation programs and conservation projects for the rice terraces and hopefully to improve the quality of lives of the people engaged in terrace farming.

2.6 Project Component

The proposed project features a run-of-river hydropower plant with a maximum capacity of 810kW and will tap the Lamut River traversing Barangay Haliap. The river system has a catchment area of 44.02 km^2. The project site has a total land area of 1.61ha. Figure 2-3 shows the location of the project main components.

Figure 2-3

Location of the Main Project Component

REVISIONS	GRAPHICAL SCALE	NOTES	SOURCES OF INFORMATION
Rev 2	N		

TEPSCO

IEE - 810 kW Likud Mini Hydropower Plant Project
Barangay Haliap, Municipality of Asipulo
Province of Ifugao

AECOM

ArcGIS

2.6.1 Diversion Weir

The intake weir will be constructed in Barangay Haliap. The intake weir is of the floating type which has a length of 20m, height of 3m and width of 0.8m. The body will be of the masonry concrete type while the surface will be covered with rain faced concrete. Access to the weir is by foot trail. Geographical and geological conditions on both sides of the river bank and river bed will be considered in constructing the structure along with the priority use of local raw materials and local manpower during construction.

2.6.2 Intake and Settling Basin

The intake is designed as the side intake type. The dimensions were designed to allow a smooth inflow of maximum discharge and irrigation water (Plate 2-1).

The settling basin is designed to ensure the capture of sediments with a diameter of 0.1mm (Figure2-4). A spillway will be installed to prevent the inflow of excess water from the intake into the headrace during floods (Plate 2-2).

There are two existing irrigation Communal Irrigation System (CIS) between the intake and the powerhouse, so a valve will be provided on the side wall of the settling basin for water diversion into the nearby irrigation systems, to comply with the Philippine Water Act, where irrigation water is a priority use over power.

2.6.3 Headrace

The headrace will be of the open channel type with the interior design to ensure a smooth flow of maximum discharge, with a dimension of 1.4m width by 1.2m depth (Figure 2-5). It will have a distance of 1.8 km from the intake to the head tank and an inclination of 1/500, following the contour line of the right bank of the Lamut River (Plate 2-3).

2.6.4 Head-tank

The head-tank will be an open type, with a dimension of 4.8 m width and 11.8m length (Figure 2-6). This project structure will ensure that the output capacity is stable even with fluctuations in power demand, compatibility with increase and decrease in the volume of the river water, ultimate removal of sediments and other foreign particles, and ability to discharge surplus water during a stop in the operation of the power station (Plate 2-4).

2.6.5 Penstock and Spillway

The penstock will facilitate the water transport from the head-tank to the powerhouse (Plate 2-5). Steel pipes will be used with a dimension of 0.85 m diameters and 118.5 m length (Figure 2-7). All of it will be constructed as an underground type in consideration of the existing landscape.

2.6.6 Powerhouse

The location of the powerhouse is 230 m upstream from the watershed-out concrete overflow crossing where it is relatively flat. . The structure has 12.7 length, 3.5 height and 6.9 width. The base of the powerhouse is 4 m up from the river basin (Figure 2-8). A new access road to the powerhouse with a total length of 230 m will be constructed.

Plate 2-1 Intake Weir[1]

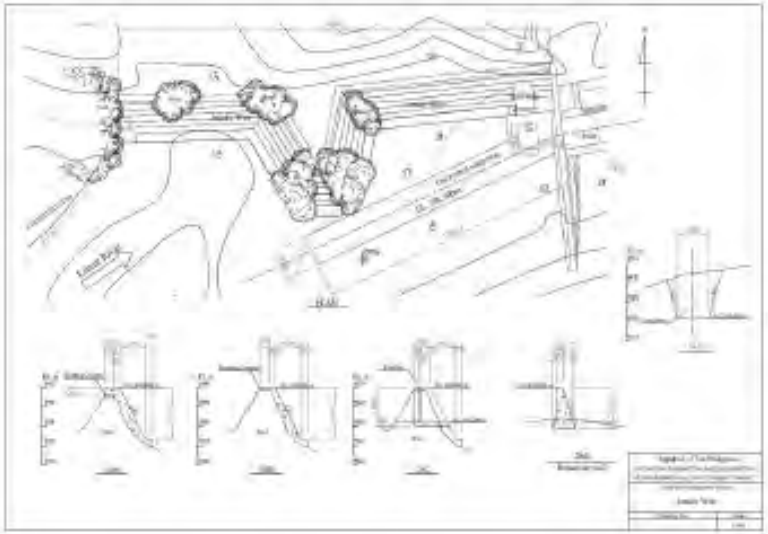
Plate 2-2 Settling and Basin[1]

Plate 2-3 Headrace[1]

Plate 2-4 Headtank[1]

Plate 2-5 Penstock and Spillway[1]

[1] The image photos of the civil structure. All pictures, except Plate 2-1, are image picture of each civil structure. .



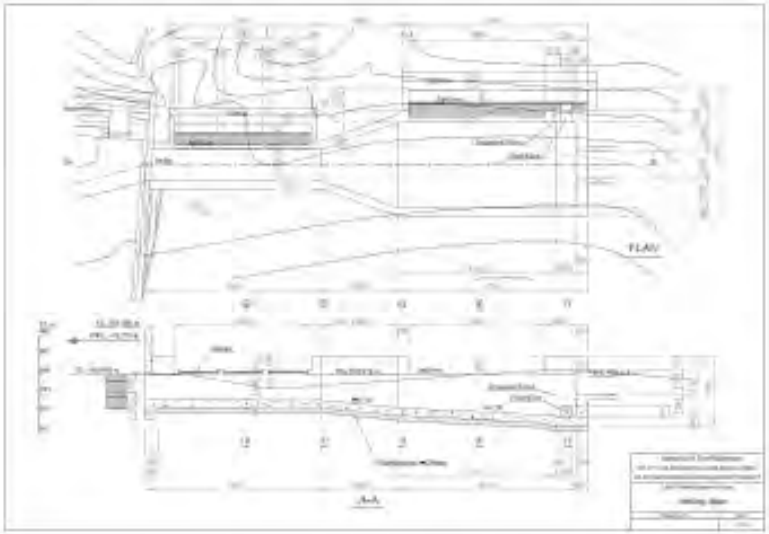


Figure 2-4

Lay-out of Intake and Settling Basin

REVISION	GRAPHICAL SCALE	NOTES	SOURCE OF INFORMATION
Rev 2	Not to scale		

TEPSCO

Tokyo Electric Power Services Co., Ltd.

IEE - 810 kW Likud Mini Hydropower Plant Project

Barangay Hallap, Municipality of Asipulo

Province of Ifugao

AECOM

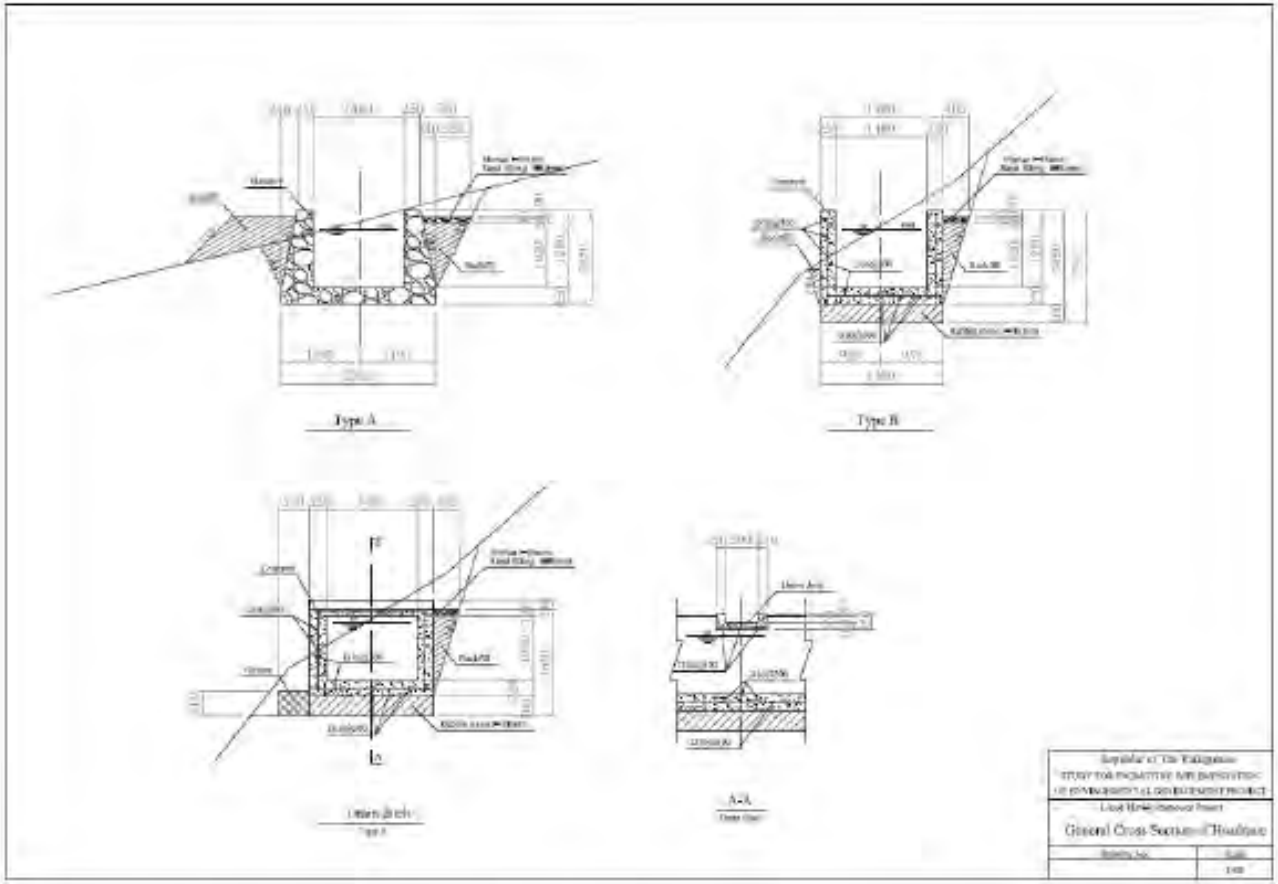


Figure 2-6

Layout of Headrace

IEE - 810 kW Likud Mini Hydropower Plant Project
Barangay Hulap, Municipality of Asipulo
Province of Ifugao

REVISIONS	DRAWING SCALE	NOTES	SOURCES OF INFORMATION
Rev 2	Not to scale		

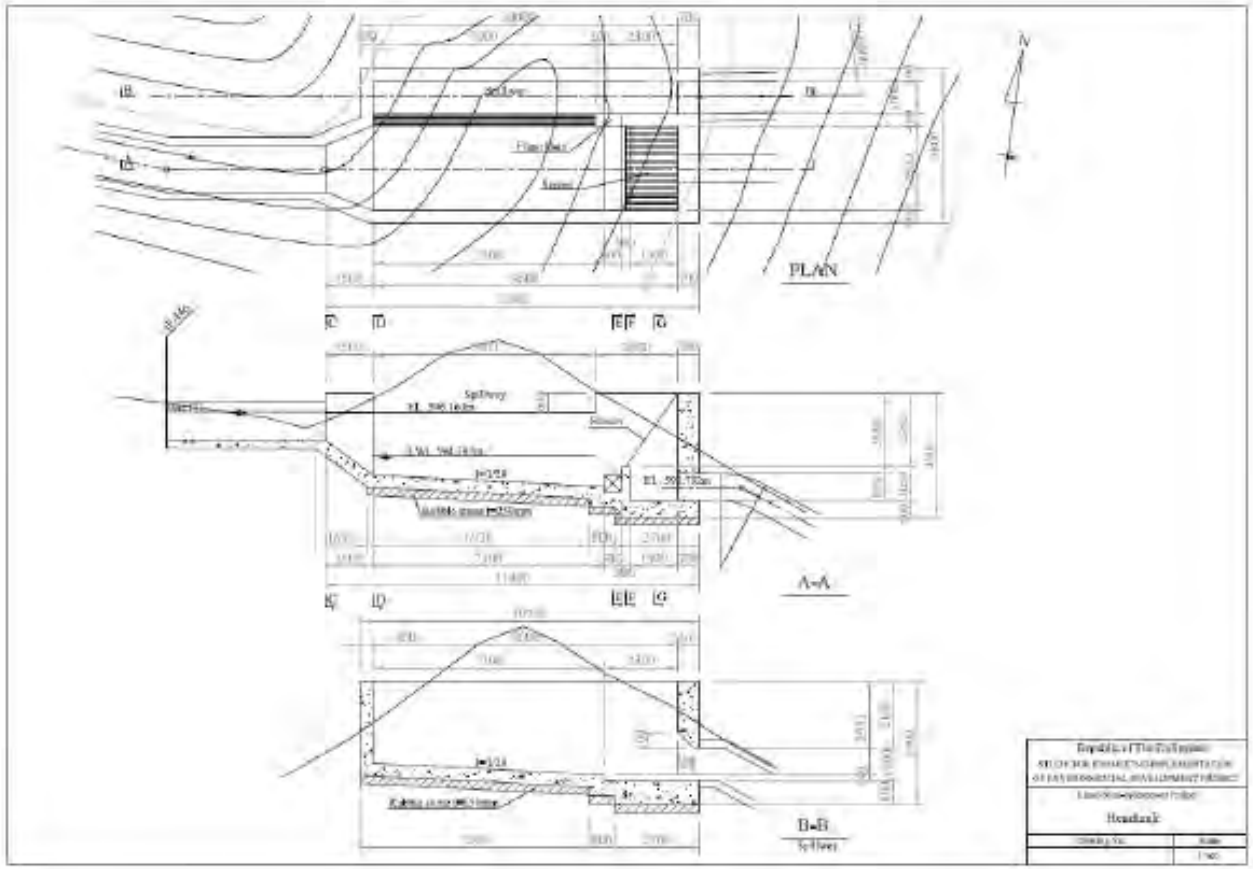


Figure 2-8

Lay-out of Headtank

REVISIONS	GRAPHICAL SCALE	NOTES	SOURCES OF INFORMATION
Rev 2	Not to scale		

IEE - 810 kW Likud Mini Hydropower Plant Project
Barangay Hallap, Municipality of Asipulo
Province of Ifugao

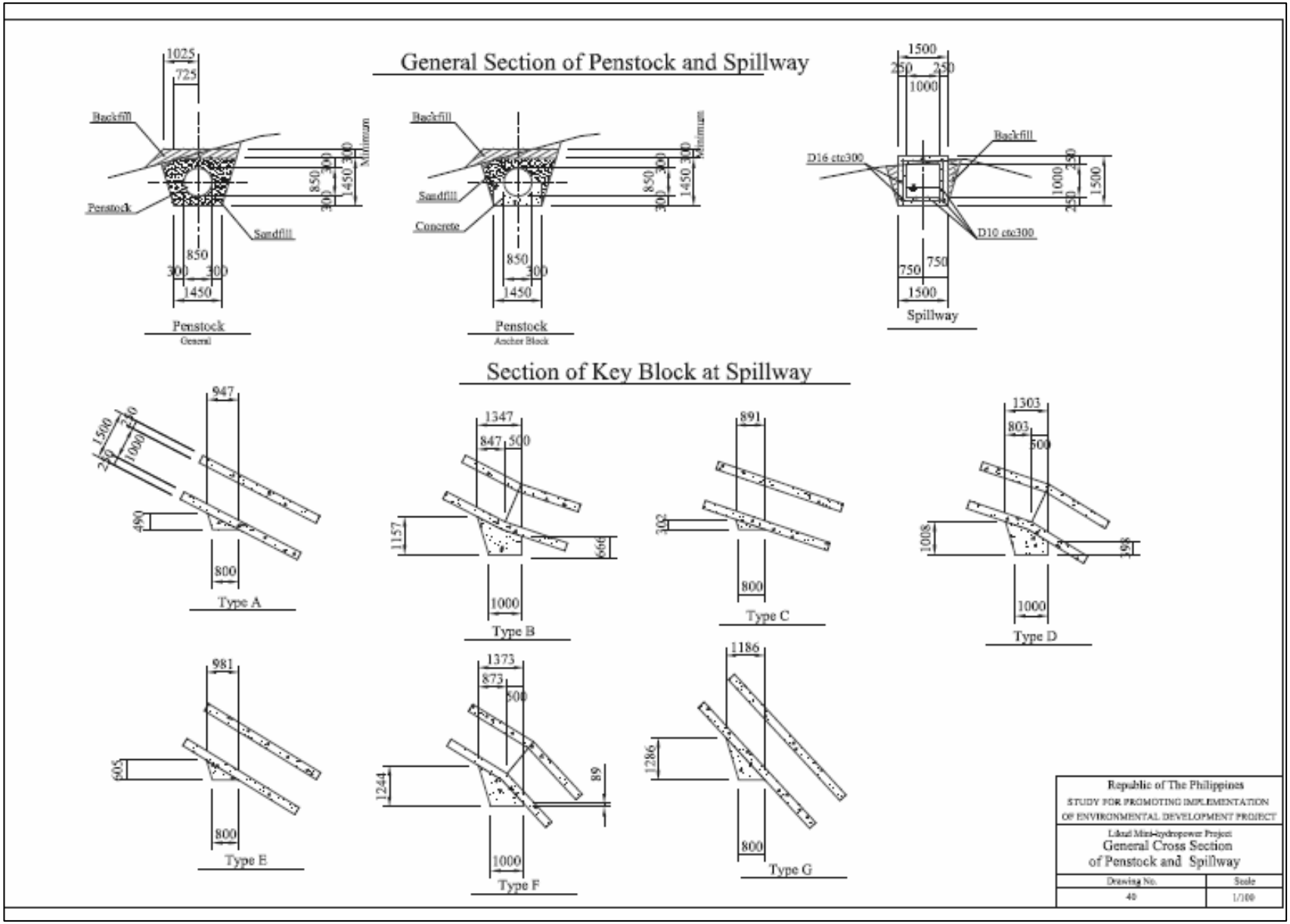


Figure 2-7 Lay-Out of Penstock and Spillway

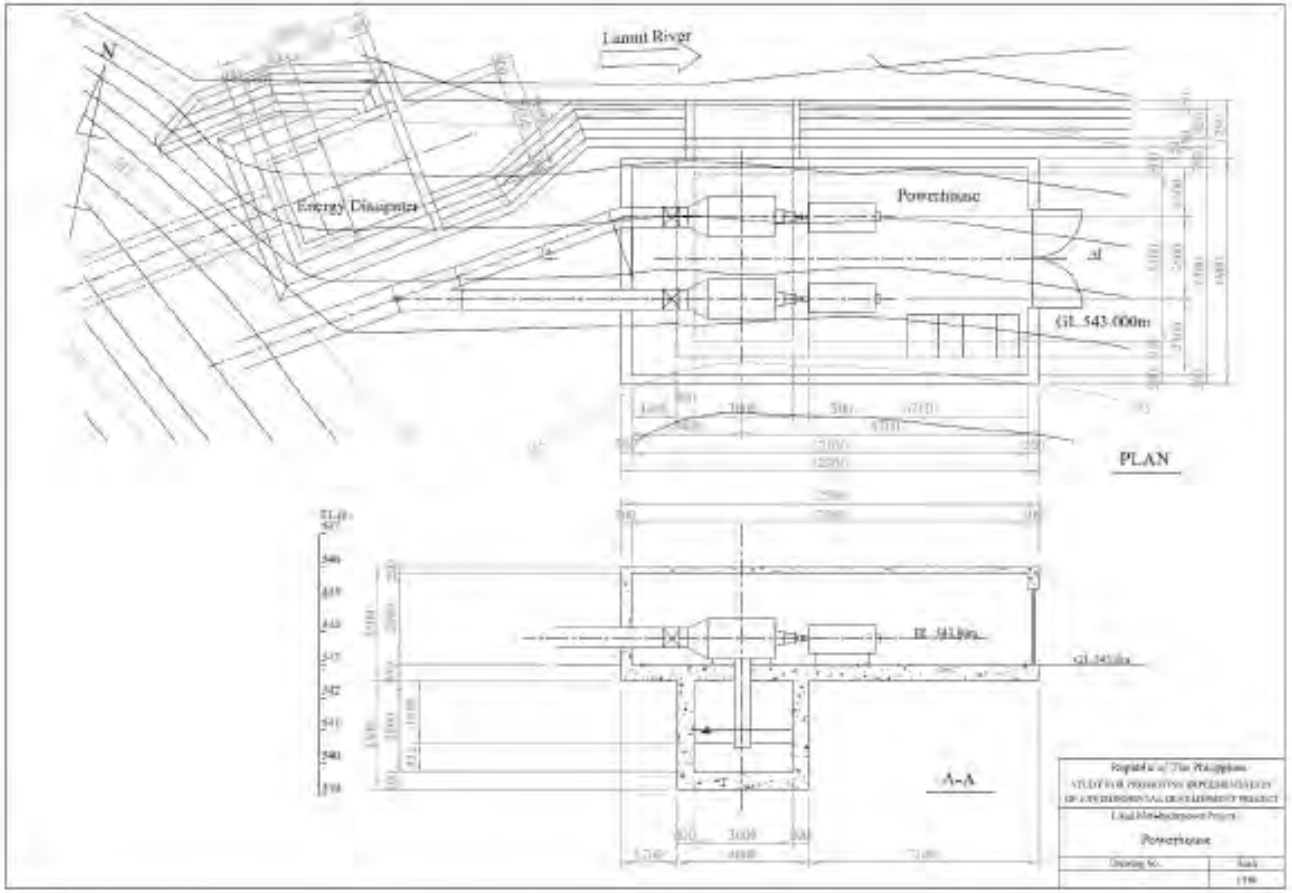


Figure 2-8

Lay-Out of Powerhouse

IEE - 810 kW Likud Mini Hydropower Plant Project
Barangay Hallap, Municipality of Aglipulo
Province of Ilocos Norte

REVISIONS	GRAPHICAL SCALE	NOTES	SOURCES OF INFORMATION
Rev 2	Not to scale		

3.0 Survey Methodology

The approach and methodology were based on the Revised Procedural Manual of DAO 2003-30 specific to renewable energy projects. The study team conducted both primary and secondary data collection from February 2011 until June 2011. Published and unpublished information was supplemented with primary data obtained through actual field reconnaissance. The details of methodology used are discussed in each chapter of the report.

4.0 Administrative and Regulatory Framework in the Philippines

4.1 National Legal and Administrative Framework

The Philippine Government has enacted a number of Acts and Rules to safeguard the environment in the country. The details of these Acts and Rules and their applicability to the Mini-hydropower Project are provided below.

4.1.1 Legislation for the Development of the Project

4.1.1.1 Power and Energy Policies

The Philippines Electric Power Industry Reform Act of 2001 (RA 9136) declaration aims to ensure and accelerate the total electrification of the country and to ensure the quality, reliability, security and affordability of the supply of electric power. It also promotes the utilization of indigenous and new and renewable energy resources in power generation in order to reduce dependence on imported energy wherein details are covered in the Renewable Energy Act of 2008.

The Renewable Energy Act of 2008 (RA 9513) describes the framework for accelerated development and advancement of RE sources, and promotes the development of strategic programs to increase its utilization. It aims to attain the following:

- Accelerate the exploration and development of renewable resources to achieve energy self-reliance through the adoption of sustainable energy development strategies;
- Increase the utilization of renewable energy by institutionalizing the development of national and local capabilities in the use of renewable energy systems and promoting efficient and cost-effective commercial application; and
- Encourage the development and utilization of renewable energy resources to effectively prevent or reduce harmful emissions and thereby balance the goals of economic growth and development with the protection of health and environment.

4.1.2 Legislation for the Environmental Protection

This IEE has been prepared and in compliance to Presidential Decree 1586 (PD 1586) or the Philippine Environmental Impact Statement System which provides that no person, partnership or corporation shall undertake or operate any project declared as environmentally critical or is located within an environmentally critical area without first securing an Environmental Compliance Certificate (ECC) issued by the President or his duly authorized representative. This aims to balance the socio-economic growth that will be brought about by a project and the environmental protection for the benefit of the future generations. The DENR Administrative Order No. 2003-30 (DAO 2003-30), the implementing rules and regulations of PD 1586, defines the scope and guidelines of the EIS system.

Administrative Order No. 42 of 2002 streamlined the EIS processing system and delegated the ECC approving authority to the Secretary of the Department of Environment and Natural Resources

(DENR) and the Director and Regional Directors of the Environmental Management Bureau (EMB) of the DENR.

The IEE process is also guided by the following environmental legislations:

- Republic Act 9275, An Act Providing for a Comprehensive Water Quality Management and for Other Purposes (Philippine Clean Water Act of 2004);
- Republic Act 8749, An Act Providing for a Comprehensive Air Pollution Control Policy and for Other Purposes (Philippine Clean Air Act of 1999);
- Republic Act 9003, An Act Providing for an Ecological Solid Waste Management Program, Creating the Necessary Institutional Mechanisms and Incentives, Declaring Certain Acts Prohibited and Providing Penalties, Appropriating Funds Thereof, and for Other Purposes (Ecological Solid Waste Management Act of 2000); and
- Republic Act 6969, An Act to Control Toxic Substances and Hazardous and Nuclear Wastes Providing Penalties for Violations Thereof, and for Other Purposes (Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990).

4.1.3 Other Relevant legislation

4.1.3.1 National Integrated Protected Areas System (NIPAS)

Republic Act 7586 or the NIPAS Act of 1992 provides for the establishment and management of national protected areas, whether terrestrial, wetland or marine, protected areas, areas that shall encompass outstanding remarkable areas and biologically important public lands that are habitats of rare and endangered species of plants and animals, biogeographic zones and related ecosystems.

4.1.3.2 Indigenous People Rights Act (IPRA)

Another important legislation taken into consideration in this assessment is the Indigenous People Rights Act (IPRA) of 1997 (RA 8371). This act recognises and promotes the rights of indigenous peoples to ancestral domains and lands; the right to self-governance; economic and social rights; and cultural integrity, including indigenous culture, traditions and institutions.

5.0 Description of the Environment of the Project Site

5.1 Physical Resources

5.1.1 Land Use and Classification

This section describes the existing land classification and land uses within the project site, and includes mitigating measures that address identified impacts by the project. Under Philippine Law, the implementation of a project within a specific area is covered by an official declaration of land classification. Certain specific exclusions also exist as a matter of national interest, such as those under the Philippine Constitution (1987) or as local interest under the Philippine Local Government Code (1991), together with other associated laws. Since the project will involve a significant change to the current land use, it is important to determine and understand the existing land use, and compare this to what was legally classified both by the local and national government.

5.1.1.1 Methodology

The study of land use for the project involved a review of published literature and maps sourced primarily from the provincial, municipal, and barangay land use and development plans. Additional information was obtained from National Mapping Resources Information Agency (NAMRIA) maps for base referencing of key areas within the project site.

5.1.1.2 Baseline Environment

Land Classification

The project site falls under the classification alienable and disposable land with some locations outside the proposed facility falling under the forest/timber land classification. The distribution of these land classifications are presented in detail in Table 5-1 and illustrated in Figure 5-1.

Table 5-1 Barangay Haliap Land Classification

Land Classification	Area (ha)	Percent of Project Site
Alienable and Disposable Land	165	98%
Forest/Timber Land	3	2%
Total	168	100

Source: PPDO-Ifugao, 2010

Land Use

The distribution of actual land use/cover within Brgy.Haliap is presented in Table 5-2 and Figure 5-2. Agricultural land encompasses majority of the project site. Other uses include shrubland/grassland and built-up areas.

Table 5-2 Project Site Land Use Distribution

Land Use Category	Area (ha)	Percent of Barangay Land Area
Brushland	137	29
Agricultural	335	71%
Total	**472**	**100**

Source: PPDO-Ifugao, 2010

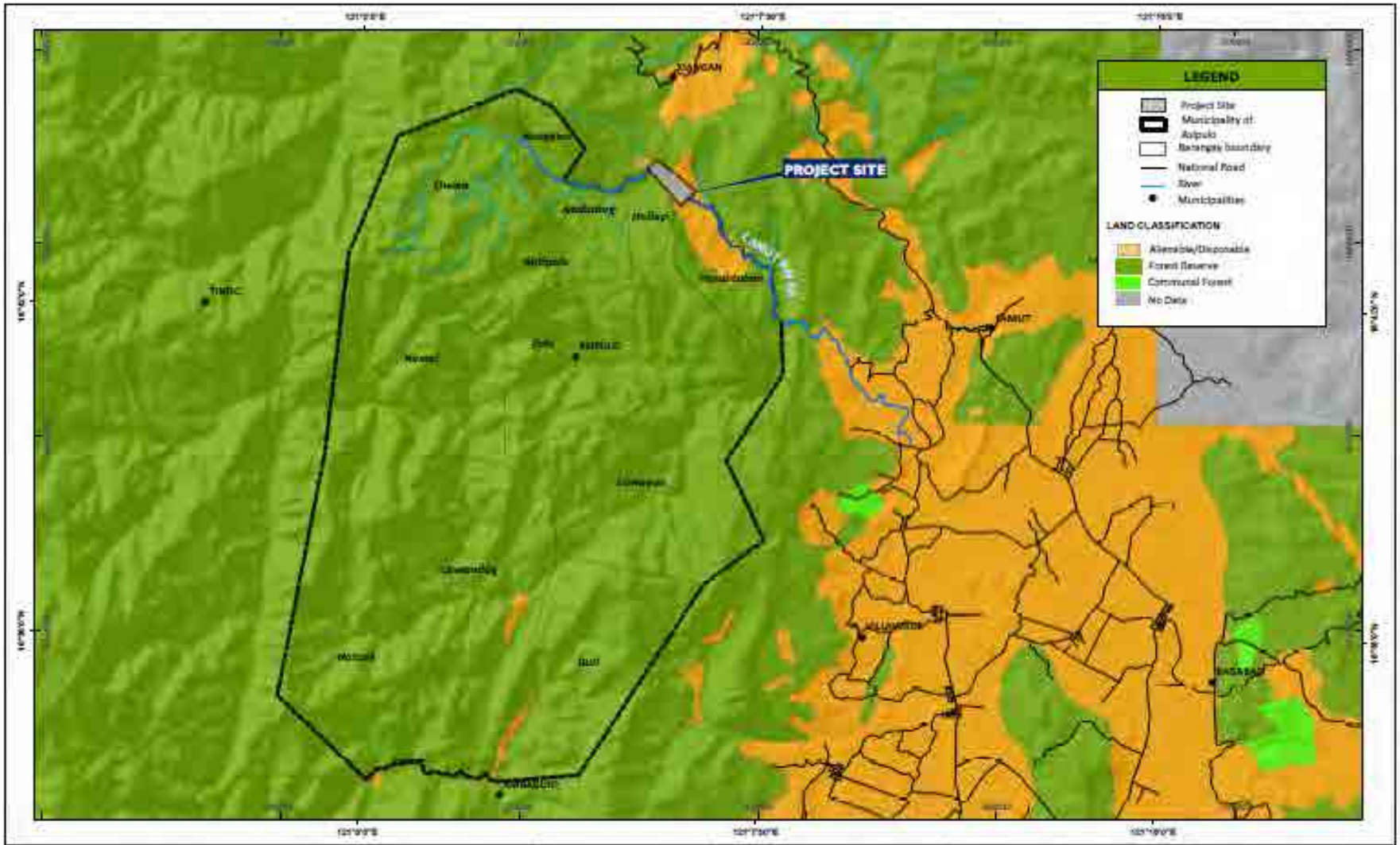


Figure 5-1

Land Classification of the Project Site

IEE - 810 kW Likud Mini Hydropower Plant Project
Barangay Hallap, Municipality of Aslpuki
Province of Ilugo

REVISIONS	GRAPHICAL SCALE	NOTES	SOURCES OF INFORMATION
Rev 2	N 0 1.25 2.5 5 KM		

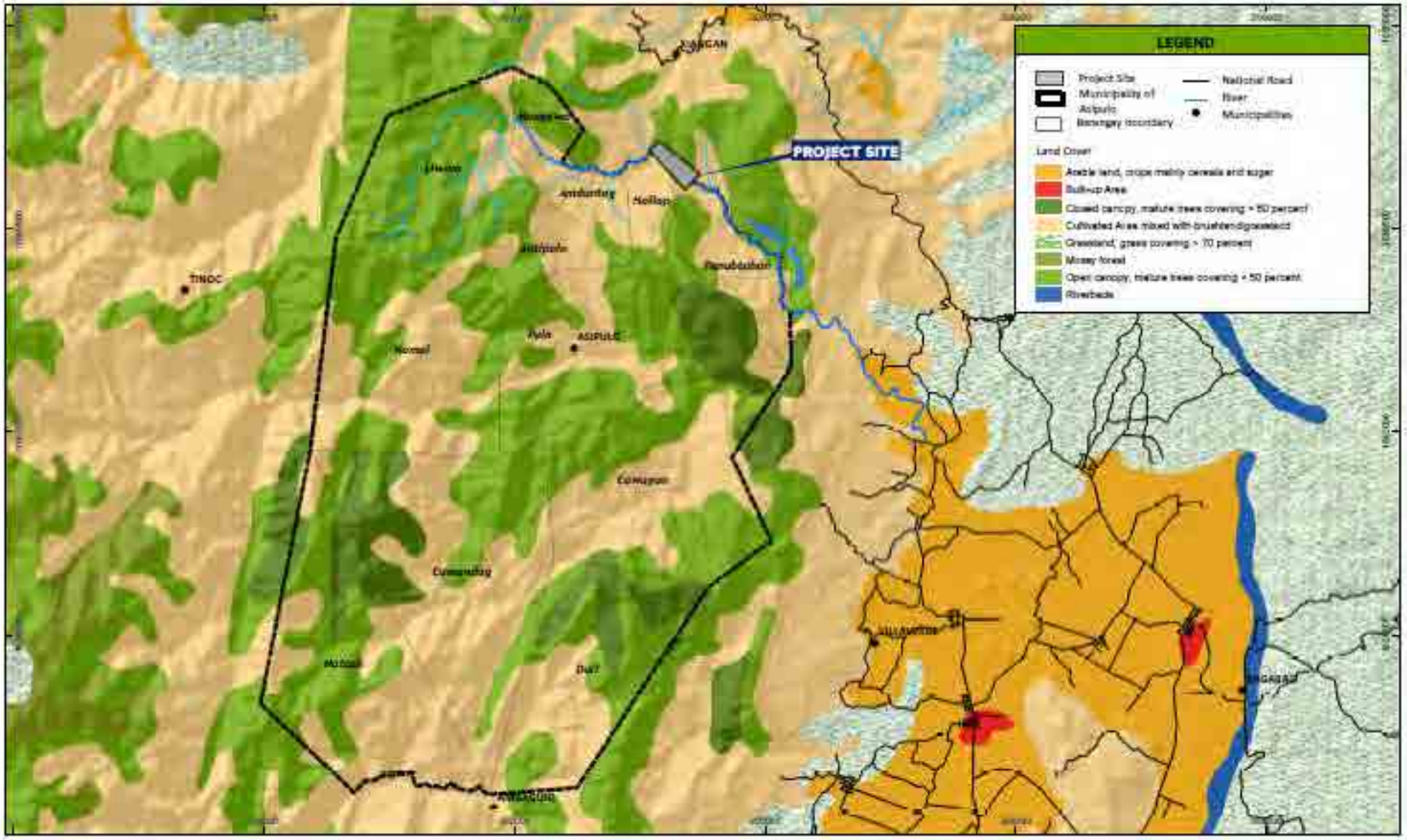


Figure 6-2

Existing Land Uses of the Project Site

IEE - 810 kW Likud Mini Hydropower Plant Project
Barangay Hallap, Municipality of Asipulo
Province of Ifugao

REVISION	GRAPHICAL SCALE	NOTES	SOURCES OF INFORMATION
Rev 2			

5.1.2 Geology, Geomorphology and Geohazards

This section presents information on the baseline assessment of the geologic characteristics of the project site, focusing on the geo-structural conditions and natural geologic hazards that may potentially occur in the project site with or without project implementation.

5.1.2.1 Methodology

Discussions on geology, geomorphology, and geohazards are mainly based on the latest available geologic maps from the Mines and Geosciences Bureau (MGB) unit of the DENR and Philippine Institute of Volcanology and Seismology (PHIVOLCS). Published data on the province and the region were also used. Geomorphologic assessment was made using topographic maps from the National Mapping and Resource Information Authority (NAMRIA). In addition to the provision of basic geological and geomorphic information, interpretative maps generated from GIS post-processing were utilized in the evaluation of existing natural geological hazards at the project site.

5.1.2.2 Baseline Environment

5.1.2.2.1 Regional and Local Geology

The project site is located within the Cagayan Valley Basin which separates the Central Cordillera in the west and Sierra Madre mountain ranges to the east. The basin is bounded in the south by the Caraballo Range. The basin was formed from successive volcanism and uplift of the Central Cordillera from the Late Oligocene to Pleistocene (Caagusan, 1981). Previous studies and correlation with outcrops of the neighbouring mountain ranges indicate that the stratigraphy of the basin is largely composed of deep marine sediments and extrusive igneous rocks (Hipol et al., 2001).

The oldest units are represented by the Late Oligocene Dumatata Formation, equivalent to the Zigzag Formation, characterized by highly fractured and well indurated sandstone-mudstone interbeds and breccia inter-tonguing with volcanic breccia and andesite flow. Unconformably overlying this formation is the Early Miocene Ibulao Limestone composed of reefal limestones. It is generally massive to very thickly-bedded but becomes medium-bedded towards the top. The type locality is found in the Ibulao Gate. Conformably overlying the Ibulao Limestone is the Early Miocene Lubuagan Formation. This formation is composed mainly of sandstone-siltstone interbeds with alternating sequences of sandstones and conglomerates towards the top of the formation. The sandstone-siltstone sequence shows structures typical of turbidites indicating deposition in a subaqueous environment. The Lubuagan Formation is unconformably overlain by the Balbalan Formation. It is composed of andesite flows, fossiliferous sandstones, shales, conglomerates, alternating sandstones and conglomerates, and minor limestones. The Late Middle Miocene to Pliocene period is marked by a break in the rock record as no rocks of these ages are seen in the area. Unconformably resting on the older formations is the Pleistocene Tabuk Formation consisting of volcanic plugs in lower sections and tuffaceous sand deposits, autobreccia, lahar deposits, and terrace gravel deposits in upper sections. Recent alluvial deposits cap the deposits. The main exposures in the municipalities of Asipulo and Kiangan are characteristic of the sedimentary deposits of the Dumatata Formation and the Lubuagan Formation.

During the Early Miocene, NE-SW compression and extension directions are inferred based on fault array analysis. Strike-slip and reverse faults indicate that during the Middle Miocene, the primary stress direction slightly changed to the NNE-SSW direction. During the Quaternary, a NW-SE compressive stress is occurring. This force is associated with the movements along the left lateral strike-slip Philippine fault.

5.1.2.2.2 Geomorphology and Geologic Structures

The project site lies on rolling to steep terrain with elevations ranging from less than 450 m to 1935 m above sea level (masl) (Figure 5-3). The project site's terrain is steep characteristic of the mountainous area with river terraces and gorges bounding the headwaters. Near vertical slopes and gullies also run parallel to the river.

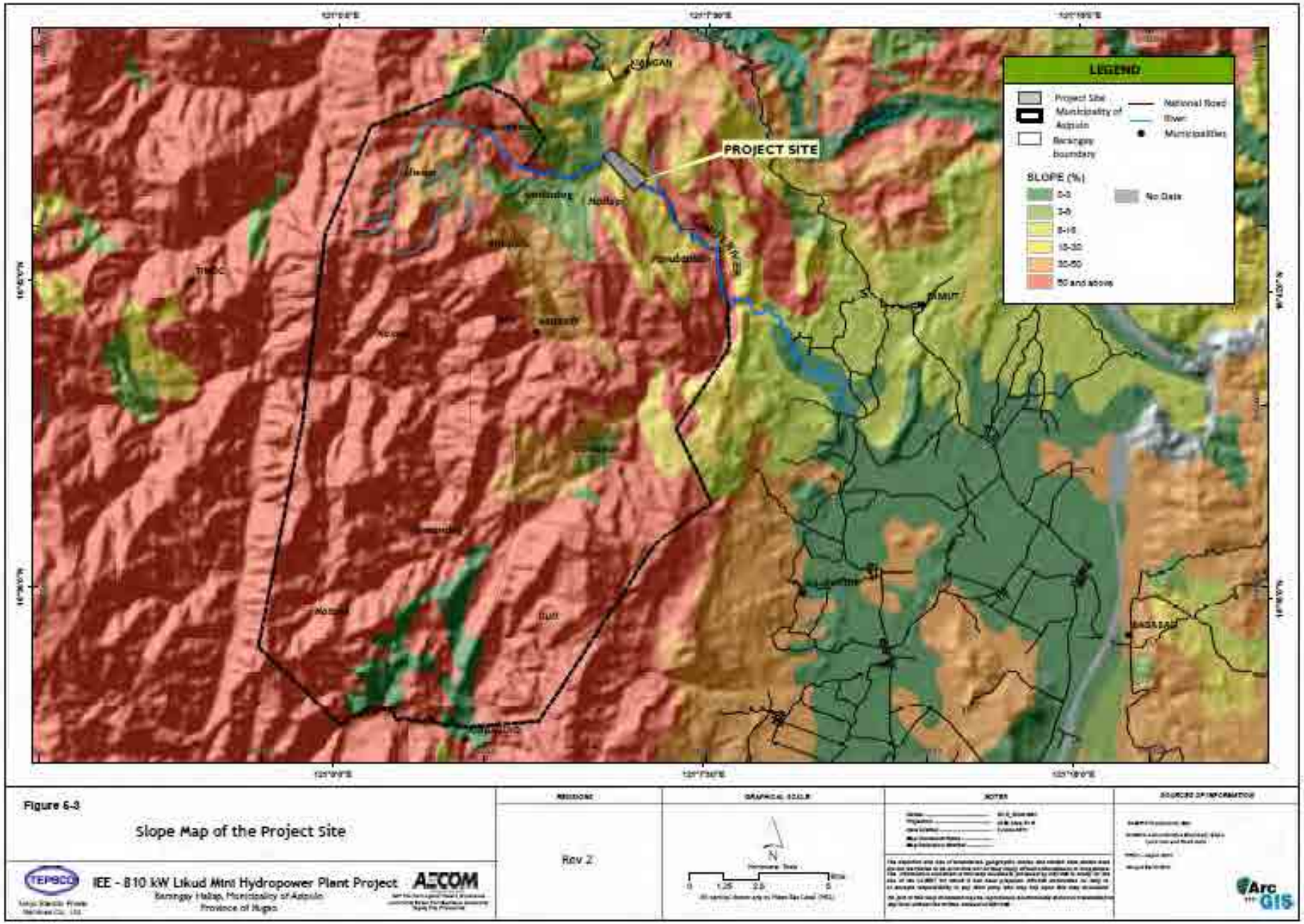


Figure 6-3

Slope Map of the Project Site

TEPSCO

IEE - 810 kW Likud Mini Hydropower Plant Project
Barangay Hallap, Municipality of Aglubin
Province of Ifugao

AECOM

REVISIONS	GRAPHICAL SCALE	NOTES	SOURCES OF INFORMATION
Rev 2	N		Arc GIS

5.1.2.2.3 Geohazards

This section presents the assessment of various geological hazards that may affect the project. Hazards discussed are the natural hazards occurring as a consequence or part of the natural geological processes operating within the project site. The discussion also attempts to present useful information that can be included as part of the detailed design criteria that are both site and infrastructure-specific, to reduce, if not completely eliminate, the impact of natural environmental risks both to the proposed structures and their surroundings.

The influence of slope gradients on the generation of potential geologic hazards is presented in Table 5-3. The types of geohazards presented pertain only to surficial processes and excludes hazards in relation to seismicity. In addition, gradient values at 18% and above (usually characterized as steep) are subdivided further into three sub-categories to better characterize geohazard responses in each sub-category.

Table 5-3 Geohazard in Relation to Slopes and Percent Coverage of the Project Site

Slope Gradient	Geohazard	Soil Slope Class	Percent of Project Site	Area (ha)
Level to Nearly Level (0 to 3 %)	0	0	0	0
Nearly Level to Undulating (3 to 8%)	72%	341.791	72%	341.791
Undulating to Rolling (8 to 18 %)	Low susceptibility to slope failure and erosion			
Rolling to Moderately Steep (18 to 30%)	28%	129.39	28%	129.39
Very Steep (30 to 50%)	Highly susceptible to slope failure and erosion			
High Angle/Very Steep (>50%)	Highly susceptible to slope failure and erosion			
Total			**100**	**471.181**

A summary of identified geologic hazards that may affect the project site and proposed facilities is presented in Table 5-4. The table outlines the specific hazards, possibility/frequency of occurrence, and the potential impacts to the project as well as proposed mitigating measures to address the identified geohazard limitations.

Table 5-4 Geohazards, Corresponding Risks, and Mitigating Measures

Geohazard	Specific Hazards	Likelihood of Occurrence (prior to mitigation)	Potential Areas to be Affected	Risks to Project	Mitigating Measure
Seismic hazards	• Ground shaking	Possible	All areas within the project site	• Structural failure or collapse • Landslides and slope failure	• Detailed investigation of engineering, geological, and foundation properties for the structures • Appropriate design parameters to be taken into consideration in the design and reinforcement of the structures • Application of suitable ground preparation prior to erection of structures

Likelihood of occurrence are as follows: rare, unlikely, possible, likely, and probable; arranged from least occurring to most frequently occurring. The frequency/ probability rating for the geohazards is subject to change in the future as the Philippines has no officially established hazard rating matrix comparable to established frequency/ probability rating systems such those of FEMA and USGS. However, the probability rating presented is referenced from locally published literature and recognized by EMB and MGB as a sound rating system pending the establishment of a published local geohazard ratings guideline.

Seismic Hazards

Structures such as lineaments and joints indicate a NW-SE compressive stress within the general area of Ifugao as surveyed for the municipalities of Asipulo and Kiangan in 2001 (Hipol et al., 2001). This force is associated with the movements along the Philippine fault. The province of Ifugao is ranked by PHIVOLCS as 7th in terms of vulnerability to earthquakes and 1st in terms of earthquake-induced landslide among 10 provinces in the country. This was based on assessment of historic hazards within the province. Though Ifugao experiences less earthquakes than the eastern margin of Northern Luzon, the generally steep topography of the province and the project site make it susceptible to landslides and slope failures that may be induced by earthquakes of significant magnitude.

Based on the most recent regional active faults map defined by PHIVOLCS, the nearest known active faults are splays of the Philippine Fault Zone found 26 km south of Lagawe.

Ground Shaking

While the major earthquake-generating structures are outside the project site, the possible generation of a significant ground movement during an earthquake is the major concern for the project site. The actual ground acceleration g-values specific to the project site, as per relative distance from different earthquake generators in the region is calculated using the formula of Fukushima and Tanaka (August 1990, in Thenhaus, 1994) below,

$$\text{Log}_{10}A = 0.41M - \log_{10}(R + 0.032 \times 10^{0.41M}) - 0.0034R + 1.30$$

Where:

A = mean of the peak acceleration from two horizontal components at each site (cm/sec^2)
R = shortest distance between site and fault rupture (km)
M = surface wave magnitude

Ground acceleration values are represented as the unitless function g. The average g is calculated from the resulting mean of peak acceleration represented by A, divided by the computed acceleration due to gravity. The mean of peak acceleration generally decreases for a particular area as its distance increases from the potential epicenter of an earthquake which, for the purpose of this study, is treated as the project site's distance to the fault concerned. Variations in the mean value of g is calculated based on the type of subsurface material underlying a particular place or area, as different materials have different responses to the transmission of the earthquake energy. Four general categories, namely Rock, Hard Soil, Medium Soil and Soft Soil, are used to recalculate the g as presented in **Table 5-5**. The summarized table presents the fault defined by PHIVOLCS, all calculated from a theoretical maximum credible earthquake of 7.5 with pre-determined distance from the project site to the nearest contact with the identified fault.

Table 5-5 Calculated G-values for Defined Faults and Seismic Responses per Subsurface Material

Parameters	26 km north of the identified trace of the Philippine Fault Zone. (In this report, PHIVOLCS, 2010)
Radius (km)	26.000
Magnitude (M)	7.500
Acceleration (cm/sec^2)	302.136
Acceleration due to gravity (cm/sec^2)	981.000
Average g (ground acceleration)	0.308
Rock (60% of g)*	0.185
Hard Soil (107% of g)*	0.330

Parameters	26 km north of the identified trace of the Philippine Fault Zone. (In this report, PHIVOLCS, 2010)
Medium Soil (87% of g)*	0.268
Soft Soil (139% of g)*	0.428

* Based on Fukushima and Tanaka - Bulletin of Seismological Society of America, August 1990

5.1.3 Land Suitability Classification

In the absence of a detailed assessment involving actual sampling and analysis, land suitability within the project site is assessed with respect to specific uses.

The project site is suitable for cultivated crops and production forests as shown in Figure 5-4.

The area is also moderately to severely susceptible to erosion as shown in the Erosion Potential Map below. This is attributed to the steep topography of the area and the utilization of the land for agricultural use.

5.1.4 Surface Water Quality

5.1.5 Methodology

5.1.5.1 Sampling Stations

The water quality sampling was conducted in March 2011. Two stations were established in the areas that could possibly be affected by the project. Samples were collected along the upstream and downstream of Lamut River, covering the intake area and powerhouse of the proposed project site, respectively. Table 5-6 describes each water quality station, while Figure 5-5 and Plate 5-1 and Plate 5-1 illustrate the locations

Table 5-6 Surface Water Quality Stations

Station ID	Name of Water Body	Location of Water Body	Description of Station	Coordinates	Elevation
Intake	Upstream of Lamut River (*local name: Itum River*)	Sitio Lower Haliap, Brgy. Haliap, Asipulo	Station is located at the proposed intake area and downstream of Itum Bridge. This station is also downstream of the Lamut River and an unknown river confluence.	16º44'24.5" N 121º05'30.5" E	631 m
Powerhouse	Downstream of Lamut River (*local name: Guihinon River*)	Sitio Guihinon, Brgy. Makppit, Kiangan	Station is located at the proposed powerhouse, in-between Barangays Makppit and Panubtuban. It is downstream of Lamut River and its confluence with an unnamed river.	16º43'48.1" N 121º06'36.0" E	541 m

Plate 5-1 Water quality station at the intake area upstream of Lamut River

Plate 5-2 Water quality station at the proposed powerhouse downstream of Lamut River

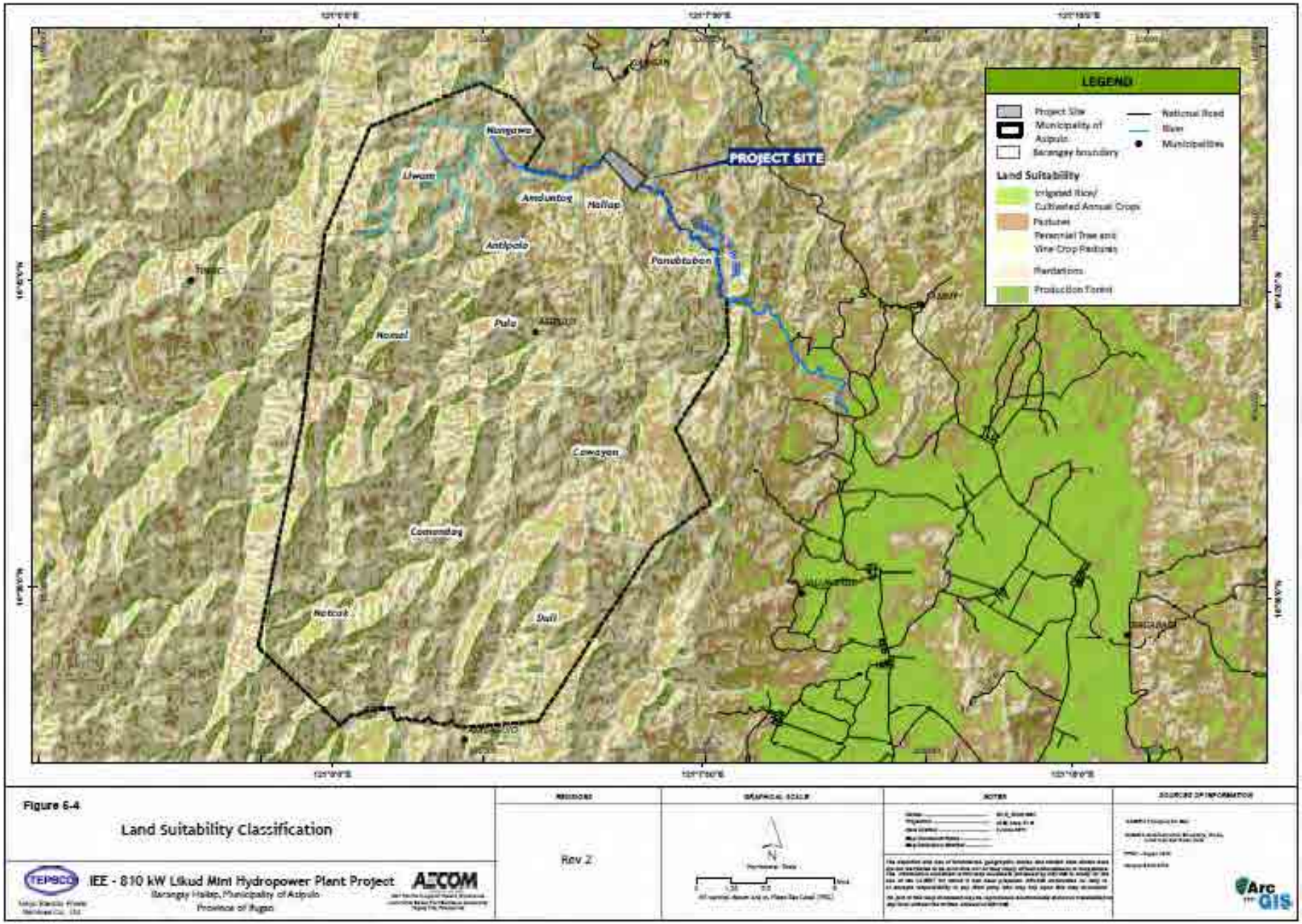


Figure 6-4

Land Suitability Classification

IEE - 810 kW Likud Mini Hydropower Plant Project
Barangay Hallap, Municipality of Asipulo
Province of Ifugao

REVISIONS	GRAPHICAL SCALE	NOTES	SOURCES OF INFORMATION
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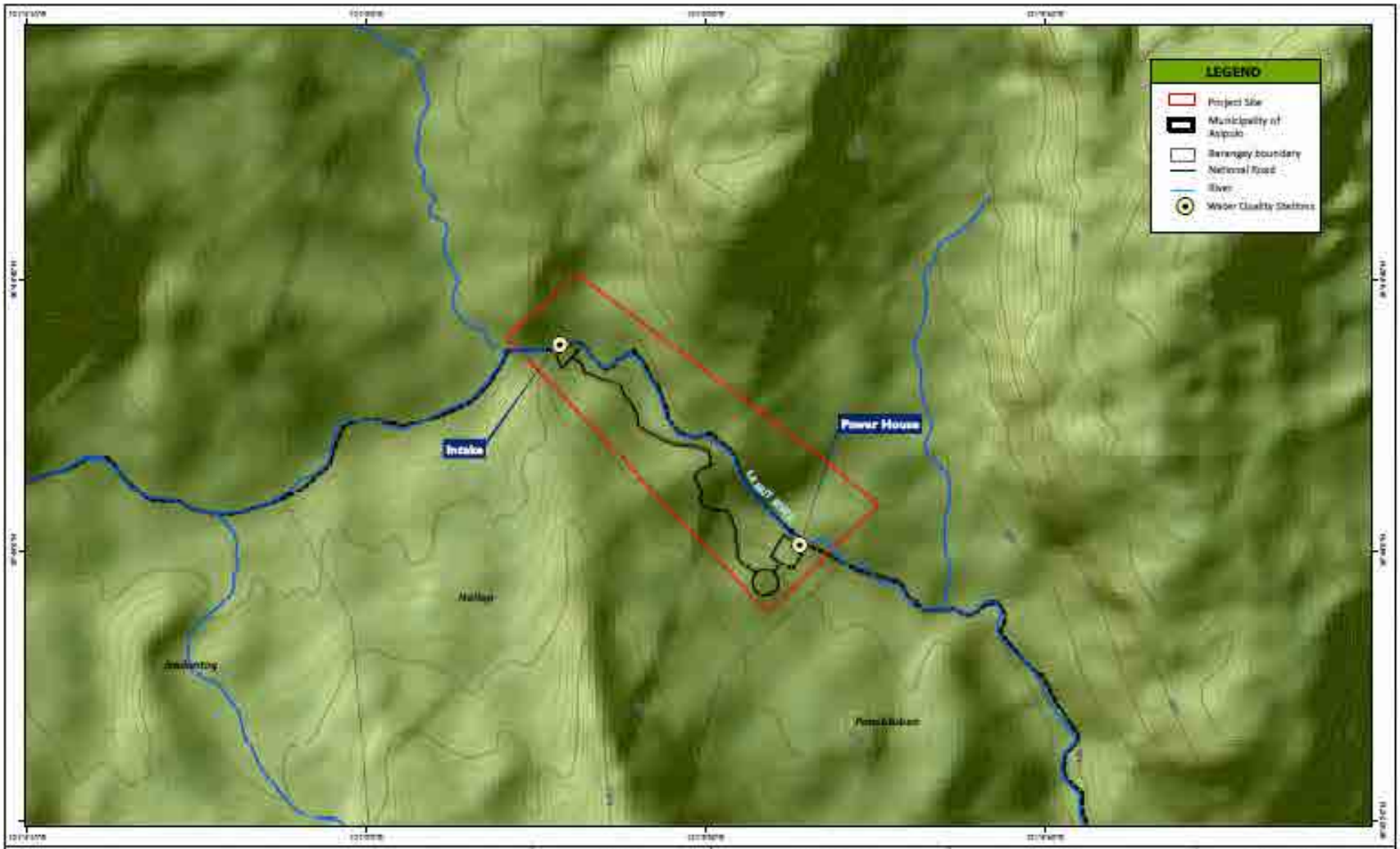

Figure 6-6

Water Quality Sampling Stations

IEE - 810 kW Likud Mini Hydropower Plant Project
Barangay Hallap, Municipality of Asipulo
Province of Ifugao

REVISIONS	GRAPHICAL SCALE	NOTES	SOURCES OF INFORMATION
Rev 2			

5.1.5.2 Sampling and Analytical Procedures

The temperature and dissolved oxygen (DO) were measured in-situ using the WTW® Oxi 3210 DO meter, while the in-situ measurements of pH levels were determined using a pen type pH meter, Eutech® pH Testr 30. These equipment were calibrated prior to the sampling activity to confirm the validity and accuracy of the readings.

The sampling techniques, preservation and handling procedures were according to the *Australian/New Zealand Standard® Water Quality Sampling Guidance: AS/NZS 5667 series*. Grab samples were collected by submerging the containers against the flow or drift at a depth of 20 cm, as practicable or whenever the depth of the stream permits[2]. The samples were cool stored at approximately 4°C and were immediately brought to the accredited laboratory of OSTREA Mineral Laboratories, Inc. (OMLI) for analysis. Table 5-7 summarizes the parameters analyzed in the laboratory and their corresponding container, minimum volume, holding time, and preservation requirements. The analytical procedures used by OMLI are the approved methods described in the *DENR Administrative Order No. 34, series of 1990: Revised Water Usage and Classification/Water Quality Criteria Amending Section Nos. 68 and 69, Chapter III of the 1978 NPCC Rules and Regulations* (DAO 1990-34) *for water quality criteria* (Table 5-8).

Table 5-7 Water Quality Sampling Protocols

Parameter	Volume Required	Container	Preservation	Maximum Allowable Holding Time Prior to Analysis
pH, temperature, DO	Parameters measured *in-situ*			
Biological Oxygen Demand (BOD)	1 L	Polyethylene washed with phosphate-free detergent and distilled water	Cool stored at 1°C to 4°C	24 hours
Total Suspended Solids (TSS)	500 mL	Polyethylene washed with phosphate-free detergent and distilled water	Cool stored at 1°C to 4°C	24 hours
Total and Fecal Coliform	250 mL	Glass, sterilized	Cool stored at 1°C to 4°C	24 hours

Table 5-8 Methods of Analysis

Parameter	Method
Temperature	*In situ* measurement (Thermistor)
pH	*In situ* measurement (Glass Electrode)
DO	*In situ* measurement (Membrane Electrode)
BOD	Azide Modification (Dilution Technique)
TSS	Gravimetric (Filtration and Drying at 103°C -105°C)
Total coliform	Multiple Tube Fermentation Technique or Membrane Filter
Fecal coliform	Multiple Tube Fermentation Technique or Membrane Filter

[2] Grab sampling refers to collecting a water sample at one time from a single point. A grab sample represents only the composition of the water at the time and place the sample was collected (Environmental Management Bureau, Department of Environment and Natural Resources, 2008. Water Quality Monitoring Manual: Volume I Manual on Ambient Water Quality Monitoring).

5.1.6 Baseline Environment

The Lamut River is identified in the DENR Memorandum Circular No. 07 series of 1993 Additional List of Classified Rivers and Bays (DMC 1993-07) as a Class C fresh surface water body. Based on the classification guidelines of DAO 1990-34, Class C waters are used for aquaculture, recreational activities such as boating, and industrial water supply[3]. Table 5-9 presents the results of the baseline study covering the parameters that contribute to the aesthetic quality and oxygen demand in freshwaters, as well as their corresponding DAO 1990-34 Class C limits. Laboratory results are attached in Annex 1.

Table 5-9 Water Quality Sampling Results

Parameter	Water Quality Stations		DAO 1990-34 Class C limits[b]
	Intake	Powerhouse	
	16 March 2011 10:01 am[a]	*16 March 2011 1:24 pm*[a]	
Temperature (°C)	20.1	21.9	3C maximum rise
pH	8.5	8.4	6.5 to 8.5
DO (mg/L)	8.1	7.9	5.0
BOD (mg/L)	2	2	10
TSS (mg/L)	<1	<1	Not more than 30 mg/L increase
Total coliform (MPN/100mL)	5,400	16,000	5,000[c]
Fecal coliform (MPN/100mL)	3,500	9,200	-

a. Date and time of sampling;
b. Maximum limits unless otherwise specified;
c. The value refers to the geometric mean of the most probable number of coliform during a 3-month period, without exceeding in 20% of the samples taken during the same period.

- No prescribed limit

Temperature

The temperature levels during the time of sampling in the Lamut intake and powerhouse were 20.1°C and 21.9°C, respectively. The low temperature readings could be attributed to the cold climate in Kiangan, along with the cloudy to slightly rainy weather condition during the time of sampling. The shade provided by the large boulders surrounding the Intake station and the lush vegetation cover along the river banks of the Powerhouse station could have also contributed to the colder temperature measurements, at a lesser extent. Since there are no sources of thermal effluent in the area, the DAO 1990-34 Class C limit is no longer applicable for the purposes of this baseline study.

pH

Samples from the two stations along Lamut River were both alkaline, with values ranging from 8.4 to 8.5. Thus, both surface water stations conformed to the Class C range limit specified in the DAO 1990-34.

DO

The DO levels in the Intake and Powerhouse are above the minimum limit in the DAO 1990-34 for Class C waters. The high DO levels in the Intake (8.1 mg/L) and Powerhouse (7.9 mg/L) could have been influenced by the cold temperature and fast current flow of Lamut River, observed during the course of sampling. The low organic content of the river, which is reflected in the low BOD

[3] Beneficial use of Class C fresh waters include: (1) Fishery Water for the propagation and growth of fish and other aquatic resources; (2) Recreational Water Class II (Boatings, etc.); and Industrial Water Supply Class I for manufacturing processes after treatment (DAO 1990-34).

measurements of both stations, also contributed to the high DO levels, as these two parameters are inversely proportional.

BOD

BOD levels in the two stations both registered at 2 mg/L, which pass the DAO 1990-34 maximum allowable limit for Class C. This indicates that the surface water stations within the proposed project sites have low organic pollutant load, as BOD is the measurement of the amount of oxygen consumed by microorganisms in the process of biological degradation of organic matter in water.

TSS

Both surface water stations have undetected levels of TSS (<1 mg/L). Clear waters were collected from the upstream (Intake) and downstream (Powerhouse) sampling stations despite the partly raining weather condition during the time of sampling. The TSS concentration, for monitoring purposes, should not have an increase of more than 30mg/L.

Total and Fecal Coliform

Elevated levels of total and fecal coliform were noted in the Intake and Powerhouse stations. Measured values in the two surface water stations are higher compared to the 3-month geometric mean Class C limit for total coliform. The DAO 1990-34 has no specific guidelines for fecal coliform for Class C freshwaters. Possible sources of total and fecal coliform include human and animal wastes due to lack of domestic sewage and septage treatment facilities and widespread hog-raising activities in the area.

5.1.7 Hydrology

The project has a catchment area of 44.02 km^2. There is no historical stream flow data available for the Lamut River. Probable flood discharges for various return periods for Lamut River is calculated using the Dimensionless Hydrograph which is described below:

The Dimensionless Unit Hydrograph Method

The magnitude of flood from a catchment area depends on intensity, duration, and distribution in time and space of the rainfall over the catchment area and on the physiographic parameters that would affect the runoff viz. drainage basin area, its shape, slope, land use pattern, surface infiltration characteristics of the soil, vegetation cover and initial wetness of the soil. The problem of estimation of design flood actually reduces to selection of the minimum number of parameters that truly represent the drainage basin's response to the storm and to account for the complexities of the patterns of rainfall storms.

The magnitude of flood is the net result of all factors mentioned above acting individually and collectively, thereby suggesting the need to carry out probability and frequency analysis to calculate probable flood for a given return period. (a statistical parameter used in frequency analysis as a measure of most probable time interval between occurrence of a given event and that of an equal or greater event). With the availability of the RIDF data (Rainfall Intensity Duration Frequency) from PAGASA, the frequency analysis was simplified and the methodology as described in the DPWH Design Guidelines, Criteria and Standards, Vol. 2 was applied. The RIDF data of Baguio City was used in the calculation of probable flood discharge as it has similar climatological characteristics with Ifugao and being the nearest station of PAGASA. The RIDF of Baguio City is shown below.

Equations Used to Express the RIDF

The equation below was used to express the relationship between rainfall intensity and duration. The equation is expressed as:

$$I_p = a*(t + b)^m$$

Where: **Ip** = Rainfall Intensity

t_c = Rainfall Duration

a,b,m: are constants

Constants of the RIDF equation were estimated by least square regression analysis giving relationship between probable rainfall intensities and corresponding rainfall duration.

The dimensionless unit hydrograph shown in Figure 5- masks the effect of basin size and essentially eliminates the effect of shape, except as they are reflected in the estimate of basin lag t_p and runoff volume[4].

[4] Linsley, Kohler and Paulhaus, Hydrology for Engineers, 1988

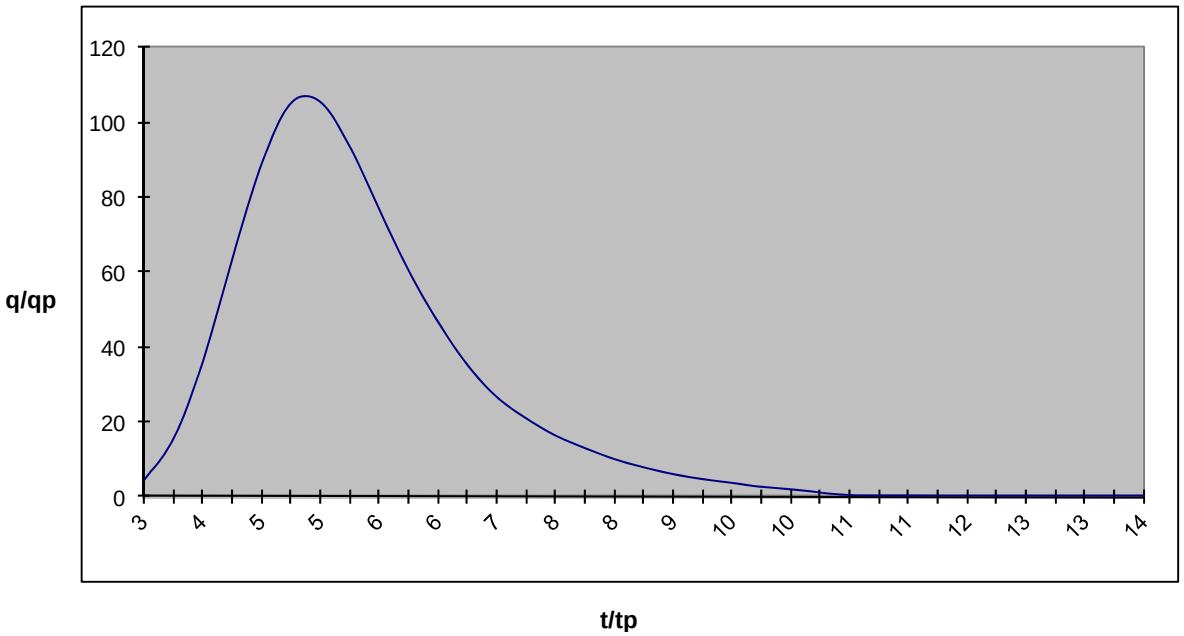

Figure 5-6 Dimensionless Unit Hydrograph

The general expression for basin lag used in the project take the following form:

$$t_p = C_t\,(LL_c / S^{1/2})^{0.38}$$

Where: t_p = lag time in hours

C_t = Coefficient varying from 0.35 to 1.2

L = Main stream distance from outlet to divide, in km.

L_c = Stream distance from outlet to a point perpendicular to the basin centroid, in km.

S = Average channel slope

The Model Hyetograph of each catchment area was created by the method of Soil Conservation Service (US-SCS).

The cumulative runoff is determined by the following equation:

$$Q = (P - l_a)^2 / (P - l_a + S)$$

Where: Q = cumulative runoff (mm)

P = Cumulative rainfall (mm)

F = Cumulative infiltration (mm)

l_a = Initial abstraction

S = Potential maximum abstraction

CN=Curve number. (Curve number used is for Antecedent Moisture Condition III).

The CN used is 80.

Calculated flood discharge at various return periods for Lamut River is shown in Table 5-10 below.

Table 5-10 Calculated Flood Discharge of Lamut River

Return Period	Calculated Discharge (cms)
2 years	165.85
5 years	367.45
10 Years	508.36
25 Years	698.55
50 Years	840.33
100 years	978.53

Weir Site

Access to the weir site is by foot, either through a 150 m trail from an existing concrete bridge or through another paved trail about 100 m long. Both trails are rarely travelled. The project site is at elevation 633 m from sea level with limestone rock outcrops at both sides of the riverbanks. Sheer vertical cliffs are at both sides, with moss and some small plants and trees that appear to be remnants of the original forest cover. The river at the weir site is about 8m wide with water flowing at a depth of about 500 mm. Locals describe flooding to occur after about two full days of continuous rain at the upstream part of the river and surrounding mountains. Floods usually makes the water level at the site rise to about 1 to 1.5 m high and also making the river flow wider to about 12 m. A flash flood was reported to have occurred in the past due to a dike collapse upstream of the project site after a fairly long downpour. Flow along the river was reported to have risen to about 3 to 4 m high (Annex 2).

Along the River

An irrigation weir was observed at about 50m from the proposed weir site. This was reported to have been constructed about 20 years ago to serve small rice paddies and vegetable orchards along the river. Access to the irrigation weir is through an existing paved footpath at the left side of the bank facing the downstream direction. There were signs of “kaingin” at some slopes not far from the river. Small slides and erosion have also been observed (Annex 3).

During the site visit, water levels at different river crossings were just above the knees (500-600 mm) with small boulders lining the river bed. There are four streams / gulleys that flow into the river along the stretch of the project area, some of which are also being used for irrigation. Three of these streams are on the left side of the river when facing the downstream direction, and one is on the other side of the river. These streams have well vegetated slopes. A washed-out concrete overflow crossing was also seen along the river. This structure reportedly collapsed during the onslaught of Ondoy – Pepeng storms.

Powerhouse

The site for the powerhouse is 230 m downstream from the washed-out concrete overflow crossing. The elevation of the river near the powerhouse was taken as 541m above sea level. The river width at the powerhouse site was about 16 m. Trees, shrubs and small plants abound on the site (Annex 4).

The elevated flat area near the river was considered for the powerhouse and appurtenant structures. Floodwater rises to about 2 m during flood events but local guides informed that the area has not been flooded from past storms.

5.1.8 Air Quality, Noise and Vibration

This section presents the results of the ambient air quality and noise assessments for the project. Secondary data were used to characterize the baseline conditions of the project site with regard to its climate, air quality and noise levels.

5.1.9 Methodology

The meteorological conditions in the project site were described using the long-term data obtained from the nearest Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) located in Baguio City.

The other relevant data and information gathered are contour map, climate map and typhoon frequency map. Contour maps were procured from the NAMRIA while the climate map and the typhoon frequency map of the whole Philippines were also sourced from PAGASA.

5.1.10 General Climate

The prevailing climate in the project area falls under Type II of the Modified Corona's Classification of the Philippines (Figure 5-7). The Type II climate is characterized by a very short dry season with pronounced maximum rain during summer months.

The threshold value which defines the dry and wet period is 50mm: value less than 50 mm represents the dry period while values greater 50 mm represents the wet period. The climatological normals (Annex 5) show that the dry period covers the month of January, February, March and December. The highest rainfall was recorded for the month of August at 905.0 mm. Further, climatological extremes (Annex 6) show that the highest daily rainfall occurred on July 4, 2001 at 1085.8 mm.

Southeasterly wind predominantly occurs at a rate of 2 m/s winds during the entire year. Climatological extremes show that the highest wind speed recorded was at 47 m/s in July 20, 1974, with wind direction of SE.

The monthly average temperature ranges from 18.1 to 20.8 °C while relative humidity, which factors in the amount of water vapour available in the atmosphere, ranges from and 83 to 93%. These parameters influence the moisture content of the ambient air which in effect affects the evaporation rate of the moisture content of the soil.

Typhoons also influence the climate and the weather of the country. Approximately 20 typhoons pass through the Philippine Area of Responsibility (PAR) each year. Figure 5-8 shows that the project site is within the area frequently visited by typhoon at an average annual incident of 5-7 typhoons.

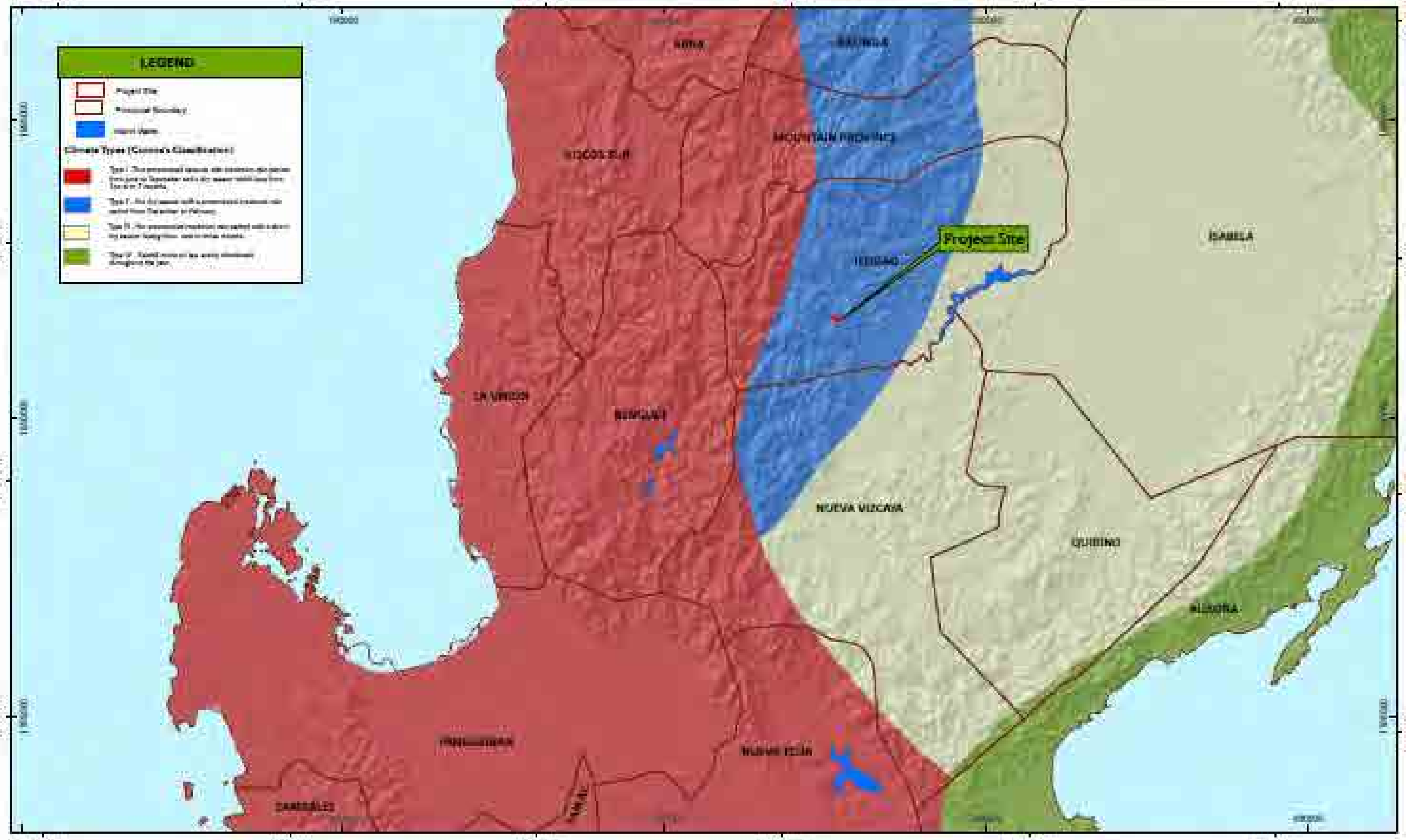

Figure 6-7

Climate Map of the Philippines

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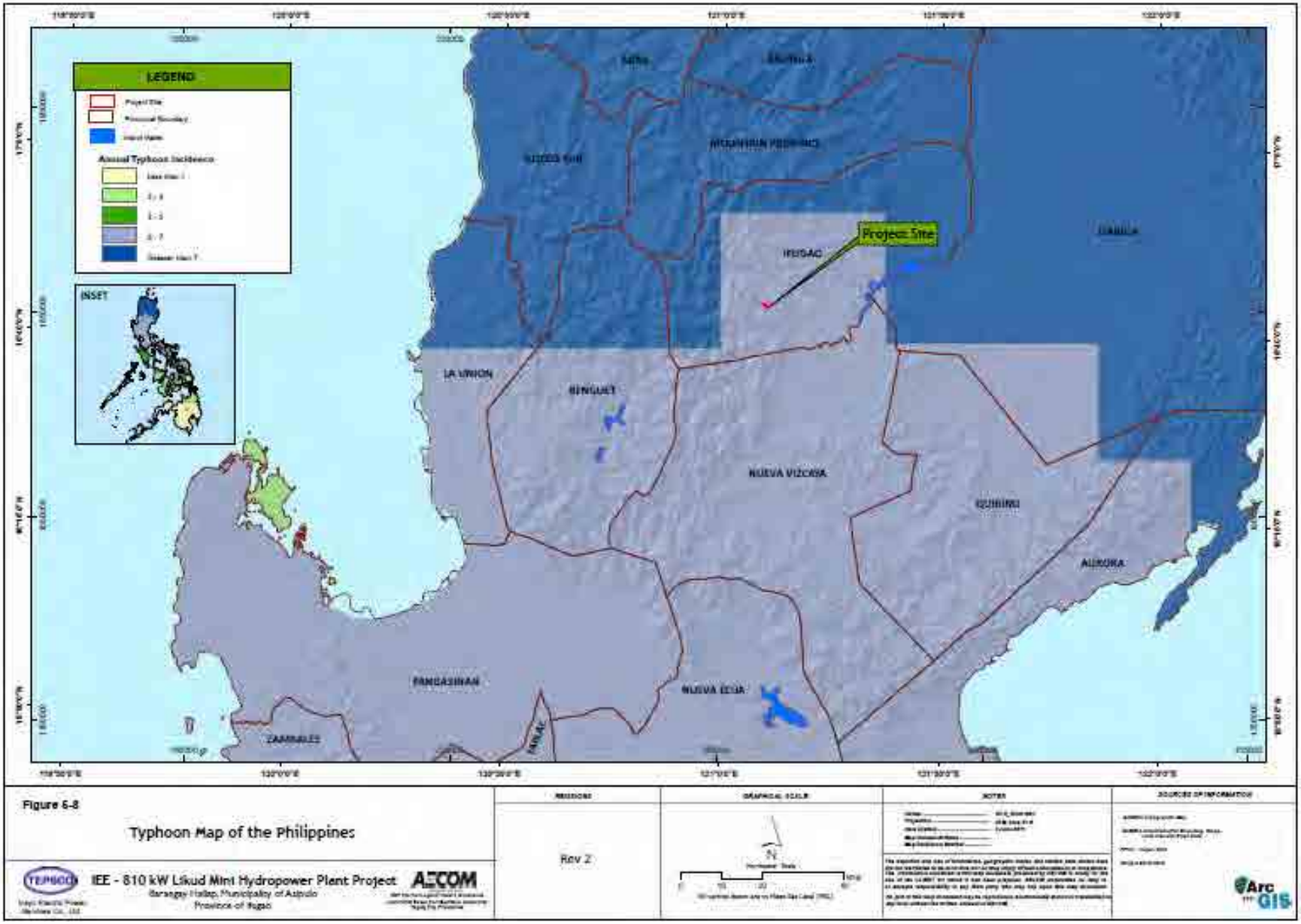

Figure 6-8

Typhoon Map of the Philippines

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Barangay Hallap, Municipality of Asipulo
Province of Ifugao

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5.1.11 Ambient Air Quality

5.1.12 Methodology

The ambient air quality of the project area has been characterized using the data gathered in March 2008 by the Tokyo Electric power Company Inc. (TEPCO) in cooperation with the e8 group, the Department of Energy (DOE) and the Provincial Government of Ifugao for a 200kW mini hydropower project in Barangays Ambabag and Pindongan, Municipality of Kiangan, Province of Ifugao. The two stations used in the EIA of the 200kW mini hydropower project were adopted for the assessment of the air quality of the project site. Figure 5-9 shows the locations of these stations relative to the project site. The location of the sampling stations is about 5.7 km north of the project site. There is also a mountain range north of the project site, between Kiangan and Haliap, with elevation ranging from 902 to 1042 meters above sea level.

5.1.13 Baseline Environment

The analytical results of the 24-hour sampling are shown in Table 5-11. For the purpose of comparison, the prescribed limits, i.e., the National Ambient Air Quality Guidelines Values (NAAQGV), under the Philippine Clean Air Act (CAA) are shown in the last rows of the tables. The NAAQGV are the 24-hour air pollutant concentration limits published by the DENR intended for protection of public health, safety and general welfare. The NAAQGV are typically used in the assessment of the air quality of an airshed or a region/locale.

The TSP levels recorded at station AQ-1 and station AQ-2 are 7 µg/NCM and 12 µg/NCM, respectively. SO_2 concentrations in both stations are below the detection limit while NO2 concentrations were 1.6ug/Ncm for Station AQ-1 and below detection limit for Station AQ-2. All the pollutants levels recorded are way below their respective NAAQGV standards.

Table 5-11 Results of Ambient Air Quality Monitoring

Station ID	Location	Coordinates	TSP (µg/NCM)	SO_2 (µg/NCM)	NO_2 (µg/NCM)
Station AQ-1	Powerhouse of the 200 kW mini hydropower plant	N 16° 47’ 29.6” E 121° 06’ 22.32”	7	ND*	1.6
Station AQ-2	Community (Sitio Bae) near the Intake weir	N 16° 47’0.18” E121° 05’ 28.38”	12	ND	ND
Detection Limit			-**	4	0.2
DENR NAAQGV			230	180	150

Note: * ND – not detected

**not specified by the laboratory

Compared with the DAO 2000-81 air quality indices, the air quality of the project area based on the 24-hour concentrations of TSP and SO2 can generally be classified under good condition (Table 5-12).

Table 5-12 Air Quality Indices (Source: Annex A of DAO 2000-81)

Type	TSP, µg/NCM (24-hour average)	SO_2, ppm* (24-hour average)	NO_2, ppm* (24-hour average)
Good	0 to 80	0.000 to 0.034 (0 to 88.8)	**
Fair	81 to 230	0.035 to 0.144 (91.4 to 376.2)	**
Unhealthy for sensitive groups	231 to 349	0.145 to 0.244 (378.8 to 637.4)	**
Very unhealthy	350 to 599	0.225 to 0.304 (587.8 to 794.2)	**
Acute unhealthy	600 to 899	0.305 to 0.604	0.65 to 1.24

Type	TSP, µg/NCM (24-hour average)	SO_2, ppm* (24-hour average)	NO_2, ppm* (24-hour average)
		(796.8 to 1577.9)	(1220.5 to 2328.3)
Emergency	900 and above	0.605 to 0.804 (1580.5 to 2100.3)	1.25 to 1.64 (2347.0 to 3079.3)

Note: * Values in parenthesis are expressed in units of µg/NCM, conversion factor for SO2: 1 ppm=2,612.4 µg/NCM; NO2=1877.6 µg/NCM.

Figure 6-8

Air Quality Stations

IEE - 810 kW Likud Mini Hydropower Plant Project
Barangay Hallap, Municipality of Aglipolo
Province of Ifugao

REVISIONS	GRAPHICAL SCALE	NOTES	SOURCES OF INFORMATION
Rev 2	N Horizontal Scale 0 0.4 0.8 1.6 km		

5.2 Biological Resources

5.2.1 Freshwater Ecology

The study was undertaken to assess the potential impacts of the project to the freshwater ecology and to identify appropriate mitigation measures needed to address these impacts. The findings of the baseline assessment, the identified potential impacts, and the mitigation measures proposed for the project are presented below and the following sections.

5.2.2 Methodology

Rapid freshwater habitat assessment through field observations was conducted on March 16, 2011 to characterize and assess the general condition of the instream habitats along the proposed project area. Ten observation points were established at irregular intervals along the stream and banks to represent the freshwater habitat condition for the entire reach of the freshwater stream. Table 5-13 shows the coordinates and details of the observation points established during the field survey.

Table 5-13 Instream habitat observation points

Station ID	Description	Coordinates (WGS 84)	
		Longitude	Latitude
LH-IN	Proposed Intake	121° 05’ 30.4”	16° 44’ 24.5”
LH-1	Small Waterfall	121° 05’ 33.0”	16° 44’ 26.3”
LH-2	Onhill-overview of the rice fields	121° 05’ 39.8”	16° 44’ 28.0”
LH-3	Onhill-overview of the stream	121° 05’ 44.6”	16° 44’ 23.6”
LH-4	Onhill-overview of the rice fields	121° 05’ 47.5”	16° 44’ 20.6”
LH-5	Midstream	121° 05’ 47.3”	16° 44’ 17.3”
LH-6	Cascade Stream	121° 05’ 51.3”	16° 44’ 12.0”
LH-7	On Hanging bridge	121° 05’ 58.4”	16° 44’ 07.0”
LH-8	Portion of midstream habitat	121° 06’ 15.7”	16° 43’ 54.6”
LH-PH	End of sampling point	121° 06’ 35.9”	16° 43’ 48.1”

The freshwater habitat assessment has been conducted in reference to the US-EPA Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers (Barbour et al. 1999). Characterization of freshwater habitats is important in defining the biological integrity and diversity of streams and other water bodies. Parameters considered in the habitat assessment were:

- Epifaunal substrate
- Embeddedness
- Pool substrate characterization
- Velocity/depth combination
- Pool variability
- Sediment deposition
- Channel flow status
- Channel alteration
- Frequency of riffles
- Channel sinuosity
- Bank stability
- Bank vegetative protection

5.2.3 Baseline Environment

In general, the entire reach of the proposed project area is in good condition. Other than the man-made weir bridge at Station LH-8, the stream reach experiences no significant perturbation that would likely impact the freshwater habitats and organisms thriving in the area. The entire reach of the surveyed section of the stream is characterized by various types of freshwater habitats (Figure 5-1). The habitat channel types vary from small waterfalls and cascades to riffles and glides lined and covered with boulders, cobbles, pebbles and sand. Substrate embeddedness in most areas was low with layered cobbles providing diversity of niche space. A variety of riparian vegetation ranging from sedges and tall grasses (e.g. Station LH-5) to shrubs and small trees (e.g. LH-3 and LH-7) comprised the reach of the proposed project area. Few aquatic plants, snags, plant and tree debris, however, was observed during the survey. Most sections of the stream was shallow (<1m depth) with relatively deep sections observed mostly at pooling areas. The entire reach of the stream appears to be clear and well-oxygenated thereby allowing freshwater organisms to thrive in the area. Freshwater fishes (i.e. catfishes and tilapia) and small crabs are reportedly caught upstream and in some midstream section of the surveyed area for sustenance and home consumption. Fishing is usually done via damming during summer months when water level is low. Aquatic insects that are likely to inhabit such instream habitat include pollution sensitive taxa such as mayflies (Ephemeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera). Nematodes and oligochaetes (aquatic worms) are unlikely to be abundant in such areas because fine and organic-rich sediments were not that apparent in and along the stream. Nonetheless, high freshwater fauna biodiversity is expected in the area as the instream habitat features an array of good to optimal habitat characteristics. On a study conducted by Maunsell AECOM (2007) at Ambangal River in the municipality of Kiangan, Ifugao, the most common aquatic insects collected were mayflies and caddisflies which are indicative of a good instream habitat. Few fishes inhabit Ambangal River as attested by the interviewed locals in the area. Only two fishes (i.e. goby and halfbeak) were caught during the sampling. Other freshwater fishes reportedly caught in Ambangal River, and possibly in Itum River, are small-sized murrels (dalag), tilapia, freshwater catfishes (hito), and carps (karpa).

The stretch of freshwater stream where the project site will be established also has several agricultural farmlands cultivated for rice and crops. The local guide who assisted during the freshwater survey cited the use of fertilizers and pesticides in some of these farmlands. The use of these chemicals should be regulated and maintained to prevent contamination of the streams and other water resources. The water quality section summarizes the general water quality condition of the stream section where the proposed intake and powerhouse will be established. Detailed notations of the observations made during the site assessment are detailed below.

Station LH-IN (Proposed Intake)

Station LH-IN where the proposed intake of the project will be established is an upstream section of Itum River located at Sitio Lower Haliap, Barangay Haliap. The observation point was accessed by foot using the narrow trail near Itum Bridge some 150 meters upstream. Both banks in this area are characterized by fluvial slope landforms with relatively steep sides similar to ravines. Short intermittent bends of the outcrop wall indicating high degree of channel sinuosity bounds the upstream section of the stream. Optimal channel sinuosity provides diverse habitat for various aquatic fauna and allows better protection from water surges during storms and torrential rains. The vegetation protection in this area is located on top of the limestone outcrop with sparse cover of shrubs, herbs and small trees. Moss patches on the outcrop wall were also observed indicating a humid environment and possible flooding in this stream section due to continuous rain. The instream substrate and banks were composed mostly of bedrocks, cobbles and pebbles with minimal sediment deposition at the time of the sampling. Moderate stream flow rate characteristic of runs and glides along the stream gushes into the small waterfall located a few meters downstream. There was no apparent aquatic vegetation present in this area as the substrate appeared to be loose and possibly have low nutrient levels.

Freshwater fishes thrive in the upstream section of this observation point according to the locals who accompanied the team during the survey. Bank erosion was not evident during the survey but may possibly occur after heavy rainfall events. The municipalities of Kiangan and Asipulo where the stream traverses experiences slight erosion with few areas predicted to have moderate to severe erosion (PDPFP). Slash and burn was reported at the upstream section of the project area that may promote land erosion at the upstream section of Itum River.

Stations LH-1 to LH-8 (Midstream Habitats)

At least two sections of instream habitats are apportioned at the midstream section of the surveyed area. The first section runs from the view at Station LH-2 towards Station LH-5 and the other runs near Station LH-7 towards LH-8. The small waterfall at Station LH-1, a cascade at Station LH-6, and the weir bridge at Station LH-8 bisect these sections from the proposed intake, the midstream areas and the proposed location of the powerhouse, respectively.

The first section has several rice fields near both banks spanning from the downstream areas of the proposed intake and small waterfall at LH-2 and extending towards the proposed powerhouse station. Minimal use of fertilizer and pesticide has been reported in these fields but may still potentially contribute to organic and contaminant levels in the water resources around the area. Most portion of the stream section is generally shallow with cobbles and boulders distributed within the reach of the stream. The stream is generally narrow in some areas with widths spanning to ~3 meters that widens to as much as ~10 meters in several portions. Riparian vegetation including overhanging vegetation, shrubs and grasses are also common in the area. Other than mosses clinging to cobbles and boulders and few microalgal patches in entrained and pooled waters, aquatic vegetation such as submerged, floating, or emergent species were not observed in the area. Residual part of a cut tree was observed on one portion of the stream (Station LH-5). The channel flow status varied from slow to fast flowing waters with riffles present on stream sections creased with boulders and cobbles.

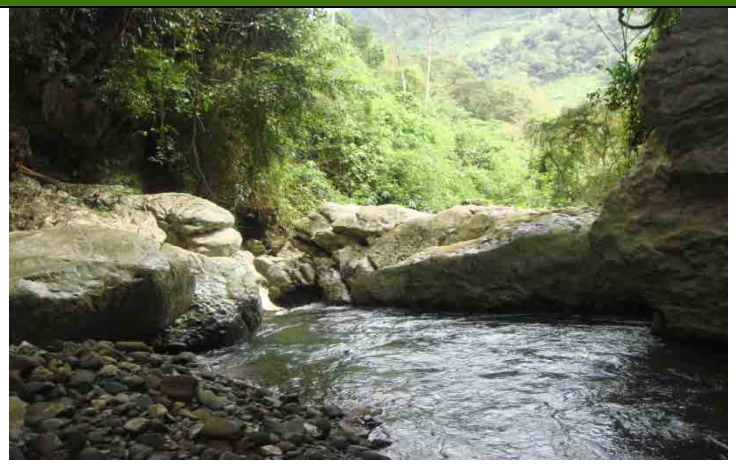
The second portion of the midstream section is lined with huge boulders on both banks and on instream areas (i.e. Station LH-7). Stream water depth varies from knee level in shallow areas (e.g. run and backwaters) to around a meter in pool areas. The water level may reach approximately one meter above the presently observed depth as indicated by the demarcation on the boulders at the banks (i.e. Station LH-7). Flooding has been reported in the area especially during frequent and strong rainfall events. A steel-cable hanging foot bridge approximately 5 meters above the water level has been constructed to replace the torn down wooden hanging foot bridge lying below. Several overhanging vegetation have been observed in the area. Further downstream of the observation point (Station LH-8), uniform distribution of cobbles and pebbles with few boulders were observed. There was no indication of aquatic vegetation throughout the observed portion of the stream. A dilapidated irrigation weir-bridge previously constructed obstructs water flow, thus modifying the instream habitat in these areas.

Station LH (End of Sampling Point)

The stream is characterized by several channel habitat types with rapids, riffles and runs interspersed within the reach of the observation point. Both banks appeared to have high stability with gently sloping banks and good riparian vegetation. The upstream section in lined with sedges, tall grasses, and shrubs on both banks whereas the downstream section have an assortment of woody shrubs, grasses and small trees that in some cases overhang the stream. A few snags and submerged aquatic plants at the instream habitat were also sited during the survey. The instream substrate had numerous boulders and cobbles with riffled fast flowing waters especially at the downstream section. An island bar bisecting the stream (where the observations was also done) composed variably from boulders to sand was formed. Although the stream water was clear, sediment deposition at certain section of the banks have also been observed. A temporary weir made up of cobbles was placed at the right

upstream section of the stream that results to flow impediment at the fork stream. Freshwater fauna likely to dominant such instream environments are aquatic insects clinging or burrowed under the substrate. Small fishes were seen around pooling areas of the stream at the time of the survey.

Figure 5-1 Photos of Observation Points

Station ID	Upstream View	Downstream View
LH-IN		
LH-1		

Station ID	Upstream View	Downstream View
LH-2		

Station ID	Upstream View	Downstream View
LH-3	**Upstream view covered with dense vegetation**	
Station ID	**Upstream View**	**Downstream View**

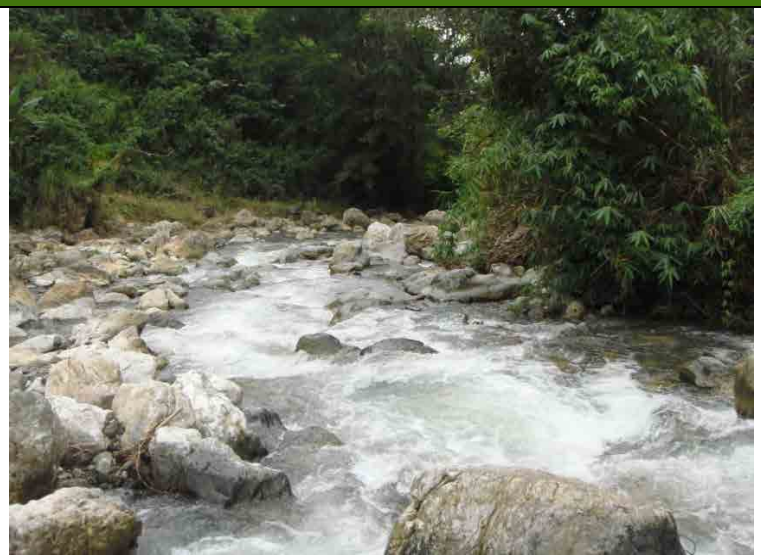
Station ID	Upstream View	Downstream View
LH-4		

Station ID	Upstream View	Downstream View
LH-5		

Station ID	Upstream View	Downstream View
LH-6		

Station ID	Upstream View	Downstream View
LH-7		

Station ID	Upstream View	Downstream View
LH-8		

Station ID	Upstream View	Downstream View
LH-PH		

5.2.4 Terrestrial Ecology

The study was undertaken to assess the potential impacts of the project to terrestrial vegetation and wildlife and to identify appropriate mitigation measures needed to address these impacts. The findings of the baseline assessment, the identified potential impacts, and the mitigation measures proposed for the project are presented below and the following sections.

5.2.5 Methodology

A rapid site assessment was undertaken to have a general picture of the vegetation and wildlife assemblage that will potentially be affected by the project. Methodology included walk-through survey, photo-documentation and interview of locals encountered during the site visit. Conservation status of each identified plant and wildlife species were determined from DENR Administrative Order (DAO) 2007-01 known as the "National List of Threatened Philippine Plants and their Categories, and the List of Other Wildlife Species" and International Union for Conservation Nature (IUCN). The IUCN's Red List of Threatened Species was also referred to since it provides the global assessment of the conservation status.

5.2.6 Baseline Environment

Based on the rapid site assessment, four vegetation communities within and along the immediate surroundings of the project site were identified. These are agricultural land (planted mainly to rice, winged beans, and sweet potato), shrubland/grassland (dominated by various species of grass and woody shrubs), tree plantation (planted to Gmelina), and patches of forest (secondary growth and original vegetation restricted to the very steep portions of the river stretch). More than 90% of the river stretch (about 10 m from both sides of the banks) is heavily disturbed as represented by the agricultural land, shrubland/grassland, and tree plantation. The remaining forest patches were most likely untouched either because of their very steep location and/or stunted structure rendering them without economic value. A general assessment was conducted to determine the suitability of these vegetation communities as a potential habitat for wildlife species.

A total of 12 bird species dominated by the yellow-vented bulbul (*Pycnonotus goiavier*), chestnut munia (*Lonchura malacca*), and Pacific swallow (*Hirundo tahitica*) were observed and confirmed present along the entire stretch of project site. Except for the white-eared brown-dove (*Phapitreron leucotis*), Philippine bulbul (*Hypsipetes philippensis*), and Philippine coucal (*Centropus viridis*), all recorded species are resident breeding but are non-endemic. None are considered under any threat categories based on PWRC Act of 2001 and IUCN Red List of Threatened Species 2010.

Table 5-14 presents the key findings and conclusions of the terrestrial ecology assessment.

Table 5-14 Key Findings and Conclusions - Terrestrial Ecology

Baseline Information *	Key Findings and Conclusion
Habitat	• The entire stretch of the project site is heavily disturbed and modified caused by past anthropogenic activities such as land clearing for agriculture. The host and neighbouring barangays have been utilized as agricultural land and settlement areas.
Vegetation communities	• There are four vegetation communities within the project site namely: agricultural land, shrubland/grassland, tree plantation, and forest patches.
Endemicity and conservation status of plant species identified	• None of the plant species recorded within the actual stretch of the project site is included within the DENR Administrative Order (DAO) 2007-01 list known as the "National List of Threatened Philippine Plants and their Categories" and the International Union for Conservation Nature (IUCN). Majority of the species recorded are introduced while some are native but non-endemic.
Wildlife species inventory and their conservation status	• A total of 12 bird species were recorded. Of which, only three species are considered endemic while the rest are resident breeding but non-endemic. This low species turn-out was expected due to the highly disturbed vegetation condition of the project area.None are

Baseline Information *	Key Findings and Conclusion
Habitat	• The entire stretch of the project site is heavily disturbed and modified caused by past anthropogenic activities such as land clearing for agriculture. The host and neighbouring barangays have been utilized as agricultural land and settlement areas.
	considered under any threat categories based on PWRC Act of 2001 and IUCN Red List of Threatened Species 2010.

5.3 Socio-Economic Cultural Conditions

5.3.1 Socio-Economic Profile

The project site is within the administrative area of Barangay Haliap in Asipulo Municipality. Formerly a part of Kiangan, Ifugao Province, Asipulo was created a separate jurisdiction by Republic Act 7173 in 1992. Asipulo covers a land area of 29,043 hectares with a total population of 13,100 and population density of 2.18 hectares per person (CBMS, 2007).

The following structures are envisioned to be constructed in Haliap.

Structure	Haliap
Diversion Weir	✓
Intake and Settling Basin	✓
Headrace	✓
Head-Tank	✓
Pension and Spillway	✓
Powerhouse	✓

Haliap is bounded to the north by Barangay Duit, the south by Pula, the east by Panubtuban and Mappit, and west by Amduntog. Haliap has nine sitios and a total land area of 490.0848 ha. According to the 2007 CBMS survey, the total population is 979 with a 1.84% population growth rate.

5.3.1.1 Household Composition and Structure

The average household size is 4.7. Haliap has 194 households, the largest being in Purok Lower Haliap, Gulun and Tangngadon (31 each) and the smallest in Taaw (2). Table 5-15 shows the population distribution, household population and number of families per sitio.

Table 5-15 Population Distribution by Purok (CBMS, 2007)

Purok	No. of HH	Population	No. of Males	No. of Females
Likud	23	137	73	64
Upper Haliap	26	136	69	67
Lower Haliap	31	151	78	73
Nadonglaan	5	37	21	16
Mayubba	29	121	62	58
Gulun	31	174	85	89
Taaw	2	11	6	5
Tangngadon	31	133	67	66
Panakligan	16	79	37	41
Total	**194**	**979**	**498**	**479**

5.3.1.2 Labor Force

Forty percent of the population (15-64 years old) is of working age. Household members who are working total 388. The employed labor force for males is at 230 compared to females at 158. Haliap has no record of unemployment rate as per 2007 CBMS. Table 5-16 shows the labor force 15 years and over by sex.

Table 5-16 Labor Force 15 years and over by Sex (CBMS, 2007)

Purok	Labor Force	Male	Female
Likud	51	32	19
Upper Haliap	45	25	20
Lower Haliap	58	36	22
Nadonglaan	13	9	4
Mayubba	61	35	26
Gulun	64	39	25
Taaw	3	2	1
Tangngadon	57	34	23
Panakligan	36	18	18
Total	**388**	**230**	**158**

5.3.1.3 School-Age and Educational Profile

Eighty-six percent of Haliap's population (10 years old and above) are literate. The illiteracy rate is almost equal for males and females at 12.81% and 12.08%, respectively. In 2007, 31% of the population is of school age (6-21years old). The participation rate for elementary is at 97.1% and high school at 87.23%. Table 5-17 demonstrates the school age population and enrolment rate.

Table 5-17 School Age Population and Enrolment Rate (CBMS, 2007)

Education Level	Number	Enrollment Rate
Elementary School-going age	186	181
Secondary School-going age	119	104

5.3.1.4 Ethnicity and Religion

The overwhelming majority of the population in Barangay Haliap is indigenous (Ayangan-Ifugao). Ayangan is one of the two ethno-linguistic subgroups in Ifugao province. Manuel Dulawan, local historian and noted authority on Ifugao culture, states that the Ayangan dialect are distinguished for the phonemes *ch, f, sh* and *j* which sounds are not uttered in Tuwali, another dialect in Ifugao that is spoken in the area surrounding Asipulo.Haliap barangay officials claim that more than half of the households are Roman Catholics followed by various Protestant denomination (United Methodist, Bible Methodist, Baptist and Evangelical).

5.3.1.5 Income and Livelihood

The main sources of livelihood and income in Haliap are agriculture and forestry. Key informants cited beans, tomato and palay as major crops in the barangay. Harvested crops from small land holdings are primarily for family consumption, while the remaining produce are marketed in Kiangan and Lagawe for additional income. Table 5-18 shows the income and livelihood source by sex.

Table 5-18 Income and Livelihood Source by Sex (CBMS, 2007)

Industry	Total	Male	Female
Agriculture mining and Forestry	300	179	121

Industry	Total	Male	Female
Fishing	2	2	0
Manufacturing	1	0	1
Electricity, Gas and Water Supply	1	1	0
Construction	8	8	0
Wholesale and Retail Trade, Vehicle Repair	14	4	10
Transportation, Storage & Communication	8	8	0
Financial Intermediation	1	1	0
Real Estate, Renting and Business Activities	3	2	1
Public Administration and Defense	12	11	1
Education	10	2	8
Health and Social Work	2	0	2
Other community, Social or Personal Activities	21	12	9
Private Households with Employed Persons	5	0	5
Number of Employed Persons	388	230	158

Asipulo is a 5th class municipality according to the Department of Finance classification in terms of fiscal revenues. This is reflected in the household incomes of the host barangays and the largely subsistence agricultural economy. Incomes are generally low and majority of people are dependent on subsistence farming. The range of household income in the barangay is approximately 3000Php-7,000Php per month, as per interview with the barangay officials. Table 5-19 demonstrates the number of households by quintile.

Table 5-19 Number of households (CBMS, 2007)

Quantile	Magnitude	Proportion
Poorest	38	19.59
Lower middle	38	19.59
Middle	38	19.59
Upper middle	38	19.59
Richest	42	21.65

Households augment incomes by taking out loans from local lenders, mostly cooperatives. The community is also characterized by strong family and affinity ties evidenced by neighbours willing to lend help, both monetary and in kind, in times of financial scarcity. Identified as one of the poorest in the province, Asipulo also started receiving aid from KALAHI-CIDDS since 2003. The government's poverty alleviation project provides interventions to host barangay, such as human development services.

5.3.1.6 Physical-Cultural Resources

5.3.1.7 Land Resources

The 490.0848 ha land area of Barangay Haliap will be classified to agricultural, industrial, commercial and residential areas. The agricultural area is mainly devoted to crop cultivation, livestock and grazing. Industrial and commercial areas are locations for non-agricultural employment and activities such as public markets and offices. The residential areas in Barangay Haliap are scattered and are found in relatively remote locations.

5.3.1.8 Water Resources

The Lamut River stretches on a southeast-northwest direction fed by two tributaries, the Pambingan River from the Asipulo side and the Bagnit River from the Kiangan area. Both tributaries emanate from thickly forested watersheds adjacent to each other. These watersheds ensure sufficient water volume on the Haliap River needed by the mini-hydro electric plant even during the dry months of the year. There are private and communal irrigation systems supplying irrigation water in all rice fields throughout the municipality. The systems, however, are easily destroyed during rainy seasons and calamities.

Almost all barangays in Asipulo have with Levels I (point source) and II (point source with public faucet) water systems. However, several households still fetch water from a distance beyond 250 meters, which is beyond the MBN (Minimum Basic Need) norm. The water sources are also reported to be poorly constructed often proned to contamination by wandering animals. Table 5-20 shows the type of source of drinking water.

Table 5-20 Types of Source of Drinking Water (CBMS, 2007)

Type of Source of Drinking Water	Magnitude	Proportion
Community water system-own	56	28.87
Community water system-shared	98	50.52
Deep well-own	2	1.03
Deep well-shared	1	0.52
Artesian well-own	2	1.03
River, stream, lake, spring	35	18.04
Number of Total Households	**194**	

5.3.1.9 Power

Ifugao Electric Cooperative (IFELCO) provides Haliap with electric service. Haliap is not completely energized. A still significant portion of the households is without electric service. The households without access to or could not afford the services of IFELCO use kerosene lamps, gas lanterns (petromax) and pinewood for their lighting needs. Alternative source of electricity, such as solar panel, are also offered by IFELCO.

5.3.1.10 Communication

Presently, wireless/mobile telecommunications service in Haliap is provided by the GLOBE and SMART. However, there are still selected portions of the barangay that are not accessible to mobile phone signals.

5.3.1.11 Historical and Cultural Value

Interviews with key informants and field observation suggest that there are no sites of historic, cultural, archaeological or religious significance. The testimonial of Manuel Dulawan, local historian and noted authority on Ifugao culture, also claimed that no site of cultural, historic, or religious significance will be negatively impacted by the hydro power plant project. Testimonial of Mr. Dulawan is appended in this report (Annex 7)

5.3.1.12 Settlement and Infrastructure

5.3.1.13 Land Acquisition and Settlement Pattern

Based on key local informants (land owners and organization heads) and barangay council, there are no settlements within the project site. The settlement and built-up areas are concentrated along the national highway and the low-lying puroks or sitios. However, a total of 1 ha of agricultural land will be converted for the project. Local owners with legal rights to land and assets within the vicinity of the

project site will be directly impacted by the proposal. The project will also affect the ability of the adjacent agricultural landowners to continue farming. The local land owners require monetary compensation in exchange of land and property. Potential right of way conflict is also expected within the project site.

The proponents will estimate the economic implications of the project proposal, including impacts to the agricultural sector in Haliap, productivity changes, impact on land values and property taxes and the potential effect on agricultural lease rents. The proponents will provide prompt and adequate monetary compensation for the change in land ownership within the project site.

5.3.1.14 Existing Infrastructures and Industries

Haliap has three government-owned schools, one each for day care, complete elementary and high school. The elementary school has a total of nine classrooms, seven other buildings and three makeshift latrines. The Haliap National High School is built with two to three classroom buildings; one Home Economics Building; one faculty building, teachers cottage, one Administration Building and a two-storey library building with three Latrines. The HNHS has two annexes located at Natcak and Camandag, Asipulo.

Retail trade and cooperative lending are the most common types of business establishments in Haliap. On the other hand, cottage industries include beans as product.

Haliap also has one barangay station accessible to all the households in need of medical and health assistance.

5.3.1.15 Health and Safety

5.3.1.16 Public Health and Sanitation

Sixty-eight households (35%) have no sanitary toilets (closed pit or water-sealed), while 35 households are without access to safe water. The barangay health center has no record of the illnesses caused by water borne diseases. On the other hand, total of 20 incidences of maternal mortality has been recorded per 2007 CBMS.

Colds and diarrhea are the most common illnesses in the barangay host. Irregular weather condition and cases of pollution are the leading causes of these illnesses. CBMS data, however, record, no cases of malnutrition Table 5-21 demonstrates the barangay's nutrition status by sex.

Table 5-21 Nutrition Status by Gender (CBMS, 2007)

	Total (Base: 117)	*Male (Base: 57)*	*Female (Base: 60)*
Above Normal	0.85	0	1.67
Normal	99.15	100	98.33
Below Normal (moderate)	0	0	0
Below Normal (severe)	0	0	0

5.3.1.17 Community Health and Safety

Haliap has one barangay station accessible to all the households in need of primary health care. A midwife is in charge of the health station. Small budget for medical supplies and health concerns are cited among the most common problems on community health.

The barangay has a single case of homicide based on 2007 CBMS. In general, however, the key informants (barangay officials) claim that Haliap is still a peaceful and safe community.

5.3.1.18 Social Protection

The largest membership among the community associations are Women's Organization and Religious Groups, with 25 members each. The Active Males Movement against Violence also ensures the prevention of violence against women and children in the community.

6.0 Land Compensation and Its Implementing Procedure

The Land Compensation section describes the principles, entitlement and implementation procedures on land acquisition and resettlement for I.2 MW Likud Mini-hydropower Plant Project. Relevant laws and regulation of the Philippine Constitution are detailed to ensure that (a) landownership concerns on the project site are addressed thru a legally binding land use agreement (b) the economic implications of the project proposal, including impacts on Haliap agricultural sector, productivity changes, impact on land values and property taxes and the potential effect on agricultural lease rents are accurately assessed (c) adequate funds are allocated, based on detailed valuation of properties and assets, for disbursement of compensation on impacted land properties.

6.1 The Policy Framework of Land Ownership

The policy framework of land ownership is based on the relevant laws and regulations of the Philippine Constitution. Specifically, Section 19 of RA 7160 (Local Government Code of 1991) and Section 17 of RA 6657 (Comprehensive Agrarian Reform Law of 1988) shall serve as the primary policy guidelines for the land compensation scheme of the project.

Section 19 (Eminent Domain) of RA 7160 acknowledges the inherent political right of a local government unit to exercise the power of eminent domain for public use upon payment of just compensation pursuant to the provisions of the Constitution provided however:

(i) That the power of eminent domain may not be exercised unless a valid and definite offer has been previously made to the owner, and such offer was not accepted
(ii) That the local government unit may immediately take possession of the property upon the filing of the expropriation proceedings and upon making a deposit with the proper court of at least fifteen percent (15%) of the fair market value of the property based on the current tax declaration of the property to be expropriated
(iii) That, the amount to be paid for the expropriated property shall be determined by the proper court, based on the fair market value at the time of the taking of the property.

In addition, Section 17 of RA 6657 or the Comprehensive Agrarian Reform Law of 1988, which is particularly relevant in the determination of just compensation, stated as follows:

> "In determining just compensation, the cost of acquisition of the land, the current value of like properties, its nature, actual use and income, the sworn valuation by the owner, the tax declarations, and the assessment made by government assessors shall be considered. The social and economic benefits contributed by the farmers and the farm-workers and by the Government to the property as well as the non-payment of taxes or loans secured from any government financing institution on the said land shall be considered as additional factors to determine its valuation."

Another important legislation taken into consideration in this assessment is the Indigenous People Rights Act (IPRA) of 1997 (RA 8371). This act recognises and promotes the rights of indigenous peoples to ancestral domains and lands; the right to self-governance; economic and social rights; and cultural integrity, including indigenous culture, traditions and institutions.

6.2 Land Acquisition Procedure

The stretch of freshwater stream where the project site will be established has several agricultural farmlands cultivated for rice and crops. The impacted stakeholders of the Mini-hydropower Plant Project are agriculture landowners from Barangay Haliap for the construction of hydropower plant. The primary stakeholder's interests involve land acquisition procedure and the disbursement of just compensation for the affected properties. Other stakeholders are local residents of the host barangay and nearby communities, and local government units, whose interests are related to the implementation of the project and availability of reliable power at a reasonable cost.

Necessary data collection were undertaken to understand project's site development plan, project description, and related laws and regulations pertaining to land acquisition and just compensation.

Consultations for the project were conducted to inform landowners and institutional stakeholders (i.e. LGU's and other affected government agency) that a hydropower plant project has been chosen by the proponent to be established in Haliap. The objective of these consultations were to (i) discuss scope of the proposed hydro power plant; (ii) identify land users and landowners of the proposed site; and (iii) discuss guidelines and procedures on land acquisition and compensation scheme in accordance to customary and regulatory laws. The list of initial consultations conducted is shown in Table 6-1.

Table 6-1 Key Consultation Activities

Public/ Stakeholder Consultation	Date	Place	Participants	Topic of discussion
Public Consultation	February 22, 2011	Barangay Hall, Barangay Haliap, Asipulo	1. Barangay Council of Haliap 2. Barangay Council of Panubtuban 3. Provincial Planning and Development Office 4. TEPSCO 5. AECOM	Discussed project objectives, history and goal of the mini-hydro development in Ifugao, location of the project, schedule and items of the feasibility study and basic considerations in the planning and designing of the project.
Plant visit to Ambangal Dam	February 28, 2011	Ambangal, Kiangan	1. Barangay Council of Haliap 2. Barangay Council of Panubtuban 3. TEPSCO 4. Ambangal Dam operators	Discussion on the structures and the daily operations of the Ambangal Minihydro Power Plant.
Public Consultation	April 28, 2011	Barangay Hall, Barangay Haliap, Asipulo	1. Barangay Council of Haliap 2. Barangay Council of Panubtuban 3. Farmers	• Selection of the location of the main facilities. • Comparison study between waterway routes
Public/ Stakeholder Consultation	**Date**	**Place**	**Participants**	**Topic of discussion**

Key Informant Interview	June 23, 2011	Haliap Barangay Hall, Haliap, Asipulo	Kgd Rosemarie Doque	Discussed project background, their concerns and how they will benefit or experience negative impacts. (i.e. Opinion on the establishment of hydro power plant; Perceived Impacts on the establishment of hydro power).
Consultation with Haliap Barangay Council and Sector Leader	June 23, 2011	Haliap Barangay Hall, Haliap, Asipulo	1. Kgd Basilio Fedelito 2. Basilio Bayawna 3. Christina Ngabit 4. Nancy Addab	Discussed project background, their concerns and how they will benefit or experience negative impacts. (i.e. Opinion on the establishment of hydro power plant; Perceived Impacts on the establishment of hydro power).
Consultation with Panubtuban Barangay Council	June 23, 2011	Panubtuban Barangay Hall, Panubtuban, Asipulo	1. Brgy Captain 2. Kgd Josie 3. Brgy Treasurer 4. Brgy Secretary 5. Brgy Staff	Discussed project background, their concerns and how they will benefit or experience negative impacts. (i.e. Opinion on the establishment of hydro power plant; Perceived Impacts on the establishment of the hydropower plant)
Landowners' Focus Group Discussion	June 23, 2011	Haliap	Landowners	Discussed project background, their concerns specific to land ownership and how they will benefit or experience negative impacts. (i.e. Opinion on the establishment of hydro power plant; Perceived Impacts on the establishment of hydro power).
Public Consultation	July 1, 2011	Barangay Hall, Barangay Haliap, Asipulo	1. Barangay Council of Haliap 2. Barangay Captain of Haliap	• General Lay-out of the hydropower plant • Development Scale • Outline of civil structure • The result of parceally survey to identify potential affected landowners

6.3 Social Acceptability

The level of social acceptability of this project was assessed through a series of consultations and focus group discussions conducted in the project affected community and the lot owners. The barangay council of Barangay Haliap gave their approval upon presenting the primary objectives of the projects and its positive impacts to the community and the entire province as well (Annex 8).

Whereas, the most cited reason of lot owners for objecting to the project is "might affect the flow of water for irrigation." Upon thorough presentation of the project vis-a-vis their objection, the lot owners approved of the project.

6.4 Land Ownership of the Potentially Project- Affected Area

Based on key local informants (land owners and organization heads) and barangay council, there are no settlements within the project site. The settlement and built-up areas are concentrated along the

national highway and the low-lying puroks or sitios. The project does not require displacement of community host residents. There are no physical structures on the proposed site (historic, cultural, archaeological or religious site). The project will however need to acquire a total of 1 ha of land.

Local owners with legal rights to land and assets within the vicinity of the project site will be directly impacted by the project. The project site covers 22 land owners from Barangay Haliap. The acquisition of land is also expected to affect the livelihoods and income of the adjacent agricultural landowners.

Affected landowners have been consulted during feasibility study. They are generally supportive of the project, but are also concerned of the land acquisition and compensation procedure. The local land owners require monetary compensation for affected land and assets including right of way conflicts. The stakeholders also cited concerns on activities during construction with potential negative impacts on proposed project site. This includes apprehensions on the removal of vegetative cover and trees and fear of the excavation and drilling of land for the installation of facilities.

6.5 Land Acquisition for the Project

The proponent will estimate the implications of the project proposal, including impacts to the agricultural sector in Haliap, productivity changes, impact on land values and property taxes and the potential effect on agricultural lease rents. The proponents will provide prompt and adequate monetary compensation for the change in land ownership within the project site.

Discussion with the landowners will continue, to reach a legally binding land use agreement on land acquisition. The landowner clan leaders will be informed of the policies and implementation procedures regarding compensation for land and assets. This will include specific details on compensation rates and entitlements with careful details on the mode and schedule of compensation payment.

A model for land compensation is presented in Annex 9. This model is applied in a similar project in Ambangal mini-hydro power project.

7.0 Impacts due to the Project and Mitigation Measures

7.1 Soil

There is a potential for topsoil loss during construction. As mitigation, topsoil that will be disturbed during construction will be gathered and properly stockpiled. Gathered topsoil will be used for revegetation of cleared or affected areas. These cleared or affected areas will include but not limited to areas used for temporary storage of construction materials and campsite.

7.2 Water Quality and Wastes

During construction, possible soil erosion from digging/excavation activities may result to increased sedimentation particularly at the intake weir and the headrace area. Furthermore, potential degradation of water quality due to the generation of wastes that may indiscriminately be disposed of by the workers may eventually find its way into the water body. As mitigation, the contractor will be required to adhere to best construction practices including proper housekeeping and this will be stipulated in their contract. Non-adherence to the said provisions will render non-payment of their fees. If practicable, the weir will be constructed during the dry season when the water level is low. Sediment traps will be placed along the headrace alignment to prevent, if not to minimize, the transport of the excavation spoils to Lamut River. The temporary camps for workers will be positioned away from the river. This will be provided with adequate and properly maintained sanitation systems. Good housekeeping measures (including waste segregation and proper disposal) will be strictly enforced.

7.3 Hydrology

The project requires for a 2.0 m^3 maximum discharge and a 0.4 m^3 minimum discharge to able to operate. As such, lower than this amount, the Plant will stop operation.

Potential impact might be the non-priority of the irrigation requirements. Based on the Water Code of the Philippines (PD 1067), priority of water use is given to irrigation prior to power generation energy.

7.4 Air Quality

Potential air quality impacts will be exhibited during construction and operation stages. During construction, there will be generation of particulate matters from excavation works and movement of vehicles. Furthermore, nitrogen oxides and sulfur oxides from fuel combustion of vehicles and engine/generator set will be generated. There will be no big equipment to be used but manual labor will be extensive, thus, sources of dust will be limited from excavation works and vehicular movements of delivery trucks. To mitigate exposure to increased level of dusts, proper Personal Protective Equipment (PPE), such as mask will be provided to workers, when applicable. Most of the barangay roads, although very narrow are cemented, thus build up of dust will also be negligible.

During the operational phase, there will be generation of nitrogen oxides and sulfur oxides from fuel combustion of back-up generator. This will be mitigated by employment of regular maintenance.

7.5 Noise

During construction, noise and vibration will be generated from vehicular movements, sand and aggregates processing, excavation and other construction noise including workers. The main potential impact of the increased noise levels and vibration will be to the construction workers since there are no communities within the immediate environ of the construction sites. Mitigation will include standard occupational health and safety practices such as use of ear mufflers and enforcement of exposure duration restrictions. Construction activities will also be limited during daytime (if practical) to contain noise during daytime and assure a quiet and peaceful night in the area.

During operational phase, there will be generation of noise from operation of turbine and back-up generator set. This will be mitigated by regular maintenance and enclosure of the powerhouse to minimize noise.

7.6 Vegetation

The construction of the different facilities will require vegetation clearing. The vegetation following the entire stretch of the project site is already heavily disturbed (more than 90%) due to past anthropogenic activities represented by the agricultural land, shrubland/grassland, and tree plantation. The remaining forest are restricted to small patches that were most likely untouched either because of their very steep location and/or stunted structure rendering them without economic value.

Vegetation clearing activities of the project will adhere to all Philippine statutory requirements. Harvesting of timber and timber products require a tree cutting permit issued by the Department of Environment and Natural Resources (DENR). A Private Land Timber Permit (PLTP) is issued to harvesting of naturally grown forest while a Special Private Land Timber Permit (SPLTP) is issued to harvesting of premium hardwood species. This permit is issued by the DENR Regional Director if volume is less than 10m3, while it goes up to the DENR Secretary if more than 10m3(DAO 2000-21).

As mitigation, reforestation/revegetation areas will be at least equivalent to the area cleared to give way to the project's facilities. Reforestation/revegetation areas will be located in the immediate vicinity of the project site.

7.7 Wildlife

The main group of vertebrate fauna that will be potentially susceptible to the impacts of the project will be the amphibians and reptiles due to their limited and localized mobility. The construction of the headrace will affect the movement of these groups specifically, those that are distributed along its entire length since this would act as a barrier for individuals trying to move perpendicularly across the river. Their regular movement patterns (i.e., foraging, breeding, etc.) might be affected. A possible solution is to put a covering on strategic locations to serve as a bridge which would facilitate their crossings. Simultaneously, these coverings would also prevent the entry of too much litter into the headrace.

Neither birds nor mammals are expected to be negatively impacted by the different facilities of the project. Vegetation clearing will be mainly limited to the already disturbed habitats; birds and mammals could easily migrate to similar nearby areas. The foreseeable negative effect is during the construction phase specifically when workers and other personnel will be present in the area. Noise and other disturbances brought by their presence will definitely drive them away but they are expected to slowly return as soon as the disturbance source is eliminated. Hunting will also be strictly prohibited and enforced among the workers as some of them might resort to this activity which could result to further decrease of already limited species.

7.8 Freshwater Ecology

The project will cause minimal impacts on the freshwater ecology of the project site. This will be experienced during the construction of the intake and headrace only. The potential increase in sedimentation/erosion, due to clearing and digging activities may smother the benthic organisms thriving in the river. This can have similar effect to fisheries.

Mitigating measures to minimize erosion/sedimentation in the river will include the establishment of protection wall in the intake area, which will also prevent flooding in the nearby farm, use of riprap/stonewall in strategic locations, and re-vegetation of cleared areas.

The maintenance of the minimum river flow during the dry season would also maintain aquatic life in the river.

7.9 Socio-Cultural and Heritage

The project is expected to bring positive economic benefits to the host community. Jobs will be created as a result of the construction and operation of the project. About 200 local residents will be hired at the peak of construction. During operations, seven local residents will be employed to manage and maintain the mini-hydro power plant. The host communities will receive benefits indicated in Sections 4 and 66 of EPIRA 2001 (The Generation Company and/or energy resource developer should set aside one centavo per kilowatt hour (P0.01/kWh) of the total electricity sales as financial benefits to host communities). The project will also generate funds for the conservation programs of the Ifugao rice terraces.

Mr. Manuel Dulawan, a noted local historian and cultural worker in Ifugao, states that given the scale of the mini-hydro power plant project in Barangay Haliap, no site of cultural, historical or religious significance will be negatively impacted. He also concluded that no intangible aspects such as cultural practices, rituals, taboos of Ifugao culture will be affected. Moreover, the proposed mini-hydro power plant project in Barangay Haliap, will promote cultural significance of harnessing water for progress and this resonates with age-old Ifugao traditions that venerate water as a primary life force. Water is a natural resource used by Ifugao for agriculture and also had been used as an engineering tool in building terraces, dams and move larger rocks.

8.0 Environmental Monitoring Plan (EMoP)

8.1 Self- Monitoring Plan

The framework for environmental compliance monitoring and environmental performance indicators is described in this section. The primary purpose of the self-monitoring plan is to ensure that the project complies with relevant regulatory requirements through the proposed management measures identified to address project impacts. There will be two types of monitoring report that will be submitted to EMB.

- ECC Compliance Monitoring Report– A semi-annual report of the project's compliance with the ECC conditionalities; and
- Self-Monitoring Report – A quarterly report of the project's compliance to environmental standards and other requirements specific to four environmental laws under the direct mandate of the EMB on air quality (Republic Act (RA) 8749), water quality (RA 9275), toxic substances and hazardous waste management (RA 6969), and solid waste management (RA 9003).

Table 8-1 presents the Monitoring Plan that will be undertaken by the Provincial Government of Ifugao and ECC Compliance Monitoring Report will be submitted to EMB-CAR. A notarized completed Project Environmental Monitoring and Audit Prioritization Scheme Questionnaire is presented in Annex 10. The questionnaire serves as a guide for EMB to determine the monitoring strategy and to rank/classify projects based on their priority in terms of monitoring.

Table 8-1 Environmental Monitoring Plan (EMoP)

Key Environmental Aspects per Project Phase	Potential Impacts Per Envt'l Sector	Parameter to be Monitored	Sampling & Measurement Plan			Lead Person	Estimated Cost (PhP)	EQPL Management Scheme			
			Method	Frequency	Location			EQPL Range		Management Measure	
								Action	Limit	Action	Limit
Construction Phase											
Water	Water Pollution	TSS, TDS, coliform, BOD, COD	AS/NZS 5667.1	Semi-Annual	Four water stations in Lamut River	Environmental Officer	50,000/ sampling		DAO 1990-34		
Air	Generation of dust and gaseous pollutants	TSP, NO_2, SO_2	USEPA 40 CFR, Part 50	Semi-Annual	Two stations within the project site	Environmental Officer	50,000/ sampling		NAAQS		
Noise	Increase in noise levels	Noise levels	AS 1055.1-1998	Semi-Annual	Concurrent with the Air Quality Stations	Environmental Officer	5,000/ sampling		NPCC Guidelines		
Health and Safety	Exposure of employees and to some degree, the local community to health and safety risks as a result of construction activities	Safety and health committee meeting agreements; accident investigations/ reports; and periodic hazards assessment with the corresponding remedial measures/ action for each hazard.	Included in the Health and Safety Plan of the proponent	Daily	Project site	Health and Safety Officer	50,000/monthly reporting			DOLE DO 13 of 1998	
Operation Phase											
Water	Water Pollution	TSS, TDS, coliform, BOD, COD	AS/NZS 5667.1	Quarterly for the first year; will be adjusted as necessary	Four water stations in Lamut River	Environmental Officer	50,000/ sampling		DAO 1990-34		
Aquatic Biota	Loss of habitat and		Scientifically	Quarterly for		Environmental	100,000/				

Key Environmental Aspects per Project Phase	Potential Impacts Per Envt'l Sector	Parameter to be Monitored	Sampling & Measurement Plan			Lead Person	Estimated Cost (PhP)	EQPL Management Scheme			
			Method	Frequency	Location			EQPL Range		Management Measure	
								Action	Limit	Action	Limit
	aquatic biota.		accepted methodologies; photo transect and visual census	the first year; will be adjusted as necessary especially if there's no perceived impacts after a year		Officer	sampling				
Air	Generation of dust and gaseous pollutants	TSP, NO_2, SO_2	USEPA 40 CFR, Part 50	Quarterly	Two stations within the project site	Environmental Officer	40,000/ sampling		NAAQS		
Noise	Increase noise levels	Noise levels	AS 1055.1-1998	Quarterly	Two stations within the project site	Environmental Officer	5,000/ sampling		NPCC Guideline		
Health and Safety	Exposure of employees and to some degree, the local community to health and safety risks as a result of operations activities	Safety and health committee meeting agreements; accident investigations/ reports; and periodic hazards assessment with the corresponding remedial measures/ action for each hazard.	Included in the Health and Safety Plan of the proponent	Daily	Project site	Health and Safety Officer	50,000/monthly reporting			DOLE DO 13 of 1998	

9.0 Conclusion and recommendations for the Initial Environmental Assessment

It is expected that given the scale of the proposed mini hydro-electric power plant project, the limited facilities proposed to be established, the already heavily disturbed vegetation in the area, and the strategic mitigations provided, that negative impacts to the environment will be very minimal. Proposed mitigation for the different modules will minimize if not totally eliminate negative impacts to the surrounding environment of the project site. With the proper implementation of the different mitigation, the project is considered unlikely to pose major impacts to the environment of the project site. Benefits to the host communities in the form of a fund which will conserve and protect the rice terraces will heavily outweigh possible impacts.

10.0 Annexes

11.0 References

Climate Data Section, 2010. Climatology and Agro-meteorology Branch, PAGASA/DOST

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Maunsell Philippines Inc. 2007. Baseline Environmental Report for 200kw Kiangan Mini-Hydro Electric Power Project. Internal Report.

Annex

Annex 1 Laboratory Results

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Attention: MS. SHERYL JOY ANNE GUTIERREZ / MR. LARRY PADILLA

DATE March 24, 2011
R.A. № 57664
INVOICE №
PAGE 1 OF 2 PAGES

CERTIFICATE OF ANALYSIS

Date received : March 17, 2011
Date analyzed : March 17 – 22, 2011

	Cot. Intake	Cot. Powerhouse	Method/Technique
BOD, mg/L	2	2	Azide Modification (Dilution Technique)
TSS, mg/L	<1	<1	Gravimetric (dried at 103-105^{0}C)

**** O V E R ****

Total Samples : 2 Total Analysis : 8

Reference/Remarks :
Standard Methods for the Examination of Water and Wastewater, 21st ed.

Certified Correct by: LUISITA GRESILDA V. MENDOZA, PRC № 0006312
Approved Signatory: GINA B. MARITAN, Environmental Section Head
Noted by: LORNA G. SY, President

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DATE March 24, 2011
R.A. № 57664
INVOICE №
PAGE 2 OF 2 PAGES

CERTIFICATE OF ANALYSIS

Date received : March 17, 2011
Date analyzed : March 17 – 22, 2011

	Cot. Intake	Cot. Powerhouse	Method/Technique
Total Coliform, MPN/100ml	54×10^2	16×10^3	Multiple Tube Fermentation
Fecal Coliform, MPN/100ml	35×10^2	92×10^2	Multiple Tube Fermentation

**** NOTHING FOLLOWS ****

The test results pertain only to the samples submitted by the customer.

Total Samples : 2 **Total Analysis :** 8

Reference/Remarks :
Standard Methods for the Examination of Water and Wastewater, 21st ed.

Certified Correct by: LUISITA GRESILDA V. MENDOZA, PRC № 0006312
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SAT № 2008-13
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Annex 2 Photos of Observation at Weir Intake

Looking upstream at weir site

Looking upstream at weir site

Looking downstream at weir site

Looking downstream at weir site

Annex 3 Photos of Observation Along the River

Stream flowing into Lamut River

Surrounding slope

Slide

Slopes and slides

Washed out bridge

Lamut River

Annex 4 Photos of Observation in the Powerhouse

River near Powerhouse

River near powerhouse

River near powerhouse

River near powerhouse

Annex 5 Climatological Normals

NORMAL VALUES

Station Name : BAGUIO CITY, BENGUET
Period : 1981 - 2010

Latitude : 16°24'36" N
Longtitude: 120°36'00" E

Elevation: 1500 m

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	
	Rainfall		Temperature									Wind			No. Days w/	
Month	Amount	No. of	Max	Min	Mean	Dry Bulb	Wet Bulb	Dew Pt.	Vapor Pressure	Rel. Hum.	MSLP	DIR	SPD	Cloud Amount	TSTM	LTNG
	(mm)	RD	(°C)	(°C)	(°C)	(°C)	(°C)	(°C)	(mbs)	%	(MBS)	(16 pt)	(mps)	(okta)		
JAN	15.2	3	23.3	12.9	18.1	17.1	15.5	14.5	16.5	85	1011.7	SE	2	5	0	0
FEB	23.4	3	24.1	13.4	18.7	17.7	16.0	15.0	17.0	84	1011.3	SE	2	5	1	0
MAR	46.0	5	25.2	14.5	19.9	18.9	17.0	15.9	18.1	83	1010.3	SE	2	5	3	1
APR	104.1	9	25.8	15.9	20.8	20.0	18.2	17.3	19.7	84	1008.9	SE	2	5	9	4
MAY	341.1	20	25.0	16.4	20.7	19.8	18.4	17.7	20.2	88	1007.7	SE	2	6	17	12
JUN	475.8	22	24.4	16.5	20.5	19.6	18.4	17.8	20.3	89	1007.0	SE	2	7	16	12
JUL	781.9	26	23.4	16.3	19.8	19.0	18.1	17.6	20.2	92	1006.6	SE	2	7	15	10
AUG	905.0	27	22.6	16.2	19.4	18.7	17.9	17.5	20.0	93	1006.3	SE	2	7	13	7
SEP	570.9	24	23.4	16.0	19.7	18.9	17.9	17.3	19.8	91	1007.1	SE	2	7	13	7
OCT	454.3	17	23.9	15.7	19.8	19.0	17.8	17.1	19.6	89	1008.0	SE	2	6	8	6
NOV	97.4	8	24.1	15.1	19.6	18.7	17.2	16.4	18.6	86	1009.3	SE	2	5	3	2
DEC	26.2	4	23.5	13.7	18.6	17.7	16.0	15.0	17.0	84	1011.0	SE	2	5	0	0
ANNUAL	3841.4	168	24.0	15.2	19.6	18.8	17.4	16.6	18.9	87	1008.8	SE	2	6	98	61

Definition of Terms:

Climatological Normals — Period averages computed for a uniform and relative long period comprising at least three (3) consecutive 10-year period.

Rainfall (mm) (column 2) — The amount of precipitation (rain, hail, etc.) expressed in millimeters depth, of the layer of the water which has fallen.

Rainy days (RD) (column 3) — A rainy day is defined as a period of 24 hours beginning at 8AM to 8 AM of the next day during which 0.1 mm of rain is recorded.

Maximum Temperature (°C) (column 4) — The maximum temperature in °C recorded for the day, usually occurring in the early afternoon.

Minimum Temperature (°C) (column 5) — The minimum temperature in °C recorded for the day, usually occurring during early hours of the morning (before sunrise)

Mean Temperature (°C) (column 6) — Mean Temp. = Maximum + Minimum / 2

Dry Bulb Temperature (°C) (column 7) — It gives the air temperature in °C at the time of observation.

Wet Bulb Temperature (°C) (column 8) — It gives the temperature in °C that an air parcel would have if cooled adiabatically to saturation at constant pressure by evaporating water in it.

Dew Point Temperature (°C) (column 9) — The temperature in °C at a given pressure, to which the air must be cooled to become saturated. It is the temperature when atmospheric moisture begins to condense to liquid forming "dew" upon objects.

Vapor Pressure (mbs) (column10) — Denotes the partial pressure of water vapor in atmosphere. As the water evaporates, additional water vapor is introduced into space above and pressure increases slightly as the new vapor is added. The increasing pressure is due to an increase in the partial pressure of water vapor.

Relative Humidity (column 11) — The ratio of the amount of water vapor actually in the air to the maximum amount the air can hold at that temperature.

Mean Sea Level Pressure (mbs) (column 12) — The force exerted by the weight of the atmosphere on a unit area at the mean sea level. It is also the atmospheric pressure at mean sea level.

Prevailing Winds (mps) (column 13 & 14) — The prevailing wind direction most frequently observed during a given period while the average wind speed in meters per second is the arithmetic average of the observed wind speed.

Cloud (oktas) (column 15) — The amount of cloud present in the sky, expressed in oktas of the sky cover.(Okta is the function used in denoting cloud amount and is equal to 1/8 of the whole sky.

Days with Thunderstorm (column 16a) — A thunderstorm day is defined as an observational day during which thunder is at station.

Annex 6 Climatological Extremes

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Philippine Atmospheric, Geophysical and Astronomical Services Administration
Climatology and Agrometeorology Branch
CLIMATE DATA SECTION
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CLIMATOLOGICAL EXTREMES

STATION: BAGUIO CITY
YEAR: AS OF 2009

	TEMPERATURE (°C)				GREATEST DAILY RAINFALL (MM)		HIGHEST WIND (MPS)			SEA LEVEL PRESSURES (MBS)			
MONTH	HIGH	DATE	LOW	DATE	AMOUNT	DATE	SPD	DIR	DATE	HIGH	DATE	LOW	DATE
JAN	29.7	01-31-1978	6.3	01-18-1961	107.4	01-25-2006	20	SE	01-25-1975	1021.7	01-18-1959	1001.9	01-01-1950
FEB	28.7	02-10-1978	6.7	02-01-1963	58.4	02-26-2008	15	ESE	02-13-1974	1020.6	02-01-1962	1002.3	02-07-1985
MAR	30.4	03-15-1988	7.4	03-01-1963	80.6	03-27-2001	17	ESE	03-28-1996	1019.6	03-07-2006	1000.6	03-05-1999
APR	29.3	04-28-1995	10.0	04-01-1923	147.7	04-08-1967	25	SW	04-25-1976	1018.0	04-05-1998	992.4	04-21-1956
MAY	29.4	05-09-2003	7.7	05-30-1989	730.3	05-15-1980	32	ESE	05-07-2009	1014.0	05-02-1978	987.8	05-23-1976
JUNE	28.7	06-03-1991	11.8	06-20-2014	538.4	06-29-2004	35	WNW	06-26-1993	1014.0	06-27-1993	985.9	06-10-1974
JULY	27.9	07-04-1983	12.5	07-08-1925	1085.8	07-04-2001	47	SE	07-20-1974	1012.8	07-12-1979	981.0	07-04-2001
AUG	27.7	08-30-1988	12.8	08-12-1936	969.8	08-04-2008	31	S	08-07-1964	1014.0	08-18-1963	985.3	08-06-1964
SEP	28.0	09-04-1981	12.6	09-01-1990	799.8	09-27-1911	38	S	09-11-1970	1013.8	09-28-1982	988.7	09-23-1955
OCT	27.7	10-08-1980	11.3	10-26-1913	994.6	10-14-1998	41	WNW	10-27-1974	1015.8	10-26-2008	978.9	10-24-1988
NOV	28.2	11-19-1987	9.2	11-30-1989	698.7	11-05-1980	41	SE	11-04-1967	1018.2	11-30-1978	978.4	11-08-1954
DEC	28.2	12-28-1929	7.6	12-13-1991	148.8	12-04-1936	30	SSE	12-02-2004	1019.7	12-19-1994	974.1	12-14-1964
ANNUAL	30.4	03-15-1988	6.3	01-18-1961	1085.8	07-04-2001	47	SE	07-20-1974	1021.7	01-18-1959	974.1	12-14-1964
Period of Record	1909-2009				1902-2009		1950-2009			1949-2009			

PREPARED BY: CADS/CAD/PAGASA

Annex 7 Testimonial of Mr. Manuel Dulawan

A Writ-up for the Mini-hydro Electric Plant to Be Constructed at Lica on the Haliap River

Asipulo was once a part of Kiangan. By virtue of R.A. 7173 signed into law by then Pres. Corazon Aquino on January 13, 1992, the nine barangays of southern Kiangan (Haliap, Panubtuban, Nungawa, Amduntog, Antipolo, Pula, Cawayan, Namal and Camandag) were separated from the mother municipality to constitute the new municipality of Asipulo.

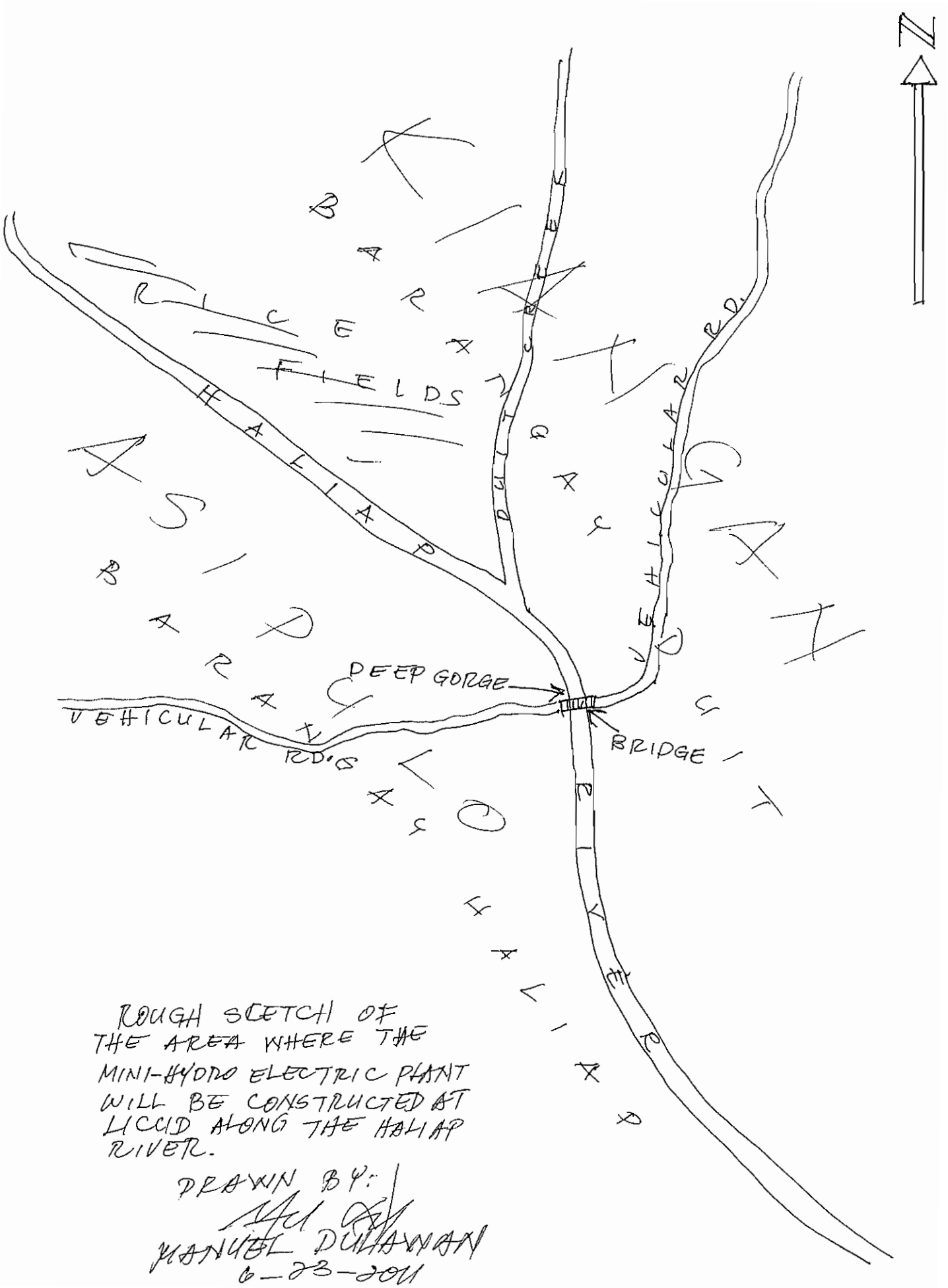
The boundary separating the two municipalities is the Haliap River stretching on a southeast-northwest direction. The Haliap River is fed by two main tributaries, the Pambingan River from the Asipulo side and the Pagnit River from the Kiangan area. Both tributaries emanate from thickly forested watersheds adjacent to each other. These watersheds ensure sufficient water volume on the Haliap River needed by the mini-hydro electric plant even during the dry months of the year.

The site of the mini-hydro dam have to be at least 100 meters below the ~~the~~ location of the bridge. This will prevent the possible inundation of the rice fields above the bridge even when the river gets swollen

during heavy rains

As far below as a kilometer from the bridge on both sides of the banks of the river, there are no places that may pose any problem. There are no sacred places nor properties either on the Asigan or Kiangan side that may be damaged in the course of the construction of the mini-hydro electric plant

written by Marivel Dalawan
6-23-2011



ROUGH SCETCH OF THE AREA WHERE THE MINI-HYDRO ELECTRIC PLANT WILL BE CONSTRUCTED AT LICUD ALONG THE HALIAP RIVER.

DRAWN BY:

MANUEL DULAWAN

6-23-2011

The Ayangan*

The Ifugao ethnic group (not tribe) is composed of two subgroups, the Ayangan and the Tuwali. The Ayangan subgroup occupies a wider area of the province of Ifugao and its members are more than that of the Tuwali.

The Ayangan occupy the whole municipalities of Aguinaldo and Lagawe and they are found in several barangays in Banaue, Hingyon, Hamut, Kiangan and Asipulo and a few places in Hingyon and Alfonso Lista. It is only in Tinoc and Hungduan where no Ayangan community is found.

What distinguish the Ayangan* and the Tuwali subgroups are: (1) the way members of each speak the Ifugao language — the Ayangan dialect has the phonemes ch, f, sh and j which sounds are not uttered in Tuwali; (2) the slight variation in the design and preference in color scheme of woven costumes; and (3) a slight difference in socioreligious rites.

At present permanent Ayangang and Tuwali Ifugao migrant communities are found in the provinces of Nueva Vizcaya, Quirino, Tarlac as well as Baguio City. In Quirino the Ifugao (Ayangan and Tuwali) make up a significant number of the total population of the province. A number of barangays in the municipalities of Cabarroguis and Maddela, in fact, are inhabited wholly by Ifugao.

* Based on the book An Ethnocartographic Mapping of the Ifugao Ethnolinguistic Subgroups by M. Dulawan, 1996.

Annex 8 Minutes of Focus Group Discussion with Barangay Haliap and Panubtuban

Public/Stakeholder Consultation	Date	Place	Participants	Consultation Minutes
Key Informant Interview	June 23, 2011	Haliap Barangay Hall, Haliap, Asipulo	Kgd Rosemarie Doque	Topic of Discussion: i. Demographic data, sources of livelihood and household income; Sources and consumption of electricity and water; ii. Opinion on the establishment of hydro power plant; iii. Perceived Impacts on the establishment of hydro power Details: Major Sources of Livelihood and Income in the community: ▪ Farming - Major crops include rice, beans, tomato, squash, pepper - Majority of the households are into subsistence farming - Only sells excess harvest to Kiangan, Haliap and Bangbang kompradors ▪ Kaingin ▪ Poultry and Livestock - Encounters difficulty in water sourcing Average Family Income 3000PHP-7000PHP Expenses: 1. Food 2. Children's School Allowance 3. Electric Bill 4. Poultry Supplies 5. Medicine Knowledge of the Hydro electric Power Plant ▪ Use of water to generate electricity Gained support from Kgd Duque on the proposed hydro power plant Cited the positive impacts in terms of energy supply and rice field irrigation.
FGD	June 23, 2011	Haliap Barangay Hall, Haliap,	1. Kgd Basilio Fedelito	Demographic data, sources of livelihood and household income; Sources and consumption of electricity and water;

Public/Stakeholder Consultation	Date	Place	Participants	Consultation Minutes
		Asipulo	2. Basilio Bayawna 3. Christina Ngabit 4. Nancy Addab	Opinion on the establishment of hydro power plant; Perceived Impacts on the establishment of hydro power Major Sources of Livelihood and Income in the community: ▪ Farming - Major crops include beans, squash, rice, tomatoes - Subsistence farming - Sells excess produce but there are also some households who purposely farm to market their harvest ▪ Employed - Around 5% of labor force ▪ Poultry and Livestock *Government Assistance in the form of KALAHI-CIDDS (MSWDO) *Cooperative loan, but mostly help are received from neighbors Average Family Income ▪ 3000PHP-10000PHP - Income is not stable, based on harvest Peace and Order - Generally peaceful, no recorded crime - Active Males Movement against violence (on women) Main source of Water ▪ Spring - Problem arises during dry season - Likud – continuous water flow Ethnicity ▪ 90-95% are Ayangan ▪ 5% - Tuwali (intermarriage) ▪ Haliap is Ayangan's ancestral land Community Health

Public/Stakeholder Consultation	Date	Place	Participants	Consultation Minutes
				▪ Health center with midwife ▪ Common illnesses are cold and diarrhea ▪ Small budget for medical supplies and health concerns Perceived Impacts on the establishment of hydro power Gained support from the Barangay Council on the proposed hydro power plant Cited the positive impacts in terms of energy supply and reiterated that the project should push through. Based on the results of Ambangal project, the respondents perceived the project to be beneficial to the community as well. Initial concerns on flooding, but has proven otherwise. Again, based on experience on Ambangal Dam. One major concern is the proponent's interest on the "hidden treasure." Others claimed however, that could be acceptable so long as the project is set.
FGD	June 23, 2011	Panubtuban Barangay Hall, Panubtuban, Asipulo	1. Brgy Captain 2. Kgd Josie 3. Brgy Treasurer 4. Brgy Secretary 5. Brgy Staff	Raised concern on the project site. Inquired on the benefits for the barangay. Also claimed that the access road will not be part of the Panubtuban. Major Sources of Livelihood and Income in the community: ▪ Farming - Major crops include beans, squash, rice, coffee, corn - Subsistence farming - Sells excess produce but there are also some households who purposely farm to market their harvest - Market to Kiangan, Lagawe, Bagabang ▪ Kaingin - To plant corn ▪ Work abroad Average Family Income ▪ 3000PHP-10000PHP - Income is not stable, based on harvest *Government Assistance in the form of KALAHI-CIDDS (MSWDO)

Public/Stakeholder Consultation	Date	Place	Participants	Consultation Minutes
				*Cooperative loan Expenses: 1. Education 2. Health 3. Water 4. Electricity 5. Medicine Peace and Order - Theft Transportation ▪ Jeepney (one trip a day), Motor Concerns Raised by the respondents: • Perceived interest of the proponents (gold) • Employment opportunities for barangay Panubtuban during construction • Health Impact • Effect on the water flow (water diversion) • Share of benefits with the host community
FGD	June 23, 2011	Haliap	Haliap Landowners	Issues and Concerns: • Effect on the flow of water for irrigation • Attention to Irrigation Source • Land Excavation • Compensation on Damages and Right of Way • Where to stock the Soil • Damages on Vegetation • During construction, increase in employment opportunities In favor of the project but Claimant and Proponent negotiation on Compensation should be clear and just.

Attendance

Focus Group Discussion: Licud Mini-Hydro Power Plant Project

June 22, 2011; Barangay Council Haliap

Facilitator:

Name	Designation	Signature	Fax
1). Rosemarie Dagud	Brgy. Helper		
2) Basilio Bayaona	Haliap	Bayaona	
3) Fedelito Rendon	"	Ord Rel	09262709077
4. Christina Ngabit	Haliap	Ngabit	09269891698

Lotowners Consultation (June 23, 2011)

Name	Signature	Contact #
1. [illegible] Catama	[signature]	09265656922
2. CHRISTOPHER Catama	[signature]	09262866460
3. CALIXTO CATAMA	[signature]	09069711899
4. Rogelio catama	[signature]	09269163020
5. Pablo Bittuwon	[signature]	
6. Joseph Otana	[signature]	09066047438

June 24, 2011

Lot owner

1. [illegible] paliza [signature]

Attendance

Name	Position	Signature	Contact #
1) Donato Khablingan	Brgy Kagawad		09058201
2) Mary Lah. ao T.	brgy Treasurer		
3) Josephine M. Bital	Brgy Kagawad		0911688
4) Oscar D. Lacs-o	" Capt.		
5) Feliza K. Pahgod	Brgy. Secretary		0906455

Attendance

Focus Group Discussion: Licud Mini-Hydro Power Plant Project

June 22, 2011; Barangay Council Haliap

Facilitator:

Name	Designation	Signature	Fax
1). Rosemarie Dagud	Brgy. Helper		
2) Basilio Bayaona	Haliap	Bayaona	
3) Fedelito Rendon	"	Ord Rel	09262709077
4. Christina Ngabit	Haliap	Ngabit	09269891698

Lotowners Consultation (June 23, 2011)

Name	Signature	Contact #
1. Granoancio Catama	[signature]	09265656922
2. CHRISTOPHER Catama	[signature]	09262866460
3. CALIXTO CATAMA	[signature]	09069711899
4. Rogelio catama	[signature]	09269163020
5. Pablo Bittuwon	[signature]	
6. Joseph Otana	[signature]	09066047435

June 24, 2011

Lot owner

1. Esmulato palija [signature]

Annex 9 Land Compensation Procedures for Ambangal Mini-Hydro Power Plant

Land Acquisition Process for the e8 Ambangal mini-hydro power project

1. The Provincial Government of Ifugao (the PGI, the proponent) together with DENR staff and the Provincial Engineering Office staff identified the potential affected area based on the result of topographic survey.

2. The PGI and the affected landowners went through along the proposed headrace and penstock for verifying. The PGI made the inventory list.

3. The PGI and the affected land owners took Memorandum of Agreement (MOA) for the land compensation.

4. Payment of the land area shall be made on cash basis before actual implementation of the project. Price of the land shall be based on the following table.

Land Classification	Agreed Price
Muyung (Forest)	Php 30.00
Rice field = idle	Php 60.00
Rice filed = cultivated	Php 75.00
Coffee Plantation	Php 30.00
Corn Plantation	Php 30.00

5. Payment of damaged trees, plants and other vegetation by reason of project implementation which shall be given on cash basis after construction based on actual damaged to be determined after the post inventory report to be conducted in the presence of the landowners. Price of vegetation shall be determined by the price quotation as follows.

(A) Forest Trees:

Common Name of Existing Vegetation	Price per tree (per board foot)
1) Dogwe, 2) Laglabong, 3) Alimit, 4) Binwa, 5) Kakawate, and 6) Madre de Cacao	Php 5.00
1) Tagisang Bayawak, 2) Dapadap, 3) Anattap, 4) Calcalpo, 5) Tuwol, 6) Anonang, 7) Saraisa, 8) Balanti, 9) Bunot, 10) Kurdodannum, 11) Upla, 12) Baccuwog, 13) Tagacalo, 14) Alagge, 15) Ilhit, 16) Hupok, 17) Pau,	Php 10.00

18) Tupngag, 19) Bini, 20) Ludping(Lubting), 21) Hanung, 22) Ppole, 23) Analdong, 24) Polallay, 25) Latbang, 26) Kalabakab, 27) Ipil0pil, 28) Takang, and 29) Dulnuan	
1) G-melino, 2) Acacia, 3) Bakan, 4) Paguringaon(Aliguyon), 5) Dalakan, 6) Halong, and 7) Mahogany	Php 15.00
1) Narra, 2) Kultib, 3) Tabak, 4) Putukan, 5) Pakak and 6) Banolan	Php 20.00

(B) Fruit Bearing Trees:

Name of Fruit Bearing Trees	Yield/Tree	Unit Cost
1) Excetsa Coffee		Php 100.00 /tree
2) Robusta Coffee		Php 100.00 /tree
3) Santol	150 pcs. Or 25 kgs / tree per year	Php 10.00 /tree
4) Betel Nut	Half can / tree per year	Php 300.00 / can
5) Avocado	150 pcs. or 38kgs / tree per year	Php 10.00 / kg
6) Lychee	7 kgs / tree per year	Php 35.00 / kg
7) Banana	7 bunches / tree per season	Php 24.00 /bunch
8) Cacao	20 pcs. / tree per year	Php 50.00 / pc.
9) Pomelo	80 pcs. / tree per season	Php 4.00 / pc.
10) Coconut		Php 300.00 / tree
11) Rattan	20kgs / vine	Php 20.00 / kg.
12) Papaya	20 fruits or 32 kgs / tree	Php 10.00 / kg.
13) Rambutan	7 kgs / tree	Php 35.00 / kg.
14) Chesa	50 pcs. Or 10 kgs / tree	Php 10.00 / kg.
15) Gayunan	80 pcs. Or 16 kgs / tree	Php 12.00 / kg

6. Immediate restoration of damages to rice and corn plantations

   If immediate restoration is not possible, compensation shall be paid by the PGI which will be based on the actual produce per season. The basis for the computation for rice plantations shall be sixty five (65) cavans per hectare for the first cropping and forty five (45) cavans for the second cropping computed at twenty five (25) kilograms palay per canvan at Ten Pesos (Php 10.00) per kilogram and 0.35 kilogram per square meter at Five Pesos (Php 5.00) per kilogram for corm plantation.

(A) Rice…….yield/harvest

Average yield/harvest:

1st cropping= 65 cavans / hectare @ 25kgs/cavan@Php10.00/kg

2nd cropping= 45 cavans / hectare @ 25kgs/cavan@Php10.00/kg

(B) Corn……..yield/harvest

0.35 kg/m2 @ Php 5.00 / kg

Annex 10 Project Environmental Monitoring and Audit Prioritization Scheme questionnaire

PROJECT ENVIRONMENTAL MONITORING AND AUDIT PRIORITIZATION SCHEME (PEMAPS) QUESTIONNAIRE

Project Name	:	**810kW Likud MiniHydropower Plant Project**
Project Location	:	**Sitio Likud, Barangay Haliap, Asipulo, Ifugao**
ECC Reference No.	:	
Proponent	:	**Tokyo Electric Power Service Co., Ltd.**
Pollution Control Officer	:	
Tel. No./Fax No./Email	:	
Project Type	:	**Hydro Power Project (Renewable Energy)**
Project Status	:	

I. PROJECT CONSIDERATIONS

Size and Type

Size based on number of employees

Specify number of employees: 200 workers during construction and 6-7 employees during operation

Type

ECP (in either ECA or Non-ECA)	
Non-ECP but in ECA	
Non-ECP and Non-ECA	✓

Waste Generation and Management

Enumerate Waste Type and Specify Quantity of Wastes generated in your facility. (Identify /Enumerate)

Category	Waste	Type		Quantity (Mt/yr)
		Hazardous	Non-Hazardous	
Air	Emissions[1]		TSP	Quantities were not estimated
			PM_{10}	
			NO_x	
			SO_x	
Liquid	Effluent[2]			
Solid	Domestic Waste[3]			

Pollution Control System (PCS)
Enumerate PCS or Waste Management Method Used in your facility.
(Identify /Enumerate)

Category	PCS/Waste Management Method Used	Remarks
Air	Main source of emissions are the mobile vehicles to be used onsite; proper maintenance will be employed periodically	RA 8749
Liquid	Conventional Sewage Treatment Plant	DAO 35 effluent requirements
Solid	Segregation will be employed (biodegradable, residual, hazardous, recyclable); Disposal through DENR accredited haulers	RA 9003 and RA 6969 requirements

II. PATHWAYS

Prevailing wind towards barrio or city? (mark the corresponding point) Yes ____ No ✓

Rainfall (impacts surface & groundwater pathways)

Average annual net rainfall:

Specify amount: 905 mm to 1085.8 mm

Maximum 24-hour rainfall:

Specify amount: 11 mm

Terrain (select one and mark) Flat ___ Steep ✓

Is the facility located in a flood-prone area? (select one and mark) Yes ✓ No ____

Ground Water

Depth of groundwater table (meter)	(select one and mark)
0 to less than 3	
3 to 10	✓
Greater than 10	

III. RECEIVING MEDIA/RECEPTORS

Air (Distance to nearest community)	(select one and mark)
0 to less than 0.5 km	
0.5 to 1 km	
Greater than 1 km	✓

Receiving Surface Water Body -- Lamut River (Freshwater)

Distance to receiving surface water:	(select one and mark)
0 to less than 0.5 km	
0.5 to 1 km	
Greater than 1 km	✓

Size of population using receiving surface water

Specify number:

Fresh Water

Classification of fresh water (select one and mark)

AA	
A	
B	
C	✓
D	

Size of fresh water body

Specify size:	W = 17.7 L = 1.7kms (within the project area)

Economic value of water use (may select more than one of the criteria below)

Drinking	
Domestic	
Recreational	✓
Fishery	✓
Industrial	✓
Agricultural	✓

Salt water

Classification of salt water (select one and mark)

SA	
SB	
SC	
SD	

Economic value of water use (may select more than one of the criteria below)

Fishery	
Tourist zone or park	
Recreational	
Industrial	

Ground Water

Distance to nearest recharge area (select one and mark)

0 to less than 0.5 km	
0.5 to 1 km	
Greater than 1 km	

Distance to nearest well used (select one and mark)

0 to less than 0.5 km	
0.5 to 1 km	
Greater than 1 km	

Groundwater use within the nearest well (may select more than one of the criteria below)

Drinking	
Industrial	
Agricultural	

Land

Indicate current/actual land uses within 0.5 km radius: (may select more than one of the criteria below)

Residential	✓
Commercial/Institutional	
Industrial	✓
Agricultural/Recreational	✓
Protected Area	

Potential/proposed land uses within 0.5 km (may select more than one of the criteria below)

Residential	
Commercial/Institutional	
Industrial	✓
Agricultural/Recreational	✓
Protected Area	

Number of affected Environmentally Critical Areas within 1 km:

Specify number: 0

Distance to nearest ECA (select one and mark)

0 to less than 0.5km	
0.5 to 1 km	
Greater than 1 km	✓

IV. ENVIRONMENTAL PERFORMANCE

Compliance (pls. take note that this will be double-checked with PCD files)

Law	Violation (check if any)	Type (pls. specify number of times committed)				Type of Admin Violation	Additional Remarks/Status of Compliance
		STANDARD					
		Emission/Effluent/ Discharge	Ambient	Human Impact	Admin/ ECC		
RA 8749	NA						
RA 9275	NA						
RA 6969	NA						
PD 1586	NA						
RA 9003	NA						

Number of Valid Complaints

Citizen and NGOs

Specify number:

Others (other Govt. Agencies, Private Institutions)
Specify number:

(To be filled up by EMB Personnel)
RECOMMENDATION/S:

_____
_____
_____

Assessed By: _____

Noted By: _____

Annex 11 IEE Checklist

810kW Likud Mini-hydropower Development Project

Initial Environmental Examination Checklist

810kW Likud Mini-hydropower Development Project

Initial Environmental Examination Checklist

Prepared by

AECOM Philippines Consultants Corporation
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4 August 2011

Table of Contents

1.0 GENERAL INFORMATION

1.1 Project Name/Title:

810kW Likud Mini- Hydropower Development Project

1.2 Proponent/Company:

The Provincial Government of Ifugao
Provincial Capitol
Lagawe, Ifugao

1.3 Project Location:

Barangay Haliap, Asipulo, Ifugao

1.4 Scheme of Hydro Development :

[√] Run-of-water Scheme ☐ Storage Scheme

1.5 Project Objective/s

Ifugao Province is well known for its extensive rice terraces. In 1995, UNESCO had included the Cordillera rice terrace in their World Heritage List of Cultural Landscapes. However, in 2001, UNESCO included them on the List of World Heritage in Danger because of its continuous deterioration primarily due to the decline of the traditional balance as a result of out-migration, slow but continuous disappearance of the old culture and leadership, and indiscriminate deforestration. In addition, there is no effective and comprehensive rice terraces conservation plan.

This project is primarily being developed to create funds from the sales of electricity that will be generated. These funds will be used in the rehabilitation programs, conservation projects for the rice terraces in Ifugao Province. It also envisioned that the funds generated will help in improving the quality of lives of the people engaged in terrace farming and removal of the Rice Terrace from the List of the UNESCO World Heritage in Danger.

1.6 Project Ownership:

Type of Owner(s): ■ Single Proprietorship ☐ Corporation

☐ Partnership/Joint Venture ☐ Cooperative

☐ Others, pls. Specify: Local Government Unit

1.7 List of Owners (in case of partnership/corporation) : N/A

1.8 Project Cost:

Total Project Cost: PhP120, 300,000.00

2.0 PROJECT AREA DESCRIPTION

2.1 Project Area Coverage:

Watershed area (ha):

Above weir/ intake: 43.31 ha
Total watershed area of river: 4538.1899

Area of project sites (m2 or ha): 4538.1899

Total area: 94.111ha
Structures: 28.381ha
- Intake Weir: 60m^2
- Settling Basin: 47.95m^2
- Headrace: 2,250m^2
- Head-tank: 46.02m^2
- Powerhouse: 44.45m^2

Others, please specify:
- Tailrace: 20.13m^2

See **Annex 2 Design of the project structures**

2.2 General Water Appropriation:

[ ] Domestic [ ] Municipal [√] Irrigation [ ] Power Generation

[√] Fisheries [ ] Livestock [ ] Industrial [ ] Recreational

[ ] Others, pls. specify: _____

2.3 General Land Classification of project areas:

[√] Public Land (ha): 4538ha
[ ] A (applicable), (ha): ___ [√] D (disposable), (ha) : 165ha

2.4 Present Land Use Classification

[√] Agriculture [ ] Residential [ ] Tourism
[ ] Industrial [ ] Forest Land [ ] Institutional
[ ] Commercial [ ] Open Spaces
[ ] Others, pls. Specify:

3.0 PROJECT COMPONENTS

3.1 Relevant Dimensions

Dimension		Proposed Project
Plant Capacity	kW	810
Max. Plant Discharge	m3/s	2
Min Plant Discharge	m3/s	0.4
Max. Headwater Level	m.a.s.l	601,750 (flood)
Min. Operating Headwater Level	m.a.s.l	600,000
Tailrace Water Level	m.a.s.l	541,000
Estimated Net Head	m.a.s.l	59.000
Total Storage Volume	M3	

3.2 Structures and Buildings

3.2.1 Description

Facility	Specifications/ Descriptions	Characteristics		
		Area [m2]	Length [m]	Height [m]
Weir	Floating type with stop log for flushing	60	20	3
Intake Settling and Basin	Side intake type	47.95	13.7	3.5
Headrace	Open channel	2,250	1,875	1.2
Head tank		46.02	11.8	3.9
Penstock	Steel pipe (diameter 5cm)		118.5	
Powerhouse	Grand type	44.45	12.7	3.5
Tailrace	Open channel	20.13	6.1	3.3
Turbine and Generator	Inline Francis type turbine; induction type generator			
Switchyard	Outdoor	40.05	4.5	8.9

3.2.2 Access

Facility	Access		New or upgrading Access to Project Site		
	Access from (preferable main road)	Distance [km]	Max. allowable Weight on road [t]	Length [m]	Height [m]
Weir	Trail	170m			
Headrace	Trail	260m			
Surge Tank	Trail	1414m			
Penstock	Trail	1444m			
Powerhouse	Trail	1460m			
Other structures, pls. specify					

3.3 Transmission Line

Transmission from Switchyard to	New Transmission Line		
Location of next Substation/Tapping Point	Voltage [V]	Length [km]	Right-of-way [m]
From powerhouse to existing IFELCO distribution line No. 24	13.2	1	n/a
From existing IFELCO distribution line No. 24 to Kiangan Tapping Point	13.2	5.46	n/a

3.4 Resource Requirements

Water Demand:

Design Discharge (m3/s or l/s):	**Maximum**	**2.0 m3/s**
	Minimum	0.4 m^3/s
Other Resource Requirements (Specify): Irrigation		2 litter/ha
Minimum flow requirement set by NWRB (board Res. No.01-0901) which is set at 10% of dependable flow		0.136 m^3/s

3.5 Water Treatment and Sewage Disposal

Is water used for other purpose than energy generation?
[ ] No [√] Yes, pls. specify: agricultural

If yes, is there provision for water treatment?
[ ] No [ ] Yes, pls. describe: _____
[√] N/A

If sewage disposal is required, what system is used?
[√] Individual Septic Tank [ ] communal Septic Tank
[ ] N/A

3.6 Handling and Disposal of Dangerous Substances

What kind of dangerous substances (e.g. oil, lubricants, chemicals; pls. Specify) are used during:

- Pre)Construction Phase:
  None; No use of machineries,
  Very small fuel oil for vehicles;
  Very small Paints and Thinners

- Operation/Maintenance Phase:
  None; Oil-less facilities will be used

Is an oil water separator installed?

[√] No [ ] Yes, Location: _____

What oil/Lubricants Collection and Disposal System are used?

Collection System: Volume of storage containers(l):
Storage Location:

Disposal System:

[ ] Recycled [ ] Sold to Re-cyclers
[ ] Others, pls. Specify: _____

3.7 Solid Waste Disposal System

Collection System:

[ ] Association/project-maintained garbage collection system
[√] integrated into municipal garbage collection system
[ ] Others, pls. Specify: _____

Disposal System :
[ ] Burning at open dumpsite [ ] Open dumpsite in project site
[ ] Sludge cleaning [√] Municipality/City landfill site
[ ] Others, pls. Specify: _____

Location of waste disposal site:
_____

3.8 Manpower and Employment

How many people will be employed by the proposed Mini Hydro Power Plant during:

- (Pre)Construction Phase: 200
- Operation and Maintenance Phase: 7

3.9 Project Schedule

3.10 Pictures of Project sites

See **Annex a**. Photo documentation

4.0 BASELINE ENVIRONEMTAL CONDITIONS

4.1 Natural and Physical Environment

River characteristics (length of river between intake and tailrace, slope, waterfall, typical flow depths), pls. describe and attach maps/photographs:

Weir Site

Access to the weir site is by foot, either through a 150 m trail from an existing concrete bridge or through another paved trail about 100 m long. Both trails are rarely travelled. The project site is at elevation 633 m from sea level with limestone rock outcrops at both sides of the riverbanks. Sheer vertical cliffs are at both sides, with moss and some small plants and trees that appear to be remnants of the original forest cover. The river at the weir site is about 8m wide with water flowing at a depth of about 500 mm. Locals describe flooding to occur after about two full days of continuous rain at the upstream part of the river and surrounding mountains. Floods usually makes the water level at the site rise to about 1 to 1.5 m high and also making the river flow wider to about 12 m. A flash flood was reported to have occurred in the past due to a dike collapse upstream of the project site after a fairly long downpour. Flow along the river was reported to have risen to about 3 to 4 m high (**Annex a**).

Along the River

An irrigation weir was observed at about 50m from the proposed weir site. This was reported to have been constructed about 20 years ago to serve small rice paddies and vegetable orchards along the river. Access to the irrigation weir is through an existing paved footpath at the left side of the bank facing the downstream direction. There were signs of "kaingin" at some slopes not far from the river. Small slides and erosion have also been observed (**Annex b**).

During the site visit, water levels at different river crossings were just above the knees (500-600 mm) with small boulders lining the river bed. There are four streams / gulleys that flow into the river along the stretch of the project area, some of which are also being used for irrigation. Three of these streams are on the left side of the river when facing the downstream direction and one is on the other side of the river. These streams have well vegetated slopes. A washed-out concrete overflow crossing was also seen along the river. This structure reportedly collapsed during the onslaught of Ondoy – Pepeng storms.

Length of river: 1.7kms

Flood characteristics of the river:

Return Period	Statistical flood discharge (as far as known)
[Years]	[m^3/s]
2	165.85
5	367.45
10	508.36
25	698.55
50	840.33
100	978.53

Are there areas in the site where indication of soil erosion occur?
[ ] No
[√] Yes, pls. specify and/or attach pictures: See **Annex b**.

If yes, what causes the erosion? Pls. specify:
Kaingin, loose top soil.

Have any landslide occurred or still are occurring in the project area?
[ ] No
[√] Yes, pls. Specify and/or attach picture: See **Annex b.**

What are the present uses of water bodies (ground water surface water) in the watershed of the proposed project area?

[ ] Washing [ ] Recreation (swimming, boating. Etc.)
[ ] Source of drinking water (body/ location / demand [l/s]):

Sanitation (body/location / demand [l/s]):
None

[√] Irrigation (body/location / demand [l/s]): Agricultural land adjacent to river banks.
[ ] Fishing(body/location / demand [l/s]):
[ ] Others, pls. Specify:

What is the present land use of the project wherein the structures and buildings of the proposed mini hydro power plant will be located?

Facility	Area	Present Land Use
	[m2]or[ha]	*Categories see below*
Weir/Intake		Others (forest)
Headrace		Agricultural / Others (forest)
Surge Tank		Agricultural / Others (forest)
Forebay		Agricultural / Others (forest)
Penstock		Agricultural / Others (forest)
Powerhouse		Agricultural / Others (forest)
Tailrace		River
Switchyard		
Others, pls. specify		

Categories:
(1) Prime agricultural land (productive/irrigated); (2) Prime agricultural land (idle/abandoned);
(3) Grassland; (4) Build-up; (5) Orchard; (6) Marshal/Mangrove; (7) Fishpond;
(8) Others (pls. Specify)

Was the present water quality in the river assessed?

[ ] No
[√] Yes, pls. Insert results in table:

Parameter		Sample	Intake	Powerhouse
pH			8.5	8.4
Total Suspended Solids	ppm		<1	<1
Total Coliform	MPN/100ml		5400	16000
Oil and Grease	Mg/l Temp (Celsius)		20.1	21.9
Chlorides	Mg/l DO (mg/L)		8.1	7.9
Copper	Ppm BOC (mg/L)		2	2
Lead	Ppm			

Parameter		Sample	Intake	Powerhouse
Iron	Ppm Fecaliform (mpn/100ml)		3500	9200
Manganese	Ppm			
Total Hardness	Mg /l			
Alkalinity	Mg/l as CaCo3			
Pesticides, pls. Specify:				

Pls. Describe methods and locations of sampling and attach chemical attests:

The water quality sampling was conducted in March 2011. Two stations were established in the areas that could possibly be affected by the project. Samples were collected along the upstream and downstream of Lamut River, covering the intake area and powerhouse of the proposed project site, respectively. **Table 4-1**describes each water quality stations. See **Annex c** for illustration of locations.

Table 4.1 Water Quality Stations

Station ID	Name of Water Body	Location of Water Body	Description of Station	Coordinates	Elevation
Intake	Upstream of Lamut River (*local name: Itum River*)	Sitio Lower Haliap, Brgy. Haliap, Asipulo	Station is located at the proposed intake area and downstream of Itum Bridge. This station is also downstream of the Lamut River and an unknown river confluence.	16º44'24.5" N 121º05'30.5" E	631 m
Powerhouse	Downstream of Lamut River (*local name: Guihinon River*)	Sitio Guihinon, Brgy. Makppit, Kiangan	Station is located at the proposed powerhouse, in-between Barangays Makppit and Panubtuban. It is downstream of Lamut River and its confluence with an unnamed river.	16º43'48.1" N 121º06'36.0" E	541 m

4.2 Biological Environment

Are there flora and/or fauna of ecological or commercial significance to be found in the water bodies near within the project area that might be affected by the proposed project?

[√] No, pls. discuss probable reasons:

Based on the rapid site assessment, four vegetation communities within and along the immediate surroundings of the project site were identified. These are agricultural land (planted mainly to rice, winged beans, and sweet potato), shrubland/grassland (dominated by various species of grass and woody shrubs), tree plantation (planted to Gmelina), and patches of forest (secondary growth and original vegetation restricted to the very steep portions of the river stretch). More than 90% of the river stretch (about 10 m from both sides of the banks) is heavily disturbed as represented by the agricultural land, shrubland/grassland, and tree plantation. The remaining forest patches were most likely untouched either because of their very steep location and/or stunted structure rendering them without economic value. A general assessment was conducted to determine the suitability of these vegetation communities as a potential habitat for wildlife species.

A total of 12 bird species dominated by the yellow-vented bulbul (*Pycnonotus goiavier*), chestnut munia (*Lonchura malacca*), and Pacific swallow (*Hirundo tahitica*) were observed and confirmed present along the entire stretch of project site. Except for the white-eared brown-dove (*Phapitreron leucotis*), Philippine bulbul (*Hypsipetes philippensis*), and Philippine coucal (*Centropus viridis*), all recorded species are resident breeding but are non-endemic. None are considered under any threat categories based on PWRC Act of 2001 and IUCN Red List of Threatened Species 2010

[ ] Yes, pls. specify (water body/location/species/significance of the population):

What methods and data sources were used to assess the flora and fauna in the water bodies? Pls. describe and/or attach documents:

A rapid site assessment was undertaken to have a general picture of the vegetation and wildlife assemblage that will potentially be affected by the project. Methodology included walk-through survey, photo-documentation and interview of locals encountered during the site visit. Conservation status of each identified plant and wildlife species were determined from DENR Administrative Order (DAO) 2007-01 known as the "National List of Threatened Philippine Plants and their Categories, and the List of Other Wildlife Species" and International Union for Conservation Nature (IUCN). The IUCN's Red List of Threatened Species was also referred to since it provides the global assessment of the conservation status.

Is there flora and/or fauna of ecological or commercial significance to be found outside the water bodies near within the project area that might be affected by the proposed project?

[√] No. A similar type of vegetation (mixed of secondary forest and orchard) is found outside the project jurisdiction, however, no vegetation will be affected by the hydropower plant. For the fauna, these will be temporarily disturbed and would be displaced during the construction stage due to increased activity in the area. Once construction is finished, the displaced wildlife will slowly turn up in the area.

[ ] Yes, pls. specify (location/location/significance):

4.3 Socio-Cultural, Economic and Political Environment

Are there existing settlements in the watershed area of the proposed project?
[√] No
[ ] Yes, pls. specify(location/number of households. families and population):

What methods and data sources were used to gain information on the existing settlements? Pls. describe and/or attach documents:

Occular Survey
Data Source; Community- Based Monitoring System
Methods Used: Key Informant Interviews and Focus Group Discussion (landowners, barangay council, community organization heads)

What social infrastructures are located in or near the project area? Pls. describe.

Facility	**Location**	**Capacity**	
		Number of persons	Sufficient (yes/no)
School(s)	1 Elementary School and 1 High School in Barangay Haliap	181 (elementary) 104 (high school)	Yes

Facility	Location	Capacity	
		Number of persons	Sufficient (yes/no)
Health Center(s)/Clinic(s)	1 Rural Health Unit in Nanduntog, Antipolo 1 Barangay Health Station (Haliap)	1 doctor 1 nurse 1 sanitary inspector 7 permanent 4 casual public health midwives.	Yes
Hospital(s)	Ifugao Provincial Hospital		
Others, pls. specify			

Is the political situation (peace and order) stable in the near the project area?

[√] Yes
[ ] No, pls. describe:

What are the major employment and income sources in and around the project area?

Livelihood	Percentage of Population living on
Farming	77%
Fishing	.5%
Backyard poultry and piggery	
Vending/Buy and Sell	3.6%
Sari-sari store	
Others, pls. specify:Real Estate, Education, Community and Social activities, etc.	18.9%

Are there existing local non-governmental organizations in or around the project area?

[ ] No
[√] Yes, pls. identify:

a. Irrigator's association
b. Women's association
c. Cooperative
d. Senior Citizen's Club

Social acceptability of the project assessed(community, government, non-governmental organizations)?

[ ] No
[√] Yes, pls. describe and/ or attach documents:

Focus group discussions/ key informant interviews in the affected barangay of Haliap, indicate general acceptance of the project. Kindly refer to Annex 8 of IEE report for minutes of the meeting and attendance sheets.

5.0 IMPACT ASSESSMENT / MITIGATION MEASURES

5.1 Project Location and Design

Impact	Evaluation		Mitigation Measures	Responsibility
	Relevant Subjects and Parameters	Magnitude of Impact		
Loss of species due to obstructions to movement of aquatic life	Height of the weir(m):3m	[√] none [ ] low [ ] moderate [ ] high	[x] No mitigation measure [ ] Fish way or by-pass planned. Pls. Describe design and arrangement of the proposed mitigation facility and attach plans: [ ] Further measures, pls. specify.	
Fish injuries due to passing through turbine or across sharp edged weir	Width of openings of screen or rack at intake (mm) : 1.6mm Design of weir spillway (Intake weir is over-flow type on the weir crest because it is utilized for the existing irrigation weir).	[√] none [ ] low [ ] moderate [ ] high	[√] No mitigation measure: No project structure will be constructed within the river channel [ ] Planned measures, pls. Specify:	
Dying out of the riverbed between the intake and the outlet	Minimum residual flow with proposed project: -In m3/s or l/s: ____ In % of mean annual flow without proposed project: ___	[√] none [ ] low [ ] moderate [ ] high	How is the residual flow provided? [ ] With a residual flow section in the weir [ ] By-pass pipeline [ ] Other, pls. Specify [ ] Other measures, pls. specify:	
Downstream Erosion due to reduction or inhibition of bed load transport	Design and arrangement of the weir and the intake	[√] none [ ] low [ ] moderate [ ] high	Design and arrangement of the weir and the intake? Pls. Attach drawing or plan: Project Component Main Section	
Sludge alluvial deposits, increased growth of algae, Reduction of capacity for self-cleaning of the water due to the transformation of a stream into an impoundment	Tot. storage volume (m3): 0 Tot. surface area of the impoundment (m2): 0	[√] none [ ] low [ ] moderate [ ] high	[ ] No mitigation measure [ ] Planned measures, pls. Specify:	

Impact	Evaluation		Mitigation Measures	Responsibility
	Relevant Subjects and Parameters	Magnitude of Impact		
Impairment on aesthetics or cultural heritage due to protruding structures	Architecture, size and construction materials of buildings and structures:	[√] none [ ] low [ ] moderate [ ] high	Architecture, size and construction materials of major buildings? Pls. describe and attach plans:	
Erosion due to building of roads and/or structures on steep slopes	Maximum slope at construction site (%, N/A if tunnel): -Weir and intake structure: ___ -Headrace____ -Surge tank/Forebay:____ _ -Penstock:____ -Powerhouse:____ -Tailrace:___ -Others, pls. Specify: _____ _____ ____	[√] none [ ] low [ ] moderate [ ] high	[ ] No mitigation measure [ ] Slope stabilization with methods of bio-engineering, pls. Specify : [x] Other slope stabilization measures, pls. Specify [ ] Other measures, pls. Specify: Refer to IEE Report	
Construction Phase				
Construction work in sensitive environment	Estimated duration of noisy and dust provoking activities during construction at all major project sites (days or months)? Estimated duration and volume of major transport traffic to construction sites (days and trucks per day)? Kind and number of machinery used at major construction sites? Truck	[√] none [ ] low [ ] moderate [ ] high	[ ] No mitigation measure [ ] General guidelines for construction work (safety, health, and environment). Pls. Attach guidelines and implementing procedures. [ ] Restricting of hours during which the offending activities are carried out. Pls. Specify: [ ] Use of blast mats [ ] Maintenance of equipment exhaust system [ ] Removing and disposal of trees and any vegetation pushed or felled into watercourses [ ] Inhibition of illegal settlement and housing of wild animals as well as logging around the construction work [ ] Introduction of speed limits on access roads [ ] Other measures, pls. Specify:	TEPSCO, Provincial Government of Ifugao and Contractor
Contamination of soil and water due	Storage, handling and disposal of	[ ] none [√] low	[√] following of the regulation of RA 6969	

Impact	Evaluation		Mitigation Measures	Responsibility
	Relevant Subjects and Parameters	Magnitude of Impact		
to spilling of dangerous substances (fuel, oil, lubricants, chemicals)	dangerous substances	[ ] moderate [ ] high	[√] Other measures, pls. Specify: Regular maintenance of construction heavy equipment will be observed.	
Loss of habitat due to excavation work in watercourses	Volume of excavation in or at watercourses (m3):10,190m^3; there will be no excavation of existing watercourses.	[√] none [ ] low [ ] moderate [ ] high	[ ] No mitigation measure. [ ] Erosion control measures with methods of bio-engineering, pls. Specify: [ ] Other erosion control measures, pls. Specify: [ ] Protection measures for fish populations, pls. Specify: [ ] Other measures, pls. Specify:	
Erosion and sedimentation due to disposal of spoil from excavation work	Estimated volumes of spoil from excavation work at construction sites (m3): 5,382m^3	[ ] none [√] low [ ] moderate [ ] high	[ ] No mitigation measure [ ] Disposal of spoil from excavation works at dedicated spoil and stockpile location, pls. Specify location(s): [ ] Related measures (drainage, re-vegetation)at stockpile location, pls. Specify: [√] Other measures, pls. Specify. Disposal site will be identified. Excavated spoils may be used as fill materials and may be given out free to interested individuals.	
Operation and Maintenance				
Obstruction to movement of aquatic life due to insufficient functionality of the migration facility	Functionality of mitigation facilities	[√] none [ ] low [ ] moderate [ ] high	[ ] No mitigation measure [ ] Frequent maintenance of fishway or by-pass, pls. Describe measures: [ ] Other measures, pls. Specify:	
Loss of aquatic life due to surges as a consequence of	Estimated maximum variation of downstream	[√] none [ ] low [ ]	[ ] No mitigation measure [ ] operation guidelines	

Impact	Evaluation		Mitigation Measures	Responsibility
	Relevant Subjects and Parameters	Magnitude of Impact		
intermittent operation of the hydro scheme	discharge (m3/s) during normal plant operation within a period of 5 Minutes: ____ 10 Minutes:___ 60 Minutes:___	moderate [ ] high	to limit surges, pls. describe: [ ] Other measures, pls. specify:	
Loss of aquatic life due to flushing of the impoundment	Volume of life storage, that will be maintained during plant operation phase (m3/s):____	[√] none [ ] low [ ] moderate [ ] high	[ ] No mitigation measure [ ] Flushing during natural floods [ ] Provision and Implementation of flushing guidelines, pls. specify or attach flushing guidelines: If flushing during natural floods is not successful, what other strategies are planned to maintain the live storage? [ ] Dredging [ ] Flushing outside natural floods [ ] Others, pls. specify:	
Accumulation of floating debris at the intake	Design of intake	[ ] none [√] low [ ] moderate [ ] high	[ ] No mitigation measure [√] Measures to reduce or avoid accumulations of floating debris at the intake, pls. describe: Regular cleaning of the settling pond will be conducted to prevent siltation and to remove large organic debris before any incipient decomposition occurs.	
Loss of habitats due to de-watering of basins and channels during revision and maintenance work		[√] none [ ] low [ ] moderate [ ] high	[ ] No mitigation measure [ ] Relocation of fish population prior to de-watering of basins and channels [ ] Other measures, pls. specify:	
Abandonment and Rehabilitation Phase				
Contamination of soil and water due to abandoned equipment	Abandonment of plant facilities including all equipment	[√] none [ ] low [ ] moderate [ ] high	[ ] No mitigation measure [ ] Abandonment plan including cost	

Impact	Evaluation		Mitigation Measures	Responsibility
	Relevant Subjects and Parameters	Magnitude of Impact		
	(machinery, electro-mechanical equipment)		estimate, pls. describe and attach plan: [ ] Other measures, pls. specify:	
Flooding due to blocking of abandoned dam or weir				

5.2 Risk Assessment

Risk	Evaluation		Mitigation Measures	Responsibility
	Relevant Subject and Parameters	Magnitude of Impact		
Downstream flooding due to failure of the dam or weir	Dam or weir stability	[√] none [ ] low [ ] moderate [ ] high	[ ] No mitigation measure necessary [ ] Monitoring of dam or weir stability; pls. include monitoring plan (refer to paragraph 6.3.) [ ] Other measures, pls. specify:	
Upstream flooding due to high head water level	Maximum flood water level in impoundment if sluice gate is blocked (m.a.s.l.): ____	[√] none [ ] low [ ] moderate [ ] high	[ ] No mitigation measure necessary [ ] Restricting activities near impoundment, pls. specify: [ ] Other measures, pls. specify:	

6.0 ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

6.1 Environmental Management and Protection Plan

Subject	Activity
Watershed Management and Protection	The community and the entire Ifugao practice a communal forest system called *muyong.* This system somehow effectively controlled swidden (*kaingin*) farming, which largely the cause of forest degradation in the Cordillera region. Integration of this practice in the watershed management and protection plan will assure the preservation of the forest. A detailed watershed management plan will also be prepared during the implementation of the project.
Protection of significant flora and fauna in or near the project area	Protection of significant flora and fauna will be incorporated in the Watershed Management Plan to be established

6.2 Disaster Preparedness Plan

Subject	Activity
Flood Alarm System	Alarm System provided? [√] Not necessary [ ] Yes, please describe or attach plan:
Evacuation Plan	Evacuation Plan provided? [√] Not necessary [ ] Yes, please describe or attach plan:
Others, pls. specify:	

6.3 Monitoring Plan

Subject	Parameter, Location, Frequency of Monitoring	Responsibility	Cost Estimated
Water Quality	The 2 baseline stations can be assigned as monitoring stations. Monitoring will be conducted quarterly. Monitoring parameters include ph; temperature; DO; BOD;TSS; Total and Fecal Coliform; Oil and Grease; Chlorides;	Proponent	PhP 50,000.00 per quarter

Subject	Parameter, Location, Frequency of Monitoring	Responsibility	Cost Estimated
	Copper; Lead; Iron; Manganese; Total Hardness; Alkalinity and Pesticides		
Fish Mitigation	None		
Soil Erosion	Restoration of vegetation within the vicinity of the structures (i.e. headrace)	Proponent	-
Dam or weir stability	N/A Dam weir is only		
Waste disposal	none	Proponent	-
Others, pls. specify:			

Annex a. Photo documentation (Weir Site)

Stream flowing into Lamut River

Surrounding Slope

Looking upstream at weir site

Looking upstream at weir site

Looking downstream at weir site

Looking downstream at weir site

Annex b. Photo documentation- Along the River and Eroded Area

Lamut River

River near powerhouse

River near powerhouse

Washed out bridge

Erosion

Slopes

Annex c. Water Quality Stations

Water quality station at the intake area upstream of Lamut River

Water quality station at the proposed downstream of Lamut River